MoDOT

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Missouri Department of Transportation
David B. Nichols, Director

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August 1, 2014

Dear Research Partner:

The Missouri Highways and Transportation Commission requests proposals from qualified organizations—namely private consultants, universities, and research organizations—to furnish professional engineering services as described in the following request for proposal to be coordinated by the Research Unit of the Construction and Materials Division.

Please submit a proposal for project TR201506 entitled, "Evaluation of Finger Plate and Flat Plate Connection Design". Your submittal must include a work plan, the proposed project team and its background, and any related projects now active or recently completed by your firm. The project team must be led by a licensed professional engineer in the state of Missouri and the final report must be sealed, in accordance with the provisions of Chapter 327 RSMo.

The selection committee will use Qualification Based Selection. Budgets are not to be included with the proposal submissions, and will not be presented to the selection committee.

Please deliver all proposals to my attention in Research Unit of the Construction and Materials Division as indicated in the RFP by **August 29, 2014**. More information about project contracting in general can be found at: www.modot.mo.gov/services/OR/orRFP.htm.

Sincerely,

Bill Stone

Bill Stone
Research Administrator

Project Specific Requirements:

This document contains information and requirements for only this RFP. A "Standard Requirements" document contains additional needs for all research proposals and contracting. Submitters should review both this document and the Standard Requirements document, available from the Construction and Materials Contract Administrator (identified at the end of this document) or:

www.modot.org/services/OR/orTemplates.htm

TR201506
Evaluation of Finger Plate and Flat Plate Connection Design

Background:

MoDOT has recently observed earlier than expected distress of its finger plate and flat plate expansion device connections on structures with high traffic volumes. Although this distress seems to be a common occurrence, there appears to be no consistent mode of failure as sometimes the damage results in an anchorage spall and other times with weld failures in the plate itself. This early life damage results in costly and difficult repairs which must be accomplished quickly to minimize impact on traffic. Additionally, these repaired expansion devices often end up with similar early distress. The following are a few images of the damage:

These finger plates and flat plates are common on very large structures and are often installed or repaired with staged construction. They must be able to accommodate very large expansion lengths, often on wide structures, and sometimes with large skews.

Objectives:

The objective of this project is to learn the cause(s) of premature deterioration of MoDOT finger plate and flat plate expansion devices under high traffic volumes and then use that information to design a new Load and Resistance Factor Design (LRFD) finger plate and flat plate design that is intended to last 40 years or more with minimal maintenance. In addition, repair and replacement best practices and details are to be developed as part of this project. Designs and practices must be able to accommodate large traffic volumes on a wide variety of superstructure sizes, types, and skews.

This project is to deliver LRFD designs and details for new standard finger and flat plate expansion devices and a procedure or design routine showing a design process and flow, including a list of special design considerations for possible future designs in accordance with Finite Element Model (FEM) analysis results, LRFD, best practices, and considering all possible bridge movements that will prevent premature failures as exhibited by recent failures and based on what analysis results predict.

Project Requirements and Deliverables:

Task descriptions are intended to provide guidance in development of the research. MoDOT is seeking the input of proposers to determine the best strategies to accomplish the research objectives.

Task 1: Literature search of finger plate and flat plate durability research along with designs and construction considerations from other states.

Task 2: Develop a failure matrix of causes of MoDOT finger plate and flat plate distress.

Task 3: Analyze and investigate MoDOT's current finger plate and flat plate design and connection details and distress.

Task 4: Design and model a new LRFD finger and flat plate design with connection details which has an intended 40 year lifespan. **New designs should account for four inches, six inches, and eight inches of movement and for skew ranges between zero and sixty degrees.** Additionally a list of special design considerations for possible future designs is created.

Task 5: Develop new repair and replacement best practices and details that can accommodate a wide variety of existing of structure widths, skews, and superstructure types in a format that can be easily added to MoDOT's Engineering Policy Guide (EPG). http://epg.modot.mo.gov

Task 6: Draft a final report to document the results of the literature search, investigation, and the steps that led to the new design and repair practices.

