Commitment to Sustainability

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April 27, 2012

Colleen Harer, Contract Administrator
Minnesota Department of Transportation
3485 Hadley Avenue North
Oakdale, MN 55128

Re: Final Bridge Design for the St. Croix Crossing Project

Dear Ms. Harer and Members of the Selection Committee:

The Parsons Transportation Group Inc. and International Bridge Technologies, Inc. (Parsons/IBT) team provides MnDOT and WisDOT a trusted and proven world class team with the right balance of technical knowledge and management expertise to successfully deliver the Final Bridge Design for the St. Croix Crossing Project. We have combined our expertise and proven leadership, built from years of fast paced accelerated delivery design-build projects, with a unique and complementary blend of technical experience on extradosed, cable stayed, and segmental bridge designs; large diameter deep foundations; and bridge construction. Key features the Parsons/IBT team offers to the St. Croix Crossing Final Bridge Design are:

- **Proven Leadership** – With over 20 years of experience our Project Manager, **Vince Gastoni, PE** is fully committed and located locally in our Minneapolis office. Vince is one of our Company’s leading national major bridge Project Managers with proven leadership and communication skills, and an in-depth knowledge of MnDOT procedures. He has successfully delivered two of MnDOT’s major river bridge projects in the last three years and been involved in a total of eight Mn/DOT and WisDOT major river bridge projects over the past 10 years. Pat Cassity, PE will continue to support Vince with Parsons deep resources and provide technical leadership.

- **World Class Technical Expertise and Experience** – The Parsons/IBT team has successfully completed over 75 segmental and 15 cable stayed projects of similar scope and complexity to the St. Croix Crossing. Parsons leads the industry in major complex bridge project delivery including design build delivery of major cable stayed and segments bridge projects. IBT is an international leader in cable supported structures and recently completed the design and construction engineering of the Vivekananda Extradosed Bridge, India.

- **Exceptional Key Personnel** – We have selected and commit our highest qualified staff to lead project tasks including IBT’s 39 year veteran **Daniel Tassin, PE** to lead the extradosed main span design. Key project staff includes Parsons’ **Eddie He, PE, Jeff Cavallin, PE, Martin Furrer, PE**, IBT’s **Chris Hall, PE**, and industry expert **Yves Gauthier**, serves as our technical Specialist. This core staff represents some of the industry’s leading and most respected practicing professionals with over 150 years of combined experience.

- **Unparalleled Construction Understanding** – Parsons and IBT’s “cradle to grave” design build experience and Parsons self performing construction contractor division provides world class knowledge of construction practices necessary to produce a cost effective constructible design. Parsons construction division built the award winning Elwha concrete segmental bridge in Port Angeles WA and 32 year construction veteran **Warren Hallum** will lead the constructability reviews, scheduling, cost estimating, and risk assessments.

- **Dedicated Visual Quality and Public Information Support** – We have selected architect **Bradley Touchstone, AIA** to lead the critical Visual Quality coordination tasks similar to his successful work for us on the Hastings and Lafayette bridge projects. Short Elliott Hendrickson Inc. to assist in coordinating with Permitting and assist Bradley with MnDOT’s public information needs.

- **Strategic Quality Based Management Approach** – Parsons is an ISO 9001:2008 Quality Certified Company. To meet the schedule and management challenges of this project, we have developed a proactive, quality based management approach based on our years of design-build experience to function as a single coordinated group to assure issues and risks are identified, tracked, and resolved early in the design process through project specific quality management procedures.

Our proposal provides the information request in your RFP and demonstrates our understanding and approach to successfully meeting the project goals and includes our preliminary Value Engineering/Optimization review of the preliminary design. We are excited about this opportunity to deliver this world class bridge project to MnDOT and WisDOT.

Patrick Cassity, PE
Vice President
1. Responder Information

Our contact person for this Proposal is Mr. Vince Gastoni of our Parsons Minneapolis office at 45 South 7th Street, Suite 2750, Minneapolis, Minnesota 55402. Vince can be contacted via phone at (612) 656-7070, via fax at (612) 656-7001, and via email at vincent.gaston@parsons.com.

2. Project Understanding

With the culmination of over 30 years of planning and studies the Minnesota Department of Transportation (MnDOT) and the Wisconsin Department of Transportation (WisDOT) are proceeding with the final design of the St. Croix River Crossing. The new bridge will connect TH 36 in the City of Oak Park Heights, Minnesota, with State TH 64 in the Town of St. Joseph Wisconsin across the Lower St. Croix National Scenic Riverway.

This project will provide the final design, plans, special provisions, and cost estimates for the new extradosed river bridge and Minnesota mainline approach Br. No. 82045, and the two Minnesota approach ramps Br. Nos. 82047, and 82048. This project also includes the Excel barge unloader facility site modifications, visual quality coordination, water resources engineering review and coordination, independent hydraulic analysis review, and bridge drainage system integration.

The design team will also support MnDOT’s mitigation, permitting, SHPO and visual quality coordination efforts and ensure the final design complies with the 2006 St. Croix River Crossing Supplemental Final EIS, project specific Visual Quality Manual, Preliminary Bridge Plans, and current Water Resources Engineering (WRE) studies.

OBJECTIVES, GOALS AND TASKS

The overall objective of this project is to complete the final design plans, special provisions, and cost estimate by May 17th, 2013, for a new, safe, efficient, state-of-the-art St. Croix River extradosed bridge and Minnesota approaches which replace the 80 year old lift bridge and meets the historic, cultural and environmental commitments of the SFEIS.

Simply meeting the project deadlines will not be a guarantee of success on this project. To be successful, the designer must possess a clear understanding of the design and construction principles for segmental and stayed structures beyond basic design code. Knowledge of construction practice, field operations and the Departments long-term maintenance goals are essential to produce a durable, cost effective, low maintenance design. Only by bringing these elements together through a systematic development process that includes the Departments and Stakeholders project needs can the bridge design be delivered successfully. Specific technical goals of this project are:

- Cost effective constructible design.
- High quality transparent design approach.
- Final design details meeting the VQM and SFEIS requirements.

3. Work Plan, Project Approach and Methodology

KEY TASKS

Key tasks associated with successfully delivering our work plan are listed below. Our work plan details our approach and methodology in accomplishing these tasks to meet the project goals.

Project Management — Vince Gastoni is located in our Minneapolis office and will lead this project using design build management techniques from Parsons national and MnDOT design build experience. He is one of our Company’s leading national major bridge Project Managers and a trusted asset to MnDOT having delivered MnDOT’s Lafayette Bridge, Hastings Bridge Design Build projects, two of the TH62 Crosstown Segmental Bridges, and led the Peer Reviews for MnDOT’s I-35W Bridge reconstruction, Lowry Avenue Bridge, and the MnDOT/WisDOT Dresbach Bridge. Vince will be responsible for the administration, contract, invoicing, communications, and coordination subtasks necessary to successfully execute the work and will utilize his experience managing complex bridge projects to deliver this project within the project schedule. Parsons/IBT are also committed to meeting the DBE goals for this project.

Parsons and IBT have successfully worked as an integrated team on other project such as our A-25 cable stayed bridge design build project in Montreal, Hodariyat cable stayed bridge in Abu Dhabi UAE, and the Elhwa concrete segmental bridge in Port Angles WA. Our approach to managing this project is built on Parsons and IBT’s national/international design build experience using proven management tools have been developed to ensure communications, scope, risk, budget and quality are systematically tracked and reported to allow the entire management team to understand the “health” of the project at any given time. Key elements such the regular PDT meeting and State Bridge Design Project Manager meetings and value added team Task Forces will be used to communicate project progress and developments. We also utilize a project controls system tied to the P6 schedule using Earned Value (EV) budget reporting to track actual progress against planned progress by WBS element in order to effectively manage the budget, identify trends and allow for easy audits and reporting by MnDOT staff. Vince is one of Parsons major bridge project managers located locally in Minneapolis...
Critical path scheduling using a resource loaded P6 is a very powerful tool together including the A-25 Cable stayed design build project and the similar condensed schedules is also demonstrated in our previous projects MnDOT, Parsons/IBT history of successful design build projects under risk with Parsons long history of successful complex bridge work for Parsons understanding and long history with MnDOT will mitigate this Schedule risks are associated with new type of structure, complex opportunities for improvement in the bridge superstructure.

Deck and Pylon Optimization demonstrated in our first time, and manage the project to a successful delivery. This approach is using proven techniques and details, produce plans to MnDOT standards the risk of any learning curve and our team is ready to provide a design the best local understanding of major bridge practice with an experienced for MnDOT and WisDOT, we assembled the Parsons/IBT team to combine tendon post tensioning in the struts. As for the delivery of a new bridge type that we believe cannot be managed though a detailed fracture analysis, current design and do not identify any significant risks for redundancy to small adjustments from the test program. We have also reviewed the foundation performance with little risk for major global changes due information and believe sufficient information exists to properly capture the foundation performance with little risk for major global changes due to small adjustments from the test program. We have also reviewed the current design and do not identify any significant risks for redundancy that we believe cannot be managed though a detailed fracture analysis, redundant stay anchor detailing such as saddles, or the use of multiple tendon post tensioning in the struts. As for the delivery of a new bridge type for MnDOT and WisDOT, we assembled the Parsons/IBT team to combine the best local understanding of major bridge practice with an experienced international extradosed bridge design group. This combination eliminates the risk of any learning curve and our team is ready to provide a design using proven techniques and details, produce plans to MnDOT standards the first time, and manage the project to a successful delivery. This approach is demonstrated in our Value Engineering Case Study – Extradosed Bridge Deck and Pylon Optimization exhibit provided in this Proposal to identify opportunities for improvement in the bridge superstructure.

Schedule risks are associated with new type of structure, complex nature of the project, and unfamiliarity of team members within a team. Parsons understanding and long history with MnDOT will mitigate this risk with Parsons long history of successful complex bridge work for MnDOT, Parsons/IBT history of successful design build projects under similar condensed schedules is also demonstrated in our previous projects together including the A-25 Cable stayed design build project and the Eliwa Segmental bridge construction project.

Critical path scheduling using a resource loaded P6 is a very powerful tool to manage the schedule, resources and provide a tool to identify trends and issues. From Parsons mega project design, design-build, and actual construction projects we have a thorough understanding of making this tool into a productive leading indicator tool and not just a reporting function. Parsons dedicated Scheduler is responsible to monitor progress and collect data from discipline leads on a monthly basis to evaluate earned value of each task. Regular monthly updates to the schedule will serve to inform MnDOT and WisDOT of trends early when there is adequate time to take corrective actions and mitigate the risk of surprises at the end of the job. Parsons has reviewed the Project’s proposed 11 month schedule per the RFP and developed a work plan that can provide Certified Plans four weeks earlier than required on April 19, 2013.

Visual Quality Coordination – Bradley Touchstone will coordinate the final design visual quality aspects for conformance with the Amended Visual Quality Manual. Bradley understands MnDOT process and procedure from his work developing the VQM for the Lafayette Bridge and working as the VQC with Parsons on the final design. This was also demonstrated on the Hastings Design build project where Parsons successfully submitted a freestanding arch bridge type not previously considered by the VQAC and SHPO. Through Bradley’s skillful management, consensus was quickly achieved without any schedule delay. As the St Croix Bridge Visual Quality Coordinator (VQC) Bradley will manage the visual quality coordination between the design team, PDT and VQAC and support the States Open Houses to be held during the project. Bradley will participate in the weekly Task Force meetings and attend the regular PDT meetings to report on progress regarding visual quality elements. The VQC will also participate in all plan reviews, oversee Illumination Arts in the architectural lighting of the Piers and bridge trail lighting, and participate in the bridge Drainage Task Force to coordinate the visual quality of the bridge deck drainage system.

Quality Management – Parsons has earned recognition for its high standards of technical and management excellence in services to our clients. Parsons was one of the first design firms in the country to become ISO 9001 certified on a company-wide basis. The company’s extensive quality assurance program covers all aspects of our work, including management, checking and review of technical studies, reports, design work, cost estimates, specifications, and construction services. Our quality manager, Tom Stelmack, PE, will be responsible for the development and implantation of the Design Quality Management Plan (DQMP) and provide the QA for the project. All design work products will be reviewed in accordance with the project DQMP, which includes applicable project specific quality assurance procedures. These procedures establish a methodology for the preparation and the review of design plans, independent checking, interdisciplinary reviews, over-the-shoulder reviews and the overall quality management of the project. The DQMP will also include formal Independent Technical Reviews (ITR) and Constructability Reviews (CR) performed by our project technical specialist Pat Cassity, PE, and Yves Gauthier, PE, for the extradosed specialty design items, foundations, piers, and box girder superstructures.

Technical Expertise & Solutions
Meeting VQM Requirements
Bradley Touchstone coordinated the VQM for the Lafayette and Hastings Bridge projects quickly gaining VQAC consensus on the Hastings design build teams unique bridge design type.

Technical Expertise & Solutions
Peer Review & Coordination
Vince Gastoni & Jeff Cavallin provided the Peer Review for the I-35W Bridge and Dresbach bridge and worked with MnDOT’s Peer Review on Lafayette and Hastings.

Peer Review Coordination – Integrating the Peer Review into the overall work plan is essential to ensure timely reviews through early issue identification and resolution. Parsons has successfully worked with MnDOT’s
Peer Reviewers on the Lafayette, Hastings, and Maryland Ave SMPT bridge projects and as MnDOT’s Peer Reviewer on the I-35W Bridge Reconstruction and Dresbach River bridge projects. Our work plan and schedule includes the Peer Review into the project development through the Task Forces and Over-The-Shoulder reviews to allow the Peer Review to update their modeling and analysis as it is developed by the design team.

Permitting and Coordination – Recognizing the importance of supporting MnDOT and WisDOT in their overall program delivery, we have included Mark Dierling, PE, of SEH to lead this task with local experienced staff. This additional value added position will coordinate information between the design team, PDI, WRE, and other State functional units as well as support the visual quality coordinator for public information needs. Expected Agency’s include U.S. Army Corps of Engineers, U.S. Coast Guard, U.S. Fish Wildlife Service, National Park Service, MPCA, MnDNR, Minnesota Board of Soil and Water Resources, WDNR, Metropolitan Council, Brown’s Creek Watershed District, and Middle St. Croix Watershed Management Organization.

Project Meetings – Regular project meetings are essential to good communication and to identify and resolve issues as soon as possible. Monthly PDT, Bridge Management and Peer Review will be held to status project progress, identify and resolve issues. As part of our design build approach the Parsons/IBT team will also hold weekly Task Force meetings which the MnDOT and WisDOT functional units, Peer Review and others can participate in design development process. To facilitate these meetings Parsons will use our proven design build tools including WebEx web conference and SMART Boards located in our design offices.

Geotechnical Engineering – Doug Baker PE, of Terracon will review all existing project information, development of lateral soil foundation parameters, coordination with MnDOT testing program and final river pier foundation recommendations. A river pier foundation type study will be performed using the existing geotechnical data available to evaluate drilled shafts and driven piles. The focus will be on the evaluation of installation risks verses project cost and schedule impacts as well as structural performance both vertically and laterally. Additionally, the suitability for options such as tip grouting to increase axial capacity and strain compatibility and enhance constructability for below water shafts will be evaluated. From this study and the MnDOT testing program Terracon will provide the river pier foundation recommendations. Terracon will also perform a soil structure interaction finite element analysis (FEM) to predict foundation performance, evaluate sensitivity, and provide parameters to the bridge designers for incorporation into their global systems models. From our many long span bridge projects Parsons, IBT and Terracon have a great deal of experience in the evaluation of soil structure interaction iterative modeling techniques for thermal, creep/shrinkage, vessel impact, and seismic loading.

Specialized study of cofferdam alternatives that minimize environmental impacts and expedite construction will be investigated under this task though a coordinated effort of the design team, construction engineer and geotechnical engineering staff. Parsons design experience on precast tub footings and caissons on our Carquinez and Tacoma Narrow suspension bridge combined with our design build experience and hard dollar bid construction division provide us the knowledge and resources necessary to successfully accomplish this innovative task.

Terracon brings significant national expertise on deep river shaft design and lateral soil/structure interaction evaluation and have provided design review of the drilled shaft foundations on Parsons on our Christopher S. Bond cable stayed bridge project. Martin Furrer, PE, will lead the bridge foundations design, Martin is the EOR for the Hastings and Christopher S. Bond bridges.

Technical Expertise & Solutions

Deep Shaft Foundation Design
Parsons, IBT & Terracon have designed numerous drilled shaft foundations. Parsons’ Christopher S. Bond Bridge utilized 11’ shafts.

Project Criteria – Development of the design and load rating criteria is one of the bridge Owner’s primary tools to ensure project design goals are met. We have reviewed the current design criteria and find it a suitable starting point for this project with no specific areas of concern. Parsons and IBT’s extensive cable stayed design experience as well as developing project specific criteria for the Vivekananda Bridge gives our team a clear understanding of how theory and practice get correctly integrated in the design of extradosed bridges. In addition, IBT’s Ben Soule, PE, is currently president of the Post Tensioning Institute’s (PTI) division of cable stay design practice which produces the industry standard used in the US, and is referenced as a key document in the current Project Criteria. Near the start of the design stage for the St. Croix project, PTI will be releasing revised design standards that will apply to new extradosed bridges. This will allow the Parsons/IBT team to fully understand and integrate new standards, and implement accepted, state-of-the-art practice in the early stages of the project. Adding value to the project Parsons’ Jeff Cavallin of our Minneapolis office will manage the criteria development. Jeff has been a dedicated partner to MnDOT in the development and evolution of their major structure design and rating criteria including the Hastings, Lafayette, and TH 62 Crosstown bridges as well as the Peer Review for I-35W reconstruction and the Dresbach segmental River Bridges. Jeff is thoroughly familiar with MnDOT’s concerns for concrete deck durability and bridge permit load rating issues and recognizes that the design criteria is one of the bridge Owner’s primary tools to ensure project design goals are met. Jeff will work with the Parsons/IBT design team as a staunch advocate for MnDOT to confirm implementation of key design criteria items such that MnDOT’s long-term bridge performance goals will be achieved for the St. Croix River Crossing Project. WJE will also provide a materials memorandum as part of the Corrosion Protection Plan for achieving the 100 year service life of the bridge. Parsons” and IBT’s national and international segmental, cable stayed and extradosed experience will assure that the state-of-the-art in industry practice and standards are well defined.

The Parsons/IBT design team also recognizes that a separate Load Rating Criteria memorandum is necessary to supplement the Design Criteria for MnDOT and WisDOT Ratings Engineers and Peer Reviewers to review. This load rating memo serves as a proactive first step in the bridge load ratings which will ensure that overall bridge performance goals will be met and will culminate in the rating and Bridge Rating Manual.
Preliminary Plan Review Refinement and Optimization – This task includes the initial evaluation of the design detailed in the preliminary plans with the goal of identifying issues and proposing design refinements within the VQM constraint that improve and optimize the project. The intent of this review will be to optimize the design for constructability, access, erection operations, and costs. This formalized approach provides the State with an independent assessment and ultimately validation of the preliminary design at a stage in the project where implementing changes to improve the design, constructability and cost of the bridge is relatively inexpensive. Parsons performed a similar analysis for MnDOT on the Lafayette Bridge project which produced a much improved and cost effective design from the preliminary plan design.

The Parsons/IBT team has prepared a Value Engineering Case Study—Extradosed Bridge Deck and Pylon Optimization exhibit included in this proposal to identify opportunities for further review. Using our extensive national and international resources the Parsons/IBT team has reviewed the Preliminary Design Plans, Concept Refinement Report and other project documents using a value engineering and design build approach. Our evaluation includes review of the SFEIS VQM, and WRE constraints with a focus on bridge fixity, span configurations, zone of intrusion evaluation, typical sections, and roadway geometric improvements. The primary concepts already identified by Parsons/IBT for further study are:

Geometrics: The current design requires significant width increase (over 30 ft.) at the end of extradosed portion which makes precast elements difficult. We have reviewed the current geometrics and believe that the ramp gore areas can be pushed further west to facilitate better constructability opportunities. Also, the end of extradosed spans could be reconfigured such that the extradosed structure ends at the current location of Pier 8 and the extradosed tower is located 280 ft east to maintain the 480 ft span and results in a total of 6 extradosed towers with an end pier located on the Wisconsin side. This results in better western geometrics by eliminating the extradosed span from the variable gore area. We identify sufficient borings exist to provide foundation recommendations at the new pier locations with a test boring being performed as the first order of shaft installation to validate the design.

Redundancy: At the towers, reconfigure single steel anchorage box section to provide redundant load path and eliminate the possibility of multi-stay failure. The anchor box tension for an extradosed bridge it typically higher than that of a cable stayed bridge and the side face of the steel anchor box presents a potential large area fracture case. To better address this issue, we recommend detailing the stays to be continuous over the tower. The shallower stay angle of extradosed bridges decreases the need for larger, unattractive, complex, box anchors at the tower which may need to become more complex single box anchorage to address redundancy. The Parsons/IBT team is aware of previous FHWA concerns with cable saddles and recognizes advances in the past 15 years to address the concerns. We have successfully used similar continuous stay details on extradosed and cable stayed bridges with equal or better performance to anchored stays. In addition to improving redundancy, this approach allow for more aesthetic opportunities and refinements.

