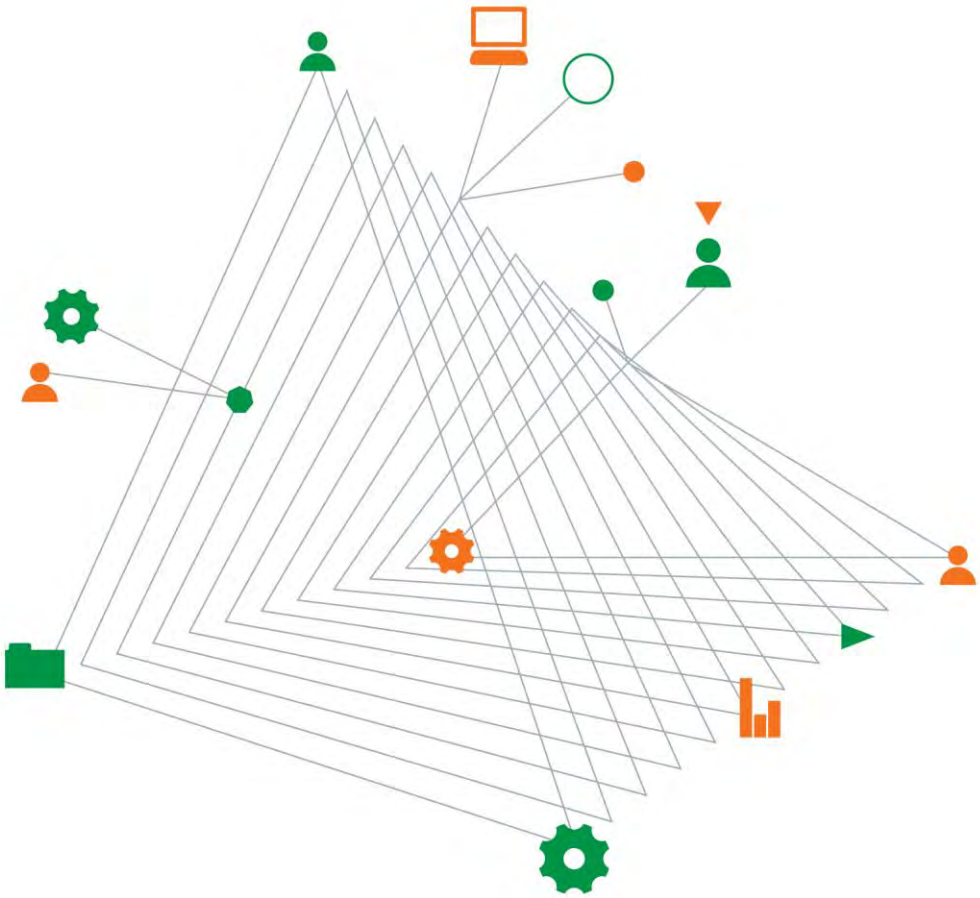
Report of Geotechnical Desktop Study

DPT and DPPT Operator Pty Ltd c/- Enstruct Group Pty Ltd

Proposed Cockle Bay Park, Darling Harbour, NSW

Cockle Bay Park, Darling Harbour, NSW

25 August 2017



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Proposed Cockle Bay Park, Darling Harbour, NSW

Prepared for
DPT and DPPT Operator Pty Ltd c/- Enstruct Group Pty Ltd
Level 4, 2 Glen Street
Milsons Point NSW 2061

Prepared by
Coffey Services Australia Pty Ltd
Level 19, Tower B, Citadel Towers
Chatswood NSW 2067
t: 02 9406 1000 f: 02 9406 1001
ABN: 55 139 460 521

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Document authorisation

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For and on behalf of Coffey

Patrick Wong
Senior Consultant

Quality information

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1. Introduction

1.1. General

This report presents the results of a geotechnical desk study carried out for the proposed Cockle Bay Park located on the eastern side of Darling Harbour, NSW. The study has been carried out in general accordance with our proposal dated 12 May 2016 (ref GEOTLCOV25496AB-AA). This report supports a State Significant Development Application (SSDA 7684) submitted to the Minister for Planning and Infrastructure pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). This study was commissioned by the Darling Park Trust (DPT) and DPPT Operator Pty Ltd (ABN 94 092 173 754). This study is being carried out as an extension to our previous works on the preliminary assessment of tower foundations (ref GEOTLCOV25496AA-AC Rev 1 dated 26 November 2015).

This report supports the Response to Submissions and amended Concept Proposal associated with a State Significant Development Application (SSDA 7684) submitted to the Minister for Planning and Infrastructure pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

DPT Operator Pty Ltd and DPPT Operator Pty Ltd (the Proponent) is seeking to secure approval to establish concept proposal details for the redevelopment of the Cockle Bay Wharf Building and surrounding area to create a new area of open space and commercial, retail and tourist precinct in the heart of the CBD (now referred to as Cockle Bay Park). The amended concept plan includes:

- a large area of publicly accessible open space;
- new retail outlets, including new food and beverage destinations;
- new cultural and entertainment destinations; and
- a new commercial office tower.

The project will add new open space to the Sydney CBD and help to reconnect the city to the Darling Harbour waterfront. Cockle Bay Park will take its place in a revitalised Sydney CBD and speaks directly to local government objectives to create a ‘Green, Global and Connected City’ (City of Sydney) as well as the strategic vision outlined in ‘Towards Greater Sydney 2056’ to grow the “developing central city”. The vision for this project was developed with consideration for the NSW Government objectives to support and “grow the knowledge industry”, double tourism expenditure and “strengthen our local environment and communities” as outlined in ‘NSW 2021: A Plan to Make NSW Number One’.

The objectives of this desk study are to provide:

- Preliminary ground conditions
- Preliminary design parameters for foundations
- Identification and discussion of perceived geotechnical issues and constraints
- Recommended further geotechnical investigations

Please note that all plans, diagrams, images and graphics within this report and the supporting documentation (excluding the amended Concept Proposal Envelope Plans prepared by Francis-Jones Morehen Thorp Pty Ltd) are indicative only and have been included to communicate the intent of the amended Concept Proposal, including representative building shapes, forms, locations, layouts and relationships. It is proposed that these representations, together with acceptance of the building envelopes and massing, and associated design principles, will then be used to inform the Design

Excellence process to follow the Stage 1 SSD Determination. Design Excellence outcomes will form the basis of the Stage 2 SSDA.

1.2. Background

The Proponent controls the lease of the site, and also of the adjacent Darling Park precinct. The Darling Park site is a successful premium grade office precinct located on the west of the Sydney CBD, the associated Crescent Garden, located to the west of the three existing Darling Park towers, is a key area of open space in this part of the city.

The Proponent has recognised a number key issues with the existing layout of the Darling Park and Cockle Bay precinct, these being:

- The existing Cockle Bay Wharf building is not well integrated with the city, the Western Distributor freeway currently acts as a barrier to separate this area from the CBD;
- Publicly accessible open space is limited to the existing Crescent Garden in Darling Park; and
- The existing Cockle Bay Wharf building is outdated and is not in keeping with the future of Darling Harbour area as a vibrant entertainment and tourist destination.

The Cockle Bay precinct is at risk of being left behind and undermining the significant investment being made in Darling Harbour that will see it return to the world stage as a destination for events and entertainment. Accordingly, the Proponent is taking a carefully considered and staged approach to the complete revitalisation of the site and its surrounds. The envisaged development, which will be facilitated by the proposed building envelopes will:

- Reconnect the city with the Darling Harbour waterfront;
- Create new publicly accessible open space in the heart of the Sydney CBD;
- Create new public land above the Western Distributor;
- Provide new access routes between the city and the ICC Sydney / Darling Harbour Live precinct;
- Support the Sydney economy by providing a new premium commercial building; and
- Refresh and renew an existing entertainment and tourist destination.

2. Site Description and Proposed Development

2.1. Site Description

The Site is located within Darling Harbour. Darling Harbour is a 60 hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

The Site is located to the immediate south of Pyrmont Bridge, within the Sydney CBD on the eastern side of the Darling Harbour precinct. The Site is also located within the City of Sydney local government area (LGA). A locational context area plan and location plan are provided at Plate 1 below.

The project Site area has been slightly amended by this Response to Submissions, a comparison of the exhibited and now-proposed Site area is provided as Plate 2, and the now proposed Site area is shown below as Plate 3.

The Darling Harbour precinct is undergoing significant redevelopment as part of the SICEEP, Darling Square, and IMAX renewal projects. The urban, built form and public transport / pedestrian context for the proposed Harbourside development will fundamentally change as these developments are progressively completed.

