RESEARCH
PROJECT CAPSULE [10-2GT]
March 2011
TECHNOLOGY TRANSFER PROGRAM

Geotechnical Information Database – Phase II

JUST THE FACTS:

Start Date:
March 10, 2011

Duration:
18 months

End Date:
September 9, 2012

Funding:
State: TT-Reg

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Sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University

POINTS OF INTEREST:

Problem Addressed / Objective of Research / Mehodology Used Implementation Potential

PROBLEM

The Louisiana Department of Transportation (LADOTD) has been collecting geotechnical data for many years in a variety of different formats. Accessing this data and combining it with new data for the purpose of design, analysis, visualization, and reporting is difficult because the data have been generated by disparate systems and stored as hard copies, scanned images, various digital formats, or other non-digital formats such as microfilm. Essentially, there is no single system or repository nor an integrated, systematic approach for collecting, managing, archiving, and retrieving the vast amount of geotechnical data that are collected or generated by LADOTD each year.

OBJECTIVE

With advances in computing capabilities, software tools are available that streamline the entire data management process from data collection through reporting, archiving, and map-based retrieval/reporting. Dataforensics, LLC will create a plan to integrate and customize a data management system to fulfill the needs of the LADOTD. This Enterprise Global Information System (GIS)-based Geotechnical Data Management System is comprised of various off-the-shelf software packages including PLog Enterprise, RAPID CPT, gINT, ArcGIS, and ArcGIS Server integrated with critical process and workflow components to be designed and developed as part of this project.

METHODOLOGY

The principal investigator will conduct the following tasks in order to complete this research:

Task 1. Departmental Records Research
Review the current data storage procedures used by the LADOTD Geotechnical Design Section, Materials Lab Geotechnical Group, and LADOTD as a whole. Contact Bridge Design, Pavement and Geotechnical Design, Information Technology, GIS, and the Materials Laboratory Sections at a minimum. Develop a flow chart outlining the process and show recommended modifications. Develop a detailed work plan outlining tasks and a recommended approach to accomplish the objectives.

Task 2. Interim Report
Prepare and present an interim report outlining the structure, steps, and philosophy in the work plan to streamline the data recording and storage, transfer, tracking, and reporting processes.

Task 3. Future Records
Based on the results and approval of Tasks 1 and 2, develop a system to collect, import, store, and digitally manage deep boring data and associated information (pile/shaft information, driving records, test pile information, load test data, CPT files, etc.). Compatibility with the Geotechnical Information Database GIS Web site developed in LTRC Final Report 446, LADOTD Information Technology Section application standards, and Geotechnical design software is required. The information will speed retrieval

time and aid future exploration efforts, load resistance factored design (LRFD) calibration updates, design, etc.

Task 4. Expand Functionality and Connectivity
Develop the existing Geotechnical GIS system's potential as a portal and simple interface for geotechnical and related information within the Department. Utilize and expand the capabilities of the existing department software. Update the boring log sheet template and generation process.

Task 5. Historical Records
Research, import, and catalog deep boring historical data (prior to 1998) located in the LADOTD general files (hardcopy, microfiche, microfilm, CD, and DVD formats) into Content Manager, LADOTD's Enterprise Document Management System.

Task 6. Develop a Tracking System
Develop a system to track the progress of deep boring geotechnical data collection from start to finish that is accessible by involved LADOTD sections. The tracking system goal is to improve transparency and accountability within the process and aid in planning and scheduling.

Task 7. Demo the Project
The researcher shall provide live demonstrations throughout the progress of the project and be tied to project milestones. The demos are intended to show the capability and connections to the users and stakeholders who may help direct efforts on the project.

Task 8. Provide Training and Implementation Support
The researcher shall provide training to applicable users and provide implementation support for six months after project demo/delivery. This beta-testing support (time and funds) will begin after acceptance of the Project Review Committee (PRC) and is designed to address initial-use hurdles and remedy any technical "bugs" that may arise during initial implementation. Training scope should be defined and funds should be documented as a separate budget item in the proposal.

Task 9. Provide a Final Report
The researcher shall provide a final report that documents the entire research effort and make a summary presentation to the PRC upon completion of the work. The report shall direct and recommend future steps toward the incorporation of other historical geotechnical documents within LADOTD not addressed by this study.

IMPLEMENTATION POTENTIAL

Implementation of the proposed work will obviously have significant implications for the manner in which LADOTD as well as consultants and contractors working with them plan for and undertake all phases of engineering projects in the future. The potential benefits of this are to implement a system to logically store LADOTD Geotechnical data, speed access to that data, update the boring log document and its preparation, and create a system to track the status of boring data and the boring logs for plan incorporation.

An equally important benefit of the proposed implementation, however, is in enhancing the manner in which LADOTD can respond to what might be termed "extreme events." This term refers to the engineering consequences of natural events such as hurricanes and man-induced events, such as bridge and other waterfront structures impacts by ships and barges. In many cases, organizations such as LADOTD are required to be able to return the impacted structure to some level of functionality in a very short period or else demolish and rebuild a replacement structure in a "fast-track" mode. Having the type of GIS-based geotechnical data management system described herein can dramatically influence the ability of LADOTD to meet these challenging project demands.

Dataforensics views the probability of success for the project to be extremely high. Major components of the software to accomplish the project goals are already commercially being used by others and the approach proposed by Dataforensics is focused on integration of these components into a system to meet the needs of LADOTD. Dataforensics has similar experience in nearly every phase of the project for various clients. Dataforensics views the highest levels of uncertainty are related to the ease of accessing the historical data and method for geo-referencing historical data. As the project evolves and the work plan has been created, Dataforensics can provide LADOTD a more detailed risk assessment in the draft final report. At that time, project priorities can be re-assessed by the PRC to ensure the most important project goals are accomplished.