MoDOT

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Missouri Department of
Transportation
Patrick K. McKenna, Director

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December 17, 2018

Dear Research Partner:

The Missouri Highways and Transportation Commission requests proposals from qualified organizations—namely private consultants, universities, and research organizations—to furnish professional 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 **TR201911** entitled, **"INLAID PAVEMENT MARKING EVALUATION."** 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. A "not to exceed" budget amount is included in the RFP to assist with the required scope, but budgets are not to be included with the proposal submissions, and will not be presented to the selection committee.

Please submit all proposals to the Research Contract Administrator by **January 31, 2019 10:00 AM (CST)**. More information about project contracting in general can be found at https://www.modot.org/research-requests-proposal.

Sincerely,

Jennifer Harper
Research Engineer (Research Contract Administrator)

Request for Proposal
TR201911
Inlaid Pavement Marking Evaluation

This document contains information and requirements for only this RFP. Submitters should review both this document and general Contracting Documents, which contain additional requirements for all research proposals and contracts. "Contracting Documents" are available on the MoDOT website at https://www.modot.org/information-researchers.

Background

Over the past three decades, MoDOT has tried multiple strategies to provide and improve wet nighttime guidance on its major routes, culminating in the current use of ASTM Type III glass beads on all lines on MoDOT's major roadways. Before the implementation of the Type III bead system, MoDOT's St. Louis District began experimenting with inlaid pavement markers (IPMs); however, to date, a complete evaluation of their effectiveness and life cycle cost has not been performed. Before moving forward with further implementation plans for IPMs, the performance and effectiveness of these devices needs to be determined in order to establish a statewide direction for the use of these devices. MoDOT has already utilized its mobile retroreflectometer contractor, Beck & Co. Engineering, to collect initial retroreflectivity and presence data for many of the existing segments of inlaid pavement markers in St. Louis. This data will be made available to the successful applicant so that it can be utilized for this study.

The objective of this study is to determine the benefits of IPMs on Missouri roadways considering our current wet reflective pavement marking system. It is believed IPMs will provide added benefit in certain locations; however, there is a question regarding the accuracy of national crash modification factors (CMFs) as they apply to Missouri's roadways. It is assumed these CMFs were established based on IPM applications with standard pavement markings.

Objectives

Coordinate the kick-off meeting to begin task, and establish a schedule and protocol for regular communication with the MoDOT point of contact. Contractor will acquire accurate and good quality data as the basis of the safety analysis. Contractor will:

- Inventory routes and locations with IPMs. There are approximately 9 segments with IPMs installed. This can be done with assistance of the MoDOT St. Louis District Office.
- Determine the number of functional IPMs by roadway segment, supplementing any data not already provided in Beck & Co. Engineering's report.
- Identify an expected failure rate / life expectancy for IPMs.
- Identify the degree of crash reduction IPMs can provide when used with MoDOT's enhanced wet nighttime pavement marking system in areas with and without ambient light.

- Determine a life cycle cost for this IPM system per mile, including initial installation and maintenance costs for the life of the driving surface, by surface type (concrete and asphalt).
- Identify a minimum level of effective service (visible IPMs) and/or length of section of IPMs which can be missing before affecting the IPM's performance.
- Identify required maintenance intervals needed to maintain a minimum level of effective service.
- Determine if national CMFs apply to Missouri roadways with MoDOT's wet nighttime pavement marking system, and, if not, determine an expected CMF which applies to Missouri, both for segments with and without ambient light.
- Identify any correlation between effectiveness/presence and/or maintenance requirements of the IPMs and the condition of the pavement in which the IPMs are installed.
- Identify any relevant data or research conducted in other states which would correlate to performance and maintenance costs.

Contractor will present the initial findings and support the decision process for additional analysis, determine the real safety impact of inlaid pavement markers to support future decision-making by MoDOT, and document the research methods, data analysis, and CMFs associated with installing inlaid pavement markers.

Project Requirements

The following 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: Project Management

The contractor will facilitate a kick-off meeting with MoDOT to review the work plan, scope, and schedule; and establish a protocol for regular ongoing communication and coordination with the team. This proposal will serve as the Draft Work Plan, to be discussed in the kick-off meeting. Upon comments received during the meeting and/or in writing, the contractor will incorporate those comments into a Final Work Plan.

The contractor will conduct a monthly status meeting to review progress for the previous period and anticipated work for the next period. Contractor will also develop minutes for the kick-off meeting and each of the monthly status meetings.

Task 2: Define and Obtain Data

Upon notice to proceed, MoDOT and contractor will collaborate to finalize the draft matrix of installation locations and dates for inlaid pavement markers in the St. Louis area. At minimum, the list will include the county, route designators, number of lanes, marker installation dates, and maintenance/replacement activities. The contractor will use this information to schedule the census activities, and develop a preliminary model for the rate of deterioration determinations.