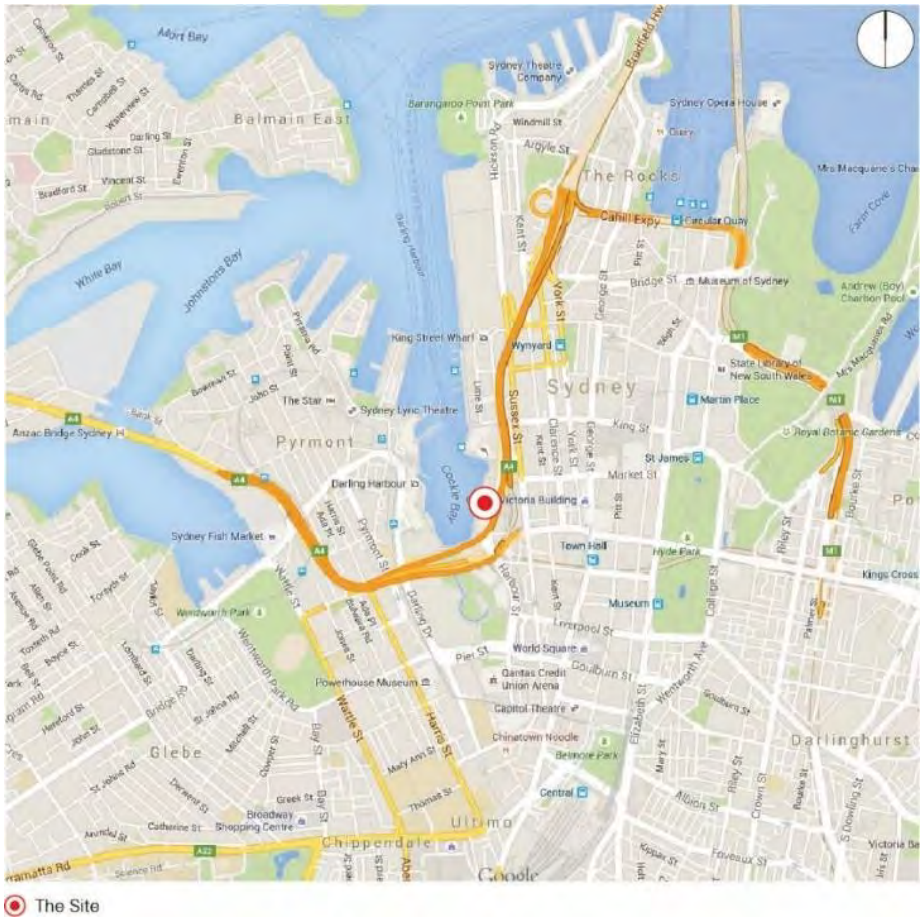


Plate 1 – Location Context Area Plan

Plate 2 – Location Plan (revised site area in yellow)

Plate 3 – Amended Location Plan

2.2. Overview of Proposed Developments

The proposal relates to a staged SSDA and seeks to establish amended concept proposal details for the renewal and re-imagining of the Cockle Bay precinct. The amended Concept Proposal establishes the vision, planning and development framework which will be the basis for the consent authority to assess future detailed development proposals. The Cockle Bay Park Site is to be developed for a mix of Retail, Cultural and Commercial (Office) uses including retail and restaurants, offices, and publicly accessible open space.

The amended Concept Proposal seeks approval for the following key components and development parameters:

- Demolition of existing site improvements, including the existing Cockle Bay Wharf building complex, pedestrian bridge links across the Western Distributor, and obsolete monorail infrastructure;

- Building envelopes;
- Land uses across the Site;
- A maximum total Gross Floor Area (GFA) across the Cockle Bay Park of 75,000m^2 for commercial development and 14,000m^2 for retail (including food and beverage) development;
- Urban Design and Public Realm design principles to provide a Design Excellence framework; and
- Strategies for utilities and services provision, drainage and flooding, and ecological sustainable development.

We understand that the proposed deck structure over the existing Western Distributor will cover a wide area extending from an existing pedestrian overpass which leads to the Pyrmont bridge near the northern end of the site to another overpass connecting the promenade to the parking facility (see Appendix A). It is understood that a number of piled-foundation and columns will be constructed to support the deck.

In an email correspondence dated 27 July 2016, we were advised that the proposed developments will not include any basement below the existing deck. Therefore, we have not considered any excavation work below the existing deck level. The proposed developments may include the consideration of the reuse of the columns and piled foundations supporting the existing structures. A plan view showing the extent of proposed developments and some architectural drawings as supplied by Enstruct Group Pty Ltd are attached in Appendix A.

3. Available Information

3.1. Published Information

The Sydney 1:100 000 geological map indicates that the site is underlain by quaternary alluvium of Holocene age infilling the Cockle Bay channel. The alluvium is further underlain by Hawkesbury Sandstone formation. The alluvium is described as silty to peaty sand, silt and clay with ferruginous and humic cementation in places and common shell layers. These river sediments and back swamp deposits would be expected to have been deposited predominantly in a north-south direction, consistent with the shape of the bay. The underlying sandstone bedrock is described as medium to very coarse grained quartz sandstone, with very minor shale and laminate lenses.

3.2. Coffey's Archived Information

Coffey has undertaken a number of geotechnical site investigations in the vicinity of the site locations. Our past projects and relevant reference numbers are given in Table 2 below.

Table 1 – Summary of Past Projects and Experience

Reference No.	Project Description (Client, Project Name and Time)
R1	Department of Main Roads, "North Western Expressway Project", 1971
R2	Leighton Contractors Pty Ltd, "Darling Harbour Development Maritime Structures Geotechnical Investigation Zones 1 to 6", May 1985
R3	Sydney Harbour Foreshore Authority "Cockle Bay Marine Structures – Geotechnical and Geophysical Report", March 2015

Reference No.	Project Description (Client, Project Name and Time)
R4	Civic and Civic Pty Ltd, “Darling Park Stages 1 to 2”, 1996

A site plan and available borehole locations are shown in Figure 1.

4. Site History and Preliminary Geotechnical Model

4.1. History of Site Locality

Plate 4 below (ref. R2) shows the 1984 outline and western distributor location projected on Governor Macquarie’s map of 1822. It shows that Cockle Bay formerly extended to as far south as Haymarket. It has been progressively filled since the 1820’s to the current sea wall locations.

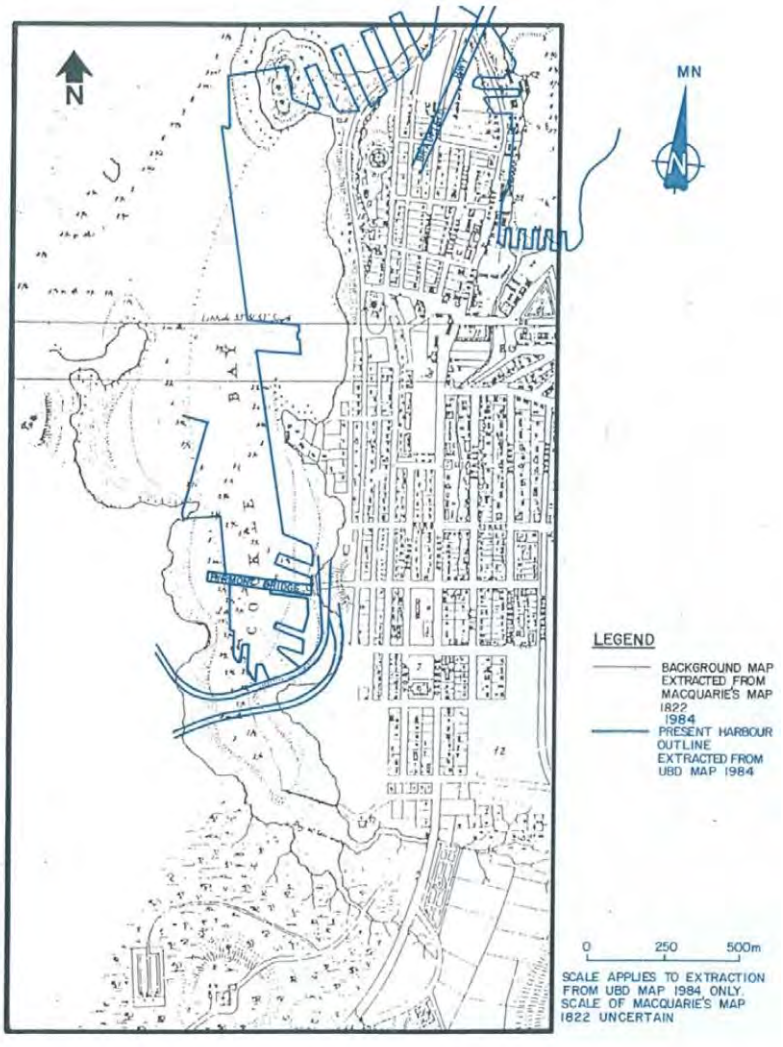


Plate 4 – Historical map showing Cockle Bay area overlain with harbour outlines in the 1984 (ref R2)

Finger wharfs and some adjacent buildings were present within the site proximity up to 1943 (see Plate 5). Between 1955 and 1963, roads were built along an area located slightly to the west of the current alignment of nearby section of Western Distributor. Between 1972 and 1982, a section of Western Distributor was built with which the site forms its eastern boundary. In 1985, the finger wharfs (see Plate 5) were demolished and the current concrete decking was built on piles extending past the sea walls over the bay.

