

**ARKANSAS DEPARTMENT OF TRANSPORTATION
SYSTEM INFORMATION AND RESEARCH DIVISION
FISCAL YEAR 2023
REQUEST FOR PROPOSAL
RESEARCH PROJECT NO. TRC2303**

TITLE: Evaluation of Impacts Due to a Bridge Closure: A Case Study of the Mississippi River Bridges in Arkansas

ARDOT POLICY

All proposals shall be submitted electronically per the Proposals section of this Request for Proposal. All research project contracts will be managed utilizing Infotech's Doc Express paperless contracting platform. All information on the utilization of this platform for research projects can be found at <https://www.ardot.gov/divisions/system-information-research/research/> or from the Research Section.

PROBLEM STATEMENT

The purpose of this project is to quantify the multi-modal traffic impacts resulting from bridge closure events through a case study of the Mississippi River bridges in Arkansas. The impacts will be measured and reported in terms of traffic volume, delay, and detour volumes, each disaggregated by passenger vehicle traffic, highway freight traffic, and waterway freight traffic. Current studies in progress examine the impacts of each transport mode separately and primarily for delay-associated costs, while this study will perform a comprehensive multi-modal analysis that considers delay costs from detours as well as the monetized impacts stemming from secondary effects (e.g. accidents and fatalities). For example, the Arkansas Trucking Association reported \$2.4 million of added costs resulting from detouring 26,500 trucks per day. The delays to 1,058 barges and 62 vessels have also been reported. However, a monetary cost impact has not been determined. This initial cost estimate was based on delays due to detours and may not reflect the full scope of impacts to safety, infrastructure, operations, and maintenance. This study will develop the model for "what-if" analyses that will explore how investments and innovative strategies in operations, maintenance, and planning activities could reduce the impacts of transportation infrastructure disruptions caused by a bridge closure.

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The results of this study can be used to support future investment planning and prioritization for maintenance programs, especially those that include cost-benefit analyses. This study will also provide historical documentation and information that the Department needs to come up with the situations of major transportation disruptions caused by a bridge closure.

AREA OF STUDY

The primary objective of the proposed research is to quantify the multi-modal traffic impacts due to a Mississippi River bridge closure. This study will consider different scenarios/combinations of bridge closures (i.e., full and partial bridge closures that take account of one/both directions, single/multiple lanes, and day/night closures) including all the Mississippi River bridges in Arkansas (i.e., I-40, I-55, Hwy 49, and Hwy 82 bridges). A comprehensive multi-modal analysis will be performed that considers the number of vehicles, trucks, and marine vessels/barges disrupted due to the bridge closure (with all potential scenarios/combinations) and applies detailed cost conversions to monetize direct (delays) and indirect (safety, infrastructure, operations) impacts. Also, this study will develop an Excel-based tool to conduct “what-if” analyses for decision-making purposes, whether for operation, maintenance, or planning activities.

METHOD OF STUDY

The project will include but is not limited to the following tasks that ensure the research objectives are met:

1. Conduct a comprehensive literature review of ongoing and previous research that should include a variety of state, national, and international level studies, which help provide a better understanding of the problems and the significance of research needs.

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2. Collect the data required including stationary traffic sensor data, fatality and accident reports, marine data tracking platforms, third-party data providers, etc.
3. Perform a comprehensive multi-modal analysis that considers the number of vehicles, trucks, and marine vessels/barges disrupted due to the bridge closure and apply detailed cost conversions to monetize direct (delays) and indirect (safety, infrastructure, operations) impacts in consideration of different bridge closure scenarios.
4. Develop the model (Excel-based tool) for “what-if” analyses that will provide the information for investments and strategies in operations, maintenance, and planning activities to reduce the impacts of transportation infrastructure disruptions caused by different bridge closure scenarios.
5. Develop the database of historical documentation and the information that the Department needs to come up with the situations of major transportation infrastructure disruptions due to a bridge closure.

BENEFITS

Possible benefits of implementation discussed in terms of the Department, traveling public, and environment.

