

**ARKANSAS DEPARTMENT OF TRANSPORTATION  
PLANNING AND RESEARCH DIVISION  
FISCAL YEAR 2027  
REQUEST FOR PROPOSAL  
RESEARCH PROJECT NUMBER TRC2601**

**TITLE**

TRC2601: Development of a Rigorous ARDOT Protocol for Chemical Soil Stabilization

**ARDOT POLICY**

All projects must conform to the rules, regulations, policies, and procedures issued by the Federal Highway Administration (FHWA), State of Arkansas regulations, and those of the Arkansas Department of Transportation (ARDOT). Questions on situations and circumstances not adequately addressed herein will be negotiated on a case-by-case basis and done in accordance with FHWA's 23 CFR Part 420, the Basic Agreement, the Research Manual, and all other Department guidelines and policies.

The contracting agency must enter into a Basic Agreement, if one does not already exist, with ARDOT prior to executing any Project Agreement.

All research project contracts will be managed utilizing Infotech's Doc Express paperless contracting platform. The selected Principal Investigator (PI) and Co-Principal Investigator (Co-PI) must have access to Doc Express through their organization's account.

**PROBLEM STATEMENT**

ARDOT frequently encounters subgrade soils that lack sufficient strength, durability, or exhibit moisture sensitivity, requiring soil stabilization for road construction and rehabilitation. Currently, ARDOT does not follow a standardized, engineered approach for choosing soil stabilizers or determining their application rates. Consequently, stabilization choices can lead to over- or under-treatment, inconsistent performance in the field, higher costs, delays, and limited use of innovative or non-traditional stabilization solutions.

A variety of soil stabilizers, such as lime, cement, fly ash, and proprietary products, are currently marketed to enhance soil strength and durability. However, ARDOT lacks extensive laboratory-to-field performance data and cost-effectiveness assessments across various soil types and site conditions. The lack of validated laboratory procedures and field verification methods complicates the ability to predict long-term performance, objectively compare options, or effectively implement stabilization strategies with confidence.

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To overcome these limitations, ARDOT is seeking professional and research services to systematically evaluate soil stabilizing agents through controlled laboratory tests and full-scale field applications. The goal is to identify the best stabilizer types and dosages for Arkansas soils, establish mechanistic-based strength requirements connected to pavement performance criteria, and validate lab predictions with field testing on designated test sections and active construction sites.

This work aims to develop practical, repeatable procedures for selecting soil stabilizing agents and their corresponding dosages, designing stabilized soil layers, and evaluating the post-construction performance of these layers. Ultimately, it will deliver implementation-ready guidance to ARDOT, improving construction reliability, fostering innovation, reducing life-cycle costs, and enhancing the long-term performance of transportation infrastructure across the state.

**OBJECTIVE AND SCOPE OF STUDY**

The chosen Proposer will deliver professional and technical services to assess the performance, durability, constructability, and cost-efficiency of soil stabilizing agents suitable for Arkansas soil conditions. This will involve laboratory testing, engineering analysis, and comprehensive field evaluations of both traditional and commercially available stabilizing agents.

The Proposer will create standardized methods for predicting laboratory strength and verifying field performance, along with ready-to-implement recommendations for ARDOT's use in future projects, specifications, and guidance documents.

The primary objectives of this project are to:

1. Develop an engineering-based framework for selecting soil-stabilizing agents and determining the appropriate application rates and treatment depth.
2. Quantify the mechanical performance and durability of multiple stabilizing agents across representative soil types.
3. Establish mechanistic-based strength requirements for stabilized soil layers considering traffic loading, environmental conditions, and pavement performance criteria.

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4. Validate laboratory-based strength predictions through full-scale field testing.
5. Provide standardized laboratory procedures that reliably predict field performance.
6. Compare stabilization alternatives based on performance, constructability, and cost.
7. Deliver practical guidance to support consistent and cost-effective soil stabilization practices on ARDOT projects.