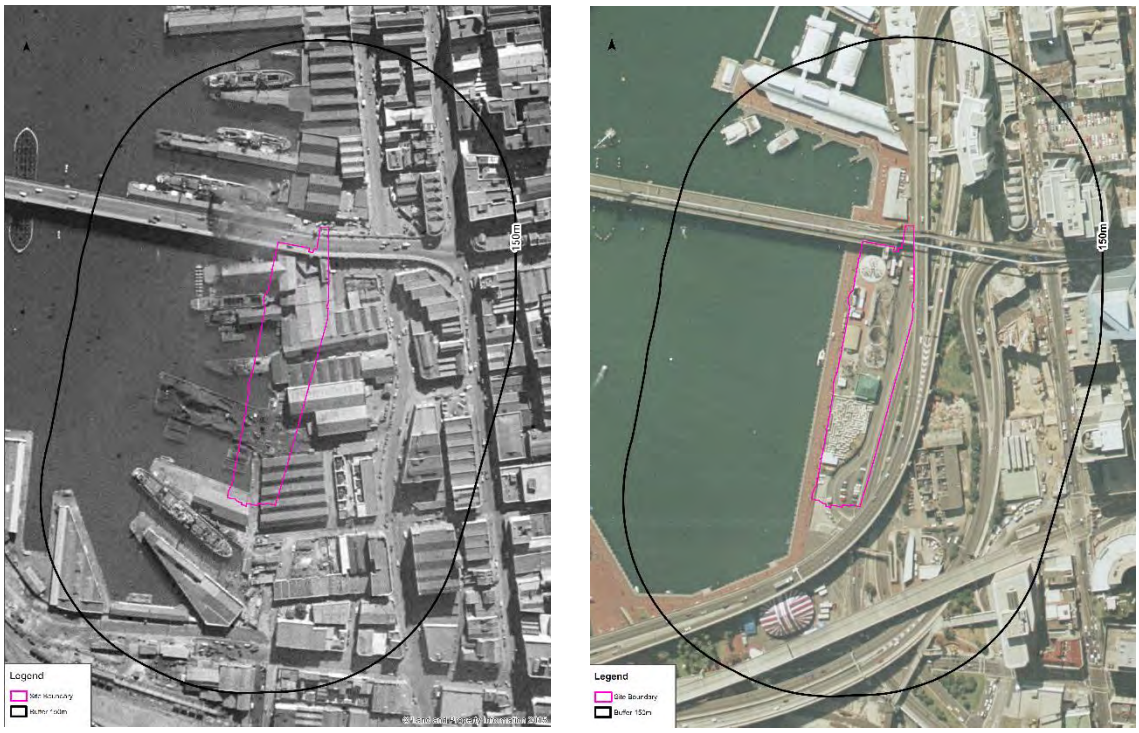


Plate 5 – Historical Area Photograph with the projected site boundaries at 1943 (left) and 1991 (right)

4.2. Preliminary Geotechnical Model

Based on available information above, we have developed a preliminary geotechnical model for the proposed development site as shown in Table 3 below. It is noted that the variations in the top of bedrock (Unit 4A or Unit 4C) are inferred in the north-south direction and west-east direction. The reduced level of the top of bedrock generally increases from the west (sea side) to the east while a dip in the top of bedrock is noted within the middle part of the site. The preliminary subsurface profiles along north-south direction and east-west directions intersecting at the tower location are plotted as Sections A-A' and B-B' presented as Figures 2 and 3, respectively. For clarity, the model shown in Table 3 excludes the area where the deck structure over the existing Western Distributor is proposed as the proposed deck covers a wider footprint.

Table 2 – Preliminary Geotechnical Model for the development building footprint

Unit	Material Type	Description	RL of top of unit (m AHD)	Thickness (m)
1	Fill and Disturbed Alluvium	Heterogeneous materials comprising gravel, sand, clay, sandstone, bricks, concrete and timber	3	4 to 6.5
2A	Estuarine Deposit	Clayey silt with high content of organic materials	Note (b)	Note (b)
2B, 2C, 3A and 3B	Alluvium	Silty sand, sandy clay, peaty clay, clay and clayey silt with some ironstone gravels	-3.5 to -1	3 to 11.5
4A	Sandstone Bedrock	Typically extremely weathered sandstone (Class V[a])	-15 to -4[c]	1 – 2
4B		Typically Highly to Moderately Weathered and Very Low to Medium Strength (Class IV[a])	Note (d)	Note (d)
4C		Typically Moderately to Slightly Weathered and Medium to High Strength (Class III[a])	-17 to -5	Note (e)

Note:

a. Where the rock classifications specifically relate to Shale or Sandstone, the classification is based on Pells et al (1998) "Foundations on Sandstone and Shale in the Sydney Region" that is in common use among geotechnical practitioners and contractors.

b. The estuarine deposit is predominantly present to the west of existing promenade. The presence and thickness of this layer beneath the site footprint are not indicated due to limited investigation data

c. The variation in the bedrock depth is noted. Refer to Sections A-A' (Figure 2) and Section B-B' (Figure 3) for illustration.

d. Unit 4B is not clearly noted due to limited investigation data.

e. The extent of Unit 4C is not given due to the limited depths of boreholes from past geotechnical investigations.

The geotechnical model for the proposed deck located in the eastern part of the site is generally similar to that shown in Table 3. However, the inferred top of bedrock (Units 4A or 4C) increases up to RL -2mAHD towards the eastern end. Some parts of Section B-B' and Section C-C' presented as Figures 3 and 4, respectively, were plotted to indicate the inferred subsurface conditions based on archived information within the area where the proposed deck structure is located.

5. Discussion and Recommendation

5.1. Foundations

We have assumed that piled foundation with or without raft may be adopted to support the proposed developments including the tower core. It is expected that the piles will penetrate into and be founded in the sandstone bedrock (Units 4A, 4B and 4C). Table 4 below presents indicative serviceability and ultimate limit state design parameters that can be adopted for the preliminary design of piled foundation system into the sandstone bedrock.

Table 3 – Preliminary Design Parameters for Piled Foundation System

Unit	Foundation Material	Serviceability End Bearing (kPa)[2]	Ultimate End Bearing (kPa)	Ultimate Shaft Adhesion (kPa)[3]	Ultimate Lateral Yield Pressure (kPa)	Young's Modulus (MPa)[4]	
						Axial Ev	Lateral Eh
1	Fill	-	-	30	200	10	7.5
2A	Estuarine Deposit	-	-	20	180	4	3
2B, 2C, 3A and 3B	Alluvium Deposit	-	-	30	350	10	7.5
4A	Class V Sandstone[1]	800	2,000	100	500	50	37.5
4B	Class IV Sandstone[1]	2,000	10,000	500	2,500	200	150
4C	Class III Sandstone[1]	6,000	25,000	1,000	6,000 to 12,000[5]	500	375

Note:

1 Where the rock classifications specifically relate to Shale or Sandstone, the classification is based on Pells et al (1998) "Foundations on Sandstone and Shale in the Sydney Region" that is in common use among geotechnical practitioners and contractors.

2 Serviceability design parameters are based on settlements of less than 1% of the pile diameter or footing width. Higher serviceability design values may be possible based on specific assessment of foundation settlement.

3 Shaft adhesion assumes a rough socket (at least grooves of depth 1 mm to 4 mm and width greater than 5 mm at spacing of 50 mm and 200 mm).

4 For the ultimate limit state design, serviceability should also be assessed using the Young's modulus to check that settlements are within tolerable limits.

5 Ultimate lateral yield pressure of up to 12,000 kPa may be adopted from 1 m below the top of Class III sandstone.

If foundations are to resist uplift (i.e. due to wind load), the ultimate shaft adhesion shown in Table 4 should be reduced by a factor of 0.7. Uplift piles should also be checked for an inverted cone pull-out mechanism.

Rock quality should be assessed during construction to verify that the quality is consistent with design assumptions. For the design of bored piles, particular attention needs to be given during construction to ensuring the socket is cleaned and roughened using a suitable scraper such as tooth oriented perpendicular to the auger shaft prior to pouring of concrete. To achieve the required socket during construction, the pile hole will need to be cased within the fill and alluvium layers and then bored into rock to obtain the required socket length.

