Canary Wharf station is a railway station currently under construction on the Isle of Dogs in east London, being built as part of the Crossrail project adjacent to existing high rise buildings.

The station box, which is 256 metres long and 45 metres wide, needs to be complete for the two tunnel boring machines to break-through from the east of Canary Wharf in summer 2012. As part of the innovative design to enable construction of the station box, a cofferdam has been created to hold back the water around the worksite. This is made up of approximately 300 interlocking Giken steel and concrete piles and various supporting equipment. The largest piles supporting the dam are 38m long.

The primary structural support for the coffer dam wall consists of 160 temporary anchor piles offset in the dock with tie rods connecting the anchor piles to the Giken piled wall. This method of support allows works to commence within the drained coffer dam without the need for internal propping at the upper levels and makes ‘top-down’ construction within the cofferdam much simpler and quicker.

The initial requirement was to check the load that was ‘locked-in’ by the anchor jack and then monitor the load on the ties as excavation and dewatering progressed.

As the excavation was adjacent to more than 15 major buildings up to 45 storeys high in an area 400m by 400m, monitoring of any deflection within the cofferdam wall was required.

Instrumentation was an integral part of minimising the risks associated with such a deep and innovative construction project.

The Giken Piles are monitored using 21 inclinometers, with a further 16 inclinometers being strategically installed in corresponding anchor piles. With this data deflection plots can be produced to indicate accurately the extent of movement at specific intervals along the full depth of the piles.

The 21 vibrating wire load cells installed at key locations where the tie rods connect to the piled wall, via an automated data logging system, measured the force in the tie rods caused by the water pressure at the back of the wall while the dock is drained and excavated and allowed safe working loads to be maintained.

Canary Wharf Station - Crossrail

**Project Summary**

- **NAME:** Canary Wharf Station - Crossrail
- **YEAR:** 2010-2011
- **CLIENT:** Canary Wharf Group Plc
- **MAIN CONTRACTOR:** Laing O'Rourke's Expanded Division
- **INSTRUMENTATION SPECIALIST:** SES Ltd
- **CONSULTANT:** Ove Arup & Partners Int Ltd

**Products used**

- **VW load cells**
  Used to monitor the load on tie-back rods.

- **VW piezometers**
  Used to monitor groundwater levels and pore water pressures in and around the excavation.

- **Portable MEMS Inclinometer**
  Used to monitor lateral displacement of the Giken piles.

- **Inclinometer casing**
  Quick Jointing casing to allow measurement of lateral displacement.

- **GeoLogger**
  Automatic data logger used for a wide range of sensors and outputs.