Michigan Department of Transportation

100% STATE FUNDED PROJECT

SCOPE OF SERVICE
FOR
DESIGN SERVICES

CONTROL SECTION(S): Various

JOB NUMBER(S): 210134SCOP

PROJECT LOCATION: These 25 bridges are situated within the MDOT Davison TSC area (see the BRIDGE SCOPING PROJECT LISTING for specific bridge numbers and locations).

PROJECT WORK DESCRIPTION (description of the project):
Bridge Scoping and Inspection Reports

To evaluate various repair alternatives for a prescribed set of bridges and develop a scope of work and cost estimate for each bridge. Recommend the most appropriate replacement or preservation treatment based on current conditions, remaining structure life and sound engineering judgment.

To perform in-depth bridge safety inspection of MDOT owned structures in accordance with the National Bridge Inspection Standards (NBIS). NBIS 650.305 defines in-depth inspection as a close-up, inspection of one or more members above or below the water level to identify any deficiencies not readily detectable using routine inspection procedures. When appropriate or necessary to fully ascertain the existence of or the extent of any deficiencies, nondestructive field tests may need to be performed.

Utilizing in-depth bridge safety inspection information, complete the routine bridge safety inspection report in accordance with the NBIS. NBIS 650.305 defines routine inspection as a regularly scheduled inspection consisting of observations and/or measurements needed to determine the physical and functional condition of the bridge, to identify any changes from “initial” or previously recorded conditions, and to ensure that the structure continues to satisfy present service conditions.

One CONSULTANT will be selected for this work.

ADDITIONAL INFORMATION
All consultants interested in submitting a proposal for this work will respond with a one page Statement of Qualifications e-mailed to both, the MDOT Project Manager and Proposal Agent.
listed below before the time/date posted to the web. Any Statement of Qualifications (response) received after this day/time will be considered non-responsive. The Statement of Qualifications will include:

- Provide a description of one challenge or significant issue relating to the project and how that challenge or significant issue will be addressed during the project.
- Qualifications of Team
- Key Personnel available for **immediate work**
- Resumes of Key Personnel (limit 2 pages per resume, pages do not count toward page limit stated above)

Questions regarding this solicitation must be submitted to the MDOT Project Manager in writing (e-mail) no later than three (3) business days prior to the date and time that the proposal response is due.

**GENERAL STAFFING REQUIREMENTS**
The selected consultant is expected to provide a satisfactory number of qualified personnel as necessary to effectively carry out its responsibilities under this project. There may be work during nighttime hours, on weekends, and/or generally under tight time constraints.

**CONSULTANT SERVICE TASKS** *(actual work consultants will perform):*

*This is an as-needed service:*

☐ **YES**

⊗ **NO**

**ANTICIPATED SERVICE START DATE:** April 6, 2020

**ANTICIPATED SERVICE COMPLETION DATE:** December 30, 2020

**DBE PARTICIPATION REQUIREMENT:** None

**PRIMARY PREQUALIFICATION CLASSIFICATION(S):**
Design – Bridges: Scoping
Design - Bridges: Safety Inspection

**Signed by:**

[Signature]

**cosign**
SECONDARY PREQUALIFICATION CLASSIFICATION(S):
Design – Traffic: Work Zone Maintenance of Traffic

MDOT PROJECT ENGINEER MANAGER:
Paul J. Schiefer, P.E. - Region Bridge Engineer
MDOT - Bay Region
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MDOT PROPOSAL AGENT:
Trevor Block, P.E. – Cost & Scheduling Engineer
MDOT - Davison TSC
E-mail: BlockT2@michigan.gov

PURPOSE:
The scope of service is to evaluate various repair alternatives for a prescribed set of bridges and recommend the most economical replacement or preservation treatment. Each bridge must have a detailed scope of work and an estimate developed prior to submitting for approval and design. This process is termed bridge scoping.

The information contained in the scoping reports will be used by MDOT – Bridge Design to prepare plan sets. The reports will need to adequately convey the physical condition of each structure, the specific areas in need of repair, and identify surrounding appurtenances which may affect the project.

In addition to the scoping reports, the National Bridge Inspection Standards (NBIS) Section 650.313 (a), states each MDOT owned bridge must be inspected according to the AASHTO Manual for Bridge Evaluation. An updated Bridge Safety Inspection Report (BSIR) and AASHTO Element Report based on the in-depth inspection/scoping report will be required for each structure and the information uploaded into the respective forms using the MiBRIDGE web-based application.

MDOT has determined the following preliminary maintaining traffic concepts, which may be assumed by the CONSULTANT in developing the scopes of work. All maintaining traffic concepts shall be consistent with the MDOT Work Zone Safety and Mobility Policy.
1. Work on the bridges shall be performed at night or on weekends to keep daytime lane closures to a minimum when possible.

2. Temporary or permanent widening and traffic shifts on the roadway and bridge shoulders should be evaluated for feasibility, such that as many lanes of traffic can be maintained as possible when night work is not possible.

3. The feasibility of incentive/disincentive provisions should be considered, and cost estimates added to the scope of work for each bridge as applicable.

The deliverables for this project will be the scoping reports, inspection reports, photographs, worksheets, CAD drawings, and notes. All documents for each structure will be submitted in ProjectWise in their original digital format and compiled as a PDF binder in a separate folder for each structure.

A separate PDF binder containing the scoping reports as described below will be submitted for each structure. The binder will contain all information pertaining to the site review findings and recommended repair options for each bridge.

Table of Contents:
A table of contents will be provided for the complete document.

Executive Summary:
A statement of the recommended treatment for the bridge and the cost of the recommended repair. The executive summary will be a standalone section and will not refer to other sections of the report, nor will the main text refer to information in the executive summary.