For limit state design, the design ultimate geotechnical pile and footing capacity is derived by applying a geotechnical strength reduction factor (Φ_g) to the ultimate geotechnical capacity assessed using the parameters shown in Table 4. In addition, in accordance with AS2159-2009, the selection of Φ_g is dependent on the Average Risk Rating (ARR) which takes into account various geotechnical uncertainties, foundation system redundancy, construction supervision, quantity and type of pile testing. The assessment of Φg therefore depends on the structural design as well as the design and construction method, and pile load testing (if any) to be employed by the designer and piling contractor. Where testing is undertaken, it may be possible to adopt a higher Φ_g value that leads to a more economical design.

The use of limit state design also requires assessment of the serviceability performance of the foundation system, and this often governs the design of rock socketed piles. This should be carried out by an experienced geotechnical professional using well-established and soundly based methods. The Young's modulus given in Table 4 may be adopted for the assessment of serviceability performance of the foundation system. It should be noted that pile performance is dependent on construction methods as well as material stiffness. Where foundation settlement is critical to the performance of the structure, serviceability pile load testing should be carried out to confirm the design assumption and/or assess prediction accuracy.

5.2. Reuse of Existing Piles

We were previously advised that the existing piles supporting the current buildings are founded on Class III Sandstone (Unit 4C). Based on Pells et al (1998), a typical serviceability bearing pressure in the order of up to a maximum 6 MPa can be assigned for existing piles that are founded in Class III Sandstone, with an anticipated settlement of less than 1% of the pile diameter.

The detailed design incorporating the reuse of existing piles should be carried out after the detailed information regarding the piles are obtained. These information comprise the pile dimension and as-built toe level, the layout and spacing of pile group, raft details (if any), and other relevant construction records which may be available such as pile testing record.

5.3. Soil Aggressivity

The groundwater in Cockle Bay area is expected to be generally at RL 0 mAHD. It is considered that the fluctuating seawater will directly affect the groundwater beneath the site footprint.

The results of past chemical analyses (reference R2) on four sediment samples indicate that the foundation environment is highly aggressive in terms of corrosion of steel elements especially at the splash zone (near the fluctuating sea level) and mud zone (near sea bed level). A previous report on corrosion of steel piles concluded corrosion rates between 0.02 mm/year and 0.03 mm/year at depths where oxygen level is limited. In the splash zone, a value of 0.1 mm/year should be allowed unless corrosion protection such as cathodic protection is provided. Corrosion protection can also take the form of epoxy coatings or protective paint.

It is prudent that the aggressivity testing is carried out once the detailed design is developed as the chemical conditions of soil and groundwater may change over times due to the surrounding development and human activities.

5.4. Potential Impact on Adjacent Buildings

As no basement is currently proposed for the developments, the risk of excavation induced movements and groundwater inflow issues impacting on adjacent structures is expected to be negligible.

The plants used for the construction and demolition activities could cause potential vibration damage to the nearby structures. Therefore, an assessment of the proximity of vibration sensitive structures to the construction and demolition zones should be carried out. Additionally, dilapidation surveys on the existing structures are also recommended before any activity which generates vibration begins and on the completion of the respective activity.

5.5. Earthquake Design

Based on AS1170.4 – 2007, the Earthquake Hazard Factor, Z, for the Sydney region is 0.08. The site in its present condition would be the site sub-soil Class D_e (Deep or Soft Soil Soil Site). The Earthquake Design Category could then be assessed based on a Probability Factor, kp, (which is related to an Annual Probability of Exceedance) as defined in Table 3.3 of AS1170.4 – 2007.

5.6. Recommended Geotechnical Investigations

It can be expected that the recent developments in the Cockle Bay area may have altered the ground conditions to a certain extent. Therefore, further geotechnical investigation is required after the structural design is developed. The existing buildings and current usage of the site will impose access and space constraints to carry out a ground-intrusive investigation. Hence, prior to any ground intrusive investigation, a non-intrusive geophysical investigation using Land Seismic Refraction or similar method can be carried out as an option to obtain preliminary information regarding the current ground conditions and assist in the subsequent planning of the ground-intrusive investigations.

For the ground-intrusive investigation, a few boreholes are proposed to be drilled within or in the vicinity of the tower footprint and elsewhere within the overall site footprint depending on the accessibility. The boreholes should be drilled to about 5 m deep below the anticipated toe level of the piles. The boreholes should include an allowance for the sampling of soil and rock core. A standpipe piezometer can be installed in one of the boreholes to monitor and sample the groundwater. Aggressivity testing should be carried out on soil and groundwater samples.

5.7. Conclusion

Based on a review of the available information and our experience with projects within Cockle Bay area and other projects of similar nature, the development is considered feasible from a geotechnical perspective subject to appropriate design and construction methodology. The amended proposed development without basements has eliminated potential problems associated with dewatering and excavation induced ground movements to existing structures. Further geotechnical site investigations should be carried out following SSDA approval to assess the subsurface conditions, assist in developing a more thorough geotechnical site model and support detailed design works.

6. Closure

The description of subsurface conditions is based on a desktop study, published maps, historical investigations for other purposes and our local experience. The preliminary geotechnical models and geotechnical engineering comments/advice presented in this report are based on professional judgment and limited information, and must be assessed and reviewed following detailed geotechnical site investigations and laboratory testing.

To evaluate potential impacts to nearby services and infrastructure, detailed geotechnical assessments should be carried out once the detailed designs for the proposed developments have been developed. Additional site investigation, detailed design assessments and construction monitoring normally associated with this type of development must be undertaken.

The attached document entitled “Important Information about your Coffey Report” presents additional information on the uses and limitations of this report.

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

LEGEND

- PREVIOUS BOREHOLE LOCATION (REFERENCE R1 AND R2)
- GEOPHYSICS LINE (REFERENCE R3)
- APPROXIMATE PODIUM PROFILE
- APPROXIMATE TOWER PROFILE
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE PROPOSED DECK OVER WESTERN DISTRICTOR
- LOCATION OF GEOTECHNICAL SECTIONS

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	AW	PKW	25/07/17
	B	REVISION No.1	FS	PKW	25/08/17

