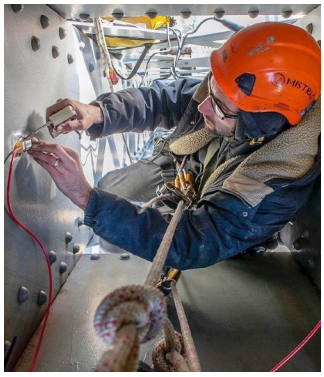
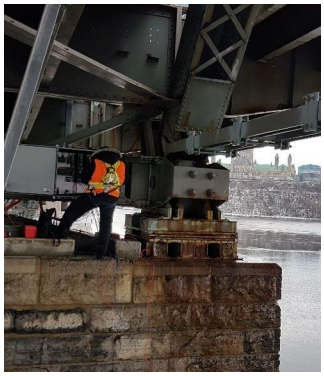
Project summary / **Structural Health**

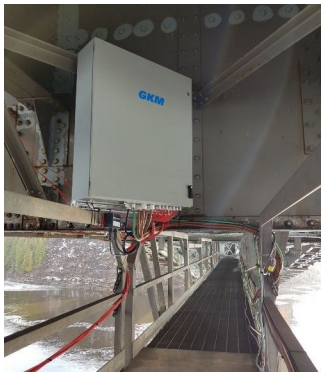
Interprovincial Alexandra Bridge connecting Ottawa and Gatineau



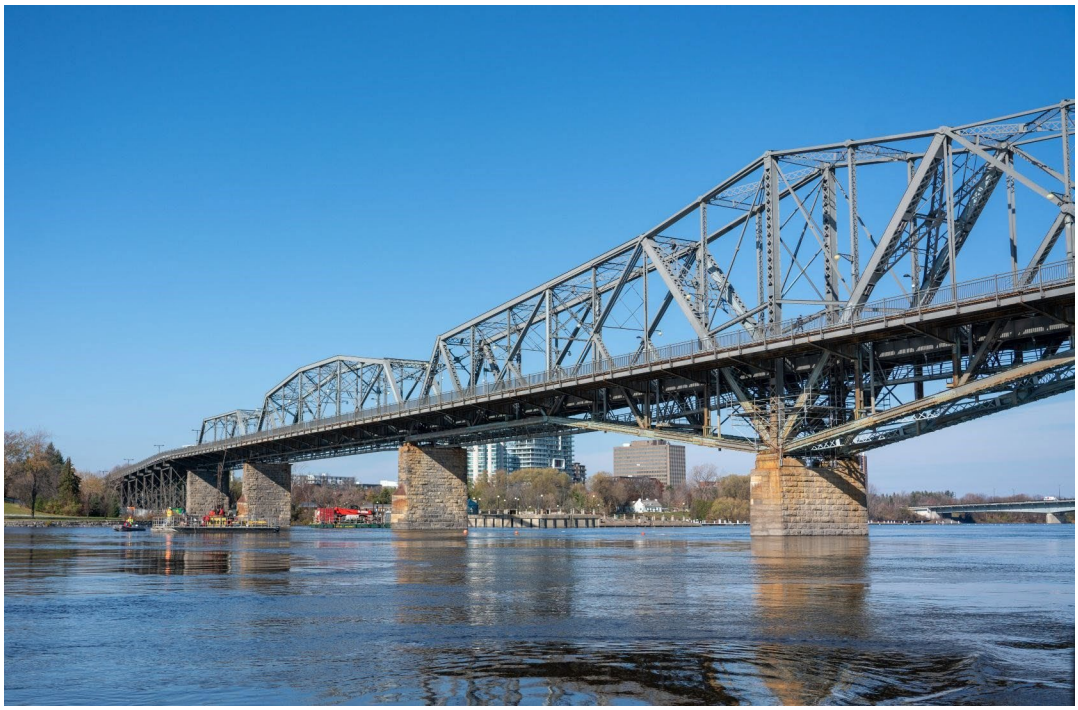
Strain gauges installation on the bridge truss.



Installation of data acquisition systems under the Alexandra bridge.



One of the two custom-made data acquisition systems installed under the Alexandra bridge.



Panoramic view of the Alexandra bridge taken during the installation of our data acquisition systems.

The Alexandra Bridge connects the cities of Ottawa and Gatineau in Canada. It has been in service for over 120 years and has seen many different uses of its life leading to its' designation as a National Historic Civil Engineering Site. It has been an important feature of the Canadian capital's skyline for a long time and offers tourists and commuters beautiful views of the cities.

Due to the bridge's venerable age, it has undergone many phases of maintenance and rehabilitation. The latest major rehabilitation projects were undertaken in 2009 and 2010. As of 2021, the bridge is nearing its end of service life and the bridge operator has to keep it operational at least until a replacement bridge is built which is tentatively planned for 2035. In order to help engineers better target their maintenance interventions, a state-of-the-art structural health monitoring was commissioned by GKM Consultants on behalf of Mistras.

To achieve the goals of the bridge's owner, a large number of vibrating wire strain gauges and temperature sensors were attached to critical members of the structure. Spot-weldable vibrating wire strain gauges (Geokon 4100) were selected due to their small footprint and durability. This application requires that the sensors be very stable both in time and as a function of temperature, both of which are achieved with this instrument. Geokon thermistors were also attached to the structure to supplement the built-in thermistors of the strain gauges.

The target locations for instrumentation were in challenging areas and our specialized team used methods of rope access, barges, and aerial lifts reaching every single spot needing to be monitored. GKM Consultants can provide installation in the most difficult conditions on bridges of any height, location, or position.

The installed sensors are polled at rates of up to 50 sample per second with Campbell Scientific's new Granite hardware. Such a high acquisition rate provides key insights into the behaviour of the members and the structure as a whole. This combination of long-term monitoring with high-speed data acquisition will help engineers understand how the structure behaves under variable loads at different temperatures over the course of a year.

While all data is stored locally, summary statistical data is continuously streamed over a cellular modem, providing engineers with rapid and easy-to-read insights regarding the current state of the bridge.

GKM Consultants is excited to have taken part in this project to help extend the life and preserve the unique beauty of a historic bridge in the heart of Canada's capital.