Historic England

Conserving War Memorials

Case Study: Differential Movement of Foundations

Civilian Second World War Memorial, Abney Park Cemetery, Stoke Newington, London

Summary

This case study describes the options and chosen solution for the stabilisation of the Civilian War Memorial within Abney Park Cemetery, London. The memorial was sinking into the ground and following investigations, appropriate foundations were introduced to reinstate structural integrity.

This guidance is intended for those designing, specifying and undertaking conservation and repair work to free standing war memorials, such as architects, building surveyors, structural engineers, project managers, contractors, craftspeople, and conservators. It will also be of interest to those responsible for making decisions, such as local authority conservation officers, custodians or volunteer groups. It also indicates where to get further help and advice.

This guidance forms part of a series of resources produced by Historic England, to coincide with the centenary of the First World War. This series covers the overall approach to caring for these memorials, as well as some of the more poorly understood technical aspects. It includes:

- guidance on how to record, repair, conserve, maintain, and protect these unique monuments for future generations: *The Conservation, Repair and Management of War Memorials* and *Conservation and Management of War Memorial Landscapes*
- short technical advice notes covering inscriptions, structural problems and repairs, and maintenance
- case studies on conservation options for specific war memorial issues
- films on technical aspects of war memorial conservation

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HistoricEngland.org.uk/advice/technical-advice/war-memorials/

Front cover:
Civilian War Memorial, Abney Park, Stoke Newington, London. The base of the memorial had become unlevel and the panels bearing the names had developed a lean. ©C Loewe

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1 Description and Condition

The project was to repair the Grade-II listed Civilian War Memorial in Abney Park Cemetery, Stoke Newington, London. The memorial was erected in 1948 in memory of 122 civilians who lost their lives through enemy action at seven locations in Stoke Newington; they are buried separately elsewhere within the cemetery.

Description

The memorial comprises four Portland stone panels which have leaded inscriptions of the names. To the front is a low wall marking out two planters, with three shallow steps and a stone urn at the centre. It covers a 4.5m-long x 2.1m-wide footprint.

Condition

In 2013, the structural engineers survey found the memorial had moved. It was found to have shifted uniformly on its base across its diagonal with a net variation in level of approximately 250mm. The monument was leaning back by an angle of approximately 5° from vertical. Although located in a cemetery, it was understood that there were no burials beneath the monument.

The shift was identified as being due to the differential movement of the foundations. The underlying clay subsoil undergoes seasonal shrinkage and swelling which was made worse by the proximity of the trees surrounding the memorial.

1 The memorial is constructed on clay soil and was closely surrounded by trees and bushes.

2 Remedial Options

Do nothing

If the memorial was left in its current state, the risk was that the movement would continue to the point of causing collapse. The consequence of this would be possible damage to the masonry, loss of historic fabric, and loss of the commemorative function of the memorial.

Traditional mass concrete foundations

This option would require excavating to below the depth of desiccated soil, and casting mass concrete footings. Excavation would be needed to a depth of greater than 1m, although the actual depth would only be known once work had started on site. The large volume of concrete required would add a weight significantly greater than the masonry structure above, and some initial construction settlement would be likely.

Raft foundation

The cemetery management wanted to install planters, so a conventional raft foundation was not practical: it would have separated the planters from the ground below, creating problems for planting, watering and maintenance.

Ground beams

Ground beams beneath the structural elements were also considered. These would serve to spread movement, producing the same benefits as a raft foundation, but with the bonus of not having to construct beneath the planters. This option had another benefit over a raft foundation: should the adjacent trees be removed in the future, the vulnerability to heave would be reduced due to the smaller area taken up by the ground beams.

Ground beams combined with ground anchors

This option combines the benefits of avoiding constructing beneath the planters, while still spreading the load. A further benefit is that the ground anchors could resist uplift forces resulting from ground heave.

3 Solution

From the options described, the chosen solution was the use of ground beams combined with ground anchors. The ground beams were designed to span between the ground anchors, so that should shrinkage of the soil occur the memorial would not move. Similarly, if heave occurred the ground beams would transfer this uplift load to the ground anchor positions, where the tension load would be transferred into the subsoil below the desiccated level.

Construction

When excavation works started on site, it was found that the subsoil was clay (as anticipated). The existing foundations were found to be reinforced concrete of similar dimensions to the proposed ground beams. It was also found that a vault had collapsed in the vicinity of the memorial, which would have contributed significantly to the settlement.

With this additional information, the ground anchors were revised to proprietary micropiles. The benefit of this was the load could to be transferred to a depth of 4m greater than what could be achieved by ground anchors. This depth was required because of the discovery of the collapsed vault nearby.

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2 Lifting the main inscription panel required specialist equipment which could operate in confined spaces.