Field Site Review Findings:
This section will include, as a minimum, discussion of the following areas:

Overall assessment of the condition of the bridge including an evaluation of beam thicknesses (webs & bottom flanges) taken during the site inspection.

Sketches of beam repair areas, substructure repair areas, or widening options.

Site issues, i.e., geometrics, maintenance of traffic, utilities, scour, etc. A statement will be made that all areas were investigated, and no issues were found if no site issues are identified.

Test results and implications of the repair options. It will be stated in the report no testing was performed if no tests were conducted.

Replacement or Preservation Options:
This section will include a discussion of the repair options considered. A discussion of the necessary improvements and the associated costs will be included for each option evaluated. The report must discuss and state the reasoning and judgment for selection of the recommended option. This discussion will also include the reasoning for the elimination of all other options, as appropriate.

Summary with Repair Recommendation:
This section will state the recommended course of action for the bridge and the factors used in determining this recommendation. This section will briefly discuss the effects of postponing the recommended improvements.

Maintaining Traffic / Mobility Summary:
This section shall include an analysis of the traffic control plan in accordance with the Michigan Department of Transportation’s Mobility Policy. Various traffic control alternatives shall be evaluated.

Cost Estimate Sheets:
A cost estimate must be prepared for each repair option that was considered. A life cycle cost estimate (LCCA) must be prepared for each replacement option that was considered.

Appendix:
Photos and descriptions
Field notes and sketches
Paint calculations
Table of beam thickness readings
Lab test reports (if applicable)
Road preliminary estimate (if applicable)
Existing plan sheets (general plan of site and general plan of structure)
Updated bridge inspection reports

General site review procedures
MDOT’s 1190 form (Structure Clearance Measurements) will be signed and submitted for each grade separation with information collected during the detailed inspection.

Incomplete final reports, forms, or reports with errors will be returned to the CONSULTANT for revision. Failure to make the required changes will be considered a failure to meet the terms of this contract.

DURATION & SCHEDULE

A. Work Plan & Schedule

Jason M. Garza

Reviewed by: _______________________________    Page 5 of 28
The CONSULTANT must review the Scope of Service to develop a Work Plan that details the inspection dates and report development for a typical bridge. Submittal of the Work Plan is required as part of the Priced Proposal. Submit any changes to the Work Plan in writing to MDOT’s PROJECT MANAGER (PM) for review and approval.

B. Meeting Dates

The CONSULTANT is required to attend a Project Initiation Meeting and Progress Meetings held at the local MDOT region office where field inspections will occur. Shown below are the expected periods for these meetings. MDOT reserves the right to adjust these periods.

Project Initiation Meeting: One week after Notice to Proceed (NTP) (prior to any fieldwork)

The intent of the Project Initiation Meeting is to exchange information regarding the general procedures for communication, review the schedule, discuss emergency procedures and communication, and discuss any open questions that remain. Additional MDOT region and statewide staff may attend the meeting.

Preliminary Scope Review and Progress Meetings: After fieldwork has been completed and a preliminary scope of work for each bridge has been determined. (Some may be done by conference call).

The CONSULTANT will include all field review worksheets, old plans, bridge inspection reports, photographs, all information gathered in the field, two copies of a summary sheet describing the proposed work for each bridge and two copies of the proposed maintaining traffic / mobility concepts. Questions on the report preparation may be asked at this time as well.

The CONSULTANT will include a copy of all non-emergency Request for Action (RFA) forms completed during the previous inspection period and will review these in the meeting with the MDOT PM.

Draft Scope Review Meeting: One week after PM review of final deliverables.

This meeting is intended as a review of any outstanding contract requirements and final presentation of the deliverables. Draft reports will be provided to the MDOT PM a minimum of one week prior to the meeting. All MDOT comments and any necessary changes to the final deliverables will be discussed. The completed “Consultant Performance Evaluation” form will be given to the CONSULTANT and reviewed.
The CONSULTANT will keep notes of these meetings and provide minutes to the MDOT PM within one week after the meeting.

TEAM REQUIREMENTS:
The CONSULTANT firm must provide a team of individuals that is technically qualified and cost effective. All site visits will be done with at least a two-person team for safety reasons. The CONSULTANT must staff the project with the number of teams necessary to complete the field inspections and report documents in the allotted time. The requirements listed below are in addition to the prequalification requirements.

A. Project Manager
The CONSULTANT will provide a PROJECT MANAGER who is responsible for overall coordination of the project and all administrative aspects of the project including invoice preparation. The CONSULTANT PM will coordinate the daily activities of all project members and will be the primary contact with MDOT’S PM. The CONSULTANT PROJECT MANAGER will also perform contract Quality Control in accordance NBIS Section 650.313 (g) and the CONSULTANT’S Quality Control plan. Only one manager level position will be allowed and paid for on this project, with no exceptions.

The following are the minimum qualifications for this position:
1. Professional registration as an engineer or structural engineer, licensed to practice in the State of Michigan.
2. Ten (10) years of documented experience in project supervision.
3. A thorough understanding of the National Bridge Inspection Program and National Bridge Inspection Standards.
4. Documented skills in technical writing.

B. Qualified Team Leader, QTL(s)
The CONSULTANT will provide current copies of certificates to the MDOT PM for all QUALIFIED TEAM LEADERS (QTLs) that will be performing bridge safety inspections on this project.

It is anticipated that the CONSULTANT will propose no more than four QTLs to fulfill the obligations of this project.

The following are the minimum qualifications for the position(s):
1. Preferably be registered as an engineer or structural engineer; licensed to practice in the State of Michigan.
2. Three (3) years of documented experience performing routine, element, and detailed inspections.

