

Battersea Power Station

Battersea, LONDON - UK

Measurement of vibration and movement to the existing Thames Water Putney and Crouch Hill mains during sheet piling trials



Parkview, the developer of the Power Station has come up with a plan to regenerate the 38 acre site with the existing shell using its trademark chimneys to form the heart of the scheme. The now derelict structure will contain retail outlets, restaurants, cinemas, conference facilities and exhibition halls. Additionally, the surrounding site will be developed into hotels, office and residential accommodation an auditorium and a 2000 space underground car park.

Running through the North-East corner of the site are two Thames Water mains (twin 800mm GRP pipes installed within a 3.2m diameter concrete pipe) located approximately 20m below ground level. With the volumes of water flowing through these pipes, Thames Water were concerned about the proposed construction works, it was agreed that a series of trials would be held to determine the effect of different methods of sheet piling on the Thames Water structure. The trial was to consist of 5 methods of piling: a 17m ABI rig, ICE18RF, 1.5 DA, Pilemaster, Giken rig and the Giken with pre-auguring/water jetting.

Sol Data were employed to carry out the design, installation and control of the monitoring system during the trials, to comply with both the Buro Happold specification and the additional requirements of Thames Water and their consultants, GCG.

Sol Data's scope was split into two main areas; firstly, and of most importance, were the Thames Water mains. These mains were to be monitored in 'real-time' for vibration and movement at specific joints and were also to be continuously observed using CCTV video cameras.

The surface monitoring was to consist of vibration sensors installed at ground level in arrays along the line of the pipes, noise monitoring throughout the driving periods and manual surveys of ground markers in X, Y and Z.



ABOVE: Confined space installation team enter the tunnel with a tripod and fall arrestor.

BELOW: view within the tunnel showing geophone arrays



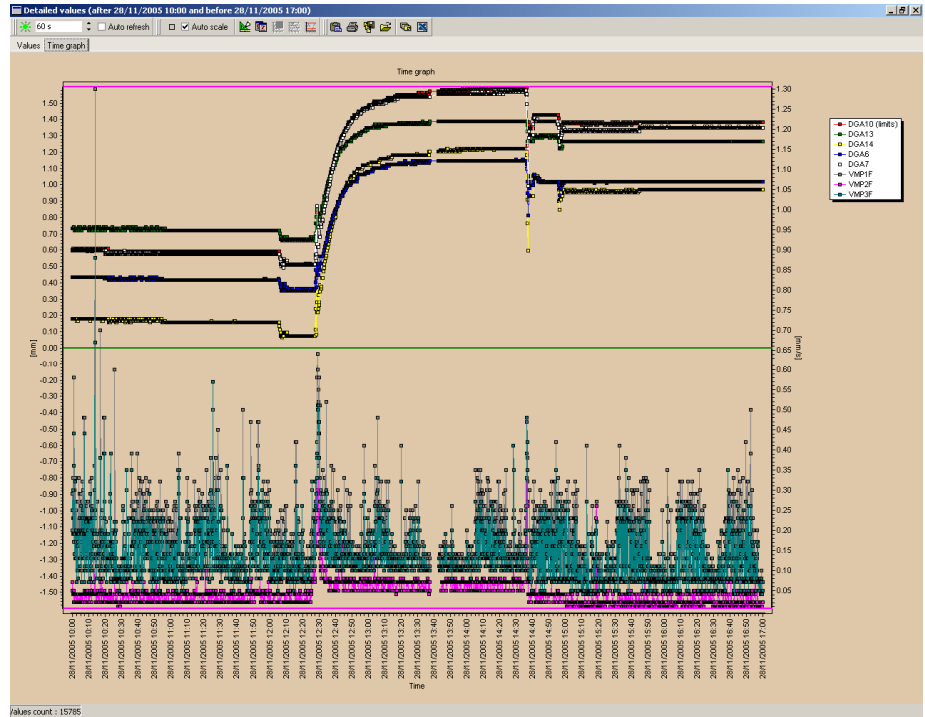


Above (From left to right): View down the tunnel showing the location of one of the CCTV LED cameras. Geophones mounted on the pre-cast concrete lining and the GRP pipes. High precision crack gauge (accurate to 0.1mm) installed over one of the GRP pipe joints.

All of the monitored instruments were to run simultaneously with very high acquisition times (every second for the geophones and every 15 seconds for the crack gauges) and the data was to be both displayed and recorded on one database.

In order to comply with these requirements, Sol Data used their Geoscope software that allowed them to provide the storage database, graphical displays and also to set predetermined trigger levels for each of the instruments. With the high number of vibration sensors required we also used another of our proprietary systems, "Gorgone". This system allows 16 tri-axial geophones to be connected and read simultaneously.

This project not only created difficulties with respect to the number of geophones to be read simultaneously, but the instruments had to be installed in a confined space, 20m below ground level and 60m away from the entry point. This meant that our installation team were required to be certified as CP 1, confined space entry and exit using a 10minute escape BA. But also required our team leaders to be CP2 qualified, confined space rescue and full BA trained. During the installation we were also requested to have an emergency rescue team on standby fully kitted out with breathing apparatus should there be any problems.



The image above is of the real-time display taken from the monitoring computer installed in the site office and shows the movements recorded during the baseline period for the crack gauges and vibration sensors mounted on the Crouch Hill main. The recorded movements on the crack gauges at the top of the graph show the instruments installed over the pipe joints.

CONSULTANT :	BURO HAPPOLD
CONTRACTOR :	DEW CONSTRUCTION LTD
PROJECT DURATION :	NOV 2005 – DEC 2005
SCOPE OF WORKS :	
Installation and commissioning of :	
<ul style="list-style-type: none"> • 18 nos. Geophones connected and monitored in real time. • 5 nos. high precision electrical resistance crack gauges. • 3 nos. CCTV cameras with real time display. • 2 nos. environmental noise monitoring kits • 6 nos. ground settlement points • Design, installation and commissioning of a fully automated, real time monitoring system with real time displays and alarms with acquisition rates of between 1 and 10 seconds. 	