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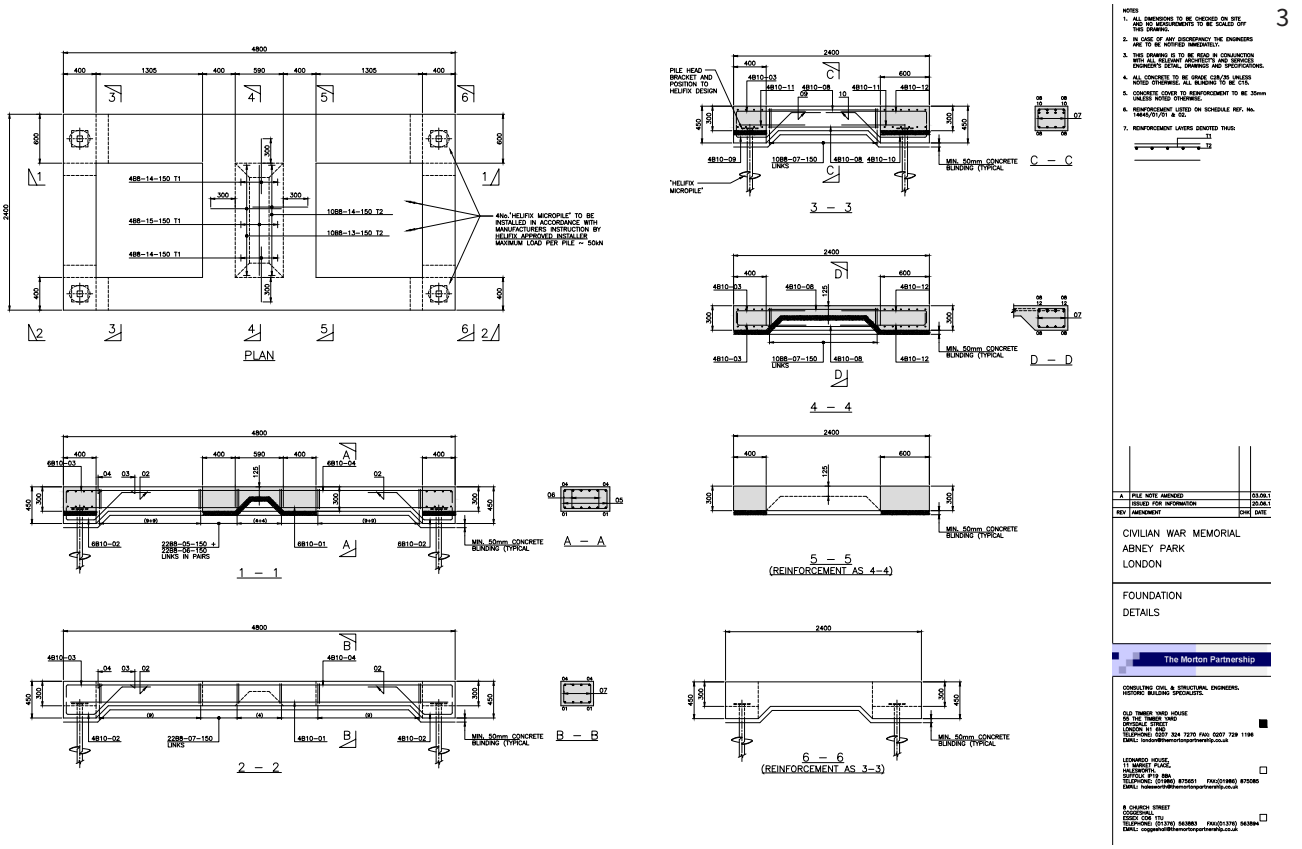

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3 Structural engineers' drawings showing details of the new foundations for the memorial.

4 Shuttering and steel reinforcement ready to receive the concrete.

4 Lessons Learnt

Post-project reflections are useful for learning what could be done differently in the future. The nature of conservation often means that unforeseen dilemmas and situations arise and even the best planned projects require flexibility and adaptation to resolve them to produce appropriate outcomes.

The structural engineer's advice was taken on board at the beginning of the project in the design phase. However, before the start of the construction phase, no ground investigation was undertaken to ascertain depth of existing foundation, subsoil type or depth of desiccation of the soil. This was a risk to the project. But in this case it was calculated the cost of such opening up and initial investigations would have been over half the final value of the works undertaken. To mitigate for this, the structural engineer was fully involved with the contractors in the construction phase and so was quickly able to modify the design with the new information about the site revealed by the initial groundworks.

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5 The war memorial after structural work was completed.

5 Acknowledgements

Project Team

Client: Timeline

Architect: Matthew Lloyd Architects

Engineer: The Morton Partnership

Principal Contractor: London Stone Conservation

Groundworks Contractor: Charterbuild

Total Construction Costs: £10,090 with grant of £7,567.50 from War Memorials Trust

Images

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