TIME AND FUNDING OF STUDY

Work will begin no earlier than January 1, 2023, contingent upon acceptance of the proposal and availability of research funds. The length of the project shall be 18 months. A final report is to be drafted and presented to the Research Project Subcommittee on or before the completion date of the Work Phases of the project. Up to 25% of the estimated project costs will be withheld pending final acceptance of the final report. Failure to deliver the required Final Report at the end of the project will result in the cancellation of the project and the Department will retain 25% of the total project cost.

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REPORTS

All reports must be in accordance with the most current Research Manual (available at <https://www.ardot.gov/divisions/system-information-research/research/> or from the Research Section). All reports are required to be submitted through Doc Express. An Implementation Report which details the recommended means/techniques for using the project results shall be submitted to the Department within two (2) weeks of the research project's Final Report. All reports are required to be reviewed by a technical editor before submission to the Department.

Final reports must also be Section 508 compliant. Federally funded research with public-facing PDFs must be accessible as of March 23, 2018, according to the final federal rule for the Information and Communication Technology (ICT) refresh under Section 508. This ensures that federal employees with disabilities have comparable access to and use of information and data just like federal workers without disabilities. The law also ensures that members of the public with disabilities receive comparable access to publicly available information and services. All researchers should use the accessibility tracker in Microsoft Word before submitting final reports.

An oral report to the Transportation Research Committee may be required. In addition to reports and publications, the Department shall be furnished one (1) copy of any master's thesis or doctoral dissertation which is a result of any investigation or study on this project. The submitting of any report to be published by an outside publication or presentation on this project before its completion; shall be submitted for the Department's approval before submission.

PROJECT DELIVERABLES

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The proposed research will provide ARDOT with the project deliverables that will include, but are not limited to:

1. A draft literature review submitted three (3) months following the initiation of the project.
2. Quarterly progress reports and benchmark reports.
3. A final report outlining the results of the study.
4. The development of the model (Excel-based tool) that will provide ARDOT with a resource to evaluate “what-if” scenarios for corresponding impacts of transportation infrastructure disruptions due to a bridge closure.
5. The development of the database of historical documentation and the information that the Department needs to come up with the situations of bridge closures in consideration of different scenarios.
6. An implementation report that shows a specific plan for ARDOT on how to incorporate the results of this study into the current operation, maintenance, planning activities and documents being used by the Department. Make sure that a user guide with a methodology on determining benefit-cost is included. This must include a detailed cost analysis on savings to the Department with full implementation of the project findings and any anticipated benefit not foreseen as cost savings. Also, the tool developed should be flexible and user-friendly so that ARDOT staff can update parameters over the years as needed (i.e., inflation, economic factors, etc.).

AUTHORIZATION TO BEGIN WORK

A letter separate from the contracting documents authorizing the beginning of work will be transmitted through Doc Express initiating the project. Any cost incurred before the authorization letter is received, will not be eligible for reimbursement. The project will begin work no earlier than January 1, 2023.

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EQUIPMENT

Complete physical verification of all software and equipment purchased or built for use on this project and the actual location of the equipment will be made each year. An Equipment Capitalization Notice is available from the Research Section for the reporting of software or equipment purchased during the project. All software developed on the project will be completed in open-source format, and ARDOT shall be provided a copy of the source code. If non-expendable or special equipment is purchased with project funds, the equipment is owned by ARDOT and disposition of the equipment will be determined by ARDOT at the project's closeout session.

All rental rates shall be approved by ARDOT before the approval of the proposals. Should a subcontract be part of the proposal, ARDOT will not approve the purchase of any equipment in the subcontract. Any equipment purchased through ARDOT's Transportation-Related Research & Workforce Development Grant Program is not eligible for rental rate charges.

All equipment shall be purchased in accordance with the State of Arkansas purchasing laws.

PROPOSALS

Proposals shall be submitted in a word document utilizing the provided template to research@ardot.gov no later than the end of business on June 3, 2022. No proposals will be accepted after this date. All procedures shall be in accordance with the most current Research Manual and Federal-Aid Policy Guide (FAPG). In the event of policy contradiction, the FAPG shall govern.

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Upon approval of the Proposal by the Research Subcommittee, the Project Manager will initiate the process within Doc Express to acquire the appropriate electronic signatures from all parties.