Project Profile – Bridge Abutment Construction Monitoring

Overview

The current Point Marion Bridge was constructed in 1930 by the Pittsburgh Des Moines Steel Company. The bridge, spanning the Monongahela River near the Mason-Dixon Line, is also known as the Albert Gallatin Memorial Bridge, named after a Swiss immigrant who served his adopted country in public and private for nearly seven decades. An entrepreneur, politician, diplomat, financier, and scholar who was a major influence in the shaping of our early republic, Gallatin was instrumental in financing the Louisiana Purchase and the Lewis and Clark Expedition, ending the War of 1812, developing the National Road, and mitigating the Whiskey Rebellion.

The bridge named in his honor consists of three cantilever truss spans with a total length of 225m (740 feet) and width of 8.5m (28 feet). It is a historically significant bridge due to its unusual cantilever truss design and is listed on the National Register of Historic Places. It is the second oldest bridge of this type in the state of Pennsylvania.

Studies undertaken in the 1990’s determined the bridge to be structurally deficient and too costly to maintain so plans were initiated to replace it. A new bridge, being built 20m (65 feet) south of the existing bridge, will eventually replace the historic structure. The new bridge will be a truss type, similar in structure to the existing bridge, with three piers and four spans. The longest span, situated above the river’s navigation channel, will be 126m (414 feet) long. The new bridge will also include a pedestrian lane.

Ground was broken for the new bridge on December 5, 2007. Unfortunately, upon completion of the new bridge, the historic Point Marion Bridge will be demolished.
**What We Did**

Due to concerns regarding the soft nature of the bridge abutment foundation soils and the proximity of construction relative to the old bridge a geotechnical/structural instrumentation program was implemented to provide monitoring of the construction impacts. Automated measurements were taken of 19 vibrating wire piezometers monitoring water pressures in the foundation soils beneath both sides of the river, a vibrating wire piezometer which recorded river water levels, and two vibrating wire strain gages which monitored impacts on the existing bridge. Manual measurements were taken of tilt plates installed on the old bridge, settlement pins placed in the fill and inclinometers installed in the foundation soils.

We were tasked with designing and fabricating the 2 automated monitoring systems, one for each abutment embankment. The systems had to be battery powered with solar re-charging. We utilized our VWDSP Interface to provide high reliability vibrating wire measurements, along with our lightning protection-equipped MultiMux, and Campbell Scientific CR800’s to automate the measurements. The systems were also equipped with cellular IP modems to provide remote telemetry. A view of an installed system is shown.

Data were automatically collected every hour and imported into the MLDB database. Our MLWeb software was used to provide web data access to the construction contractor and owner. Use of MLWeb also provided for entry, via web forms, all of the manually read instrumentation data. Data were entered via the **Add Data** form, and were reviewed and edited using the **View Data** and **Edit Data** forms. The entered data were then made immediately available for generation of the settlement and tilt plots.

**Who to Contact**

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