Jarry Tunnel, Quebec

SAA installation

Multipoint borehole extensometer

Highway 40 column tilt monitoring

Noise and vibration monitoring station

Tunnel boring machine head

The Jarry Tunnel project stems from a decision by the City of Montreal administration to secure the domestic water supply for critical sectors of the city. Part of the project involves installing a conduit of 1200 mm in a tunnel of 4.1 km under Jarry Street and 24th Avenue. In the fall of 2015, GKM Consultants was mandated to provide and install geotechnical instruments to monitor ground and existing structure movements during and after the tunnel boring machine went through. In addition, GKM was to assist with monitoring and control of noise and vibration caused by the work done on site as well as supply autonomous monitoring stations.

To measure ground subsidence and/or displacement, we installed a total of 28 multipoint borehole extensometers from the surface, directly above the tunnel axis. Also, to measure lateral displacement, we installed 18 SAA (Shape Accel Array) inclinometers in boreholes on either side of the tunnel. As the SAA inclinometers can be reused, we moved 10 of the 18 to other locations following the tunnel boring machine (TBM) advancement. In two locations where previous Lugeon tests showed high values, we used a Geokon Model 4500S Vibrating Piezometer to monitor water pressure.

One of the challenges of this project was to monitor any movement of the Highway 40 columns caused by the TBM crossing beneath it. In order to achieve this, we fixed five biaxial MEMS tilt sensors on five different columns to measure their tilt. These sensors were connected to an automatic data acquisition system which relays the information to GKM's remote data management system via cellular modem, allowing the client to access the data in real time and to receive automatic alerts if any movement is detected.

Finally, to control and monitor noise and vibration during the construction of the access shafts, we installed six noise and vibration stations specially designed by GKM. Two additional stations were also used to measure the vibration caused by the TBM advancement. To ensure real-time monitoring, all the stations automatically collect data and transfer them to the GKM remote data management system.

Drawing on our knowledge and expertise, GKM Consultants is pleased to have helped our client achieve their monitoring goals.