

Macquarie

**Sydney Metro Martin Place  
integrated station development**

**South Tower, SSD DA Stage 2:  
Structural Statement**

CSWSMP-MAC-SMS-ST-REP-999903

Revision 01 | 23 August 2018

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Arup  
Arup Pty Ltd ABN 18 000 966 165



**Arup**  
Level 10 201 Kent Street  
PO Box 76 Millers Point  
Sydney 2000  
Australia  
[www.arup.com](http://www.arup.com)

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# 1 Introduction

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This report supports a State Significant Development (SSD) Development Application (DA) (SSD DA) submitted to the Minister for Planning (Minister) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on behalf of Macquarie Corporate Holdings Pty Limited (Macquarie), who is seeking to create a world class transport and employment precinct at Martin Place, Sydney.

The SSD DA seeks approval for the detailed design and construction of the **South Site Over Station Development (OSD)**, located above and integrated with Metro Martin Place station (part of the NSW Government's approved Sydney Metro project). The southern entrance to Metro Martin Place station and the South Site OSD above are located at 39-49 Martin Place.

This application follows:

- Approval granted by the Minister for a Concept Proposal (otherwise known as a Stage 1 SSDA) for two OSD commercial towers above the northern (North Site) and southern (South Site) entrances of Metro Martin Place station (SSD 17\_8351). The approved Concept Proposal establishes building envelopes, land uses, Gross Floor Areas (GFA) and Design Guidelines with which the detailed design (otherwise known as a Stage 2 SSDA) must be consistent.
- Gazettal of site specific amendments to the Sydney Local Environmental Plan (LEP) 2012 (Planning Proposal reference: PP\_2017\_SYDNE\_007\_00) permitting greater building height (over a portion of the South Site) and additional floor space (over both the North and South Sites).

Lodged concurrently with this SSD DA, is a Stage 1 Amending SSD DA to the Concept Proposal (Stage 1 Amending DA), which seeks approval for an amended concept for the Metro Martin Place Precinct (the Precinct), aligning the approved South Site building envelope with the new planning controls secured for the Precinct.

To ensure consistency, the Stage 1 Amending DA must be determined prior to the determination of the subject Stage 2 SSD DA for the South Site.

This application does not seek approval for elements of the Metro Martin Place Precinct which relate to the Sydney Metro City and Southwest project, which is subject to a separate Critical State Significant Infrastructure (CSSI) approval. These include:

- Demolition of buildings on the North Site and South Site;

- Construction of rail infrastructure, including station platforms and concourse areas;
- Ground level public domain works; and
- Station related elements in the podium of the South Tower.

However, this application does seek approval for OSD areas in the approved Metro Martin Place station structure, above and below ground level, which are classified as SSD as they relate principally to the OSD. These components are within the Sydney Metro CSSI approved station building that will contain some OSD elements not already approved by the CSSI Approval. Those elements include the end of trip facilities, office entries, office space and retail areas, along with other office/retail plant and back of house requirements that are associated with the proposed OSD and not the rail infrastructure.

This report outlines the structural and geotechnical philosophy for the project and demonstrates how the Over Station Development (OSD) will integrate structurally with the Sydney Metro Martin Place Station Infrastructure.

## Context

The New South Wales (NSW) Government is implementing Sydney's Rail Future (Transport for NSW, 2012), a plan to transform and modernise Sydney's rail network so that it can grow with the city's population and meet the needs of customers in the future.

Sydney Metro is a new standalone rail network identified in Sydney's Rail Future. The Sydney Metro network consists of Sydney Metro Northwest (Stage 1) and Sydney Metro City and Southwest (Stage 2).

Stage 2 of Sydney Metro entails the construction and operation of a new metro rail line from Chatswood, under Sydney Harbour through Sydney's CBD to Sydenham and onto Bankstown through the conversion of the existing line to metro standards. The project also involves the delivery of seven (7) new metro stations, including Martin Place.

This step-change piece of public transport infrastructure once complete will have the capacity for 30 trains an hour (one every two minutes) through the CBD in each direction catering for an extra 100,000 customers per hour across the Sydney CBD rail lines.

On 9 January 2017 the Minister approved the Stage 2 (Chatswood to Sydenham) Sydney Metro application lodged by Transport for NSW (TfNSW) as a Critical State Significant Infrastructure (CSSI) project (reference SSI 15\_7400). Work is well underway under this approval, including demolition of buildings at Martin Place.

The OSD development is subject to separate applications to be lodged under the relevant provisions of the EP&A Act. One approval is being sought for the South Site – this application – and one for the North Site via a separate application.

## Site Description

The Metro Martin Place Precinct project relates to the following properties (refer to Figure 1):

- 50 Martin Place, 9 – 19 Elizabeth Street, 8 – 12 Castlereagh Street, 5 Elizabeth Street, 7 Elizabeth Street, and 55 Hunter Street (North Site);
- 39 – 49 Martin Place (South Site); and
- Martin Place (that part bound by Elizabeth Street and Castlereagh Street).

This application relates **only to the South Site**, being the land at 39-49 Martin Place (refer to Figure 1).

The North Site is the subject of a Stage 2 SSD DA.



Figure 1: Aerial Photo of the North and South Site of the Metro Martin Place Precinct

## Background

## Sydney Metro Stage 2 Approval (SSI 15\_7400)

The Sydney Metro CSSI Approval approves the demolition of existing buildings at Martin Place, excavation and construction of the new station (above and below ground) along with construction of below and above ground structural and other components of the future OSD, although the fit-out and use of such areas are the subject of separate development approval processes.

On 22 March 2018, the Minister approved Modification 3 to the Sydney Metro CSSI Approval. This enabled the inclusion of Macquarie-owned land at 50 Martin Place and 9-19 Elizabeth Street within Metro Martin Place station, and other associated changes (including retention of the opening to the existing MLC pedestrian link).

