

Hans Centre Sydney Pty Ltd

**338 Pitt Street, Sydney**

Rail Corridor Impact Statement  
SSDA

ST02

Issue 2 | 17 March 2020

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.







Job number 271640

**Arup**  
Level 5  
151 Clarence Street  
Sydney NSW 2000  
Australia  
[www.arup.com](http://www.arup.com)

**ARUP**

# Document Verification

# ARUP

<b>Job title</b>		338 Pitt Street, Sydney		<b>Job number</b>	
				271640	
<b>Document title</b>		Rail Corridor Impact Statement SSDA		<b>File reference</b>	
<b>Document ref</b>		ST02			
<b>Revision</b>	<b>Date</b>	<b>Filename</b>			
Issue 1	13/12/19	<b>Filename</b>	191213 338 Pitt St - Rail Corridor Impact Statement_ Issue.docx		
		<b>Description</b>	For issue		
			Prepared by	Checked by	Approved by
		Name	Richard Cass	Andrew Johnson	Andrew Johnson
		Signature			
Issue 2	17/03/20	<b>Filename</b>	200317 338 Pitt St - Rail Corridor Impact Statement_ Issue 2.docx		
		<b>Description</b>	For issue (Appendix A amendments to pages 3,10, 11)		
			Prepared by	Checked by	Approved by
		Name	Richard Cass	Andrew Johnson	Andrew Johnson
		Signature			
<b>Issue Document Verification with Document</b> <input checked="" type="checkbox"/>					

## Contents

---

	Page
<b>1 Introduction</b>	<b>1</b>
1.1 Project Overview	1
1.2 SEARS requirements	2
<b>2 Recommendations</b>	<b>2</b>
<b>3 Design Development Application</b>	<b>2</b>
<b>4 Ground Conditions</b>	<b>3</b>
<b>5 Existing Structures</b>	<b>3</b>
<b>6 Coordination of the development with the rail tunnel infrastructure</b>	<b>4</b>
<b>7 Noise, Vibration and Stray Currents</b>	<b>4</b>

## Appendices

### Appendix A

Shoring Concept

### Appendix B

Geotechnical Report

# 1 Introduction

---

Arup has been commissioned by Hans Centre Sydney Pty Ltd to prepare a rail corridor impact assessment as part of the SSDA application for the proposed mixed-use development located at 338 Pitt Street, Sydney.

## 1.1 Project Overview

This report supports a Stage Significant Development Application (SSDA) for the mixed use redevelopment of 338 Pitt Street, Sydney, which is submitted to the City of Sydney pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). China Centre Development Pty Ltd is the proponent of the SSDA.

The site is located at the corner of Pitt Street and Liverpool Street, within the 'Mid Town' precinct of Sydney's Central Business District (CBD). The site is approximately 150m west of Museum Station and Hyde Park, and approximately 350m from Town Hall Station. The site includes several allotments and constitutes nearly one third of the city block between Bathurst Street, Pitt Street and Liverpool Street. The site is an irregular shape and has a combined area of approximately 5,900m<sup>2</sup>.

The proposed development comprises of hotel, residential, commercial and retail uses and will include:

- demolition of all existing structures;
- excavation and site preparation, including any required remediation;
- construction and use of a mixed-use development, with an iconic 258m two-tower built form above a podium and internal courtyard;
- four (4) basement levels and a lower ground level accommodating residential, retail and hotel car parking, motorcycle parking, bicycle parking, loading dock, storage and relevant building services;
- improvements to the public domain, including landscaping, pedestrian thoroughfares/connections, and landscaping; and
- augmentation and extension of utilities and services.

Underground rail easements are located along Pitt Street, Castlereagh Street and Liverpool Street that bound the site. The first reserve of the CBD Rail Link (CBDRL) tunnel under Pitt Street encroaches across the corner of the site. The CBD Metro tunnel is located under Castlereagh Street. A link tunnel between the CBDRL and the CBD Metro tunnel is located under Liverpool Street. The tunnels are located approximately below 21m deep at the site location.

A historic Telstra tunnel close to the site boundary poses a further similar constraint to the site development.

## 1.2 SEARS requirements

The requirements for the SSDA are provided in the SEARs SSD-10362 dated 19/08/2019, as summarised in Table 1 below.

Table 1: Relevant SEARs requirements for rail corridor assessment

Clause	Relevant requirements/policies
12. Rail Corridor Assessment	The EIS shall detail the likely effect of the proposal on the Sydney Metro Corridor and Pitt Street North Station consistent with the Sydney Metro Underground Corridor Protection Technical Guidelines