10 0 20 40 60

Scale (metres) 1:1250

drawn	FS / AW
approved	PKW
date	25 / 08 / 17
scale	1:2000
original size	A3

coffey
A TETRA TECH COMPANY

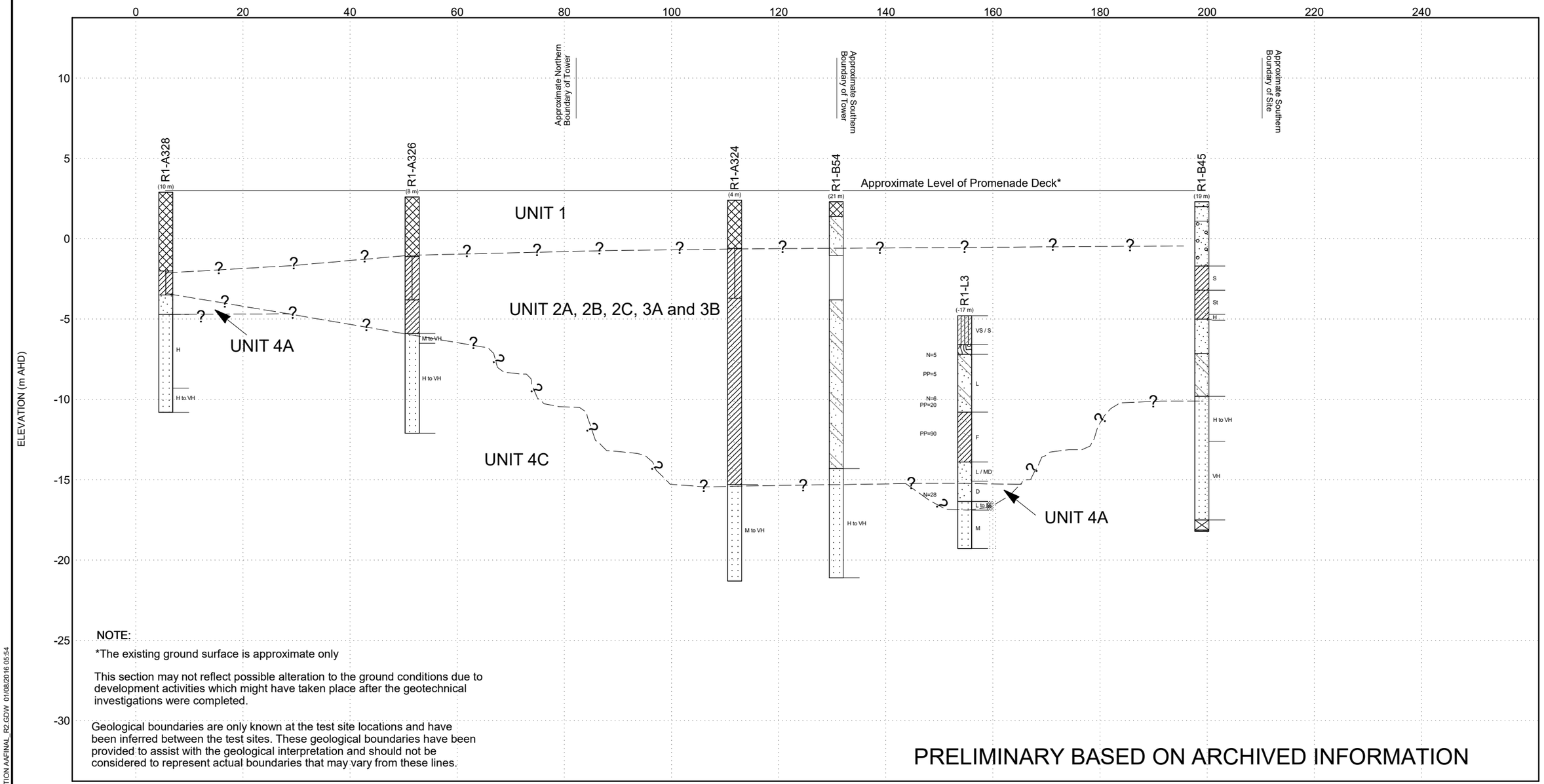
client: DPT AND DPPT OPERATOR PTY LTD

project: PROPOSED CBP PROJECT
COCKLE BAY PARK, DARLING HARBOUR, SYDNEY, NSW

title: PLAN SHOWING PROPOSED DEVELOPMENT AND BOREHOLE LOCATIONS

project no: GEOTLCOV25496AB-AB | figure no: FIGURE 1 | rev: B

PLOT DATE: 25/08/2017 1:57:44 PM DWG FILE: \\TTS779FS1.TT.LOCAL\DATA2. TECHNICAL\GEOTECHNICS\1.PROJECTS\GEOTLCOV25496\GEOTLCOV25496AB CBW PROJECT DARLING HARBOUR\CAD\754-GEOTLCOV25496AB-AB-REVB.DWG



NOTE:

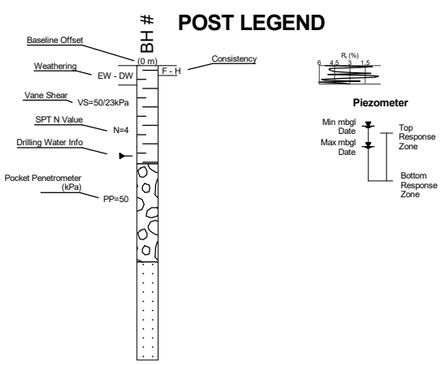
*The existing ground surface is approximate only

This section may not reflect possible alteration to the ground conditions due to development activities which might have taken place after the geotechnical investigations were completed.

Geological boundaries are only known at the test site locations and have been inferred between the test sites. These geological boundaries have been provided to assist with the geological interpretation and should not be considered to represent actual boundaries that may vary from these lines.

PRELIMINARY BASED ON ARCHIVED INFORMATION

POST LEGEND



MATERIAL GRAPHIC

FILL
SILTY CLAY
SANDY CLAY
SANDSTONE
SAND
CONCRETE
GRAVELLY SAND
CLAY
CLAYEY SAND
NO CORE
SHALE
CLAYEY SILT
WOOD

PROJECT UNIT

UNIT 1 - Fill
UNIT 2A - Estuarine Deposit
UNITS 2B, 2C, 3A and 3B - Alluvium Deposit
UNIT 4A - Class V Sandstone
UNIT 4B - Class IV Sandstone
UNIT 4C - Class III Sandstone

H 1:750
0 5 10 15 20 25m
V 1:250
0 2 4 6 8 10m
Coord.System: ISG66 Zone 56 Height Datum: AHD

drawn	**FS**
approved	**PKW**
date	**07/08/2017**
scale	**H 1:750 V 1:250**
original size	**A3**

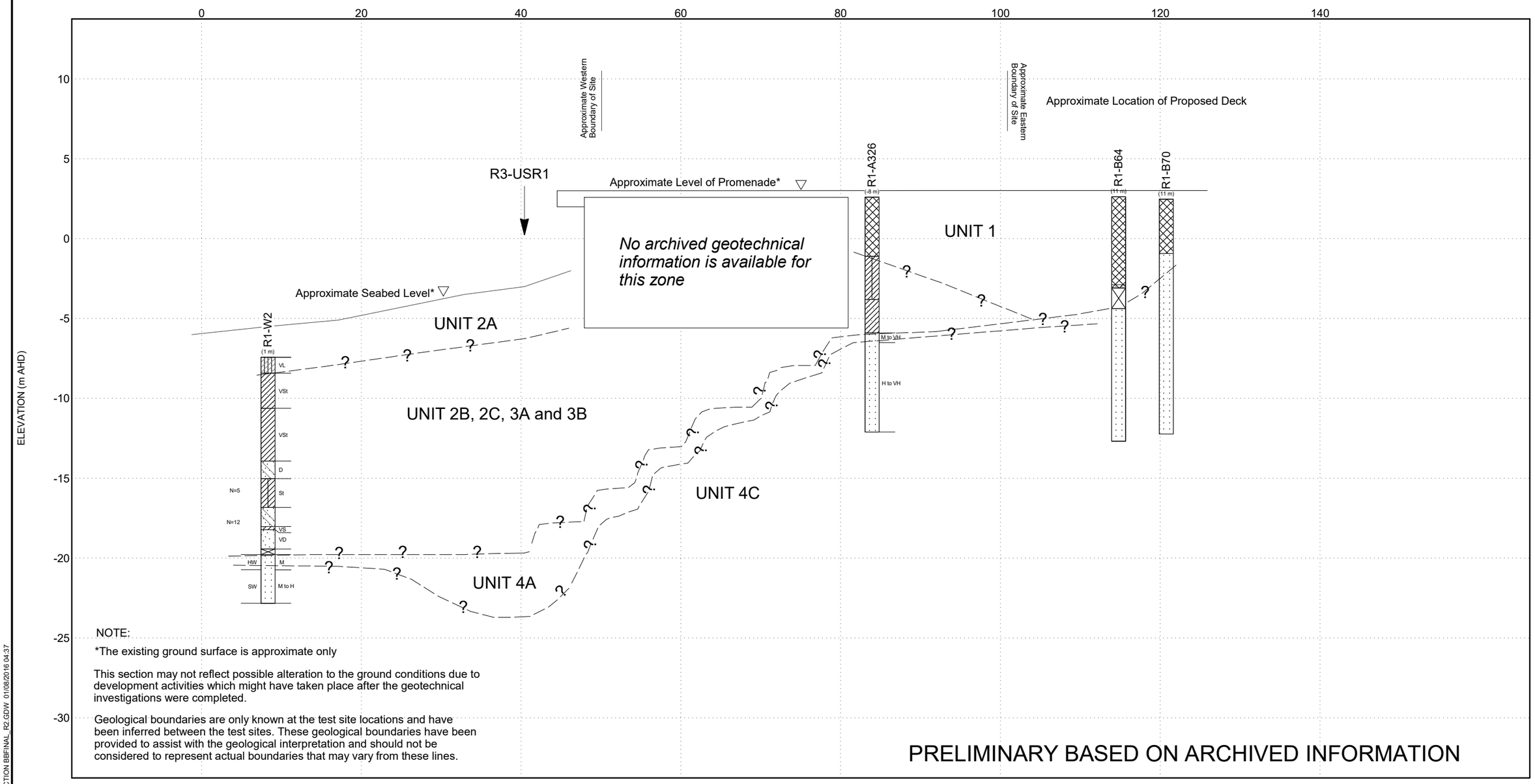
client: DPT AND DPPT OPERATOR PTY LTD

project: PROPOSED CBP PROJECT
COCKLE BAY PARK, DARLING HARBOUR, SYDNEY, NSW

title: PRELIMINARY GEOTECHNICAL SECTION A-A'

project no: GEOTLCOV25496AB | fig no: **2** | rev:

CDF_0_9_06_LIBRARY.GLB Fence COF FENCE A3L GEOTLCOV25293AA.GPJ SECTION AAFINAL_R2.GDW 01/08/2016 05:54



NOTE:

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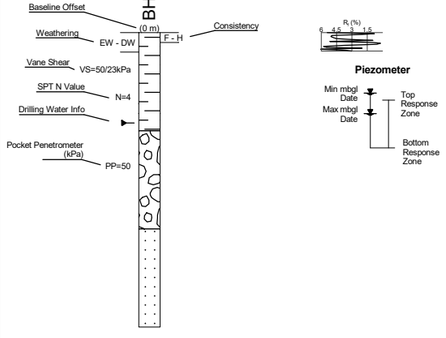
PRELIMINARY BASED ON ARCHIVED INFORMATION