The contractor will also use the finalized matrix as the basis for requesting the appropriate crash data needed to perform simple before and after safety analysis. The crash data requested will include, but not be limited to, nighttime crashes in both wet and dry conditions for at least

three years before and after installation (if data is available). Prior to formally requesting the data, the contractor will meet with MoDOT to present the preliminary request, refine any details necessary, and mitigate any data delivery concerns. Following the data meeting, MoDOT will query the data and deliver it to the contractor in an agreed-upon electronic format.

Task 3: Collect Field Data and Develop Census

Based on preliminary information from MoDOT, the contractor will map the routes and plan the number of passes required to collect clearly discernible nighttime video footage of all pavement markers which have not already been collected by Beck & Co. Engineering, Inc. Upon completion of the collection plan, contractor will drive each route during both dry and raining nighttime conditions, and record, catalogue, and archive video footage. In the safety of an office, the footage will be used to count the number of functional pavement markers in place. Functionality will be defined on a pass/fail basis, meaning visible markers are functional and missing or invisible markers are non-functional. Additionally, the contractor will rate the level of ambient light in each segment (high, moderate, low).

Task 4: Conduct Naïve Evaluation

Contractor will use initial MoDOT crash data to determine the simple before and after safety function compared to, and weighted by functionality.

Task 5: Develop Interim Report

Contractor will draft an interim report describing the data acquisition, analysis, and findings; and recommend further action, if warranted. Upon completion, contractor will submit the interim report to MoDOT for review. Within two weeks of submittal, contractor and MoDOT will meet to discuss the findings and plan further action as required. At a minimum, the following will be addressed in the report:

- Inventory of IPMs in the locations specified in this study, including the type of IPM installation used (single reflector in a shallow groove, single reflector in a deep groove, dual reflectors in a shallow groove and dual reflector in a deep groove), and the percent which are present and functional
- Evaluate IPM performance in various ambient light conditions (high, moderate, none) in regards to providing enhanced guidance over the existing pavement markings during night/rain conditions
- Life cycle costs of IPMs
- Lifespan of IPMs
- Crash reduction
- Recommendation for future use of IPMs

Task 6: Conduct Rigorous Analysis and Develop CMF, If Needed

If naïve analysis indicates the potential to apply a more rigorous examination, contractor will coordinate with MoDOT to determine how much additional crash analysis is needed. This may lead to the need to provide additional data to the contractor. If this analysis is conducted, the findings will be included in the final report.

Project Deliverables

For report and plan templates and forms, visit https://www.modot.org/information-researchers

Email Communications

E-mail and phone communications between the Principal Investigator(s) and MoDOT contacts as necessary are required to provide ongoing updates of progress throughout the project.

Data Management Plan

The plan is a formal document that describes the data that is acquired, created or produced during the project, specifies who owns it and who can access it as well as information on how it will be described, managed, analyzed, stored, shared and preserved during and after the project is over. Please refer to templates on the website.

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. Please refer to template on the website.

Draft Final/Interim Report and Research Summary

These drafts should be final products except for revisions based on MoDOT's review. A final report must include a completed Technical Report Documentation page. Please refer to templates on the website.

Final Report and Final Research Summary

After MoDOT's review is complete and documents have been edited to MoDOT's satisfaction, final documents should be submitted as a Word document (unless otherwise instructed). Please see research summary template on the website.

Final Presentation

May be required. The contractor will present the results, recommendations, and implementation ideas to MoDOT and other stakeholders. The contractor will coordinate location, date, and meeting fees with MoDOT. For stakeholder and agency participants, any travel and lodging fees are to be covered by individual attendees or their firms. MoDOT and stakeholders will provide feedback to the contractor, especially related to implementation.

Task-Specific Deliverables

Task	Deliverables
1	Schedule and conduct kickoff meeting Kickoff meeting minutes Draft and final work plans Monthly project status meetings
2	Draft data proposal Data meeting Final data request
3	Census of functional inlaid pavement marks Rate of unmaintained functionality decline
4	Simple before and after crash analysis
5	Draft Final/Interim Report Interim project meeting
6	Data analysis Crash modification factors Append Initial Report, if necessary

Project Schedule

The following is an estimate of the project timeline or information on key dates within the project, presuming the project starts **March 15, 2019**. Proposals need to include a work plan with a proposed timeline. For a sample of a work plan template, see link below. Changes to our estimated project timeline below will be considered, however, timeline extensions cannot be guaranteed. The project timeline will be discussed and finalized during the kickoff meeting.

The Offeror will provide a proposed schedule to complete the work including the following items: monthly progress meetings, crash data analysis, life cycle cost analysis, draft final/interim report, and final report.

The draft final/interim report shall be completed and provided to MoDOT within six months of the notice to proceed. All work shall be completed and the final report provided to MoDOT within eight months of the notice to proceed.

For report templates and forms, visit https://www.modot.org/information-researchers.

Date	Milestone
Before 3/31/19	A kick off meeting with MoDOT will be scheduled to discuss project requirements and deliverables. The dates of key milestones and deliverables will be determined from this meeting.
3/31/19	Quarterly report due.
6/31/19	Quarterly report due.

