Agenda

• Goals and objectives
• Management Plan Study overview
• Review of available data
• Review tasks included in SOW
• RFP/interview items
• Questions
Goals and Objectives

• Provide technical analysis for needs identified in the Management Plan.

• Investigate remaining service life of all elements within the entire bridge.

• Collaborate with MnDOT and WisDOT to provide support in the global scoping effort.
Goals and Objectives

- LRFR bridge rating of entire bridge (truss and approach spans)
- In-depth analysis of approach spans, explore extending service life
- Structural analysis, field data collection and evaluation, high level bridge inspection
Management Plan Study

• Goal of Management Plan study was to develop a series of strategies to maintain the existing bridge and guide future investments for the crossing.

• Identifies actions and investments necessary to maintain the condition of the bridge in a state better than structurally deficient, as defined by the Federal Highway Administration, for the next 15 to 40 years.
Management Plan Study

• Identifies inspection data gaps, analysis needs, and bridge deficiencies
  • Outlined in Section III
  • Basis for this scope of work
  • MnDOT has selected specific tasks (not all recommendations are included)

• Summarizes Maintenance and Rehabilitation Scenarios and Estimated Cost
Management Plan Study

• Appendices
  • Strengthening Concepts
  • Scenario Summaries and Cost Estimates
  • Condition Data Review
  • Risk Register
  • Maintenance and Rehabilitation Strategies
  • Life-Cycle Analysis
Review of Available Data – Blatnik File Archive

• SECURITY SENSITIVE NON-PUBLIC DATA: (SIGNED SECURITY NONDISCLOSURE AGREEMENTS REQUIRED)

• Bridge Information – Includes documents, photos, and data provided from MnDOT and WisDOT.
  • Bridge Projects – Contains information on original construction, maintenance and rehabilitation projects from 1961-2016.
    • 1961 Original Construction
    • 1973 Median Closure
    • 1989 Median Rehabilitation
    • 1994 Widening Project
    • 1995 Painting and Pier Repair Project
    • 2010 Suspender Rope Replacement Project
    • 2012 Rating and Repair Project
    • 2015 In-House Repairs
    • 2016 Repair Project
Review of Available Data – Blatnik File Archive

• SECURITY SENSITIVE NON-PUBLIC DATA: (SIGNED SECURITY NONDISCLOSURE AGREEMENTS REQUIRED)

  • Inspection Information – Contains all routine, fracture critical, underwater, and supplemental inspection documentation.
    • Elemental Data
    • Fracture Critical Inspections
    • Routine Inspections
    • Supplemental Inspections
    • Underwater Inspections
    • WisDOT Inspection Photos

  • Miscellaneous – Contains bridge related information that was not associated with projects or inspections (i.e. Management Plan).
1. Evaluate data and facilitate document compilation review process.
2. Perform LRFR rating of the entire structure.
4. Complete material data collection and sampling.
5. Perform service life analysis.
6. Complete a service life extension investigation (conceptual strengthening measures, etc.).
Task 1: Evaluate Data, Ongoing Compilation

• Contractor must:
  • Familiarize itself with the Management Plan and create summary document and PowerPoint presentation to convey work plan with any proposed modifications to SOW.
  • Facilitate organized compilation of data going forward.
  • Intent is to streamline communication among Contractor, State, WisDOT, FHWA, and the general public.
  • Identify additional supplemental inspection needs.
• Supplemental Inspection & Materials Sampling

1) **Access from deck level:** Contractor will have access from deck level planned during a 3-week period during July 2018 inspection.

   • Contractor to coordinate use of State-provided traffic control during this period (on deck).

   • Contractor required to provide its own inspection vehicles.

2) **Access from ground or water level:** Contractor required to provide its own access, inspection vehicles, permits, and traffic control.