**METHOD OF STUDY**

The proposer must provide a detailed methodology that outlines how the research objectives will be achieved. The proposed method should demonstrate scientific rigor, logistical feasibility, and effective coordination with the ARDOT and partner agencies. Certain tasks necessary for project completion may be best performed by ARDOT personnel. The proposer should clearly specify which tasks will be assigned to the Department. At a minimum, the study methodology should include the following components:

***Task 1: Literature Review and Coordination***

- The Proposer shall conduct a comprehensive literature review and state-of-the-practice assessment related to soil stabilization methods applicable to highway and transportation infrastructure.
- The review shall inform laboratory testing, engineering analysis, and field evaluation activities.

***Task 2: Project Coordination and Planning***

- The Proposer shall coordinate with ARDOT personnel, contractors, and material suppliers to support project planning and execution. Activities shall include:
  - Participation in project meetings and coordination activities
  - Review of available background information and current ARDOT practices
  - Identification of candidate stabilizing agents and testing requirements
  - Development of a detailed work plan and schedule

***Task 3: Collect Soil Samples and Perform Initial Field Testing (In Coordination with ARDOT)***

- The Proposer shall determine the field-testing regimen and frequency.

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- Collect subgrade soil samples at each test section.
- Perform initial field soil condition/stability/strength testing.

***Task 4: Engineering Analysis and Design Criteria Development***

- The Proposer shall perform engineering analyses to determine the required stabilized soil strength based on pavement performance needs. This task shall include:
  - Collection and evaluation of traffic, environmental, and design input parameters
  - Application of mechanistic-empirical pavement design principles
  - Determination of required layer modulus or strength to control relevant distresses

***Task 5: Stabilizing Agent Characterization and Application Procedures***

- The Proposer shall compile and document detailed application information for each stabilizing agent evaluated, including:
  - Description of material properties and stabilization mechanisms
  - Typical application rates and construction procedures
  - Current industry practices and relevant case histories

***Task 6: Laboratory Testing and Mix Design***

- The Proposer shall conduct comprehensive laboratory testing to evaluate soil–stabilizer combinations. This task shall include:
  - Soil classification and baseline characterization
  - Chemical suitability testing (e.g., pH, organic content, sulfate content)
  - Determination of compaction characteristics for untreated and treated soils
  - Stabilizer dosage evaluation and mix design development
  - Strength testing (e.g., Unconfined Compressive Strength (UCS), California Bearing Ratio (CBR)) at multiple curing intervals
  - Durability testing (e.g., wet-dry or freeze-thaw cycles)
  - Evaluation of swell potential and moisture sensitivity

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***Task 7: Full-Scale Field Testing and Performance Evaluation***

- The Proposer shall support or conduct evaluation of full-scale stabilization efforts at designated test sites. Activities may include:
  - Coordination with ARDOT and contractors during field stabilization
  - Collection of post-stabilization field performance data
  - Comparison of laboratory-predicted and field-measured performance
  - Use of non-destructive and destructive field-testing methods as appropriate

***Task 8: Data Analysis and Performance Correlation***

- The Proposer shall analyze laboratory and field data to identify trends, correlations, and performance relationships. This task shall include:
  - Statistical evaluation of laboratory and field results
  - Assessment of predictive reliability of laboratory testing methods
  - Evaluation of stabilization effectiveness across soil types and agents
  - Identification of strengths and limitations of each stabilization method

***Task 9: Development of Standardized Laboratory Procedures***

- The Proposer shall develop stabilizing agent-specific laboratory procedures that can be used to predict field performance. This task shall include:
  - Standardized curing, compaction, and specimen preparation protocols
  - Identification of key test methods for strength prediction
  - Recommendations to minimize variability and improve repeatability
  - Documentation suitable for adoption by ARDOT laboratories

***Task 10: Active Construction Site Evaluation***

- As directed by ARDOT, the Proposer may repeat selected laboratory and field evaluation activities on active construction sites to validate findings under real-world conditions.
  - Select Active Construction Sites with Contractors interested in Partnering
  - Allow the Contractor to pick 3 stabilization agents for evaluation.

