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| Michigan DepartmentOf Transportation5308 (04/12) | **RESEARCH ADMINISTRATION****PROBLEM STATEMENT****MDOT Led Pooled Fund** |  |
| PROPOSED RESEARCH PROJECT TITLE The Use of Bridge Management Software in the Network Analysis of Big Bridges  |
| OR NUMBER or TPF STUDY NUMBEROR14-022 | [STRATEGIC PRIORITY NO](http://www.michigan.gov/documents/mdot/mdot_research_admin_2014-2015_research_priorities_370923_7.pdf).3 | MDOT PROJECT CATEGORY (see key at bottom of form)1a |
| **SUBMITTER** |
| NAMERebecca Curtis | DATE2/12/13 (revised) |
| TELEPHONE NO.517-373-2256 | E-MAIL ADDRESS curtisr4@michigan.gov |
| BUREAU/REGION/OFFICE\SECTION/UNITDevelopment/Design/Bridge Development/Bridge Management |  |
| **PROBLEM TO ADDRESS** |
| BRIEFLY DESCRIBE THE PROBLEM TO BE ADDRESSED AND WHY IT IS AN ISSUE FOR MDOTCurrent financial outlay plans for big bridge projects are being scheduled for rehabilitation or replacement as a whole, either in a single year or in a short series of years, without regard to element conditions in localized contiguous settings. This is viewing element condition as an entirety when it may make more sense fiscally to view contiguous simple spans or continuous spans as a series of interactive networks. The AASHTO National Bridge Elements and Bridge Management Elements were developed for standard structures and should be reviewed to see if the elements and their units are appropriate for the management of Big Bridges. Big bridges may include slab on girder bridges of significant length as well as other structures including suspension bridges, cable stay, trusses, movable bridges, arches, or boxes. The ability to predict accelerated deterioration and apply it to a span-by-span preservation/replacement matrix could optimize deck life and capital outlay planning.  |
| **RESEARCH OBJECTIVES AND TASKS** |
| LIST THE RESEARCH OBJECTIVE(S) TO BE ACCOMPLISHED1. Develop a methodology to utilize Element Level Inspection and AASHTOWare Bridge Management (formerly Pontis) in the management of big bridges in order to make cost effective preservation decisions.

LIST THE MAJOR TASKS TO ACCOMPLISH THE RESEARCH OBJECTIVES ESTIMATED PERSON HOURS1. Review and evaluation ongoing and recently completed research in this topic area **40 hrs**
2. Review national literature for state of the art and state of the practice in large bridge management and the use of AASHTOWare Bridge Management **100 hrs**
3. Develop a methodology for the management of big bridges using Element Level inspection data and AASHTOWare Bridge Management. The initial frame of reference shall be the National Bridge Elements. Possible methods could include user defined elements of developing a network of structures within AASHTOWare Bridge Management to create the total structure. Consideration should be given to account for data sets from advanced inspection techniques that might be used on big bridges such as Infrared Thermography or Ground Penetrating Radar. **1400 hrs**
4. Survey states to ID bridge types/size/characteristics that merit refined bridge mgmt.. elements/data. **160 hrs**
5. Upon approval of Task 3 by the RAP, recommend user defined bridge management elements for use in the methodology developed in Task 3. **1000 hrs**
6. Write report of research and recommended components for a big bridge Element Level Inspection Manual.