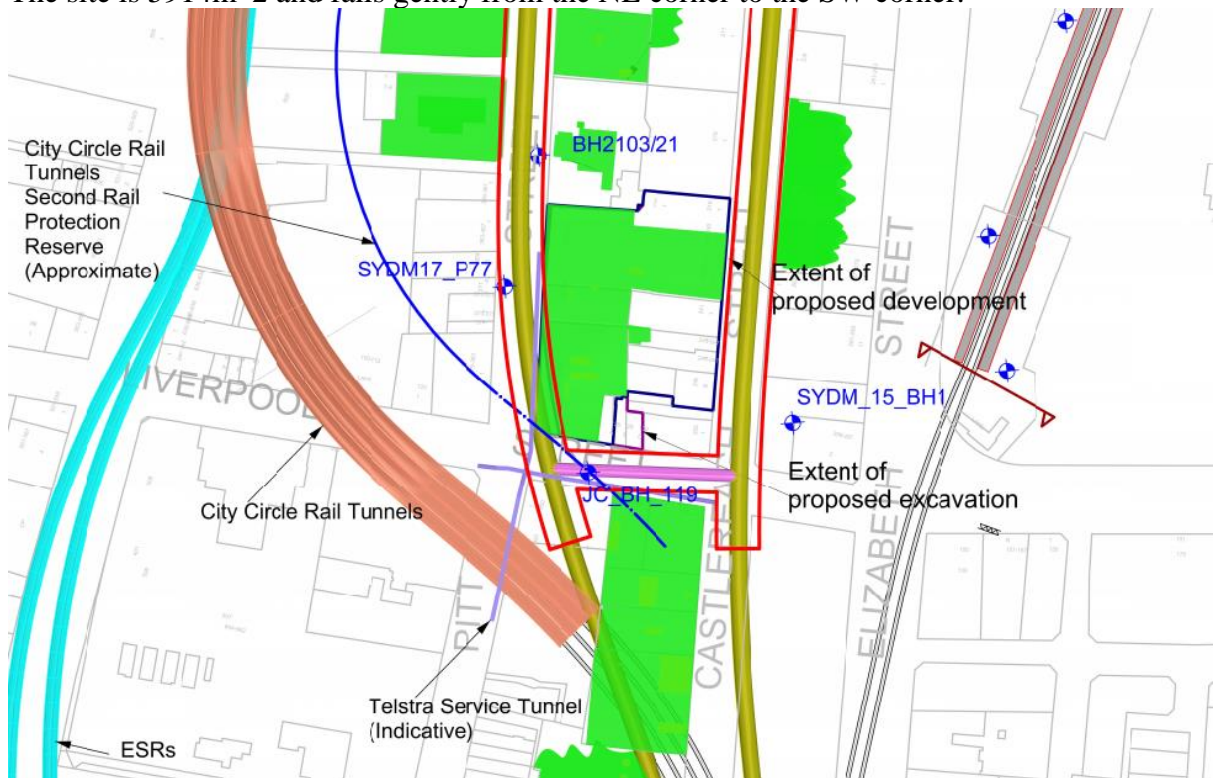
## 2 Recommendations

- The basement excavation and imposed loads from the proposed development are not expected adversely impact on the operation of the rail infrastructure due to the relative depth of the rail tunnels. We recommend that a three dimensional rock substratum analysis investigation model is prepared to demonstrate this. If any issues are identified as a result of the modelling investigation, the extent of the proposed basement or founding depths of the structure may be modified to mitigate. Pells Sullivan Meynink Geotechnical engineers (PSM) are engaged to undertake the analysis model investigation and report on their conclusions and recommendations.
- The basement excavation and tower foundations will be located outside the first reserve corridor. The tower foundations will be located below the zone of influence for the tunnels. No temporary or permanent structure is to encroach into the rail first reserve protection zone.
- Refer to the Arup Acoustic report: AC01(v0-0) Acoustic SSDA report.pdf. for recommendations on performance criteria, design, monitoring and measurement to manage noise and vibration.
- Protection from stray electrical currents is provided by insulating structural steel and reinforcing steel with adequate cover concrete. Typically, this is achieved to reinforced concrete foundation and shoring elements with a minimum cover of 50mm for 32 MPa concrete that is in contact with the ground.

## 3 Design Development Application

The site is located on the north eastern corner of Pitt Street and Liverpool Street with frontages to these streets, Castlereagh Street and Dungate Lane.

The site is 5914m<sup>2</sup> and falls gently from the NE corner to the SW corner.



**The development site and adjacent rail tunnels**

## 4 Ground Conditions

Good quality rock suitable for the support of shallow foundations is expected at an RL of 10m. Rock stress relief from the proposed basement excavation is expected to be in the order of 0.5mm to 1.0mm lateral of displacement to the excavated face per metre of excavation depth in the good quality rock. A three dimensional model of the rock mass will be prepared to predict the movement influence on the rail and Telstra tunnel infrastructure.

## 5 Existing Structures

The site is currently occupied by existing buildings which will be demolished as a part of the proposed development. The existing buildings include:

- High rise commercial tower at 338 Pitt Street
- Two storey terrace style building at 126 Liverpool Street
- High rise commercial tower at 324 Pitt Street and 233 Castlereagh Street
- Six storey commercial building at 326 Pitt Street
- Three multi-storey commercial buildings at 245-247 Castlereagh Street and 249-253 Castlereagh Street

## 6 Coordination of the development with the rail tunnel infrastructure

---

The presence of rail tunnels on the site has a significant impact on the extent and form of the development.

Underground rail easements are located along Pitt Street, Castlereagh Street and Liverpool Street that bound the site. The first reserve of the CBD Rail Link (CBDRL) tunnel under Pitt Street encroaches across the corner of the site. The CBD Metro tunnel is located under Castlereagh Street. A link tunnel between the CBDRL and the CBD Metro is located under Liverpool Street. The tunnels are located at a depth of approximately 21m at the site location. The proposed basement excavation is outside the rail first reserves but encroaches into the second reserves.

We recommend that a three dimensional geotechnical analysis model of the rock substratum is prepared to assess the impact of the development on the rail and Telstra tunnels. The analysis model will require a non-linear staged analysis and we recommend that sensitivity analyses are also run to envelope a realistic range of input parameters. PSM geotechnical consultants are engaged to prepare the analysis modelling investigation and make any recommendations that are required to minimise the impact of the development on the operation of the rail and the Telstra tunnel.

Vertical movement of the rock substratum will be induced from unloading of the site due to demolition of the existing buildings and re-loading of the site due to the construction of the new tower and basement. Lateral stress relief movement of the rock substratum will be induced from excavation of the basement.

The basement excavation extent may need to be limited or stepped to reduce any movement influences on the tunnels. The tower foundations are to be designed such as to limit their impact on the tunnels. This is typically achieved by founding below the zone of influence on the tunnels and sleeving any piles required to achieve this that pass through the second reserve.

The shoring systems for retention of the upper soil and weak rock layers will be designed without any structure encroaching into the first reserve including temporary anchors.

Refer to the shoring concept drawings in the appendix.

## 7 Noise, Vibration and Stray Currents

---

Refer to the Arup Acoustic report: AC01(v0-0) Acoustic SSDA report.pdf. for recommendations on performance criteria, design, monitoring and measurement to manage noise and vibration.

Protection from stray electrical currents is provided by insulating structural steel and reinforcing steel with adequate cover concrete. Typically, this is achieved to the reinforced concrete foundation and shoring elements with a minimum cover of 50mm for 32 MPa concrete that is in contact with the ground.



## Appendix A

### Shoring Concept

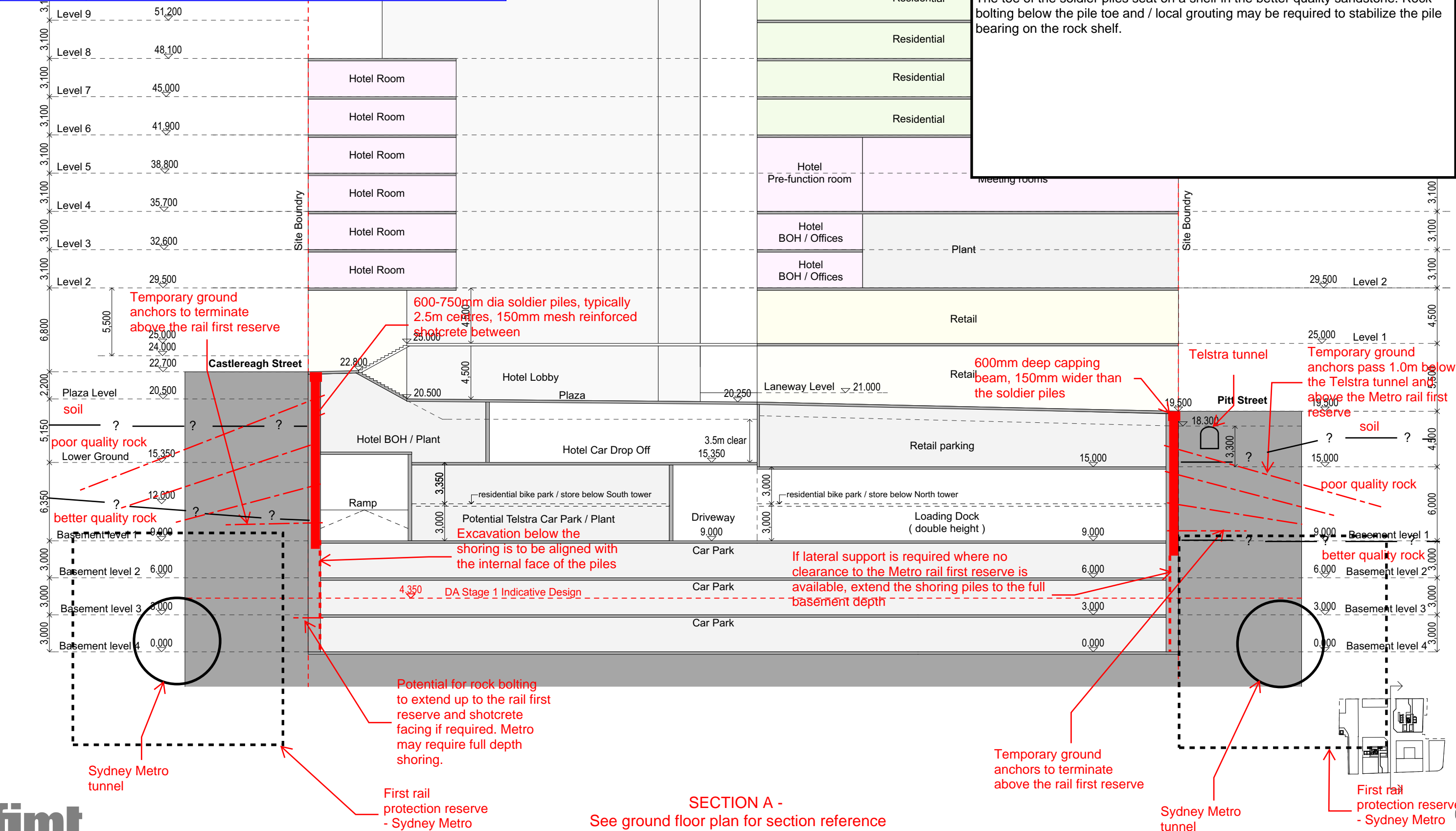
ARUP	Job No	271640-11		Status	information	
	Dwg No	SSK-01		Rev	2	
	Date	05/11/2019	Made by	Cass	Page	1 of 10
Job Title	338 Pitt Street, Sydney					
Dwg Title	Basement Shoring - Concept					

