INZWA

ENVIRONMENTAL IMPACT
MONITORING SOLUTIONS

Simplifying Geotechnical Sensor Management

INZWA CLOUD

Centralized Sensor Management System

Geotechnical monitoring, simplified.

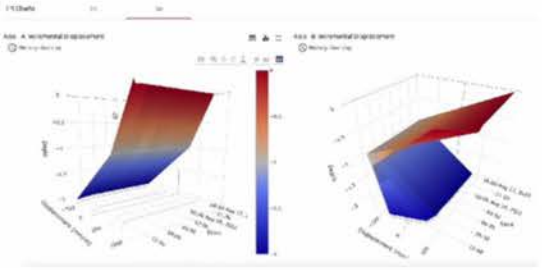
The Inzwa Cloud is an easy-to-configure, "plug & play" sensor management system that integrates seamlessly with a broad array of third-party geotechnical monitoring data loggers and sensors. It seamlessly collects and reports your sensor data, providing real-time, intuitive data visualizations for fast operational insights to help you mitigate risk and assure your project safety and compliance parameters are continuously met.

Remote IIoT data management & operational insights,
anytime, any screen, anywhere.

Four ways we make it easy for you.

All your site data at your fingertips.

Monitor with virtually any device and see your data centralized in one place, in real time, on any screen.

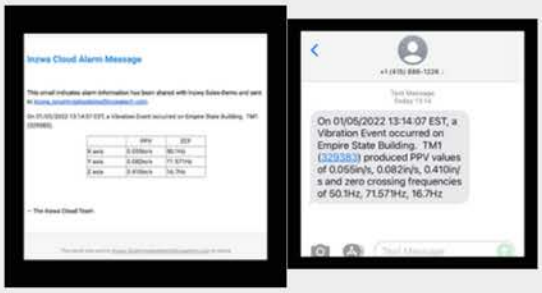


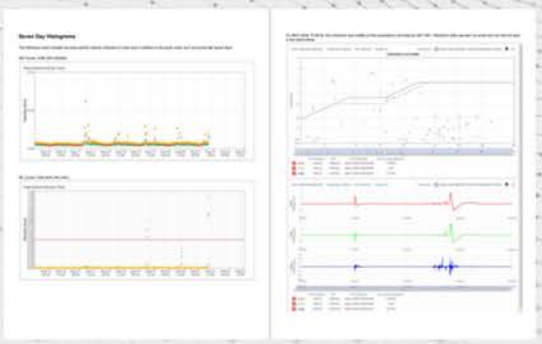
Insights at your fingertips.

Visualizations on maps, project plans, or your own uploaded images to help you make sense of complex data quickly - and make decisions with confidence.

Alerts at your fingertips.

React instantly to sensor alerts with custom alarm notifications - email, sms, or both - to you and key stakeholders.





Customized reports at your fingertips.

Use our Report Template Builder to develop customized automated summary reports quickly and easily.

Integrate with any sensor.

The Inzwa Cloud is device agnostic, so you can seamlessly integrate with all your geotechnical instrumentation - without the long configuration time and even longer learning curve of other systems.

Supported devices include many from:

- GeoKon
- Instantel
- Syscom
- Ackcio
- WorldSensing
- TopCon
- Sonitus
- B&K

Don't see yours? Just ask! We're adding devices frequently.

What our customers are saying.

"The Cloud is super convenient to access and set up. It's simpler to have just one platform. When we used our old system, we'd have to set the Micromates up in the field, then call in to check and confirm the devices were running on Thor, and then have to check if the data was sending over to Sensemetrics. None of that's necessary with the Cloud."

Raymond Yang, GeoLabs

They were WAY better looking than any reports I had reviewed in the past. It was already pre-packaged and ready to go; I didn't really have to do anything, which was great."

Michael Tinney, KUE, Inc.

Purpose-built remote management features for project peace of mind.