Quarterly Reports: Quarterly reports should be submitted throughout the project on the last day of March, June, September and December. The quarterly reports are not intended to replace any additional correspondence between the research team and MoDOT needed to keep the project moving

Interim Presentations: Two interim presentations shall be scheduled during the project to update MoDOT on the progress on the structural investigation and the direction of the new design and repair practices section of the project prior to final structural modeling and analysis. This is in addition to the necessary communication between the Principal Investigator(s) and MoDOT contacts throughout the project. The purpose of the interim presentations is to evaluate the progress and determine if any mid-project corrections are necessary.

Project Schedule:

The following is an estimate of the project timeline or information on key dates within the project, presuming the project starts near October 17th. Proposals need to include a work plan with a proposed timeline. The project timeline will be finalized during the contracting phase.

October 24, 2014: A kick off meeting with MoDOT will be scheduled to discuss project requirements and deliverables.

December 31, 2014: Quarterly report due.

February 27, 2015: The First Interim Presentation must be completed by this date.

March 31, 2015: Quarterly report due.

June 30, 2015: Quarterly report due.

July 17, 2015: The Second Interim Presentation must be completed by this date.

September 30, 2015: Quarterly report due.

October 31, 2015: Draft Final Report due.

November 30, 2015: Final Report due.

December 30, 2015: Final invoice due and contract ends.

(For report templates and a standard form see: www.modot.org/services/OR/orTemplates.htm.)

Special Notes:

A budget is not to be included in the proposal, but will be required for the contract.

MoDOT can provide additional images of deterioration accompanied by designs of various expansion devices, traffic control for field instrumentation of existing expansion devices (if deemed necessary), and can send out a survey to relevant state DOTs about expansion device deterioration and design considerations.

A fabricated test model is not requested for this project. A finite element model (FEM) analysis is encouraged as a system to determine the cause of premature deterioration and for design validation.

Additional Model/Design Considerations

- Include both traffic loading and temperature effects.
- Include impact in accordance with LRFD or possibly greater.
- Include the loading of a single axle from a super load.

Reporting templates and standard report forms are available from the Construction and Materials Contract Administrator or the web site:
www.modot.org/services/OR/orTemplates.htm

RFP Requirements:

- Proposals must be no more than 10 pages with a font size no less than 11 points. This length limit does not include forms or resumes attached to the proposal.

- The "Standard Requirements" document provides further details and links to the required forms. It is available from the Construction and Materials Research Administrator or at: www.modot.org/services/OR/orTemplates.htm

- Proposals will be evaluated by an agency and stakeholder team with knowledge and backgrounds in relevant areas for this project. Selection of the successful proposer will be based on the proposer's demonstrated knowledge in the required areas, the merit of the proposed methods and approach in achieving the desired goals, the experience and qualifications of the team, the plan for ensuring implementation of results, and the adequacy and availability of team members to complete the work in a timely manner.

RFP Schedule:

The following timeline must be met for a proposal to be accepted.

Date:	Action:
August 1, 2014	MoDOT posts RFP to the website: www.modot.mo.gov/services/OR/orRFP.htm
August 15, 2014	Written comments or questions must be submitted to Construction and Materials Contract Administrator.
August 22, 2014	MoDOT will post written responses publicly on the website: www.modot.mo.gov/services/OR/orRFP.htm
August 29, 2014	Written proposals must be submitted to Construction and Materials Contract Administrator.
September 12, 2014	MoDOT will notify submitters about project selection, or if needed about interviews to finalize selection.

Contracting Requirements:

- The successful team will be required to complete additional documentation and enter into a contract such as a "Standard Research Agreement" or "Task Order." Applicants should be aware of these additional needs so contracting can proceed in a timely manner.

- Standard contracts, forms, attachment templates and additional information are available from the Construction and Materials Contract Administrator or the web site:
  www.modot.org/services/OR/orTemplates.htm

Contact Information:

Proposals must be either hand delivered by close of business; or faxed, emailed, or mailed by midnight (Central Standard Time) according to time stamp or postmark; on the due date indicated below. Please reference the project title since more than one RFP may be due at one time. **Electronic proposals are encouraged**. They may be faxed or emailed to the Construction and Materials Research Administrator:

william.stone@modot.mo.gov
Fax: 573-526-0558

Proposal packages suitable for duplicating may be submitted by mail or hand delivery to:

Construction and Materials Contract Administrator

Missouri Department of Transportation
1617 Missouri Blvd.
PO Box 270
Jefferson City, MO 65109