



Case Study Construction Monitoring

At 26th and Guadalupe in Austin, Texas, you'll find a once empty lot a buzz with construction. This small piece of land near the University of Texas will soon be home to a Moxy® hotel. A part of the Marriott® International chain, the new hotel is designed to sit on 0.384 acres, with 154 rooms across four-stories and a two-story underground parking garage. With the University Neighborhood Overlay district limiting the development height to 60 feet (or no more than five-stories), the architects and developers had to maximize the use of ground space. That's where Integrated Geotechnical Solutions, Inc. (IGS) comes in.

THE PROBLEM

Construction of the new hotel will take place six inches from a legendary bar, the Hole in the Wall. Design required the installation of soldier piles for the support of excavation (SOE) and excavation for the construction of the foundation and parking garage. These operations require protective measures to detect and mitigate vibration settlement for the safety of the public and to prevent undermining this popular structure.

THE SOLUTION

IGS was brought in to monitor the stability of the SOE, vibration levels and the integrity of the Hole in the Wall structure. Our team is fully equipped to handle projects that have varying geotechnical and vibration monitoring needs. After conducting a pre-condition inspection, the structure was assessed for potential areas of concern. We also determined the appropriate equipment and where to place it to achieve maximum results.

8 InstanTel® Seismographs

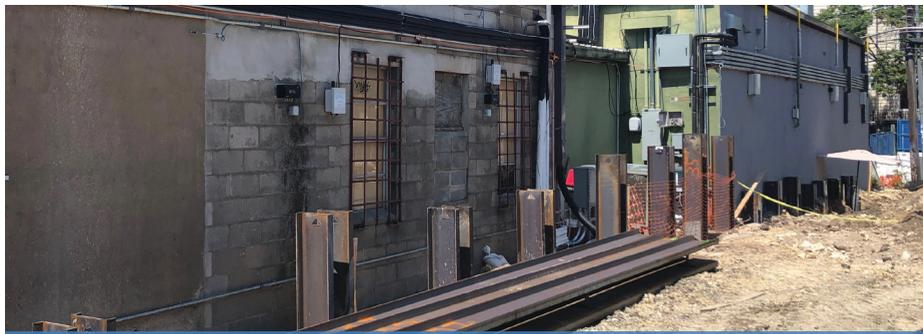
8 Wireless Tilt Gauges

4 Dynamic Crack Gauges

8 Leica™ GPS Stations

1 Leica Base Station

1 Pre-Condition Inspection



SOLDIER PILES - THE BEGINNING OF THE RETAINING WALL



CRACK GAUGE ACROSS BUILDING MATERIALS



GPS TOTAL STATIONS INSTALLED ALONG THE HOLE IN THE WALL



PROXIMITY OF THE PILES TO THE FOUNDATION

THE EQUIPMENT

Vibration Monitors: Vibration is a staple when monitoring movement of soil and buildings. Eight InstanTel Micromate® seismographs were installed throughout the interior of the Hole in the Wall. They are recording 7 days a week, 6AM to 8PM. They record in Histogram Combo mode, sampling at 1024 times per second and record the peak every 10 minutes. If the vibration exceeds 0.350 in/s, a waveform event is generated and sent immediately to stakeholders.

Crack Gauges: Existing cracks on the building are typically monitored to detect change, which may be indicative of settlement. IGS chose four locations to install vibrating wire crack gauges, cabled to wireless data loggers built into the tilt meters. These are programmed to record every hour, 24 hours a day and record in millimeters.

Tilt Gauges: IGS installed eight tilt gauges, spaced evenly, along the upper area of the Hole in the Wall. The data loggers were programmed to record in degrees of rotation, as well as temperature, every hour, 24 hours a day. With cost savings in mind, IGS used tilt gauges with built-in data loggers capable of handling multiple gauges. Our selection of this equipment cut the required quantity of data loggers, power source and modems in half. It also reduced the cabling on the building, which lowers the risk of damage by operators.

GPS Total Station: An automated Leica TM-50 Total Station was used to monitor the SOE – protecting the workers and the hole in the wall structure. Using the automated Total Stations, IGS is able to replace the conventional site surveyors at a fraction of the cost and monitor 41 prisms every 30 minutes. Eight Leica GM30 GPS monitoring systems were also installed to provide continuous monitoring of multiple locations on the building. These GPS receivers stream data every second and record movement deformation in millimeters. Notifications will be sent to stakeholders if any movement recorded exceeds the threshold limit.

CONCLUSION

IGS will be on-site monitoring until the first floor and sub-grade parking garage have been completed, approximately six months. At this point there will be little, to no, impact on the adjacent structure. The success of monitoring lies in the data that the stakeholders receive. With almost instant alert notifications, the contractor is in control and can modify activities BEFORE issues arise. Our digital geotechnical instrumentation provides consistent, accurate and reliable data.