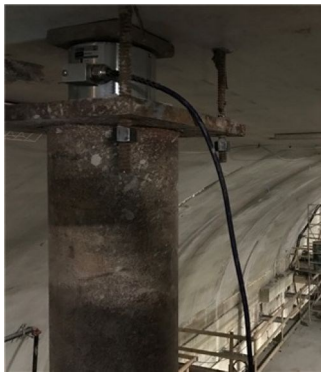
Ottawa Light Rail Transit (OLRT), Ontario



Installing load cells between support struts and the tunnel liner

NATM pressure cells installed at the interface of the shotcrete tunnel liner and natural ground

Instrumented shotcrete tunnel liner section

Accessing SAAX data using the ShapeArray Field Power Unit

Starting in 2013 OLRT Constructors began construction on Ottawa's Confederation Line transit link. The Confederation Line will be an integral part of OC Transpo's transit network with a significant portion of the required construction being the 2.5-km downtown tunnel section. This tunnel section runs from the west of Lyon Station to just north of the uOttawa Station and was constructed by using three roadheader digging machines to excavate the tunnels and stations.

GKM Consultants were retained for portions of the in-tunnel instrumentation program designed to monitor deformations around the underground excavation, stress development in the ground support structures and building movements adjacent the alignment. All of which are used to confirm the engineering assumptions used in the design and to allow for the early identification of potential impacts of construction on the existing infrastructure. With over 10 data loggers, 20 ShapeArrays (SAAX and SAAV), 100+ vibrating wire and 50+ potentiometer instruments this project work was completed over a period from 2014 through to the end of 2017.

Geokon vibrating wire NATM pressure cells (Model 4850) as well as concrete embedment strain gauges (Model 4200) were used to monitor the tangential and radial stress developments in the shotcrete tunnel liner. To monitor load and strain developments in the tunnel's temporary vertical support struts, load cells (Model 4900) and spot-weldable strain gauges (Model 4150) were installed between the strut and the tunnel liner and along the pipe strut respectively. Measurand ShapeArrays (SAAX and SAAV) were used to measure deformations in the tunnel roof as well potential movements in the building basement structures adjacent the excavations. Mine Design Technology SMART multipoint borehole extensometers and SMART cable bolts were utilized within the tunnel alignment and at the access shaft excavations to monitor deformations around the underground excavations. The various instrument types are connected to a combination of custom GKM DL800 and DL1000 data loggers which were connected to the network link within the tunnel. The data is collected automatically and forwarded to a third party for evaluation on a regular basis.

On-site specialized training was provided to the client's engineers and the construction group with training focused on the properties of the various sensors and proper installation procedures with special care given to cable handling during the construction stage.

GKM Consultants Inc. and Geokon Inc. are proud to have worked with EXP, OLRT Constructors and the City of Ottawa on such a complex and challenging project which contributes to the advancement of public infrastructure in the Ottawa region.