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: Study of High Tension Cable Barrier on Michigan Roadways
ORBP Number: OR10-036

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 Study of High Tension Cable Barrier on Michigan Roadways			
ORBP NO. *OR10-036*	STRATEGIC PRIORITY NO. *3-2-C-6-C*	CRITICAL ISSUE CODE 9-SAFETY	MDOT PROJECT CATEGORY 2c. Safety & Systems, Operations & Mobility

PROBLEM TO ADDRESS

BRIEFLY DESCRIBE THE PROBLEM TO BE ADDRESSED AND WHY IT IS AN ISSUE FOR MDOT

Many transportation agencies have reported that high tension cable barrier is highly effective at capturing and redirecting vehicles. As a result, high tension cable barrier has been recognized as an effective tool in reducing the frequency of median crossover crashes, which usually result in fatalities.

In an attempt to reduce median crossover crashes, MDOT began identifying specific freeway segments that could benefit from high tension cable barrier. In 2008, MDOT began installing over 280 miles of high tension cable barrier throughout Michigan and, as of July 2010, 180 miles of high tension cable barrier have been installed. MDOT intends to have all installations identified as part of the 280-mile cable barrier initiative completed by the year 2012.

Since high tension cable barrier is a new feature on Michigan roadways, and with a noticeable amount of publicity and public interest, the department should conduct a study to determine the effectiveness of high tension cable barrier in Michigan. The results of this study could be used to determine if the current level of investment in high tension cable barrier is appropriate. In addition, this study could be used to determine if any modifications should be made to MDOT's cable barrier design guidelines.

RESEARCH OBJECTIVES AND TASKS

LIST THE RESEARCH OBJECTIVE(S) TO BE ACCOMPLISHED

1. Determine the average level of effectiveness of high tension cable barrier in reducing median crossover crashes (e.g., 95% effective at capturing/redirecting impacting vehicles) for all cable barrier installations in Michigan.

2. Estimate the overall life-cycle cost of high tension cable barrier in Michigan.

3. Perform a cost-benefit analysis for each high tension cable barrier installation in Michigan and determine if the benefits of the installation outweigh the costs.

4. Propose guidelines for installing high tension cable barrier. Cable barrier guidelines should be based on specific characteristics, such as crash frequency, traffic volumes, roadway location, etc. Cable barrier guidelines recommended as part of this study must be clearly defined and must specify which characteristic(s) they are based on.

5. Explore the effects of cable barrier placement. Specifically, compare the crash history of cable barrier installations in Michigan and determine if there is a relationship between the number of cable barrier impacts and the lateral offset between the cable barrier and the nearest traveled lane.

6. Explore the effects of regional weather patterns in Michigan and the frequency of cable barrier impacts. Specifically, identify cable barrier installations in areas that traditionally have specific weather patterns (e.g., "snow belt" areas), compare the frequency of cable barrier impacts in areas with specific patterns to cable barrier installations in other regions of Michigan, and determine if there is a relationship between the frequency of cable barrier impacts and regional weather patterns.

7. Explore the effects of traffic volumes and the frequency of cable barrier impacts. Specifically, compare the crash history of cable barrier installations in Michigan based on roadway traffic volumes and determine if there is a relationship between the number of cable barrier impacts and traffic volume.

8. Compare the level of effectiveness of comparable four-cable and three-cable systems. MDOT has at least two cable barrier installations where the barrier has four individual cables. Both of these four-cable systems meet National Cooperative Highway Research Program Report 350, Test Level 3 (NCHRP 350, TL-3) and are approved for use on 1:4 slopes. MDOT also has several cable barrier installations which only have three cables, and these cable systems also meet NCHRP 350, TL-3 and are approved for use on 1:4 slopes. Determine the number of cable barrier impacts on similar installations (i.e., three-cable versus four-cable), determine the number of crashes where the impacting vehicle breached the cable system, and determine if four-cable systems have resulted in fewer breaches compared to three-cable systems.

9. Determine the percentage of cable barrier impacts on Michigan roadways involving motorcycles, and determine the crash severity of motorcyclists impacting cable barrier. Determine the percentage of motorcycle crashes on Michigan roadways where the motorcyclist impacted other barrier types (i.e., traditional guardrail, concrete barrier) and compare the frequency and severity of those crashes to motorcycle crashes involving high tension cable barrier.

10. Estimate the number of vehicular impacts involving traditional beam guardrail and permanent concrete barrier installations in Michigan and compare this to the number of impacts involving high tension cable barrier. Determine if high tension cable barrier is more susceptible to vehicular impacts compared to other barrier types (i.e., traditional beam guardrail and concrete barrier).

11. Create marketing tools and techniques that could be used to promote the use of high tension cable barrier to the general public, and help give cable barrier a positive image.

12. Explore the relationship between cable barrier installation and the ability of official vehicles to cross the freeway median. Median barrier installation closes all unofficial median crossovers and forces all official vehicles (e.g., emergency first responders, law enforcement, maintenance vehicles, etc.) to use official median crossovers or interchanges to change bounds. Therefore, determine what effects cable barrier installation has had on the day-to-day operations of emergency first responders, law enforcement, and maintenance. Also, determine if cable barrier installation has had an adverse impact on the day-to-day operations of emergency first responders, law enforcement, and maintenance. Examine MDOT's current median crossover guidelines as it pertains to crossover spacing. If deemed appropriate, suggest modifications to the median crossover spacing guidelines.