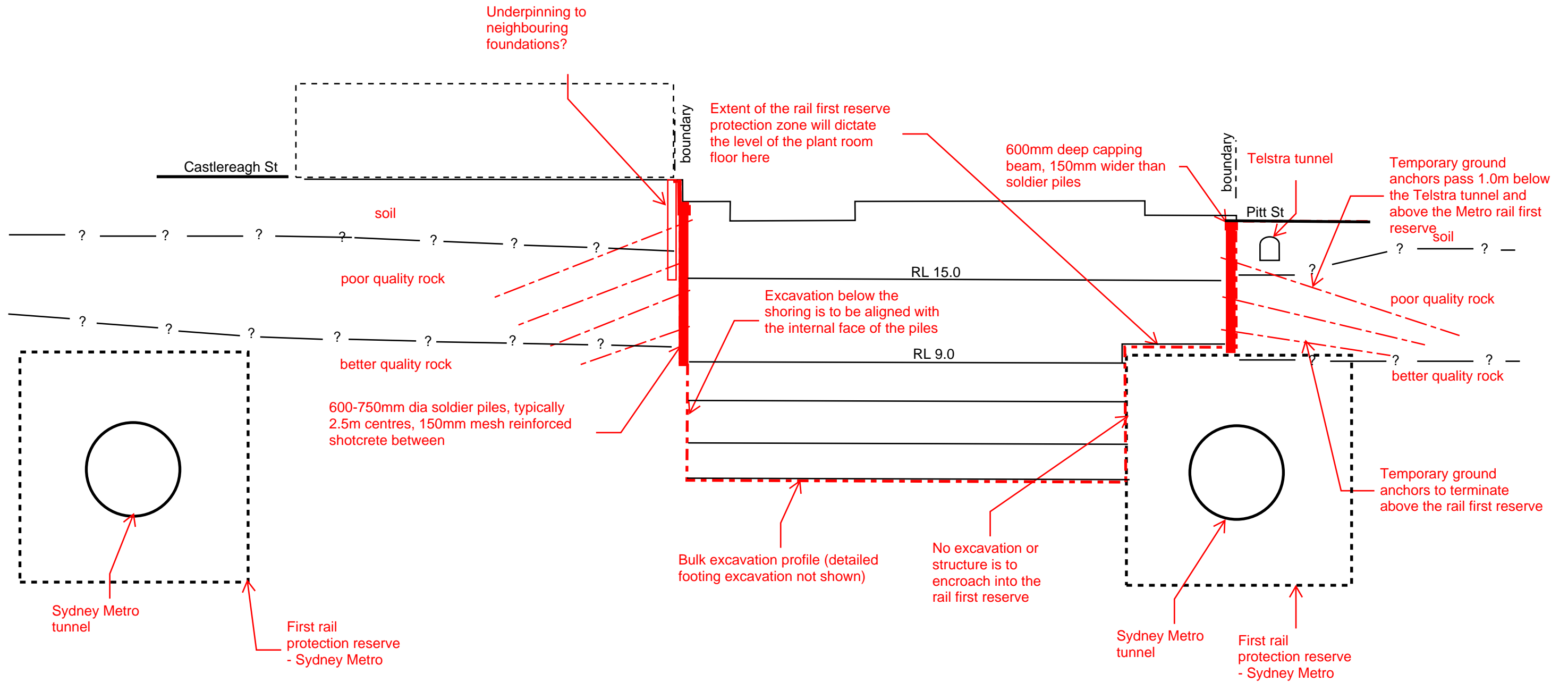
**SHORING NOTES**

The soldier piles are 600mm to 750mm diameter subject to the distance between floors and the lateral earth forces which are yet to be determined. The soldier pile spacing is nominally @2.5m centres. (Adopt 750mm diameter piles for preliminary cost planning).

The soldier piles typically socket 1.0m into the 'better quality' rock and at least 300mm below the highest floor within the better quality rock.

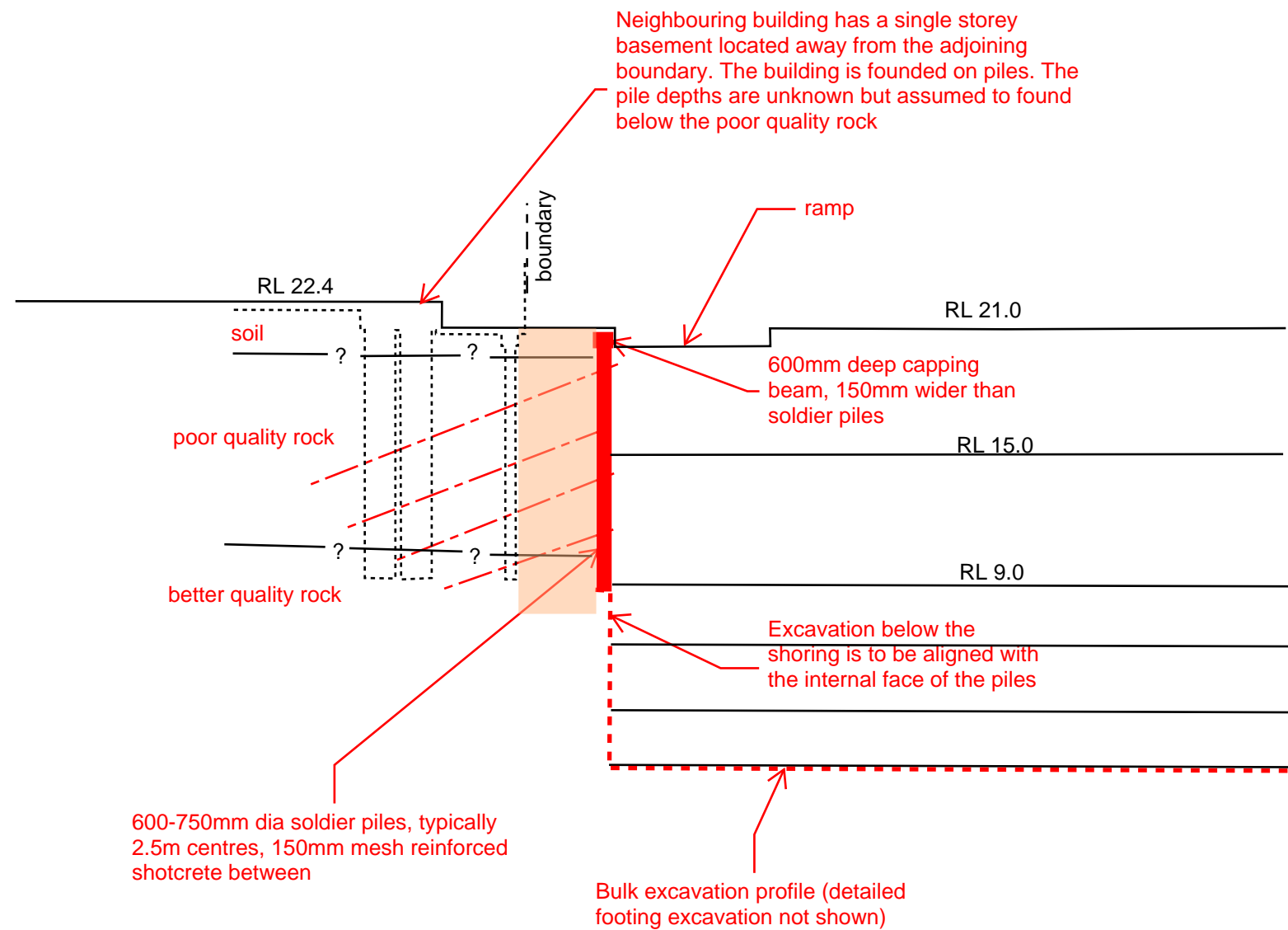
The toe of the soldier piles seat on a shelf in the better quality sandstone. Rock bolting below the pile toe and / local grouting may be required to stabilize the pile bearing on the rock shelf.





