DYWIDAG Permanent Multistrand Ties for the new Wembley Stadium

Reference Details:

Owner National Stadium Ltd., London, England +++ **Main Contractor** Multiplex, Sydney, Australia +++ **Sub Contractor for Retaining Walls and Ties** T McGee & Co., London, England +++ **Engineer (Retaining Walls and Ties)** Arnold Burgess Partnership, New Ash Green, England

DSI Units DSI UK, Southam, England **DSI Services** Supply of 364 DYWIDAG Strand-Anchors from 1,200 up to 4,500kN; Rental of stressing equipment and technical support

The new Wembley Stadium, Wembley, England

The new Wembley Stadium, currently being built on the old site of the "Twin Towers" stadium, will feature a 90,000 seating capacity. Demolition of the old Twin Towers stadium started in 2002, with completion of the new stadium planned for 2006.

The site of Wembley Stadium is on a gradual slope, with a difference between levels of approximately 20m. The solution proposed to raise the ground level on the lower side (north-east and south-east quadrants), was a series of concrete retaining walls, tied back to cast insitu deadmen using DYWIDAG Permanent Multistrand Ties.

The retaining walls were supported on rows of contiguous piles, with ties placed at four different levels on the face of the walls, tying back to deadmen.

The installation sequence for the ties was to cast the reinforced concrete deadmen within open trenches dug in the London Clay. A shallow trench was then excavated and levelled for the tie, between the concrete deadman and the external retaining wall. The tie was then laid in the levelled trench using a DYWIDAG Spooling Wheel, with bearing plates and head assemblies connected to both the dead-ends and live-ends, and then stressed to an alignment load only. Following stressing, the tie was then grouted and the trench backfilled.

The Ties:

The multistrand ties were fabricated at DYWIDAG-Systems International Ltd, Southam manufacturing facility,using state of the art strand handling and coiling systems.

A range of DYWIDAG Permanent Multistrand Ties were supplied with capacities from 1200 kN to 4500 kN. All ties featured double corrosion protection in accordance with BS 8081, comprising of individually greased and sheathed Ø15.2mm Dyform Strands all enclosed within a common external corrugated plastic sleeve.

The head detail for both the dead-end and live-end of each tie, comprised of an epoxy painted steel bearing plate with a steel transition tube welded to the underside. At the nose of each transition tube a steel splay collar was fitted, to control the splay of the strands into the larger diameter head blocks. The ties were terminated at each end using the standard head block wedge detail,all enclosed within a greased steel protection cap.

Installation of the coiled ties:

Some of the ties were over 48m in length, weighing 1200 kg. The system employed for installation of the ties utilised a DYWIDAG Spooling wheel. The spooling wheel comprised of a large wheel (flange diameter = 2.6 m) with an expandable internal hub, to accommodate the different coiled tie lengths. One of the flanges was removable, to enable a new coiled tie to be added.

The spooling wheel, with a coiled tie loaded on to its hub, was then picked up (in the vertical plane) using a DYWIDAG lifting frame suspended from a tracked excavator, and carried to the correct site location. The tie was then positioned over the levelled trench and the dead-end of the tie anchored into the concrete deadman. With the tie securely anchored,the excavator then tracked along the trench carrying the spooling wheel and unwinding the tie in a straight line. The unwinding speed of the tie was carefully controlled through the use of a manual brake on the DYWIDAG Lifting Frame.

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