Jason M. Garza

Reviewed by: ______________________  Page 7 of 28
Changes made to the Consultant Project Manager/Consultant Qualified Team Leader that occurs after the authorization must be submitted in writing for MDOT’s Project Manager’s approval. Failure to comply with this requirement may result in termination of the contract.

DESCRIPTION OF THE WORK
Routine and in-depth bridge safety inspections are performed to ensure the safe use of the structures by the motoring public. To accomplish this, the National Bridge Inspection Standards (NBIS), AASHTO Manual for Bridge Evaluation, FHWA Bridge Inspection Reference Manual (BIRM), MDOT NBI Rating Guidelines, Michigan Structure Inspection Manual (MiSIM), Michigan Bridge Element Inspection Manual (MiBEIM), and MDOT Bridge Advisories are to be used as guidance to complete the inspection and provide necessary information. Additional guidance documents and manuals are listed in the APPLICABILITY & STANDARDS section.

For the purposes of this project, the work is separated into four phases: bridge file review, in-depth field bridge inspection and scoping reports, bridge inspection reports, and communication of critical findings to the MDOT PM. An in-depth bridge inspection and routine inspection report is required at each bridge in addition to a detailed scoping report. The Consultant must be capable to perform and complete all phases for successful completion of the project.

Bridge File Review

In this phase of the work the Consultant will take several steps to review the documentation for each bridge and register on-line to be assigned the forms to complete.

1. The Consultant QTL(s) must gain access to the MiBRIDGE web-based application. Instructions are provided at the following link to register with the application: [http://www.michigan.gov/documents/mdot/ACCESS_To_MiBRIDGE_using_the_MiLogin_User_Authentication_557244_7.pdf](http://www.michigan.gov/documents/mdot/ACCESS_To_MiBRIDGE_using_the_MiLogin_User_Authentication_557244_7.pdf)

2. The Consultant Project Manager must contact the MDOT PM for plan drawings, previous inspection reports, and other pertinent historical documentation.

3. Review the bridge files and become familiar with the online and electronic documentation for each bridge. Arrangements to review hard copies, if necessary, may be required at the MDOT Region office.

The Consultant team will visit each bridge site and perform an inspection according to the NBIS and AASHTO manual description for a “Routine” and “In-Depth” inspection. This will be done by a hands-on inspection and non-destructive tests (NDT). Several reports, described below, will be completed by the QTL while performing this inspection.

Jason M. Garza

Reviewed by: ___________________________  Page 8 of 28
B. In-Depth Field Bridge Inspection and Scoping Reports

The information collected in the field must be enough to determine quantities and locations of repairs and improvements. This information must be detailed in the field notes and sketches. These notes are to be included in the reports.

1. Steel Beam Inspections

   a. All dirt, debris, and rust scale must be removed from steel beams under all joints, at piers, and abutments. The steel shall then be inspected for section loss. Areas where section measurements are to be taken shall be cleaned by means of hand tools to a SSPC SP3 degree of cleanliness. Thickness readings on the web and the bottom flange are to be taken at the thinnest locations at beam ends as well as along the entire length of the beam. Document cracks, corrosion, spalls, unusual movement, settlement, changes in alignment, and loose connections.

   These thickness readings will be compared with the original thickness and the percentages of section loss will be calculated (MDOT will supply the CONSULTANT with existing plans). This data will be tabulated on a spreadsheet that is approved by MDOT, and sketches will be prepared, of major components, showing the location of the deteriorated areas. The sketches are CAD drawings or photographs with reference measurements, not to scale, but in relative proportion and dimensioned on 8.5” x 11” sheets. A plan of the superstructure must be made showing the location of the beam needing repair if beam repairs are necessary. This information can be shown on the existing erection diagram and shall be presented in the Appendix of the report.

   b. On structures with pin and hanger assemblies, the beam end shall be cleaned as described in section (a). Thickness readings on the web and the bottom flange are to be measured at the thinnest locations at beam ends as well as along the entire length of the beam. Thickness readings must also be measured at the pin plates. If there are areas of heavy flaking rust, the CONSULTANT will clean as necessary to measure for any section loss. Structures with riveted pin plates shall be inspected and measured for section loss, using an ultrasonic thickness gage or calipers with a straight edge. Check pin and hanger assemblies for proper operation. Note the condition of the pin plates, and if the ends are in contact due to pin and hanger closure.

   c. The CONSULTANT shall note the condition of all other steel superstructure elements including but not limited to stiffeners, intermediate diaphragms, end diaphragms, pier diaphragms, cross frames, other lateral bracing and bearings including sole plates and masonry plates. These elements shall be inspected visually, and no cleaning is required.
d. The CONSULTANT shall visually check for fatigue cracking on fatigue prone details such as welded cover plates, diaphragm connections, or any welding in tension zones that are transverse to the plane of stress.

e. The CONSULTANT must determine if the structure has been hit by a vehicle and damaged. The CONSULTANT shall document all high load hit damage. This damage must be documented with a location description and photographs. Comments such as “approximately,” “about,” “possibly,” etc. to describe the extent the beam or bridge element is distorted due to impact shall not be included on the BSIR. The extent and length of damage shall be determined by an in-depth inspection.

