



Crossrail - Canary Wharf Station, London, UK



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



OVERVIEW

Canary Wharf station is a railway station currently under construction as part of the Crossrail project. It is adjacent to existing high rise buildings.

The station box, which is 256m x 45m, needed to be complete when the two tunnel boring machines break-through.

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.

MONITORING

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 were 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.

PRODUCTS USED

VW Anchor Load Cells

High strength steel cylinder with 3 to 6 vibrating wire strain sensors arranged around the circumference to measure compression of cylinder under load.

VW Piezometers

Use the well-proven method of converting fluid pressures on a sensitive diaphragm into a frequency signal.

Inclinometers & Casing

Latest Bluetooth and MEMS technology provides fast and highly accurate readings of movement, displacement, deflection and stability. QJ casing is a quick connecting casing, precision extruded from ABS.

GeoLogger Datalogger

Built around the Campbell Scientific CR800 and CR1000 control modules and offers reliable remote monitoring under demanding geotechnical conditions.