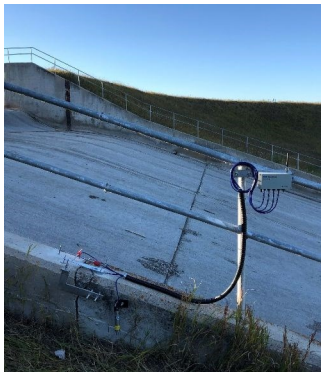
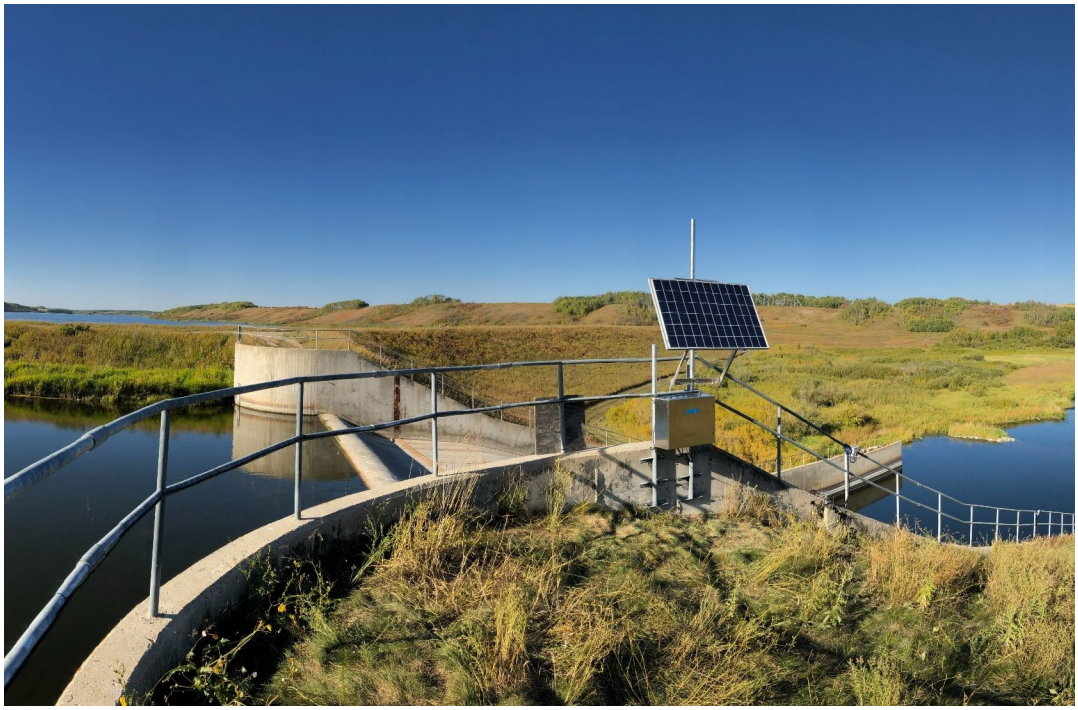
Theodore Dam Spillway | Saskatchewan (WSA)



Crack monitoring on the spillway chute

Crack monitoring on the spillway wall

Dashboard graphic



Integrated wireless remote structural health monitoring (SHM) | Theodore Dam spillway, Saskatchewan

The Theodore Dam near Yorkton in Saskatchewan, Canada was completed in 1964. Given the age of the structure, the Saskatchewan Water Safety Agency (WSA) has put in place a state-of-the-art monitoring plan with the help of GKM Consultants. GKM was mandated to provide and commission fifteen vibrating wire crackmeters and eight tiltmeters to track the behaviour of the spillway over several years. This project was conducted successfully in 2020 and has been collecting data without interruption since then.

While other technologies are commonly available for this type of monitoring such as potentiometers for crackmeters and micro-electromechanical systems (MEMS) chips for tiltmeters, vibrating wire was selected for its well-established reliability and long-term stability. Due to the unusual way some of the blocks of the spillway wall move and restrictions on how far the instruments are allowed to extend away from the surface, low-profile triaxial crackmeters were installed. This unique instrument relies on the deflection of a metal plate to monitor changes in a position perpendicular to the wall as opposed to installing a regular crackmeter perpendicular to the wall with a cumbersome bracket.

The data is collected using LoRa-based data acquisition systems. These battery-powered systems provide a cost-effective solution as they can monitor instruments for years on a single set of batteries and transmit the readings over LoRa to a gateway located hundreds of meters away. The gateway acts as the collection point where it connects to the internet over the cellular network. All readings are automatically transferred to the GKM secured server.

GKM designed dashboards that show the trends, alarm levels, and pictures of each instrument for seamless reporting. Engineers and project managers can connect to this tool from their office or smartphones to check at any time the status of their structure. Moreover, all data is saved to a database thus future-proofing access to the data for years to come.

With the help of these leading-edge tools, the Saskatchewan WSA will be able to monitor the spillway as part of a comprehensive maintenance plan of its structures across the province of Saskatchewan.

The blend of proven technologies such as vibrating wire and innovative LoRa enabled loggers open new options for dam owners to monitor their structures as part of a holistic structural health monitoring plan.