2. Concrete Deck (Surface/Underside)

a. The deck surface/underside will be inspected for wet areas, map cracking, delamination, rust along beam edges or any other evidence of deterioration.

b. The concrete deck surface and underside will be sounded with a hammer or chain drag. Delaminated, spalled, and cracked areas will be marked with spray chalk, crayon, kiel, or white permanent surveyor’s paint that will be evident in the photographs. The use of permanent surveyor’s paint is required to mark out delaminated and spalled areas of the deck underside. Photos of the area must be recorded, and a written description of the deterioration must be documented for inclusion into the report. Sketches will be prepared of areas spalled, delaminated, or with substantial cracking showing the location of the deteriorated areas. These sketches are to be CAD drawings, not to scale, but in relative proportion and dimension on 8.5” x 11” sheets. This information shall be presented in the Appendix of the report.

c. The percentage of deck surface and soffit deficiencies will be noted in the report. A table shall be provided for each span noting the quantity and percentage of cracking, delamination, and spalling in the structural deck and wearing surface (if applicable).

d. Note as to whether the deck has previously been overlaid.

3. Substructure

a. Sound all substructure concrete elements (pier columns, caps, abutments, backwalls, etc.) for delamination and unsound areas. All delaminated areas are to be marked with spray chalk, crayon, kiel, or white permanent surveyor’s paint that will be evident in the photographs. All delamination surveys are part of the site review work (not part of testing). Sketches of the substructure units mapping the areas of distress (cracks,
delamination, spalls, etc.) are to be included in the appendix of the scoping report in CAD format. The quantity and percent of the total surface area distressed shall be calculated and shown on each sketch.

b. Visually inspect all substructure units for signs of settlement, lateral movement, cracking, spalling, exposed reinforcement and material defects. Visually examine fractured concrete to determine if it contains slag aggregate. Note the condition of the backwalls and check the bridge seat for undermining at bearing locations. Check for flexural cracks and shear cracks in pier caps. Note areas of previous repairs. Pictures of the area must be recorded, and a written description of the deterioration and location must be documented for inclusion into the report.

c. Inspection of underwater portions of the substructure is limited to observations during low-flow periods and probing for signs of scour and undermining. Follow the plan of action for scour critical bridges. Stream and riverbed scour must be evaluated to ensure the foundation for the bridge has adequate support. The CONSULTANT QTL will perform a scour inspection around all structural elements that are in water up to ten feet deep utilizing the wade and probe or the boat and probe methods. Substructure elements in water over ten feet will be inspected by a diver under a separate contract.

Stream bed cross sections shall be performed at all structures over water. The completed cross section shall be uploaded to MiBRIDGE for reference during subsequent inspections.

Questions regarding scour are to be directed to MDOT – Structure Scour Specialist, Andrew Zwolinski at 517-256-7131, ZwolinskiA@michigan.gov

4. Reinforced Concrete and Prestressed Concrete Superstructures

Visually inspect for shear or flexure cracking, exposed or broken prestressing strands, crushing of beam end in bearing areas, discoloration of concrete caused by corroding mild reinforcement or prestressing strands, high load hit damage and signs of previous repairs. Observe live loads crossing structure and note excessive deflections or working cracks. Inspect the diaphragms for spalling or diagonal cracking from structure movement or excessive deflection, and any other defects. Note the use of temporary supports.

5. Bearing Devices

Note the condition of all bearing devices. Inspect for pack rust, rocker alignment, section loss and paint condition of steel bearings such as rocker bearings or pedestal bearings. Check for excessive bulging of the sides (greater than 15% of bearing thickness), shear deformation due
to thermal movement, splitting and tearing, and discoloration from exposure to light of elastomeric bearings

6. Vertical Clearance

The vertical clearance of the bridge must be field verified and noted in the executive summary and stated in the report. A picture of any vertical clearance sign attached to the bridge must be taken. See the MDOT Bridge Design Manual, Volume 5, Section 7.01.08 for minimum vertical clearance requirements. These measurements will be recorded on MDOT’s 1190 form. Raising the structure to meet current standards must be considered in selecting the repair option for structures not meeting minimum vertical under clearance criteria. Any option including a deck replacement, superstructure replacement or bridge replacement must meet the minimum vertical under clearance requirement. The cost of raising the grade of the bridge to obtain acceptable under clearance must consider additional approach work.

7. Structure Geometry

The width of the structure must be evaluated to determine whether it is functionally obsolete. It must be stated in the report if widening is necessary to upgrade the structure to current standards, or for maintaining traffic during construction. Please refer to the MDOT Bridge Design Guides, Section 6.05 for acceptable bridge deck cross sections. This will include possible widening to meet current standards for radii. The CONSULTANT will describe how and where the widening is to take place and provide a plan view sketch showing the proposed widening. Specify if widening can be done within the deck overhang, or if additional beam lines and substructure width will be needed to accommodate the required deck cross section. Widening may also require additional approach work to transition between the roadway width and the new bridge width.

8. Bridge Approaches

Any work required for the approaches must be included in the report and these items accounted for on the Estimate Sheet.

9. Bridge Railing

Note the type and condition of the bridge railing. Does the railing meet current standards? Is a railing replacement required? Note the condition of pedestrian fencing. Guardrail on the approaches should also be evaluated. Note the condition of brush blocks, raised shoulders and sidewalks, and how these elements transition from the approaches.

10. Non-Destructive Testing
The CONSULTANT may determine that other non-destructive testing beyond what is mentioned in the Scope of Work is needed to make a better judgment. Testing (magnetic particle testing, acoustic emission, etc.) must be approved by the MDOT PM. If the project manager approves the test, the CONSULTANT must submit a testing proposal. The testing proposal will show what tests are to be performed, what specific information is to be gained from testing, and how the information is to be used. Proposals submitted with insufficient information will be denied.