Fixity: Consideration should be given to a mid span framed expansion joint in the middle span of the extradosed structure to minimize the impact of creep and shrinkage movements which can be unpredictable and present long term durability risk for joints, bearings, and pier walls. A mid span expansion joint will provide more reliable overall system performance by reducing the overall demands on the system with a single, inspectable and maintainable element. The Parsons/IBT team has successfully designed and detailed these joints for the Vivekananda extradosed bridge and has been implemented, or is in the process of being implemented, on five other projects worldwide.

Optimization of deck cross section: Based on our national and international experience, we have identified opportunities to refine the deck cross section to reduce weight; improve constructability and reduce costs. These include reducing the box girder depth by two feet using struts in lieu of webs to reduce weight by as much as 30% and improve fabrication. Other opportunities include utilizing in—plane stays to significantly improve pylon performance, delta-frame between the boxes for improved redundancy and constructability, using a single cell box with struts to eliminate the constructability and cost issues of an interior rib, use a saddle anchorage to reduce the pylon width and provide more opportunities for visually improving the deck stay anchorages and minimize truck intrusion zone issues.

Constructability of MnDOT approach: We have identified challenges for the current layout of the approach piers and box girder cross sections for constructability and cost impacts. We recognize coordinating the approach box section with the main river span box section will optimize the fabrication of the box and provide opportunities for the variable width typical section using the same box section and a delta frame. This approach combined with refinements to the span configurations (consistent with the VQM and WRE) will better allow precast alternatives (see below) and minimize the use of cast-in-place sections which in-turn reduce impacts to WRE while improving constructability and reducing costs.

Early Bridge Construction Contract – Historically, to accelerate project schedule it has been practical to let early foundation contracts on major waterway bridges due to the relatively few specialty complex marine contractors and long span erection contractors being able to perform both services. Recent national industry trends have been to minimize contractual segmentation on projects to reduce contract coordination risk to the owner and lower costs though economies of scale by a joint venture between two or three contractors. A joint venture can better manage risk and assemble the appropriate management, construction expertise and equipment to deliver the overall project. The result is that many of the smaller specialty foundation and erection contractors have diversified their capability such that they now perform both. With this in mind, the following are the pros and cons of adopting this approach:

Pros:
- Construction work begins earlier than a traditional complete package letting.

Cons:
- Contract coordination and overlap risk to owner; delay in foundation contract could delay overall contractor; less opportunity to overlap foundation and superstructure activities could negate overall schedule benefits; schedule risk increased since no opportunity to mitigate slip through float on superstructure activities.

Based on current our industry review potential cost reduction may be realized under both an individual specialty contractor and a joint
Precast vs. Cast-in-Place Construction – We clearly identify precast concrete as the best alternative for the extradosed river bridge spans. The repetitious nature of the box sections, particularly after they are optimized for casting, will be far more advantageous for both cost and schedule than cast-in-place segments. The primary advantages of precasting are improved quality control and faster segment erection (one to two segments per day). Cast-in-place (CIP) construction will require at least three form travelers to meet the project schedule based on 5-8 day casting cycle and still must account for cold weather winter productivity constraints. CIP also requires more demanding quality control issues due to concrete placement, and more significant post-tensioning grout issues due to climatic conditions allowing for grouting operations only from around April to October. We also note that the precast option will be improved with a refined deck cross-section. Currently the size and weight of the segments are well above industry norms, and streamlining the section will result in cost and schedule savings, in addition to risk reduction.

We have identified an opportunity for improvement in the coordination between the river span and main line approach box girder section in the preliminary design. Based on our past experience detailing the box section to be consistent through the project creates significant cost savings and fabrication benefits to the project due to economy of scale. Based on our cross section optimization review, precasting the main line portions of the Minnesota approach structures is optimal using similar box section and a modified delta frame to manage the variable width geometry in most locations. However, we do expect some specialty areas may require cast-in-place on false work construction but feel these can also be minimized or eliminated with our proposed roadway geometric modifications. We will also apply this approach to the ramp structures utilizing the advantage of an active precasting yard to facilitate the precast balanced cantilever segmental construction of the ramps over the sensitive wetland areas to minimize environmental impacts.

Specialized Studies – Numerous specialized studies will be performed to investigate, evaluate and prepare a design to successfully meet the project goals. Chief among these are the wind and redundancy studies in order to thoroughly understand and design for bridge performance and safety. RWDI is performing the wind engineering as they have done previously on Parsons Hastings and Christopher S. Bond Bridge projects. Parsons, IBT and RWDI’s clear understanding of the stepwise integration of winds engineering testing into the design is critical to ensure adequate design development ahead of model testing with sufficient scheduled for modifications if required after testing and validation.

Designing for Durability and Maintenance – Long life durability begin in design with the proper evaluation of materials and details based on maintenance and life cycle cost evaluation. Improper detailing or inadequate inspection access can lead to durability issues that grow into significant performance problems. Decisions regarding maintenance and bridge systems must be made early in the design process to ensure their full integration into the final plans from the onset of design to avoid late schedule changes or additions that could impact delivery.

Parsons also understands MnDOT’s redundancy needs and recently prepared a redundancy report of the Hastings free standing tied arch bridge detailing the adequate load redistribution through numerous potential fracture cases of multiple primary elements including the grillage floor system. Integration of these critical studies in the design process ensures that detailed design approach and bridge performance information is shared early to avoid late schedule modifications.

Parsons will also perform bridge security review and prepare a threat and vulnerability assessment report. Vince Gastoni will personally lead this task as he did on the Lafayette and Hastings Bridge projects. As on the Lafayette project, Parsons adds value to this task by offering in-house blast evaluation and 3-D progressive failure experience from our work on Federal DOD projects. Parsons will also develop the details to install security cameras on and off the bridge, similar to our work on the security camera installation on the Hastings bridge. Parsons is an industry partner for bridge health monitoring (smart bridge) with in-house specialty staff to support the Departments review for the application of bridge smart technology to the St Croix Bridge. Our philosophy for bridge monitoring is for actionable data to be collected remotely by a limited number of strategically placed sensors manufactured by proven suppliers. We focus on making sure Owners get a return on investment. MnDOT is partnering with Parsons on the TIGER IV grant for an innovative approach to load postings on rural structures using this principal and technology.
VALUE ENGINEERING CASE STUDY - EXTRADOSEDBRIDGE DECK AND PYLON OPTIMIZATION

Step 1
Identify Key Project Goals
- Meet or Beat Schedule
- Maintain Visual Quality
- Design Optimization
- Constructible Design

Strategy
- Assemble Experienced Team with Design-Build, Segmental, Extradosed Experience
- Keep Key Visual Aspects
- Think Like a Contractor

Step 2
Consider Alternate Proven Concepts
- Using the Team’s experience and employing proven technical concepts, we will develop alternates that improve design details, cost, and constructability
- Six items identified

Step 3
Develop Alternate Section
- Following the six items identified, an alternate concept was developed. Some or all could be implemented.

Step 4
Review Updated Bridge Visual Quality
- Confirm commitment to Visual Quality guidelines, develop accurate renderings
- Graphics developed by Parsons/IBT team for proposal

Opportunities
1. Optimize Cross-Section
2. Alternate Web Detail
3. Alternate Stay Anchorage
4. Revise Internal Strut
5. Revise External Strut
6. Modify Stay Anchorage In Pylon

Adapt Proven Design Concepts
1. Reduce Cross-Section to a Single Cell (Streamlined)
2. Replace Webs with Struts
3. Improve Constructability by Replacing Inclined Stays with Vertical Stays
4. Replace Single Strut with Delta Frame, Precast in 2 Halves for Improved Handling
5. Replace Internal Rib with Struts (See Item 2)
6. Use Saddle in Place of Embedded Steel Anchor Box

Alternate Concepts Items
1. Revised Cross Section - Box girder depth can be reduced by 2 feet and weight can be reduced by 30-40%, providing savings in overall quantities, stay cables, and foundation. Same outer curved shapes are maintained. Easier to manufacture, ship, and erect.
2. Replace Webs with Struts - Contributes to lighter section, proven concept, improved load distribution, greater access for inspection personnel.
4. Delta Frame - Multiple members provide increased redundancy. A proven concept that is easier to construct, as members come attached to segment at erection. Closure pour between box-girder greatly simplified. Provides direct connection for drainage.
5. Remove Interior Rib - Based on past projects, it has been found that this member is not required. Interior ribs difficult to precast, struts make detail more constructible.

1. SECOND VIVEKANANDA BRIDGE (RET)
2. JAMES RIVER BRIDGE (D. TASSIN)
Bridge Hydraulic Design (Rani Engineering) – Craig Johnson PE, of Rani Engineering will perform the WRE, bridge hydraulic design, and review the adequacy of the 2006 WRE analysis. Rani will also work as part of structures Task Forces to coordinate drainage performance, structural integration, and visual quality into the final drainage system design. Our team understands the need to integrate the complex drainage systems required for major river crossings based from Parsons drainage system design on the Lafayette and Hastings bridges, Christopher S Bond Bridge and IBT’s Coast Meridian and Pitt River bridges. Parsons has set the standard for deck drainage systems with our Lafayette and Hastings details being used on the new Dresbach bridge and also identified in the St Croix preliminary drainage study.

Structural Analysis and Design – Daniel Tassin, PE, is the EOR for the Vivekananda extradosed bridge, will lead Eddie He and the Parsons/IBT design team in the development the extradosed river bridge design. Jeff Cavallin will lead the design of the segmental approach span, and Martin Furrer will lead the design of the river span substructures. From our team’s experience with similar projects, the approach to the analytical evaluation of the bridge is an important step not only for the calculation of loads and stresses in the structure, but also to mitigate risk by modeling the components that are critical for construction. It is important that the bridge structure is clearly understood well before a contractor begins construction. An extradosed bridge is in large measure the combination of traditional concrete segmental and cable-stay construction. The complexity arises from the “competition” of stiffness between these two primary functions of the structure, and as each construction step is evaluated it is important that the analysis and analytical tools accurately capture this behavior such that bridge deck and cable stresses remain in proper limits. We have a high degree of confidence in this approach since IBT’s modeling of the Vivekananda Bridge accounted for this structural action and closely monitored the field results during construction, which confirmed the modeling and modeling tools were accurate. This same approach will be adopted for the St Croix design.

The St. Croix structure also has additional challenges due to the width of the deck. The alternate options presented in our refinements and optimization exhibit are intended to address some of the inherent challenges in constructability and redundancy that could occur with the current preliminary plan design. For a twin box-girder section with transverse framing the separate erection of each separate box will create imbalances and alternate construction load paths that will not be present in the final configuration. Our team recognizes this challenge and has successfully managed the unbalanced force effect by sequencing the cable stay installation to occur after a balanced condition in the box-girders is achieved and monitor the shear lag effect as subsequent sections are constructed. The overall interaction of the longitudinal bridge behavior with the transverse section framing and stay anchor points is a balance that we recognize as requiring thorough analysis and benefits from implementing proven design details. See our work plan for more details.

Our construction group lead Warren Hallum, has more than 27 years of experience in precast and cast-in-place segmental construction and cable stay structures. Warren and other members of our construction division will attend the project Task Force meetings to provide continuous input on the design progress and provide over-the-shoulder constructability reviews. Specific elements the construction group will focus on are reinforcing and post Tensioning details and installation, cofferdam design and bracing installation along with foundation design and WRE impacts.

Each milestone constructability review will include a constructability report evaluating the staging areas, equipment access, casting yard set up and storage, crane locations and hoisting requirements, marine vessels, and or crane barge requirements. Our team will also prepare and update a P6 construction schedule of key schedule elements to fully evaluate construction sequencing, equipment, duration of activities, the potential impact weather and water elevations, borings and winter shut downs, in order to quickly evaluate schedule and cost impacts to the project as design progresses. Warren will be assisted by Jeff Cavallin, PE, and our local segmental field inspector/technician Shannon Meeks who both bring significant local construction experience through their involvement on the Wakota, I-35W Crosstown, Hastings and Dresbach projects.

Civil/Site Design – As part of this contract, the design and a separate plan set for access and site preparation to the Xcel Barge unloader facility for configuration to a contractors staging area and the entire removal of this facility following construction of the new river bridge. SEH and Rani Engineering will lead this design effort.

Plan Preparation – Clean plans and proper detailing produce the best bids on a project by clearly communicating the construction and eliminating risks due to ambiguities. Further, even on major national level projects such as the St. Croix, it is necessary to detail to the construction local standards of practice to best communicate the project requirements and allow for the most competitive bidding. A key strength of our team is the ability to produce clean MnDOT plans done right the first time. Parsons sets the standard on MnDOT’s major bridge projects with our Crosstown segmental bridge plans.
being used by the contractor as the standard for detail modifications to the other four segmental bridges on the project and our Lafayette bridge plans being praised by contractors and contributing to our alternative being selected. The Lafayette plans are also being used as a best practice example on the Dresbach project for the new bridge design.

**Construction Expertise**

**Parsons Construction Division**

Parsons was the prime construction contractor for the Elwha River Segmental Bridge. Warren Hallam was Sr. Construction Manager, IBT provided the CEI services.

Our same local and regional staff assigned to the St. Croix have produced MnDOT plans for over 25 bridges in the last 10 years including three major river crossing structures. Our Senior CAD Manager Marie Schulz will manage the CAD process through active quality tools such as ProjectWise to ensure all Cad standards are met and eliminate quality issues by using singular master files for the entire design team to reference.

Ahead of our 30%, 60%, 95% and Certified plans submittals, all plans will be thoroughly checked per our Quality Management Plan via the project specific quality control procedures and audited per our Quality Assurance process.

**Specifications and Cost Estimating** — Parsons technical expertise, construction engineering and design-build experience, and self-performing construction division uniquely qualifies us to develop accurate and reliable special provisions and cost estimates for segmental bridges. Our local knowledge of construction practices from our design build projects and our Lafayette and Hastings projects will be integrated into Parsons/IBT’s national and international experience to produce state of the art specifications.

Parsons construction division maintains its own estimating group with segmental experience and will develop the construction cost estimate per the specified unit price approach where we will utilize historic unit prices modified with our construction expertise for consideration of industry and economic trends, quantities, and site constraints. As added value we will be able to provide a detailed review of the Peer Reviewers construction style estimate. This level expertise will provide MnDOT and WisDOT a high level of confidence on the cost and risk factors associated with the project.

**Load Rating** — Parsons Minneapolis staff have performed or been part of the load ratings for MnDOT major bridges including the Lafayette, Hastings and TH62 Crosstown segmental bridges and as the Peer Reviewer using independent calculations on the I-35W bridge and Dresbach bridge. Nationally Parsons has recently rated our cable stayed bridge designs for the A-25 cable stayed bridge, Christopher S. Bond cable stayed bridge and John James Audubon cable stayed bridge. We have extensive experience in the use of LRFR and Mn/DOT’s complex major bridge rating requirements. Under Eddie He’s leadership, Parsons has developed simple Excel spreadsheet tools for segmental bridges that include the standard vehicles and allow for custom special vehicles for future use. This involves the use of Visual Basic Macros to input live load influence surfaces and apply the user specified axle configuration and loads to quickly determine the worst case truck positions and live load forces automatically. Parsons implemented this same spread sheet based approach in the ratings manual for the Hastings project with great success.

The Parson/IBT team has developed an work plan to successfully deliver the St. Croix bridge to MnDOT, WisDOT, Project Stakeholders, and the community through a balance of technical expertise and proven management techniques from our team’s extensive major bridge design and design build experience. We have assembled a team of world class bridge design experts in Daniel Tassin, PE, Eddie He, PhD, PE, SE, Jeff Cavallin, PE, Martin Furrer, PE, and Chris Hall, PE to lead the technical design. Our leading complex bridge project manager Vince Gastoni will be the Project Manager to lead this project. Vince lives and works in Minnesota, is fully vested in this project as part of the local community fabric. Vince is well known to MnDOT for delivering the Lafayette and Hastings bridge projects and leading the Peer Reviews for both the I-35W Bridge Reconstruction and Dresbach Bridge projects. As a resident of the area he also has a complete understanding and appreciation of the climate, community, and natural resources and is fully committed to this project. **Vince knows what needs to be done, how to do it to meet the Departments goals, and is fully dedicated to getting it done right.**

The outline of our work plan and project approach below describes the Parsons/IBT Team approach and methodology to accomplishing the major tasks, deliverables and critical due dates. This outline summarizes the P6 Critical Path Schedule and serves as our complete resource loaded work plan. Our graphic summary of the schedule included in this proposal demonstrates how our work plan will be executed to meet the design schedule and deliver **Certified Plans four weeks earlier than required on April 19, 2013.**

Parsons/IBT understands we will work under the St Croix Project Team, Assistant Project Director for Design and will work in conjunction with MnDOT and WisDOT functional units and the Peer Reviewer to successfully complete the project. Bradley Touchstone will lead our visual quality coordination with Illuminations Arts performing the aesthetic lighting design they have done previously for Parsons on the Lafayette and Hastings bridge projects. To address the program needs of this project Vince Gastoni will be supported by SEH for permitting coordination and Rani Engineering for Water Resources Engineering (WRE) needs. Parsons and IBT will combine our deep resources in segmental and extradosed/ stayed structures, construction experience to successfully meet the demands of the project schedule.

**TASK 1 – PROJECT MANAGEMENT (SOW, ARTICLE 2.0)**

Design build management techniques such as earned value, risk assessment, Task Forces and Over-The-Shoulder plan reviews will be used to manage the administration, contract, invoicing, communications, and coordination subtasks necessary to ensure timely delivery of a quality product through the use of the resource loaded schedule. Key elements of this task include PDT and MnDOT WisDOT reporting and coordination, risk management, P6 schedule management, visual quality coordination, quality management, and Peer Review coordination. A Design Status Report in support of our monthly invoice which will include a summary of progress by task, updated risk matrix with an identification of potential issues, earned value report to track actual progress against planned progress and an updated P6 schedule, and DBE monitoring report.

1.1: The base line resource loaded P6 schedule will be developed to identify the deliverables in our work plan, detail tasks and review periods with start/finish dates and logic ties between tasks to identify the a critical path. This Baseline Schedule is integrated into our work plan and resource loaded though our earned value system. This tool will also be used to track design progress for invoicing purposes.

1.2: The Visual Quality Coordinator manages the visual quality coordination between the design team and the PDT and VQAC and support the Open
Houses to be held during the project. He will participate in the weekly Task Force meetings and attend the regular PDT meetings to report progress and participate in the over the shoulder and interdisciplinary quality reviews. The VQC will also participate in the bridge drainage Task Force group to coordinate the bridge deck drainage solution.

1.3: Parsons Project Manager is responsible for assuring the overall quality of products produced. The Quality Assurance Manager for this Project will ensure quality through accurate planning, coordination, supervision, and technical direction; proper definition of job requirements and procedures; and the use of appropriately skilled personnel performing their work functions with care.

1.4: Peer Review coordination will occur at the regular PDT and Bridge Design Project Manager teleconference meetings, upon milestone submittals, and through the project Task Forces. Over-The-Shoulder plan sets will be provided to Peer Review as the design progresses through each element identified in Article 2.4 Scope of Work.

**Task 1 Deliverables:**
- P6 baseline CPM schedule and Monthly updates
- Bridge document security procedures

**TASK 2 – PERMITTING AND COORDINATION (SOW, ARTICLE 13.0)**
Project permitting support function will begin immediately after NTP. The Vince Gastoni will coordinate these meetings through the Permitting Coordinator Mark Dierling, PE, who will coordinate information between the design team, PDT, WRE, and other State functional units. The Mark will attend PDT, visual quality function, Task Force meetings, and coordinate with the project team WRE group for the US Army Corps of Engineer 404 and Section 10 permits and MPCA 401 water quality certification.

**Task 2 Deliverables:**
- Respond to external RFI and prepare permitting information memorandums in support of State permit applications.
- Assist in preparation of US Army Corps of Engineer 404 and Section 10 permits and MPCA 401 water quality certification to be finalized and available by November 1, 2012.

**TASK 3 – PROJECT MEETINGS (SOW, ARTICLE 3.0)**
Vince Gastoni will coordinate with the key personnel of the design team to attend the meetings identified in Article 3.0 of the Scope of work. Additional weekly Task Force will be held with separate task forces for the Extradosed River Plans, Minnesota Approach Spans, Deck Drainage Systems, and Civil/WRE/Utilities/Site Works. Additional meetings will be held for design workshops on technical methods and comment resolution following Peer Review submittals. The design team will facilitate these meeting and provide meetings minutes.

**Task 3 Deliverables:**
- Kick Off meeting by June 15, 2012
- Monthly PDT team meetings
- Monthly Peer Review Coordination Meetings and State Bridge Design Project Manager meetings
- Contractor Information Meeting week of May 31, 2013
- Pre-Bid Meeting Week of Aug. 9, 2013
- Public Outreach Meetings (near 30%, 60%, and 95% plans stages)
- Weekly Task Force meetings
- Comment resolution meeting for Peer review and MnDOT/WisDOT comment reviews.

