Quaibrücke, Zurich

Automatic bridge monitoring with geodetic and geotechnical sensors

- Zurich, Switzerland
- Civil engineering department of Zurich
- 2024 - ...

The foundations of the Quaibrücke were built in the 1880s on embankments around the present-day lake basin and the underlying lake chalk. Lake chalk is a soft, extremely challenging building ground. This means that the abutment at Bürkliplatz has been shifting by around one millimetre per year since the bridge was completed. The deformations have been measured and regularly assessed since the 1990s.

At the end of 2023, experts came to the conclusion that the structural safety of the abutment could no longer be mathematically proven and that it could theoretically fail at any time, according to a statement from the Zurich Civil Engineering Office. They therefore recommended that real-time monitoring be set up and contingency plans for a closure be carried out.

At the end of 2023, the Civil Engineering Office of the City of Zurich commissioned Terradata to develop a measurement concept with various sensors for the permanent monitoring of the bridge. The concept was implemented after approval at the beginning of 2024, and the sensors were installed and put into operation.

In April 2024, the project planning work for the renovation was started. This will show whether and to what extent the abutment or other parts of the bridge need to be renovated to ensure long-term structural safety.

The safety of the Quaibrücke is guaranteed by the monitoring measures and emergency concepts that have been put in place. Major events such as the Street Parade or the New Year's Eve celebrations can also be held as usual. The loads on the bridge during such major events are comparable to those under normal intensive operation.

Services

- Development of a monitoring concept for automated surveillance
- Design and production of special total station consoles
- Planning, installation and commissioning of automatic geodetic and geotechnical sensors
- Development of a web portal with all the results of the manual and automatic measurements
- Commissioning of automatic limit value alarms

Technologies

- 2 precision total stations with measuring points on the bridge and at both abutments
- 9 automated crackmeters
- 6 automated inclinometers
- 3 pore water pressure sensors with LoRa radio module
- 2 vertical chain inclinometers
- TEDAMOS Web, password-protected customer portal with 24/7 access