GEO INSTRUMENTS

Instrumentation and monitoring

- Manual and Automated Monitoring Solutions
- Geotechnical and In-Ground Instrumentation
- Bespoke monitoring systems
- Environmental Monitoring
- Data visualisation software
- Wireless Tiltmeter solutions
- Hydrostatic Levelling Cells
- Automated Total Stations
- Settlement Monitoring
- ShapeArrays

Monitoring solutions for the construction industry

GEO INSTRUMENTS

GEO-Instruments is part of the Keller Group plc and specialises in providing instrumentation and monitoring solutions for a wide range of applications.

We focus on producing reliable, repeatable data and presenting the results to our clients in the most effective and user-friendly way. Our team designs and installs monitoring systems that provide our clients with the essential information they require to manage their assets or projects.

GEO-Instruments provides expert management and advice to assist your project from the earliest stages of design through to on-site project management.

We are driven to innovate and bring the latest technologies to the instrumentation and monitoring sector. We select our partners carefully to provide the world class service that you would expect from a Keller company.

Although we are a global organisation, our regional structure means that our businesses are close to their customers and can respond to their needs quickly.

Whatever and wherever the project, we are on hand to offer the best quality service.

Expertise

GEO-Instruments offers valuable experience to the construction, geotechnical and structural health industries:

- Hydrostatic Levelling Cells (HLC) for automated settlement monitoring
- Bespoke instrumentation & monitoring systems
- Real-time structural and geotechnical monitoring
- Project-tailored data visualisation software
- Software systems for compensation, jet and permeation grouting
- Geotechnical instrumentation
- ShapeArrays (SAA) for measuring ground and structural deformation
- Fibre optic instrumentation for measuring deformation and strain
- Excavation monitoring
- Wireless tiltmeters
- Surveying and Automated Total Stations (ATS)
- Monitoring and project management
- Tendering and bid assistance

We can personally supply, install and commission all of our instrumentation options depending on your needs.

These, and all our services, are supported by experienced management and site operatives, with worldwide experience in the planning, installation, reporting and delivery of monitoring systems.

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Hydrostatic Levelling Cells (HLC)

A Hydrostatic Levelling Cell system allows for accurate real-time measurement of structures for vertical movement, ideal for monitoring for predicted settlement or heave.

Typical applications include monitoring of buildings, excavations, railways, bridges and tunnels. This system is adapted to an environment where conventional survey techniques would not be possible.

Benefits of the system are the high accuracy, the ability to completely monitor structures on all sides with one system, and reduced need for maintenance. We can also utilise tiltmeters in conjunction with a HLC system to provide a complete settlement and tilt package for structural monitoring purposes.

We have years of experience in the effective design, installation, commissioning and longterm maintenance of HLC systems.

The HLC system can work in a broad range of conditions, with a rapid system for acquisition, archiving and visualisation of data.

This makes it an essential system for controlling risk-critical events such as compensation grouting and tunnelling.

QuickView

Powerful, adaptable and easy to use, QuickView is a browser based data visualisation platform at the centre of your monitoring project.

Ideal for the collection and display of all your project's information, QuickView is not just for Instrumentation and Monitoring data.

Weather data, plant telemetry i.e. TBM data, excavation/construction progress, site logs and many other types of information can all be archived and visualised on your project's individual QuickView page.

With a focus on convenience and functionality, QuickView is browser based and optimised for mobile devices, making data accessible at a moment's notice.

