150 HOLBORN STRUCTURAL REPORT

DAH REAL ESTATES SARL

APRIL 2016

DARPLUS

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Clarke | Nicholls | Marcel

CIVIL & STRUCTURAL ENGINEERS

150 Holborn

Structural description for Planning report

March 2016

Revision	Reason	Date	By	Checked
DRAFT	Comment	18/11/2015	I Jackson	MBP
Rev 01	Planning Issue	03/03/2016	I Jackson	MBP

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1.0 Introduction

Clark Nicholls Marcel have developed a structural scheme for the commercial redevelopment of the site bounded by Holborn, Gray's Inn Road, Brooke Street and Fox Court. The current site is located on the north side of Holborn (A40), to the East of its junction with Gray's Inn Road (A5200), with the southern part of the London Borough of Camden, London EC1. The site is approximately 1km north of Blackfairs Bridge and the River Thames.

Clarke Nichols Marcel have been involved with 150 Holborn for some considerable time having assisted the buildings previous owners with design options for various schemes ranging from minimal alteration and rooftop extensions, through major refurbishment options to demolition and rebuild as a new development. CNM therefore have extensive bespoke knowledge of the existing building, its construction and environs, and have within its possession archive material of the original structural data and drawings of superstructure, foundations, basement and piling obstructions. CNM also have acquired a considerable amount of data on below ground infrastructure including all statutory services information entering or crossing the site, but also and importantly unique features such as the London Underground Tunnels and the deep tunnel construction of the 'Cold War' nuclear bunkers which run directly below the pavement adjacent 150 Holborn.

2.0 Site background

2.1. Existing structure and ground constrains:

The existing building is 6 storey in-situ concrete frame with 275mm thick slab. The structure is founded on piles and it has one story basement level. The basement slab varies in levels and it was designed to span between the ground beams and pile caps. An in-situ concrete retaining wall around the building connects the basement and ground floor slabs.

The London Underground Central line and Kingsway Telephone Exchange are below the Holborn road adjacent to the building. Clarke Nicholls Marcel is currently talking with TFL and is planning to submit Ground Movement Report once the Site Investigation is completed, to prove that demolition and construction works will not adversely affect the underground assets.