**TASK 4 – BRIDGE FOUNDATIONS (SOW, ARTICLE 5.0)**
4.1: Doug Baker PE, of Terracon will collect and review existing geological for the extradosed river spans and coordinate with MnDOT’s vertical and lateral pile load test program to establish foundation design parameters to be used in final design. Evaluation will include coordination with the design team for the bridge structural elements and load demands. A river pier foundation type study will be performed using the existing geotechnical data available to evaluate drilled shafts and driven piles addressing installation risks, project cost, schedule impacts, and structural performance both vertically and laterally. Options such as tip grouting and strain compatibility and enhance constructability for below water shafts will be evaluated. Concurrently, LPILE, UniPile, GROUP, GLRWEAP and ALIPile models will be developed to advance the design based on the existing data. Soils structure interaction finite element analysis (FEM) will be provided using FB Pier to predict performance and evaluate the sensitivity of the model to input parameters. This information will be provided with MnDOT for review as it relates to the field load test operations. Terracon will also review MnDOT’s load test operation plan and coordinate the design teams recommendations as appropriate to enhance the quality of data developed. Load test results will be compared to the FEM model which will be adjusted as needed to calibrate to field performance. A final geotechnical recommendations report will be developed for the extradosed river spans identifying the final lateral soils interaction parameters and the final foundation type and installation recommendations.

4.2: The design team will utilize the MnDOT provided foundation recommendations for each bridge approach span foundations and provide an independent review of the MnDOT recommendations for design optimization opportunities.

4.3: The design team will work with the Parsons construction engineer and Terracon to evaluate alternative cofferdam construction techniques including the use of precast cofferdams.

4.4: WJE will evaluate the existing corrosive material data related to permanent pile foundations and recommended corrosion allowances for design if required. This corrosion evaluation will be the first step in the development of the Corrosion Protection Manual.

**Task 4 Deliverables:**
- Foundation recommendations for lateral soil modeling parameters by August 17, 2012
- Draftriverpierfoundationtypeandinstallationrecommendations August 17, 2012
- Review Foundations recommendations memorandum of Approach land piers by August 17, 2012
- Pile Corrosion Evaluation Memorandum by August 17, 2012
- Provide Vessel Collision Study report by August 17, 2012
- Alternative precast cofferdam feasibility report by August 17, 2012
- Final river pier foundation type and installation recommendations December 7, 2012
**Task 5 – Design and Load Rating Criteria (SOW, Article 6.0)**

5.1: **Design Criteria** – Jeff Cavallin will manage the Parsons/IBT design team’s review of the design criteria on the Preliminary plans and prepare final design criteria for MnDOT, WisDOT and the Peer Reviewer to evaluate. The design criteria serve as a basis for the design, independent check and Peer Review and must identify project specific specifications, loadings and load factor combinations, materials, allowable stresses, fatigue requirements, foundation parameters, rating vehicle information, and required fabrication tolerances. Material recommendation memorandum for achieving the 100 year design life of the bridge will be provided per the Corrosion Protection Plan.

**Task 5.1 Deliverables:**
- Draft Design Criteria by June 15, 2012
- Materials Memorandum by June 15, 2012
- Final Design Criteria by July 6, 2012

5.2: **Load Rating Criteria** – Jeff Cavallin will lead the separate Load Rating Criteria memorandum will be prepared for MnDOT and WisDOT Ratings Engineers and Peer Reviewers to review. The load rating criteria memorandum will detail the overall rating approach, methodology, vehicle load applications and combinations.

**Task 5.2 Deliverables:**
- Draft Rating Criteria memorandum by June 15, 2012
- Final Rating Criteria memorandum by August 17, 2012.

5.3: **Preliminary Plan Design Revision and Optimization** – Daniel Tassin will lead the entire team through the review the Preliminary Bridge plans, Concept Refinement Report and other project documents to provide the State with opportunities for refinements and optimization. Immediately on NTP the design team will meet with MnDOT and WisDot to discuss our staff proposed refinements prioritize results and prepare a report of findings to the State and Peer review. This will be done in conjunction with the Design and Rating Criteria development to assure all concepts meet the project requirements. Evaluation will consider the SFES VQM, WRE constraints to minimize any significant change or impacts to these elements.

**Task 5.3 Deliverables:**

5.4: **Wind Engineering Study** – Mark Hunter of RWDI will perform a wind evaluation study to determine the performance and applicable loading for the extradosed river bridge. Study will include a meteorological site analysis, cable vibration study, aeroelastic model tests and Theoretical buffeting analysis. The study will be delivered stepwise as the design progresses to ensure adequate time for design development ahead of model testing.

**Task 5.4 Deliverables:**
- Meteorological site analysis by July 20, 2012.
- Cable vibration study by Nov. 23, 2012.

5.5: **Redundancy Analysis** – Eddie He will lead the redundancy evaluation of the cable stay system, intermediate box girder strut, and other critical path elements or connection and prepare a report identifying performance capabilities under extreme case fracture or loss load cases for the State and Peer review evaluation. The cable stay system will be evaluated for the loss of any one cable at a time and maintain acceptable capacity-to-demand ratios through the remaining system tension elements. The intermediate box girder strut will be evaluated for any one strut to fracture and maintain acceptable capacity-to-demand ratios through the remaining system tension elements as well as meeting deck serviceability and cracking criteria.

**Task 5.5 Deliverables:**

5.6: **Maintenance and Systems Concept Design Reports** – Prepare reports and memorandum that evaluate and provide recommendations for the maintenance and inspection access, bridge security, Federal Aviation Administration lighting requirement, bridge electrical systems (inspection, architectural lighting, lighting protection), and architectural lighting. These reports will be submitted with the Concept Design (30%) submittal for State and Peer review evaluation and serve as the basis for the final design and integration of this system into the final bridge plans.

Reports shall include evaluation of the State maintenance needs and access demands, perform the UBV1 study and begin the conceptual design of the inspection platform and traveler system. Review and coordinate the FAA permit requirements for Bridge No. 82045, Form 7460 information, and lighting fixture type. Prepare aesthetic lighting concept report including fixture cut sheets, preliminary power loads, specifications, and costs.

Based on our experience on the Hastings bridge projects we will develop a Corrosion Protection Plan (CPP) which incorporates the pile corrosion evaluation memorandum and the materials memorandum developed earlier to concrete specifications and cover requirements based on Lifespan 365, stainless steel reinforcement use recommendations, and specialized protection of post-tensioning and stay systems.

**Task 5.6 Deliverables:**
- Draft Corrosion Protection Plan by Dec. 21, 2012
- Final Corrosion Protection Plan by Mar 29, 2013

**Task 6 – Design and Plan Preparation (SOW Article 7.0)**

6.1: **Coordination** – All project information related to the development of the Preliminary Plans will be collected including the proposed roadway geometry and typical sections, topographic maps of the site. Our Minneapolis senior CAD Technician Marie Schulz will lead the drawings development through a Project Wise control system. The design team will coordinate any geometric modification request with MnDOT project staff and functional units. This task will also include the coordination of construction staging requirements consistent with the
current project environmental documents and staging of the Xcel barge faculty and Wisconsin shore. Information will also be collected regarding utilities, sign structures, lighting structures, and other appurtenances to be installed on the structures.

6.2: Final Structure Design
6.2.1: Hydraulic Drainage System Design

6.2.1.1: Water Resources Engineering Review – Water resources design will balance multiple project objectives including bridge aesthetics, efficient drainage collection/conveyance design, and constructability considerations. Rani Engineering will perform an independent review of the Water Resources Preliminary Drainage Design, as amended in 2012 by HZ United. Final plans will be prepared tabulating areas of permanent fill wetland impacts, permanent cut wetland impacts, and temporary (limited to six months) wetland impacts. A WRE report will also be provided identifying SWPPP and other measures taken to reduce environmental impacts.

6.2.1.2: Bridge Deck Drainage Systems Design – Working with the bridge designer and the Deck Drainage Systems Task Force in an interactive and iterative work process, a drainage collection and conveyance system will be determined that best delivers stormwater drainage to two pond locations for detention and water quality treatment. The design will incorporate the bridge design type, plan and profile, pier location, and final bridge facia treatment. A thorough review of the preliminary drainage design report, February 2012 will form the basis of the initial design which may be refined as maintainability, accessibility for inspection, material stability for pipes and conveyance system, constructability, and aesthetics are considered.

Drainage analysis with include the use of P8 for water quality, XPSWMM for peak flow and pipe conveyance for design stormwater events and MPCA design guide for infiltration basin volumes. For drop shaft structure analysis, manufacturer’s predictive model will be checked for turbulence that may reduce manhole capacity.

Task 6.2.1 Deliverables:

- Prepare deck drainage analysis and design memorandum by Aug. 3, 2012.
- Final CAD drawings of wetland impacts and associated WRE Report by November 1, 2012.

6.2.2: Visual Quality – See Task 1.2 for Visual Quality Coordinator coordination tasks. The VQC will participate in the design development process through Task Forces and plan reviews, develop sketches, rendering and animation as identified in Article 7.2.2 of the Scope of Work to support final design and MnDOT’s and WisDOT’s public information program.

6.2.3: Bridge Geometry and Layout – The bridge and roadway design team personnel will review the final geometrics and provide any comments or modification request to MnDOT before the 30% submittal.

6.2.4: Structural Modeling and Analysis – The Lead Bridge Designers will provide a project memorandum outlining the designers approach to structural analysis for MnDOT, WisDOT and Peer Review. Memorandum will include descriptions of global boundary conditions, modeling techniques, finite element selection, material properties, creep and shrinkage models, member stiffness, and soil structure interaction iterative methods for global foundation stiffness evaluation.

Superstructure modeling will be performed by both the designer and lead independent checker of the bridge using different software. Global structural modeling will utilize 3D time dependent computer models which incorporate the time-dependent properties of concrete resulting in global 4D models will be developed that explicitly model the concrete members, framing elements, stay cables (for the extradosed), post-tensioning layout, piers/pylons, and foundations in a consistent structural system. The foundations in particular will take advantage of state-of-the-art tools such as FB Pier that provide a detailed 3D soil-structure interaction to capture the long-term displacement behavior due to thermal effects post-tensioning creep, shrinkage behavior. Detail performance concerns will be investigated by stand-alone detailed “local” modeling such at a complex intersection of forces like the box-girder, cross-beam, and pylons. Pylons and cable anchorage zones require special attention to assure a long-term, safe and efficient design.

Task 6.2.4 Deliverables:

- Memorandum on proposed modeling techniques by July 15, 2012.
- Prepare detailed designs for items identified RFP Scope of Work 7.2.5 through 7.2.9 based on the global and local model analysis and resulting loads from Task 6.2.4.
- Prepare the design for any aesthetic features.
- Develop the drainage and utility design and details per Task 6.2.2.

6.2.14: Constructability Analysis – Perform a detailed construction analysis review of each milestone plan submittal to evaluate the staging areas, equipment access, casting yard set-up, crane locations and pick requirements, crane barge requirements, rebar and post-tensioning details, foundation and cofferdam installation and WRE impacts. Analysis will include a P6 construction schedule of key construction schedule elements to evaluate construction sequencing, equipment, duration of activities; the potential impact of weather and water elevations, borings, and winter shut downs, in order to quickly evaluate schedule and costs impacts to the project as the design progresses.

Task 6.2.14 Deliverables:

- Constructability Review Report (30%, 60% & 95%).
- Perform an erection analysis in support of Task 6.2.4 and prepare schematic erection plans that identify the basis of the design analysis and construction loads.
6.2.16 – Prepare bridge layout and coordinate correct geometry files. Working points to be located along alignments and gutters for box girders.

6.2.17 – Perform vulnerability assessments based on Task 5.6 and prepare the final report. Include design and details for accommodation of security camera installation on and off the bridge.

Task 6.2.17 Deliverables:
- Treat and Vulnerability Assessment report by Nov. 9, 2012.

6.2.18 – Prepare the designs and details miscellaneous bridge elements, including; anti-graffiti coating, bridge access, temporary drainage during construction, sign, signal and deck lighting details, navigational lighting, box lighting, etc. Provide engineering, plans and specifications for aesthetic, navigation and box interior lighting systems.

6.2.19 – Prepare design and details for utility hangers.

6.3: Plans Preparation – Design for the use of the Xcel barge unloader facility as proposed as a staging area during construction. Design will comply to the Xcel Energy Memorandum of Understanding (Appendix “K” of the SFEIS) for use of Xcel’s barge unloader facility and other site constraints. Design will include the removal of the facility following construction of the new river bridge. Plans will be developed as a separate package to be included with the bridge plans submittals.

6.3 Deliverables:
- Construction staging area site plans (Xcel Unloader facility) by Mar. 1, 2013

6.4: Plans Preparation – Plans will be produced to MnDOT standards identified in the Scope of Work Article 7.3. A complete independent check of the design and plans will be performed per the DQMP. The independent analysis check will produce a separate set of calculation produced sign different software for the original designer and by personnel not involved with design of the elements being checked.

TASK 7 – CONCEPT DESIGN (30% PLAN) (SOW 8.0), DUE AUGUST 17, 2012
30% Concept Plans will be based on the accepted Design Criteria, Value Engineering Optimization Report. Analysis will include a full 3D global model of the extrados structure including foundation type and soil lateral design parameters to validate the longitudinal performance of the structure and capture the global moments, shears and movements. Stand alone 2D model of the piers and cross sections will be used to validate the design feasibility and design loads. The MN Approach structures will be analyzed using a 2D global longitudinal model to developed segment layout, and validate precast and cast-in-place elements and cross-sections. Special also analysis to be performed at this stage to validate the base design approach for the transverse deck analysis, longitudinal (cross section) post tensioning layout, stay cables, stay cable anchorages/saddles, approach footing sizes, and abutment geometrics. This package will also contain preliminary details of the accepted deck drainage system. Plans will include the reports and memorandum identified in the Maintenance and Systems Concept Design. A Constructability Review will also be performed and report included with the submittal.

Bradley Touchstone and MnDOT’s VQM will preview the design products through the OTS review process. Bradley will generate architectural design plan sheets necessary for the 30% submittal in coordination with MnDOT, stakeholder (VQAC/SHPD) and other visual quality personnel. Updated renderings and other visual quality exhibits such as the aesthetic lighting renderings will be completed ahead of the 30% submittal date for MnDOT’s review. Bradley will coordinate any VQAC meetings and public information needs to support any design refinements.

Task 7 Deliverables:
- Concept design Plans (30%)
- Constructability Review Memorandum
- Corrosion Protection Plan
- WRE Review Report
- Engineers Cost Estimate
- Draft Unique Special Provisions and Item List
- Architectural Lighting Memorandum
- Threat and Vulnerability Assessment
- River Pier Geotechnical recommendations
- Extradosed Pier Type Selection Memorandum
- Foundation recommendations for lateral soil modeling parameters

MnDOT and Peer Review coordination of this submittal will be facilitated by an Over-The-Shoulder review plan set to be distributed on July 20, 2012. This will allow both the Peer Review and the Parsons/IBT independent checker to initiate their independent modeling and evaluation ahead of the submittal. All MnDOT and Peer review comments will be received transferred to the DQMP Comments Resolution Form with initial Parsons/IBT responses provided ahead of the schedule Comments resolution meeting on September 7, 2012. Final 30% Concept plan will be returned to MnDOT by September 14, 2012.

TASK 8 – FINAL DESIGN (60% PLAN), DUE DECEMBER 7, 2012
60% Plan submittal represents a “snapshot” in progress mile stone for MnDOT to verify progress and visual quality compliance. Plans are expected to represent a mostly completed final design with the majority of analysis and details completed in order for the independent checkers and Peer review to update their analysis on schedule. Bradley Touchstone will update any Visual Quality exhibits to represent the current design for coordination with the VQAC and public information needs.

MnDOT and Peer Review coordination of this submittal will be facilitated by an Over-The-Shoulder review plan set to be distributed on November 9, 2012. All MnDOT and Peer review comments on the 60% plans will be received transferred to the DQMP Comments Resolution Form with initial Parsons/IBT responses provided ahead of the schedule comments resolution meeting on January 25, 2013. Comments will then be resolved and tracked through the next submittal.

Task 8 Deliverables:
- Final design Plans (60%)
- Preliminary LRFR Rating Factors
- Final river pier foundation recommendations
- Redundancy Report
- Concept design for maintenance and inspection platforms
- Draft Special Provisions
- Draft Engineer’s Estimate
- WRE Final Design Report
- Constructability review memo
TASK 9 – FINAL PLAN/CONSTRUCTABILITY REVIEW (95% PLAN), DUE MARCH 1, 2013

This submittal will be the fully detailed, checked and ready for signature plan set. All plan checking, independent design checking, quantities, and quantity checks will be complete. The package will include a full second set of Independent design calculation and Independent Design Certification stating that all elements meet the requirements of the project and that all issue with the Engineer of record have been resolved.

Task 9 Deliverables:
- Final Plans (95%)
- Design and Quantity calculations
- Constructability Review Memorandum
- Engineers Cost Estimate
- Special Provisions
- Corrosion Protection Plan
- WRE Review Final Report

MnDOT and Peer Review coordination of this submittal will be facilitated by an Over-The-Shoulder review plan set to be distributed on February 1, 2013. This will allow both the Peer Review and the Parsons/IBT independent checker to finalize their modeling ahead of the submittal. All MnDOT and Peer review comments will be received, transferred to the DQMP Comments Resolution Form with initial Parsons/IBT responses provided ahead of the schedule Comments resolution meeting on March 29, 2013. Final Certified Plan set will be submitted to MnDOT on April 19, 2013.

TASK 10 – LOAD RATING ANALYSIS AND MAINTENANCE MANUAL

Prepare bridge ratings per the Scope of Work Article 11 and the final project Design and Rating Criteria. Ratings will include the specified MnDOT and WisDOT vehicles. The lead engineers will coordinate bridge rating with the respective DOT ratings engineers at each mile stone submittal (30%, 60%, and 95%). Preliminary LRFR rating factors will be provided at the 60% Plan submittal milestone. Cable structure specialty element will be rated per Scope of Work Article 11.1. Upon written notification from MnDOT, work will proceed on the Ratings Manual per Scope of Work Article 11.4. All MnDOT and Peer review comments on the received transferred to the DQMP Comments Resolution Form with initial Parsons/IBT responses provided ahead of the scheduled comments resolution meetings. Comments will then be resolved and tracked through the next submittal.

Task 10 Deliverables:
- Preliminary Bridge Rating manual by July 1, 2013
- Bridge Maintenance and Inspection manual by June 30, 2013

TASK 11 – SPECIAL PROVISIONS AND COST ESTIMATING

Review the preliminary bridge plan, create, and maintain a database of material, pay items and MnDOT transport pay items to be used to track quantities and special provision needs over the entire of the projects. Create a special provision library standing with current MnDOT Standard Specifications for Construction special provision templates and expanding these template for the state-of-the art practice. Specialty provisions for cable stays, and other unique item will be identified by the 30% plans submittal and submitted with each subsequent mile stone for MnDOT and Peer review. Final Division SB Project Special Provisions will be provided for Bridges 82045, 82047, and 82048.

A review of the Engineer Estimate of the Preliminary Bridge estimate will be provided at a 30% submittal point with recommendations for adjustment and modifications based on the 30% submittal refinements. A Draft Engineers Estimate will be developed for each bridge and submitted with the 60% Plans. Estimate will be based on historic unit prices adjusted for current market trends, site conditions and project risks and include costs for unique specialty items developed from unit prices of recent national bid tabulations. The Final Engineers Estimate will be provided with the 95% Plans submittal utilizing actual final plan quantities and updated unit prices based on current and projected market trends site conditions and project risks. Unit price development will be documented and all supporting computations, and information used to determine final unit costs will be submitted with the Final Engineers Estimate.

4. Background and Experience

Parsons has been an international leader in transportation for more than 80 years with over 10,500 employees worldwide. Parsons is consistently ranked by Engineering News-Record (ENR) as a top design firm and is recognized by clients and the engineering profession for providing innovative solutions. We will be the lead consultant for the project. Parsons is prequalified in all MnDOT Bridge Types. Parsons’ Minneapolis and Chicago offices have completed the final design of two steel plate/box girder bridges over the Mississippi River, two segmental bridges over the Mississippi River, a cable-stayed bridge over the Missouri River and two tied-arch bridges over the Mississippi River. The same Parsons’ key staff that performed on the Hastings Bridge, Lafayette Bridge, and the Lowry Bridge projects. Vince Gastoni, Martin Furrer, and Eddie He are all proposed for this project.

International Bridge Technologies (IBT) brings proven leadership and experience in the design of complex bridge projects and will serve as the Lead Bridge Engineer for the extradosed bridge, Lead Quality Check Engineer, and support all other design activities. Headquartered in San Diego, CA the firm’s sole focus is the design and construction of complex bridges, including concrete segmental, cable-stayed, and extradosed spans. IBT staff members have delivered the design of twelve cable-supported bridge projects and fifteen concrete segmental projects over the last ten years. IBT possesses the institutional knowledge for bridge types related to the proposed St. Croix River Crossing. IBT’s Second Vivekananda Bridge in Kolkata, India is a “pure” extradosed, highway bridge, carrying six-lanes of traffic with two shoulders for a total width of 96-ft. The main bridge crosses the Hoogly River at total length is 2885-ft.