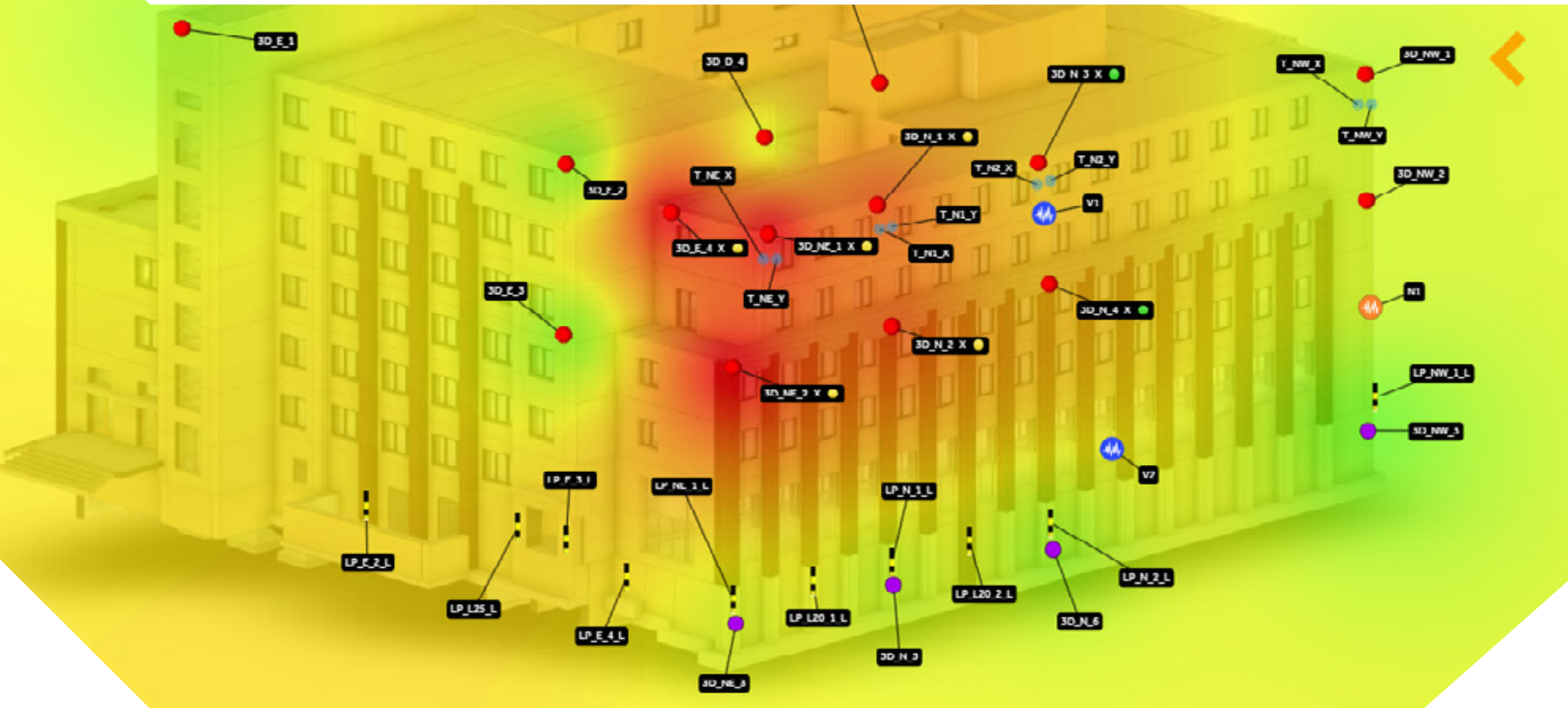
We are committed to continuously make QuickView better. In the last year the infrastructure has undergone a complete upgrade, resulting in improved security, versatility and faster data access.

QuickView has a wealth of visualisation options from full site overviews, customisable views, models, graphs and tables. Recorded data can be uploaded automatically or manually from any browser. Users can download data, export graphs and generate reports. Automated reporting functionality can be set up around customisable templates and regular distribution to mailing lists.

Users are able to tailor project displays to show information on maps, uploaded images or CAD files.

The platform allows the client to review historical data and use the journal feature to keep detailed records of key events through the progress of works. Sophisticated alarm/trigger systems can be user defined and adjusted at will, allowing for complete control over exceedance limits, timings and alert recipients.

QuickView is designed to be intuitive and easy to learn, quickly allowing users to analyse, report and discuss monitoring results.



GEO INSTRUMENTS

Manual and Automated Surveying

GEO-Instruments specialise in providing both manual and automated survey solutions to assist with the specific requirements of each of our clients.

Our team of highly experienced surveyors undertake surveys using high quality specialist equipment and software to produce reliable, consistent and accurate data.

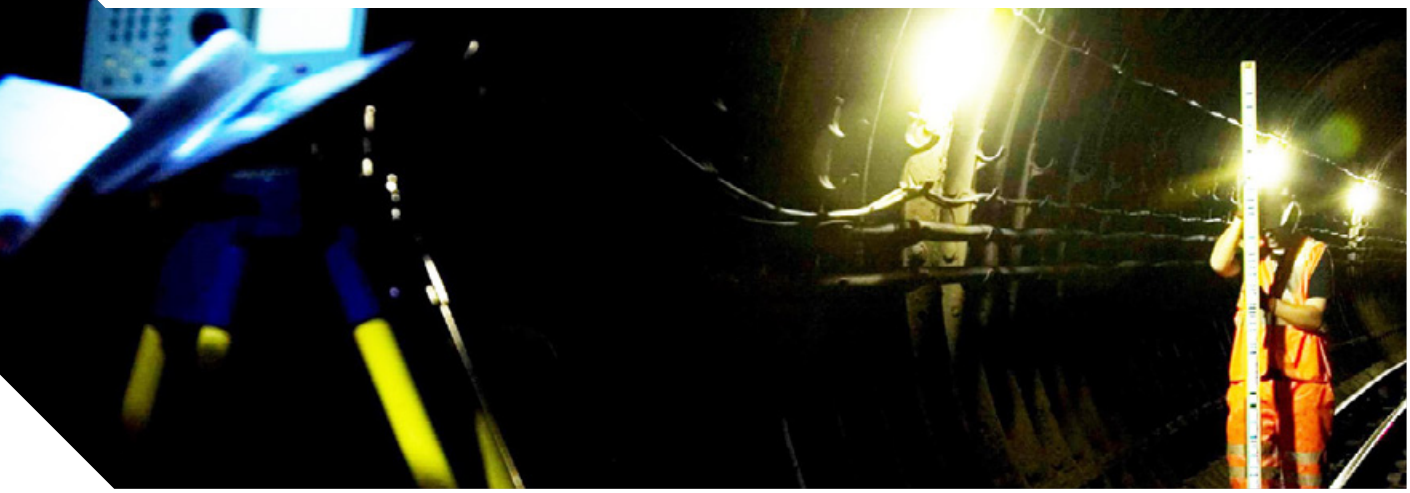
Our range of techniques include:

