MoDOT

Missouri Department of Transportation
Patrick K. McKenna, Director

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February 1, 2022

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 **TR202215** entitled, **"Missouri DOT Data Acquisition and Processing Using Artificial Intelligence and Machine Learning."** 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 **March 22, 2022** at **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

MoDOT

Our mission is to provide a world-class transportation system that is safe, innovative, reliable and dedicated to a prosperous Missouri.

www.modot.org

Background

There has been an evolution in the technologies and methodologies used to collect and analyze transportation imagery and data. The data collection equipment has improved as well with more granular data able to be collected with high resolution imagery utilizing lighter weight devices that can be carried on more platforms. Some human-based tasks of conducting asset inventories, inspection activities, and design surveys could be replaced with Artificial Intelligence (AI) and Machine Learning (ML) capabilities.

Artificial intelligence consists of the "thoughts" and conclusions that computers make after receiving data inputs. If human intelligence uses the brain to receive, store, and analyze information, AI uses various technologies to also receive, store, and analyze information. Machine learning is a branch within AI in which computers use programming as a jumping-off point to create their own processes to analyze vast amounts of data. The machines themselves could develop processes and algorithms to take these data and compute observations, trends, and conclusions about the data.

These impacts could be quantified in personnel time savings, improved safety for highway workers and the public, and greater access to data needed for informed decision-making. As more state departments of transportation realize the benefits of these technologies, Missouri needs to ensure it stays at the forefront of these developments and implement them into more work activities.

Objectives

The use of AI and ML is an innovation that will continue to play a prominent role in transportation. The objective of this research is to provide MoDOT with tools and information to implement and leverage AI and ML to improve workforce and public safety, increase time efficiencies and operations, facilitate asset inventory, support maintenance decision making, and reduce overall costs to the agency.

This project will review and analyze current data collection and analysis efforts performed by MoDOT staff and recommend five work activities that could be replaced or augmented by AI and ML. MoDOT will select three of the recommendations to move forward. As support documentation, each recommendation should have a cost-benefit analysis comparing AI and ML to traditional methods.

Project Requirements

Task 1: Project Management

The Contractor will facilitate a kickoff 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 kickoff meeting. Upon comments received during the meeting and/or in writing, the Contractor shall incorporate those comments into a Final Work Plan.

The Contractor will schedule and conduct a quarterly status meeting to review progress for the previous period and anticipated work for the next period. Contractor shall also develop minutes for the kickoff meeting and each of the quarterly status meetings.

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Task 2: Research and Literature Review

The Contractor will perform a literature review of Artificial Intelligence and Machine Learning in transportation practices, particularly at state departments of transportation.

Task 3a: Data Acquisition, AI Training, and Analysis

The Contractor will review and analyze current data collection and analysis efforts performed by MoDOT staff and recommend five work activities that could be replaced or augmented by AI and ML.

Task 3b: Development of AI Processes

MoDOT may select up to three of the recommendations to move forward with. The Contractor will then develop processes and report to MoDOT as analysis is completed for each distinct project and report to MoDOT as analysis is completed for each distinct project.

Task 4: Evaluate Benefit-Cost of AI and ML methodologies versus Traditional Data Collection and Analysis methods

The Contractor will calculate benefit-cost values of using AI and ML against traditional data collection and analysis methods. Costs must include not only the technology involved but also storage requirements for the data and continuous technical support as needed.

Task 5: Develop Draft Report and Research Summary

The Contractor will prepare an interim report and research summary for MoDOT review. The report will summarize all research tasks and the research findings. The Contractor will conduct an interim presentation on the research results to MoDOT.

Task 6: Develop Final Report, Research Summary and Presentation

The Contractor will develop a final report detailing the tasks completed during the project, including any and all findings generated during the project's duration. The Contractor will provide a 1-2 page research summary that states the project objectives, findings and conclusions. A presentation for MoDOT staff, summarizing important or significant details of the project, may also be provided, if warranted by MoDOT personnel. Please refer to the Publications Guidelines for the report and research summary, which can be found on the website.

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Project Deliverables

For templates and forms for reports and plans, 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 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 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 determine if any mid-project corrections are 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.

Other Deliverables

Examples include construction reports, interim reports, annual reports, maps, brochures, Include descriptions, criteria, and frequency.

Final Presentation

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	Minutes from the kickoff meeting and a revised final work plan.
2	None.
3a	Provide five recommendations of current MoDOT practices /applications which could be replaced by AI and ML.
3b	Develop (up to) three processes for MoDOT to utilize.
4	Produce a benefit-cost analysis comparing traditional methods of data acquisition and processing versus those produced through AI and ML.
5	Draft report and presentation.
6	Final report and presentation.

Project Schedule

The following is an estimate of the project timeline or information on key dates within the project, presuming the project starts **June 1, 2022**. 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.

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

Date	Milestone
6/10/2022	A kickoff 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.
3/11/2024	Interim presentation must be done by this date.
3/11/2024	Draft report, draft summary report, and other deliverables are due. The draft documents shall be submitted to MoDOT approximately two months prior to the final report.
5/10/2024	Final report, summary report, presentations, and other deliverables are due. The final documents shall be due approximately one month before

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Date	Milestone
	the end of the contract. This is to allow all billing to be completed prior to the end of the project.
6/10/2024	Final invoice due.
6/10/2024	Contract ends.

Special Notes

Project budget is not to exceed **$250,000**. 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.

All questions, information, data and/or manual requests regarding any aspect of the RFP details or process for submissions should be submitted to *MoDOTResearchRFP@modot.mo.gov* by the date and time listed in the "RFP Schedule" section of the RFP. This is the only acceptable method for contact regarding the RFP and contacting MoDOT employees via other methods is prohibited. Not adhering to this rule is cause for disqualification of the proposal.

RFP Requirements

- "Contracting Documents" provide further details and links to the required forms. They are available at https://www.modot.org/information-researchers.
    - o **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.
    - o **Team Member Experience**: Please list all team members (including subcontractors) proposed to work on the project. Attach licenses, certifications and resumes for key personnel.
    - o **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 TR202215 Missouri DOT Data Acquisition and Processing Using Artificial Intelligence and Machine Learning 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
2/1/2022	MoDOT posts RFP to the website at https://www.modot.org/research-requests-proposal.
2/15/2022 4:00 PM (CST)	Written comments or questions must be submitted to MoDOTResearchRFP@modot.mo.gov. This is the only acceptable method for contact regarding the RFP and contacting MoDOT employees via other methods is prohibited. Not adhering to this rule is cause for disqualification of the proposal. This includes all requests for information, data, and manuals.
3/1/2022	MoDOT will post written responses publicly on the website at https://www.modot.org/research-requests-proposal.
3/22/2022 10:00 AM (CST)	Written proposals must be submitted to MoDOTResearchRFP@modot.mo.gov. Do not consider your proposal submitted until you receive notification of receipt. A notification should be sent by noon of the same day.
4/26/2022	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.

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