POST LEGEND



MATERIAL GRAPHIC

- FILL
- SILTY CLAY
- SANDY CLAY
- SANDSTONE
- NO CORE
- CLAYEY SILT
- CLAY
- CLAYEY SAND
- SAND

H 1:500
0 5 10 15 20 25m
V 1:250
0 2 4 6 8 10m
Coord.System: ISG66 Zone 56 Height Datum: AHD

PROJECT UNIT

UNIT 1 - Fill
UNIT 2A - Estuarine Deposit
UNITS 2B, 2C, 3A and 3B - Alluvium Deposit
UNIT 4A - Class V Sandstone
UNIT 4B - Class IV Sandstone
UNIT 4C - Class III Sandstone

drawn	**FS**
approved	**PKW**
date	**07/08/2017**
scale	**H 1:500 V 1:250**
original size	**A3**

client: DPT AND DPPT OPERATOR PTY LTD

project: PROPOSED CBP PROJECT
COCKLE BAY PARK, DARLING HARBOUR, SYDNEY, NSW

title: PRELIMINARY GEOTECHNICAL SECTION B-B'

project no: GEOTLCOV25496AB | fig no: **3** | rev:

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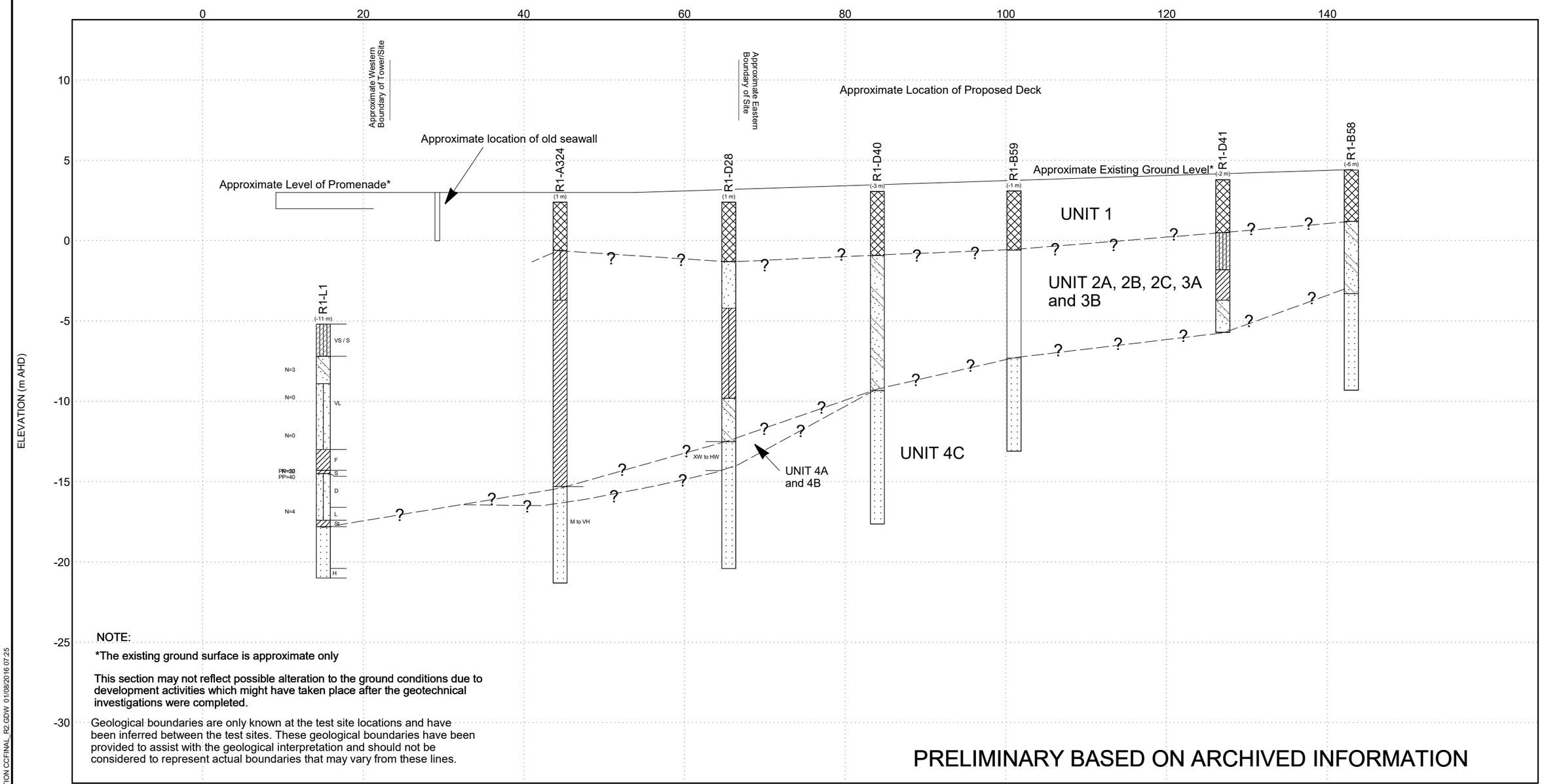

NOTE:

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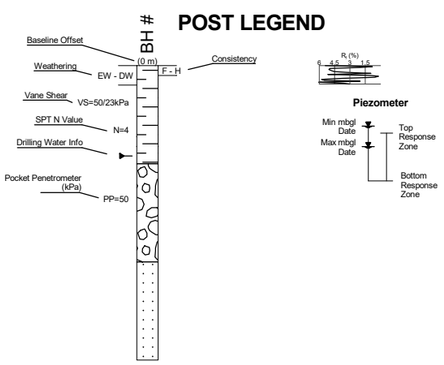
PRELIMINARY BASED ON ARCHIVED INFORMATION

POST LEGEND



MATERIAL GRAPHIC

- FILL
- SILTY CLAY
- SANDY CLAY
- SANDSTONE
- CLAYEY SAND
- SAND
- CLAYEY SILT
- SILTY SAND
- CLAY

H 1:500
0 5 10 15 20 25m

V 1:250
0 2 4 6 8 10m

Coord.System: ISG66 Zone 56 Height Datum: AHD

PROJECT UNIT

UNIT 1 - Fill
UNIT 2A - Estuarine Deposit
UNITS 2B, 2C, 3A and 3B - Alluvium Deposit
UNIT 4A - Class V Sandstone
UNIT 4B - Class IV Sandstone
UNIT 4C - Class III Sandstone

drawn	**FS**
approved	**PKW**
date	**07/08/2017**
scale	**H 1:500 V 1:250**
original size	**A3**

client: DPT AND DPPT OPERATOR PTY LTD

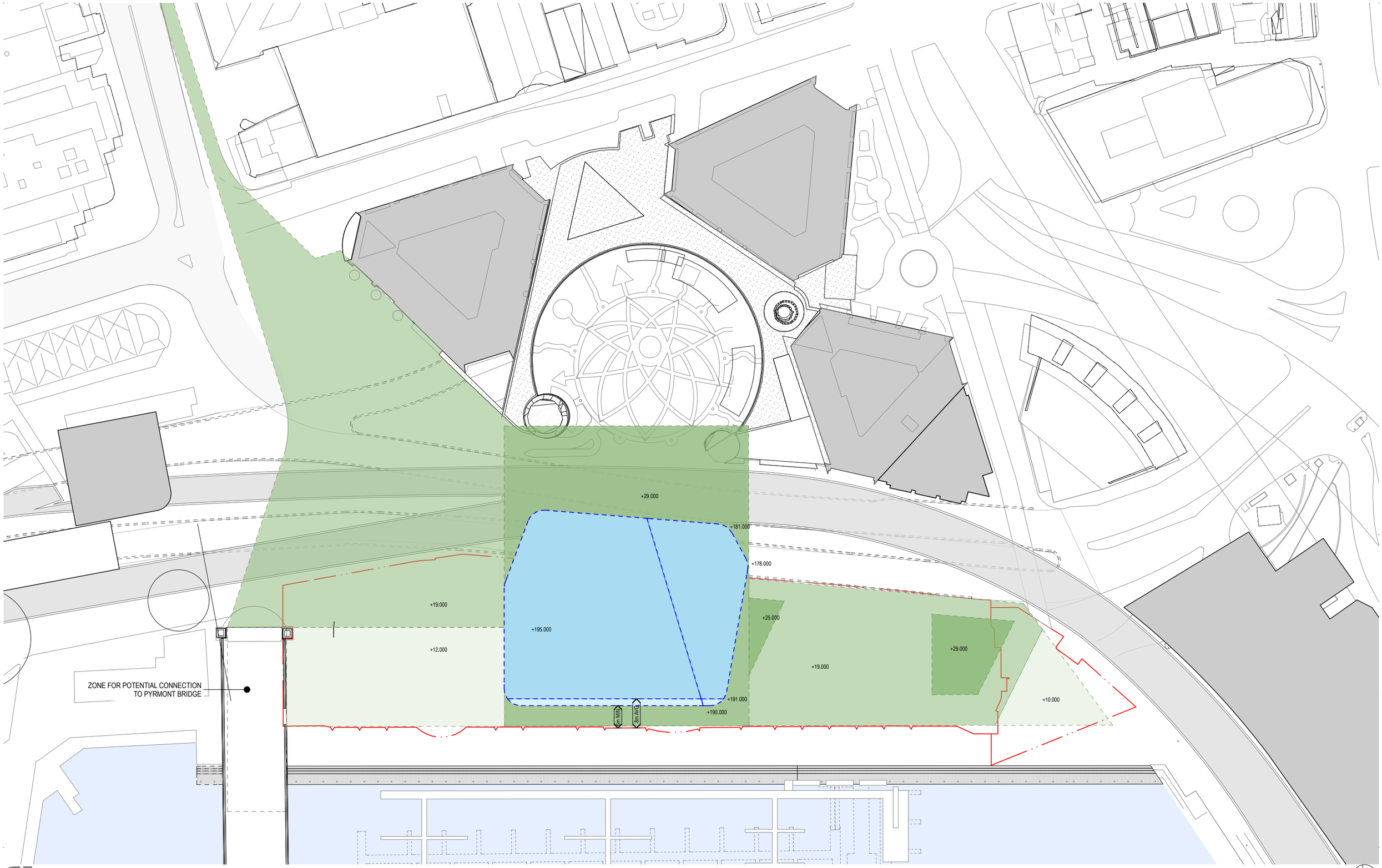
project: PROPOSED CBP PROJECT
COCKLE BAY PARK, DARLING HARBOUR, SYDNEY, NSW