- Precise levelling
- Manual total station monitoring
- Single or networked Automated Total Stations (ATS)
- Line and level surveys
- Track geometry and clearance surveys
- As-built surveys
- Topographical surveys
- 3D scanning / modelling

Survey data is either automatically or manually uploaded to the GEO-Instruments database. The data can then be visualised in various graphical, visual and tabular formats to provide the flexibility valued by our clients.

We deploy Automated Total Stations (ATS) as either single units or as part of a larger, more complex network to monitor building structures, tunnels, railways and excavations.

We also conduct track surveys to measure track geometry and clearance using an Amberg GRP3000 track trolley.



Geotechnical Instrumentation

GEO-Instruments install a wide range of geotechnical instrumentation.

Our engineers provide the method statements, risk assessments and on-site supervision for the installations.

Where applicable we use accredited drilling companies for groundworks and our own engineers for in ground and structural installations.

GEO-Instruments source, supply and install the following solutions:

- Inclinometers (Manual, Mems IPI and ShapeArray)
- Single and Multi-point Piezometers
- Multi-point Extensometers
- Deep Datums
- Fibre Optic Piezometers and Strain Gauges
- In Pile and Diaphragm Wall instrumentation
- Prop Strain Gauges
- Crack meters
- Tiltmeters

Geotechnical instrumentation and monitoring benefits all phases of a construction project.

In the early stages it can be essential for examining initial site conditions and confirming laboratory testing results.

During advanced construction it is used to enable the site team to guide construction control, enhance communication between contractors and help provide value engineering.

Post construction, the long-term performance of the ground or structure can be monitored and evaluated using Geotechnical I&M.

The data collected is invaluable to designers and engineers for developing more efficient designs and construction methods.