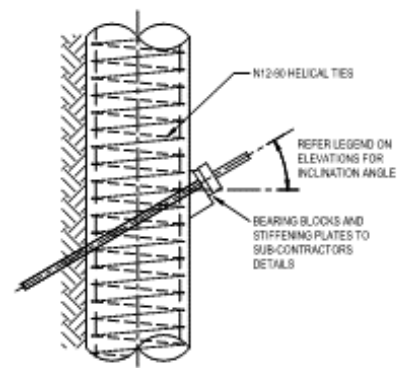
SECTION B -  
See ground floor plan for section reference

<div>ARUP</div>	Job No271640-11		Statusinformation	
	Dwg NoSSK-01		Rev	2
	Date05/11/2019	Made byCass	Page	2 of 10
Job Title	338 Pitt Street, Sydney			
Dwg Title	Basement Shoring - Concept			

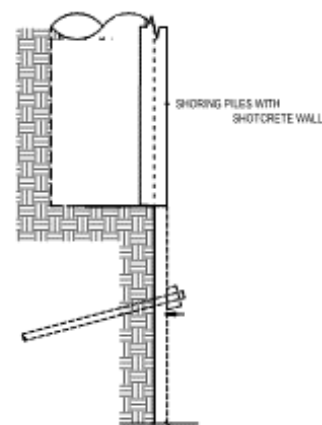


SECTION C -  
See ground floor plan for section reference

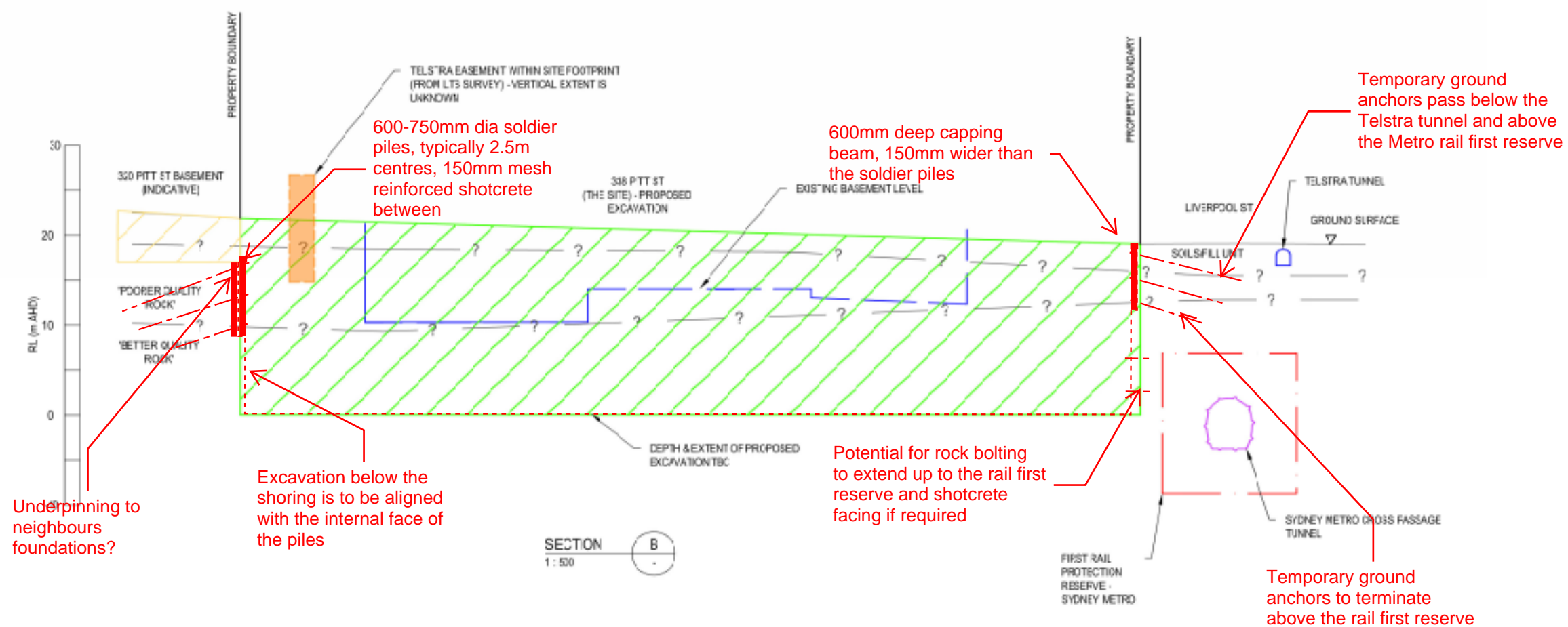
ARUP	Job No	271640-11			Status	information
	Dwg No	SSK-01			Rev	3
	Date	17/03/2020	Made by	Cass	Page	3 of 11
Job Title	338 Pitt Street, Sydney					
Dwg Title	Basement Shoring - Concept					