3) Equipment and work for excavation at pier footings, obtaining core samples, grout samples, and other materials testing must be provided by Contractor.
Task 2: LRFR Ratings

- Perform LRFR rating of the entire bridge.
- Investigate AASHTOware BrR to determine if it can rate any or all portions of the bridge.
- Develop a load rating tool for State and WisDOT use.
Task 2: LRFR Ratings

- Develop load rating criteria.
- All superstructure elements on the truss and approach spans will be rated.
- Phase I load ratings will consider four live loads.
- Provide interim load rating results from Phase I to State and WisDOT for review prior to proceeding with Phase II.
- Phase II load rating will consider all remaining State and WisDOT permit trucks (as authorized).
Task 2: LRFR Ratings

- **Phase 1 Load Rating:**
  
  Provide LRFR load ratings for the approach spans and truss spans using:

  1) HL-93 loading
  
  2) State (MN) Permit C and P-413 permit vehicles
  
  3) Wis-SPV per Wisc Bridge Manual Figure 45.12-1

- **Phase 2 Load Rating:**
  
  Provide LRFR load ratings for approach and truss spans using:

  1) Legal load ratings per MBE 6A.4.4, using loads per MnDOT LRFD appendix 15-D
  
  2) Permit load ratings per MBE 6a.4.5, using MnDOT LRFD appendix 15-E, 15-F, and WisDOT Special Permit per WBM Ch. 45, Figure 45.10-3
Task 2: LRFR Ratings – Truss Spans

- Develop 2D and 3D models (concurrent with development of load rating criteria).
  - Include condition of trusses based on review of plans, inspection reports, shop drawings, and project documents.
  - 2D model will ultimately be basis for rating of primary members.
  - Use of 3D model needed for wind load model, cable analysis, and comparison of LL distribution factors for use in 2D model.
  - 3D model may be used only after sufficiently calibrated to 2D model to ensure demand from primary members is not overly reliant on modeling assumptions.
Task 2: LRFR Ratings – Truss Spans

• Review inspection reports for section loss and as-built drawings for previous repairs that affect section properties.

• Provide recommendations on condition factors and system factors for all members, include in development of load rating criteria.
Task 2: LRFR Ratings – Cable Analysis

• Review locations where cables have been damaged by rubbing, and include in analysis.

• Perform separate analysis to simulate loss of 1 of 4 cables at 1 end of FB.

• Identify load restrictions that result from cable loss in draft and final memos.
Task 2: LRFR Ratings – Approach Spans

Original girders and stringer system includes both unbraced FB and K-braced FB with exterior beams added in 1993-94 widening.
Curved girders with variable beam spacing, includes pin and hangers (new pins installed with ‘93 rehab)
Task 2: LRFR Ratings – Approach Spans

• Provide a rating for all load carrying members per MBE and MnDOT LRFD BDM Chapter 15.

• Report performance ratios for all LL described in Phase I loading on all pin and hanger systems.

• Review inspection reports for section loss and as-built drawings for any previous repairs that affect section properties.

• Provide recommendations on condition factors, system factors, and include in development of load rating criteria.
Task 2: Substructures

- 51 Piers present on the project.
- Piers 1-3 widened by adding PT on only the outer faces of the pier caps.
- Piers 4-14 and 19-43 widened by adding PT and end blocks.
- Piers 15-18 (main river span piers support truss not widened).
- Pier 44-51 reconstructed new CIP caps.
Widening by P/T without end blocks
Widening by P/T with end blocks
Truss span piers
Reconstructed pier caps
Task 2: Substructures

• Phase I

  • Analyze all pier caps.

  • For pier caps that include post-tensioning, perform analysis of to investigate effects of loss of pre-stressing, expected signs of cracking, and evaluation of ductility.

    • Assume this will be limited to 4 pier caps.

  • Perform Vessel Impact Study for Piers 16, 17, 30, and 31.

  • Conduct detailed analysis of all pier components on piers specified in SOW.
Task 2: Substructures

• Phase II

  • Report ultimate strength and service load performance ratios using HL-93 loading for ALL remaining pier columns and footings using LRFD Strength I loading.

  • Geotechnical evaluation of pile capacity is not currently included in this contract. This will be completed by State or by separate geotechnical contract.
Task 3: Lateral Wind Load Analysis of Truss

• Evaluate the wind bracing system in the truss spans under wind loading for strength evaluation.

• Evaluate AASHTO load combinations that include wind loading to determine demand/capacity ratios for truss members that include effects from wind forces.

• Perform a strength evaluation.

• Investigate wind-induced vibrations due to slenderness effects.