Project Visualization	• Project's assigned sensors displayed on Google Map or uploaded image • Table view of assigned sensors • Table view of alarm events • Latest sensor data in pop-up windows • Easy access to sensor visualization
Sensor Visualization	• Pre-built sensor dashboards for all supported types • Dashboard includes sensor alarm events • Vibration event dashboards with frequency and time domain analysis
Data Visualization Types	• Time domain data visualizations • Frequency domain visualization for vibration data • 2D and 3D inclinometer visualization • Extensometer visualization
Data Management	• Multiple input modes (FTP, HTTP, MQTT, COAP) • API for integrating data in other services • User-defined functions for mathematical combinations of sensor data
Report Functionality	• GUI-based template designer • Templates usable across multiple projects • Scheduled report generation • PDF or DOCX output formats • Comprehensive content options (visualizations, tables, alarms, etc.)
Alarm Notifications	• Email and SMS notification • Recipients managed by distribution groups
White Labelling & Localization	• Custom Domain Name • Custom Logos • Custom Transactional Emails
Supported Sensor Types	• Vibration • Sound Level Meters • Tilt Meters • Inclinometers • Extensometers • Automated Robotic Total Stations • Thermistor Strings • Crack Gauges • LVDT • Vibrating Wire • Analog Sensors (Voltage and Current) • Digital Sensors
Supported Devices	• Inzwa Veva III • Sonitas EM2030 • B&K 2240 Sound Level Meter • Aeroqual PM10 Dust Meter • Ackcio Loggers and Tiltmeters • Worldsensing Loggers • Geokon GeoNet Loggers • Instantel Micromate and Minimate • Omnidots Swarm • Syscom MR3000 and Rock

Simplified, all-inclusive pricing.

Tired of incremental platform fees or upcharges for reporting or other modules? You won't get that here.

We offer a free trial period plus straightforward, all-inclusive pricing that makes figuring out your costs so simple, you might not even need a calculator.

All-inclusive pricing includes:

- No Platform Fees
- Pre-configured Dashboards
- Automated Reporting
- Report Template Builder
- Client User Access

Hurdles, complexities, frustrations, tedium – how did chasing your dreams turn into chasing to-do lists and mundane tasks?

At Inzwa, we believe there's a better way. A way to turn time-consuming, repetitive chores into a path to greater challenges and success.

How? By making it easier to gather and report environmental data, with user-friendly devices and a platform so clear and simple, you don't have to be an engineer to use it. The result? Limits are lifted, you get time and bandwidth back, which means you get more time to focus on bigger, more meaningful challenges.

This is our pledge to you: No more headaches. We guarantee it.

Lose the limitations. Call us today.

For more information or to schedule a demo, please contact us:
(844) 44-INZWA
sales@inzwatech.com
www.inzwa.io

Inzwa Technologies, 200 W. Butler Ave. Unit 3111, Philadelphia, PA 19002

Veva III 3-in-1 Monitor

Vibration, Tilt & Sound Sensor

Integrated with Inzwa Cloud platform & includes cellular service.

Microphone sold separately

Vibration Specifications:	
Accuracy	± 5%
Acceleration Ranges	± 2, 4, 8 G
Output Modes	Peak Particle Velocity Vibration Dose Value Vibration Total Value Analysis One-Third Octave (VC-C)
Measurement Axes	3
Max. Velocity Range	4.9in/s (125 mm/s) @100Hz
Sample Rates	1, 2 and 4 kHz
Frequency Response	1 - 1000 Hz
Timestamp Resolution	1.0 ms
Alert Threshold Range	0.04 to 24.4 in/s (1 to 620 mm/s)

Tilt Specifications (license optional):	
Euler Angles	Pitch ±90°, Roll ±90°
Resolution	0.0035°
Accuracy	±0.005°
Data Outputs	Baseline, Instantaneous & Differential Angle
Alert Thresholds	0.5° to 70.0°
Temperature Stability	+/-.005° (-45° to 85°C)
Stabilization Time	10 secs
Reading Interval	10 sec to 12 hours

Technical Data (con't.)

Sound Level Specifications (microphone required):	
Type	IEC61672 Class 1
Weightings	A, C, and Z
Sample Rate	48 kHz
Frequency Response	20 Hz - 20 kHz
Distortion	2.2% at 115dB SPL
Equalization	Flat, 10 Hz to 20 kHz
Signal to Noise (dB)	64.5dbA
Acoustic Overload	120db
Response Standard	Fast (125s), Slow (1s), Impulse (35ms rise/1.5sec fall)

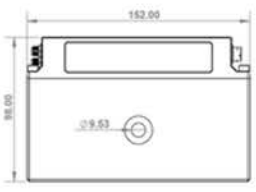
Communications	
Cellular	4G LTE M1/NB1/EGPRS, GPS
WiFi	802.11 b/g, 2.4 GHz
Protocols	FTP, M2M/SMS, MQTT, NTP, HTTP