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**POTENTIAL BENEFITS**

This project will provide ARDOT with an engineering-based framework for selecting soil-stabilizing agents and determining the appropriate application rates. The results will improve consistency and predictability of stabilized soil performance, reduce construction risk and cost uncertainty, and support more economical use of materials. The project will also deliver standardized laboratory procedures, validated field performance data, and implementation-ready guidance to support future ARDOT designs, specifications, and construction practices.

**TIME AND FUNDING OF STUDY**

Work will begin no earlier than July 1, 2026, contingent upon acceptance of the Proposal and availability of research funds. The total length of the project should not exceed 36 months, including the Publication Phase. A final report is to be drafted and presented to the Project Subcommittee on or before the completion date of the Work Phase. The Publication Phase (3 months) will be of sufficient length to allow for proper review, comments, and revisions, and will include funding to cover the costs of revisions and publication. The end of the Publication Phase will be the formal completion date of the project. Up to 25 percent of the estimated project costs will be withheld pending final acceptance of the Final Report. Failure to deliver the required Final Report by the project's completion date will result in the cancellation of the project, and the Department will retain 25 percent of the total project cost.

**REPORT REQUIREMENTS**

All reports must be in accordance with the most current Research Manual (available at <https://www.ardot.gov/divisions/planning/research/> or from the Research Section). All reports must be submitted through Doc Express. All final 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

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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, journal articles, and publications, the Department must be furnished with one (1) copy of any master's thesis or doctoral dissertation that results from any investigation or study on this project. The Department's written approval must be obtained before the publication or presentation of this project, before its completion.

### **PROJECT DELIVERABLES**

The proposed research will provide ARDOT with the following documentation:

- **Quarterly Progress Reports**
  - Interim decision activity reports should be submitted in a Microsoft Word document with Quarterly Reports or more frequently on a Task Completion Basis\*
- **Benchmark Reports** should be submitted three months prior to the project renewal (due by March 1 every year), and document all work done to date, where the project is behind, if applicable, and how the project will be made current, if applicable.
- **Draft Final Report** (due by March 31, 2029)
- **Draft Implementation Report** (due by March 31, 2029)
- **Final Report and Implementation Report** with all comments addressed, and Project Subcommittee presentation, are due no later than June 30, 2029.

\*The intent of this documentation is to allow for Project Subcommittee input and concurrence regarding methods and assumptions in a timely manner to allow for adjustments if needed.

### **AUTHORIZATION TO BEGIN WORK**

A letter 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 is scheduled to begin work no earlier than July 1, 2026.

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**EQUIPMENT**

A comprehensive physical verification of all software and equipment purchased or developed for use on this project, as well as the actual location of the equipment, will be conducted annually. 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 an open-source format, and ARDOT must be provided with a copy of the source code. If non-expendable or special equipment is purchased with project funds, the equipment is owned by ARDOT, and its disposition will be determined by ARDOT at the project's closeout.

All rental rates must be approved by ARDOT before the proposals are approved. Should a subcontract be included in the Proposal, ARDOT will not approve the purchase of any equipment specified in the Subcontract. Any equipment purchased through ARDOT's Transportation-Related Research & Workforce Development Grant Program (TRRWDP) or previous TRC projects is not eligible for rental rate charges.

All equipment must be purchased in accordance with the State of Arkansas purchasing laws and the Arkansas Department of Transportation purchasing policies.

**PROPOSALS**

Proposals must be submitted in a Word document using the provided template to [research@ardot.gov](mailto:research@ardot.gov) by the end of business on March 6, 2026. No proposals will be accepted after this date. All procedures must 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.

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