London School of Hygiene & Tropical Medicine

Movement monitoring during basement construction

The below outlines the proposed strategy for the monitoring of any movement to surrounding structures during the basement construction at the development known as 15 – 17 Tavistock Place, London. WC1H 9SH. The basement is single storey (Circa 6m deep) and is to be constructed using 600mm diameter Secant piled wall construction with capping beam to the perimeter at ground level. The Secant piled wall is to be designed to only require temporary works propping at capping beam level such that the deflection levels are not exceeded as per the Basement Impact Assessment (BIA) prepared by GEA. The temporary works will be installed by the specialist groundwork contractor and inspected and signed off by the temporary works designer with a permit to load issued prior to excavation of the ground within the piled wall construction. Temporary works shall remain in place until the new basement construction is permanently braced by the construction of the new basement slab, basement to ground floor concrete walls and ground floor capping slab that props the basement in its permanent condition, with load transfer from temporary works to permanent works signed off by the basement designer with permit to load issued prior to temporary works removal. During this period, movement monitoring will be carried out as follows.

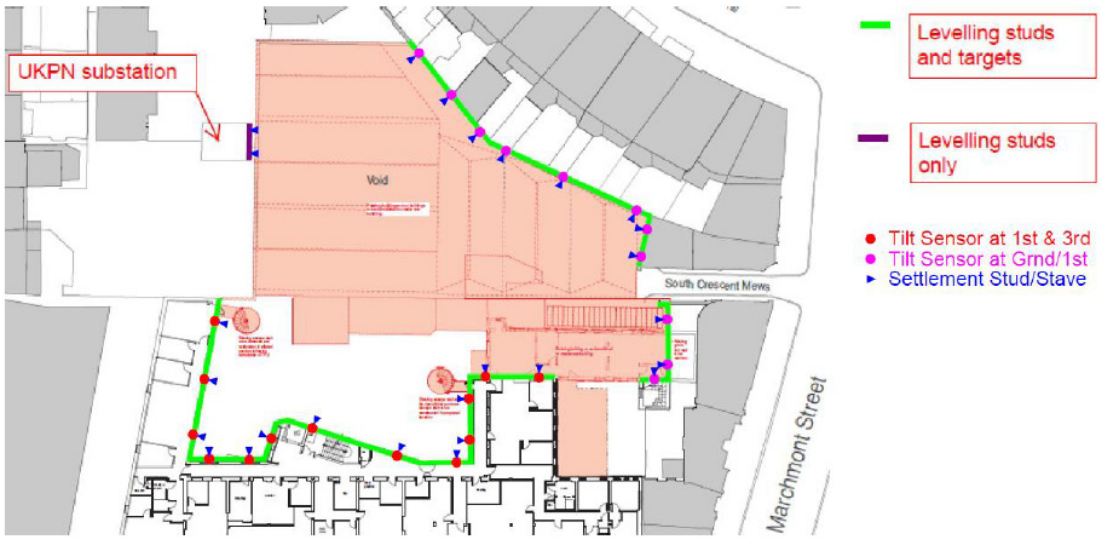

Figure 1 - Location of monitoring stations.

Structural deformation monitoring to determine the rate and direction of any movement of building facades, boundary and party walls to be retained during basement construction will be carried out. The structures shall be monitored using either reflective targets or uniaxial tilt sensors subject to sight lines with monitoring reports being prepared at specified intervals.

Reflective targets or uniaxial tilt sensors will be installed onto the structures where highlighted red and magenta on figure 1. Using the reflective targets, weekly measurement using Electronic Distance Measuring equipment (EDM) will ascertain if there is any movement against a set base line and a report prepared against trigger levels set and agreed with the Structural Engineer.

Where uniaxial tilt sensors are used, a data gateway positioned on site will transmit live real time measurement data. The approximate locations of these sensors will be recorded on site to aid analysis of the monitoring data. Monitoring reports will be provided throughout the basement construction with the monitoring system continuously recording any movement at intervals of 30 minutes. This will be streamed live to the host server with a live traffic light system set up to predefined movement threshold values for notification of any erroneous movements. These notifications would be set-up to contact relevant personnel via email.

To accompany the reflective target measurement / uniaxial tilt readings, manual settlement monitoring of the structures will be carried out. Monitoring studs and / or bar code staves will be installed on the structures where marked blue on figure 1 at ground level. These studs / staves will be observed manually using a precise levelling instrument with results referenced to datum's established away from the zone of influence, being recorded to submillimetre accuracies and presented in a spreadsheet format against baseline readings.

Monitoring will commence ahead of the basement construction works to set baseline readings, and will continue beyond the completion of the basement construction to monitor any movement post removal of any basement propping temporary works. All reports shall be prepared and submitted to the Structural Engineer for their review and comment and records maintained on site for inspection.