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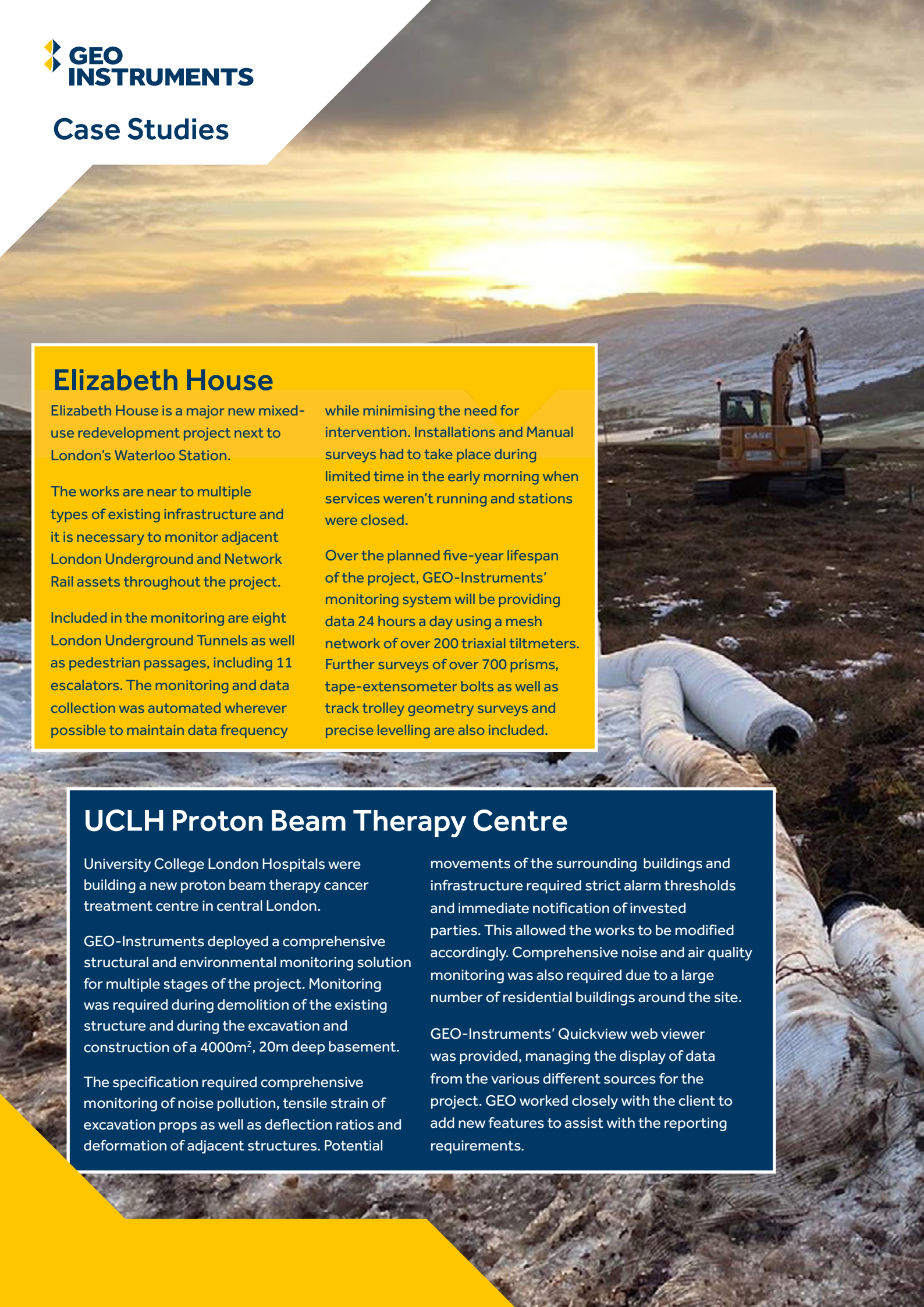
Case Studies



Elizabeth House

Elizabeth House is a major new mixed-use redevelopment project next to London's Waterloo Station.

The works are near to multiple types of existing infrastructure and it is necessary to monitor adjacent London Underground and Network Rail assets throughout the project.

Included in the monitoring are eight London Underground Tunnels as well as pedestrian passages, including 11 escalators. The monitoring and data collection was automated wherever possible to maintain data frequency while minimising the need for intervention. Installations and Manual surveys had to take place during limited time in the early morning when services weren't running and stations were closed.

Over the planned five-year lifespan of the project, GEO-Instruments' monitoring system will be providing data 24 hours a day using a mesh network of over 200 triaxial tiltmeters. Further surveys of over 700 prisms, tape-extensometer bolts as well as track trolley geometry surveys and precise levelling are also included.

UCLH Proton Beam Therapy Centre

University College London Hospitals were building a new proton beam therapy cancer treatment centre in central London.

GEO-Instruments deployed a comprehensive structural and environmental monitoring solution for multiple stages of the project. Monitoring was required during demolition of the existing structure and during the excavation and construction of a 4000m^2, 20m deep basement.

The specification required comprehensive monitoring of noise pollution, tensile strain of excavation props as well as deflection ratios and deformation of adjacent structures. Potential movements of the surrounding buildings and infrastructure required strict alarm thresholds and immediate notification of invested parties. This allowed the works to be modified accordingly. Comprehensive noise and air quality monitoring was also required due to a large number of residential buildings around the site.

GEO-Instruments' Quickview web viewer was provided, managing the display of data from the various different sources for the project. GEO worked closely with the client to add new features to assist with the reporting requirements.

SCAN ME

ŁDK (Lodz Centre of Culture), part of CPK (Central Communication Port)

The Łódzki Dom Kultury (Łódź Cultural Centre) is one of the city's most recognizable cultural landmarks. As part of geotechnical works carried out by Keller Polska, foundation strengthening is being undertaken in connection with the construction of the TBM reception chamber. The chamber will receive a tunnel boring machine that is set to excavate more than 4 km of tunnel beneath the city of Łódź.

During these complex works, it was essential to ensure the safety of the existing structure and surrounding area. The main objective of the monitoring system was to track any movements of the building and changes in ground conditions that might occur during the underpinning and excavation phases.

GEO-Instruments designed and implemented a comprehensive geotechnical and environmental monitoring system for the site. The setup includes two fully automated total stations providing continuous measurements of structural displacements, as well as precise levelling surveys inside the building, covering over 100 points to detect vertical movements with less than 1 millimetre accuracy.