Power and Environmental:	
Battery	4 x D-cell Li-SOCl2
Battery Capacity	52Ah
Battery Life	Up to 6 months, depending on configuration and environmental factors.
External Power	5V D.C. via USB, 2A USB adapter required.
Solar/Bus Power	7 - 18V D.C. Optional cable required.
Operating Temperature	-40°F to +185°F (-40°C to +85°C)

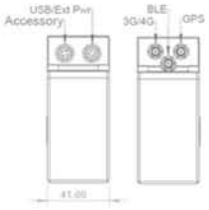
Physical:	
Enclosure	Aluminum, IP67 rated
Dimensions	6.0in. x 1.6in. x 3.9in. (152mm x 41mm x 98mm)
Weight	2.5lbs. (1.15kg) w/4 D-cell batteries
Mounting	3/8 in. (M10) through-hole
Connectors	RP-SMA Female Antenna (Cellular/Wifi, GPS, BLE) 6-pin LEMO (USB) 4-pin LEMO (Auxiliary)

General:	
Data Storage	512Mb Micro SD Card, expandable to 2Gb
Data Buffer	1 Mb
Clock	Network Time Sync, NTP
Data Output Format	CSV, JSON
Firmware Updates	Remote over-the-air programming (OTAP)
Device Management	Cloud, USB terminal, BLE (future)

Specifications subject to change without notice or obligation.



INZWA
Sales@InzwaTech.com
844-44-INZWA
www.inzwa.io



INZWA VIBRATION MONITORING CASE STUDY:

NORTH SYSTEM RENEWAL PROJECT

Situation: Mitigating Risk Critical While Excavating in Residential Neighborhood

The east phase of Denver's multi-year, North System Renewal Project called for the installation of more than a mile of new, 60-inch pipeline straight through several residential neighborhoods of Wheatridge, CO. To mitigate risk and maintain positive community relations, general contractor Garney Construction turned to Kilduff Engineering to provide vibration monitoring for the length and duration of the project.

And Kilduff Engineering turned to Inzwa and their Veva III vibration monitors.

Solution: Four Inzwa Veva III Vibration monitors and a game of leapfrog

Plans required excavation of over 6,000 feet of existing residential roadway to install the pipeline, potentially affecting several hundred households. Four Inzwa Veva III devices were deployed to measure potential vibrational impact to residential structures closest to the point of excavation. As the project commenced, each device was relocated to stay abreast with the project's progress, essentially "leapfrogging" their way forward through the neighborhood.

Given their small size and fully integrated design, deployment couldn't have been easier; Kilduff staff engineer Banks Irelan didn't even need to affix the devices to the buildings.

"It was really easy," Irelan exclaimed, "I just put it down outside the house, turned it on, put a sandbag on it and let it run." This made relocating each device to the next house in line as excavation commenced simple and easy, too.

Irelan especially appreciated that the Veva III came fully integrated and activated with both the Inzwa Cloud and cellular service, requiring no additional components to be installed. The fully integrated battery also ensured that monitoring for the life of the project wouldn't be an issue, either.

Result: "It was pretty perfect"

Keeping others informed with Inzwa Cloud's automated reporting was a simple process as well. Irelan was able to generate and customize weekly automated reports for the project stakeholders within minutes. "Reporting parameters required that the addresses of each home being monitored be added to the weekly report," Irelan explained. "It took maybe 15-30 minutes to update on the Inzwa system, but the interface is really easy, so it's all good. It was pretty perfect."

"It was really easy. I just put it down outside the house, turned it on, put a sandbag on it and let it run."

Banks Irelan, KUE

For more information, please contact us at:

Sales@InzwaTech.com
844-44-INZWA
Inzwa.io

INZWA

INZWA VIBRATION MONITORING CASE STUDY:

P.A.T.H. SUBWAY EXPANSION

Situation: Vibration monitoring while tunneling in a highly urbanized area

Kilduff Underground Engineering, Inc., was hired to perform design, construction management and vibration monitoring for a new subway cross-passage tunneling project for the Port Authority Trans-Hudson (P.A.T.H.) in Jersey City, NJ.

Vibration monitoring before and during tunnel excavation was specified below grade at the existing subway platforms the tunnel would be connecting, as well as along the densely urbanized street some 60 feet overhead. Kilduff turned to Inzwa to ensure the excavation activity did not create any adverse impact to existing structures — including P.A.T.H.'s headquarters directly above the excavation site.

Solution: "Three up, one down"

Shrey Arora, lead engineer for Kilduff on this project, placed one Inzwa Veva III vibration monitor at the excavation site in close proximity to the subway platform. He placed three additional Veva III monitors at street level along the length of the tunnel site. The devices' small size and integrated, long-lived battery made them ideally-suited to these applications.