Touchstone Architecture (Touchstone) specializes in the aesthetic design of bridges to meet both the functional and cultural needs of the community while existing in harmony with the physical and historical environment. Bradley C. Touchstone, AIA, will lead the public involvement and visual quality task along with his staff of experienced personnel. Touchstone provided architectural services for the preliminary design of the Lafayette Bridge and was instrumental in the development of the

**WJE Consulting Engineers & Scientists (WJE)** is a top design-build geotechnical firm in the US, capable of providing comprehensive geotechnical, environmental, and materials engineering and testing services from over 120 offices across the United States with a local office in White Bear Lake, just 11 miles from the project. Our national management and engineering resources will support the project with a highly specialized team of senior engineers with expertise in Cofferdam design and construction in northern latitude rivers subject to ice flows, jams, and breakup conditions, pile and shaft load test design and interpretation, drilled shaft tip grout design and construction methods, and finite element modelers.

**Illumination Arts (IA)** will be responsible for the aesthetic lighting of the new St. Croix River Crossing, as they have been for many other signature structures across the U.S., including the award-winning Christopher S. Bond Bridge in Kansas City. Illumination Arts has designed more than a dozen such structures in the eight years since the firm was founded in early 2004, and Principal and Founder, Faith Baum, was the Project Manager and Lead Designer for eight others during her tenure with her previous firm.

**RWDI Consulting Engineers and Scientists (RWDI)** will serve as the wind engineering specialists for this project and specialize in the wind and structure interactions; from long-span vehicular bridges to pedestrian bridges tailored to meet the objectives of each individual bridge project. RWDI is a world leader in bridge wind engineering services including stability, loading, vibration, and scale testing conducting studies for over 200 bridge projects in the past 40 years in North America, Asia and Europe.

**Wiss, Janney, Elstner Associates, Inc. (WJE)** Through the investigation of thousands of bridges and notable bridge failures, WJE bridge engineers have learned that better bridge rehabilitation designs are accomplished through a better understanding of the problems. WJE’s knowledge of bridge performance is supported by technical expertise in materials, testing, and instrumentation. WJE experienced includes providing the Corrosion Protection Plan for Parsons Hastings Bridge Project.

**Short, Elliot and Henderson, Inc. (SEH)** will provide the Civil/Permitting Coordination and Public Outreach services for the St. Croix River Crossing Final Bridge design project. SEH is a full service professional services firm of 550 engineers, architects, planners, and scientists including permitting support for over 200 civil and transportation projects since 2003. Specific project experience related to this project includes St. Croix River Crossing (previous bridge design), Stage I Stillwater Flood and Retaining Walls, and the St. Croix Riverfront Properties Phase I ESA.

**Rani Engineering (Rani)** is a privately owned professional services firm based in Minneapolis, Minnesota. They are dedicated to providing high quality engineering and land surveying services to our clients. Rani provides planning, land surveying, and engineering design services on Transportation, Site Development, and Water Resources projects. Project delivery is available on both AutoCAD/Civil 3D and MicroStation/GEOPAK platforms. Rani is a certified woman and minority owned firm.

**Hansen Thorp Pellinen Olson Inc. (HTPO)** is a certified small business enterprise (SBE), we are small enough to ensure the personal touch of our hands-on principals and senior department heads, yet big enough to deliver results on time and within budget utilizing the latest proven technologies.

**M-P Consultants (M-P)** is a Woman/Minority Owned Business Enterprise that was founded in 1995 to provide quality professional electrical engineering consulting services to architectural and engineering consulting firms and government agencies. In 2005, M-P expanded their services to include integrated communication systems engineering and transit systems engineering.

Please refer to our Project Experience Matrix exhibit for our teams background and experience on projects of similar type, size, and complexity.

### 5. Key Personnel

**Vince Gastoni, PE, Project Manager.** Vince, located in Parsons’ Minneapolis office, will be the primary point of contact with Mn/DOT and will coordinate and direct Parsons’ management, contract, and quality efforts, and will have full contractual responsibility for the overall execution of the project. Vince has more than 20 years of experience in bridge design and has demonstrated his ability to communicate effectively and proactively, organize and manage resources to meet schedule requirements, deliver quality work, and resolve issues as they arise. He has demonstrated his experience on multiple MnDOT projects, including the final design for the TH 61 Hastings Bridge, the Lafayette Bridge, and the Crosstown Bridges; peer review of the 35W Bridges; and peer review and construction oversight for the Wakota Bridges and Dresbach bridges, and the lead the design of over of over 50 post-tensioned concrete box girder as a Caltrans Senior Engineer.

**Daniel Tassin, PE, Lead Bridge Designer/Extradosed Superstructure.** Daniel is President and Technical Director of International Bridge Technologies, Inc. (IBT). He has over 39 years of comprehensive experience in the design and construction of major bridge projects throughout the world, including the Sunshine Skyway cable-stayed bridge in Tampa, FL, and has been lead technical director for all twelve cable-supported bridges designed by IBT. This includes acting as the engineer of record for the extradosed Vivekananda Bridge in India. His work with cable-supported bridges encompasses fourteen constructed bridges, with twelve built within the last 10 years, and is presently one of the only designers in North America to have served as the engineer of record of a completed extradosed bridge. He has worked primarily on design-build projects for the past two decades, and has developed the design and management tools necessary to produce an efficient, constructible solution that successfully integrates construction methodologies into the final design.
Firm Legend:
*All personnel are Parsons staff unless otherwise noted*

- International Bridge Technologies (IBT)
- Touchstone Architecture (TA)
- Short, Elliot & Henderson, Inc. (SEH)
- Illumination Arts (IA)
- Terracon Consulting Engineers & Scientists (T)
- RWDI Consulting Engineers and Scientists (RWDI)
- Wiss, Janney, Elstner Associates, Inc. (WJE)
- Rani Engineering (R)
Martin Furrer, PE, Lead Bridge Designer/Substructure. Martin has more than 16 years of experience in the management, design, analysis, load rating, and construction of complex bridges. He has been involved with the design and construction of 14 bridges over major waterways, including leadership positions on five cable-stayed bridges and six arch bridges. Martin has extensive experience in the design, analysis, and construction of the following bridge types: cable-stayed, arch, prestressed concrete segmental, suspension, steel girder, and reinforced concrete, as well as innovative prestressed composite steel girders.

Jeff Cavallin, PE, Lead Bridge Designer/Segmental Superstructure. Jeff has over 11 years of segmental bridge design experience and is located in our Minneapolis office. He will be the technical resource to the design team in the areas of analysis, constructability, detailing, and load rating. Jeff has been involved in the design and construction of 14 segmental bridges. His key relevant project experience includes the Wakota Bridges CEI/peer review; the Crosstown Bridges design and rating; the 35W Bridges peer review and rating; the $300 million Benicia Martinez Bridge; the 1,250-foot span Sidney Lanier Bridge; and the I-205 Portland LRT Bridge in Oregon.

Chris Hall, PE, Lead Quality Check Engineer. Chris has served as the Design Manager for many major bridge projects, primarily under design-build contracts, with a proven track record of identifying cost-savings through good design, while closely adhering to the owner’s needs and meeting aggressive schedules. He served as the lead reviewer for the extradosed Vivekananda Bridge, and his recent experience with precast segmental bridges includes acting as the Project Manager for the nearly complete Port Mann Bridge approach structures near Vancouver Canada. Chris has also served a lead role in the design of many cable-stayed bridges, including the Pitt River Bridge and Coast Meridian Overpass.

Tom Stelmack, PE, SE, Quality Assurance Manager. Tom has established himself as a specialist in the design of all types of segmental bridges, including both precast and cast-in-place segmental box girders. He has extensive experience involving the design of a wide variety of conventional concrete bridges, including standard precast pretensioned I girders, cast-in-place on falsework box girders, flat slabs, precast U girders, and precast pier caps.

Warren Hallam, Construction Engineer. As a senior construction manager, Warren Hallam has more than 32 years of professional experience in the heavy civil construction industry. He has worked on projects involving mega bridges, waste water treatment plants, elevator grain terminals, hospitals, hotels, and roadways. Warren has supervised and inspected construction of segmental bridges, cable-stay bridges, and post-tensioning and grouting for numerous post-tensioned bridges. He has also been responsible for logistics and training staff and crew personnel.

Doug Baker, PE, Geotechnical Engineer. Doug has 22 years of experience as Project Engineer and Project Manager. He has provided geotechnical engineering services for numerous high-rise and low-rise buildings, airports, utilities, water control structures, wetlands, schools and subdivisions. In addition, he has performed engineering services on over 200 projects for the Florida Department of Transportation (FDOT) in Districts 1, 2, 3, 4, 5, 7, and Turnpike and is thoroughly familiar with FDOT practices and procedures.

Burton Dryden, PE, Lead Electrical Engineer. Burton has over 30 years of industrial and transportation electrical system engineering. He has provided bridge systems engineering for the Hastings Bridge, Lafayette Bridge, and the Williamsburg suspension bridge in New York City.

Bradley Touchstone, AIA, Visual Quality Coordinator. Bradley has dedicated his career to the development of signature bridge projects both nationally and internationally. He has worked with design teams and community groups to ensure that the bridge design selected fits in harmony with the local culture and environment. Bradley has teamed with Parsons on the following bridge projects: Hastings Bridge, Lafayette Bridge, kcICON, John James Audubon Cable-Stayed Bridge over the Mississippi River, and the US 90 Bridge over Biloxi Bay.

Craig Johnson, PE, Hydraulics Engineer. Craig has over 14 years of experience in civil engineering; roadway drainage, water resources, utility relocation, and transit oriented projects. Due to his extensive knowledge, skills and experience on design and construction of major public works, Craig thoroughly understands the interdisciplinary nature and phasing of transportation and drainage work from planning to construction, sequential or concurrent.

*Staff will be available for 40 hours or more per week when working on the St. Croix River Project.*

<table>
<thead>
<tr>
<th>Key Personnel</th>
<th>% Dedicated</th>
<th>Completion Date</th>
<th>Available Hours per Week*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vince Gastoni, Project Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hastings Bridge (design)</td>
<td>10%</td>
<td>June 2013</td>
<td>40+</td>
</tr>
<tr>
<td>I-90 Dresbach Peer Review</td>
<td>5%</td>
<td>May 2012</td>
<td>40+</td>
</tr>
<tr>
<td>I-90 Dresbach Approach</td>
<td>5%</td>
<td>April 2011</td>
<td>40+</td>
</tr>
<tr>
<td>Lafayette Bridge</td>
<td>5%</td>
<td>June 2011</td>
<td>40+</td>
</tr>
<tr>
<td>Daniel Tassin, Lead Bridge Designer/Extradosed Superstructure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 520 Floating Bridge (Final Design)</td>
<td>10%</td>
<td>August 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Sound Transit East Link (Final Design)</td>
<td>10%</td>
<td>Dec. 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Martin Furrer, Lead Bridge Designer/Substructure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hurricane Deck Bridge, MO</td>
<td>50%</td>
<td>July 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Hastings Bridge Construction Support</td>
<td>10%</td>
<td>April 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Jeff Cavallin, Lead Bridge Designer/Segmental Superstructure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-90 Dresbach Peer Review</td>
<td>50%</td>
<td>June 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Hastings Bridge PT Engineering Support</td>
<td>10%</td>
<td>July 2013</td>
<td>40+</td>
</tr>
<tr>
<td>Chris Hall, Lead Quality Check Engineer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR 520 Floating Bridge (Final Design)</td>
<td>30%</td>
<td>Jun. 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Sound Transit East Link (Final Design)</td>
<td>20%</td>
<td>Dec. 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Tom Stelmack, Quality Assurance Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDOT FASTER Bridge Contract</td>
<td>15%</td>
<td>Jan. 2014</td>
<td>40+</td>
</tr>
<tr>
<td>Christo OTR Project</td>
<td>15%</td>
<td>Oct. 2014</td>
<td>40+</td>
</tr>
<tr>
<td>Warren Hallam, Construction Engineer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandpoint US 95 Project (ITD)</td>
<td>30%</td>
<td>June 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Legacy (LSI)</td>
<td>30%</td>
<td>June 2013</td>
<td>40+</td>
</tr>
<tr>
<td>Ottawa OLRT</td>
<td>10%</td>
<td>Dec. 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Doug Baker, Geotechnical Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-4 Daytona</td>
<td>40%</td>
<td>March 2013</td>
<td>40+</td>
</tr>
<tr>
<td>Sunrail Orlando</td>
<td>30%</td>
<td>August 2012</td>
<td>40+</td>
</tr>
<tr>
<td>District 4/6 Scour</td>
<td>10%</td>
<td>August 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Burton Dryden, Lead Electrical Engineer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Randall’s Island (shop drawing review)</td>
<td>40%</td>
<td>Dec. 2012</td>
<td>40+</td>
</tr>
<tr>
<td>Hastings Bridge (shop drawing review)</td>
<td>5%</td>
<td>Dec. 2012</td>
<td>40+</td>
</tr>
</tbody>
</table>
6. Identification of the level of MnDOT participation of Contract

Partnership is the basis of successful teams when facing a rigorous schedule. This project will require 100% dedication from all parties for timely decision making and full engagement from the MnDOT Bridge Design Project manager down through the MnDOT and WisDOT organization into functional unit line staff.

We have read and acknowledge MnDOT’s participation and deliverable identified in the RFP. A summary of MnDOT roles and responsibilities by task is provided below:

<table>
<thead>
<tr>
<th>TASK</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TASK 1: PROJECT MANAGEMENT</td>
<td>Provide MnDOT PPMS, project document control system, project oversight, project data, coordination with external stakeholders and the public, review submittals and provide comments or approvals, make timely decisions, and coordinate the Peer Review process. Coordinate the Visual Quality modifications with the VQAC, SHPO, and MnDOT’s Metro Visualization Unit.</td>
</tr>
<tr>
<td>TASK 2: PERMITTING AND COORDINATION</td>
<td>Lead the process to develop and submit the necessary applications for the project permits.</td>
</tr>
<tr>
<td>TASK 3: PROJECT MEETINGS</td>
<td>Attend monthly team meetings and coordinate MnDOT, WisDOT and Stakeholder member attendance as necessary.</td>
</tr>
<tr>
<td>TASK 4: BRIDGE FOUNDATIONS</td>
<td>Provide soil boring foundation report near each river pier. Provide pile load data by Fall 2012. Provide Preliminary Bridge foundation recommendations and foundation boring information Provide recommendations form for the Minnesota approaches. Engage department maintenance personnel to provide review and approval of river pier final foundation recommendations.</td>
</tr>
<tr>
<td>TASK 5: DESIGN AND LOAD RATING CRITERIA</td>
<td>Participate in the criteria refinement and engage the State ratings and maintenance engineer’s reviews early. Participate in the optimization and preliminary plans reviews, Provide review and acceptance of the specialty reports and Wind Engineering Testing facility. Provide review an acceptance of the WRE review and modifications. Determine Smart Bridge technology implementation.</td>
</tr>
<tr>
<td>TASK 6: DESIGN AND PLAN PREPARATION</td>
<td>Participate in the Task Forces, engage in technical discussion and coordinate the Peer Review in order to make decisions quickly, provide existing site data and proposed roadway geometry, utilities and utility relocations, ITS, approval of drainage and utility detailing, plans for pond construction. Provide roadway design, lighting, signing, striping, maintenance of Traffic/Permitting/environmental design. Provide the deck drainage spacing and location.</td>
</tr>
<tr>
<td>TASK 7: CONCEPT DESIGN (30% PLAN)</td>
<td>Provide review comments, Peer Review coordination, MN and WI SHPO coordination and authorization to proceed with final design.</td>
</tr>
<tr>
<td>TASK 8: FINAL DESIGN (60% PLAN)</td>
<td>Provide cursory review to assess progress and provide comments, review preliminary rating factors, Peer Review coordination, and MN and WI SHPO coordination.</td>
</tr>
<tr>
<td>TASK 9: FINAL PLAN/CONSTRUCTABILITY REVIEW (95% PLAN)</td>
<td>Provide final review comments, Peer Review coordination, MN and WI SHPO coordination.</td>
</tr>
<tr>
<td>TASK 10: LOAD RATING ANALYSIS AND MAINTENANCE MANUAL</td>
<td>Provide standard form for rating factor reporting, provide input for the development the manual and coordinate WisDOT and other extradosed bridge owner reviews and approvals.</td>
</tr>
<tr>
<td>TASK 11: SPECIAL PROVISIONS AND COST ESTIMATING</td>
<td>Review progress submittal and provide contractor style estimate from Peer reviewer.</td>
</tr>
</tbody>
</table>

In Summary

This Proposal was personally developed by all of our team members as a functional work plan to deliver this project on schedule to MnDOT and WisDOT. It represents our team member’s personal commitment to deliver a high quality, economical and safe design. The experts we have assembled to achieve this goal are professionals of the highest standards and proven industry leaders. A summary of why Parsons Transportation Group Inc. and International Bridge Technologies, Inc. is the best team for your project are:

Proven Leadership – Vince Gastoni, PE is a proven and trusted resource who is fully committed to delivering this project.

World Class Technical Expertise and Experience – The Parsons/IBT team leads the industry in major complex bridge project delivery including the Vivekananda Extradosed Bridge, India.

Exceptional Key Personnel – Daniel Tassin PE, Eddie He PE, Jeff Cavallin PE, Martin Furrer PE, Chris Hall PE, Pat Cassidy PE, and Yves Gauthier PE.

Unparalleled Construction Understanding – Parsons provides a world class in-house self performing construction contractor division.

Dedicated Visual Quality and Public Information Support – Bradley Touchstone AIA and Short Elliott Hendrickson Inc.

Strategic Quality Based Management Approach – Parsons is an ISO 9001:2008 Quality Certified Company.

As dedicated bridge engineering professionals, we recognize that bridges like the St Croix River Crossing are historic endeavors and once-in-a-lifetime opportunities for those involved that shape the landscape and make history. We have no greater want than to be part of this history.
### Final Bridge Design for the St. Croix Crossing Project

#### Project Scheduling

<table>
<thead>
<tr>
<th>Activity Name</th>
<th>Project Start</th>
<th>Project End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick-off Meeting</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Memorandum on proposed modeling techniques</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Foundation recommendations for lateral soil modeling parameters</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Bridge Fixity Study Report for Bridge 82045-1</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Alternative precast cofferdam feasibility report</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Bridge Electrical and Lighting System Memorandum</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Wind Loads for Extradosed Structure (Wind Engineering Study)-1</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Redundancy Analysis</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Special Rating Requirements for Cable Structures</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Peer Review / MnDOT Comment Resolution Meeting</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Final 30% Plan by September 14, 2012</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Special Provisions</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Cost Estimate</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Draft Rating Manual by July 1, 2013</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
<tr>
<td>Submit a Bridge Maintenance and Inspection Manual to State by June 30, 2013</td>
<td>01-Jun-12</td>
<td>01-Jun-12</td>
</tr>
</tbody>
</table>

#### Milestone Tracking

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Remaining Work</th>
<th>Actual Level of Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Bridge Design for the St. Croix Crossing Project</td>
<td>Remaining Work</td>
<td>Actual Level of Effort</td>
</tr>
</tbody>
</table>
### PROJECT EXPERIENCE MATRIX

**Vivekananda Bridge, India (Extradosed)**  
**Location:**  
**Description:** EOR for the 2,890 foot long, multiple-span “extradosed” bridge. Superstructure was erected by balanced cantilever method and is monolithically connected to cast-in-place pier shafts supported on 45 m (148 ft) deep caissons or well foundations.  
**Related Key Staff:** Daniel Tassin – EOR  
**Engineer of Record:** Chris Hall – Sr. Engineer  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**A25 Bridge, Montreal, Quebec**  
**Location:**  
**Description:** Parsons was the EOR for the superstructure and IBT was EOR for the pylons, plus provided engineering services during construction and provided quality assurance for the 280-meter main span cable-stayed bridge.  
**Related Key Staff:** Ben Soule – Proj. Manager  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**Pitt River Bridge, Vancouver, BC**  
**Location:**  
**Description:** EOR for the three-span, cable-stayed bridge with a 623 ft main span. Superstructure width varies from 133 ft to 157.5 ft. Foundation utilize large diameter piles.  
**Related Key Staff:** Daniel Tassin – EOR  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**Audubon Bridge, St. Franciville, LA**  
**Location:**  
**Description:** EOR for the new 1,583-foot cable-stayed bridge designed for a 100-year service life including galvanized strand for additional corrosion protection of the stay cables.  
**Related Key Staff:** Tom Stelmack – Designer  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** A