In addition to structural monitoring, GEO-Instruments performs environmental measurements to control noise and vibration levels during the works. All data from the monitoring system is collected automatically and transmitted to GEO's web-based platform QuickView, enabling engineers to access and analyse results in real time.

The integrated monitoring system supports Keller Polska in ensuring the safety and efficiency of foundation strengthening works, providing reliable data and insight throughout the construction.

Thanks to this continuous control, all works can be carried out safely, without risk to the building or its surroundings.

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Environmental Monitoring - Vibration, Noise and Dust

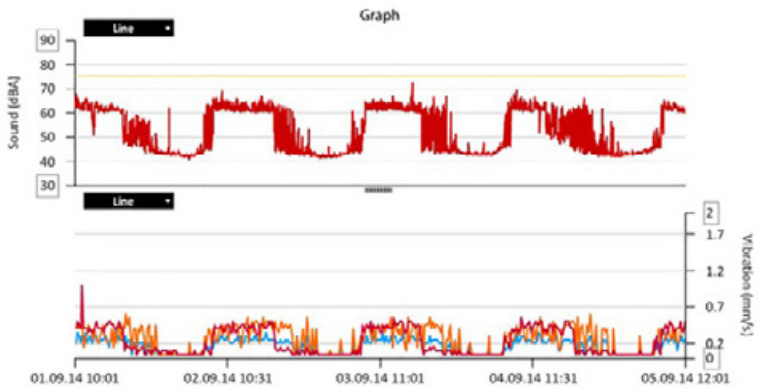
GEO-Instruments are working with manufacturers to provide a complete environmental monitoring package. This includes versatile options for vibration and noise monitoring, automated 24-hour data collection and trigger alerts via text or email. Data can be easily reviewed and reported on our QuickView visualisation software.

The system allows you to conduct continuous, high-resolution measurements in the field with minimal need for maintenance or intervention.

GEO-Instruments engineers provide professional installation and commissioning of on-site equipment and training on the reporting and trigger definitions.

The sensors we supply are able to calculate VDV (Vibration Dose Value) as well as PPV (Peak Particle Velocity) and all European standards can be used.

For Dust and particulate monitoring, GEO-Instruments offers environmental particle monitors that provide long-term, accurate, high frequency recording of PM1, PM2.5 and PM10 levels.



ShapeArray

GEO-Instruments use the ShapeArray for accurately monitoring retaining walls, large slab movements, tunnel and sewer deformation.

ShapeArrays consist of a string of rigid MEMS (Micro-ElectroMechanical Systems) gravity sensors separated by joints that can move in any direction but cannot twist.

Each sensor is capable of measuring tilt in 2D and 3D directions depending on its inclination.

This makes it an ideal tool for measuring drilling orientation inside boreholes or auger stems.

Processors transform the position (e.g. X,Y & Z) of each sensor to produce a cumulative shape and change of shape from a baseline.

The SAA data is then displayed within our QuickView monitoring platform in a user-friendly section view allowing the user to view data against ground strata profiles, propping information, excavation details and predicted ground movements depicted through design curves.

All this combines to give the user a detailed view of monitoring data alongside site information and designs.

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Load tests and pile integrity testing

GEO-Instruments Polska offers a full range of services related to deep foundation testing, including foundation piles and columns of all types, diaphragm walls, and ground anchors and nails. We can perform any load test, even the most complex.

We perform load tests using all available methods, in particular:

- Static load tests using anchor piles, ballast, or combined anchor and ballast piles
- Static load tests using extensometers
- Dynamic load tests of drilled and driven piles

We also perform pile integrity testing using the following methods:

- Sonic Echo/PIT
- Crosshole Sonic Logging

We have extensive experience in load and integrity testing, allowing us to perform pile tests according to most standards used worldwide. We are one of the few in Europe to perform static pile load tests using modern, fully automated load and measurement systems, which enable completely unattended static load testing while maintaining all technical and measurement accuracy standards. The remote loading kit ensures maximum safety for employees and third parties, without the need for many hours of tedious operation by a team of technicians, while providing full real-time monitoring of the recorded results and the possibility of controlling and changing subsequent load levels.

Fibre Optic Monitoring

We are using Fibre Optic technology in an innovative way to measure strain within structures and geotechnical processes.

GEO-Instruments have partnered with Sylex to provide complete, bespoke designed systems and strain monitoring solutions.

A key advantage of fibre optic instrumentation is being intrinsically safe as well as ATEX rated, making them especially suitable for tunnel and sewer monitoring. Able to read microstrain directly and in real time, our fibre optic sensors have a long lifespan and don't require individual calibration.

Fibre optic sensor strings can be installed over relatively long distances with no loss in signal strength. The flexibility of these solutions has seen them used in diverse applications including measurement of pipelines, props, tunnels, sewers, bridges, railway beds and roads.