LIST THE MAJOR TASKS TO ACCOMPLISH THE RESEARCH OBJECTIVES:	ESTIMATED PERSON HOURS
1. Collecting crash data before and after cable barrier installation on all installations in Michigan.	400
2. Reviewing, disseminating, classifying, and analyzing crash data.	500
3. Data analysis: Analyze all the factors affecting crashes such as: a. Cable barrier placement. b. Weather patterns. c. Traffic volumes. d. Three-cable systems versus four-cable systems. e. Motorcycles.	440
4. Collecting and analyzing installation costs, repair costs, and maintenance records pertaining to high tension cable barrier.	120
5. Establishing an average level of effectiveness and overall life cycle cost of high tension cable barrier.	160
6. Establishing and proposing cable barrier guidelines.	100
7. Cable barrier marketing analysis/product development.	70
8. Reporting.	500
9. Median crossover analysis	120

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 II $100,000 - $250,000

PROVIDE A PROPOSED TIMELINE FOR THE PROJECT (At minimum, the expected duration of the project)
Begin research project in October 2011 (FY 2012) with a 36 month duration. Therefore, project should be completed by October 2014. Please note, this time frame will not be sufficient to obtain three years of maintenance/repair cost data for the majority of cable barrier installations in Michigan. Furthermore, it is anticipated that no maintenance/repair cost data will be available for some cable barrier installations.

REQUIRED COMPLETION DATE (At minimum, the date by which results are needed to be applicable)
Project should be completed by September 30, 2014

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.)

Report containing the data, analyses, and conclusions for each research objective.

Marketing tools intended to promote the use of high tension cable barrier to the general public and help give cable barrier a positive image.

MDOT INVOLVEMENT (What will MDOT provide for this project and when)
MDOT will provide approximate cable barrier installation dates, installation costs pertaining to cable barrier, and any available maintenance/repair costs pertaining to cable barrier.

Please note that three years of maintenance/repair costs will not be available for the majority of cable barrier installations. MDOT will provide whatever maintenance/repair data is available, but this data will not be provided in a consistent format. It is anticipated that maintenance/repair cost data sets will vary by location. Each data set may contain different information, may be organized differently, and may be provided in different formats (e.g., Excel spreadsheet, other software packages, hard (paper) copies, etc.). Furthermore, the beginning and ending dates of the data sets will vary by location.

Some cable barrier installations will have a full three years of maintenance/repair costs. However, there may be less than three years of maintenance/repair cost data for some installations. Moreover, there may not be any maintenance/repair cost data for other cable barrier installations.

URGENCY, PAYOFF POTENTIAL AND IMPLEMENTATION

HOW URGENT IS THIS RESEARCH? IS IT IMPORTANT THAT IT BE DONE SOON? IF SO, WHY?
This research is important and should be done as soon as possible. However, as noted above, three years of “after” data (i.e., three years of data after the cable barrier installation has been completed) will not be available for the majority of cable barrier installations.

DESCRIBE HOW THE PROPOSED RESULTS OF THIS PROJECT CAN BE IMPLEMENTED AT MDOT
MDOT can use the results of the research project to make improvements to its current cable barrier guidelines and help promote cable barrier to the motoring public.

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.
MDOT would obtain a measure of effectiveness of the recent cable barrier installations in Michigan. The Design Division would be able to design cable

barrier more effectively. Division of Operations (Traffic & Safety) may see a reduction in the number of cable barrier impacts, and might be able to further limit future installations in areas deemed more beneficial in the reduction of median crossover crashes. Division of Operations (Maintenance) may save money if MDOT can design future cable barrier installations in a manner that results in fewer cable barrier impacts.

POTENTIAL OBSTACLES

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

Obtaining, reviewing, analyzing, and disseminating large quantities of crash data. In order to complete the research objectives, the research team will have to obtain crash data and crash reports for all locations being studied. It is anticipated that some crash reports may be coded incorrectly or may not contain all of the information desired by the research team. Therefore, it is anticipated that the research team will have to individually review and analyze the crash reports used to complete the research objectives. This will require reading and disseminating crash reports and categorizing crashes based on descriptions in the crash reports.

Availability of maintenance/repair cost data. It would be desirable to have a minimum of three years of “after” data (i.e., data collected after cable barrier installation) for all cable barrier installations. However, it is anticipated that there will be less than three years of maintenance/repair cost data for the majority of cable barrier installations. Moreover, there may not be any maintenance/repair cost data for some cable barrier installations.

MDOT will provide whatever maintenance/repair data is available, but this data will not be provided in a consistent format. It is anticipated that maintenance/repair cost data sets will vary by location. Each data set may contain different information, may be organized differently, and may be provided in different formats (e.g., Excel spreadsheet, other software packages, hard (paper) copies, etc.). Furthermore, the beginning and ending dates of each data set will vary by location.

It is anticipated that the research team may need to utilize statistical modeling or other techniques, subject to MDOT approval, to complete the research objectives.

POSSIBLE INVESTIGATOR(S)

DESIRED QUALIFICATIONS IN AN INVESTIGATOR

Strong technical background. Excellent communication (written & oral) skills. Ability to analyze and process crash data. Ability to analyze cost data regarding roadside safety features. Ability to read and disseminate crash reports and categorize crashes based on descriptions in the crash reports.

The main purpose of this research project is to conduct a before-after study of high tension cable barrier installations on Michigan roadways and to see how certain factors (e.g., cable barrier placement, weather patterns, traffic volumes, etc.) may affect the frequency of crashes involving high tension cable barrier. This also includes the possibility of secondary effects of vehicular impacts against high tension cable barrier, such as the possibility of impacting vehicles being redirected into traffic after impacting the barrier and causing other types of crashes. As a result, a statistical experiment must be carefully created to analyze the issues under investigation. Thus, the research team must have the statistical knowledge and expertise to conduct this research.