## Concept Proposal (SSD 17\_8351)

On 22 March 2018, the Minister approved a Concept Proposal (SSD 17\_8351) relating to Metro Martin Place Precinct. The Concept Proposal establishes the planning and development framework through which to assess the detailed Stage 2 SSD DAs.

Specifically, the Concept Proposal encompassed:

- Building envelopes for OSD towers on the North Site and South Site comprising:
  - 40+ storey building on the North Site
  - 28+ storey building on the South Site (see Figure 2)
  - Concept details to integrate the North Site with the existing and retained 50 Martin Place building (the former Government Savings Bank of NSW)
- Predominantly commercial land uses on both sites, comprising office, business and retail premises
- A maximum total GFA of 125,437m<sup>2</sup> across both sites
- Design Guidelines to guide the built form and design of the future development
- A framework for achieving design excellence
- Strategies for utilities and services provision, managing drainage and flooding, and achieving ecological sustainable development
- Conceptual OSD areas in the approved Metro Martin Place Metro station structure, above and below ground level<sup>1</sup>

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<sup>1</sup> Refers to those components within the Metro CSSI approved station envelope that will contain some OSD elements not approved in the CSSI consent. Those elements include the end of trip facilities, office entries, office space and retail areas, along with other office/retail plant and back of house requirements that are associated with the proposed OSD and not the rail infrastructure.



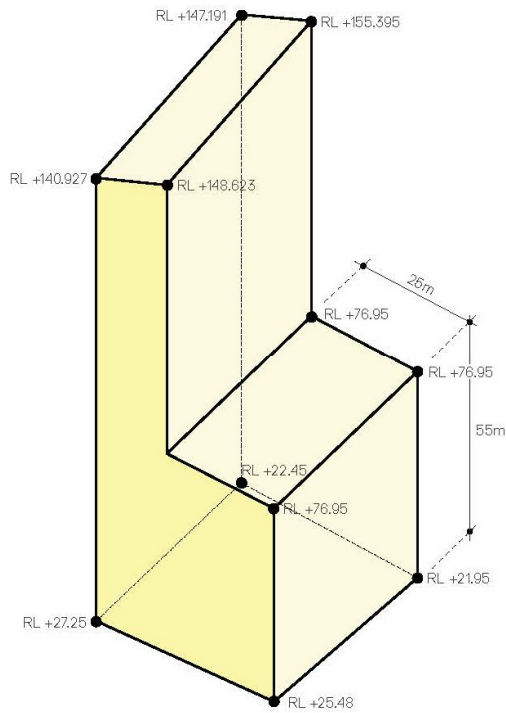
Figure 2: North Site and South Site Approved OSD Building Envelopes

Planning Proposal (PP\_2017\_SYDNE\_007\_00) - Amendment to Sydney LEP 2012

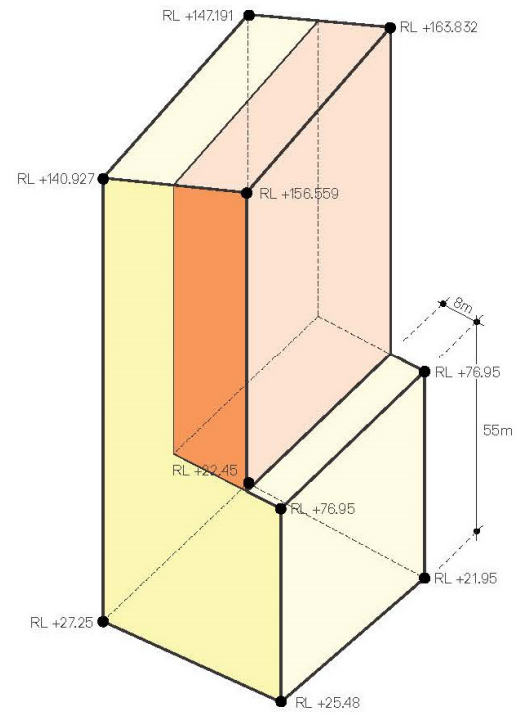
The Planning Proposal (PP\_2017\_SYDNE\_007\_00) sought to amend the development standards applying to the Metro Martin Place Precinct through the inclusion of a site-specific provision in the Sydney LEP 2012. This site-specific provision reduced the portion of the **South Site** that was subject to a 55 metre height limit from 25 metres from the boundary to Martin Place, to 8 metres, and applies the Hyde Park North Sun Access Plane to the remainder of the South Site, forming the height limit of the tower. It also permits a revised FSR of 22:1 on the South Site and 18.5:1 on the North Site. These amendments were gazetted within Sydney LEP 2012 (Amendment No. 46) on 8 June 2018 and reflect the new planning controls applying to the Precinct.

The Concept Proposal was prepared and determined prior to the site specific Sydney LEP 2012 amendment (PP\_2017\_SYDNE\_007\_00) being gazetted and was developed based on the height development standards that applied to the South Site at the time. As a result, the Concept Proposal allows for a tower on the South Site that is now inconsistent with the building envelope envisaged through the amendment to the Sydney LEP 2012. Accordingly, a Stage 1 Amending SSD DA to the Concept Proposal (Stage 1 Amending DA) has been lodged concurrently with this subject Stage 2 SSD DA, which seeks to align the approved Concept Proposal building envelope for the South Site with the revised site specific development standards applying under the Sydney LEP 2012, being increased FSR and building height. This Stage 1 Amending DA seeks to amend

the planning and development framework established under the approved Concept Proposal that is used to assess this Stage 2 SSD DA. The Stage 1 Amending DA is to be assessed concurrently with, and determined prior to the subject Stage 2 SSD DA, with the amended South Site building envelope setting the broad development parameters for the South Site (see Figure 3 below).