11. The area immediately around the structure must be closely evaluated to determine if there are any site issues or constraints that may have an impact during construction. Each quadrant of the structure is to be evaluated and photo documented. These include items such as:

- Businesses or driveways close to the approaches
- Utilities attached to or near the bridge
- Signs or sign brackets attached to the bridge (bolted or welded?)
- Poor alignment or geometrics
- Approach and departure guardrail terminals or the presence of impact attenuators
- Bank erosion or scour
- Unusual channel features
- Railroad tracks that have been removed from over or under the bridge
- Proximity of other bridge structures
- Is drainage sufficient?
- Any evidence of ponding on the structure?
- Is Right-of-Way limited and might additional ROW or easements be required?

12. The following, if applicable, must be evaluated and costs considered:

- Is the bridge historical?
- Is vertical clearance a problem?
- Is widening needed?
- Does this bridge have special structural design features which may affect the repair options (e.g., non-redundant or fracture critical)?
- Are there environmental issues that may impact the project?

Determine impacts of the proposed bridge treatment on the existing horizontal and vertical alignments, pavements, curb and gutter, drainage, right of way (ROW), etc. Every effort shall be made to minimize ROW impacts within the limits of the projects. In areas of potential ROW impacts, the CONSULTANT shall identify the potential need for additional ROW, by station or address, type of ROW required (grading permit, easement or fee), and roadside improvements proposed (i.e. fencing, turf establishment, landscaping, non-motorized, etc.).
Review and document the final scope for conformance to 3R/4R Guidelines for non-freeway jobs and 4R, AASHTO and Interstate Standards for freeway jobs. Documentation shall include existing condition, treatment as per design standards, and recommendation. Identify areas where bridge design standards cannot be met on the final proposed recommended treatment, give justification and documentation as to the reason.

Review and document the roadside safety related items (i.e. guardrail, barriers, attenuators, etc.) which need to be modified or included in the project. Documentation will include location, existing type and condition, and the recommended treatment.

Document and identify any possible utility conflicts and estimate the cost of relocation and/or adjustment.

Document and identify locations of possible environmental issues which may impact the project and estimate the cost of treatment.

Develop Construction Zone Traffic Control Concepts in accordance with the Michigan Department of Transportation Mobility Policy.

All estimates and other project related items shall meet all MDOT requirements and detailing practices (i.e., format, materials, symbols, patterns, and layout) or as otherwise directed by MDOT.

13. Determining Most Appropriate Repair Option

Make an initial determination of the most appropriate repair option, based on the physical condition of the bridge, economic considerations, and engineering judgment, based on field conditions.

The types of repair options that are to be considered must be separated into the following categories:

**Capital Schedule Maintenance (CSM): (sustain current condition longer)**
- Approach Pavement Relief Joints
- Crack Sealing
- Concrete Patching - Minor
- Concrete Surface Coating
- Drain System Clean/Repair
- Healer Sealer
• Joint Repair
• Metal Mesh Panels
• Paint - Spot
• Slope Protection Repair
• Superstructure Wash
• Vegetation Control

Capital Preventive Maintenance (CPM): (address the needs of the “fairs”)
• Bridge Approach
• Bridge Barrier Railing Repair
• Deck Patching
• Joint Replacement
• Overlay – Epoxy
• Overlay – HMA (w/ waterproofing membrane)
• Overlay – HMA Cap (no membrane)
• Paint – Complete
• Paint – Zone
• Pin & Hanger Replacement
• Scour Protection
• Substructure Patching - Minor
• Thrie Beam Retrofit

Rehabilitation: (improve “poor” or “fair” to “good”)
• Bridge Barrier Railing Replace
• Overlay – Deep (Concrete)
• Overlay – Shallow (Concrete)
• Substructure Repair - Major
• Substructure Replacement
• Superstructure Repairs
• Widen

Replacement: (improve “poor” to “good”)
• Bridge Replacement
• Culvert Replacement
• Deck Replacement
• Superstructure Replacement
Recommended repair options should conform to the latest MDOT Bridge Deck Matrix. If the most appropriate repair option does not conform to the Bridge Deck Matrix, then a written justification shall be included in the scoping report.

14. Photographs

A photo log of the bridge and the surrounding areas must be included in the report. All pictures must be captioned with a description of what the picture is intended to show. Each bridge report must show the following items.

- Elevation views of both sides of the bridge
- Deck surface (entire deck surface to be photographed, including joints. Photos shall be taken from a minimum height of 10 feet)
- Railing, sidewalks, brush blocks, raised shoulders, or any other feature of the deck surface
- Approaches
- Underside of deck (to sufficiently show condition)
- Typical superstructure elements
- Abutments, including wingwalls and slope protection
- Piers showing all faces
- Waterways
- Railroad tracks
- Areas of major deterioration
- Load posting signs
- Vertical clearance signs
- Utilities, businesses, etc.
- Quadrant photos
- Guardrail attachments
- Traffic Signals / Pedestrian Signals within Construction Influence Area
- Approach sidewalks

15. ENGINEERING ANALYSIS

The engineering analysis phase will include an evaluation of the site review findings and determination of the work type category of the appropriate repair. The degree of required analysis and required deliverables vary for the following work type categories:

Rehabilitation & Replacement (R&R)

Proceed with the preparation of and evaluation of three repair strategies, including the estimate of cost of the repair strategies and the selection of the best repair option. This will also include determining the scope of road work and maintaining traffic concepts as outlined in the scope.
An initial repair option will be determined during the preliminary scope review meeting. The CONSULTANT is required to perform an engineering analysis of all three repair options. For example, if deck replacement is determined to be the most appropriate repair option, a cost estimate shall be prepared for the overlay and superstructure replacement options.

The CONSULTANT will analyze eliminating or correcting undesirable or deficient design characteristics (e.g., structural capacity, widening, etc.) for the deck, superstructure, and bridge replacement options. Analysis of the load carrying capacity of some components of the bridge may be required.

