MoDOT

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Missouri Department of Transportation
Patrick K. McKenna, Director

1.888.ASK MODOT (275.6636)

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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 **TR202015** entitled, **"Use of (TIP) in Drilled Shafts 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 MoDOTResearchRFP@modot.mo.gov by **January 28, 2020 10:00 AM (CST)**. More information about project contracting in general can be found at https://www.modot.org/information-researchers under RFP documents.

Sincerely,

Jen Harper
Research Director

Background

Drilled shafts are deep foundations used to support structures with large axial and lateral loads and are constructed by excavating cylindrical shafts into the ground and filling them with concrete. The construction of the drilled shafts relies heavily on good practices from the contractor, engineer and inspector to produce a quality foundation element. Most installation methods involve blind concreting, so it is difficult to be certain of an intact concrete mass of the intended dimensions.

MoDOT currently uses the cross-hole sonic logging (CSL) method as a nondestructive testing method to determine whether defects exist in the concrete. Multiple access tubes must be installed, and concrete placed within the shaft cross section. Then a single generator coupled with receiver is lowered, maintaining a consistent elevation to test the integrity of the concrete shaft. This method only tests the integrity of the concrete between the access tubes, while the outside of that zone is left untested.

Thermal Integrity Profiling (TIP) is a non-destructive testing method of evaluating the integrity of concrete foundations. TIP is a technology that utilizes the heat generated by curing of concrete to assess the integrity and quality of drilled shafts. The temperature data generated by the heat of hydration from the curing cement is collected to identify potential anomalies in the drilled shaft. Temperatures are measured along the entire depth of the foundation with the use of thermal wires. If data from a certain depth show areas with either lower or higher relative temperatures, a concrete deficiency or defects may be present. It is also possible to estimate the effective area of the foundation, and to assess if the reinforcing cage is properly aligned and centered.

Optical fiber based technology may also offer potential use with TIP for integrity testing of drilled shafts. MoDOT is interested in evaluating the effectiveness, possible cost savings and other benefits of using optical fiber or other materials/techniques in the TIP testing of drilled shafts.

Objectives

The objective of this project is to evaluate the effectiveness, accuracy and cost of using Thermal Integrity Profiling versus Cross-Hole Sonic Logging for detecting defects in drilled shafts used in deep foundation construction for MoDOT. The cost, installation and data collection of CSL will be provided by a separate contractor.

MoDOT also wants to evaluate the use of optical fiber based TIP or other materials/techniques as opposed to the conventional thermal wire based TIP for detecting defects in drilled shafts.

After developing a work plan, scope, schedule and facilitating a kick-off meeting the contractor will:

- Research the use of CSL and TIP testing in drilled shafts
- Perform laboratory testing to determine feasibility of optical fiber based or alternate based TIP and compare effectiveness of thermal wire based TIP
- Based on results of laboratory testing and MoDOT approval, TIP methods will be chosen for field testing alongside CSL testing

- The contractor will provide the required equipment and materials for TIP testing; the cost of material will need to be included in the research project budget
- Collaborate with MoDOT and construction contractor on location and date of drilled shaft construction, TIP installation, and TIP testing and evaluation
- Perform field TIP testing alongside CSL testing on a minimum of four drilled shafts
- Create guidelines for the use of TIP for MoDOT to follow in future projects; guidelines should be in the format of MoDOT's Engineering Policy Guide
- Deliver final report and research summary

Note: Include research teams' ability to perform field testing in the fall of 2020 if a project is available, or spring of 2021. If field work can be completed in the fall of 2020 the project timeline will be adjusted.

Project Requirements

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 communications and coordination with the team. The contractor will also develop minutes for the kick-off meeting and any status meetings that may be held during the project.

The finalized work plan will detail implementation of the following tasks as well as the resources and schedule required to carry them out.

Task 2: Research/Literature Review

The contractor will research the use and cost of CSL versus the use and cost of TIP in drilled shafts. Conduct a literature search of available TIP testing methods including thermal wire, optical fiber wire or other materials/techniques.