*Approved South Site OSD Envelope*



*Proposed Amended South Site OSD Envelope (aligning with site specific amendment to Sydney LEP 2012)*

Figure 3: Relationship between the approved and proposed amended South Site building envelope

## Overview of the Proposed Development

The subject application seeks approval for the detailed design, construction and operation of the South Tower. The proposal has been designed as a fully integrated station and OSD project that intends to be built and delivered as one development, in-time for the opening of Sydney Metro City and Southwest in 2024. The application seeks consent for the following:

- The design, construction and operation of a new 28 storey commercial OSD tower (plus rooftop plant) within the approved building envelope for the South Site, including office space and retail tenancies.
- Vehicle loading within the basement levels.
- Extension and augmentation of physical infrastructure / utilities as required.
- Detailed design and delivery of 'interface areas' within both the approved station and Concept Proposal envelope that contain OSD-exclusive elements, such as office entries, office space and retail areas not associated with the rail infrastructure.

## Planning Approvals Strategy

The *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD) identifies development which is declared to be State Significant. Under Schedule 1 and Clause 19(2) of SEPP SRD, development within a railway corridor or associated with railway infrastructure that has a capital investment value of more than \$30 million and involves commercial premises is declared to be State Significant Development (SSD) for the purposes of the EP&A Act.

The proposed development (involving commercial development that is both located within a rail corridor and associated with rail infrastructure) is therefore SSD.

Pursuant to Section 4.22 of the EP&A Act a Concept DA may be made setting out concept proposals for the development of a site (including setting out detailed proposals for the first stage of development), and for which detailed proposals for the site are to be the subject of subsequent DAs. This SSD DA represents a detailed proposal and follows the approval of a Concept Proposal on the site under Section 4.22 of the EP&A Act.

Figure 4 below is a diagrammatic representation of the suite of key planning applications undertaken or proposed by Macquarie and their relationship to the subject application (the subject of this report).

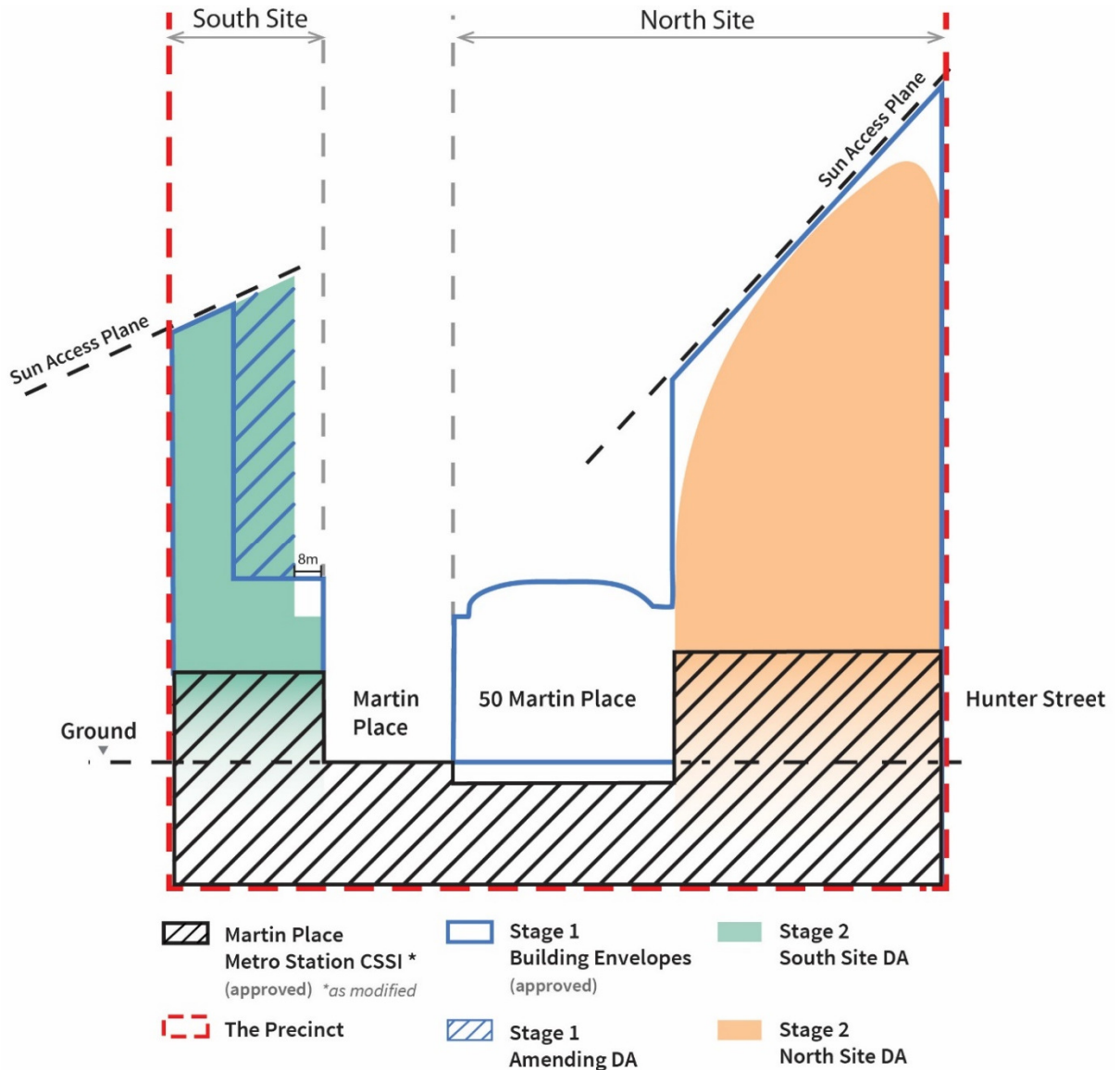


Figure 4: Relationship of key planning applications to the Stage 2 South Site DA (this application)

The Department of Planning and Environment have provided Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statement for the proposed development. This report has been prepared having regard to the SEARs as follows:

The EIS shall:

- Show how the proposed over station development (OSD) will integrate in design terms and structurally with the Sydney Metro station infrastructure, and identify any specific requirements of the CSSI 7400 approval that has influenced the design of the OSD.

The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the EP&A Regulation 2000. Provide these as part of the EIS rather than as separate documents.