TYPICAL PILE & ANCHOR DETAIL

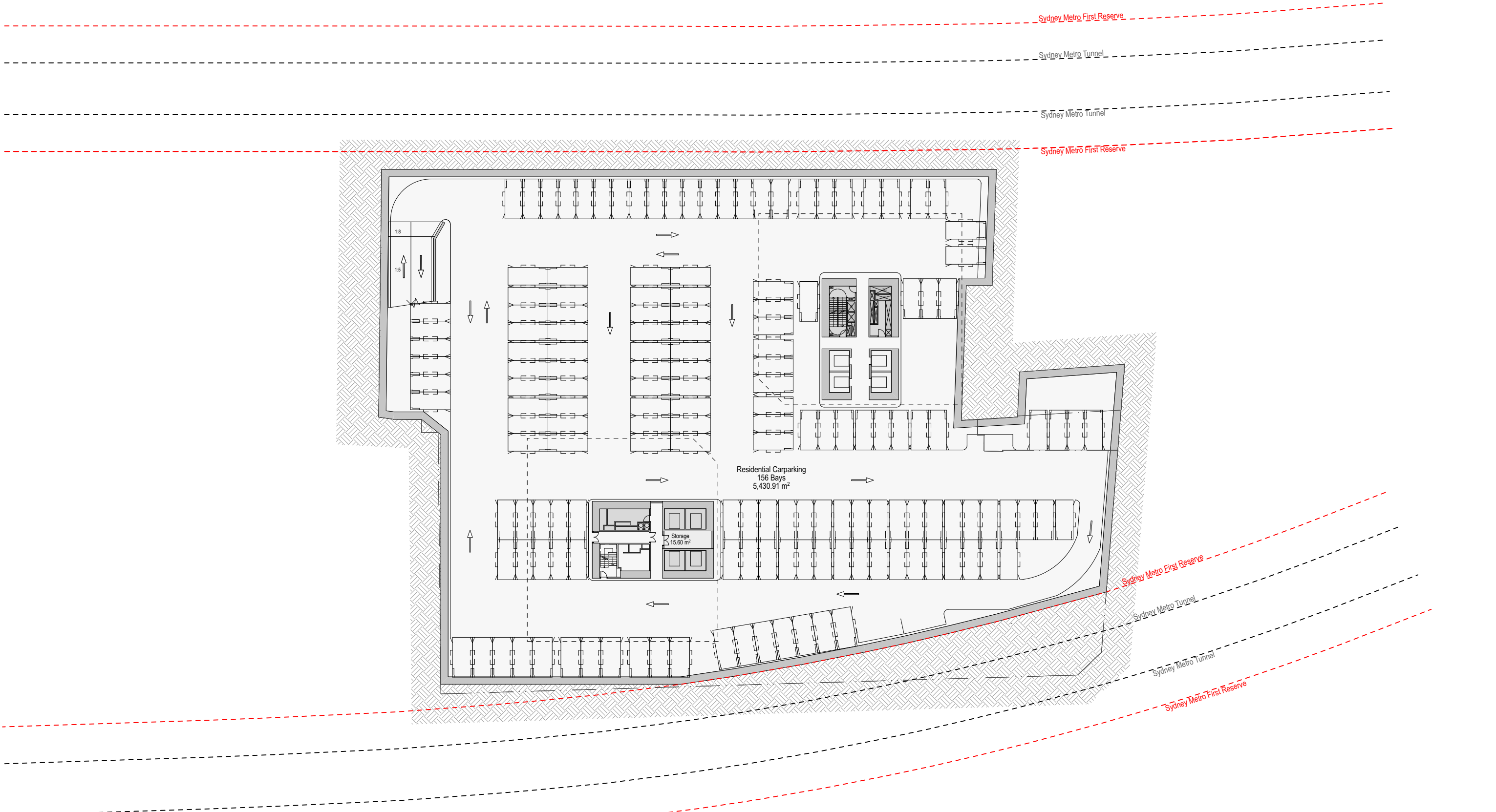


TYPICAL MID-LEVEL PILE BASE



SECTION D -  
See ground floor plan for section reference

ARUP	Job No	271640-11			Status	information
	Dwg No	SSK-01			Rev	2
	Date	05/11/2019	Made by	Cass	Page	4 of 11
Job Title	338 Pitt Street, Sydney					
Dwg Title	Basement Shoring - Concept					



ARUP	Job No	271640-11			Status	information	
	Dwg No	SSK-01			Rev	2	
	Date	05/11/2019	Made by	Cass	Page	5 of 10	
Job Title	338 Pitt Street, Sydney						
Dwg Title	Basement Shoring - Concept						

**Basement 4 Plan**  
Hans - 338 PITT STREET

157 cars

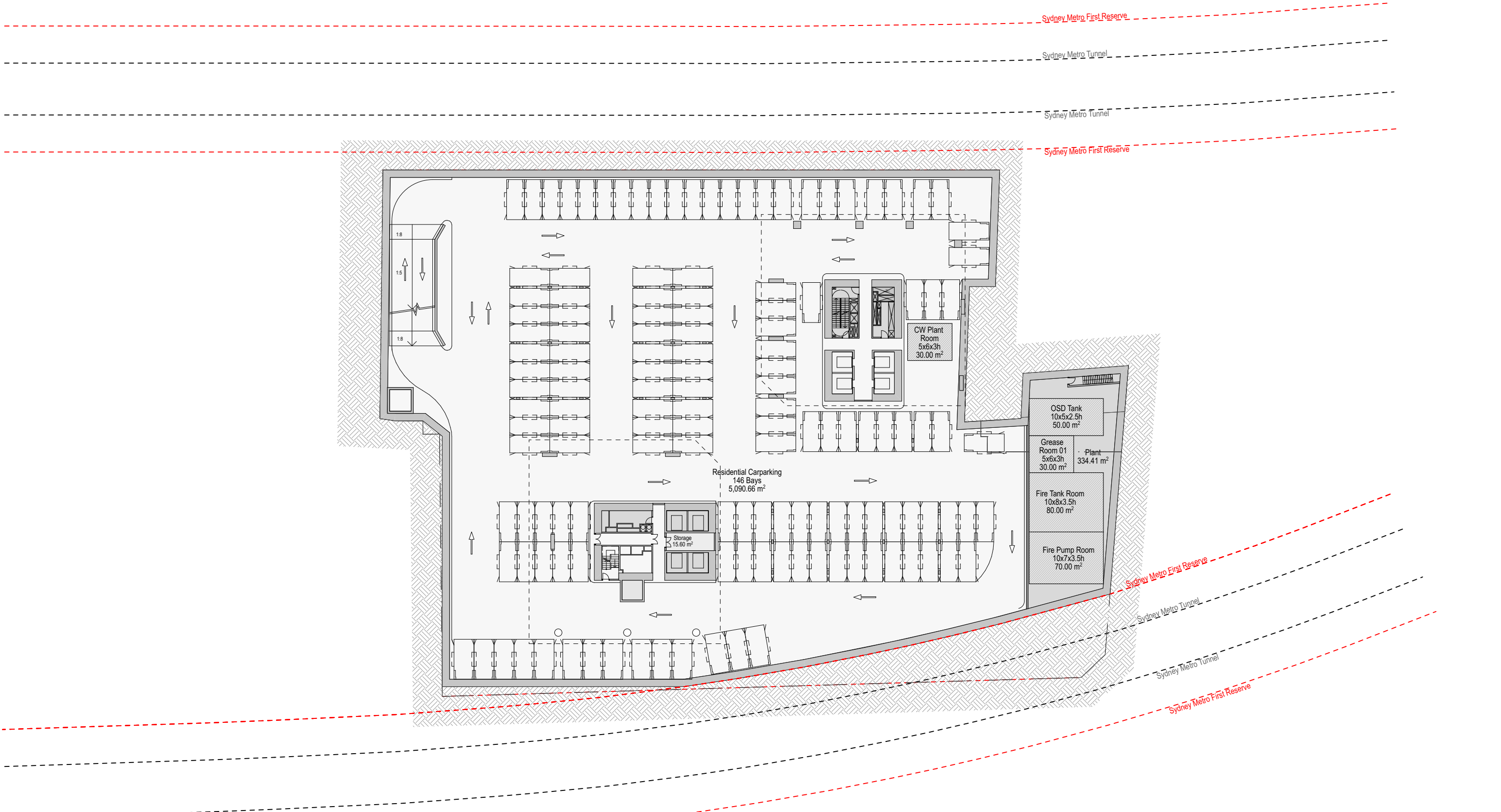


1:500 @ A3

For Information



13/9/19



ARUP	Job No	271640-11			Status	information	
	Dwg No	SSK-01			Rev	2	
	Date	05/11/2019	Made by	Cass	Page	6 of 11	
Job Title	338 Pitt Street, Sydney						
Dwg Title	Basement Shoring - Concept						