"The thing that was really attractive about Inzwa for us was that you don't have to have a power source," Shrey explained. "It has a built-in battery system, it's portable, it's light, it's small, and you don't need additional data loggers like you have to add on to other vibration monitors," he added.

Kyle Scanlan, also with Kilduff, agrees. "What I like best about it is it's lightweight, it's really easy to install and set up, it provides long-lasting battery life, especially for these projects that go on for multiple months, and it sends the monitoring data via 4G LTE directly to the website that we're managing daily. Inzwa's done a great job designing a product that can be unboxed and set up in minutes," he added.

"The biggest hurdle that we face when we're installing vibration monitoring in a densely populated area such as Jersey City is keeping the device out of the way of passersby and ensuring that theft is not an issue," Scanlan explained. "What we really like about this device specifically is that it has this 5/16" diameter cutout in the center, so all we need to do is pound a threaded bolt into the sidewalk, drop a utility box on top of it, and then mount the device inside it. It provides that peace of mind and comfort knowing that the vibration monitor isn't going to be tampered with while construction goes on," he concluded.

Inzwa's done a great job designing a product that can be unboxed and set up in minutes. Really nice job, Inzwa."

Kyle Scanlon, KUE

For more information, please contact us at:

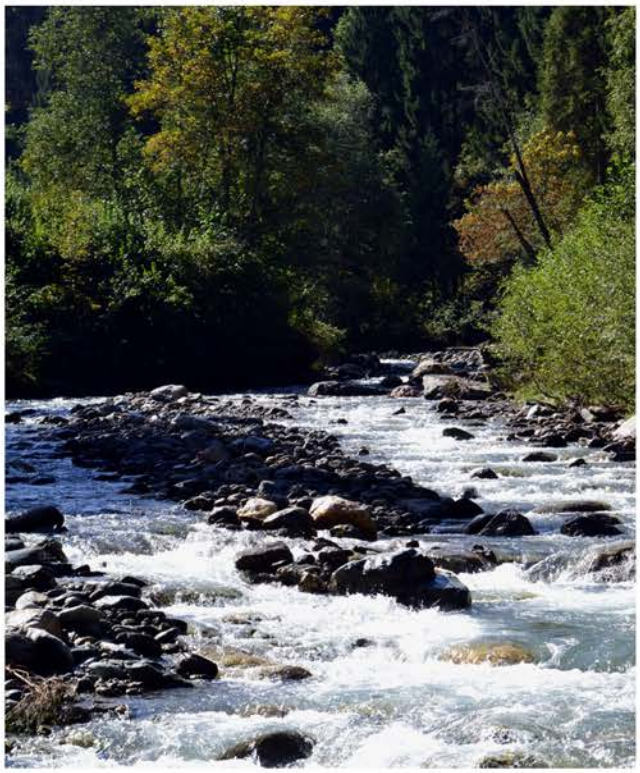
Sales@InzwaTech.com
844-44-INZWA
Inzwa.io

INZWA

INZWA VIBRATION MONITORING CASE STUDY:

REMOTE SHEET PILE DRIVING

Situation: Remote Monitoring a Must



This is going to be a challenge, Michael Tinney thought.

Tinney, Chief Engineer for Kilduff Underground Engineering of Salt Lake City, UT, was tasked with vibration monitoring at a remote construction site in Myton, UT. The project -- the installation of a new utility line running 874 feet under the Duchesne River -involved shoring with driven sheet piles and hammer boring that would come within a few feet of an existing high-pressure natural gas line. Monitoring the potential impact to this gas line from sheet pile driving and hammer boring so close by was mission critical to the project being able to move forward safely. "If we couldn't successfully monitor these vibrations, the project could grind to a halt," Tinney explained.

While the need for vibration monitoring was obvious, how to do it wasn't. The location was too remote to have monitoring staff on site at all times; access to power was a challenge; cell signal strength was poor; the gas line was below grade. Ideally, Tinney needed a compact device he could place directly on the pipe underground, that had a long battery life, flexible antenna options, and that could provide him and the project team 24/7 visibility of the data in their offices over 100 miles away.