In addition, the EIS must include the following:

- Structural Statement

## 2 Structural Philosophy

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The structural philosophy of the project is developed around the requirements of the transport authorities for the station development and the requirements of Macquarie for the retail and commercial office tower components of the buildings. Whilst the development is integrated in terms of architecture and functionality the definition of the station elements as CSSI as distinct from the OSD elements as SSD will mean differences in a number of aspects of the design and design criteria.

This report is prepared to support the Stage 2 SSDA application for the South Tower, however some references are made to the Metro Martin Place station below in order to provide context as the structural solution is integrated.

### 2.1 Excavation

The South Tower and Southern Concourse excavations will be carried out as open cut excavations. The excavation below the upper layers of fill and weathered sandstone are anticipated to be vertical cuts of the Hawkesbury sandstone. Note that this work is approved under separate CSSI consent and is not proposed with this SSD DA; however it is included here for context.

### 2.2 South Tower Overview

The South Tower structure is envisioned as an in-situ reinforced building with reinforced concrete columns, post-tensioned slab and post-tensioned beam system floor structures. The South Tower adopts a reinforced concrete core wall system located at the southern end of the building. The core will provide all lateral stability to the structure above the ground floor plane.

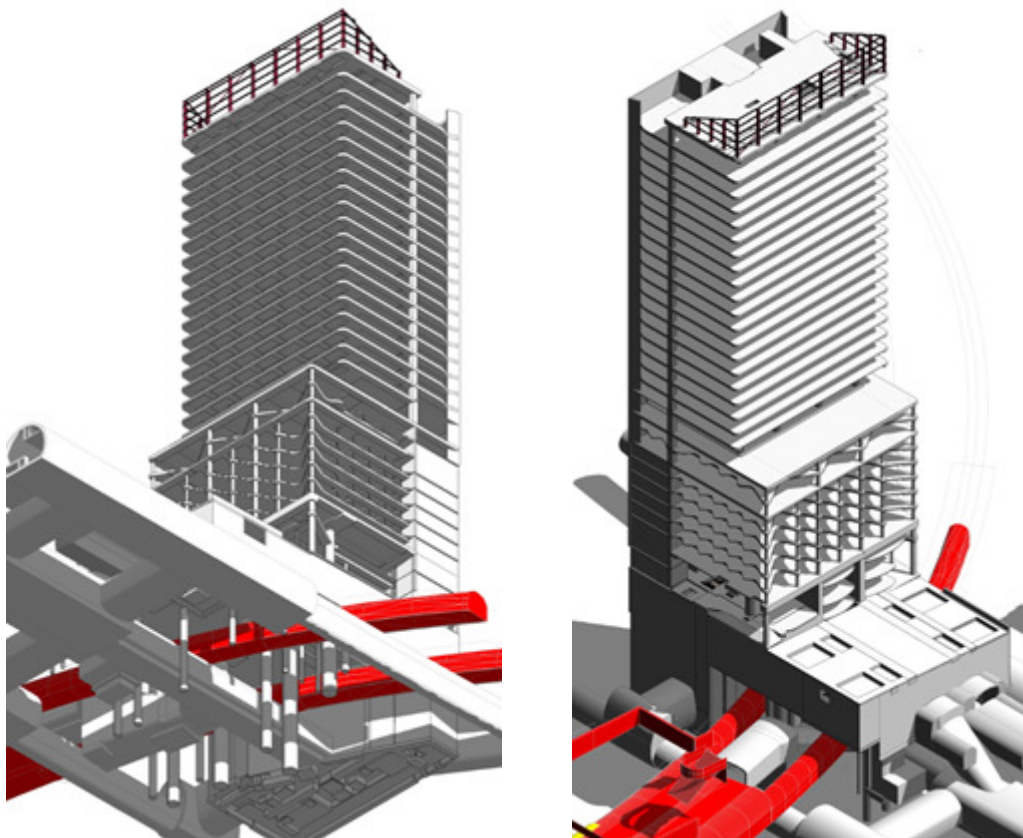


Figure 5: South Tower and station structure integrated and designed from foundation to roof top with new and existing (red) tunnels beneath

The station below the South Tower comprises of the South Tower shaft and a network of caverns linking it to the North Tower shaft. The South Tower shaft forms the base of the South Tower. The two are designed, and are to be constructed, as one integrated structure from foundation to rooftop.

The station concourses, retail and plant spaces below ground and beneath the tower footprint are to be constructed as in-situ concrete basement structures with concrete columns, walls and slab and beam floors. Due to the requirements of underground stations the basement structures will also be enclosed by perimeter in-situ concrete walls.

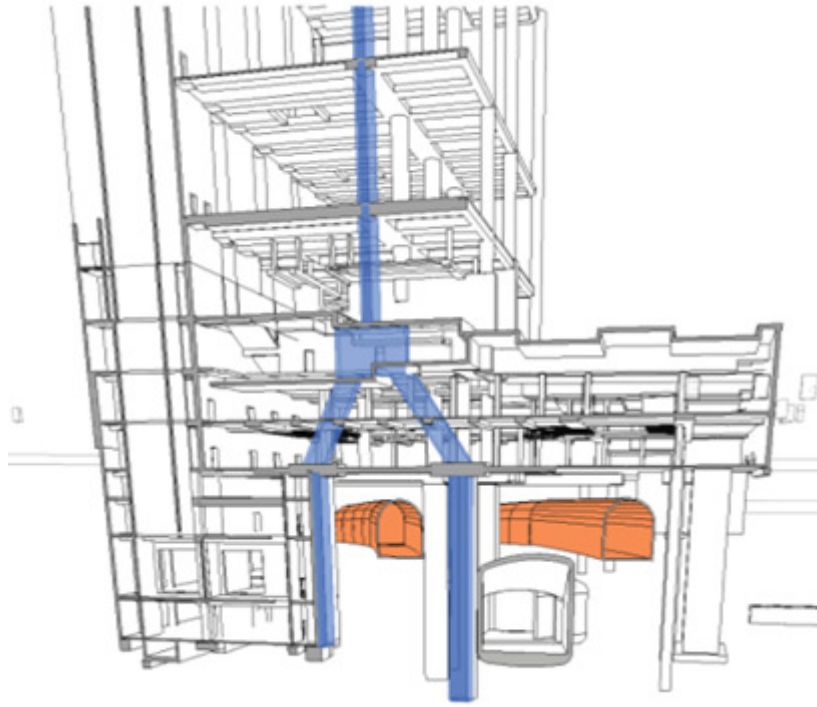


Figure 6: Section through the structure showing South Tower column bifurcating through the station to straddle the Eastern Suburbs Line (ESL) tunnel

## 2.3 Tower Stability

All lateral stability to the South Tower is provided by the in-situ concrete core above ground level.

