

Monitoring System

Blackfriars Station Ground Movement Monitoring for Jacobs on behalf of Network Rail



Extensive Site Monitoring System

- ▶ 13 Leica total stations
- ▶ 800 survey prisms
- ▶ 20 Geokon Electro-level beams
- ▶ 14 Geokon VW strain gauges
- ▶ 20 crack/joint meters
- ▶ 10 tri-axis velocity meters
- ▶ Gas leak detection system
- ▶ 80 manual levelling points
- ▶ Local systems either wired, GSM or 3G data transfer
- ▶ All data processed into central database
- ▶ Internet based client display

Straininstall have provided an extensive monitoring system for the Blackfriars Station Redevelopment project in London, for Jacobs Engineering UK. The scheme is part of the Thameslink project to double passenger capacity on the Bedford to Brighton line. The underground part of the station has been demolished (main picture) and excavation of the site is underway (April 2010) before construction of a brand new station for both the underground and the main line railway station starts. The demolition of the surrounding structures causes the ground to move, initially heaving and eventually settling down again when new buildings have been constructed. This ground movement can cause damage to nearby listed buildings and affect the underground tunnels and railway tracks by reducing the gap (clearance) between the trains and the tunnel linings - an unsafe condition.



The mainline railway and nearby underground lines remain operational during the project. To ensure they operate safely, 10 main areas are monitored including neighbouring listed buildings, services tunnels containing power, telecoms and gas services, the station area itself, the London Underground District and Circle sub-surface tunnels and Waterloo and City deep tunnels.

The main components of the system include 13 automated Leica total stations, around 800 prisms, vibration monitoring systems, Geokon electro-level beams, displacement & crack monitoring, strain gauges and gas leak detection. The vibration systems monitor at 1000 readings/sec, with summary data presented routinely and any events exceeding preset limits recorded as separate event files.



Monitoring System

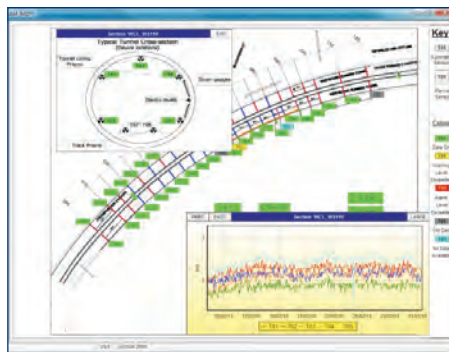
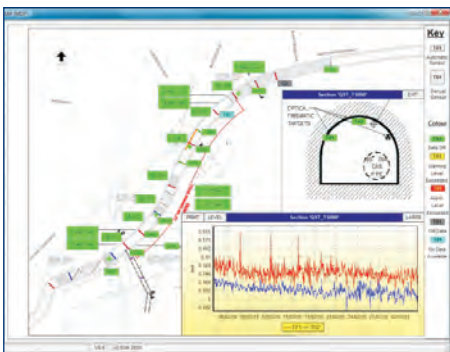
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The monitoring systems supplied by Strainstall constantly check for any such changes and will alert the project management team to any potential problems so that remedial action can be taken. 'Real-time' data is presented on a bespoke display for the client. Data is collected from the local systems either by wired landlines, GSM or 3G wireless modems. For Waterloo & City deep tunnels, due to space limitations the instruments deep in the tunnel are controlled remotely over 1km away.



The data is processed in a central database and then received by the client over the internet, with alarm e-mails and texts where required on key assets.

Manual levelling and surveying data is also added onto the system, with backup audit surveys to compliment the data where required. The new Blackfriars Station is due to open in early 2012.



Application Note: GE102

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