Wireless Tilt Sensors

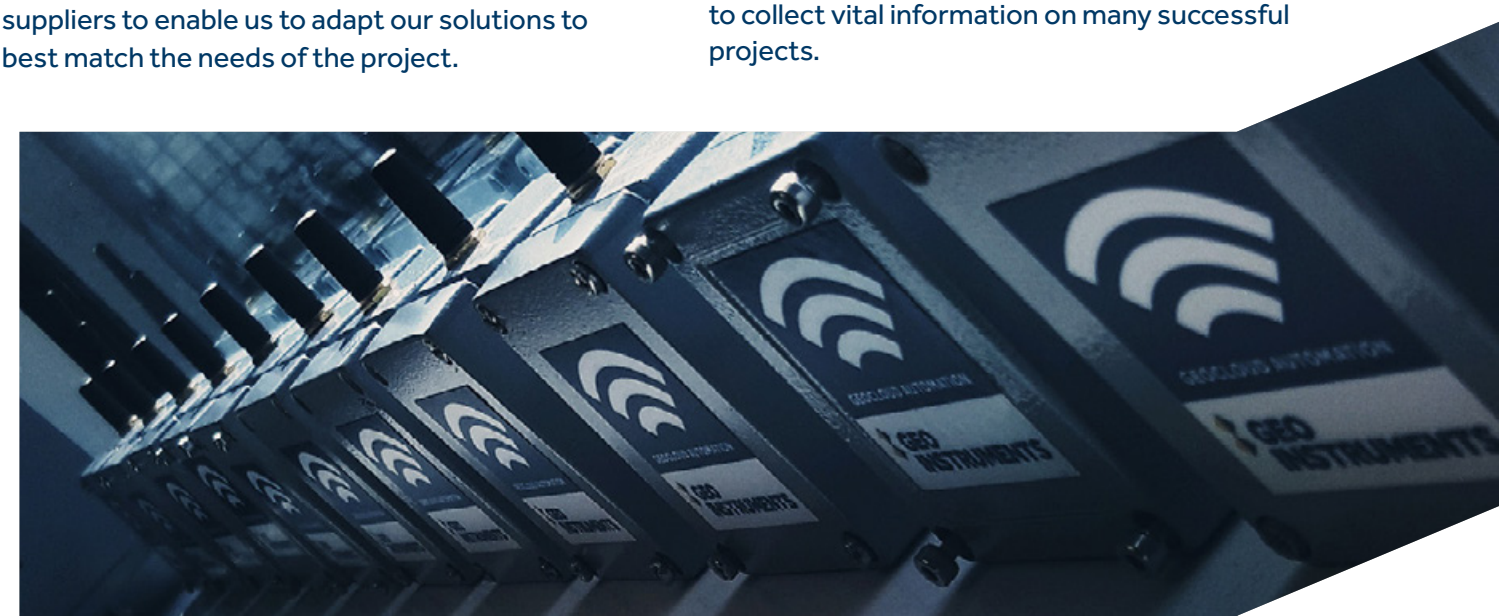
Networks of wireless tiltmeters are versatile monitoring solutions that are relatively easy to deploy, making them a popular option for tunnel and infrastructure monitoring.

These systems boast high accuracy, consistency and longevity with batteries that can last several years. The need for maintenance over the course of a project is minimal.

We work with wide range of industry-leading suppliers to enable us to adapt our solutions to best match the needs of the project.

We also offer wired tiltmeter options for applications where battery life is a concern.

Tiltmeters combined with other automated instrumentation options like settlement cells (HLCs) can help monitor three-dimensional deformation of assets where other 3D monitoring solutions are not feasible. Combining inclination and settlement monitoring in this way gives a more complete picture of structural movement has allowed us to collect vital information on many successful projects.



Keller at a glance

Every day, people around the world live, work and play on ground prepared by Keller, the world's largest geotechnical specialist contractor

Established
1860

c10,000
employees

27+
acquisitions since 2000

OUR PURPOSE
Building the foundations for a sustainable future.

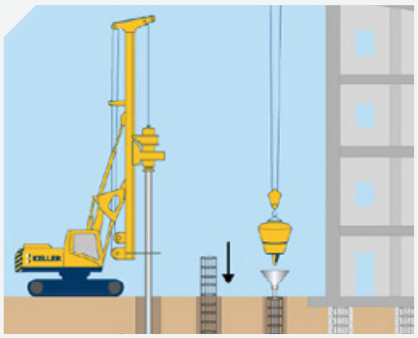
OUR VISION
To be the leading provider of specialist geotechnical solutions.