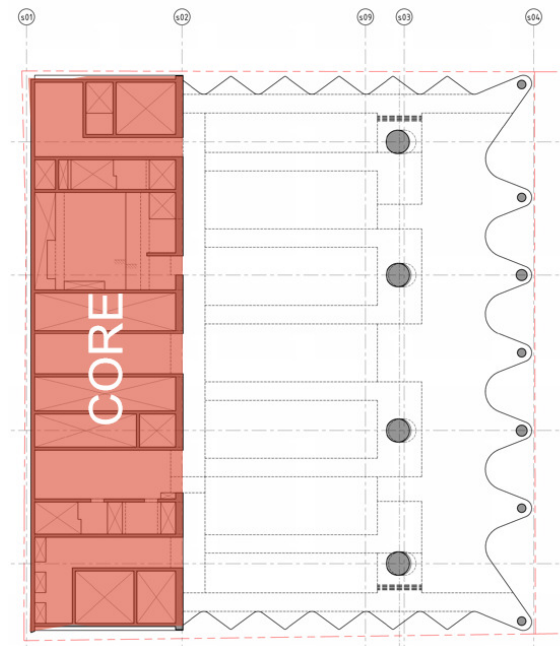


Figure 7: South Tower low rise vertical core zone

The core is stepped in the east direction between the high rise and low rise floor plates and further stepped in both the east and west directions to incorporate the Metro tunnel vent structure over the lower region of the low rise floors Level 07 and below.

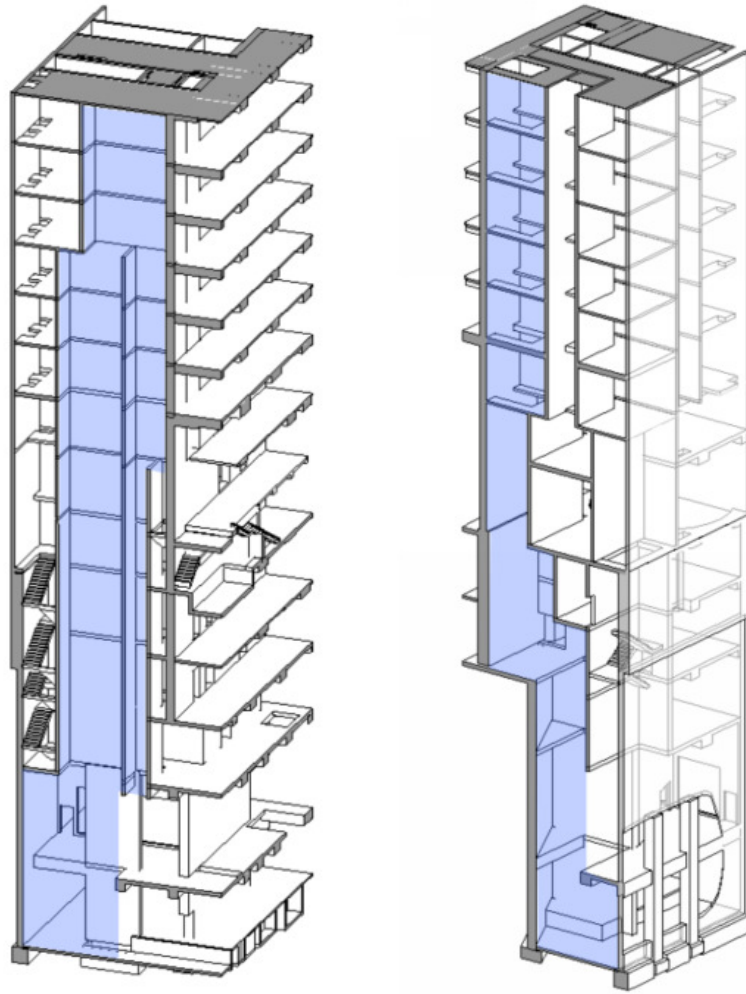


Figure 8: East and west station risers incorporated in OSD design

The core layout has been developed to service the floor plate through the main corridors with some penetrations in walls.

## 2.4 Typical Floor Plate Structures

The floor plates are divided into two typical floor plate types, low rise and high rise, which cover the majority of the tower.

