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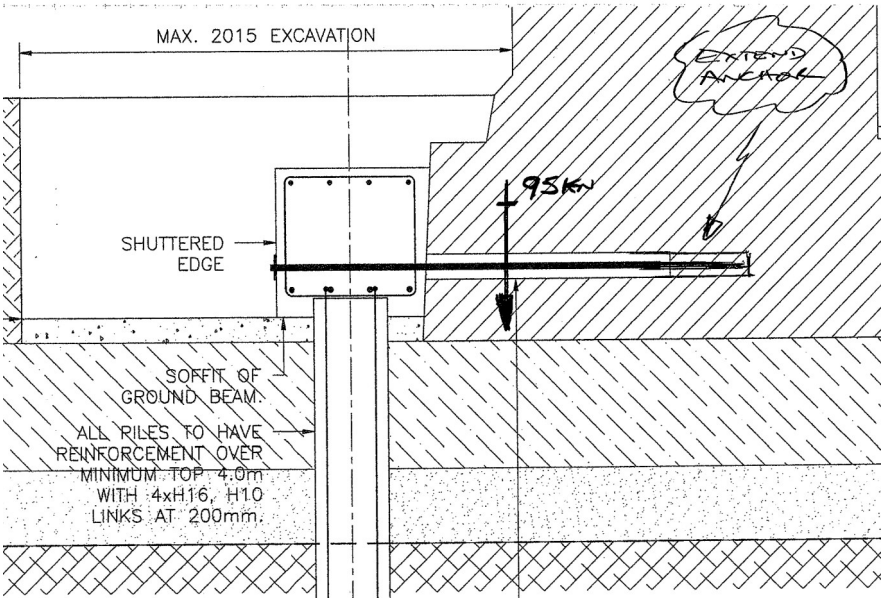
Ground beams and the underpinning at North Tuddenham Church - Load transfer anchors

This imposing church consists of a 14th century pinnacled and battlemented west tower with chequered flushwork on its buttresses, an exceptionally wide aisleless nave, a two storey north porch and a chancel.

The Morton Partnership consulting engineers investigated movement and settlement of the tower and arrived at a scheme to underpin and support the foundations with piles installed externally.

To transfer the shear loads from the existing foundations to the piles a design was prepared for ground beams to be cast around the perimeter of the tower spanning the pile caps. The design then incorporated Cintec anchors installed horizontally into the foundations of the tower with extensions then cast into the new ground beams.

North Tuddenham Church



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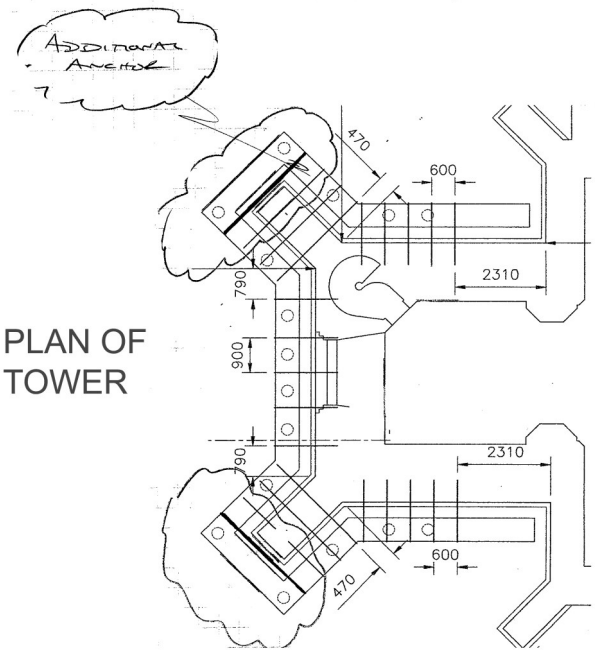
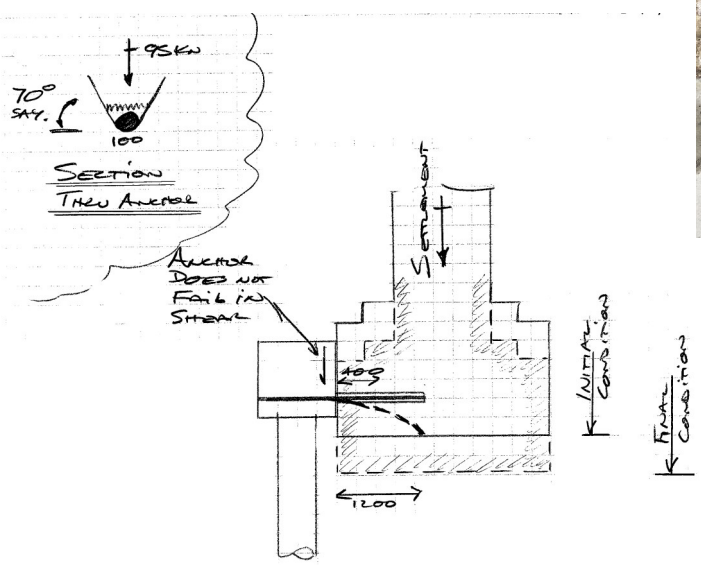


PLAN OF TOWER



Inside the base of the tower there was little cracking, and so there seemed to be a situation where the buttresses were sinking and possibly the west edge of the west wall. It was not absolute as to how much movement was caused by the west wall moving in itself, and how much was simply the effects of the weight of the buttresses upon it. On this basis, the idea was to pick up the full weight of the buttresses with the piles, ground beams and Cintec needles.

24mm diameter stainless steel Cintec anchors in 100mm diamond core drilled holes were set at 600mm horizontal centres into the side of the flint/mortar foundation. These would effectively transfer the 95kN shear load to the piles.

Once installed and grouted these anchors had couplers fitted and extended bare bars left to be concreted into the new ground beams connecting the pile caps.