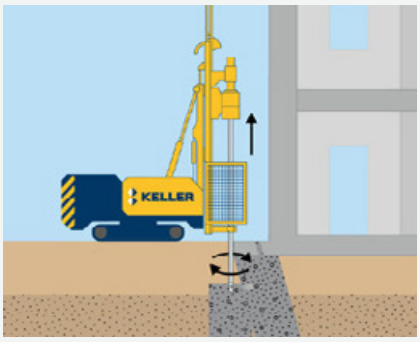
OUR STRATEGY
To be the preferred international geotechnical specialist contractor focused on sustainable markets and attractive projects generating sustained value for our stakeholders.

Local businesses will leverage the group's scale and expertise to deliver engineered solutions and operational excellence, driving market share leadership in our selected segments.

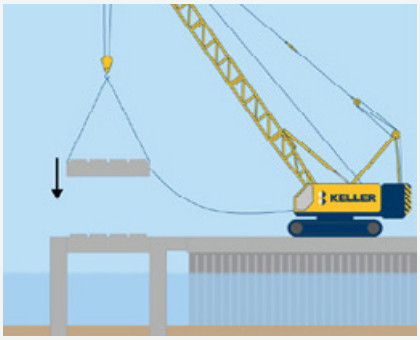
What we do

Provide solutions to a wide range of geotechnical challenges across the entire construction sector.