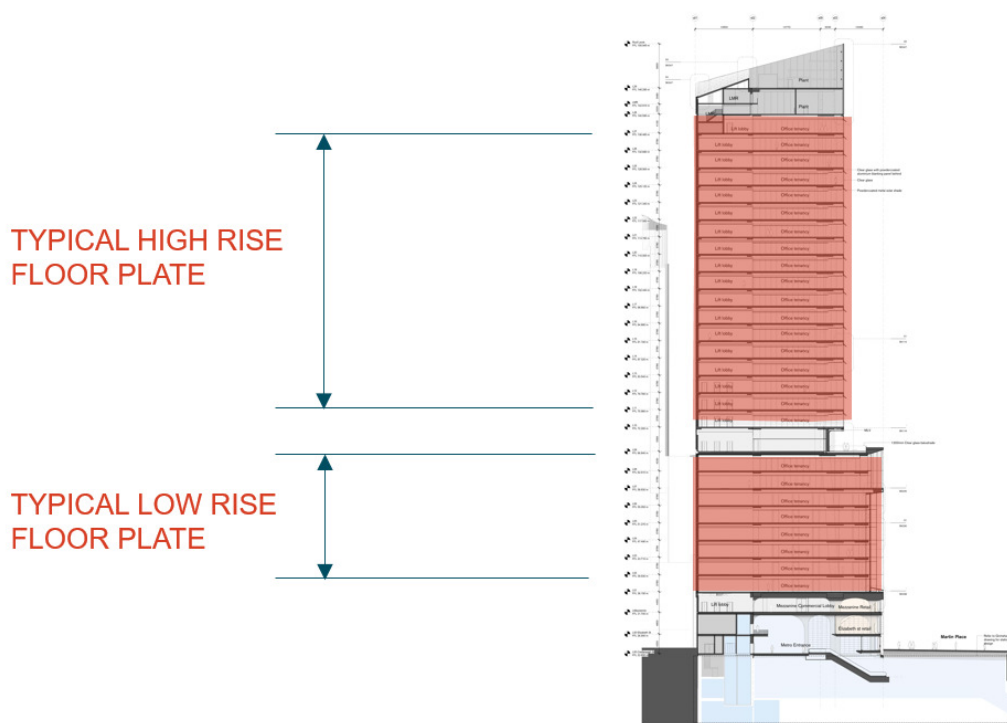


Figure 9: Typical high & low rise floorplates

All floors are post-tensioned to some degree, details of which will be developed in subsequent design stages.

### 2.4.1 Low Rise Floor Plate

The low-rise floors have a larger floor plate with the northern edge extending beyond the four main tower columns to a line of columns on the northern perimeter.

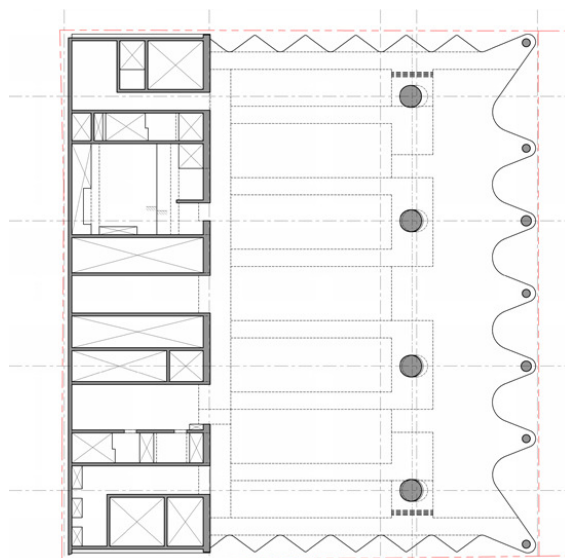


Figure 10: South Tower typical low-rise floor structure

The northern façade columns change in number on elevation, meaning a transfer beam is required on Level 01.

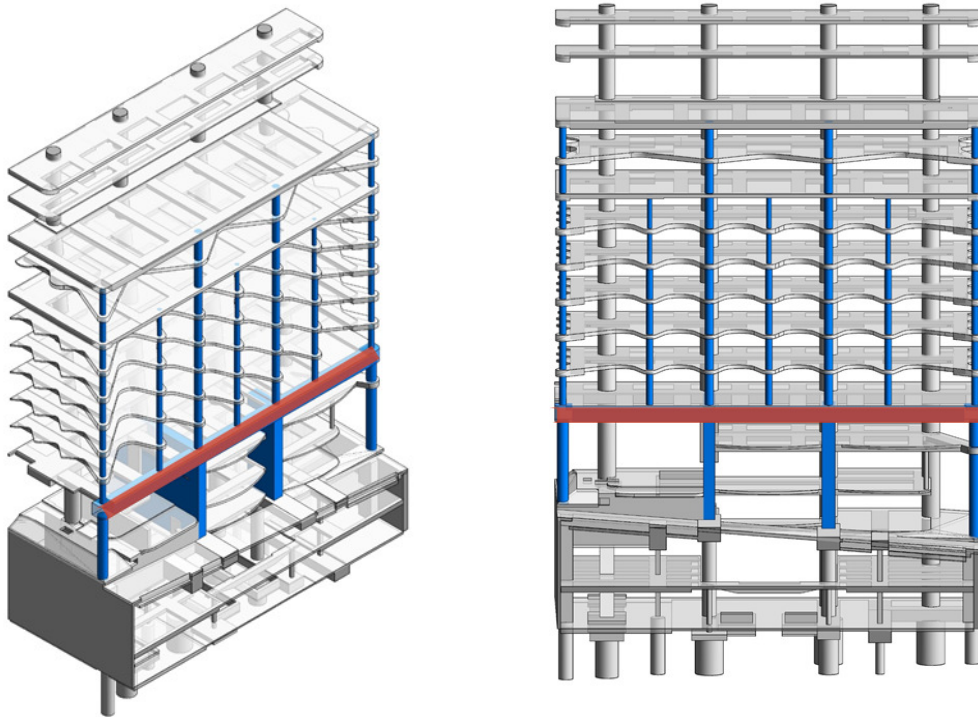


Figure 11: South Tower north elevation structure. The transfer beam is shown in red.

### 2.4.2 High Rise Floor Plate

The high-rise floors have a smaller floor plate with the northern edge pulled back to form a cantilevering edge from the main tower columns. The high-rise floors also adopt east-west spanning post tensioned reinforced concrete slabs supported on north-south spanning post-tensioned concrete secondary beams.