→

Solution: Veva III Vibration Monitor & Cloud Platform

Tinney chose Inzwa's Veva III vibration monitor and Cloud platform for this project. Given its compact size and ability to auto-orient underground, he was able to place the Veva III directly on the gas line itself, ensuring the most accurate data possible. The device's flexible antenna option allowed him to attach a longer antenna to get the signal above grade. And, given the remote location's poor cell service, Inzwa worked with Tinney to reconfigure the device overnight to meet the challenging communication situation in Myton. "Inzwa was fantastic at diagnosing the problem, communicating the solution and hand-holding us to get the project started successfully," Tinney stated.

The Inzwa Veva III allows for flexible antenna solutions. Here an extended antenna was used to allow the device to be buried and still access the available cell service.

The project's parameters required that the device run continuously for the two-month installation. The Veva III's robust, fully integrated battery was up to the task. "We could essentially just switch it on and walk away," Tinney said. Plus the Inzwa Cloud's dashboard gave him 24/7 visibility of all the data in real time, including battery life and cell signal strength, at his office and home in Salt Lake City, over two hours away. "The ability to transmit the data and monitor remotely is ideal for this kind of project," he concluded.

Vibration Monitoring Results

The Inzwa system continuously monitored the pipeline's health for two months during the critical shoring and initial hammer boring phases of this project. The need for on-site visits were minimized, saving both time and expense (not to mention the hassle of repeated, five-hour round trips!). Once complete, Tinney had one more task: to retrieve the Veva III and send it to another Kilduff Engineering project in Colorado. "We have other vibration monitoring projects this is ideal for," he concluded.

> *"Inzwa was fantastic at diagnosing the problem, communicating the solution and hand-holding us to get the project started successfully."*
>
> Michael Tinney
> Chief Engineer
> Kilduff
> Engineering

For more information, please contact us at:

Sales@InzwaTech.com
844-44-INZWA
Inzwa.io

INZWA

CONSTRUCTION MONITORING SOFTWARE CASE STUDY:

REMOTE MONITORING ON LANTAU ISLAND

INZWA

Overcoming Terrain Challenges with Remote Sensor Data Management

Nicholas Cheng with Geotechnical & Concrete Engineering (GCE) knew this construction monitoring project would be a challenge.

The project called for providing preliminary site data to inform the construction design of the Tsing Yi- Lantau Link, a major new highway planned for the northeastern side of Hong Kong's Lantau Island. However, the location's steep hillsides make it some of the most rugged terrain in all of Hong Kong. Some sensor site locations that the GCE team needed to access were only accessible via helicopter; others were accessible on foot, but were both time-consuming and dangerous to access. Using traditional on-site data collection methods that required physically uploading data directly to a laptop or device were not ideal in such potentially treacherous terrain.

Inzwa Cloud's remote sensor data management platform a game changer for GCE

GCE chose to use GEOKON vibrating wire piezometers connected to data loggers to monitor the slope water level along these hillsides. The ability of Inzwa Cloud's remote sensor management platform to integrate seamlessly with these devices and transmit data reliably and remotely meant that the need for physical site visits to access and upload the data was unnecessary.

Nicholas Cheng and his team placed 13 GEOKON piezometers at strategic locations along the site, each connected to a data logger and attached to a solar panel to provide uninterrupted and continuous power. The terrain made placement challenging, but Inzwa Cloud's remote sensor data management solution made this monitoring project more efficient, economical – and safer.

→

"Some sensor sites were so inaccessible that helicopters were required to reach them," Nicholas Cheng explained. "This project would have been both time-consuming and dangerous without the data loggers integrated with Inzwa Cloud's remote sensor data management solution."