 **300 hrs** ***Total Estimated Person Hours:*** ***3000 hrs***    |
| **ESTIMATED COST AND TIMELINE** |
| ESTIMATE THE VENDOR COST OF THIS RESEARCH STUDY (provide at a minimum the cost range (min and max) associated with the estimated person hours)***$300,000 to $350,000*** |
| ESTIMATE THE MDOT PROJECT MANAGEMENT & FIELD WORK COSTS***$25,000 ($50/hr. @ 500hrs.)*** |
| PROJECT START DATE AND DURATION REQUIRED COMPLETION DATE2 years |
| METHOD OF PAYMENT: SELECT ONE[ ]  ACTUAL COSTS (University Contracts) [ ]  MILESTONE\* [ ]  LOADED HOURLY RATE\*If milestone payment is selected, list milestones here:     ***Note: Michigan Department of Transportation is prepared to be the lead agency for the proposed pooled fund study. We anticipate a minimum of four (4) additional partner states with a minimum fund contribution of $35,000 per year for two (2) years.*** |
| **BUDGET INFORMATION** |
| TOTAL BUDGET(BY FY)***$350,000*** | ***FY 2014*** ***$125,000*** | ***FY 2015*** ***$175,000*** | ***FY2016*** ***$50,000*** | FY  |
| **DELIVERABLES** |
| WHAT DELIVERABLES WOULD YOU LIKE TO RECEIVE 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.)1. Report of research
2. Recommendations for Element Inspection and Management for Big Bridges
3. Recommendations for modifications to use AASHTOWare Bridge Management to account for Big Bridges
4. Recommendations for how to apply the method developed to a Big Bridge
 |
| MDOT INVOLVEMENT (what services and data will MDOT provide and when)MDOT will aid the research team by providing the current National Bridge Elements, Bridge Management Elements and Agency Defined Elements for MDOT Big Bridges. |
| **URGENCY, PAYOFF POTENTIAL AND IMPLEMENTATION** |
| DESCRIBE HOW THIS PROJECT WILL BE IMPLEMENTED AT MDOTThis research will be implemented by bridge engineers to select and plan for appropriate bridge maintenance and preservation activities on large bridge decks.  |
| DESCRIBE HOW MDOT WILL BENEFIT FROM THE IMPLEMENTATION OF THIS PROJECT AND WHO THE BENEFICIARIES WILL BE. The benefits which may be seen through this research are optimal capital outlay planning and timely replacement of bridge elements, including deck segments, in accordance with a preservation matrix which will allow for rehabilitation by span or spans on an as-needed basis, as opposed to scheduling of a complete project when large segments of the element in question may not meet replacement prameters for a span-by-span matrix. |
| **LITERATURE RESEARCH** |
| Attach the results of a preliminary literature search identifying related completed or in progress research. Where there is research that directly applies to the proposed project, explain how this project addresses a need that is still outstanding. The current research identified in the literature search did not account for the unique issues when dealing with a large bridge. |
| **POTENTIAL OBSTACLES** |
| WHAT RISKS OR OBSTACLES MAY MAKE CARRYING OUT THIS PROJECT DIFFICULT? WHAT STRATEGIES WILL YOU USE TO OVERCOME THEM? AASHTOWare Bridge Managment is currently being enhanced, and so findings of the research could be incorporated in the new version if recommendations are made in a timely manner. |
| **INVESTIGATOR(S)** |
| DESIRED QUALIFICATIONS IN AN INVESTIGATOR AND TEAM. Knowledge of bridge engineering and bridge managementKnowledge of bridge inspection and bridge databasesKnowledge of AASHTOWare Bridge Management and the National Bridge ElementsKnowledge of bridge maintenance and preservation activities |
| NAMES OF POSSIBLE INVESTIGATORS (universities, consultants, MDOT staff, other agencies)      |
| [ ]  RECOMMEND POSTING RFP FOR CONSULTANTS AND UNIVERSITIES [ ]  RECOMMEND A MICHIGAN UNIVERSITY ONLY SOLICITATION |
| **STAKEHOLDERS** |
| DOES THE PROJECT HAVE NATIONAL, REGIONAL/MULTI-STATE OR MICHIGAN-0NLY IMPLICATIONS? [x]  National [x]  Regional/multi-state [ ]  Michigan only |
| LIST ANY OTHER STATE, REGIONAL OR NATIONAL AGENCIES AND OTHER GROUPS MAY HAVE AN INTEREST IN SUPPORTING THIS STUDY      |
| **DO NOT WRITE BELOW THIS LINE** |
| FOCUS AREA MANAGER APPROVAL\*[ ]  EMAIL [ ]  CONVERSATION RECORD[ ]  MEETING NOTES | DATE      |
| RESEARCH ADVISORY COMMITTEE CHAIR APPROVAL\*[ ]  EMAIL [ ]  CONVERSATION RECORD[ ] MEETING NOTES | DATE      |
| COO OR CAO APPROVAL\*[ ]  EMAIL [ ]  CONVERSATION RECORD[ ]  MEETING NOTES | DATE      |
| RESEARCH MANAGER SIGNATURE | DATE      |
| ENGINEER OF RESEARCH SIGNATURE       | DATE      |

\*Records of approvals are saved in project file

MDOT employees with questions should contact:

Steve Bower, P.E., Administrator, Research Administration

Phone: 517-636-7777, Fax: 517-322-1262, bowers@michigan.gov

Or review the [Research & Implementation Manual](http://www.michigan.gov/mdot/0%2C4616%2C7-151-9623_26663_59797-201471--%2C00.html)

**MDOT PROJECT CATEGORIES**

**1. Program/Project Development**

a. Bridges & Structures

b. Design

c. Departmental Services

d. Traffic and Safety

e. Environment

f. Work Force Development

**2. Delivery and Operations**

a. Security & Safety

b. Mobility & Systems Operations

c. Pavements & Materials

d. Intelligent Transportation Systems

e. Maintenance

f. Construction & Geotechnical

**3. Multi-Modal Transportation**

a. Freight & Logistics

b. Passenger Transportation

c. Rail

d. Aeronautics

e. Maritime

**4. Planning & Finance**

a. Statewide Development & Planning/Program

b. Asset Management

c. Policy

d. Finance & Administration

e. Contract Services