Structural monitoring provides data for evaluating changes in the performance of a structure. It is also used to document and control for effects from nearby construction, such as vibration or changes in ground support, that might degrade the performance of the structure.

Instrumentation may include strain gauges, load cells, crackmeters, tiltmeters, convergence gauges, and remote sensing devices such as automated total stations (AMTS).

**Hines Bridge**
A heavily loaded barge collided with a bridge pier, damaging the pier and causing misalignment of the deck, which would no longer lock properly. The bridge was closed for static load tests of the deck and lateral load tests of the piers. Working from a barge, GEO-Instruments installed vertical and horizontal beam sensors to detect deformation during load testing. Automated readings, taken at one-minute intervals, were transmitted to GEO’s server for processing and displayed on a project website, which engineers could access on site. The tests proved that the bridge was safe and could be reopened to traffic.

**Portland Pier**
Nearby dredging posed a potential risk to the support structure of this container ship pier. To monitor the structure, GEO-Instruments was asked to provide hourly readings of underwater load cells. GEO supplied weldments for the cells, which were installed by divers, and a battery-powered logging system for data collection. The logging system, fitted with a cellular modem and GEO’s Lid-Link® antenna, was installed flush with the pavement of the pier to avoid interfering with operations. GEO’s server retrieved data 24/7 and posted processed readings on a dedicated website for convenient and immediate access.

**New York City Hall**
When New York’s historic City Hall Building underwent foundation and restoration work, GEO-Instruments deployed multiple technologies to monitor the structure and its facades. The system included tiltmeters, jointmeters, vibration monitors, and an automated total station (AMTS) which was used to monitor prisms fixed to the facades. Measurements stored by the data loggers, vibration monitors, and total station were retrieved hourly by GEO’s server and forwarded to specialized processing software, checked for alarms, and then posted on a dedicated project website.

**Old South Church**
Jet grouting at a nearby construction site opened a 70-foot vertical crack in the east wall of Old South Church, a national historic landmark. Construction was halted while engineers and specialists in stained glass, masonry, and historical restoration developed an action plan. Responding to the emergency, GEO-Instruments installed a fully automated monitoring system within 36 hours. Crackmeters, some specially configured for stained glass windows, monitored the crack, while an AMTS monitored the stability of the entire wall. Updated readings, checked for alarms, were posted on a website every 15 minutes.

**FDR Drive**
Significant deterioration of the pilings supporting this busy six-lane parkway threatened its stability. To help manage risk during reconstruction, GEO-Instruments installed 3D crackmeters and biaxial tiltmeters at expansion joints located over the deteriorated piles. A solar-powered data logger transmitted readings wirelessly to GEO’s servers for processing and alarm checking. Authorized users viewed data and graphs on a project website. The system enabled continued use of the highway during reconstruction and ensured the safe passage of thousands of vehicles.

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About GEO-Instruments

GEO-Instruments provides automated solutions for monitoring the safety and stability of buildings, excavations, bridges, railways, roads, tunnels, dams, embankments, and slopes.

We help clients manage risk by installing advanced monitoring systems and automating the collection, processing, and delivery of alarms, data, and reports.

We work as part of the design and construction team or as independent consultants. Our highest priorities are delivering practical, cost-effective solutions and maintaining good communications with our clients.

Established in 2003, we have acquired a reputation for getting results and providing excellent customer service. We now operate from offices in Rhode Island, New York, District of Columbia, California, and Washington.

Advanced Technologies

The GEO-Instruments team has extensive experience in instrumentation, civil engineering, information technology, and construction. We can integrate and deploy a wide range of technologies to meet project requirements.

Efficient Field Services

GEO-Instruments can mobilize field services quickly. Our technicians are trained and cross-trained to ensure that field services are performed efficiently and that systems are installed and commissioned correctly.

Wireless Communications

GEO-Instruments can implement wireless systems in nearly any environment. Our systems provide reliable data collection, eliminate the costs of installing and protecting cables, and reduce the need for site visits.

Web Access to Data & Reports

GEO-Instruments creates a website for each project. The website automatically updates data, graphs, and reports. Freeing engineers for other work. Reports can be emailed to all stakeholders, and site status can be reviewed in real time at meetings.

Castle Village Retaining Wall

When a large retaining wall failed, 41,000 cubic yards of rock, soil and trees slumped onto a major urban highway, closing it and endangering nearby apartment buildings. To help manage risk during reconstruction of the wall, GEO installed more than 100 sensors to monitor settlements, lateral displacements, and rotation. Readings were obtained every 15 minutes, checked against alarm thresholds, and displayed on a dedicated website. The system earned the praise of the design and construction engineers for giving them tremendous peace of mind during a very difficult project. See Monitoring Deformation

East Side Access Tunnels

Continuous monitoring for settlements was required while the ESA tunnels were driven under some of New York’s highest value real estate. The busy streets and sidewalks chosen for monitoring locations presented significant challenges for installation, power, protection, and data retrieval. GEO expedited installation by deploying preassembled fiberglass-rod extensometers, solved power and protection issues by sealing loggers, radios, and battery packs in stainless steel canisters installed below grade, and enabled communications with traffic-rated, flush-mount Lid Link® antennas. See Monitoring Settlement

Transbay Transit Center

Construction of the Transbay Transit Center required a massive support of excavation system. GEO-Instruments provided continuous monitoring of the support system, deploying six automated total stations (AMTS) and a strong geometric network of 250 target prisms and 30 control prisms. GEO’s Monstar software output measurements in project coordinates for easy use with other project documents. Every two hours for four years, the system delivered spatial measurements with an accuracy better than one mm, providing critical observational data for managing risks. See Monitoring Support of Excavation