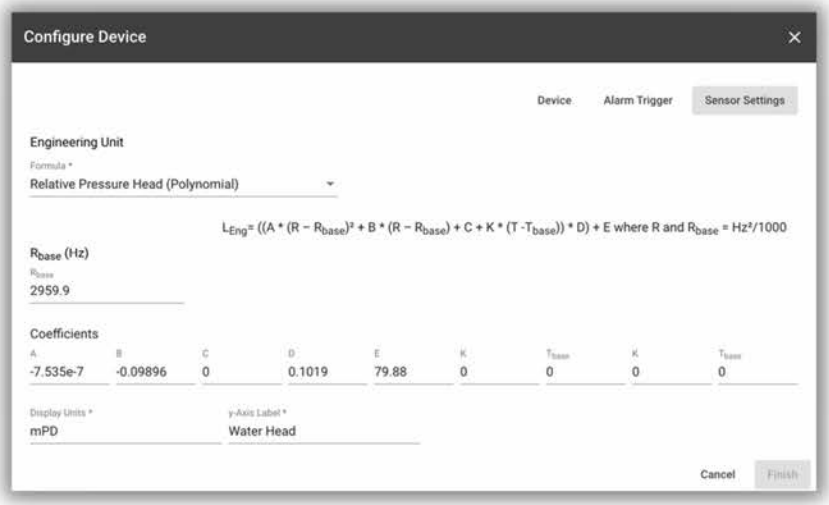
Inzwa Cloud: Customized formula created

GCE needed to monitor and report water level data. In addition, the calculation needed to include a specific variable referencing the distance from the device's location to a fixed, baseline location on Hong Kong Island. Inzwa created a customized formula for GCE to translate the water pressure data being captured into the desired water-level engineering unit by adding a secondary linear equation to the existing formula. This customization - now available to all Cloud platform users - not only allowed the remote water-pressure data to be captured and reported automatically in the desired engineering unit (with no additional manual data manipulation required), it also provided the future flexibility for nearly any device to be configured to easily provide the same. "Their customization of this formula means their platform will now cover about 90% of the devices that I would use on future projects," Nicholas Cheng said.

This project would have been both time-consuming and dangerous without data loggers integrated with Inzwa Cloud's remote sensor data management solution."

Nicholas Cheng, GCE

Result: Risk, costs and time on site minimized



The implementation of Inzwa Cloud's remote sensor data management solution revolutionized – and simplified - the construction monitoring process for GCE on this project. The platform's integration with the devices on site allowed for wireless connectivity and remote data access, eliminating the need for manual data retrieval and reducing associated risks. Seamlessly integrated, the data loggers automatically transmitted the collected data at regular intervals and in the required engineering units, ensuring immediate access to accurate and reliable readings for efficient analysis and decision making. "These systems provided a crucial solution for overcoming the dangers associated with accessing remote sensor sites," Nicholas Cheng concluded. "The ability to remotely collect and analyze data enhanced both the efficiency and safety of the monitoring process."

For more information, please contact us at:

Sales@InzwaTech.com
844-44-INZWA
Inzwa.io

INZWA

INZWA VIBRATION MONITORING CASE STUDY:

PILE DRIVING BY LAKE MICHIGAN

Situation: A Glass House Next Door

When you live on the shores of Lake Michigan, retaining walls can be serious business. And when neighbor's house is made predominantly of glass, the concern about structural damage from pile driving for a new retaining wall can be even more serious.

Alan Levine, principal of Chicago-based The Lighthouse Companies, recommended the use of vibration monitoring equipment during pile-driving to mitigate his client's risk - "and for good neighbor relations," he said.

A challenge Levine faced was poor cellular reception at the spot he needed the device to be placed. "Putting it anywhere else wouldn't give us the readings we needed," Levine said. "I needed a solution that could be placed where I needed it to be and had a flexible antenna option as well."

Solution: Inzwa Veva III vibration monitor & 50 feet of cable

Levine selected Inzwa's Veva III vibration monitoring device and CLOUD management platform for the project. The Veva III's compact size, integrated battery and cellular service and the CLOUD's user-friendly interface made it possible for Levine's team to install, configure and activate the system in a matter of minutes. However, the ability to easily replace the standard antenna with one attached to over 50 feet of coaxial cable was the key to the Veva III's success on site.