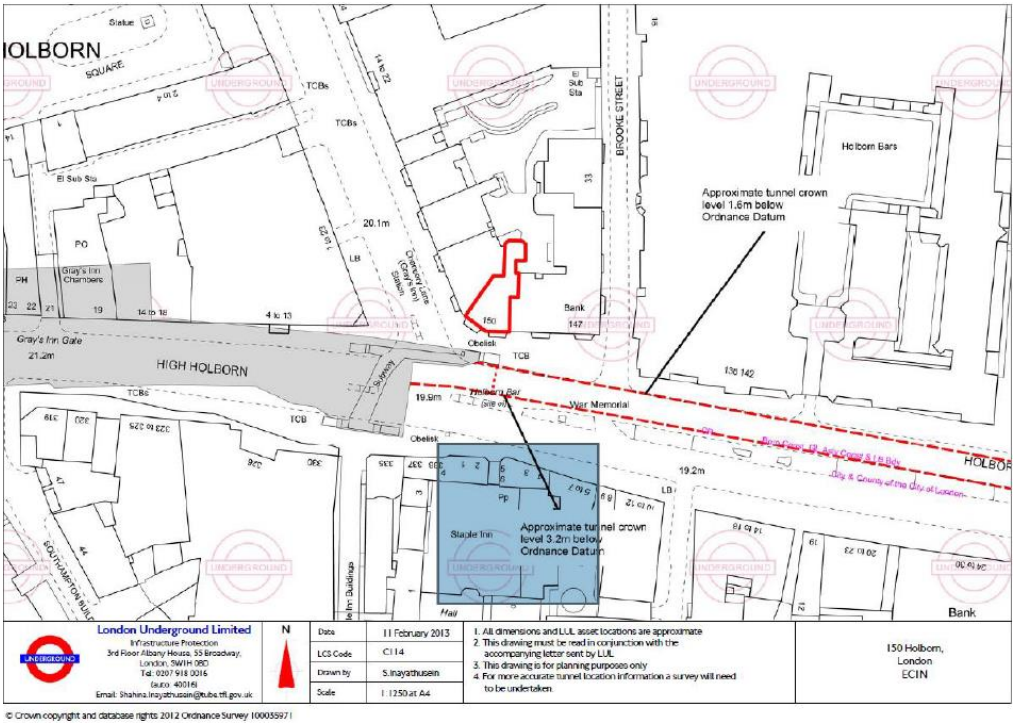


Fig 1: Location of London Underground in relation to the site

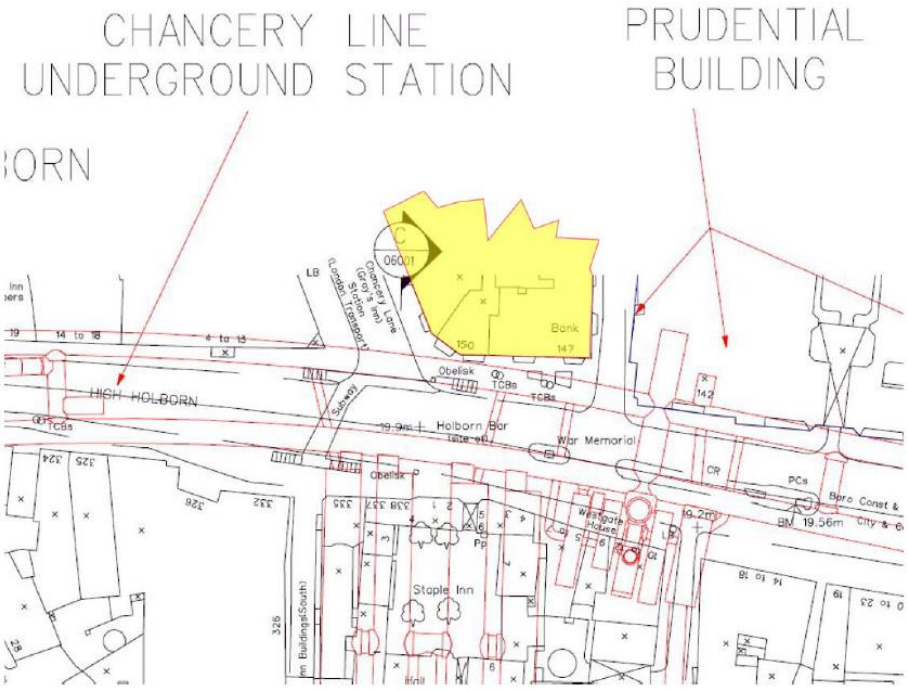


Fig 2. Kingsway Telephone exchange

2.2. Site and Ground Investigation:

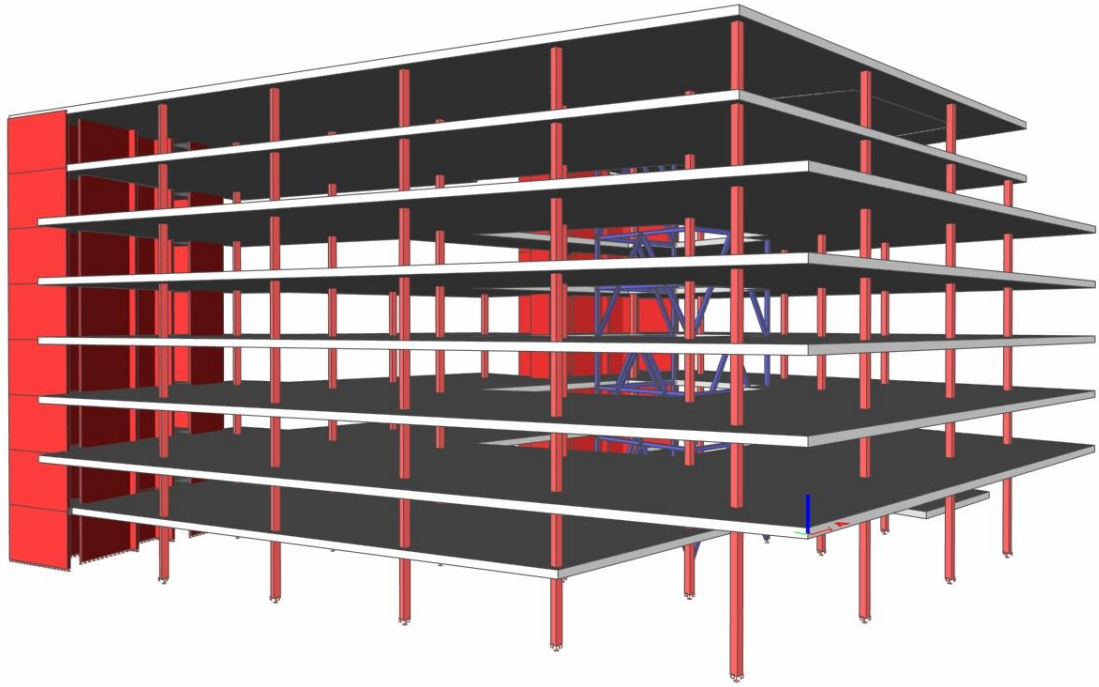
The Site and Ground Investigation is currently being carried out by RPS and its due to be completed at the end of April 2016. Previous Site and Ground Investigation was carried out in May 2013 as a result of refurbishment intention.

