REQUEST FOR PROPOSAL

The Michigan Department of Transportation is seeking professional services for the project contained in the attached Research Problem Statement.

The prime consultant/vendor is responsible for the successful completion of the service and is expected to perform at least 40 percent of the services, by dollar value, not including direct costs required on the service, unless otherwise specified in the RFP.

If your organization is interested in providing services, please indicate your interest by submitting a proposal following the research guidelines near the top of MDOT's Request for Proposals Web page at http://www.michigan.gov/mdot/0,1607,7-151-9625_32842---,00.html.

RFP SPECIFIC INFORMATION

Problem Title: Evaluation of Prestressed Concrete Beams in Shear
ORBP Number: OR10-040

This is Best Value Selection which means the budget amount submitted with the proposal is a component of the proposal score, not the determining factor of the selection.

PROPOSAL SUBMITTAL INFORMATION

REQUIRED NUMBER OF COPIES FOR PROJECT MANAGER	PROPOSAL DUE DATE	TIME DUE
8	**2/25/2011**	**5:00 PM, EST**

PROPOSAL AND BID SHEET MAILING ADDRESSES

Mail the multiple proposal package to:

☒ Michael Townley, P.E.

First Class Mailing Address
Michigan Department of Transportation
Office of Research and Best Practices
P.O. Box 30050
Lansing, Michigan 48909

OR

Overnight/Express Services Address
Michigan Department of Transportation
Office of Research and Best Practices
425 West Ottawa
Lansing, Michigan 48933

Mail one additional copy of the proposal to the Contracting Office indicated below:

☒ First Class Mail:
ORBP Contract Administrator
Contract Services Division
Michigan Department of Transportation
P.O. Box 30050
Lansing, Michigan 48909

OR

Lansing Overnight Mail:
ORBP Contract Administrator
Contract Services Division
Michigan Department of Transportation
425 West Ottawa
Lansing, Michigan 48933

BUDGET

☐ Tier I ($25,000 - $99,999)

☐ Tier II ($100,000 - $250,000)

☒ Tier III (>$250,000)

GENERAL INFORMATION

Any questions relative to the Research Problem Statement must be submitted by e-mail to: mdot-research@michigan.gov. Questions must be received by **February 18, 2011 at 5:00 p.m. EST.** All questions and answers will be placed on the MDOT RFP Web site as soon as possible after receipt of the questions and at least three (3) days prior to the due date listed above. The names of organizations submitting questions will not be disclosed.

The prime contractor must be a Michigan university. An organization located outside of Michigan may be included in the research team, but cannot be the primary contractor. A consultant located in Michigan may be included in the research team, but cannot be the primary contractor. MDOT is an equal opportunity employer and MDOT DBE firms are encouraged to participate as a subcontractor. The participating DBE firm, as currently certified by MDOT's Office of Equal Opportunity, shall be listed in the Proposal.

MDOT AND ORBP FORMS REQUIRED AS PART OF PROPOSAL SUBMISSION:

5100D – Request for Proposal Cover Sheet
5100G – Certification of Key Personnel
5100I – Conflict of Interest Statement
ORBP Research Proposal Budget Form Worksheet
ORBP Schedule of Research Activities Form
ORBP Deliverables Table
ORBP Implementation Project Recommendation Form

Michigan Department
Of Transportation
5308-10 (03/10)

OFFICE OF RESEARCH & BEST PRACTICES
MDOT RESEARCH PROGRAM
2010 PROBLEM STATEMENT

PROBLEM TITLE
Evaluation of Prestressed Concrete Beams in Shear

ORBP NO.	STRATEGIC PRIORITY NO.	CRITICAL ISSUE CODE	MDOT PROJECT CATEGORY
OR10-040		7-Infrastructure	1-a

PROBLEM TO ADDRESS

BRIEFLY DESCRIBE THE PROBLEM TO BE ADDRESSED AND WHY IT IS AN ISSUE FOR MDOT
There have been multiple methods of calculating shear capacity according to AASHTO, including the 1979 specifications for shear, the current method included in the AASHTO Standard Specifications for Bridge Design and the modified compression field theory included in the AASHTO Load and Resistance Factor Bridge Design Specifications. The MDOT bridge inventory contains structures that have been designed under all three methods. Additionally, some prestressed beams are designed continuous for live load. NCHRP report 322 research has shown that the detail used by the MDOT allows the beams to act simple span for moment, and therefore the beams are designed as simple and continuous beams for moment. However, the report did not evaluate shear and consequently some MDOT designs were not designed for simple span shear. Additionally, there have been an increasing number of prestressed concrete beams that have evidence of potential shear cracks. As an inventory, these structures should be evaluated to determine if the issues are isolated to each structure or represent a widespread condition.

