

Tottenham House**Picture Gallery****B45 Underpinning Structural Statement****1.0 Existing Structures**

The existing North elevation to B45 was constructed between 1835-1870 and comprises a loadbearing masonry wall with facing stonework which is believed to be bonded back to the substrate brickwork. A significant iron transfer structure is built into the middle of the elevation at the upper ground floor level, and there are 4 No. large window openings at lower ground floor level. Trial pit investigations have revealed that the corbelled masonry footings to the elevation are approx. 1300mm wide and depths vary between 1100mm and 2000mm below FFL, bearing onto clay. The masonry is generally in good condition, although investigations have revealed that there is limited bonding between the internal facing brickwork on the North elevation and the East cross wall.

The East cross wall was originally built in brick and lime mortar between 1737-1740 and features a number of historic masonry infills to door openings and niches, as well as a historic hearth. The masonry generally appears to be in good condition. Trial pit investigations have revealed that the corbelled masonry footings to the elevations are approx. 1300mm wide and 2000mm deep below FFL, bearing onto clay. The cross wall sits on a monolithic corbelled masonry foundation, with all straight joints finishing above the level of the corbels.

2.0 Structural Proposals

The proposals include the installation of an underground tunnel beneath the North elevation, and a shaft within the footprint of B45. The formation level of the tunnel is approx. 3500mm below the level of the shallowest observed footings. To allow for the tunnel to be installed without undermining the North elevation and the East cross wall, both walls will be underpinned.

Prior to underpinning, reinforced concrete elbow ties will be installed to improve the bond between the facing brickwork on the cross wall and the facade, and a movement monitoring regime will be installed. It has been assumed in the design of the permanent works that underpinning will initially be installed across the full width of the tunnel, with 2 stages of underpinning at the deepest points, and transition pins to limit the size of steps in foundation level. Dry packing will be undertaken from both sides of the walls to provide a well consolidated bearing, and dowels will be installed between adjacent underpins to allow for loads to be distributed into the bearing stratum.

Upon completion of the underpinning, it is assumed that the external tunnel will be installed, and temporary piles will be installed around the shaft perimeter to limit the excavated extents within B45. Steel needle beams will be installed to temporarily support the masonry above the tunnel before the underpinning is broken out within the tunnel width. The masonry around the needle beams will be temporarily broken out to accommodate the proposed waterproofing works and reinstated in the permanent case.

The permanent works include the installation of an in-situ RC shaft structure with shallow spread foundations. A ground beam will be installed below the shaft slab to distribute the loads from the overlying masonry into the stiff clay. The underpins and ground bearing elements have been sized such that the theoretical bearing pressures below the foundations are the same as existing. This approach has been adopted to limit the magnitude of long-term consolidation heave or settlement experienced by the existing structures.