**Basement 3 Plan**  
Hans - 338 PITT STREET

151 cars



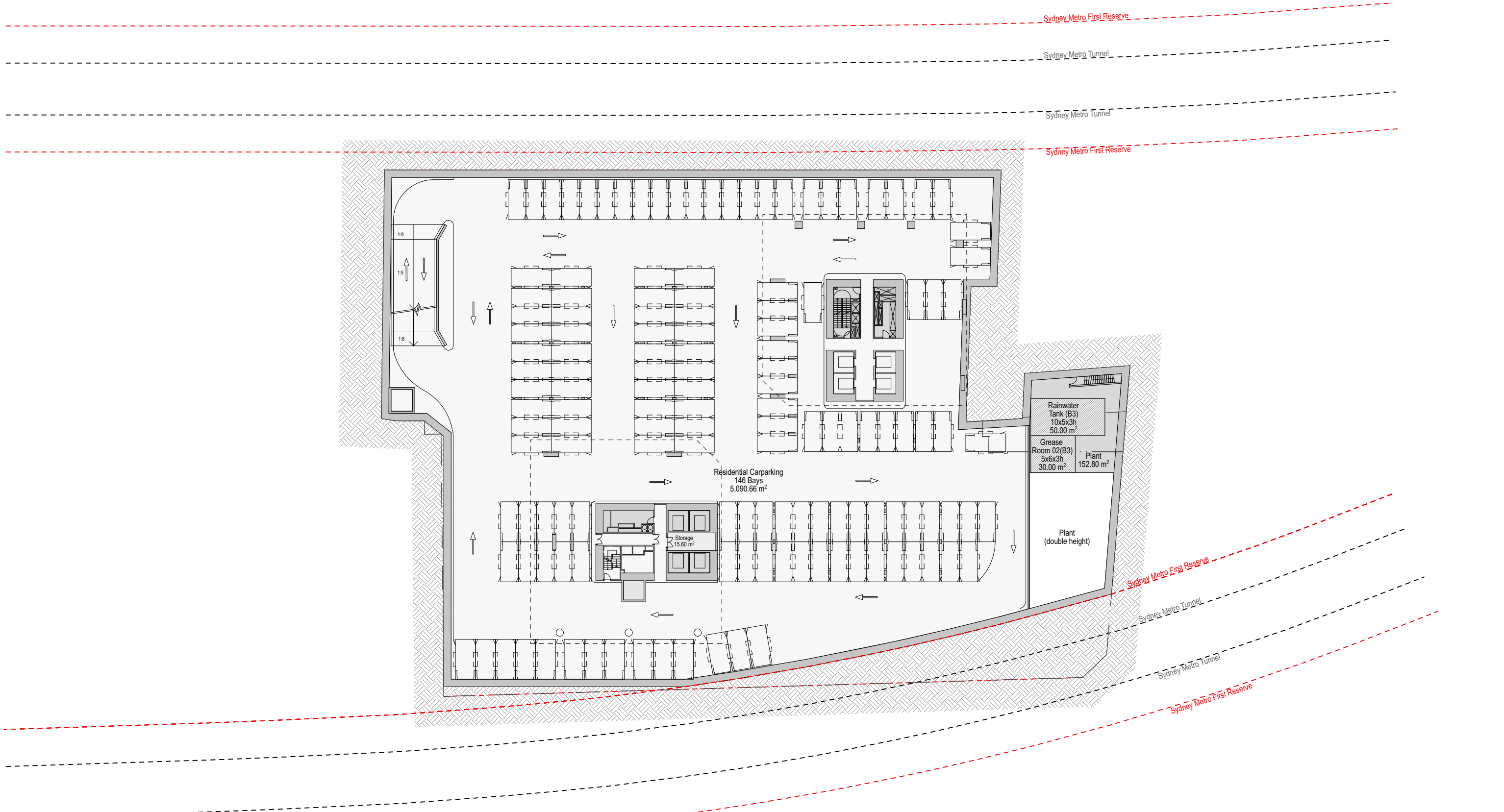
1:500 @ A3

For Information



13/9/19

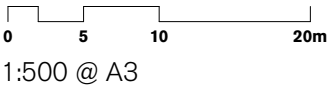




ARUP		Job No	271640-11		Status	information	
		Dwg No	SSK-01		Rev	2	
		Date	05/11/2019	Made by	Cass	Page	7 of 11
Job Title	338 Pitt Street, Sydney						
Dwg Title	Basement Shoring - Concept						

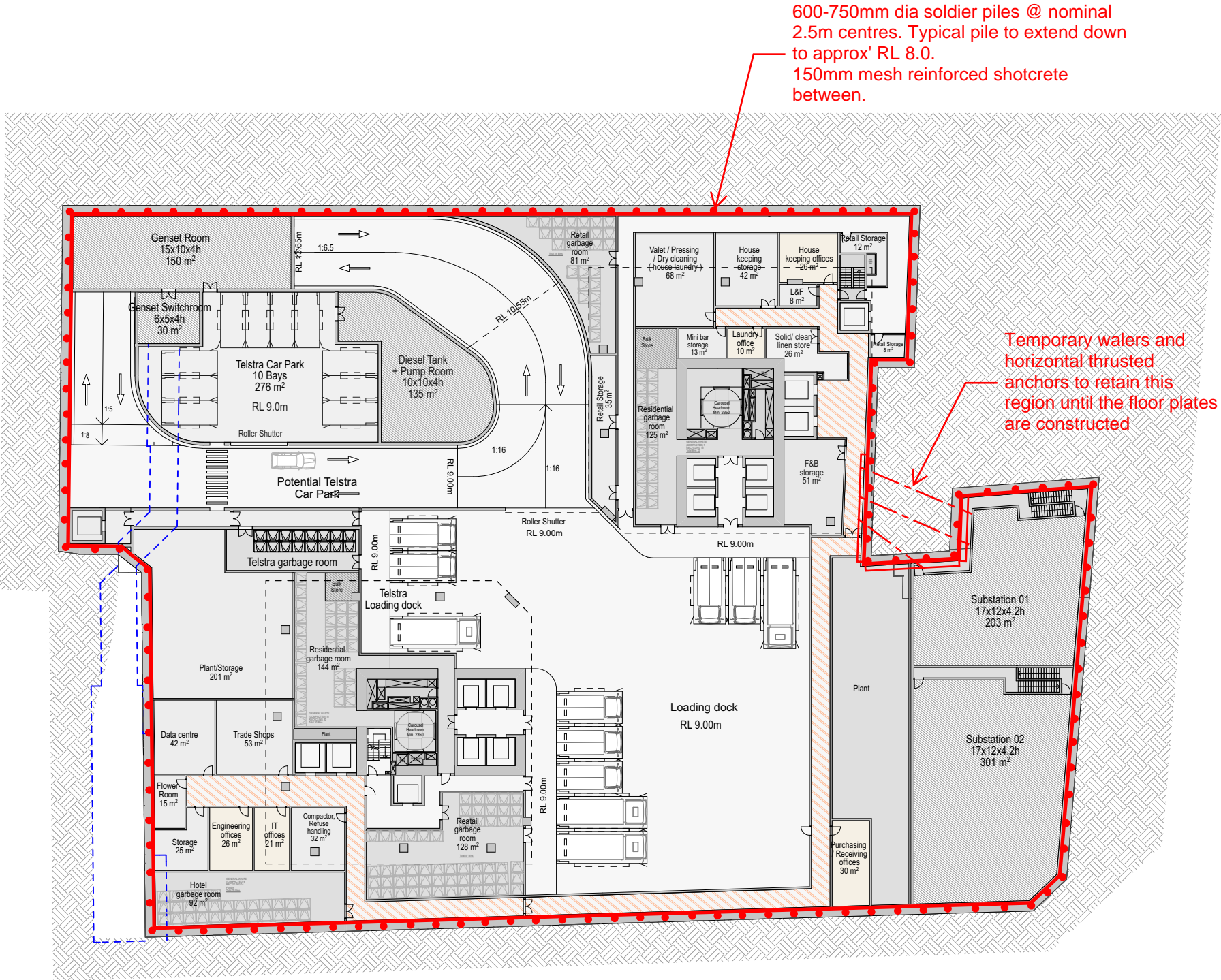
Basement 2 Plan  
Hans - 338 PITT STREET