→

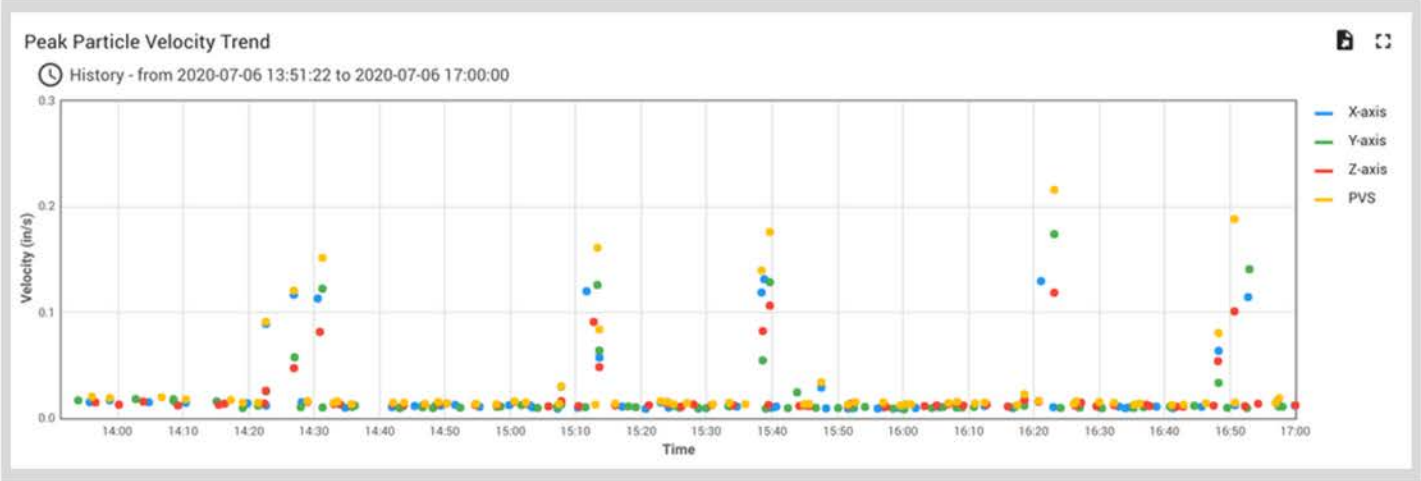
"Installing and configuring the system on the CLOUD platform was easy and fast," Levine said. "And having a flexible antenna option made the Veva III ideal for this project," he concluded. The Veva III was in place and monitoring continuously during the two-day pile driving phase of the project. Inzwa's CLOUD platform gave Levine accurate, real-time visibility of the monitor's readings from any screen he needed - desktop, tablet or smartphone.

Vibration Monitoring Results:

"I could see clear rises in vibration levels with each pile being driven," Levine said. "PPV (peak particle velocity) levels remained well below the parameters of the project, which gave us all peace of mind that the home's structural integrity was not compromised. And the data is captured for future use, should it be needed," he concluded.

"Installing and configuring the system on the CLOUD platform was easy and fast. And having a flexible antenna option made the Veva III ideal for this project."

Alan Levine
The Lighthouse Company



For more information, please contact us at:

Sales@InzwaTech.com
844-44-INZWA
Inzwa.io

INZWA TILT MONITORING CASE STUDY:

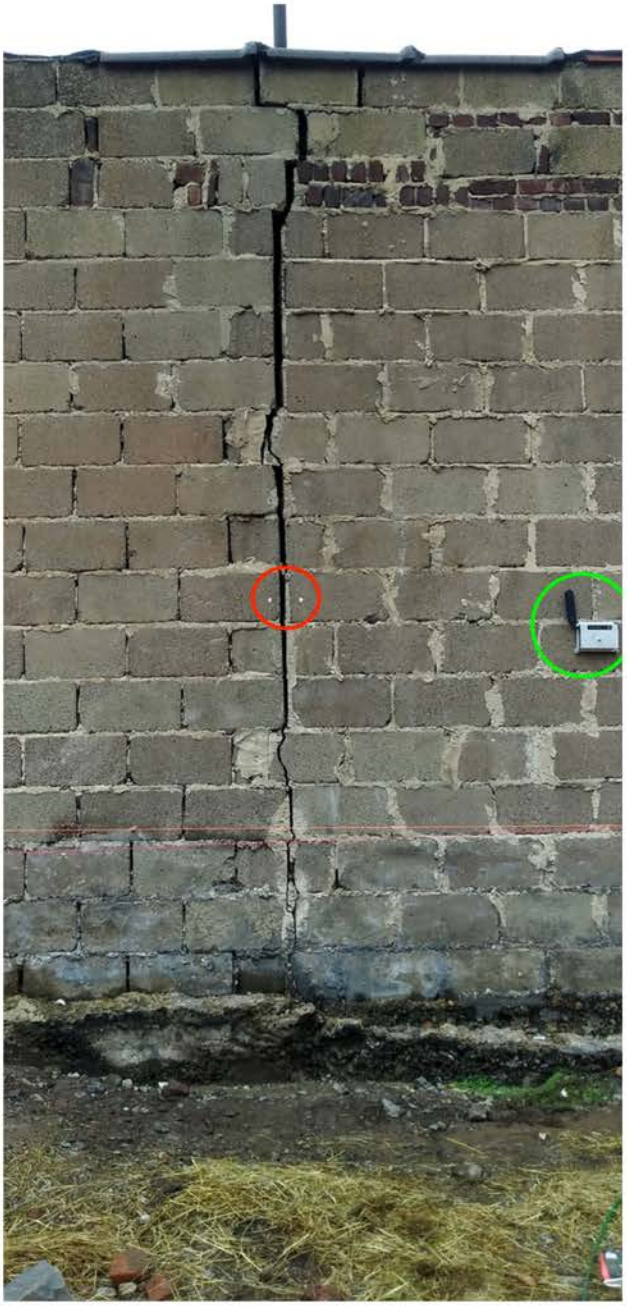
MITIGATING RISK DURING EXCAVATION

Situation: Tilt monitoring of existing structure needed during construction

SJV Construction was retained by PEEK Properties, Inc., as the supportive excavation engineer for the construction of a new apartment complex in East Orange, New Jersey. The construction site posed some unique excavation challenges:

- Plans called for excavation and construction of lot-line walls, mere feet from a 30-year-old existing building.
- This building, an original wood-frame structure with two subsequently built additions, had a large, 3/4" crack that had formed along the butt joint between the additions.
- One addition was constructed with 8" block with a return; the other was set on slab-on-grade and was unattached to the original masonry. They were both unfiled and did not meet building code requirements. Of concern was that neither the primary nor the additional masonry had the lateral stabilization typically required.

Given these challenges, SJV's engineer-of-record was concerned that additional movement would be likely to this structure during excavation due to the lack of an appropriate foundation and lateral bracing. He recommended tilt monitoring during excavation and foundation construction to provide continuous information about the movement of the structure during shoring.



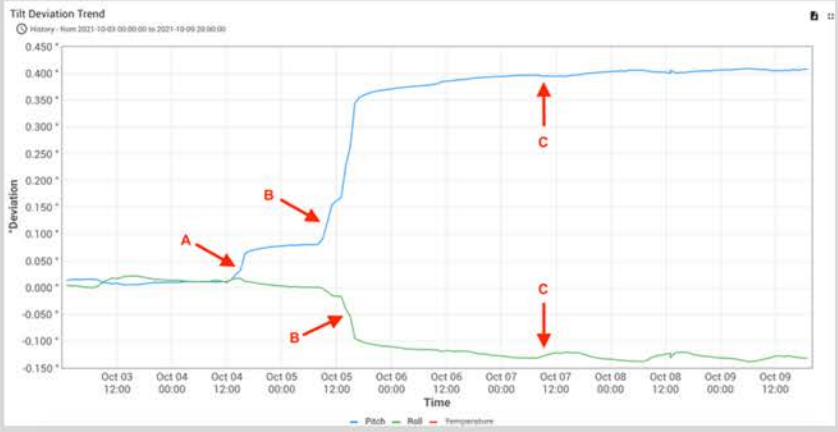
Existing structure prior to excavation. The red circle indicates reference points used for manual measurements. The green circle indicates Veva III tilt monitor placement.

→

Solution: Veva III Tilt Monitor Reveals a Buried Problem

One Veva III Tilt Monitor was placed on the addition approximately five feet above ground level and in close proximity to the crack to be monitored. Continuous tilt monitoring was provided with hourly recording 24 hours a day. The data uploaded to the Inzwa Cloud platform could be viewed by the engineer-of-record at any time and from any device.

While drilling in the rear of the addition to protect the structure, an object was struck approximately six feet below grade. This was unexpected, as soil engineering analysis previously conducted had indicated no structural elements or protrusions within 18 inches of the wall. Believing it to be a boulder, the excavation continued. However, within an hour the tilt monitor indicated rotational movement of approximately 0.04°, triggering an alert and suspension of drilling.



Rotational movement from striking first obstruction (A). More significant rotational movement, as well as some change in pitch caused by a second obstruction (B). After pile placement was changed to accommodate the newly discovered footings, no additional movement of significance occurred (C)

New test pits revealed an existing footing from a previous foundation extending beyond the lot line and into the construction site. Additional footings were also discovered the following day during drilling, triggering an alert by the Veva III and causing additional work stoppage. New measurements indicated that the wall not only rotated an additional 0.35°, its pitch changed by 0.15° as well, which was not visible to the naked eye.

Conclusion: Active Tilt Monitoring Mitigated Project Risk

The contractor mitigated the likelihood of additional movement by relocating the new piles outside the existing footings. Not only were no additional movements of the wall noted after this change - the crack reverted to its original size approximately a week after drilling concluded.

The width of the crack after rotation had occurred grew approximately 3/8", a measurement consistent with the Veva III Tilt Monitor's reading of 0.04 °.

For more information, please contact us at:

Sales@InzwaTech.com
844-44-INZWA
Inzwa.io

INZWA