The previous Site Investigation results show the site to be underline by Made ground between 0.42-2.35m; Hackney Gravel was encountered at depths between 3.20-5.10m below the basement floor, covering the London Clay formation which was encountered at depths of 11-20m. The main ground was noted to have rare fragments of brick and plastic sheet fragments but no evidence of hydrocarbon contamination or asbestos containing materials. Ground water was encountered at 1.00m depth.

3.0 Structural overview

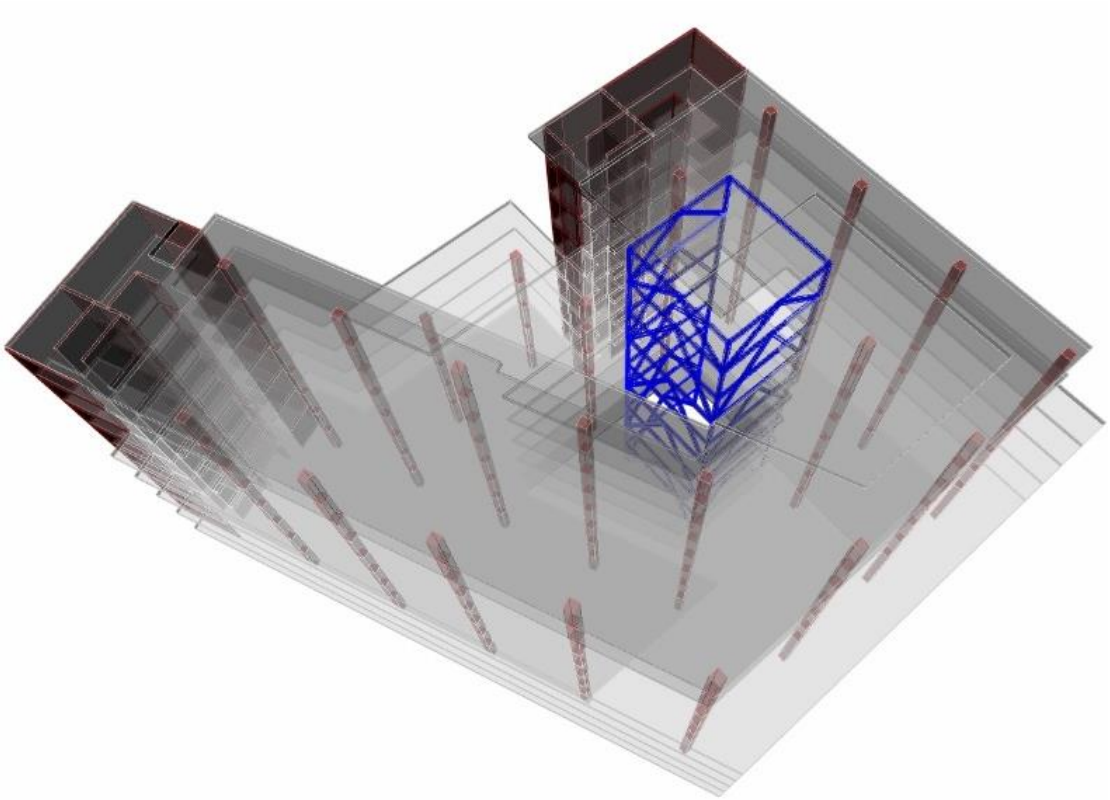
3.1. Introduction:

Several structural systems have been considered through the course of schematic design. Each system has been evaluated with the respect to the project brief, architectural design intent, program and cost.