151 cars



For Information





ARUP	Job No	271640-11			Status	information	
	Dwg No	SSK-01			Rev	2	
	Date	05/11/2019	Made by	Cass	Page	8 of 11	
Job Title	338 Pitt Street, Sydney						
Dwg Title	Basement Shoring - Concept						

Basement 1 Plan

Hans - 338 PITT STREET

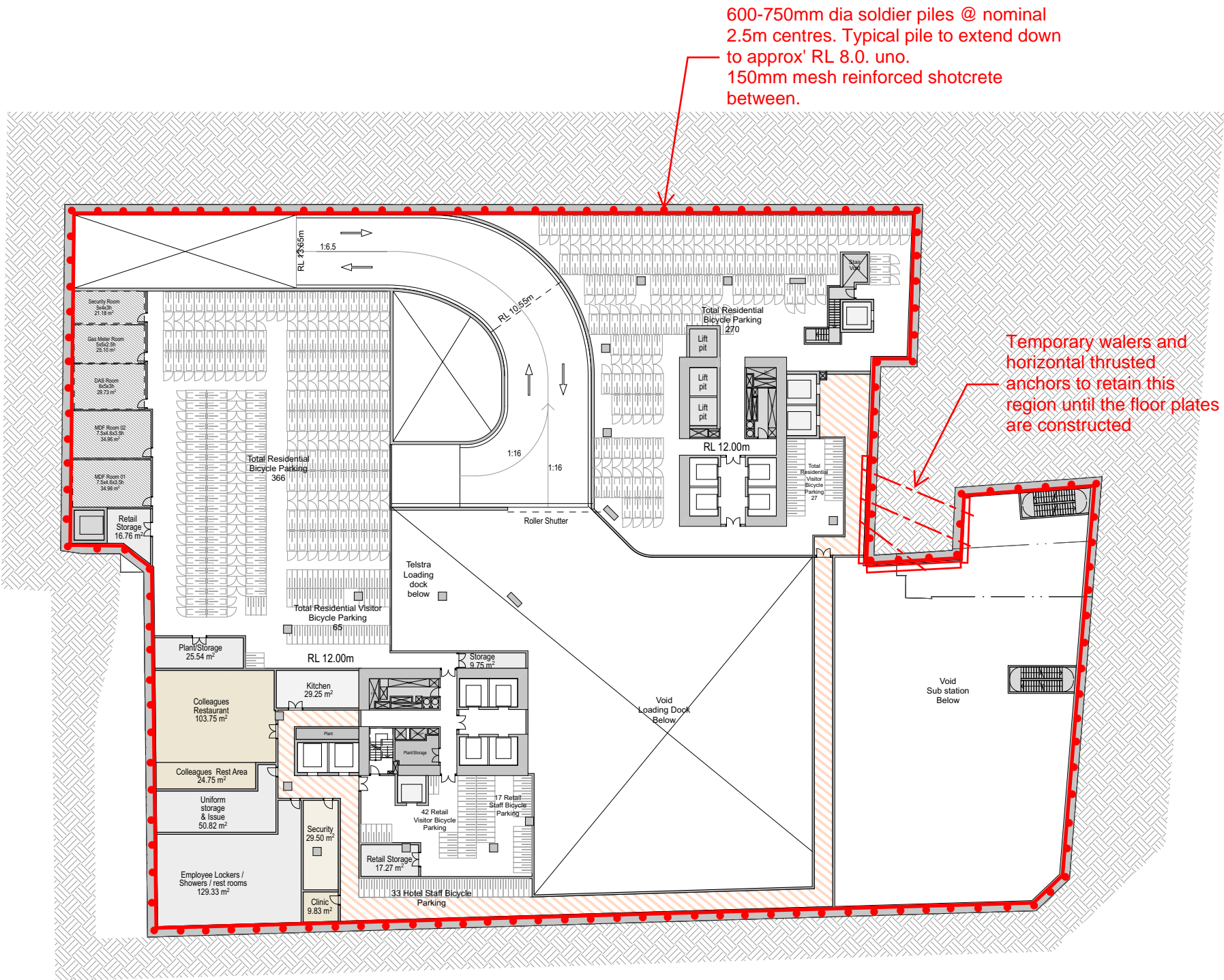


1:500 @ A3

For Information



13/9/19



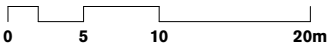
ARUP

Job No	271640-11	Status	information
Dwg No	SSK-01	Rev	2
Date	05/11/2019	Made by	Cass
Page	9 of 11		