title: PRELIMINARY GEOTECHNICAL SECTION C-C'

project no: GEOTLCOV25496AB | fig no: **4** | rev:

CDF_0_9_06_LIBRARY.GLB Fence COF FENCE A3L GEOTLCOV25293AA.GPJ SECTION CCFINAL_R2.GDW 01/08/2016.07.25

Appendix A - Structural Plan View and Architectural Drawings (supplied by Enstruct Group Pty Ltd)



fjmt

Envelope Plan

DPCBMP - DARLING PARK COCKLE BAY FEASIBILITY

0 10 20 50m

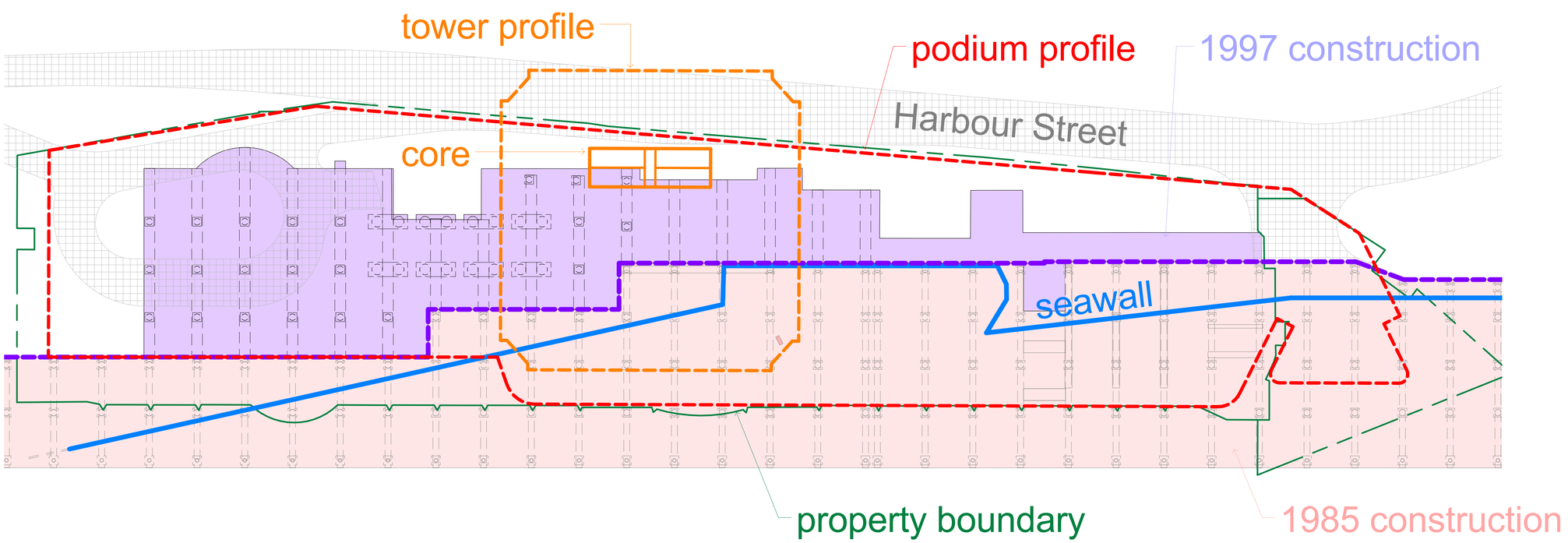
1:1000 @ A3

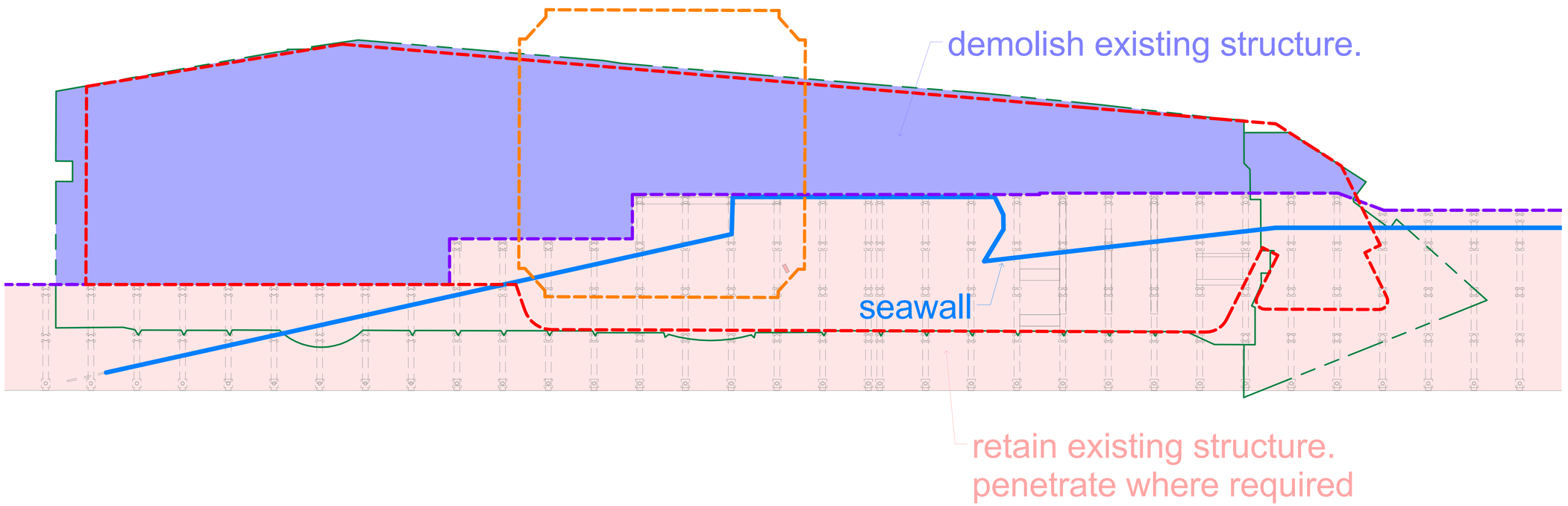
21/7/17

For Information

SK-14.20

A1





Rev.	Date	Description	By
2	28.07.17	ISSUED FOR INFORMATION	ML
1	18.11.16	ISSUED FOR INFORMATION	ML