• Investigate aeroelastic instability to identify fatigue prone details.
Task 4: Material Data Collection

• GOAL -> Collect sufficient data to supplement structural and service life analysis needs.

• Submit Draft and Final Testing Plans for subtasks to State and WisDOT for comment.

• Document deviations in appendices to Investigation Memos.
Task 4: Material Data Collection

• Submit Investigation Memos within 3 months of completed testing.
  • Deck
  • Piers
  • Foundations
  • Photographic Documentation
Task 4: Deck

• Collect physical samples for using guidance from:
  • Management Plan
  • NCHRP Report 558 “Manual on Service Life of Corrosion-Damaged Reinforced Concrete Bridge Superstructure Elements”
• Complete delamination survey of entire deck.
Task 4: Deck

• In 9 spans:
  • Reinforcement cover (30 readings per span)
  • Concrete cores (6 cores per span)
  • Electrical continuity testing (5 bars per span)

• Remaining spans:
  • Concrete core in every other span (22 spans)
Post-tensioned pier caps – grout samples

(FHWA-HRT-13-028)

• 6 samples from 3 select PT pier caps (18 total grout samples).

• Acid soluble chloride testing required – Contractor may propose additional testing, if valuable to determining service life.

• Develop Substructure Testing Plan to clearly detail proposed grout excavation locations, details, and repair procedures.
Cores and delamination survey from pier caps, columns, and footings

• 6 piers are identified in Task 2.3 for complete detailed analysis. Collect samples from the same piers used in analysis, excluding Piers 16 and 17.

• 6 core samples per pier (24 total core samples) to determine compressive strength, establish a chloride depth profile.

• Complete delamination survey and estimate quantities on these piers. Include approximate crack size and locations on plan sheets.
Task 4: Foundations

• Goal -> assess potential for steel pile corrosion; **not for verification of geotechnical capacity.**

• Approximately 26 soil borings to test for:
  • Soil classification
  • Chemical analysis
  • Groundwater
  • Specific conductance
Task 4: Foundations

• Test pits (5) for physical exploration and sampling of piling.

• Contractor is responsible for all access, traffic control, permitting, disposal, returning the site to original condition, etc.
Task 4: Photographic Documentation

• Provide high resolution photographic documentation of entire bridge deck using drone or other means.

• Compile existing photos from recent fracture critical and routine inspections into user-friendly interactive computer application, linking plan geometric location of photo(s) with its location.

• Consider other locations for photo documentation in work plan.
Task 5: Service Life Analysis

• Bridge deck – report truss spans and approach spans separately. The idea is that the truss spans may be replaced and the approach spans re-decked.

• Truss spans – report remaining fatigue life.

• Approach span girders – report life expectancy and identify fatigue prone details.

• Piers and abutments – report life expectancy of all components.
Task 5: Service Life Analysis

- Piling – report life expectancy of all components.
- Truss Paint System Evaluation
  - Identify members sensitive to paint system failure
  - Discuss ability to deploy paint system to sensitive members
  - Identify zones for more refined paint condition assessment
  - Tabulate current condition state data
  - Report life expectancy of paint system at specific members
  - Identify causes of accelerated paint failure
Task 6: Extension of Service Life

• This task will be an as-authorized task based on the findings from other tasks.

• Explore opportunities to extend life of all bridge elements, except for the truss spans.

• Utilize data from material collection and service life analysis.

• Prepare scoping level cost and construction time estimates.
Task 6: Extension of Service Life

• Prepare conceptual strengthening retrofits.

• See Management Plan Appendix A for example of expected presentation.
RFP / Interview Items

• RFP questions due Sept. 29th, answers anticipated Oct. 4th.
• Proposals due Oct. 17th, selection panel meets Oct. 30th.
• Short-listed firm interviews, Nov. 1st – 2nd.
  • Interviews must be a detailed walkthrough of your entire work plan and schedule. Be sure to not only describe what work will be done, but how you will accomplish each task.
  • Interview teams: Project Manager and up to two other team members from the org chart. Interview materials: hard copy handouts of presentation, presentation itself, presentation boards.
• Contractor should assume 14 half-day meetings with participation by:
  • Project Manager
  • Task Lead or Technical Lead (attendance driven by meeting agenda)
Thank you!