**Port Mann Bridge, Vancouver, BC**  
**Location:**  
**Description:** EOR for the 4,012 ft long precast concrete segmental box girder approaches built over water and designer for the 1,542 ft long cable-stayed superstructure deck.  
**Related Key Staff:** Daniel Tassin – EOR  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**Christopher S. Bond Bridge, MO**  
**Location:**  
**Description:** EOR for the 550-foot long, multiple-span “extradosed” bridge. Superstructure was erected by balanced cantilever method and is monolithically connected to cast-in-place pier shafts supported on 42” driven steel piles through deep soft soils.  
**Related Key Staff:** Martin Furrer – EOR  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**TH 61 Hastings Bridge, Hastings, MN**  
**Location:**  
**Description:** EOR for the four lane freestanding tied arch bridge carrying TH 61 over the Mississippi River. Structure includes steel box rib and post-tensioned concrete tie, post-tensioned concrete slab and record breaking precast concrete girder approach structures. Main span is founded on 42” driven steel piles through deep soft soils.  
**Related Key Staff:** Vince Gastoni – Project Mgr  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**Coast Meridian Overpass, Vancouver, BC**  
**Location:**  
**Description:** EOR for the six span 1,002 ft long cable stayed/extradosed hybrid structure with a 410 ft. long span over the Canada Pacific rail yard. Towers are support on large diameter drilled shafts.  
**Related Key Staff:** Daniel Tassin – EOR  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**Sheikh Khalifa Bridge, Abu Dhabi, UAE**  
**Location:**  
**Description:** EOR for the complete planning and design services for the 1.5-kilometer-long segmental concrete bridge with a main span of 200 meters.  
**Related Key Staff:** Tom Stelmack – Designer  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**Hodariyat Bridge, Abu Dhabi, UAE**  
**Location:**  
**Description:** EOR for the cable stayed structure with a 656 ft. long main span and precast segmental concrete box girder approach. Possesses extradosed properties.  
**Related Key Staff:** Daniel Tassin – EOR  
**Dates:** On schedule  
**Scheduling:** Under Budget  
**Infrastructure:** None

**Lafayette Bridge, St. Paul, MN**  
**Location:**  
**Description:** EOR for the two new steel box girder bridges carrying TH 52 over the Mississippi River in downtown St. Paul. The 16 span structures include haunched trapezoidal steel boxes and highly aesthetic pier designs on large diameter driven piles.  
**Related Key Staff:** Vince Gastoni – EOR  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**I-35W Bridge P.R., (CFI), Minneapolis, MN**  
**Location:**  
**Description:** Peer review and construction engineering inspection services for the reconstruction of the 1-35W St. Anthony Falls bridge. Bridge consisted of cast-in-place concrete box girder back spans with precast segmental main span erected in the cantilever method.  
**Related Key Staff:** Vince Gastoni – Project Mgr  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**I-35W Bridge P.R., S. St. Paul, MN**  
**Location:**  
**Description:** Peer review and construction engineering inspection services for the replacement of the I-35W bridge over the Mississippi River. Provided Independent Peer Review of the redesign and retrofit of the bridges during construction.  
**Related Key Staff:** Vince Gastoni – Project Mgr  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

**I-35W Crossing Freeway, Minneapolis, MN**  
**Location:**  
**Description:** EOR for Final Design of two precast segmental connector ramp bridge in the interchange. Prepared a load rating for the bridges and developed load rating procedures and analysis tools.  
**Related Key Staff:** Vince Gastoni – EOR  
**Dates:** On schedule  
**Scheduling:** On Budget  
**Infrastructure:** None

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A – Final design schedule was maintained but delivery of acceptable geotechnical reports early in the project required corrective action by adding additional geotechnical drilling resources and additional geotechnical Quality Control procedures.
7 - Quality Management Plan
7. Quality Management Plan

This quality management plan (QMP) for the final bridge design for the extradosed river bridge over the St. Croix River and concrete box girder approach spans (Bridge 82045), and the concrete box girder ramp bridges (Bridges 82047 and 82048) is based on Parsons ISO 9001:2008 certified quality management system and contains the general policies, specifically quality assurance/quality control (QA/QC) procedures, and will serve as a guide to quality management for our work on this project.

1.0: PROJECT SCOPE

The Project: Final bridge design services for new extradosed river bridge over the St. Croix River and concrete box girder approach spans (Bridge 82045), and the concrete box girder ramp bridges (Bridges 82047 and 82048) on the Minnesota Wisconsin State line. This project will be for the design of the following bridge plan packages:

- **Bridge 82045** – Extradosed river bridge over the St. Croix River and concrete box girder approach spans.
- **Bridge 82047** – Eastbound ramp concrete box girder bridge to the St. Croix River Crossing.
- **Bridge 82048** – Westbound ramp concrete box girder bridge from the St. Croix River Crossing.

Xcel barge unloader facility modifications and removal.

The Owner: The Minnesota Department of Transportation (MnDOT) is the project owner in coordination with the Wisconsin DOT (WisDOT).

Design Team: Parsons Transportation Group Inc. in association with International Bridge Technologies, Terracon Inc., and Short Elliot Hendrickson serves as the core consultant design team responsible for delivering the project. The team will be referred to as Parsons in this document.

2.0 QUALITY SYSTEM

The Parsons ISO 9001:2008 certified quality management system meets the MnDOT’s quality requirements of and provides for independent confirmation that project deliverables satisfy contract requirements.

The project organization and management provide the necessary supervision, QC processes and QA of all items of work, including that of subcontractors and suppliers that will ensure compliance with the specified requirements.

2.1: Quality Management Plan

The QMP sets the basic guidelines within which the Parsons design team will operate during the execution of the project. It will not be modified without the joint written approval and expressed consent of the quality assurance manager (QAM) and the MnDOT project manager.

2.2: Quality Assurance Procedures

The QMP is based on Parsons’ quality manual and draws from the extensive Quality Assurance Procedures (QAP), which provide the standard method for the performance of QC/QA activities by design staff and describe the interaction between the processes of the quality plan for the guidance of personnel. Where appropriate in the QMP, Parsons’ plan is identified as an additional reference.

2.3: Control of Documents and Records

Parsons has established a document control system (DCS) to store and record all documents generated under the Contract.

Quality records will provide evidence of conformity to requirements and the effective operation of the quality management system. The project manager will provide for the documentation of the activities required to provide evidence of the effective operation of the quality management system. Each responsible engineer will control the quality records for his/her individual area of responsibility and the pertinent quality records will be stored and maintained in the Parsons’ files. All quality records are legible, dated and identifiable to the product, person or event to which they pertain. The quality manager will review the quality records through routine audits and report findings.

3.0 QUALITY MANAGEMENT OVERVIEW

Parsons project manager, Vince Gastoni, PE, is responsible for assuring the overall quality of products produced and Tom Stelmack, PE, will serve as the QAM. Tom will ensure quality through accurate planning, coordination, supervision, and technical direction; proper definition of job requirements and procedures; and the use of appropriately skilled personnel performing their work functions with care.

Quality is controlled through thorough checking of the design product and verifying corrections, the process documented according to set procedures developed to facilitate audit.

Quality is assured by assigning qualified personnel to perform the quality audit of both the product and the QC process.

The QAM has the authority and organizational freedom to identify any quality problems and to initiate, recommend, provide and verify implementation of the solutions.

3.1: Quality Objective

Parsons management ensures that quality is achieved by accurate planning, coordination, supervision, and technical direction; proper
definition of job requirements and procedures; and the use of appropriately skilled personnel performing their work functions with care.

Quality is controlled through thorough checking of the work product and verifying corrections, the process documented according to set procedures developed to facilitate audit.

Quality is assured by assigning qualified personnel to perform the quality audit of both the product and the QC process.

3.2: Responsibility and Authority

Parsons management ensures that responsibilities and authorities are defined and communicated within the design team and that the quality policy, objectives and procedures are understood within the design organization.

The QAM has sufficient authority and organizational freedom to identify any quality problems and to initiate, recommend, provide and verify implementation of the solutions.

4.0 LIST OF REQUIREMENTS

Quality deliverables begin with a complete understanding of the project requirements and standards. The key technical reference document requirements for this project are summarized below.

- 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.
- All plan sheets and sketches will be delivered in MicroStation format;
- Construction requirements of State’s current Standard Specifications for Highway Construction and any supplements thereto on file in the Office of the Commissioner of Transportation (www.dot.state.mn.us/preletting/spec/index.html);
- Level I Computer Aided Detail Design (CADD) standards (www.dot.state.mn.us/caes/cadd/).

5.0 INTENT OF THE QMP

The intent of the QMP is to provide the basic quality management practices, processes, procedures, organizational structure, and management approach used to deliver accurate, quality products that conform to MnDOT’s requirements.

Quality is one of Parsons’ core values and part of our culture. We are committed to providing quality services and products. We will, as a corporation and an individual, meet the mutually agreed-to requirements the first time and strive for continuous improvements to our work processes.

6.0 PHILOSOPHY OF THE QMP

Evaluating the quality of work being produced on a project must be based on requirements that are thoroughly defined before the work is started, not after the work has begun. Furthermore, these requirements must be clearly communicated, understood, and agreed to by the parties involved.

This approach is critical to achieving quality expectations and will determine what information and tools the person producing the work will need to do it right the first time, and to avoid excessive expenditures for audits, checking, and rework.

The following four basic concepts of quality management are directly applicable to how Parsons does business:
**Quality Is Defined as Conformance to Requirements:** Requirements must be identified and mutually agreed to by the client, the project manager, and senior project staff before work on the project begins.

**The System for Achieving Quality Is Prevention:** This occurs by working to avoid problems, identifying the causes when they occur, and taking the steps necessary to eliminate the conditions that cause them.

**The Performance Standard Is Zero Defects:** This precise quality standard requires a personal commitment to take requirements seriously.

**The Measurement of Quality is the Cost of Nonconformance:** Measurement of the cost of wasted effort and the fixes to make things right is a good tool for identifying areas needing attention and setting priorities for the elimination of problems. Any nonconformance or rework activity is a candidate for measurement.

Application and understanding of these principles is basic to Parsons’ quality management system.

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**7.0 PROJECT MANAGEMENT**

**7.1: Comment Documentation and Reporting**

Parsons will use processes and dedicated forms to track and document project comments, requests for information (RFIs), and action items. These are continuous function forms where items are given a unique identifier and retained in subsequent iterations to provide a complete project record of issues identification, resolution, and verification. As a QC tool they will be reviewed against subsequent deliverables and work product submittals.

**7.1.1: Review Comment Log**

The review comment log form is used to document all comments received by Parsons. Parsons will transfer comments on this form and provide a preliminary response and action code. The completed form will be provided to MnDOT for review and concurrence. A comment resolution meeting will then be held to review, discuss, and resolve any responses not accepted by MnDOT and a final disposition will be entered by Parsons and the form will be returned to MnDOT for confirmation.

**7.1.2: Action Item Log**

The action item log is a management tool used to track and document action items between Parsons’ and MnDOT’s project managers. This log will be provided to MnDOT’s project manager ahead of every monthly progress meeting and intermittently as necessary. Parsons’ project manager will fill out the log identifying items, status, personnel responsible, and a due date for resolution. This is a single continuous form with all subsequent entries being added and no previous entries being deleted. The final action item log will be included with the certified report as documentation of the project decisions and quality process.

**7.2 Review Verification Process**

Confirmation and verification of agreed upon comments between Parsons to MnDOT will be verified at key review points through the design process, including the following:

- Over-the-shoulder (OTS), or informal, reviews
- Meetings
- Formal milestones and submittals
- Comment resolution meetings

**7.2.1: Informal Over-the-Shoulder Review**

Informal meetings and or discussions between MnDOT and Parsons staff during design is intended to generate discussion and provide direct feedback ahead of formal submittals. OTS reviews include internal reviews by managers and lead staff to ensure that work is progressing with project requirements and industry standards. No minutes of these meetings are kept; however, the effort put forth by the participant toward these OTS reviews will help streamline design reviews and minimize comments and major issues later.
7.2.2: Team Meetings
Regular monthly meetings will be held between MnDOT and Parsons staff to update progress, share design performance information, discuss issues, address existing or new comments, and/or verify resolution on previous work. Parsons will prepare the agenda and minutes of these meetings. Comments will be added to the comment log and included, along with the meeting minutes, as verification tools in subsequent submittals.

7.2.3: Formal Milestones and Submittals
The formal milestone submittal reviews, as defined by the RFP, include the following:
- Design and Load Rating Criteria and Material memorandum
- Preliminary Plan Design Revisions and Optimization
- Approach ramp structures (Bridges 82047 and 82048) drainage
- Bridge Fixity Study Report for Bridge 82045
- Wind Loads for Extradosed Structure (Wind Engineering Study)
- Redundancy analysis
- Maintenance Access report
- Corrosion protection plan
- Threat and Vulnerability study
- 30 percent, 60 percent, and 95 percent review submittals
- Unique Special Provisions review
- Final certified plans and calculations
- Inventory Rating and Rating reports
- Bridge Maintenance and Inspection Manual

Parsons staff will submit the plans for review and comments by MnDOT. Previous project comment logs, meeting minutes, and reports shall be reviewed and resolutions verified prior to proceeding with the work. All new comments will be provided via the comment log form, resolved with MnDOT, and verified against the subsequent submittals prior to providing any design acceptance.

7.2.4: Comment Resolution Meetings
After comments have been received, Parsons will schedule a comment resolution meeting. Parsons will distribute preliminary responses to all comments prior to these meetings. Parsons staff will log the final disposition of the comment in the comment resolution form and distribute to MnDOT. Upon the next submittal, the comment resolution form shall be reviewed and verification of the resolution noted. Completed comment review forms shall be provided in Parsons subsequent work product submittals.

8.0 TECHNICAL DOCUMENT REVIEW PROCESS
The QMP identifies the processes, procedures, and protocols to ensure product realization. Figure 1 shows the process flow and continuous feedback loops of the QMP and the interaction of project and quality management throughout the process. The management staff is in constant contact with the production and checking staff through informal reviews and formal reviews of the interim work. QA of all documents is provided through a quality audit and certification prior to any submittal.

Project functional processes are illustrated in Figure 2, which identifies the flow of the product realization and the informal and formal reviews and quality validation.

Specific attention will be provided to the following specialty items:
- Materials and details
- Cable replacement
- Cable corrosion protection
- Cable color for thermal protection
- Consideration of duct couplers at the design criteria development stage
- Cable damping requirements

8.1 Detailed Checking of Design In-puts/Outputs
In keeping with sound engineering practice, all Parsons’ design analyses, calculations, quantities, other contract documents, and reports produced
are to be checked prior to submission. Detailed procedures for the checking of various types of documents are defined in this QMP. Staff members involved in design are to be familiar with these quality procedures.

Checking of intermediate and final work products will be performed prior to progressing work to the next phase of design; when subsequent work requires additional work items; or prior to a submittal to the client. Work will be properly checked for logic, assumptions, methodologies, in- and outputs, math, spelling and grammar, formats, technical, regulatory, and contractual requirements.

The project manager will appoint experienced engineers as checkers, who are expected to perform their checking independent of the engineers who prepared the design. The checker shall have experience equal to or greater than that of the designer. A set of check prints will be formalized to document the checking process.

Detailed checking applies to the following:
- Study or report type documents
- Plans, drawings, and layouts
- Computer software In- and outputs
- Calculations

Different colors are used to identify the various stages of the checking process.
- Yellow is used by the checker to indicate agreement. All calculations, dimensions, and written text are to be yellowed-in, if correct.
- Red is used by the checker to indicate corrections and additions.
- Green is used by the back-checker to indicate approval of the checker’s changes, plus additional changes, as agreed to by checker.
- Blue is used to indicate that changes to the document’s original have been made.
- Green is also used to verify that the change to the document’s original is correct.
- Black is used for comments or instructions not recorded.

Check prints are formalized through the addition of a check print stamp. On the stamp, each participant in the checking process signs on the appropriate line, indicating that stage of the process is completed.

8.2 Calculations (QAP 3.1)

As designs are developed, calculations that support and define the design are prepared by the originator. Prior to an intermediate of final work point, copies of the appropriate calculations are made to serve as check prints. A check print copy is then independently checked by individuals who are technically competent in the procedures required for the task. Because of the progressive nature of designs, the checker must consult with the originator about differences that have been found. The checker is expected to review design criteria, specifications, and rationale pertinent to the design, as well as, the calculations themselves. Upon completion of the checking process, the checker should initial both the check print and the original calculation sheet in the space provided. The checking process and use of colors for the checking of design analyses are illustrated graphically above.

8.2.1: Checking of Calculations

When a calculation or series of calculations have been completed, the originator makes a photocopy of the original and provides it to the checker who marks up the calculations in yellow that they have been checked and are correct; and red for corrections; and signs the check print copy of the calculation sheet in the “checked by” block.

The originator back-checks the checker’s marks on the check print; if in agreement, changes the original set of calculations to reflect the checker’s comments. To document the back-checking process, the originator will do the following:
- Checkmarks, in green, each of the checker’s red-marked changes, if in agreement, and adds in green, with the concurrence of the checker, any additional changes not picked up by the checker.
- Crosses out, in green, each of the checker’s red-marked changes that both the originator and the checker agree should not be changed and signs the check print copy of the calculation sheet in the “back-checked by” block.

The back-checker should not obliterate the checker’s marks. Instead the back-checker and checker shall resolve differences encountered during the checking process so they are not repeated. If a resolution cannot be achieved by the two individuals, the appropriate work package or project manager should be requested to resolve the differences.
• The originator revises the calculations and circles in blue each correction, as incorporated. The person correcting the calculations signs and dates the check print stamp upon completion of the corrections.

The checker examines the original calculation sheets to verify that the agreed-to corrections have been made, circles in blue-green each correction as incorporated, and signs and dates the “checked by” block with the work package, as required. The calculations check sets will be retained in the Parsons files.

Checking Input to Computer Programs

When any computer program is run for design, a record copy of the in- and output must also be printed out at the same time. The input for the PC or CADD shall be yellow-line checked and signed off by the checker. Corrections will be noted in red. The originator back-checks the corrections and will either rerun the program or calculates and pen-in the correct values in the output, as appropriate. The checker verifies the corrections and initials the corrections. If the program is rerun, a new, complete, yellow-lined checking of the input must be generated, signed, and dated by either the checker or the originator.

8.2.2: Checking of Calculations Using the Independent Check Method (QAP 3.1.1)

The independent design check involves the complete verification of all design elements and details to ensure structural integrity, constructability, and all project standards and criteria have been satisfied. The analysis is based entirely from the drawings and checking of drawings that depict the elements of design for the structure will be performed. This check results in two complete sets of design calculations, such as the original set of calculations and the independent design set of calculations.

Computerized calculations may be used, provided that the software is validated.

The independent check shall be done by personnel who are independent and have not participated in the design being checked; and who do not present or investigate new or alternative design approaches; and are responsible for resolving discrepancies with the designer and seeking technical advice if unsure of any particular element of the design.

• When a project reaches a stage of completion where checking can begin, the originator shall assemble any design criteria, project standards, and memoranda; and a clear, unmarked set of plans and any draft special provisions, and quantities.

• The checker shall review the general plans, typical sections, and bridge layout sheets for any omissions, conflicts, incompatible structural framing, or other major component features prior to continuing the check. A constructability review of the configuration and details shall be made and this shall be consistent with constructability reviews that occur as part of the any of the comment resolution meetings.

• The checker completely recalculates the geometric layout. Use of independent computer programs is recommended as long as the program has been verified. These calculations shall be documented in the same manner as original calculations to indicate that checks were made. Structural design check calculations shall not be started until items two through three are complete. Any discrepancies must be resolved with the originator. If revisions are necessary, the originator will revise the design and details before the checker proceeds.

• The checker shall produce a set of independent calculations for the design of superstructure and substructure elements. The checker will produce an independent set of quantity calculations.

If discrepancies are found, the checker shall notify the originator that a possible discrepancy exists. The originator will check the checker’s calculations governing the discrepancy, following the primary yellow-line checking procedures in this QMP, and will sign off as having done so on the calculation sheets. A statement of resolution initialed and dated by both the originator and checker will be placed with or on the checker’s calculations.

If revisions are necessary, the originator will revise the design and details before the checker proceeds further. The checker will yellow-line check the revision and sign-off on those calculation and plan sheets as the checker.

8.2.3: Validation of Computer Software

When it has been determined that a first-time utilization of software or a new application is required for engineering calculations, the software application is to be validated and documented as follows:

• A hand calculation with the same formulation or a parallel technique must be documented and checked in accordance with checking of calculations. To provide effective and efficient validation, checked calculations from a previous project or the in- and output from a validated program may be substituted for original hand calculations.
The same input and assumptions utilized in the hand calculations are formatted and input into the computer to check the software. Computer input is to be checked in accordance with Checking of Computer Input.

The output of the computer is compared to the results of the hand calculation with each corresponding answer annotated as equivalent values. Differences, which are not obviously accountable to rounding, are to be explained on the output sheet.

Complete documentation of the validation, including fully checked calculations, checked computer input, printout of program when available, annotated output printout, and a brief description of the processes followed are to be maintained in the office file.

This software QC procedure, when performed by any member of the project staff, will become an acceptable project-wide validation, copies of which are acceptable from office-to-office and reviewed and signed-off by the local project personnel in the office who initially utilize the software.

8.2.4: Checking of Report Type Documents

Formal review prints of study or report-type documents will be initiated a minimum of two times during the project: first, after assembly of all data into a draft document and prior to the first submission of the draft to the client for review; second, after the document has been put in final form, with all client comments addressed and prior to submitting to the client.

Additional interim reviews and the need for further reviews because of client comments on the final submission shall be at the discretion of the project manager.