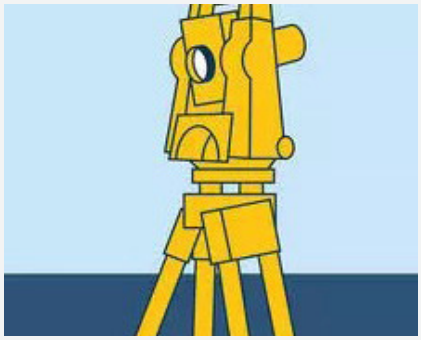

Deep foundations

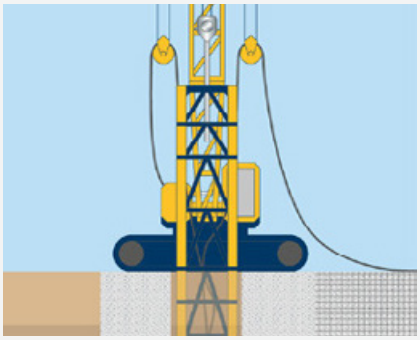


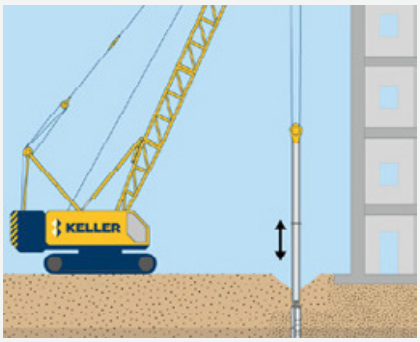
Grouting



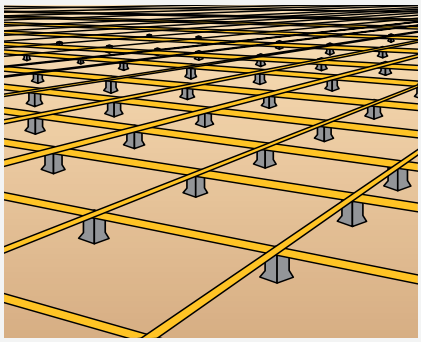
Marine


Instrumentation and monitoring


Earth retention

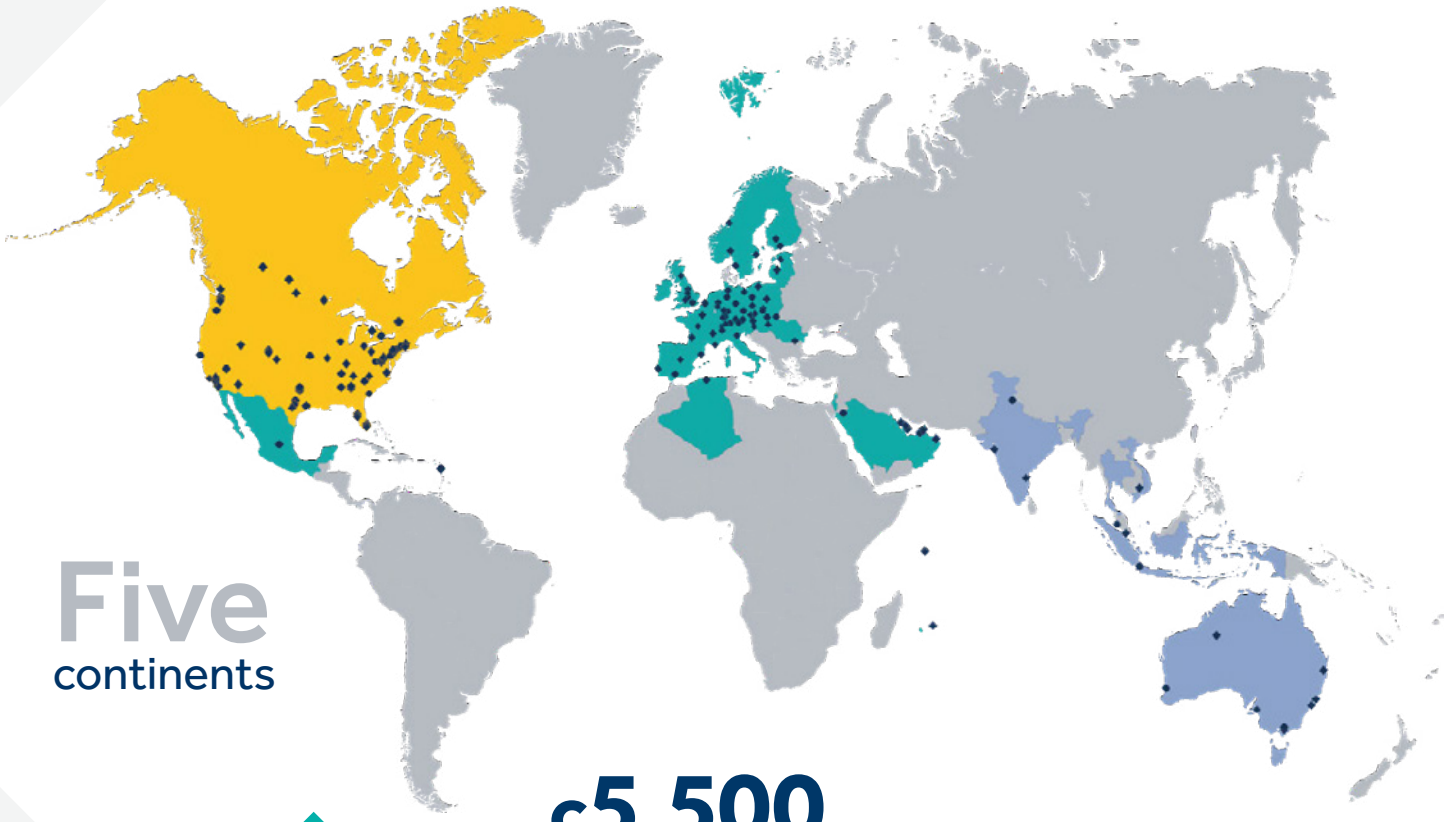


Ground improvement


Post-tension systems

Industrial services

THINK SAFE
WORK SAFE, GO HOME SAFE



Five
continents

c5,500
contracts executed a year

Typical range in project value
£25k to
£10m

Average project value
£500k

We have the people, expertise, experience and financial stability to respond quickly and see projects through safely and successfully.

14 business units

North America
- Canada
- Moretrench and RECON
- North and Pacific
- South Central
- Suncoast

Europe and Middle East (EME)
- Central Europe
- Middle East and Africa/NEOM
- North-East Europe
- South-East Europe and Nordics
- South-West Europe
- UK

Asia-Pacific (APAC)
- Austral
- Keller Asia
- Keller Australia

THINK SAFE
WORK SAFE, GO HOME SAFE

GEO INSTRUMENTS

Our Projects

- GEO-Instruments are proud to have partnered with industry leading contractors and suppliers on a wide array of projects across the globe.
- Modern commercial and service building in the Talsinki district of Tallinn (Estonia) – geotechnical monitoring with IPI inclinometers, automatic geodetic monitoring (using AMTS) excavation casing and the surrounding area, vibration monitoring.
- Warszawa Zachodnia Railway Station (Poland) – automatic geodetic monitoring (using AMTS) of railway tracks.
- S5 Expressway Ornowo – Wirwajdy section (Poland) – monitoring embankment settlement using a profilometer and inclinometer measurements.
- S19 Expressway Rzeszów – Babica section (Poland) – extensive monitoring of the TBM tunnel.
- Seaton Ground Investigation, Devon (UK) – Automated ground settlement monitoring for ground preparation works.
- Southbank Place, London (UK) – Automated and manual deformation and settlement monitoring (tunnels). Geotechnical and Environmental monitoring (surface).
- Royal Mansour Hotel, Casablanca (Maroko) – Structural, Excavation and Environmental monitoring including Tiltmeters (inclination), ShapeArray (excavation) and Vibration sensors.
- If you would like to know more about our experience or discuss your upcoming projects we are here to answer your questions.

GEO-Instruments Polska sp. z o.o.

Instrumentation and monitoring

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