

Structural Health Monitoring of an Overpass



Data Acquisition System



Vibrating wire strain gauge rosette installed on a girder's web



Vibrating wire strain gauge attached to the bottom flange of a girder



Structural Health Monitoring of an Overpass in Canada

GKM Consultants is proud to have been mandated 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.

72 vibrating-wire strain gauges ([Geokon model 4000](#)) were installed 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 but 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 the 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 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.

GKM Consultants offers turnkey, custom solutions for structural health monitoring and is proud of helping our government ministries manage the safety of their infrastructure.