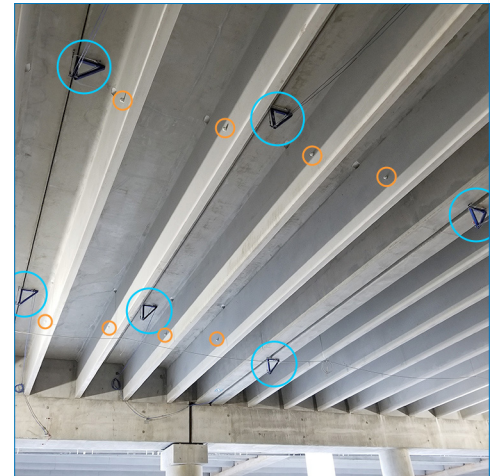




Two crackmeters connected to a GeoCloud wireless crackmeter node.



A two-axis jointmeter used to monitor vertical and horizontal movement.



Jointmeters ( blue ) and wireless tiltmeters (orange) monitoring displacements and twist.

## Crackmeters

The crackmeter consists of a displacement sensor and a set of anchors. The anchors are installed on opposite sides of the crack. The sensor is then fixed to the anchors via ball joints, which accommodate movement in other planes.

## Jointmeters

Jointmeters consist of two or more displacement sensors mounted in a frame that provides a common reference for measurements. The frame is installed on one side of the joint. One end of each sensor is fixed to the frame. The other end is fixed to an anchor in the structure.

## Applications

Typical applications include:

- Monitoring joints to provide early warning of performance problems.
- Monitoring joints and cracks in structures that could be affected by nearby construction activities.
- Monitoring cracks in structures that have experienced seismic activity.

## Data Acquisition & Processing

Signal cables from the crackmeter or jointmeter are connected to a wireless data logger or sensor interface node. These nodes obtain readings at regular intervals and transmit them offsite to GeoCloud servers for processing.

The initial reading establishes a the baseline. Subsequent readings are compared to the baseline to determine changes.

The GeoCloud server converts readings to the desired engineering unit and checks the reading against alarm thresholds.

Alerts are sent to smartphones and desktop PCs by text message or email. All readings are then used to update trendplots and planviews on the GeoCloud project website.

## Displacement Sensors

Crackmeters and jointmeters can be supplied with either vibrating wire sensors or linear potentiometers.

## Vibrating Wire Sensor

Standard Ranges: 1, 2, 4, and 6 inch.

Resolution: 0.025% FS.

Accuracy:  $\pm 0.1\%$  FS.

Linearity:  $< 0.5\%$  FS

Operation:  $-20$  to  $+80$  °C.

## Linear Potentiometer Sensor

Available ranges: 1, 2, 4, 6 inch

Resolution: 0.0015% FS.

Accuracy:  $\pm 0.15\%$  FS.

Operation:  $-40$  to  $+85$  °C.