On the face of the document, the originator stamps document review print and lists the reviewers. Each reviewer is responsible for reviewing their own discipline's contribution to assure clarity and conformance with project requirements. The originator, upon receipt of the completed review print, must back-check and address each of the corrections by marking each comment on the print as to its disposition. When the corrections are made, the originator shall verify the dispositions made on the document and sign-off on the review print stamp in the designated space.

The completed review print, along with any check prints of drawings or calculations, is kept in the project files.

8.2.5 Constructability Reviews

A constructability review (CR) is completed to obtain formal input from the construction team associated with the project into each deliverable and to take advantage of opportunities to improve construction efficiency. Parsons staff will evaluate the proposed construction at each submittal stage and provide a report of findings. Reports shall address project constraints, operations, schedules, navigation, and environmental features that may affect the construction and influence the design. Reports and comments produced by Parsons are to be checked per the internal checking procedures of this QMP.

8.2.6 Independent Technical Reviews

The design manager identifies all deliverables per the RFP that will require an independent technical reviews (ITR), which are performed to formally obtain input from a senior level engineer or technical expert are familiar with the project requirements but is independent of the preparation of the deliverable. ITRs are relevant for the following:

- Structure modeling and analysis design
- Longitudinal and transverse superstructure design and detailing
- Pier, deviation, and abutment diaphragms
- Special elements design and detailing 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
  - Precast cross frame details
  - Post-tensioned pier cap details
  - Integration of drainage system with superstructure and substructure details
  - Staged post-tensioning requirements
- Substructure design, cofferdam designs, and drilled-shaft design and detailing.

The ITR reviewer must have at least 10 years of recognized experience in the area of expertise required for the review. The design task manager for the deliverable will implement the review in accordance with the review comment procedure listed in the coordinating procedures section.

9.0 INTERNAL QUALITY ASSURANCE VERIFICATION AND AUDITS

Parsons will implement the monitoring, design reviews, witnessing analysis, and improvement processes necessary to demonstrate conformity of the product with the QMP and to improve the effectiveness of the quality system continually.
9.1 Quality Assurance Audits
Audits of each package will be performed prior to any submittal to the client to verify the compliance of the work product and design team to the QMP. Audit activities are planned, documented, and conducted in a manner to ensure adequate review of the QA procedure requirements. Audit activities, including resolution of deficiencies, will be documented and retained as quality records to provide means to monitor the quality program. Only the Parsons' QAM can authorize release of the product.

9.2 Control of Non-Conforming Work
During a quality audit, it may be determined that the work is not in accordance with the approved contract requirements, or the level of workmanship has produced a sub-standard end product. Parsons will ensure that products and services that do not conform to contract requirements are identified and controlled. Audits of each package will be performed prior to any submittal to the intended use or delivery. The general philosophy at Parsons is that a nonconformance should, if at all possible, be processed back through the individual or group that caused the nonconforming condition so that they may recognize the problem, learn from the mistake, and take action to prevent its reoccurrence. Nonconformities discovered during QA audits will be documented from the point of identification through corrective action and verification. Parsons' QC check and review prints, or QA audits, will be used for the rework of design products until they meet the specified requirements.

9.3 Corrective Action
Corrective action procedures will be used when conditions adverse to quality indicate a breakdown in controls established to ensure adherence to quality requirements. The following procedure is established to define requirements for the corrective actions.

When a quality audit finding (QAF) is identified, the QAM will prepare quality audit report that identifies the area to which the finding is directed and the originator of the audit or finding. A description of the conformed condition and statement regarding noncompliant condition will be included. Upon receipt of the QAF, the responsible organization will evaluate the actions required and respond within the time period specified. The responsible organization shall do the following:

- Identify the root cause of nonconformity.
- Establish the corrective action required.
- Establish the actions needed to prevent recurrence.

The QAM will evaluate the disposition and corrective action taken and advise the responsible organization of the acceptability or unacceptability of the actions. If the actions are unacceptable, the QAM will meet with the person or organization to resolve the issue or elevate the issue to management.

When corrective action activities are implemented and completed, the QAM will evaluate results of the corrective action, and close-out the QAF. Copies of the closed QAF will be distributed to the project manager, MnDOT, and the senior management of the organization responsible for the action. QAFs are quality records and will be maintained in accordance with approved written procedures.

9.4 Preventive Action
As a continuous improvement system, preventive actions are essential to a healthy QMP and to avoid unnecessary corrective action. Preventive action procedures are established to eliminate the causes of potential nonconformities to prevent their occurrence. Preventive action also takes the form of QC records, such as check prints, audit reports, and design corrective action procedures. These records will be used when conditions adverse to quality indicate an opportunity for improvement or a breakdown in established controls to ensure adherence review comments.

10.0 DEFINITIONS
Selected abbreviations and definitions for the terms used in this QMP. Common industry abbreviations, terms, and acronyms are assumed to be understood.

LIST OF ACRONYMS

- CADD: Computer-Aided Drafting and Design
- DM: Design Manager
- EOR: Engineer of Record
- ISO: International Organization for Standardization
- MnDOT: Minnesota Department of Transportation
- PM: Project Manager
- QA: Quality Assurance
- QAM: Quality Assurance Manager
- QAF: Quality Audit Finding
- QC: Quality Control
- QCM: Quality Control Manager
- QSP: Quality System Procedure
- RFI: Request for Information

LIST OF DEFINITIONS

The following is an alphabetized listing of terms and their accepted definitions for use with this plan:
Acceptance — Approval by authorized personnel of an item, facility or service as conforming to applicable requirements.

Acceptance Criteria — Specified limits placed on characteristics of an item, facility, process or service defined in codes, standards or other design documents.

Accuracy — The degree of conformance of a measurement to a recognized standard.

Audit — A documented activity performed in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence, that applicable elements of the quality assurance program have been developed, documented, and effectively implemented in accordance with specified requirements. An audit can include surveillance or inspection activities performed for the sole purpose of process control or product acceptance.

Auditor — Any individual who participates in the performance of an audit.

Back-checker — Person who reviews the checker’s comments and updates the document original. Preferably the back-checker should be the originator.

Basis of Design — The preliminary plan, standard drawings, criteria, parameters, and other design requirements upon which the detailed final design is to be based.

Certificate of Compliance — A document signed by a qualified party, attesting that materials, items or services are in accordance with specified requirements and accompanied by additional information to substantiate the statement.

Certification — The action of determining, verifying and attesting, in writing, to the qualifications of personnel, processes, procedures, materials, or items in accordance with applicable requirements. For an instrument, application of marker or label on instrument indicating the calibration status.

Checker — The person assigned by the Lead Designer to check documents developed by designers and drafters in that discipline.

Check Print — A copy of a Document Original in its final format used for the purpose of checking and recording additions, deletions, and corrections to the Document Original.

Configuration — Physical and functional arrangement of an item as defined in design documents and achieved in manufacture, fabrication or construction of that item.

Contract — The completed contract document with all prices, dates, signatures, and attachments included.

Controlled Document — A drawing, specification, calculation, record, report or other document where a change could affect another design.

Copy — A full or reduced scale reproduction, on photocopy, micro-fiche or microfilm, of the document as it existed in its original form in the project files.

Corrective Action — Measures taken to prevent conditions adverse to quality and, where necessary, to preclude or minimize repetition.

Design — Technical and management processes which commence with identification of design input and which lead to and include the issuance of design output documents.

Design Directives — The formal series of memoranda established to describe and convey drawings, criteria, parameters, or other design requirements subsequent to establishment of the original Bases of Design.

Design Document — A drawing, specification, calculation, record, report or other document, including shop drawings and special process procedures, which may be used for design, manufacture, fabrication, installation, testing, examination and certification of items.

Design Interface — The areas of interaction between design disciplines where one could invalidate the other’s design assumptions or affect the constructability of the finished design.

Design Input — Those criteria, parameters, bases, or other design requirements upon which detailed final design is based.

Design Output — Documents such as drawings, specifications, and other documents defining technical requirements of structures, systems, and components.

Design Revision — A revision to a drawing, specification, procedure, existing condition, or other design document during the course of design development, and prior to the release of said documents for bidding, procurement, manufacture, fabrication or construction.

Deviation — A specific written authorization, granted after a task has been initiated, to depart from a particular performance or design requirement of a specification, drawing or other documents.

Document — A single drawing or a logical compilation of related calculations, data, report text, design analyses, specification sections, cost estimates, meeting minutes or project related correspondence.

Document Original — The up-to-date original drawing, text, form, or other document type from which copies to be delivered to the client will be reproduced.

Engineer of Record — Clients design engineer, operating under their own QMP, responsible for producing the design, plans and other contract documents for Design.
**Finding** — A nonconformance; item of work or process not in conformance with the project requirements. No certifications can be issued until all Findings are resolved.

**Inspection** — A phase of Quality Control which by means of examination, observation or measurement determines the conformance of materials, supplies, components, parts, appurtenances, systems, processes or structures to predetermined quality requirements.

**Noncompliance** — A deficiency in performing an activity in accordance with prescribed policies, procedures or instructions which may, if not corrected, have an adverse effect on quality.

**Nonconformance** — A deficiency in characteristic, documentation, or procedure which renders the quality of an item unacceptable or indeterminate. Examples of nonconformance include: physical defects, test failures, incorrect or inadequate documentation, or deviation from prescribed processing, inspection, or test procedures.

**Observation** — Noncompliance; item of work or process not performed within the accepted standards of care, diligence, or best practices and that if not corrected, have an adverse effect on quality. Also used to identify an opportunity for improvement. Observations will not be cause to prevent the issuance of a certification.

**Originals** — The documents or records in the highest form in which they existed in the active project files. This might be carbon copies for outgoing correspondence, printed copies of a published document, original copies of calculations, quantity take-offs and other design analyses, original reproducible drawings and original resident engineer diaries and field records.

**Originator** — The engineer, architect, planner, designer, or other person who develops a specific document. In the case of drawings, the Originator is the individual who provides the design information, sketches and instructions to the drafter.

**Design** — Professional review focusing on the performance of professionals, with a view to improving quality, upholding standards, providing certification, or removing defects as early as possible to prevent defects from propagating through multiple phases and work products.

**Procedure** — A document that specifies or describes how any activity is to be performed. It may include specification of duties, functions and responsibilities, as well as methods to be employed, equipment or materials to be used, and sequence of operations.

**Qualification (Personnel)** — The characteristics or abilities gained through training or experience or both, as measured against established requirements such as standards or tests, that qualify an individual to perform a required function.

**Quality Assurance** — All those planned and systematic actions necessary to provide adequate confidence that a structure, facility, system, or component will perform satisfactorily in service.

**Quality Control** — Those activities by personnel outside of the Quality Assurance Department which implement the Quality Assurance Program by checking, reviewing and documenting the quality of services provided to MnDOT.

**Quality Record** — A record which furnishes documentary evidence of the required and obtained quality of items or activities affecting quality.

**Review Print** — Copy of the checked and updated Document Original developed by a single discipline, or consolidated from input of several disciplines, that is used for review by Project Engineers for each discipline involved in development of the document, by the Project or Design Manager, and by other reviewers the Project or Design Manager may designate. Term is synonymous with Review Draft when applied to report-type documents.

**Rework** — The process by which a nonconformance can be brought into conformance with the original drawing and specification requirements.

**Sign-Off Stamp** — A special stamp to be affixed on the face of document (or on the back of the document, if room is not available in front) to record who performed various checking and review activities and the dates the activities were completed.

**Software** — Computer Programs or sets of instructions formulated in any one of the programming languages. These instructions provide for transfer of data from and to the user as well as all mathematical operations necessary for the solution of a given task. For purposes of these procedures, software shall only mean Engineering or Management Applications Software.

**Standard** — The result of a particular standardization effort approved by recognized authority.

**Verifier** — Person who verifies that changes recommended by Checkers and accepted by the Backchecker have been made on the original document. Preferably the Checker should be the Verifier.
**Vincent Gastoni, PE**

**Project Manager**

**RELEVANT EXPERIENCE**

**I-90 Dresbach Bridges | Dresbach, MN | Independent Peer Review.** Vince is providing MnDOT the management and technical review services on MnDOT’s/WisDOT’s $180M 2600 ft. four-span segmental concrete I-90 Dresbach bridges to replace the existing bridge over the Mississippi River. Tasks include independent structural modeling, sectional analysis, pier and foundation review, and constructability reviews. **Project Value: $180 million.**

**TH 61 Hastings Bridge Design Build Project | Hastings, MN | Design Manager.** Vince is providing the design management for the new $120M four lane freestanding tied arch bridge carrying TH 61 over the Mississippi River. He is responsible for all design management activities, design scheduling, coordination with MnDOT Peer Review, supporting Agency and Stakeholder coordination, technical reviews and quality management. **Project Value: $120 million.**

**TH 52 Lafayette Bridge | St. Paul, MN | EOR/Design Manager.** Vince successfully delivered the $97M 16 span two steel box girder designs for the new TH 52 over the Mississippi River including the foundation designs. He is responsible for design management activities, design production, coordination with MnDOT Peer Reviewer, supporting MnDOT permitting activities and is currently providing construction support services. **Project Value: $97 million.**

**Lowry Avenue | Minneapolis, MN | Independent Review Manager.** Vince led the independent Peer Review of the $84M 450 ft. basket handle style steel arch and precast concrete tie over the Mississippi River. Under Vince’s leadership, his team provided detailed analysis of the principal arch and tie structural elements and foundations and included three dimensional analysis of complex elements. A through constructability review was also provided. **Project Value: $84 million.**

**South Wakota Bridge Construction | St. Paul, MN | CEI Manager/ Independent Review.** Vince provide the management and leadership for Parsons CEI team for the $120M post-tensioned concrete segmental box girder bridges carrying I494 over the Mississippi. Parsons provided construction engineering support as well as independent structural analyses peer review for the retrofit review for the redesign of the original design. **Project Value: $120 million.**

**I-35W St. Anthony Falls Bridge Reconstruction | Minneapolis, MN | Independent Peer Review.** Vince provided the management and engineering services to Mn/DOT for the independent review and CEI services for the $238M reconstruction of the I-35W Design Build project over the Mississippi River. Parsons was responsible for the segmental main river bridge independent analysis, foundation analysis and construction engineering oversight. **Project Value: $238 million.**

**TH62 I-35W Crosstown Reconstruction | Minneapolis, MN | Design Manager.** Vince provided the design management and is the Engineer of Record for two of the six precast segmental LRFD bridge designs in this $288M interchange. He was responsible for the design and development of the project plans and for the coordination with the other two consultant teams on the project as well as the final Bridge rating manual. **Project Value: $288 million.**

**San Mateo-Hayward Bridge | San Francisco Bay, CA | Caltrans Bridge Project Manager.** Vince was the Engineer of Record for the preliminary and final design for this new $115 million, five mile long precast prestressed concrete girder parallel to the existing structure over the San Francisco Bay. All components were precast concrete and supported on 42 inch driven precast concrete pile in deep soft muds and a high seismic area. **Project Value: $115 million.**

**New Carquinez Suspension Bridge | Vallejo, CA | Caltrans Bridge Project Manager.** Vince provided the oversight and management for the new, $180 million, 3,800-foot, three-span suspension bridge supported on 10 ft. drilled shafts across the Carquinez Strait. He coordinated all aspects of the design from the planning through final design including permitting, constructability reviews, seismic analysis and cost estimating and specifications. **Project Value: $180 million.**
Daniel M. Tassin, PE

Lead Bridge Design/Extradosed Superstructure

RELEVANT EXPERIENCE

Port Mann Bridge | Vancouver, BC Deputy | Chief Engineer. Detailed design of the 2073-m (6,801-ft)-long Port Mann Bridge in Vancouver, BC. The 65-m (213-ft)-wide superstructure consists of two five-lane decks, separated by a 10-m (32-ft) median where the central pylons are located. Each roadway consists of a composite structure with steel edge girders and floor beams, with precast concrete panels. The approach spans consist of three parallel precast segmental box girders with cantilever construction above the water and span-by-span construction on land. Engineer of Record for approach structures and portions of the cable-stayed main span. Design-Build Delivery. Project Value: $700 million.

Hodariyat Bridge | Abu Dhabi, UAE | Technical Director. The 1.3 km-long bridge provides six lanes of traffic and two walkways. It consists of a 36m-wide single cell concrete box girder with stiffening struts inside and outside the box. The 200m-long main span is supported by a single plane of stay cables. The 55m-long concrete approach spans are built by incremental launching, while the main spans are built in balanced cantilever with precast concrete segments. Design-Build Delivery. Project Value: $125 million.

Indian River Inlet | Delaware | Technical Director. The roadway includes four lanes of traffic with shoulders, a 12 ft sidewalk and a sand bypass system. The cable-stayed main bridge is 1750 ft long, with a 950 ft long main span. The superstructure components include concrete edge girders, floor beams and a concrete slab. It is supported by two vertical planes of stay cables anchored in the edge girders. Design-Build Delivery. Project Value: $125 million.

Autoroute 25 | Montreal, Quebec | Technical Director and Engineer-of-Record. Detailed design and construction engineering of the cable-stayed span over the Rivière des Prairies, part of the A25 extension from Montréal to Laval. This bridge is comprised of a 280-m (920-ft) composite main span and two 116-m (380-ft) side spans. Design-Build Delivery. Project Value: $461 million.

Pitt River Bridge | Vancouver, BC | Technical Director and Engineer-of-Record. Detailed design of this 380-m-long (1246-ft) cable-stayed bridge with a 190-m (623-ft)-long main span. The 45-m (148-ft)-wide roadway allows for seven lanes of traffic with a bike path and has a provision for eight lanes of traffic in the future. The bridge superstructure consists of a steel-concrete composite deck supported by three planes of stay cables in a “harp” arrangement. Design-Build Delivery. Project Value: $75 million.

Eleanor Schonell Bridge | Brisbane, Australia | Technical Director and Engineer-of-Record. Detailed design of this bridge across the Brisbane River in Australia. The 20-m-wide (66-ft) bridge carries two lanes for bus traffic and two sidewalks for pedestrians and bicycles and an allowance for future light rail. The main-cable stayed bridge consists of a 183-m (600-ft)-long main span and 74-m (243-ft)-long side spans. The steel/concrete composite superstructure is supported by two planes of stay cables in a harp arrangement. This bridge has won numerous awards including the ‘08 Consulting Engineering & Land Surveyors of California (CELSOC) Golden State Award (organization’s top honor) and the ‘02 Association of Consulting Engineers Australia (ACEA) Golden Award of Merit. Design-Build Delivery. Project Value: $50 million.

Second Vivekananda Bridge | Kolkata, India | Technical Director and Engineer-of-Record. Detailed design of this river crossing that will supplement the existing Vivekananda Bridge as part of a new 6.1-km (3.8-mi)-long toll way north of Kolkata, India. The project includes an 880-m (2,890-ft)-long main bridge crossing the Hooghly River with six lanes of traffic. The 29-m (95-ft)-wide structure includes seven 110-m (360-ft) spans and consists of a cable supported precast segmental concrete box girder, built in balanced cantilever. Design-Build Delivery. Project Value: $150 million.
Coast Meridian Overpass Project | Vancouver, BC | Technical Director and Engineer-of-Record. Detailed design of the Coast Meridian Overpass, which serves as a critical new transportation link between north and south Port Coquitlam. The project includes a new structure over the Canadian Pacific Railway yard and Lougheed Highway and is located in a high seismic zone. The 23.8 m-wide superstructure consists of deep twin steel box girders connected with floor beams and a composite concrete deck. It is supported by a central plane of stay cables anchored in steel pylons within the median. In order to maintain the railroad traffic during construction, the bridge is launched from the south abutment with a 40 m-long launching nose and temporary stay cables for the lead span. The structure is 580.35 m-long with 6 spans up to 125 m long. Design-Build Delivery.  

Project Value: $80 million.

Sound Transit Central Link Light Rail, Tukwila Segment | Seattle, WA | Technical Director and Engineer-of-Record. Detailed design of 4.4 mi (7 km) of elevated light-rail transit guideway. The total estimated construction cost for this project was US$ 230 million. The typical precast segmental superstructure was erected span-by-span with an overhead gantry. The project includes four long span structures, including the Duwamish River crossing with a maximum span of 350 ft (107 m). The long span structures are built in balanced cantilever.  

Project Value: $230 million.

Otay River Bridge | San Diego, CA | Project Director. Detailed design and construction engineering of the Otay River Bridge, part of the SR125 tollway south of San Diego. This is a high-level bridge crossing with pier heights up to 55-m (180-ft). The 1012-m (3,320-ft)-long bridge includes 12 spans with a maximum length of 90.5 m (297 ft). The bridge consists of twin variable depth box girders with a total width of 23.2 m (76 ft). The two box girders are erected in balanced cantilever with an overhead gantry. Design-Build Delivery.  

Project Value: $70 million.

Puente De La Unidad | Mexico | Technical Director and Engineer-of-Record. Detailed design of a 304-m (997-ft)-long bridge with a 200-m (656-ft) cable-stayed span. The elevation of the bridge is unique with a single inclined pylon and an asymmetrical harped stay cable configuration. The bridge supports four lanes of traffic along with a central pedestrian promenade. The width of the superstructure widens from 24 m (79 ft) to 33 m (108 ft) due to on/off ramps merges near the pylon. This bridge has won several awards, including the American Council of Engineering Companies (ACEC) Grand Award. Fast-Track Delivery.  

