TransEd Valley Line LRT

Background & Project Challenges

The TransEd Valley Line LRT is building a light-rail transit (LRT) project in Edmonton, Alberta, connecting Mill Woods to downtown Edmonton with approximately 13 km of light-rail. This stage includes 11 stops, an elevated station incorporating transit center and Park & Ride, and a transfer point to the existing LRT at Churchill Square. It also consists of two, one-mile long tunnels under the center of Edmonton.

The underground work to be done includes bored tunnels and station excavations. Since the work takes place in an urban setting, the protection of existing structures and buried utilities that could be impacted by the construction is critical to the successful completion of the work.

Geocomp Role & Accomplishments

Geocomp’s provided instrumentation and monitoring for the one mile of twin bored tunnels, using our iSiteCentral™ GIS web-based software to provide real-time assessment of construction related activity. iSiteCentral’s™ integrated data from more than 2,000 sensors, including automated MPBXs, inclinometers, vibrating wire piezometers, and tilt meters, with settlement measurements and performance data from the Contractor’s own tunnel monitoring regime. The software also incorporates installation documentation and photos into the database to better centralize all instrumentation information and make it readily accessible for reporting and review by TransEd.

Geocomp installed a combination of manual survey and automated instrumentation monitoring to best suit the project requirements.

The automated instruments were entirely wireless and solar or battery powered. A combination of radios and cellular modems were used to transmit data to the servers and web-based data management center, iSiteCentral, allowing near real-time viewing of data by anyone with an internet connection and the correct login credentials.

Value Provided:
- Real time data to allow dynamic construction decisions and design optimization.
- Geotechnical engineering expertise to assist TransEd with analysis of monitoring data.
- Wireless and solar / battery powered system removing the cost of cabling and mains connections.
Survey points were read manually using conventional survey techniques. Data was then uploaded and displayed on our iSiteCentral™ website, as part of an integrated monitoring system. Reading frequency was dependent on proximity of survey points to tunneling operations.

The following instruments were installed and monitored for the following purposes:

Multi-Point Borehole Extensometers (MPBX) – ground settlement above and adjacent to the tunnels;

In-Place Inclinometers (SAAs) - lateral soil deformations adjacent and between tunnels;

Electrical Biaxial Tiltmeters (EBT) – inclination of properties adjacent to the tunneling;

Vibrating Wire Piezometers - ground water level fluctuations;

Vibration Monitors – ground borne vibrations during construction activities;

Pavement Monitoring Points (PMPs) – ground settlement;

Soil Deformation Monitoring Points (SDMPs) – ground settlement;

Building Monitoring Points (BMPs) – building settlement; and

Ground Settlement Markers (GSMs) – 3-Dimensional ground movement.

The twin bored tunnels are directly adjacent to commercial and residential activity which run directly below 95th St. The construction activity was monitored continuously to help the contractor control excavation/tunneling work and mitigate risk of unexpected movement to adjacent buildings and utilities.