Job Title	338 Pitt Street, Sydney
Dwg Title	Basement Shoring - Concept

Basement 1 Mezzanine Plan

Hans - 338 PITT STREET



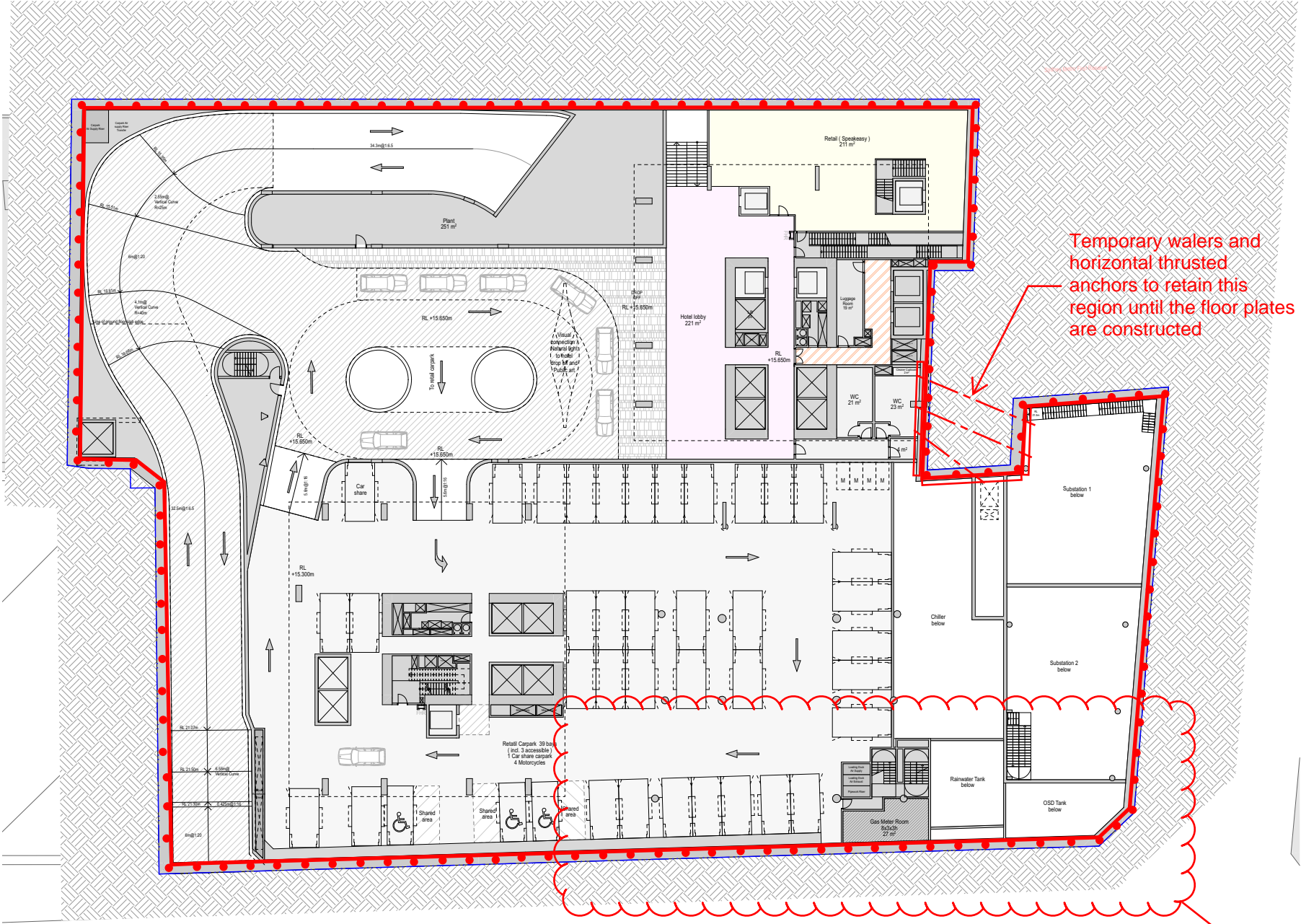
1:500 @ A3

For Information



13/9/19

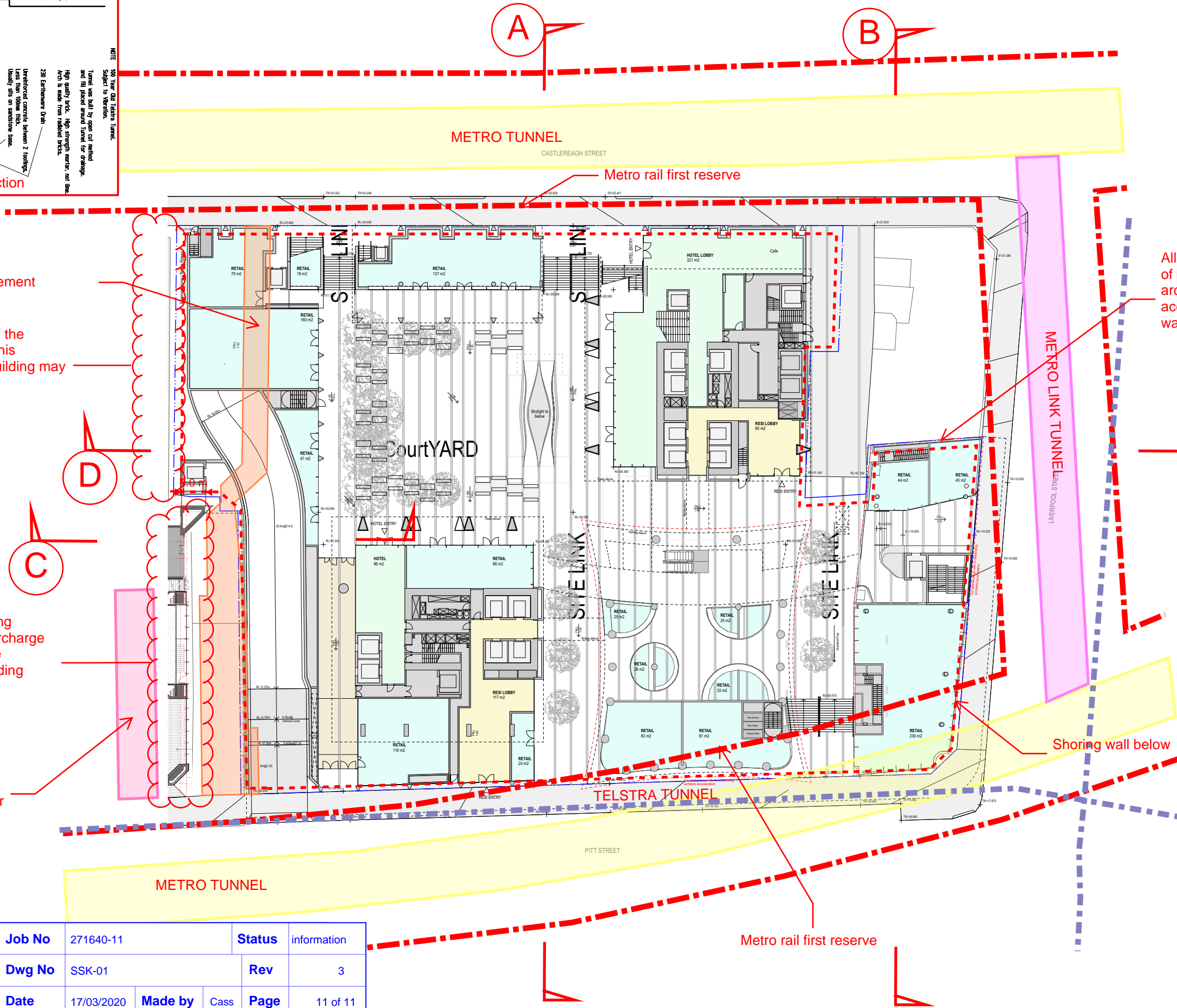
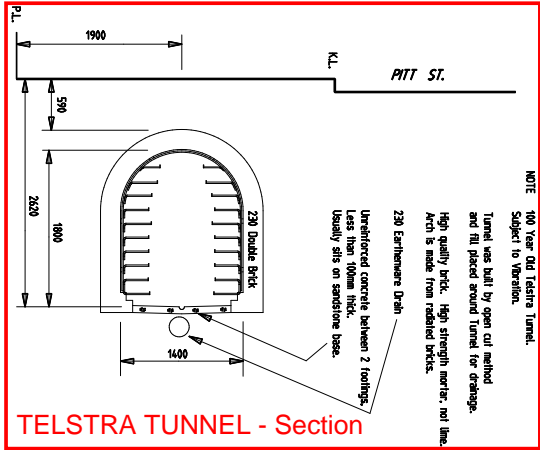
1005



ARUP		Job No			271640-11		Status	information	
		Dwg No		SSK-01			Rev	3	
		Date	17/03/2020	Made by	Cass	Page	10 of 11		
Job Title		338 Pitt Street, Sydney							
Dwg Title		Basement Shoring - Concept							

LOWER GROUND





Allow boundary clearance of minimum 1.0m in the architectural planning to accommodate the shoring wall.

Shoring wall below

Metro rail first reserve

Telstra New City South Exchange Cable Chamber

Underpinning of the foundations to this neighbouring building may be required.

Allow in the shoring design for any surcharge influence from the neighbouring building foundations

Telstra easement

ARUP	Job No	271640-11		Status	information	
	Dwg No	SSK-01		Rev	3	
	Date	17/03/2020	Made by	Cass	Page	11 of 11
Job Title	338 Pitt Street, Sydney					
Dwg Title	Basement Shoring - Concept					

## Appendix B

### Geotechnical Report

191029 PSM3102-006R - Appendix B of the Rail Corridor IS.pdf