

## Geotechnical Data Management Initiatives at Caltrans

**RESULTS:** *Caltrans is adopting innovative technologies to improve the management of its geotechnical data. The GeoResearch Group (GRG) and the Geotechnical Data Management Committee (GDMC) are developing a comprehensive data management strategy for borehole, lab test, and insitu test data, including the development of standardized data models and reporting formats, standardization of software tools, evaluation of data collection technologies, and optimization of workflow practices. Caltrans' participation in international initiatives is helping to establish a global model for data interchange.*



Figure 1 - Current geotechnical archive at Caltrans

### Why We're Pursuing This Research

In conducting geotechnical site investigations, large volumes of subsurface information and associated test data are generated. The current practice relies on paper-based filing systems that are often difficult and cumbersome to access by users (Fig.1). Misplaced files, deteriorated paper records, incomplete documentation, and a lack of awareness that certain data even exists have all contributed to inefficient or incomplete utilization of existing data. Furthermore, the pressures to expedite project delivery only heighten the need for more efficient data management practices and more productive field data collection methods.

### What We're Doing

GRG and GDMC efforts have been focused on realizing both internal operational efficiencies as well as participation in the development of national and international data standards that will enable the

rapid exchange of geotechnical data between different agencies, consultants, and industry. On the Caltrans front, current practices in field data collection, laboratory testing, and boring log creation have been examined for potential improvements.

Advancements in field operations are being explored through the use of ruggedized tablet PCs. Several units are being test deployed to evaluate their use in field logging (Fig.2). With logging software and an integrated GPS receiver, they provide staff the ability to generate near-complete borehole logs before leaving the field.



Figure 2 - Ruggedized tablet PC for field logging.

Work in the soils lab work is underway to develop a streamlined lab data management system. The system utilizes a network of touchscreen workstations located throughout the lab (Fig.3a)

and replaces redundant processes once done on paper.

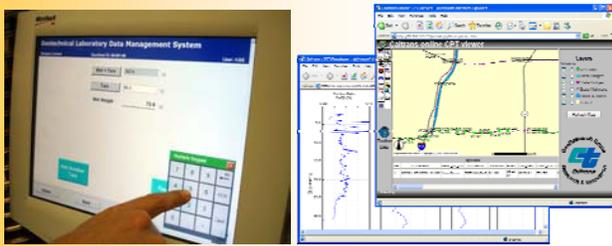


Figure 3 – (a) Soils laboratory touchscreen system; (b) Web-based access to Caltrans CPT data .

A prototype web-based repository for Caltrans' Cone Penetration Test (CPT) data was unveiled in early 2002, allowing operators to upload data files over the web and clients to browse, preview, print, or download data going back ten years. A web-based map interface and on-demand plotting are central features to the system (Fig.3b).

Efficiencies in processes are already being identified, in particular, the practice of generating boring logs for contract documents. Currently, a drafter is required to create the Log of Test Boring (LOTB) sheet in a CAD system using paper notes provided by the client. However, with the use of new software, the client can create a near-complete CAD drawing themselves with little additional effort. The drafter is then provided a CAD drawing, rather than notes on a paper, and need only perform minor editing and page layout tasks. The result is a significant reduction in the effort currently required by the drafting group.

In May 2002 the Consortium of Strong-Motion Observation Systems (COSMOS) in partnership with the Pacific Earthquake Engineering Research (PEER) Lifelines Program initiated a project to demonstrate improved methods of geotechnical data dissemination through use of the internet and data harvesting technologies. The result of the effort was the test deployment of the pilot Geotechnical Virtual Data Center (GVDC) (<https://geodata.cosmos-data.org/>) (Fig.4). By selecting areas on a map in a web browser, the user can quickly identify available borehole data sets from multiple agencies, preview, download, and use the data in their analyses. The project involved the active participation of a number of state, federal, and private organizations, including Caltrans. Using a test region in the Southern California area, the GVDC successfully demonstrated to the geotechnical community the benefits that data exchange can bring.

The system was presented in a workshop in June 2004, that led to a number of state transportation agencies forming a group to develop a

Transportation Pooled Fund project. The focus of the project is to compile the standards development work of COSMOS, the Association of Geotechnical & Geoenvironmental Specialists (AGS) from the United Kingdom, and others to create a new international data exchange format, DIGGS, short for *Data Interchange for Geotechnical and Geoenvironmental Specialists*. DIGGS is expected to have global application and allow software vendors and users in the geotechnical community to easily exchange data.

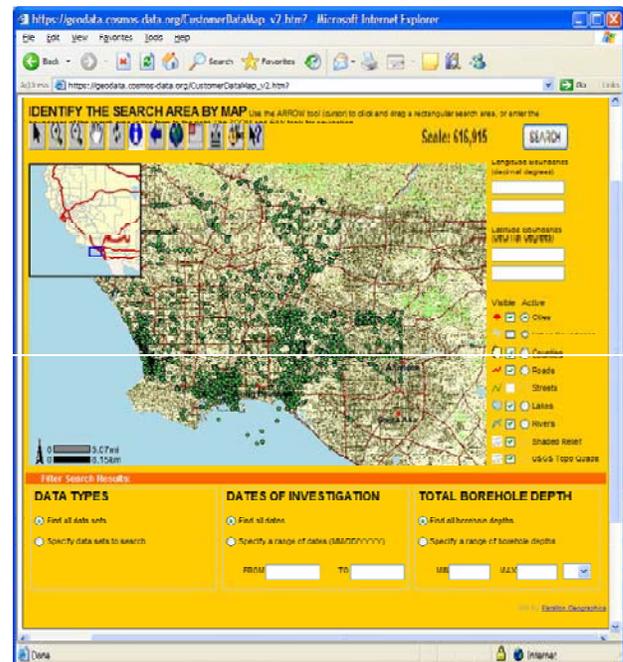


Figure 4. The COSMOS/PEER-LL Geotechnical Virtual Data Center.

## Research Results

Caltrans has initiated a number of projects to improve its data management practices, working towards the goal of a long-term integrated data repository. Through partnerships with other organizations, Caltrans is helping to establish regional and global data exchange mechanisms and technologies.

## For More Information on GeoResearch Projects

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