

EXEO Lisbon - Geotechnical Monitoring

CLIENT: JETSJ / INSTOP

How a wireless monitoring solution supported safe, efficient excavations at challenging Portuguese urban site

Challenge

The Parque das Nações district in Lisbon is the product of the transformation of a former industrial area into a cosmopolitan business, service and leisure district. Construction of the innovative EXEO Office Campus is a key part of the development and is the biggest office project of its kind in Lisbon.

The site presented numerous challenges. It is adjacent to the Oriente rail station and deep excavations were required in close proximity to other buildings, railways and tunnels. It was therefore critical to have insight into ground behaviour throughout the construction process.

The presence of so much other infrastructure and construction activity, together with the lack of mains power supply, ruled out most traditional geotechnical monitoring methods.

Instop, the Senceive dealer for Iberia, has considerable experience deploying Senceive wireless remote monitoring systems in challenging applications and recommended a wireless solution to client JETSj - Geotecnia Lda, which is a recognised monitoring specialist.

Solution

The installation of conventional wired monitoring systems on the EXEO site would have been time consuming and expensive. Installation of the lightweight and wireless Senceive system was incredibly easy. Data collection started almost immediately after installation and the whole integrated setup could be controlled remotely.

In a first phase, five 16 m deep in-place-inclinometers (IPI) were installed. Each inclinometer comprised of 32 segments of 0.5 m length, totalling 160 sections. Each IPI was connected to a data logger (Edge Hub), to transmit data from the site. Power supply came from solar panels. This enabled ground movement during excavation works to be monitored. A vibrating wire node was installed in each borehole to collect and send piezometer data; a total of 15 piezometers were connected to four-channel vibrating cable nodes. A second phase involved the installation of load cells connected to mv/v nodes and wireless triaxial inclinometers. All sensors were integrated in the same FlatMesh™ wireless communication network.

The sensors and nodes operate autonomously, using an internal battery which can last up to 15 years with readings at 30 minute intervals. Data are accessed using the Senceive WebMonitor viewer.

Outcome

The construction team was able to proceed with greater confidence and efficiency because of the geotechnical insight gained from the monitoring system.

With measurements provided automatically on a 24/7 basis there was no need for frequent site visits. The team could set and adjust threshold levels in order to receive SMS or email alerts in the event of movement levels being exceeded.

Working wirelessly and remotely rules out the need for time-consuming and potentially risky site visits. The technology is quick and simple to install and needs virtually no maintenance. With no bulky equipment or cables it can be fitted into busy construction environments without causing interference to others.

The freedom and safety offered by the technology helps to protect people and infrastructure.