Estimating Various Repair Options

Cost estimates for each repair option will be prepared for each structure. A standard form Estimate Sheet with unit prices will be used (Bridge Cost Estimate Sheet, provided by MDOT PM). The Estimate Sheet provides space to show all the repairs to be performed. A life cycle cost estimate (LCCA) is required for each replacement option. Calculations for the paint area will be prepared by the CONSULTANT and included in the Appendix of the report.

Capital Scheduled Maintenance (CSM) & Capital Preventive Maintenance (CPM)

Proceed with the preparation of a cost estimate using the Cost Estimate Sheet. This phase shall also include determining the scope of road and maintaining traffic concepts as outlined in the scope.

If additional information is necessary for estimating/unit price not on the list, contact MDOT – Bridge Management and Scoping, Matthew Moulton, 517-636-6944, MoultonM4@michigan.gov

All project related items are subject to review and approval by MDOT.

C. Bridge Inspection Reports

As stated in the PURPOSE, the deliverables for this project will be reports, photographs, printed worksheets, sketches, and notes. The CONSULTANT will be assigned the structures for inspection in MiBRIDGE. The reports in MiBRIDGE shall be entered within 30 calendar days of starting field work at each location and may be edited for a period of up to 90 calendar days from the date of inspection.

The Bridge Inspection Report (BIR) has several components that will vary from bridge to bridge, but that will include at least the “Bridge Safety Inspection Report” (BSIR), the “Culvert Safety Inspection Report” (CSIR), the “AASHTO Element Report”, and the “Work
Recommendations Report”. Additional documents may also be necessary depending on the circumstances at the bridge and its condition. Some of these are the “Request for Action” (RFA) report, the “Streambed Profile” form, field notes, CAD sketches, and photos. The BSIR, CSIR, AASHTO element Report, RFA, stream bed cross sections, and work recommendations are to be completed and the data saved in the MiBRIDGE application. All documents must be reduced to a file size no larger than 30 megabytes prior to saving the information.

All documents created by the inspection will be assembled in a PDF binder and presented under cover of a letter stating that the inspections have been performed in accordance with this scope of services, and that all appropriate procedures and guidelines have been followed. This letter will also have the professional registration seal of the CONSULTANT QTL or CONSULTANT PM.

The MDOT PM may conduct periodic QA checks on the CONSULTANT’s work (approximately five percent of the structures listed in the work package). If these evaluations, in the judgment of the MDOT PM, show that the CONSULTANT does not adhere to the policies and guidelines noted above the contract can be terminated and the balance of the structures to be inspected will not be paid for.

The following documents are typical for each bridge. Other reports may be necessary as conditions warrant.

1. Bridge Safety Inspection Report (BSIR)

This is the primary inspection report form and is incorporated into MiBRIDGE. The CONSULTANT QTL must complete the safety inspection and the respective form for the specific bridge site. MiBRIDGE has a “Field Copy” print option that creates blank space on the previous report for noting changed conditions at the site. It is recommended that the CONSULTANT retain this copy in their records as backup in case of failure of the electronic copy. A new inspection record must be created in MiBRIDGE using the information from the site visit/detailed inspection.

There must be enough comments for each element in the reports to outline its condition and to justify the rating given. Some of the previous reports may not have complete comments. The lack of previous information does not exempt the CONSULTANT QTL from providing enough comments for each element to outline its condition. Follow the MDOT NBI Bridge Rating Guidelines, unless there are circumstances, particularly if they are safety related, that in the judgment of the CONSULTANT QTL do not fit within these guidelines. In this case, the inspector will document the reason for the deviation in the respective comment section.

NBIS sets a maximum frequency of 24 months between inspection intervals. However, structures in poor condition or with rapidly changing conditions may require inspection sooner
than 24 months. It is the responsibility of the CONSULTANT QTL to determine the inspection frequency and notify the MDOT PM when a frequency is to be changed. The MDOT Guidelines for Bridge Inspection Frequencies will assist the CONSULTANT QTL in setting the frequency.

The AASHTO Element Report and Work Recommendations Report are key elements of the NBI program and MDOT Bridge Management. The key to the Work Recommendations Report is the communication of the inspector’s judgment of the need for maintenance or rehabilitation work necessary to keep the structure in service. The key to the AASHTO Element Report is tracking the bridge deterioration rates to produce a reliable and predictable future network condition. The AASHTO Element Report and Work Recommendations Report are completed in MiBRIDGE.

When the QTL determines that the Deck (58), Stringer (59), and/or Substructure (60) components need to be lowered to a poor rating condition, they must notify the MDOT PM of their findings.

2. Stream Cross Section Report Form

The CONSULTANT will record the elevation of the stream bed with reference to an established datum on this form. The data collected must be entered on the electronic form and uploaded to MiBRIDGE.

3. Photographs and Posting Document

Photographs must be taken and submitted as part of the Inspection Report to document the current elevation view, transverse deck view, and any unusual conditions. The photographs must be digital images captioned with a description of what the photo is showing. Photos that are over or under exposed so the details in question cannot be seen will be returned to the CONSULTANT and will be taken again until the photos are legible. A copy of the electronic files will also be submitted in electronic format on a USB flash drive with the final deliverables.

4. Request for Action (RFA) Report

As noted in “Notification for Unusual Situations” the CONSULTANT will use the RFA report in MiBRIDGE to document communication to MDOT of circumstances that need more urgent attention than otherwise noted in the Work Recommendations.

