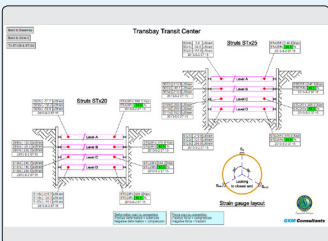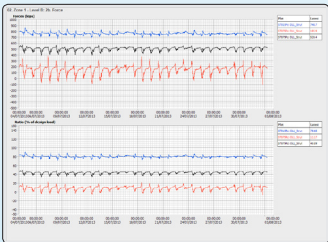# Data management and visualization
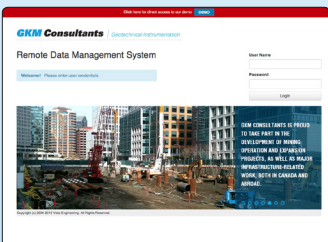

- *San Francisco Transbay Transit Center internal bracing system - Excavation zones 1 & 2*
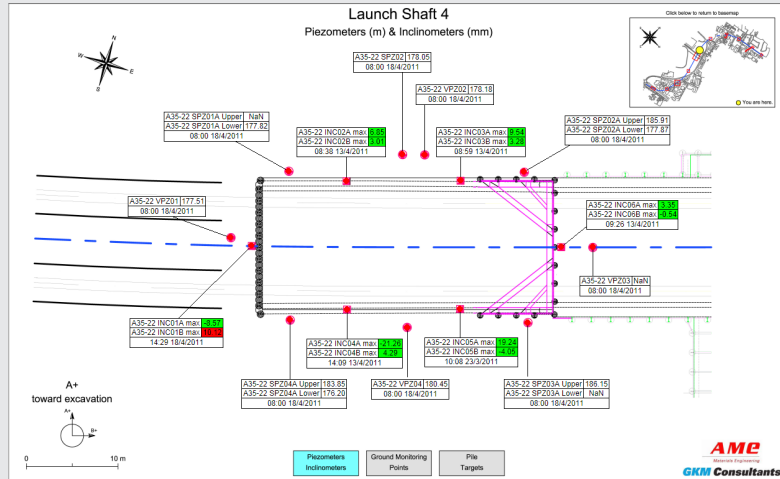

- *Real-time strut monitoring – Web access*

- *Strut stress evolution vs theoretical load*

- *GKM data center portal login page*

- *Real time monitoring plan view of Spadina Transit Extension launch shaft #4*

Large scale engineering projects, such as dams, tailing dikes, mines, tunnels and bridges, often require sophisticated monitoring systems to verify design calculations as well as to ensure people's safety on the site. In addition to reliable sensor installation, rugged monitoring software is necessary to gather all data, generate alarms and allow measurements to be available for remote real-time analysis.

GKM's data management and visualization software does this simply and efficiently.

Over the years, GKM has developed significant expertise in real-time monitoring of web-access applications. Data management software can either be implemented onto our client's server or simply be hosted at GKM's data center facility and broadcast via the Internet on our client's behalf.

For instance, the Spadina Transit Extension and Eglinton Scarborough Crosstown projects in Toronto, or the San Francisco Transbay Transit Center initiative, were sensitive urban tunnel projects under major cities, therefore requiring data measurements to be displayed in almost real time so that owners, engineers and contractors could quickly understand the stability and conditions of the ground and surrounding structures. This made it easier for decision-makers to monitor and change the construction progress as needed.

Geotechnical instrumentation generally consists of piezometers, borehole inclinometers and extensometers installed around open cuts and along the tunnel alignment for measuring pore pressure changes and ground movement (subsidence). Structural instruments such as strain gages and load cells are also useful to respectively monitor internal bracing (struts) and supporting elements (tiebacks), which often utilize in-depth excavation open cuts for underground stations, emergency structures, as well as launch and extraction shafts.

Using different kinds of telemetry (communication peripherals), readings are collected with data acquisition systems and are automatically implemented into our robust MySQL data management and visualization software for quick and easy display and analysis.

The software performs complicated calculations to facilitate graph interpretation based on historical graphs, tables, histograms, and X-Y graphs for correlations.

Several tool kits add more features while keeping the software simple to manage. For example, the alarm tool allows for program actions, such as sending email notifications to specific groups belonging to different shifts for maintenance, or providing an immediate response. The displacement graph tool allows for inclinometer readings to be displayed in a profile plot of horizontal movements similar to industry interpretation and analysis software.

Internet access allows remote users with specific authorization to manage readings and alarm notifications, or simply to look at and export the data.

The report tool kit greatly facilitates the generation of computerized reports, in accordance with a flexible standard that meets many requirements.

Depending on the project's definition, the scope of work and the equipment to install, our role and responsibilities will include implementing database instrumentation, programming systems and configuring servers, followed by client training enabling end-users and other project resources to remotely assess field data.

GKM Consultants is proud to provide innovative remote monitoring tools which allow our clients to spend time on their analysis instead of troubleshooting a complex flow of readings.

GKM Consultants
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Geotechnical and Structural Instrumentation