

Monitoring tilt of Gediminas' Tower in Lithuania

COUNTRY

LITHUANIA

PROJECT TYPE

TILT MONITORING

SECTOR

CRITICAL
INFRASTRUCTURE

MAIN PRODUCT

LOADSENSING

Challenge

Gediminas' Tower is part of the Vilnius Castle, the Palace of the Grand Dukes and the National Museum of Lithuania. The remaining part of the upper brick castle was completed in 1409 by Grand Duke Vytautas. In spring 2016, part of the north side of Gediminas' Hill started sliding. The area is protected with a temporary geotextile white cover.

Landslides at Gediminas' Hill have made the news many times. There is a lot of pressure from the media on getting Gediminas' slope and Hill back to its original state and re-opening the site to the public. The site and the funicular are currently closed to visitors.

Solution

Before Christmas 2016, GPS Partneris approached Worldsensing partner Geosense with an urgent requirement to monitor the landslide taking place in this historic site. After different options were considered, six biaxial Loadsensing wireless tiltmeters and one gateway were installed. The aim of the installation was to activate an on-site landslide alert and to control any movement in two retaining walls—a small stone one at the top and a main masonry wall at the bottom.

Installation of the wireless Loadsensing monitoring system was done in one day in January, with temperatures well below 0°C. GPS Partneris installed the biaxial tiltmeters using special brackets designed by Geosense.

GPS Partneris had also installed eight monitoring prisms at the end of December 2016. While they were surveyed by an automatic total station every hour, it became clear a more accurate measuring system was needed. Results from the monitoring prisms were in the range of ± 0.5 mm of real resolution, but the wireless tiltmeters' resolution and repeatability are ± 0.03 mm/m. Biaxial tiltmeters have been set to measure every hour to give an earlier on-site warning than monitoring prisms. The monitoring system finally comprised:

- 11 biaxial tiltmeters
- A mains-connected GPRS gateway
- Eight monitoring prisms

Benefits

The Loadsensing monitoring solution is the first wireless remote control system installed in Lithuania.

Remote access to the Loadsensing tiltmeter system has been achieved via SIM card and on Ethernet while temporarily locating the gateway seven kilometers away from the site at GPS Partneris' offices. Readings are stable and GPS Partneris is hoping to increase the number of biaxial Loadsensing tiltmeters installed on site.

GPS Partneris and the contractor benefited from Loadsensing's ease of installation and availability and reliability of data.

Advantages

- Improved access to stability data relating to a structure of major cultural significance
- Rapid implementation due to high levels of integration with industry-standard equipment
- Easy scalability to improve monitoring further if needed



1 - Loadsensing Wireless Tiltmeter, a 2-in-one sensor + data logger

2 - Gediminas' Tower is part of the Vilnius Castle, the Palace of the Grand Dukes and the National Museum of Lithuania.