3.2. Engineering response to the architectural concept:

The engineering design is based on the architectural intention to have large open space throughout the building in order to maximise office and retail space, edge cantilevers supporting glazed/stone façade, visually appealing atrium with incorporated staircases and glazed skylight above. The design will also include inner bridges, atrium glass braced lifts, double height entrance area, terraces, landscape roof and roof top pavilion.

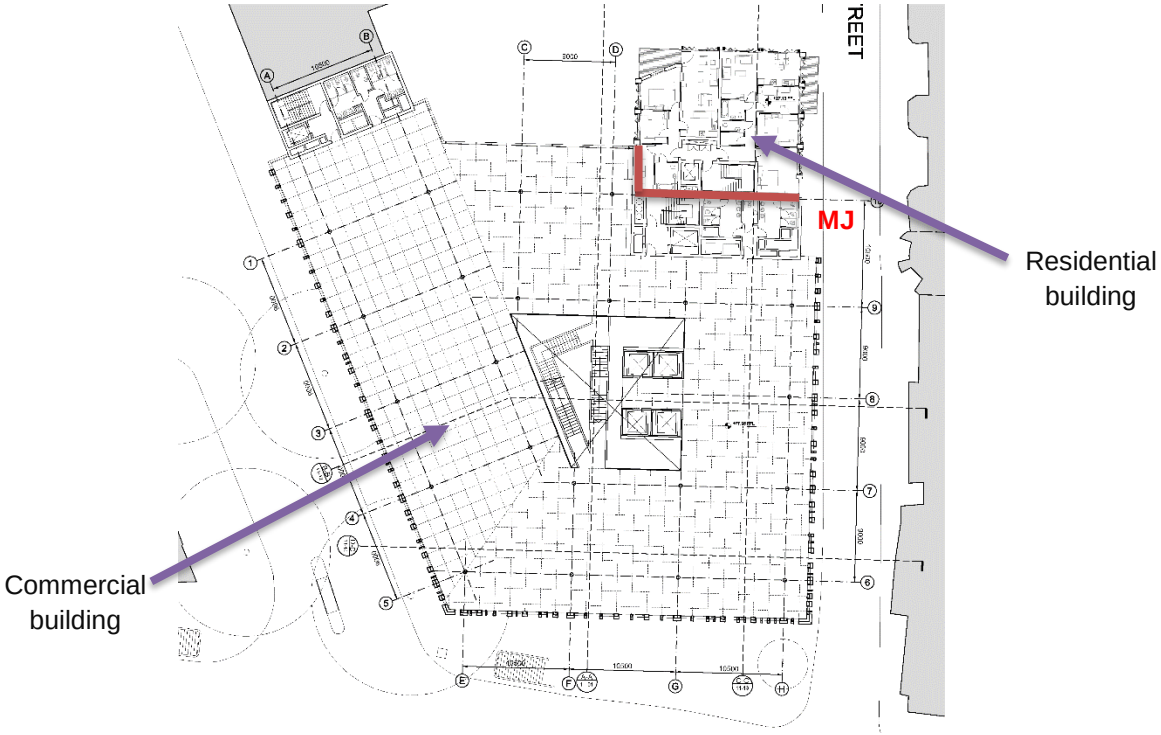


3.3. Superstructure framing:

The development consists of two structural independent buildings:

a) Commercial and office building

b) Residential building

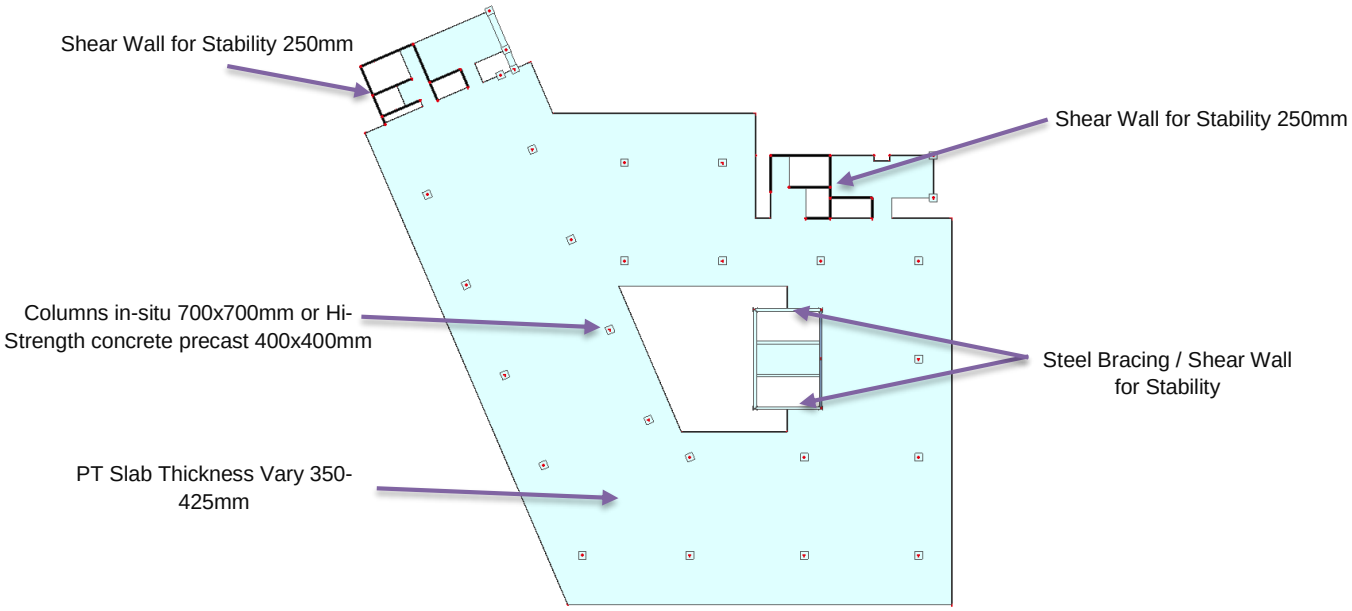


The two buildings are separated by movement joint on GL10. They will have separate stability system and will move independently.

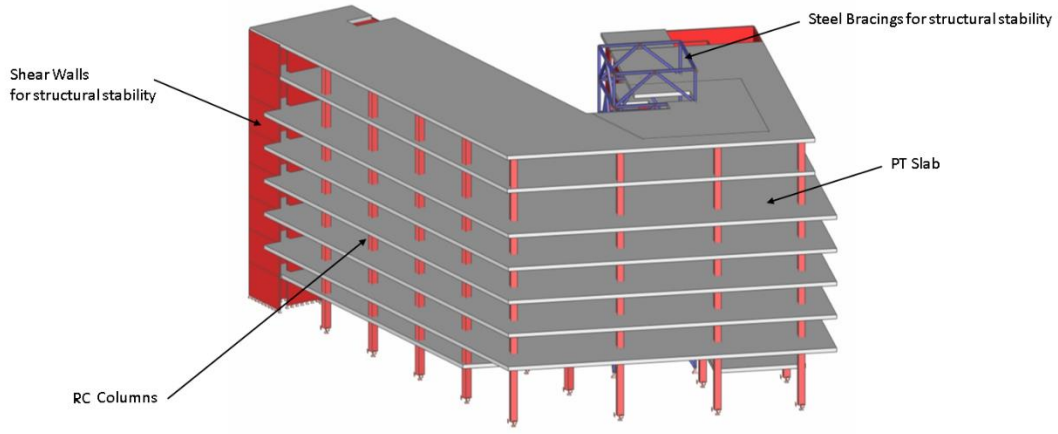
a) Commercial and office building

3.3.1 Structural framing:

The main building is proposed to be an RC structure that consists of 8 levels, one basement level and roof skylight that covers atrium and sloped part of the building. The RC columns are spaced at 10.5 and 9 m throughout the building and therefore a post tensioned (PT) slab will be used to support the large floor spans. 350mm/425mm deep PT slab also supports 3m/4.5m edge cantilevers along the building and atrium perimeter. The cantilevers will carry the floor loads as well as façade load and will act as staircase support at the central atrium.



