



## Canada: Structural Health Monitoring of an Overpass

*Providing real-time, high-quality data to help extend the lifespan of an aging overpass*



GKM Consultants was contracted by a nationally leading engineering firm to develop, commission, and install a state-of-the-art structural health monitoring system for an aging highway overpass in Canada. This monitoring system will help extend the lifespan of the structure by providing real-time, high-quality strain data.

GKM installed 72 vibrating-wire strain gauges (Geokon model 4000) on the girders of the structure. While foil strain gauges are a typical choice for high-speed data acquisition, their output tends to drift over time. The enhanced stability of vibrating-wire strain gauges makes them a better choice for long-term monitoring despite their lower bandwidth. Strain gauges are often attached to a structure using an epoxy glue. However, this method is not compatible with a cold-weather installation, and degradation of the glue-concrete interface renders comparison of measurements unreliable after a few years. The preferred method for long-term monitoring is to use drop-in concrete anchors, but standard anchors are long with respect to the thickness of the girder's web. Therefore, the unique conditions of this structure required the development of custom anchors with the collaboration of Geokon. The strain gauges were installed in rosette patterns to measure both strain and shear.

The data-acquisition system is built upon Campbell Scientific's new GRANITE™ platform. The system performs automatic long-term static measurements of the structure, as well as collection of periodic bursts of dynamic data to track fatigue in individual girders. The system can also be triggered manually with a mechanical switch when performing on-site tests to measure the effects of loading from live load test trucks.

Installation was performed to the highest standards by GKM Consultants' team, running more than 2 km (1.24 mi) of instrument cables in conduits. This attention to detail will help extend the lifespan of the system for as long as needed until the overpass undergoes major maintenance.

### Case Study Summary

#### Location

Canada

#### Products Used

GRANITE 9, GRANITE WWIRE 305, CR300, RV50

#### Participating Organizations

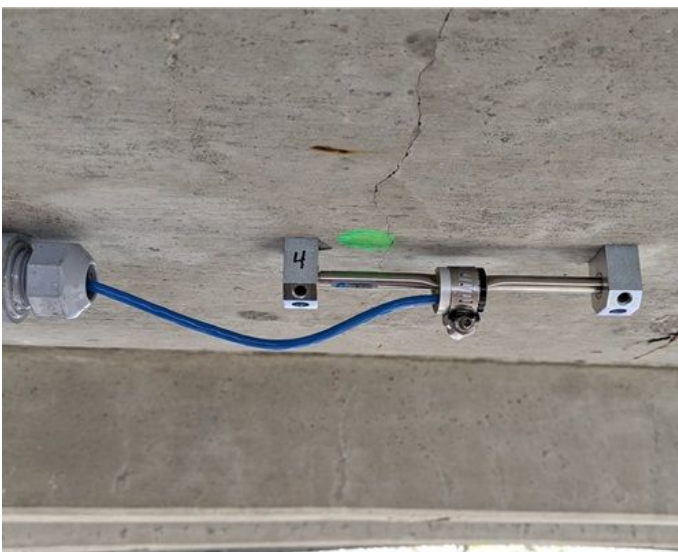
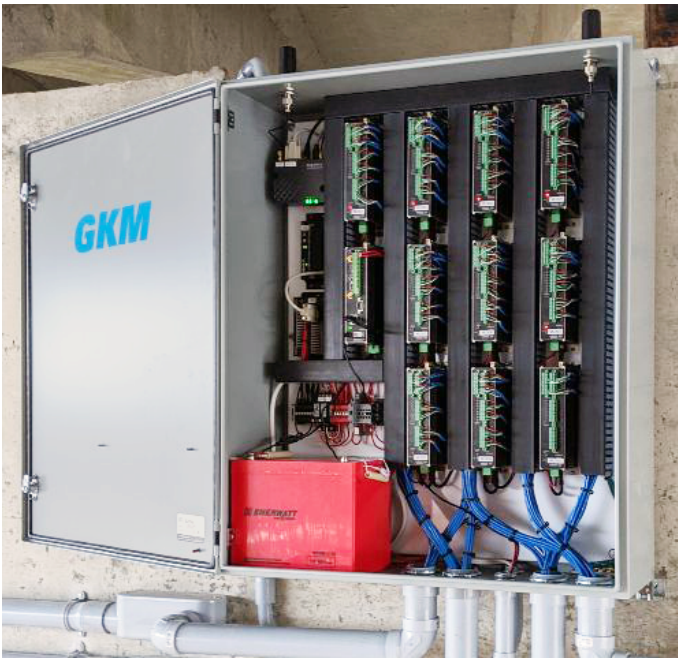
GKM Consultants, Geokon

#### Measured Parameters

Strain and shear on structure girders

#### Related Website

[GKM Consultants](http://www.gkmconsultants.com)



Vibrating-wire strain gauge installation to a girder's bottom flange

View online at: [www.campbellsci.com/canada-shm-overpass](http://www.campbellsci.com/canada-shm-overpass) 



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