Date	Milestone
9/15/19	Draft final/interim report and interim summary, are due. The draft documents shall be submitted to MoDOT approximately two months prior to the final report.
11/15/19	Final report and final summary are due. The final documents shall be due approximately one month before the end of the contract. This is to allow all billing to be completed prior to the end of the project.
12/15/19	Final invoice due.

Special Notes

Project budget is not to exceed $120,000. A budget is not to be included in the proposal, but will be required for the contract and must be within this limit. For a sample Budget template, report templates and forms, visit https://www.modot.org/information-researchers.

RFP Requirements

- "Contracting Documents" provide further details and links to the required forms. They are available at https://www.modot.org/information-researchers.
    - **Organization's Project Experience**: The proposal must clearly identify the Organization's experience in offering the services requested in this RFP during the past three (3) years. The description should include a list of the agencies which your organization has served during this time period or currently serves. Please highlight any work you have done with other state agencies or local governments.
    - **Team Member Experience**: Please list all team members (including subcontractors) proposed to work on the project. Attach licenses, certifications and resumes for key personnel.
    - **Organization's Client References**: Proposals should indicate the name, title, and telephone number of at least three clients within the past three years.
- Proposals must be no more than 8 pages with a font size no less than 11 points. This length limit **does not include** the Proposal Submission Form, Organization's Project Experience, Team Member Experience, Organization's Client References and optional cover letter (if included, one page maximum).
- Proposals must be submitted as one combined PDF document. The submission should **only include the required documents** organized in the following order: 1) Proposal Submission Form; 2) Cover Letter (Optional; 1 page maximum); 3) Body of Proposal (including work plan); 4) Organization's Project Experience; 5) Team Member Experience; and 6) Organization's Client References.
- The Offeror must respond to this RFP by submitting all the information required herein for its proposal to be evaluated and considered for award. Failure to submit all the required information shall be deemed sufficient cause for disqualification of a proposal from consideration.

- Proposals will be evaluated by an agency and stakeholder team with knowledge and backgrounds in relevant areas for this project. Selection of the successful Offeror will be based on the Offeror'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.

MoDOT Evaluation Criteria	Points Possible
Expected development and outline of research problem is understood and expressed clearly in the response. The language of the narrative should be straightforward and limited to facts, solutions to problems, and plans of action.	25
The proposed approach to the research problem appears feasible.	25
The proposal results in a sense of confidence that the Offeror could complete the task. An overall qualifications review provides the sense that the Offeror possesses the necessary experience, reliability and organizational expertise and personnel.	30
MoDOT has experienced acceptable previous performance from the Offeror's personnel and/or organization (5 is neutral, below 5 means poor performance in the past, above 5 means good performance)	10
Additional Value Provided (offering more than RFP requires)	10
Total Points	**100**
Correct proposal submission is one of the evaluation criteria. If submission instructions are not followed, the Offeror risks an automatic 10 point deduction (out of 100 total points) when points are awarded during the Proposal Evaluation Process	0 or -10

RFP Schedule

This document constitutes an RFP from qualified organizations to conduct the TR201911 INLAID PAVEMENT MARKING EVALUATION study for the MHTC and Missouri Department of Transportation (MoDOT). MHTC reserves the right to reject any and all proposals for any reason whatsoever.

The following RFP Schedule of Events represents MoDOT's best estimate of the schedule that shall be followed. The time of day for the following events shall be between 7:30 am and 4:00 pm, Central Standard Time unless otherwise noted. MoDOT reserves the right at its sole discretion to expand this schedule, as it deems necessary, without any notification except for the deadline date for submitting a proposal. Time is of the essence for responding to the RFP within the submission deadlines.

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

Date	Action
12/17/2018	MoDOT posts RFP to the website at https://www.modot.org/research-requests-proposal.
01/07/2019 4:00 PM (CST)	Written comments or questions must be submitted to Construction and Materials Research Contract Administrator.
01/16/2019	MoDOT will post written responses publicly on the website at https://www.modot.org/research-requests-proposal.
01/31/2019 10:00 AM (CST)	Written proposals must be submitted to Construction and Materials Research Contract Administrator.
2/20/2019	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.

As part of the eAgreements process, MoDOT uses an electronic signature tool, DocuSign, for signing agreements electronically. All parties of the agreement must agree to sign electronically in order to utilize the electronic signature option. If your proposal is selected, you will be informed about how to obtain your credentials for electronic signatures (including how to become a MoDOT vendor if you are not already).

Standard contracts, forms, attachment templates and additional information are available from the Research Contract Administrator or the website at https://www.modot.org/information-researchers.

Proposal Submission

Submission Deadline

Proposals must be emailed by **10:00 AM (Central Standard Time)** according to email time stamp by the submission date in the RFP Schedule to the Research Contract Administrator's attention (Jennifer Harper) at MoDOTResearchRFP@modot.mo.gov. Please reference the project title since more than one RFP may be due at one time. Electronic proposals are required.

Submission Confirmation

You will receive an email confirmation after your proposal has been received. If you do not receive such a confirmation by **12noon (Central Standard Time)** on the day of the deadline, please contact us at MoDOTResearchRFP@modot.mo.gov as soon as possible. Your submission should not be considered received until you have received your email confirmation.