D. Communication of Critical Findings

The NBIS define critical finding as “A structural or safety related deficiency that requires immediate follow-up inspection or action.” MDOT’s definition for a critical finding includes the following:

[Signature]

Jason M. Garza
• Bridges with recommendations for immediate work on fracture critical bridge members;
• Bridges with recommendations for immediate correction of scour or hydraulic problems;
• Bridges with condition ratings of 2 or less for the Deck (Item 58), Superstructure (Item 59), Substructure (item 60), or Culvert (Item 62);
• Bridges with recommendations for immediate work to prevent substantial reduction in the safe load capacity. The CONSULTANT will not be performing any load rating analyses as a part of this contract.

A critical finding includes any instance where an entire bridge, lane, or shoulder must be closed due to public safety concerns. Specific examples include:

1. Shoulder closure on bridge due to high load impact to fascia beam;
2. Lane closure on redundant bridge due to deep spall under bearing;
3. Bridge closure due to pressure flow scour.

Each critical finding requires an RFA report to be completed in MiBRIDGE.
One of the primary reasons for bridge inspection is to determine if there are any critical findings or situations that could affect the continued safe operation of the bridge, or where it could be costly if repair action is delayed. The CONSULTANT QTL must determine whether the bridge can safely remain in service until the next inspection date with no further observations required. The CONSULTANT QTL must identify the cause of any unusual circumstances or situations and notify the MDOT PM within a time frame appropriate for the situation. The CONSULTANT QTL will be given a list of all the 24-hour emergency responders for MDOT at the Project Initiation Meeting for use when structural deterioration warrants emergency closure of the structure.

Communication of these situations is accomplished formally by using the RFA report. The CONSULTANT must properly complete this report and notify the MDOT PM in a timely manner to ensure this communication takes place.

This report does not preclude advising the MDOT PM immediately by phone, or other means, of imminent circumstances. However, the CONSULTANT is still obligated to complete the report.

The RFA report should not be used to convey the ordinary information that belongs on the BSIR/CSIR. In addition to critical findings, below are some of the situations that may trigger an RFA:

a. Deficient Structural Conditions

A condition exists on a structural component that warrants a structural analysis or further investigation to determine if the capacity of the element in question is capable of safely carrying the intended loads, the CONSULTANT is required to inform the MDOT PM using the RFA report. An example is an exposed or broken pre-stressing strand in PCI beams or box beam super-structures.

b. Functional Conditions

Situations that exist in and around the structure that are not a part of a structural element but could require immediate attention are termed functional problems. Some of these are damaged approach guardrail, erosion of the shoulder, settled approach pavement, missing load posting or height restriction signs, damaged or broken light poles and sign supports.

c. Suspect Conditions Requiring Further Consideration or Testing

The CONSULTANT QTL will perform the inspection in the best manner possible on these structures and document areas that need further consideration or testing.
EQUIPMENT
The CONSULTANT will be responsible for providing all necessary inspection equipment. Some of the items that CONSULTANT will want to include in their proposal are:

1. All safety equipment to comply with MIOSHA requirements. Hard hats, safety glasses, safety shoes, and safety vests must always be worn in the field. Life vests are required while working in or above water.

2. Vehicle equipped with high visibility lighting to transport personnel and inspection equipment to the site.

3. Apple iPad Pro or equivalent with Microsoft Excel, Word, Adobe Acrobat, and photograph editing application.

4. Tools required for inspection such as a ladder, waders, rock pick hammer, tape measure, lighting, marking paint, etc.

5. Global Positioning Device (GPS) to locate bridges.

6. Cell phone so the team leader may be contacted during normal working hours.

7. Harnesses, tripods, air monitor, air supply, etc. for the proper entry of MIOSHA defined permit-required confined spaces.

8. Ultrasonic thickness gauge, calipers, dye penetrant kit, chain drag, and sounding hammer.

9. Boat to gain access to the underside of bridges and perform scour inspections.

10. Bucket truck or aerial lift for access to beam ends, bearings, deck soffit and other elements during in-depth inspections.

Under Bridge Inspection trucks may be supplied by MDOT. The CONSULTANT will be responsible for scheduling the equipment and performing their inspections based on its availability. The CONSULTANT will review the bridge(s) in advance of scheduling the equipment to ensure enough freeboard is available to permit access (minimum 6.5’ required). The Under-Bridge Inspection truck is to be used for structures greater than 45’ in height or bridges crossing water. The Under-Bridge Inspection trucks will not be utilized where a bucket truck or aerial lift can safely provide access to bridge elements. Upon Notice to Proceed (NTP) contact Christopher Zube, MDOT – Reach all Supervisor, (517) 896-9726, ZubeC@michigan.gov, to schedule a Under Bridge Inspection truck.

RAILROAD COORDINATION

Reviewed by: ___________________________  Page 23 of 28
Place Electronic Signature
of Reviewer Here
Railroad coordination may be required during routine and in-depth inspections. The CONSULTANT shall determine whether field work will occur within the railroad owner’s right-of-way and secure any necessary permits to gain access. Ownership of the railroad identified in MiBRIDGE may have changed since the most recent inventory update. The CONSULTANT is responsible for contacting the Federal Railroad Administration (FRA) and/or MDOT Office of Rail to determine the owner. The CONSULTANT shall follow the safety requirements specified by the railroad owner and ensure a railroad flagger is on site when necessary. Written confirmation must be provided to MDOT that notice has been provided and all safety provisions will be adhered to during the inspection.

MAINTENANCE OF TRAFFIC
Traffic control will be the responsibility of the CONSULTANT unless alternative arrangements are made by the MDOT PM. Traffic control will follow standard MDOT procedures. Permits for traffic control and for working in the MDOT Right of Way must be obtained from the appropriate MDOT Transportation Service Center or Region office prior to the start of work. Allow ample time for permit issuance. The CONSULTANT will be responsible for obtaining all permits and notifying the MDOT PM of the time and location of the work.

