

# Project Capsule

26-2GT



August 2026

## Geotechnical Database Phase VI: Enhancing Public Access and Utilizing Artificial Intelligence to Digitize and Grow the Louisiana Database

### PROBLEM

DOTD manages a vast repository of geotechnical data and documents. Deep bridge borings and cone penetration tests (CPTs) are valuable data, as they characterize soil conditions at locations across the state for the design of highway structures. Each bridge should have soil information associated with it for appropriate capacity calculations. Each boring would cost approximately \$30,000 to reproduce today. Having access to that information is important, but acquiring it has been difficult in the past due to its non-digitized format. LTRC/DOTD has made great strides through recent geotechnical database projects to standardize and organize this data. DOTD now faces challenges in making this geotechnical data (e.g., soil boring logs, cone penetration tests, etc.) accessible to the public for informational purposes.

Current limitations, including security constraints posed by the Louisiana Office of Technology Services (OTS) and DOTD firewall systems, can at times hinder efficient data sharing. Along with data management, data system security for la.gov, DOTD, and the geotechnical section is paramount. There is potential in the new geotechnical software (Bentley's OpenGround Cloud) to explore these and other sharing options in a safe and efficient manner. There is also a need to explore and customize software to meet this gap of integrating advanced digital tools, such as Data Interchange for Global and Geoenvironmental Specialists (DIGGS), to facilitate quick and safe access to sensitive engineering analyses and other secure information.

Additionally, vast amounts of historical DOTD data are available in image format (e.g., TIF and PDF files), which, if converted to digital format, would benefit designers and researchers more than static images. Previous research linked PDFs to a Geographic Information System (GIS) file in OpenGround but did not digitize the historical PDF information into digital data due to the cumbersome, laborious effort required. However, with recent advancements in computer software and technology, the conversation is now closer to reality with less effort. An automated system utilizing artificial intelligence (AI) and machine learning (ML) is essential and feasible for streamlining data extraction, digitization, organization, and incorporation into the DOTD OpenGround Geotechnical Database.

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### Start Date

June 1, 2026

### Duration

24 months

### Funding

SPR: TT-Fed/TT-Reg - 5

### Principal Investigator

Nick Ferguson, P.E.

Senior Geotechnical Research Engineer  
225-767-9127

### Administrative and Technical Contact

Gavin P. Gautreau, P.E.

Pavement and Geotechnical  
Research Administrator  
225-767-9110

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**4101 GOURRIER AVE.  
BATON ROUGE, LA 70808**

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## OBJECTIVE

The first objective of this research is to develop a secure, user-friendly interface for public access to geotechnical data while addressing technical challenges, including firewalls and data sensitivity, using modern tools and methodologies. This interface will have security features that meet OTS and DOTD requirements. The documents to share include scanned historic PDFs and OpenGround-generated quick-log PDFs (e.g., soil boring logs and CPT logs). This public-facing web application will allow DOTD sections and the public access to this valuable information.

The second objective of the research is to further data management efforts by including a system to automate the extraction, digitization, and organization of geotechnical data from historical PDF soil boring logs and other geotechnical documents. This system will transform unstructured data stored in various computer systems and directories into a structured, searchable format, significantly improving accessibility and usability for DOTD engineers and planners.

## METHODOLOGY

This project will include seven (7) tasks:

1. **Conduct Literature Review:** Conduct a comprehensive literature review on relevant published works.
2. **Evaluate DOTD/OTS Capabilities, Limitations, and Requirements:** Conduct a gap analysis to assess the current OTS requirements and limitations and DOTD OpenGround potential and limitations regarding geotechnical sharing to identify the specific requirements for public access.
3. **Upload Additional Boring Logs:** Printed hard copies of boring logs from 15 file boxes will be sorted, scanned, associated with DOTD projects, uploaded to DOTD's OpenGround database, and digitized along with other historical images.
4. **Develop GIS User Interface for Public Access (Part 1):** The public-facing web application interface will graphically show the locations of the available soil boring logs and CPT logs across the state.

5. **Digitize Data (Part 2):** Convert unstructured picture logs into structured formats using ML tools.
6. **Document the Research Effort:** Prepare the final report to document the entire research effort.
7. **Process through Editing:** The report will be processed through LTRC editing to refine the content, grammar, and format according to LTRC guidelines and 508 accessibility requirements. Appropriate revisions will be made, and the report will be submitted for final publication.

## IMPLEMENTATION POTENTIAL

This research will enable DOTD to enhance public transparency and improve access to valuable geotechnical information. The proposed solutions will streamline data access for stakeholders, promote standardized data sharing, and establish DOTD as a leader in leveraging advanced technologies. The framework will save time, reduce manual data-sharing efforts, and ensure compliance with modern data management practices.

This project will also provide DOTD with significant benefits by improving efficiency through reduced manual data extraction, saving time and resources. It will enhance decision-making by transforming historical documents into a structured, accessible format, enabling faster, more informed planning. Streamlined workflows will lead to substantial cost savings by reducing operational expenses and resource utilization. Automation will ensure greater accuracy and consistency, minimizing human errors and providing reliable data for engineering applications. Additionally, the development of a user-friendly search engine and visual tools will improve data accessibility, allowing engineers and planners to efficiently locate and analyze geotechnical data, ultimately supporting infrastructure maintenance and development.