Task 3: Laboratory Testing and Cost Analysis

Perform laboratory assessments of the feasibility of optical fiber based TIP and compare with thermal wire-based TIP. A comparison will also be done with the operationality, effectiveness and cost of each method being considered. Contractor will provide all required equipment for testing; cost of equipment will be part of the research project budget.

After an in-depth lab investigation and comparison of the different methods, TIP will be field tested alongside the CSL method. The TIP methods chosen will need to be approved by MoDOT prior to the start of field testing.

Task 4: Define and Obtain Data

MoDOT and contractors will collaborate to finalize the draft matrix of installation and location for the installation of the TIP testing in the drilled shafts. A minimum of four drilled shafts will be tested at the pre-determined construction site.

The research contractor will have to collaborate with the construction contractor on the exact date and time of installation of drilled shaft construction, TIP installation, and TIP testing and evaluation.

Task 5: Field Testing

Field testing will be performed on a minimum of four drilled shafts at a pre-determined project site. The approved methods of TIP testing alongside CSL will be used to locate any defects in each drilled shaft. A separate contractor will provide the CSL testing. An assessment of the data from each apparatus will be conducted, the data will be reviewed, and a comparison will be performed for each shaft.

- The cost of the TIP apparatus will be included in the research project budget
- The installation of the TIP apparatus and data collection will be performed by the research contractor
- The cost, installation and data collection of CSL will be provided by a separate contractor pre-determined in the construction contract

Task 6: Create Guideline for Use

The contractor will create guidelines for implementation and use of Thermal Integrity Profiling testing that MoDOT might follow in future projects. The guideline should be in the format of MoDOT's Engineering Policy Guide.

Task 7: Develop Interim Report and Research Summary

Task 8: Delivery of Final Report and Research Summary

Project Deliverables

Email Communications

E-mail and phone communications between the Principal Investigator(s) and MoDOT contacts as necessary are required to provide on-going 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.

Interim Presentation

An interim presentation shall be scheduled at the completion of Task 3 and near the mid-point of the project to update MoDOT on the progress and the direction of the project. The purpose of the interim presentation is to evaluate the progress and provide direction and corrections as necessary.

Draft Final 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 **Publication Guidelines** and summary template 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 documents (unless otherwise instructed). Please refer to **Publication Guidelines** and summary template on the website.

Final Presentation

The contractor will present the results, recommendations, and implementation ideas to MoDOT and other stakeholders. The contractor will coordinate meeting location and date 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.

Project Schedule

The following is an estimate of the project timeline or information on key dates within the project, presuming the project starts **February 25, 2020**. Proposals need to include a work plan with a proposed timeline (see note under project objectives). 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.

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

Date	Milestone
3/10/2020	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.
11/20/2020	Interim presentation must be done by this date.
8/20/2021	Draft final report, draft summary report, other deliverables are due. The draft documents shall be submitted to MoDOT approximately two months prior to the final report.
10/20/2021	Final report, summary report, other deliverables 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.
12/20/2021	Final invoice due.
12/20/2021	Contract ends.

Special Notes

Project budget is not to exceed **$150,000**. 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, see https://www.modot.org/information-researchers.

Note: Field testing may be performed in the fall of 2020 if a project is available, or spring of 2021. If field work can be completed in the fall of 2020 the project timeline will be adjusted.

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 10 pages in length 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.
    - Correct proposal submission is one of the evaluation criteria. If submission instructions in this section 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.

RFP Schedule

This document constitutes an RFP from qualified organizations to conduct the **TR202015 Use of (TIP) in Drilled Shafts 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
12/11/2019	MoDOT posts RFP to the website at https://www.modot.org/research-requests-proposal.

Date	Action
12/31/2019 4:00 PM (CST)	Written comments or questions must be submitted to MoDOTResearchRFP@modot.mo.gov.
1/14/2020	MoDOT will post written responses publicly on the website at https://www.modot.org/research-requests-proposal.
1/28/2020 10:00 AM (CST)	Written proposals must be submitted to MoDOTResearchRFP@modot.mo.gov.
2/11/2020	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 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 Director's attention (Jen 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.