Project Value: $25 million.
Yidong (Eddie) He, PhD, PE, SE

Lead Bridge Design/Extradosed Superstructure

RELEVANT EXPERIENCE

TH 61 Hastings Bridge over Mississippi River Design-Build | Hastings, MN | Project Engineer. The project features a 545-foot free-standing tied-arch bridge that will be erected on barges and lifted 70 feet into place using strand jacks. The innovative design is the longest freestanding arch in North America, has a 100 year life, and utilizes a steel box arch rib with a post-tensioned concrete tie girder and a network hanger system. The approach structures to the bridge include a five-span full-depth solid cast-in-place post-tensioned slab structure to the south and a five-span precast concrete beam and deck structure to the north for an overall eleven-span, 1,938-foot structure length. Project Value: $120 million.

Lowry Avenue Bridge over the Mississippi River | Minneapolis, MN | Technical Director. Parsons performed the independent review of the 450-foot-long signature arch bridge located on County State Aid Highway No. 153 (Lowry Avenue North) over the Mississippi River. The bridge consists of a basket handle arch and a concrete post-tensioned deck. Project Value: $84 million.

I-35W St. Anthony Falls Bridge Reconstruction | Minneapolis, MN | Design Review. This $234 million design-build project includes new dual 1,223-foot-long five-lane bridges carrying I-35W over the Mississippi River. The new bridges replaced the original truss bridge that collapsed, tragically killing 13 people. Eddie’s role was design review lead for the main river bridge verification and review tasks, which consisted of 330-foot and 260-foot cast-in-place concrete box girder back spans with a 504-foot precast segmental main span erected in the cantilever method. Project Value: $238 million.

Christopher S. Bond Cable-Stayed Bridge over Missouri River Design-Build | Kansas City, MO | Technical Director. The $232 million project includes the design and construction of a landmark cable-stayed bridge over the Missouri River and the reconstruction of more than four miles of Interstate 29/35. The suspended portion of the bridge consists of a composite steel and concrete asymmetrical cable-stayed system with a main-span of 550 feet and a side span of 451.5 feet The single diamond-shaped pylon rises over 300 feet above the water. Project Value: $232 million.

Detroit River International Crossing | Detroit, MI | Engineer. The project involved the preparation of an environmental impact statement, environmental screening report, and engineering report for providing additional capacity across the Detroit River. Parsons’ role included design and engineering evaluation of complex cross border transportation systems, including long-span bridges, U.S. Customs inspection and toll plazas, connecting roadways, and complex interstate freeway interchanges. Eddie was involved in the cable-stayed bridge’s concept design. Project Value: $1 billion.

North Avenue Bridge | Chicago, IL | Lead Bridge Design Engineer. The project involved the design of a new signature bridge carrying North Avenue over the Chicago River. The bridge is a unique hybrid suspension/cable-stayed bridge that is 420 ft. long with a 252-ft. center span. Project Value: $25 million.

Martin Luther King Parkway Arch | Des Moines, IA | Technical Director. This project involved bridge-type study and design of a 280-ft.-span tied arch bridge carrying Martin Luther King Jr. Parkway over the Raccoon River. The ribs are freestanding steel trapezoidal boxes with no upper lateral bracing. The floor system consists of transverse steel beams and post tensioned concrete tie girders. The foundations consist of 6-ft.-diameter drilled shafts. Project Value: $30 million.

Construction Services for East Fork White River Bridge | Columbus, IN | Construction Engineer. Eddie provided construction engineering of this composite post-tensioned and concrete cable-stayed bridge with a 465-ft. span. Two planes of stays support the deck and a single pylon is comprised of 4-ft.-diameter steel pipe sections arranged in a quadrapod configuration. The deck is 80 ft. wide and accommodates four lanes of traffic and two pedestrian walkways. Each pylon leg is supported on a single battered drilled shaft. Project Value: N/A
Martin Furrer, PE, SE

Lead Bridge Design/Substructures

RELEVANT EXPERIENCE

TH 61 Hastings Bridge Design-Build | Hastings, MN | River Lead Structural Engineer. Martin is the lead structural engineer for the new $120 million bridge and approach roadway carrying TH 61 over the Mississippi River. The project features a 545-foot free-standing tied-arch bridge that will be erected on barges and lifted 70 feet into place using strand jacks. The innovative design is the longest freestanding arch in North America, has a 100 year life, and utilizes a steel box arch rib with a post-tensioned concrete tie girder and a network hanger system. The approach structures to the bridge include a five-span full-depth solid cast-in-place post-tensioned slab structure to the south and a five-span precast concrete beam and deck structure to the north for an overall eleven-span, 1,938-foot structure length. Project Value: $120 million.

South Wakota Bridge Construction Engineering Services | St. Paul, MN | Structural Engineer. Martin supported the on-site inspection team, reviewed superstructure shop drawings, and provided segmental bridge expertise during the independent check of the retrofit design. Parsons provided on-site construction engineering and inspection services for new dual bridges carrying I-494 over the Mississippi River. The bridges are segmental cast-in-place post-tensioned box girders with a total length of 576 meters (1,890 feet). Project Value: $120 million.

Christopher S. Bond Cable-Stayed Bridge over Missouri River Design-Build | Kansas City, MO | Lead Structural Engineer. Martin was the lead structural engineer and engineer-of-record for the 1,700-foot-long bridge. It features a 1,000-foot cable-stayed unit and steel plate girder approaches. The suspended portion is supported by a 350-foot-tall diamond-shaped pylon founded on eight 11-foot-diameter drilled shafts. The main span is 550 feet and the back span is 450 feet. The 130-foot-wide deck uses full-depth precast concrete panels and is supported by steel floor beams spaced at 16.7-feet. Project Value: $232 million.

Detroit River International Crossing EIS | Detroit, MI | Lead Structural Engineer. Martin was the lead structural engineer for the cable-stayed alternatives with spans ranging from 600 meters to 900 meters and an out-to-out cross-section width of 35 meters. Project Value: $1 billion.

US Route 20 over Mississippi River | East Dubuque, IL and Dubuque, IA | Structures. The project involves providing preliminary and final design of the US 20 crossing over the Mississippi River between Dubuque, Iowa, and East Dubuque, Illinois. The new two-lane viaduct is approximately 5,600 ft. in length, with an 850 ft. tied-arch bridge navigation span, and includes a 10 ft. wide bike path. The project, which has an overall length of 2.5 miles, also includes the design of a large single-point urban interchange on the Iowa side, modifications to the existing highway alignment, a railroad grade separation, and numerous other improvements. Martin is responsible for the design of the tied arch bridge. Project Value: $160 million.

I-39 Segmental Bridges over Kishwaukee River | Rockford, IL | Structural Engineer. The project involved the strengthening of the first two segmental box girder structures erected using the balanced cantilever method. The five-span, twin structures, with 250 ft. typical spans, exhibited significant web cracking in part caused by set-up problems with the epoxy in the segment joints during construction. Parsons’ idea to retrofit these structures with draped external post-tensioning internal to the box girders to reduce and actively control shear stresses was the winning proposal. Project Value: $5 million.

Missouri River Pedestrian Bridge Design-Build | Omaha, NE | Bridge Check Engineer. Martin led the independent check for the final design of this S-shaped, 516-ft.-span steel cable-stayed bridge over the Missouri River. Each pylon is supported on a single 10-ft. diameter drilled shaft and the total bridge length is 2,000 ft. The project is complete and was contracted using the design-build delivery method. Project Value: $738,000.
Jeff Cavallin, PE
Lead Bridge Designer/Segmental Superstructure

RELEVANT EXPERIENCE

I-90 Dresbach River Bridges Peer Review | Winona County, MN | Lead Technical Specialist. Jeff is responsible for the technical coordination and execution of Parsons’ design peer review modeling and analysis services for both of the main river crossing structures. This includes performing an independent design of the post-tensioned concrete segmental box girders as well as one of the river pier foundations, and providing an independent set of calculations and bridge load ratings. He is also coordinating peer review tasks of the project design criteria, bridge design plans, bridge load rating, as well as an independent constructibility review. He is also providing on-site segmental bridge software/design training to Mn/DOT as well as acting as an advisor to the Department and providing support as necessary in its review and management of the final construction plans, specifications and rating manual. Project Value: $180 million.

TH 61 Hastings Bridge Design-Build | Hastings, MN | Principal Bridge Engineer. The project features a 545-foot free-standing tied-arch bridge that will be erected on barges and lifted 70 feet into place using strand jacks. The innovative design is the longest freestanding arch in North America, has a 100 year life, and utilizes a steel box arch rib with a post-tensioned concrete tie girder and a network hanger system. The approach structures to the bridge include a five-span full-depth solid cast-in-place post-tensioned slab structure to the south and a five-span precast concrete beam and deck structure to the north for an overall eleven-span, 1,938-foot structure length. Jeff served as Parsons lead bridge design engineer for the south approach segment of the project. Project Value: $120 million.

South Wakota Bridge Construction Engineering Services | South St. Paul and Newport, MN | On-Site Construction Engineer. Parsons provided the Construction Engineering Inspection services team for the new five span 1,890 ft. long Wakota cast in-place segmental bridge carrying Interstate 494 over the Mississippi River in South St. Paul, Minnesota. Parsons also provided the independent review of the redesign of the original design. Jeff was responsible for providing on-site construction administration support for the segmental bridge structure, including reviewing all contractor shop drawings and submittals, segment geometry control procedures, and related design support. He performed reviews and provided recommendations to the owner for contractor requests for information (RFI) documents during construction and assisted with verifying segmental erection procedures, including post-tensioning system installation, stressing, and grouting field operations. Project Value: $120 million.

I-35W St. Anthony Falls Bridge Reconstruction | Minneapolis, MN | Sr. Bridge Design Engineer. Jeff was responsible for bridge design verification modeling and the analysis of main river crossing structures and post-tensioned concrete segmental box girders, including performing independent peer reviews of bridge design calculations and drawings. He also provided on-site design verification support to Mn/DOT bridge inspection staff during construction. Project Value: $238 million.

TH62 I-35W Crosstown Reconstruction | Minneapolis, MN | Design Manager. Jeff coordinated and led all design, analysis, detailing, final plans and bridge rating for two of the six precast segmental LRFD bridge designs in this $288M interchange. Project Value: $288 million.

Sidney Lanier Bridge | Brunswick, GA | Lead Project Contact. The project involved construction of a concrete segmental cast-in-place cable-stayed bridge with a main span of 1250 ft. Jeff was the lead project contact during superstructure construction developing computer models for both construction and wind buffeting load checks, verifying capacities of bridge members during construction, finalizing detailed erection sequences, generating cambered geometry, and determining stay-cable stressing forces and elongations. Project Value: $64,000
Christopher M. Hall, PE

Lead Quality Check Engineer

RELEVANT EXPERIENCE

Port Mann Bridge | Vancouver, BC | Project Engineer. Chris was the Project Engineer for detailed design of the 2073-m (6,801-ft)-long Port Mann Bridge in Vancouver, BC. The 65-m (213-ft)-wide superstructure consists of two five-lane decks, separated by a 10-m (32-ft) median where the central pylons are located. Each roadway consists of a composite structure with steel edge girders and floor beams, with precast concrete panels. The approach spans consist of three parallel precast segmental box girders with cantilever construction above the water and span-by-span construction on land. Engineer of Record for approach structures and portions of the cable-stayed main span. Design-Build Delivery. Project Value: $700 million.

Coast Meridian Overpass Project | Vancouver, BC | Project Engineer. The project includes a new structure over the Canadian Pacific Railway yard and Lougheed Highway and is located in a high seismic zone. The 23.8 m-wide superstructure consists of 2.9 m deep twin steel box girders connected with floor beams and a composite 0.23 m concrete deck. It is supported by a central plane of stay cables anchored in steel pylons within the median. In order to maintain the railroad traffic during construction, the bridge is launched from the south abutment with a 40 m-long launching nose and temporary stay cables for the lead span. The structure is 580.35 m-long with 6 spans up to 125 m long. Project Value: $80 million.

Pitt River Bridge | Vancouver, BC | Project Engineer. This new bridge will replace two existing 2-lane swing span bridges on the Pitt River connecting the municipalities of Pitt Meadows and Port Coquitlam. The roadway allows for seven lanes of traffic with a bike path and has a provision for eight lanes of traffic in the future. The superstructure width varies from 40.5 m to 48 m in the initial configuration. The bridge superstructure consists of a steel-concrete composite deck supported by three planes of stay cables in a “harp” arrangement. The bridge is supported on large diameter piles anchored in the till with pile caps at water level. Project Value: $75 million.

Second Vivekananda Bridge | Kolkata, India | Lead Check Engineer. Detailed design of this river crossing that will supplement the existing Vivekananda Bridge as part of a new 6.1-km (3.8-mi)-long toll way north of Kolkata, India. The project includes an 880-m (2,890-ft)-long main bridge crossing the Hooghly River with six lanes of traffic. The 29-m (95-ft)-wide structure includes seven 110-m (360-ft) spans and consists of a cable supported precast segmental concrete box girder, built in balanced cantilever. Design-Build Delivery. Project Value: $150 million.

Hunts Bay Bridge | Jamaica | Project Engineer. The bridge is 26.6 m-wide and carries six lanes of traffic with shoulders. The maximum span length is 45 m and the superstructure consists of four composite steel-concrete box girders with a transversely post-tensioned top slab. The bridge is subjected to high seismic loads. The bridge superstructure was launched from the abutment with a temporary steel nose. The concrete deck was built prior to launching except for the lead span that was completed after completion of launching. Project Value:$14 million.

Sound Transit Central Link Light Rail, Tukwila Segment | Seattle, WA | Project Engineer. Chris was responsible for the detailed design of 4.4 miles of elevated LRT guide-way. The total estimated construction cost for this project is US$ 230 million. The typical precast segmental superstructure is erected span-by-span with an overhead gantry. The project includes four long span structures, including the Duwamish River crossing with a maximum span of 350 ft. The long span structures are built in balanced cantilever. Project Value: $330 million.

Puente De La Unidad | Mexico | Project Engineer. Detailed design of a 304 m (997 ft)-long bridge with a 200 m (656 ft) cable-stayed span. The elevation of the bridge is unique with a single inclined pylon and an asymmetrical harped stay cable configuration. Project Value: $25 million.

Skytrain Rapid Transit Project 2000 | Vancouver, BC | Bridge Designer and Substructure Task Leader. The project includes single and twin track guideways and nine stations in a moderate seismic zone. The span lengths are typically 37 m with special spans up to 90 m. Span-by-span segmental construction with overhead trusses is typically used except for the long spans, which are built by the balanced-cantilever method. The project schedule was exceptionally tight with precasting of the guideway segments starting four months after notice to proceed for design. Responsible for detailed design of piers and foundations. Tasks included seismic and conventional design and analysis for the superstructure and foundation. Project Value: $320 million.
Tom Stelmack, PE, SE

Quality Assurance Manager

RELEVANT EXPERIENCE

Sheikh Khalifa Bridge | Abu Dhabi, UAE | Lead Structural Engineer – Main Span. Parsons provided concept, preliminary, and final design engineering services for this 1450 m long and 57.4 m wide bridge. The structure was constructed utilizing a combination of cast-in-place sequential balanced cantilever and incrementally launched constructed methods. Tom was responsible for leading the design team for the three span main span unit with a main span of 200 m and for the review/checking of the segmental approach spans. Project Value: $225 million.

Maroon Creek Bridge Replacement | Aspen, CO | Project Manager. The project involved final design and construction services for the 620-foot-long structure on SH 82 that features a 270-foot main span 100 feet above the Maroon Creek basin. Tom served as the Project Manager and lead structural engineer for the structure selection, final design, and construction services. Project Value: $14 million.

Woodrow Wilson Memorial Bridge over the Potomac River | Alexandria, VA | Project Engineer. Parsons was selected to provide design services for this 6,000-foot-long replacement structure for the Woodrow Wilson Memorial Bridge. Tom was responsible for leading the design and drawing production for the Maryland approach V-piers and the special segments providing the connection to the V-pier horizontal tie beams. Project Value: $680 million.

DART Orange Line Project | Dallas, TX | Segment Structures Design Lead. The 14-mile Orange Line is a key component of a regional rail expansion that will lead to the growth of DART’s rail network to 90 miles by 2014. Tom was the structures design lead for the Trinity River Bridge, a key component of the project. The bridge included a 260 ft. span over the levy constructed using a precast spliced girder design. Tom was also the lead of the independent review for the remaining segment structures. Project Value: $435 million.

Erwin Allanic, PE

Substructure Engineer

RELEVANT EXPERIENCE

Hodariyat Bridge | Abu Dhabi, UAE | Project Engineer. The 1.3 km-long bridge provides six lanes of traffic and two walkways. It consists of a 36m-wide single cell concrete box girder with stiffening struts. The 200m-long main span is supported by a single plane of stay cables. The 55m-long concrete approach spans are built by incremental launching. Responsible for the detailed design and construction engineering of the approach & main span structures. Project Value: $125 million.

Pitt River Bridge | Vancouver, BC | Senior Bridge Engineer. Detailed design of this 380 m long cable stayed bridge with a 190 m long main span. The roadway allows for seven lanes of traffic with a bike path and has a provision for eight lanes of traffic in the future. The bridge superstructure consists of a steel-concrete composite deck supported by three planes of stay cables in a “harp” arrangement. The bridge is supported on large diameter piles anchored in the till with pile caps at water level. Technical lead for the design of the deck, stays and pylons. Provided technical assistance on-site for main span erection. Project Value: $75 million.

Eleanor Schonell Bridge | Brisbane, Australia | Senior Bridge Designer. The 20 m-wide bridge carries two lanes of vehicular traffic and two sidewalks for pedestrians and bicycles with provision for future light rail. The main cable stayed bridge consists of a 183 m-long main span and 74 m-long side spans. The steel/concrete composite superstructure is supported by two planes of stay cables with a harp arrangement. The concrete pylons rest on concrete pile caps at water level supported with 1.5 m diameter bored piles. Responsible for detailed design of composite edge girders. Provided technical assistance on-site for main span erection. Project Value: $50 million.
Warren Hallam

Construction Engineer

RELEVANT EXPERIENCE

Elwha River Bridge Replacement | Port Angeles, WA | Construction Manager. The project work entails reconstruction of both approaches, including structural earth walls, paving, guardrail, storm drainage, and construction access road improvements. The superstructure consists of 30 cast-in-place segments with depths ranging from 8 ft. to 15 ft. Seven segments are supported by falsework. The deck is 590 ft. long by 28 ft. wide. Project Value: $16.3 million.

8th Street Bridge Replacement | Port Angeles, WA | Construction Manager. The project entailed the removal of existing wooden truss bridges that span Tumwater Creek and Valley Creek. The bridges were replaced with a new series of W83G five-span pre-stressed concrete girder bridges. Warren was responsible for procuring equipment and manpower for the project and implementing construction work methods for field crews. Project Value: $18.8 million.

Dresbach Bridge Peer Review | St. Paul, MN | Bridge Technical Specialist. The review included superstructure spans 1-4 and substructure pier 2. The design was reviewed for concurrence with design and load rating criteria; the 30 percent design and constructability review; the 60 percent design and constructability review, with independent calculations, checking moments, shear and stresses at segment joints or other appropriate locations along girder lines and all primary connections, and other points of interest; the 95 percent design constructability review; a special provisions review; and a load rating and rating manual review. Project Value: $180 million.

Craig Johnson, PE

Hydraulics Engineer

RELEVANT EXPERIENCE

Central Corridor Light Rail Transit | Minneapolis and St. Paul, MN | Survey Lead. Managed survey team for right of way and field surveying and helped prepare and coordinate utility and general civil work for 9-mile urban corridor in Minneapolis and St. Paul, MN. Project Value: $957 million.

TH 212 Advanced Design | Chaska, MN | Hydraulics Lead. Managed hydraulic and hydrologic design for two of three segments of the preliminary design phase for Trunk Highway 212 extension from Chaska to Norwood Young America, MN. Project Value: $200 million.

Blue Lake/Seneca Wastewater Treatment Plants | Eagan, MN | Design Lead. Managed design team for civil site work and modifications at the Seneca WWTP in Eagan, MN. Managed design team for preliminary civil site work and flood control issues from the Blue Lake WWTP in Shakopee, MN. This included coordinating with cities, counties, the department of natural resources, the Army Corp of Engineers, and various other agencies for regulations and design criteria. Project Value: $164 million.

Fridley Filtration Plant | Fridley, MN | Design Lead. Managed design team for preliminary civil site work and survey work for a water supply improvements project in Fridley, MN. Required coordination with both the city of Fridley and Minneapolis, the Department of Natural Resources, the Mississippi Water Management Organization, and others to comply with rules and regulations for the project site. Project Value: $5 million.