Weekday lane closures restricted from 9:00 a.m. to 3:00 p.m., weekend, or nighttime work will likely be required in many locations. Other traffic control restrictions may be imposed by the Region or TSC.

CONFIDENTIALITY CLAUSE
MDOT will furnish the CONSULTANT access to any available, pertinent information related to the bridge(s) proposed for inspection. Information furnished to the CONSULTANT is not to be released or distributed to anyone outside of MDOT. The CONSULTANT is not allowed to make copies of the information in the bridge files unless given written approval from the MDOT PM. Failure on the part of the CONSULTANT firm to maintain security of records could result in legal penalties.

PROJECT QUALITY CONTROL
The CONSULTANT will submit a project quality control plan with their proposal that will accomplish at a minimum the following:

1. Confirm that all QTLs have the required documents and certificates to substantiate their qualifications.
2. Confirm that the inspection process and procedures meet the requirements of the NBIS.
3. Review 10% of the completed work to ensure that all reports are complete, accurate, and consistent.

RESPONSIBILITIES OF MDOT
The following activities and information will be provided by the MDOT PM, where applicable, to the CONSULTANT.
1. Assign the structures to be inspected to the CONSULTANT in MiBRIDGE.
2. Provide access to electronic or hard copy bridge files which have:
   a. Previous stream bed cross section reports.
   b. Previous work recommendations.

**APPLICABILITY & STANDARDS**
The CONSULTANT is to have the following reference material and be familiar with their contents.

2. AASHTO Manual for Bridge Evaluation, 2011
4. FHWA Recording and Coding Guide for SI&A of the Nations Bridges
5. AASHTO Element Manual
6. Michigan Bridge Element Inspection Manual (MiBEIM)
7. Michigan Structure Inspection Manual (MiSIM)
9. MDOT Bridge Inspection Rating Guides
10. MDOT Bridge Inspection Frequency Guidelines
12. [MDOT Bridge Management and Scoping - Website](#)
13. [MDOT - Bridge Safety Inspection - Website](#)

**CONSULTANT PAYMENT – Actual Cost Plus Fixed Fee:**

Compensation for this project shall be on an **actual cost plus fixed fee** basis. This basis of
payment typically includes an estimate of labor hours by classification or employee, hourly labor rates, applied overhead, other direct costs, subconsultant costs, and applied fixed fee. The fixed fee for profit allowed for this project is 11.0% of the cost of direct labor and overhead.

All billings for services must be directed to the Department and follow the current guidelines. The latest copy of the "Professional Engineering Service Reimbursement Guidelines for Bureau of Highways" is available on MDOT's website. This document contains instructions and forms that must be followed and used for billing. Payment may be delayed or decreased if the instructions are not followed.

Payment to the Consultant for services rendered shall not exceed the maximum amount unless an increase is approved in accordance with the contract with the Consultant. Typically, billings must be submitted within 60 days after the completion of services for the current billing. The final billing must be received within 60 days of the completion of services. Refer to your contract for your specific contract terms.

Direct expenses, if applicable, will not be paid in excess of that allowed by the Department for its own employees in accordance with the State of Michigan’s Standardized Travel Regulations. Supporting documentation must be submitted with the billing for all eligible expenses on the project in accordance with the Reimbursement Guidelines. The only hours that will be considered allowable charges for this contract are those that are directly attributable to the activities of this project.

MDOT will reimburse the consultant for vehicle expenses and the costs of travel to and from project sites in accordance with MDOT’s Travel and Vehicle Expense Reimbursement Guidelines, dated May 1, 2013. The guidelines can be found at http://www.michigan.gov/documents/mdot/Final_Travel_Guidelines_05-01-13_420289_7.pdf?20130509082418. MDOT’s travel and vehicle expense reimbursement policies are intended primarily for construction engineering work. Reimbursement for travel to and from project sites and for vehicle expenses for all other types of work will be approved on a case by case basis.

MDOT will pay overtime in accordance with MDOT’s Overtime Reimbursement Guidelines, dated May 1, 2013. The guidelines can be found at http://www.michigan.gov/documents/mdot/Final_Overtime_Guidelines_05-01-13_420286_7.pdf?20130509081848. MDOT’s overtime reimbursement policies are intended primarily for construction engineering work. Overtime reimbursement for all other types of work will be approved on a case by case basis.
## ATTACHMENT A
### STRUCTURE LIST

<table>
<thead>
<tr>
<th>Asset</th>
<th>NBI ID</th>
<th>Route</th>
<th>Location</th>
<th>Hands-On/Detailed Inspection</th>
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<tbody>
<tr>
<td>2585</td>
<td>S01-0 of 25084</td>
<td>LAPEER RD</td>
<td>LAPEER RD over I-69</td>
<td>Entire Structure</td>
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<td>2605</td>
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<td>BEACH ST</td>
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<td>2647</td>
<td>R03-0 of 25132</td>
<td>I-475</td>
<td>I-475 over CSX RR AND PIERSON RD</td>
<td>Superstructure/Substructure</td>
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<tr>
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<td>S06-0 of 25132</td>
<td>I-475</td>
<td>I-475 over ATHERTON RD</td>
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<td>I-475</td>
<td>I-475 over M-54 BR (SAGINAW ST)</td>
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<td>2669</td>
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<td>KEARSLEY ST</td>
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<td>S20-0 of 25132</td>
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<td>S22-0 of 25132</td>
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<td>I-475 AND RAMP B over SB SERVICE ROAD</td>
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<td>I-475 over LEITH STREET</td>
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<td>I-475</td>
<td>I-475 over STEWART AVE</td>
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<td>I-475 over HORTON AVE</td>
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