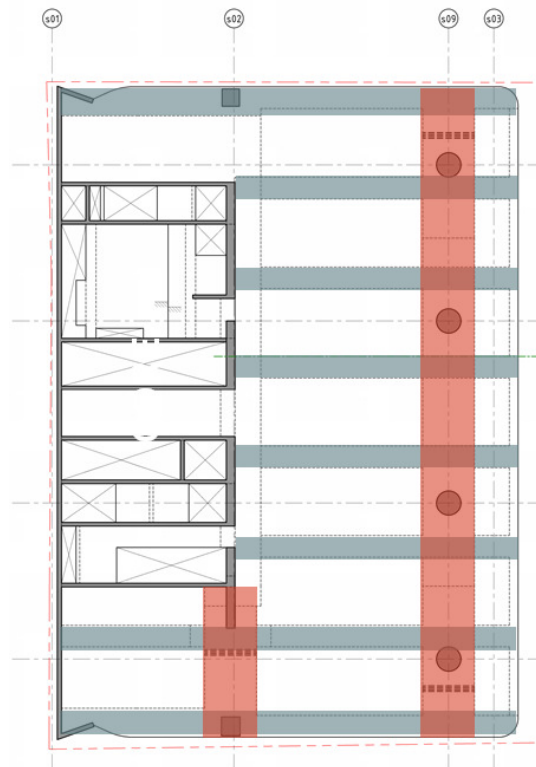


Figure 12: Typical primary and secondary beams on a high rise floor plate.

## 2.5 Non-Typical Floor Plates

There are eight locations in the South Tower where the floor plate differs from the typical. In these highlighted locations floor loadings and/or slab profiles differ to typical floors.

**Mezzanine:** Slab profile differs to typical floors, structural framing adjusted accordingly.

**Level 1:** Floor plate transfers lateral loads from inclined columns to core. Beams and slab increased to accommodate tension loads.

**Level 7:** Slab profile differs to typical floors, structural framing adjusted accordingly.

**Level 8:** Slab profile differs to typical floors, structural framing adjusted accordingly.

**Level 9:** Increased floor loading due to plant floor and water tanks and external terrace build up and planting. A fold is required in the floor plate for the terrace set down.

**Level 10:** Typical high-rise structural layout with increased loads due to soffit and acoustic treatment over plant room below.

**Level 28:** Typical high-rise layout with increased loading due to plant leading to thicker structure.

**Level 29:** Typical high-rise layout with increased loading due to plant, water tanks, Building Maintenance Units (BMU) and additional loads due to roof & crown leading to thicker structure.

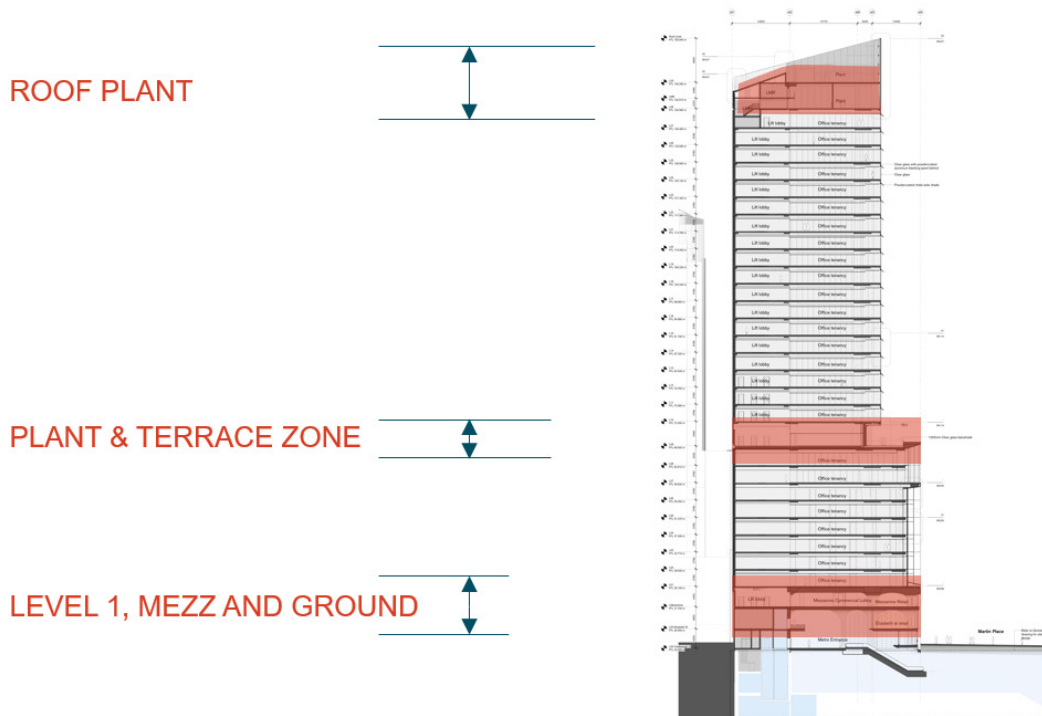


Figure 13: Location of non-typical South Tower floor plates

## 2.6 All Floors

### 2.6.1 Services Reticulation

The structural floor plate has been developed to allow a service access route to each ceiling zone between downstand beams through notched structural elements. These are primarily located in a zone surrounding the core.

## 2.7 Columns

There are four principal tower columns located on the northern side of the South Tower. Over the height of the building these are vertical up to Level 01, inclined in the low-rise floors and vertical in the high-rise floors. See Figure 14. Column sizes will step every four floors.