I-494 Design/Build Expansion | Eden Prairie, MN | Drainage Design. Prepared roadway drainage design for I-494 design/build reconstruction and expansion for 11-mile segment from Eden Prairie to Minnetonka, MN using GeoPAK Drainage software. Which required coordination with the Minnesota Department of Transportation for the highway sections and with the local cities for adjacent road connections and crossings. Project Value: $137.5 million.
**Faith E. Baum, IALD, IES, LC, LEED®AP**

*Bridge Aesthetic Lighting*

**RELEVANT EXPERIENCE**

**John James Audubon Bridge | St. Francisville, LA | Principal-In-Charge/Lead Designer.** The lighting for the John James Audubon Bridge is designed to respect the surrounding environment while revealing the dramatic forms of the cable arrays and pylons. Illumination of the cable arrays is achieved with a low level of light at the base of the cables, softly revealing the fan-shaped cable arrays and suggesting the grandeur and beauty above.  *Project Value: $409 million.*

**Cypress Avenue Bridge | Redding, CA | Principal-In-Charge/Lead Designer.** Illumination Arts worked with bridge engineers, a bridge architect and glass designers to develop the lighting for 18' high glass lanterns and entry monuments. A three dimensional puzzle of engineering and artistry, these glowing beacons integrate curved panels of cast and dichroic glass, illuminated internally with a complex structure of cold cathode lamps. In addition, IA designed the lighting for the bridge itself, creating a unique nighttime image to add to Redding’s list of signature structures.  *Project Value: $62 million.*

**Veteran’s Glass City Skyway (Maumee River Crossing) | Toledo, OH | Project Manager/Lead Designer.** Working closely with the engineering design team, the community and the Toledo Arts Commission, the lighting concept developed for this signature bridge reflects Toledo’s history as the “Glass Capital of the World”. Through a series of public workshop sessions, a final bridge design was selected that centers around a glass enclosed pylon that glows with colored lighting, creating a playful and unique nighttime landmark for the city of Toledo. This project was designed by IA Principal, Faith Baum, during her tenure with her previous firm.  *Project Value: $237 million.*

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**Doug Baker, PE**

*Geotechnical Engineer*

**RELEVANT EXPERIENCE**

**Broadway Bridge | Daytona Beach, FL | Geotechnical Project Manager.** Realignment and replacement of the Broadway Bridge over the Halifax River. Plans included precast pile and drilled shaft foundation options. Artesian conditions and scour were evaluated for the bridges. Also solved groundwater issue due to vertical curve at west abutment by recommending a two feet thick gravel drainage layer at the touchdown area, with drains to the river.  *Project Value: $40 million.*

**State Road 951, Jolley Bridge, Design/Build | Collier County, FL | Geotechnical Engineer.** Geotechnical engineering evaluation for roadway widening, stormwater, retaining walls, and bridge over Big Marco Pass. Foundations were non-redundant 60 inch diameter drilled shafts with 1400 to 1800 ton design loads.  *Project Value: $60 million.*

**Clearwater Cable-Stay Pedestrian Bridge over Mandalay Channel | Pinellas County, FL | Geotechnical Engineer.** Geotechnical evaluation included scour recommendations. 3 span cable-stay suspension bridge over Mandalay Channel with an overall length of approximately 320 feet. Tower bents included 72 inch diameter non-redundant drilled shafts 1380 ton design loads.  *Project Value: $7 million.*

**S.R. 804 (Boynton Beach) Bridge | Boynton Beach, FL | Geotechnical Engineer.** Subsurface exploration and geotechnical engineering evaluation and scour for 330 foot 4 span bascule bridge with architecturally complex features constructed over compressible organic soils. Intermediate and bascule piers included 72 inch diameter shafts that were evaluated for scour, axial, and lateral capacities including ship impact.  *Project Value: $30 million.*

**S.R. 417 over Lake Jesup | Seminole County, FL | Geotechnical Engineer.** Subsurface exploration and recommendations for two 6,300 foot-long bridges. Analysis included placement of foundations in artesian pressures 20 feet above the lake surface.  *Project Value: $150 million.*
Burton Dryden, PE

Lead Electrical Engineer

RELEVANT EXPERIENCE

TH 61 Hastings Bridge over Mississippi Design-Build | Hastings, MN | Electrical Engineer. The project features a 545-foot free-standing tied-arch bridge that will be erected on barges and lifted 70 feet into place using strand jacks. The approach structures to the bridge include a five-span full-depth solid cast-in-place post-tensioned slab structure to the south and a five-span precast concrete beam and deck structure to the north for an overall eleven-span, 1,938-foot structure length. **Project Value: $120 million.**

TH 52 Lafayette Bridge over the Mississippi River | St. Paul, MN | Design Manager. Parsons performed the final design of the Steel Box Girder Alternative for the replacement of the TH 52 over the Mississippi River in downtown St. Paul. The new twin 16 span structures included a main river crossing section main span of 362 ft, haunched trapezoidal steel boxes, and highly aesthetic pier designs. **Project Value: $185 million.**

John James Audubon Bridge, Design-Build | St. Francisville, LA | Electrical Engineer. The project involves the design and construction of the longest cable-stayed bridge in North and South America, with a main span of 1,583 ft, crossing the Mississippi River near St. Francisville, Louisiana. Burt was responsible for the design of cable-stay bridge electrics and approach roadway and bridge lighting. **Project Value: $347 million.**

Williamsburg Bridge, Reconstruction | New York, NY | Project Manager/Electrical Engineer. The project involves construction support services, which entails installation and integration of the Intelligent Transportation System (ITS) at the Traffic Management Center. Burt provided electrical design support and problem resolution for the bridge traveler control system, collector assemblies, and navigation light package. **Project Value: $1 billion.**

Mark Dierling, PE

Civil/Permitting Coordinator

RELEVANT EXPERIENCE

CSAH 14 Thrush to Crane Streets | Anoka County, MN | Project Manager. Tasks on this project include completion of the preliminary design, environmental documentation, construction plans, specifications, and the engineer's estimate of construction costs. Mark is responsible for all aspects of project delivery including assignment of staff resources, coordination with project stakeholders, public involvement, and quality control. **Project Value: $676,000.**

TH 7/Louisiana Avenue Interchange | St. Louis Park, MN | Project Manager. Mark is leading the concept development and alternatives analysis for the reconstruction of the intersection of Highway 7 and Louisiana Avenue in St. Louis Park. Working with a wide range of project stakeholders, including one-on-one meetings with adjacent property owners, Mark is leading an extensive community outreach and education program for the project. Upon completion of the alternatives analysis phase this fall, Mark will be responsible for completing the geometric layout and environmental assessment for the preferred interchange concept. **Project Value: $1.8 million.**

TH 77 Managed Lanes Corridor Study | Bloomington, MN | Project Manager. Tasks for this project include study alternatives to reduce congestion on Highway 77 (Cedar Avenue) from 138th Street in Apple Valley to Old Shakopee Road in Bloomington. Concepts being considered include traditional approaches like an additional through lane and better using underutilized existing infrastructure by creating a contra flow lane through the use of moveable barrier technology. Primary tasks include traffic forecasting, CORSIM modeling and analysis, and the development of concept layouts. **Project Value: $689,000.**

I-94/CSAH 19 and CSAH 37 Interchange Improvements | Albertville, MN | Project Manager. The proposed improvements include the new exit and entrance ramps at CSAH 19 and the addition of collector-distributor roads between CSAH 37 and CSAH 19. As Project Manager, Mark is responsible for all aspects of the project delivery including monitoring the schedule and budget, assignment of staff resources, coordination with the City of Albertville and other stakeholders, and quality control of deliverables. **Project Value: $161,000.**
Bradley Touchstone, AIA

Visual Quality Coordinator

RELEVANT EXPERIENCE

TH 61 Hastings Bridge over Mississippi Design-Build | Hastings, MN | Bridge Architect and Visual Quality Manager. The project features a 545-foot free-standing tied-arch bridge that will be erected on barges and lifted 70 feet into place using strand jacks. The approach structures to the bridge include a five-span full-depth solid cast-in-place post-tensioned slab structure to the south and a five-span precast concrete beam and deck structure to the north for an overall eleven-span, 1,938-foot structure length. Bradley is the bridge architect and visual quality manager for the design-build replacement. 

Project Value: $120 million.

TH 52 Lafayette Bridge over the Mississippi River | St. Paul, MN | Bridge Architect. As a design team member for the replacement of the Lafayette Bridge over the Mississippi River in downtown St. Paul, Bradley led the preliminary architectural design and public involvement process for the main river bridge on the $260 million project. 

Project Value: $185 million.

Columbia River Crossing Project | Portland, OR/Vancouver, WA | Bridge Architect. Bradley was the bridge architect for the design team and led the Urban Design Advisory Committee to design resolution for the 5.4 mile interstate highway project with a major crossing of the Columbia River and an iconic bridge design over North Portland Harbor. 

Project Value: $340 million.

Christopher S. Bond Cable-Stayed Bridge over Missouri River Design-Build | Kansas City, MO | Bridge Architect. Bradley was the bridge architect for the design-build team constructing the kcICON Bridge. The Missouri DOT gave a Community Advisory Group 20 percent of the total selection score to ensure that the bridge design met the expectations of the greater Kansas City area. Bradley led a community involvement and aesthetic design process for the design-build team of Paseo Corridor Constructors, resulting in a design that was awarded 95 percent of the potential points for aesthetics, secured the contract, and opened the door to an entirely new level of public input for major bridge projects. 

Project Value: $232 million.

John James Audubon Bridge over the Mississippi River Design-Build | St. Francisville, LA | Bridge Architect. Bradley was the bridge architect for the design-build team for the longest cable-stayed bridge in North America. 

Project Value: $347 million.

Autoroute 25, Phase 3 Project | Montreal, Canada | Bridge Architect. Bradley was the bridge architect for the design-build team for the completion of A-25 in Montreal. The project includes a cable-stayed river crossing and 11 land structures. 

Project Value: $461 million.

US 90 Bridge over Biloxi Bay Design-Build | Biloxi/Ocean Springs, MI | Bridge Architect. Bradley was the bridge architect for the design-build team for the 2007 post-Hurricane Katrina emergency replacement of the US 90 Bridge. 

Project Value: $339 million

Maroon Creek Bridge | Aspen, CO | Bridge Architect. Bradley served as the Bridge Architect for this historic bridge replacement project in a very environmentally sensitive location. Bradley provided design and presentation services for the extensive public involvement process. 

Project Value: $14 million

Detroit River International Crossing | Detroit, MI | Bridge Architect. Bradley is the Bridge Architect working in support of the EIS for this international crossing between the U.S. and Canada. 

Project Value: $1 billion.

Sheikh Khalifa Bridge | Abu Dhabi, U.A.E | Bridge Architect. Bradley was the Bridge Architect for the new bridge connecting Abu Dhabi, U.A.E., and Saadiyat Island. This new bridge is a unique asymmetric “V” pier design that will carry 12 traffic lanes and 2 light rail lines. 

Project Value: $226 million.
RELEVANT EXPERIENCE

TH 62/I-35W Crosstown Segmental Bridges | Minneapolis, MN | Technical Director. This project included providing final design and contract documents for two precast segmental post-tensioned box girder bridges to be erected using the balanced cantilever method. The ramp bridges are part of the $288 million Crosstown Interchange project. Both bridges are curved and have a typical span length of 200 feet. Pat was responsible for the technical direction and oversight of the preliminary and final designs. Project Value: $288 million.

Christopher S. Bond Cable-Stayed Bridge over Missouri River Design-Build | Kansas City, MO | Design Manager. The design-build project includes the design and construction of a landmark bridge over the Missouri River and the reconstruction of more than 4 miles of I-29/35. The new bridge is nearly 138 feet wide and approximately 1,700 feet long, including the approach spans. The suspended portion of the bridge consists of a composite steel and concrete asymmetrical cable-stayed system with a main-span of 550 feet and a side span of 451.5 feet. Pat’s responsibilities included project management, design-build coordination, task force implementation, and design oversight. Project Value: $232 million.

US 90 Bridge over Biloxi Bay Design-Build | Biloxi and Ocean Springs, MS | Design Manager. The design-build project involved new dual 1.6-mile-long bridges over the bay, which carry three lanes of traffic in each direction. The new bridge consists of a 250-foot navigation span comprising spliced bulb-tee girders that vary in depth from 12 feet at the piers to 6.5 feet at the mid-span. The total project length was 2.4 miles and also included roadway, drainage, utilities, and maintenance-of-traffic work. Pat was responsible for project management, design-build coordination, task force implementation, and design oversight. Project Value: $339 million.

Detroit River International Crossing EIS | Detroit, MI | Technical Director. The project involves the preparation of an EIS, an environmental screening report, and an engineering report for providing additional capacity across the Detroit River. Pat’s responsibilities included technical direction and oversight for development and an analysis of illustrative bridge and tunnel alternatives for 15 different alignments. He was also responsible for technical direction for the preliminary design of practical alternatives to select the preferred alternative. Project Value: $1 billion.

Missouri River Pedestrian Bridge | Omaha, NE | Principal-in-Charge. The project involves an independent design review for the 1,012 ft. long, S-curved, pedestrian, cable-stayed bridge, including the 12-span approach structure supported on twin steel girders. The bridge was let using the design-build method and Parsons is reviewing the design documents for conformance with the contract documents, standard industry practice, maintainability, and durability. Pat was responsible for the evaluation of the design/build team’s proposals, project oversight, and technical direction. Project Value: $20 million.

I-39 Segmental Bridges over Kishwaukee River | Rockford, IL | Technical Director. The project involved the strengthening of the first two segmental box girder structures erected using the balanced cantilever method. The five-span, twin structures, with 250 ft. typical spans, exhibited significant web cracking in part caused by set-up problems with the epoxy in the segment joints during construction. Parsons’ idea to retrofit these structures with draped external post-tensioning internal to the box girders to reduce and actively control shear stresses was the winning proposal. Pat was responsible for client relations, technical direction, and project oversight of the strengthening study and final design. He also identified and developed viable strengthening strategies for the project. Project Value: $5 million.

South Wakota Segmental Bridges over Mississippi River | St. Paul, MN | Principal-in-Charge. Parsons provided on-site construction engineering and inspection services for new dual bridges carrying I-494 over the Mississippi River. The bridges are segmental cast-in-place, post-tensioned, box girders with a total length of 1,890 ft. The 266 ft. end spans are cast on falsework and the 466 ft. main spans are built-in cantilever using form travelers. Pat’s responsibilities included project oversight, client relations, and technical direction for independent checking. Project Value: $120 million.
Yves Gauthier, PE
*Technical Specialist/Executive Committee*

**RELEVANT EXPERIENCE**

**VN-80 Verrazano Narrows, Upper Level | New York, NY | Electrical Engineer.** The project involves relocating utilities affected by the deck replacement with new standpipe branch lines; new lighting; and a communication control system, including security access control, data backbone, and the supervisor control and data acquisition (SCADA) system. *Project Value: $300 million.*

**Pragati Maidan Bridge | Delhi, India | Technical Director.** Design of the extradosed bridge with a 91m main span and an U-shaped open section. The bridge was opened to traffic in November 2006. *Project Value: N/A*

**Chambal Cable-Stayed Bridge | India | Technical Director.** Design of 350m main span with a single plane of stay cables and 30m wide concrete box section with two webs and transverse stiffening cross beams (design in progress). *Project Value: N/A*

**Ernest Lyons Bridge | Florida | Technical Director.** Preliminary and Final design of the Precast segmental bridge with 33 spans, 46 m long each. *Project Value: N/A*

**Gerald Desmonds Bridge | California | Technical Director.** for the preliminary design of the Cable stayed bridge with 310m main span and more than 2 km long approach viaducts. *Project Value: N/A*

**Rion-Antirion Bridge | Greece | Technical Consultant.** Construction of the Longest multi span cable stayed bridge with 3 main spans of 560m each and a steel composite deck. *Project Value: N/A*

Benjamin Soule, PE
*Segmental Engineer*

**RELEVANT EXPERIENCE**

**South Road Superway | Adelaide, Australia | Project Engineer.** Detailed design and construction engineering for The South Road Superway that will bring a critical congestion relief to Adelaide. It will serve as a direct connector from the A13 Highway to the industrial area to the north of the city, thereby separating the tandem trailer traffic from the surface streets. The project consists of 3 km (1.86 mi) of elevated roadway in a twin box girder configuration. The bridge deck will be precast segmental, erected using an overhead gantry. Typical spans are 66 m (216 ft). *Project Value: $500 million.*

**Indian River Inlet | DE | Project Engineer.** Bridge carries the SR1 Coastal Highway across the Indian River Inlet in Delaware. The roadway includes four lanes of traffic with shoulders, a 12 ft sidewalk and a sand bypass system. The cable-stayed main bridge is 1750 ft long, with a 950 ft long main span. The superstructure components include concrete edge girders, floor beams and a concrete slab. It is supported by two vertical planes of stay cables anchored in the edge girders. Engineer of Record responsible for the design of the towers, stays and stay anchors, and portions of the concrete deck. Design-Build Delivery. *Project Value: $125 million.*

**Autoroute 25 | Montreal, Quebec | Project Engineer.** Detailed design and construction engineering of the cable-stayed span over the Rivière des Prairies, part of the A25 extension from Montréal to Laval. This bridge is comprised of a 280 m composite main span and two 116 m side spans. Responsibilities include design of the main pylons, independent analysis and verification of the superstructure, and advanced analysis of seismic and construction loads. Design-Build Delivery. *Project Value: $461 million.*

**Otay River Bridge | San Diego, CA | Project Engineer.** Final design and construction engineering of a 1-km (3280-ft)-long, 12-span continuous, precast segmental bridge built in a high seismic region using the balanced cantilever method. Engineer of Record responsible for final design and construction engineering. *Project Value: $75 million.*
Mark A. Hunter, CET

Wind Engineering

RELEVANT EXPERIENCE

VN-80 Verrazano Narrows Bridge Renovation | New York, NY | Project Manager. The bridge was originally constructed in the early 1960's and work is now proposed to replace the upper roadway deck and upgrade the lighting on the bridge. RWDDI conducted studies to analyze the wind climate and wind turbulence properties undertaken at the bridge site, The Narrows between Staten Island and Brooklyn, New York. The results were used in subsequent analyses to assess the aerodynamic stability of the bridge and to determine wind loads for structural design during construction and after completion of the deck replacement. Project Value: $300 million.

Tacoma Narrows Bridge | Tacoma, WA | Project Manager. The bridge consists of a 854 m main span and side spans of 366m and 426m. The main structure of the existing and proposed bridges consists of steel trusses suspended from two towers by suspension cables and hangers. The wind engineering studies undertaken by RWDDI included design wind speeds for aerodynamic stability and structural design. A second analysis to determine the wind speed and turbulence properties at the site. Sectional model study was conducted to provide the design team with early feedback on whether or not the proposed cross-section would have sufficient aerodynamic stability. These tests also provided the static force coefficients for wind loading calculations and examined the effects of modifications to the existing bridge and the impact of the proposed bridge on the aerodynamic stability of the existing bridge. Project Value: $615 million.

Blennerhassett Bridge | Blennerhasset, WV | Project Manager. The proposed suspension bridge consists of a 114 ft wide steel girder deck section suspended with vertical hangers. The length of the main span over Blennerhassett Island is approximately 1380 ft. The side spans are approximately 950 ft in length. Project Value: N/A

Paul Krauss

Corrosion Protection Engineer

RELEVANT EXPERIENCE

TH 61 Hastings Bridge over Mississippi Design-Build | Hastings, MN | Corrosion Protection Engineer. The project features a 545-foot free-standing tied-arch bridge that will be erected on barges and lifted 70 feet into place using strand jacks. The innovative design is the longest freestanding arch in North America, has a 100 year life, and utilizes a steel box arch rib with a post-tensioned concrete tie girder and a network hanger system. The approach structures to the bridge include a five-span full-depth solid cast-in-place post-tensioned slab structure to the south and a five-span precast concrete beam and deck structure to the north for an overall eleven-span, 1,938-foot structure length. Project Value: $120 million.

Wacker Drive Reconstruction Project | Chicago, IL | Project Manager. Paul served as Project Manager for a project for the City of Chicago to address durability and corrosion issues for the reconstruction of the Wacker Drive Viaduct in Chicago, Illinois. Corrosion protection of the post tensioned deck was a primary objective to achieve a 100 year service life for the new structure. This project also included the construction and testing of a full-scale prototype bridge. Project Value: $300 million.

NCHRP and FHWA Research Projects | Various | Project Manager. Paul has been Project Manager for several significant and landmark research projects performed by WJE for the National Highway Research Program (NCHRP) and the Federal Highway Association (FHWA). These projects include NCHRP Project 12-37, to study transverse cracking in newly constructed bridge decks. This project included an extensive literature review, field instrumentation of a newly cast deck, laboratory testing of the cracking tendency of concretes and analytical analysis to provide an understanding of the causes of early age deck cracking and methods to reduce the risk of cracking. Mr. Krauss was also Project Engineer and Project Manager of the FHWA Project DTFH61-93-C-00027 to develop new breeds of corrosion-resistant reinforcing steel. The goal of the project was to test and develop corrosion-resistant reinforcing steel that will last for 75 to 100 years in a northern climate structure subjected to deicers or salt-spray. Recently, Mr. Krauss completed two projects for NCHRP “Guidelines for Selection of Bridge Deck Overlays, Sealers and Treatments” and “Testing Protocols for Surface Applied Concrete Sealers”. Project Value: N/A