RESEARCH OBJECTIVES AND TASKS

LIST THE RESEARCH OBJECTIVE(S) TO BE ACCOMPLISHED

1. Review existing structures in the MDOT inventory designed under the multiple methods. Review existing structures that have evidence of shear cracks and identify any issues stemming from construction or design.

2. Determine the most appropriate method of evaluating the structures, and provide calibration to apply modified compression field theory to Load Factor Design or Rating. Consider the use of automated software such as AASHTO VIRTIS, so that recommendations or changes can be seamlessly integrated into current MDOT practice.

3. Develop recommended procedures to the bridge design manual to avoid shear distress in new structures.

4. Identify a prestressed beam with shear cracks and load test to predict the load capacity at failure and also capacity at the point damage has occurred and the beam would need to be rehabilitated or replaced in service.

LIST THE MAJOR TASKS TO ACCOMPLISH THE RESEARCH OBJECTIVES:	ESTIMATED PERSON HOURS
1. Perform literature search and synthesis report.	500
2. Conduct field investigation within a limited subset (5 to 10 structures) of the database compilation of PC beams and subcategorize by best method to enhance trend identification.	550
3. Perform structural analysis such as finite element analysis on key identified beam design parameters for several beam types specifically using MCFT for LFD designed beams, and calibrate based on field load testing.	1950
4. Perform diagnostic load test of in-service beam(s), including any instrumentation needed for deflection and/or strain measurements.	500
5. Develop recommended procedures and calibration factors meeting objective 2 and provide final report.	500

ESTIMATED COST AND TIMELINE

ESTIMATE THE COST OF THIS RESEARCH STUDY (Please provide a cost range [min. and max.] associated with the person hours by task above)
Tier III (>$250,000)

PROVIDE A PROPOSED TIMELINE FOR THE PROJECT (At minimum, the expected duration of the project)
10/1/2011 to 9/30/2013

REQUIRED COMPLETION DATE (At minimum, the date by which results are needed to be applicable)
9/30/2013

BUDGET INFORMATION

(For each FY, list suggested minimum and maximum budgets as targets. Indirect Cost Rate is for ORBP use only.)

TOTAL BUDGET (BY FY)	FY1	FY2	FY3	FY4	INDIRECT COST RATE

DELIVERABLES

WHAT DELIVERABLES SHOULD BE RECEIVED AT THE END OF THIS PROJECT? (e.g., usable technical product, design method, techniques, training, workshops, report, manual of practice, policy, procedure, specification, standard, software, hardware, equipment, training tools, etc.)
Final report, including recommendations on load rating and design practices to increase shear capacity ensuring match to demand.

MDOT INVOLVEMENT (What will MDOT provide for this project and when)
Traffic control and truck for load testing, estimated at $25,000, for summer 2012. Provide access to bridge inventory information in order to identify trends in shear design and performance, throughout the project, at minimal cost, estimated at 40 hours x $85/hr = $3,500.

URGENCY, PAYOFF POTENTIAL AND IMPLEMENTATION

HOW URGENT IS THIS RESEARCH? IS IT IMPORTANT THAT IT BE DONE SOON? IF SO, WHY?
The research could influence the design of current prestressed concrete structures and would aid in the analysis of existing prestressed concrete structures.

DESCRIBE HOW THE PROPOSED RESULTS OF THIS PROJECT CAN BE IMPLEMENTED AT MDOT
Design memorandums or update to design manual. Updates to bridge inventory and load rating procedures. Distribution of the final report to design and bridge operations.

DESCRIBE HOW MDOT WILL BENEFIT FROM THE IMPLEMENTATION OF THIS PROJECT AND WHO THE BENEFICIARIES WILL BE. INCLUDE A DISCUSSION OF HOW MDOT DIVISIONS, OTHER THAN THAT OF THE PROBLEM SUBMITTER, WILL BENEFIT AND HOW.
The successful completion of this research will allow the department to analyze prestressed concrete beams for shear in a manner that will make the most efficient use of the capacity of the structure while maintaining uniform levels of reliability in the system. Other states may benefit if design changes would be applicable to standard AASHTO loading as well. Both MDOT and the public will benefit, as it will reduce the likelihood of bridge posting, enabling more commerce and flow of goods.

POTENTIAL OBSTACLES

WHAT RISKS OR OBSTACLES MAY MAKE CARRYING OUT THIS PROJECT DIFFICULT? WHAT STRATEGIES WILL YOU USE TO OVERCOME THEM?

POSSIBLE INVESTIGATOR(S)

DESIRED QUALIFICATIONS IN AN INVESTIGATOR
Experienced in finite element analysis of complex bridge systems and components, field investigations, and load testing of in service bridges. Practical civil engineering experience in the transportation infrastructure and MDOT design and construction practices is desired.