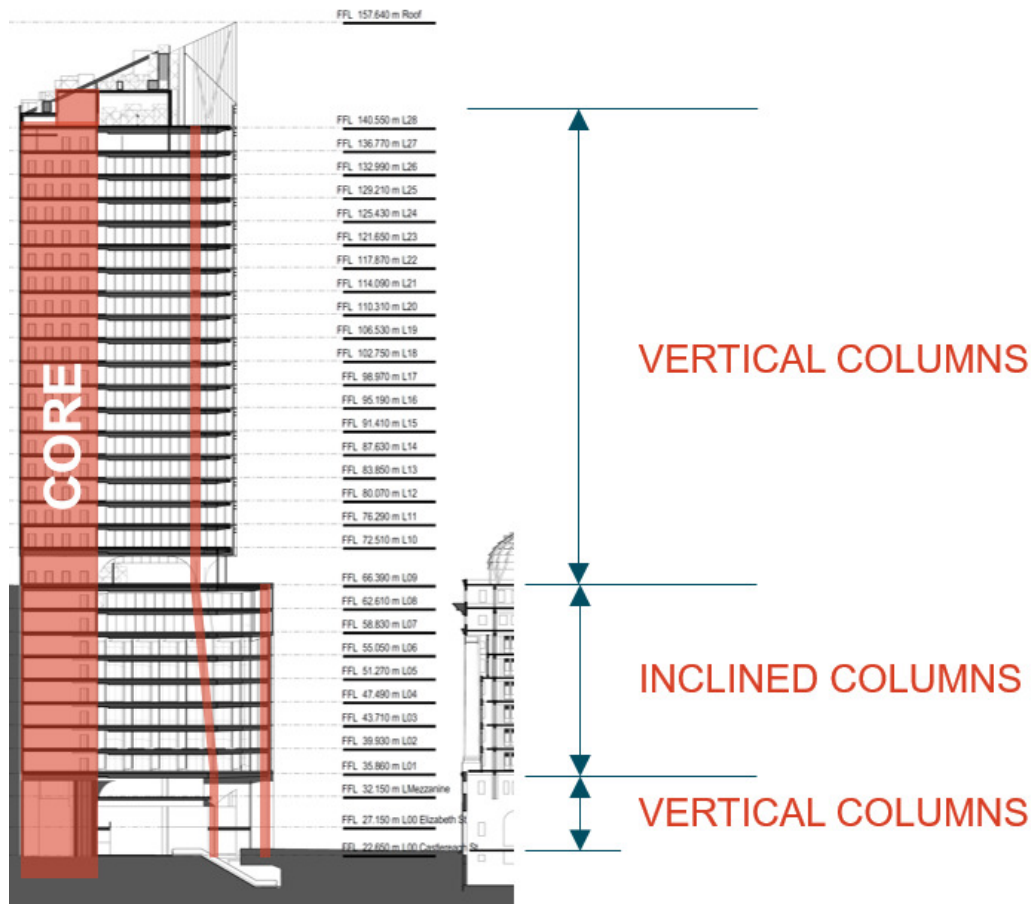


Figure 14: Vertical &amp; Inclined Tower Columns

## 2.8 Lift Motor Rooms and Pits

The lifts are a key component of any commercial high-rise development and the lift motor rooms (LMR) and pits must be carefully planned to facilitate installation, maintenance and replacement of key equipment. The planning of LMRs is further constrained by the non-horizontal solar access plane which determines the maximum height of the tower. The LMRs are typically formed of reinforced concrete walls and slabs with some of the capping slabs being stepped to honour the solar access plane. A zone above these slabs has been allowed for steelwork framing to support lightweight roof sheeting which has a complex geometric form to honour the solar access plane.

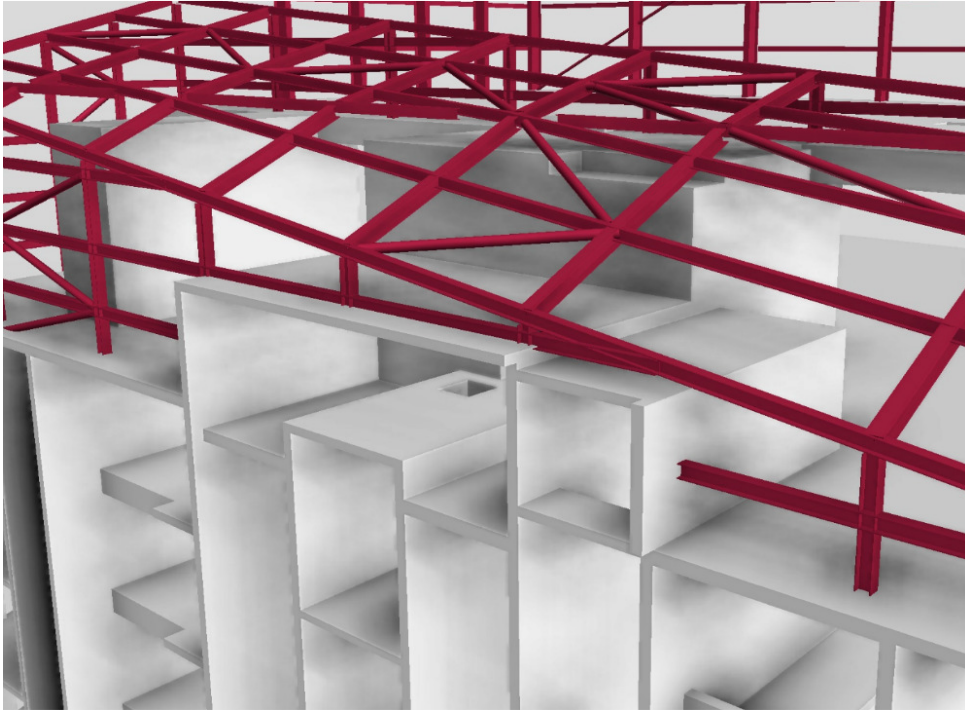


Figure 15: LMR framing and roof steelwork above

### 3 Design Criteria

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The structures will comply with:

- All current relevant Australian Standards;
- Heritage requirements;
- Building Code of Australia;
- Sydney Metro/TfNSW standards and requirements where applicable;
- Development Near Rail Tunnels THR C1 12051 ST;
- Development Near Rail Corridors and busy Roads Interim Guidelines.

## 4 Agency consultations

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Consultation has been undertaken on this SSD DA Stage 2 proposal with Sydney Metro and other relevant agencies as detailed in the Stakeholder and Community Engagement Summary Report, prepared by Ethos Urban.

## 5 Conclusion

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The structural design of the South Tower is fully integrated with the design of Metro Martin Place station and has been developed to support the architectural and engineering aspirations of the South Tower.

The design gives full consideration to all relevant design and planning criteria and industry standards, guidelines and legislation.