

Hard / Hard Secant Wall

CTRL 250 Ripple Road to Barking

ESSEX, UK



Ventilation shaft for underground railway

Introduction

The Channel Tunnel Rail Link is being built by London & Continental Railways Ltd. It will be Britain's first major new railway for over a century - a high speed line running for 109km between St Pancras station in London and the Channel Tunnel.

The Site

The site is located between the A13 and a main electrified commuter rail line at Barking in Essex.

An ellipsoidal hard/hard secant wall was designed by the Main Contractor to form the access shaft for two ventilation tunnels to be driven to both the up and down lines of the new underground section of the Channel Tunnel Rail Link to St.Pancras in Central London.

Ground Profile

The ground consisted of up to 2 metres of made ground overlying 3 metres of alluvial deposits, and very dense sand and gravel.

London Clay was encountered at 8 metres below ground level and continued to the pile toe level all of 20 metres below ground level.



Internal view of shaft from base

CLIENT: Union Railways (North) Ltd

MAIN CONTRACTOR: Nuttall / Wayss & Freytag / Kier Joint Venture

CONSULTING ENGINEER: Rail Link Engineering

DURATION OF WORKS: September to December 2001

WORKS QUANTITIES

1200mm Secant (Fully Cased)	64 No	20m	12No. Reinforced
1050mm Bearing Piles	11 No	20m	Fully Reinforced



Contract Works

Because of the close proximity to the overhead electrified rail line running through Barking and Dagenham, piles closest to the line had to be constructed entirely without the aid of the service crane.

Strict control was maintained to ensure that all the works complied with regulations laid down by Railtrack. An inspector from Railtrack was present throughout the entire duration of the works.

The piling rig as it had a “fixed mast” was allowed to add and remove segmental casings by attaching them to the rotary table. Cage installation and concreting were carried out using the service line of the rig. The service crane, which was fitted with automatic slew restrictors, could only slew until the jib was parallel to the line.

A total of 64No 1200 diameter secant piles 20 metres deep were constructed to form an elliptical ventilation shaft.

Piles were bored using an HT55 hydraulic rotary piling rig mounted on a Casagrande C60 crane.



Guide wall construction for piling

A Leibherr 845 hydraulic crane was used to service the works.

Segmental casing were installed to full depth to ensure the verticality tolerances required of 1:200. Casings were extracted using an hydraulic casing extractor. Plan tolerances of $\pm 25\text{mm}$ were achieved by constructing guide walls prior to commencing the works.

The design called for only 12 of the piles to be reinforced, three either side of the two tunnel eyes.

Instrumentation

Inclinometer access tubes were installed in three of the piles to enable the client to monitor wall movement during shaft excavation which extended to within some 400mm of pile toe level.

Variations

An additional 11 No 1050 diameter bearing piles were awarded during the main works for the shaft Head House foundations.



General site view