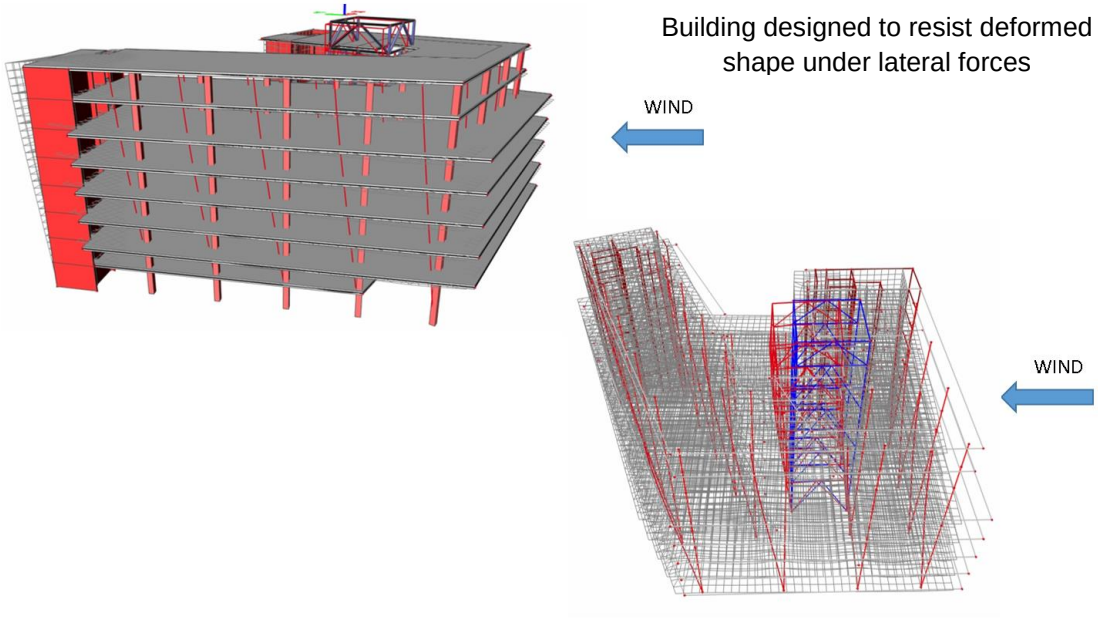
Main Structural Elements



There will be number of internal features such as atrium staircases, small floor bridges and slab openings to fulfil functional and aesthetic intention. The atrium staircases will be designed as steel trusses spanning from one level to another and they will be supported of the slab cantilevers. Inner bridges will be either steel or concrete structures with architectural finishes such as glass or solid panels.
The atrium skylight will be steel structure with glazed panels supported of the main structure.

3.3.2 Stability:

Vertical loading of the building is taken by the floor slabs and transferred into columns and walls. The force is thereafter taken down to and supported by new bored pile foundation.
Lateral Stability of the main building is provided by two concrete cores at the north side and steel braced core at the central atrium.
-Lateral stability in east-west direction is achieved by double height steel bracings along east-west lift shaft walls and shear walls at the north side of building.
-Lateral stability in north-south direction is taken by two shear walls cores at the north side of the building.



b) Residential building

3.3.3 Structural framing:

Residential building is proposed to be an RC structure that consist of 6 levels and one basement level. The traditional RC slab will be supported off RC columns and walls. The residential block will be supported by new bored pile foundation.

3.3.4 Stability

Similar to the main building, vertical force is taken by the RC flat slab and transferred to the columns and walls and taken down to the pile foundation.
Lateral stability is taken by the shear walls around central staircase and risers.

3.4. Basement and foundation:

The form of basement and foundation design takes into account the site boundary line, existing basement walls, existing piles layout and close proximity to London underground and BT Telephone exchange below ground tunnels

3.4.1 Basement walls

The existing basement wall will likely be used as temporary support to the rear of the footpaths during construction. The new basement wall will replace the existing structure and will be designed to take lateral earth pressure as well as vertical loading from the building ground floor and footpath area.

3.4.2 Basement slab

The existing basement slab will be largely demolished as the existing piles and pile caps are cut down below ground level and new piles and piles caps constructed. It has been proposed that new basement slab is constructed and monolithically connected with new basement walls.

3.4.3 Foundation

The new building will have piled foundations. The new pile arrangement is coordinated with the existing pile layout, as the existing piles remain in the ground. A number of new pile caps are designed for eccentric loading as they bridge over the existing piles. Pile caps will be connected with ground beams to balance forces across the piles.
Preliminary foundation design indicates that piles will be 35m long, which will be confirmed once the site investigation reports are completed.