

Hard / Hard Secant Wall

Eastney Pumping Station, Portsmouth

United Kingdom



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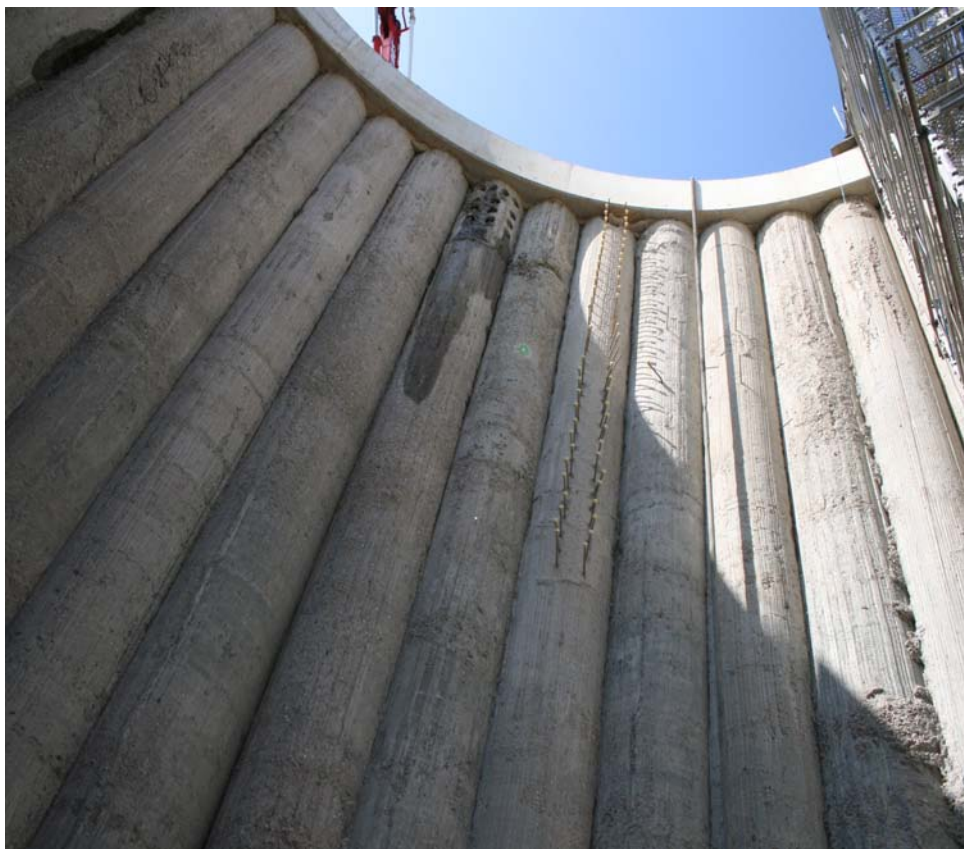
Introduction

This new underground pumping station situated on the eastern end of Bransbury Park next to the existing one will improve safety, security and response time to Portsmouth during storm conditions. It will provide the best means of managing storm water flows and will offer vital support and back up to the original pumping station.

On completion the pumping station shaft was covered and grassed over, ensuring there is no visible structure above the ground in the park.

Bachy Soletanche Ltd. was employed by the main contractors 4D (a United Utilities/Costain/ MWH J.V. company).

The project required the construction of a circular shaft, excavated to 18.0m depth, connected to a side chamber, rectangular in shape, excavated to 14.5m depth. This side chamber intercepted the line of the existing sewer.



CLIENT:	Southern Water
MAIN CONTRACTOR:	4D (a U.U. Costain MWH J.V.)
CONSULTING ENGINEER:	Halcrow
DURATION OF WORKS:	21 weeks

WORK QUANTITIES

Hard/Hard Secant Piled Shaft 17m diameter and Chamber 9m x 8.5m, 21m deep
75 number piles, 1200mm diameter, 21m long
10 number piles, 1200mm diameter, 8.5m long



Ground Profile

The piles were constructed through 3.5 metres of made ground, 16.0 metres of sandy clay and approximately two metres of silty sand.

Prior to piling dewatering wells to lower the water table. These were required for the later excavation, base construction and for connection works around the existing sewer.

Secant Piling Works

The chosen solution was a self supporting circular shaft for the main structure with the side chamber requiring temporary and permanent propping.

A hard/hard secant wall was the technique best suited, which required the use of a BG28/36 rig with a high torque converter.

All piles were 1200mm diameter with full length segmental casings to improve verticality. A total of 85 number piles were installed, with 75 number of these being 21 metres deep, and 10 approximately 8.5 metres deep. Shorter piles were installed over the line of the existing sewer and stopped short of the final excavation level.

The capping beam was used to help prop the short piles, combined with 2 rows of steel beams. The breakouts between the two chambers were supported by reinforced concrete frames cast in-situ onto the face of the secant piles, following bulk excavation.

This design was complicated by the need to allow for the differing excavation levels and the short piles that were installed above the sewer. Due to this, in addition to standard design methods, 3D finite element analyses were used to confirm the solution.