enstruct group pty ltd

Level 4, 2 Glen Street
Milsons Point NSW 2061
Australia

Telephone (02) 8904 1444
Facsimile (02) 8904 1555
http: //www.enstruct.com.au

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project
COCKLE BAY PARK

drawing title
GROUND FLOOR PODIUM EXISTING CONDITIONS

status
FOR INFORMATION

scale at A1	drawn by	checked	date
1 : 400	ML	RC	09/08/16

project no.	drawing no.	rev.
4886	ST-100-00	2

28/07/2017 6:18:59 PM

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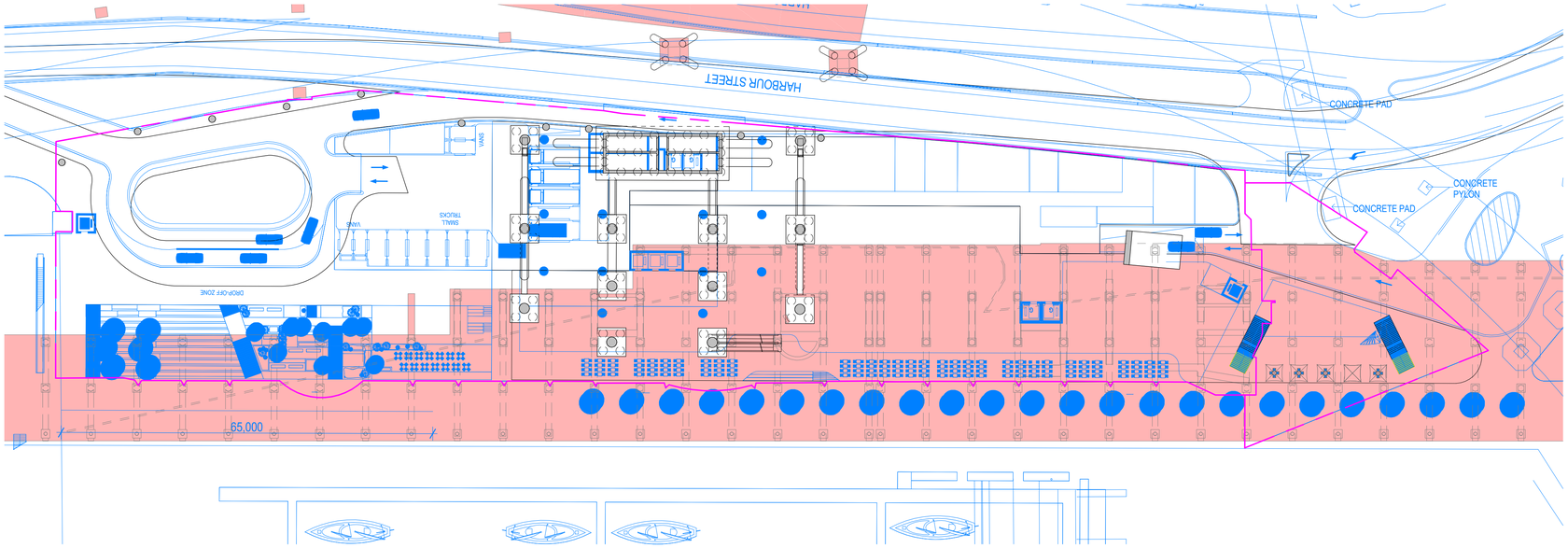

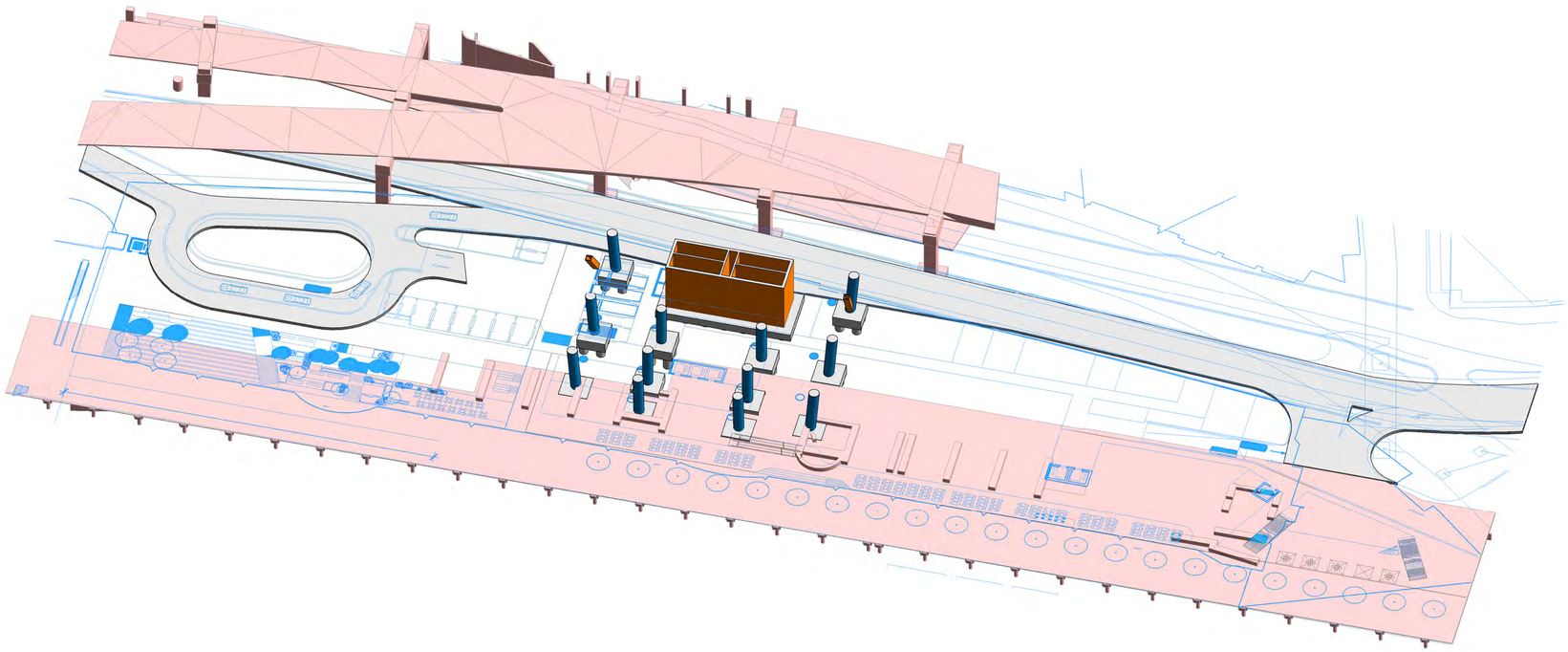

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1	28.07.17	ISSUED FOR INFORMATION	ML

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Level 4, 2 Glen Street
Milsons Point NSW 2061
Australia

Telephone (02) 8904 1444
Facsimile (02) 8904 1555
http: //www.enstruct.com.au

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project
COCKLE BAY PARK

drawing title
GROUND FLOOR ARCHITECTURAL OVERLAY

status
FOR INFORMATION

scale at A1	drawn by	checked	date
1 : 500	Author	Checker	07/20/17

project no.	drawing no.	rev.
4886	ST-100-11	1

28/07/2017 6:15:19 PM

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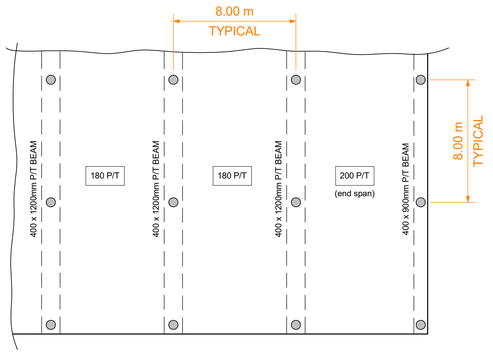
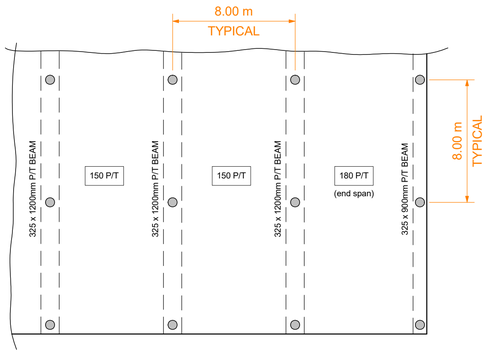


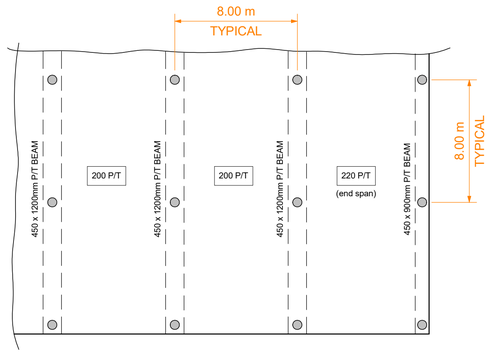
PODIUM FRAMING - RETAIL / LOBBY

REINFORCEMENT RATE = 75 kg/m³ : POST TENSIONING RATE = 6.5 kg/m³



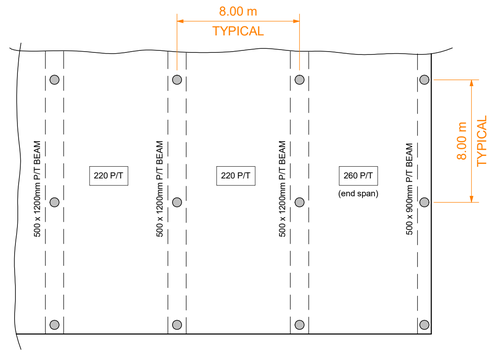
PODIUM FRAMING - CARPARKING

REINFORCEMENT RATE = 75 kg/m³ : POST TENSIONING RATE = 6.0 kg/m³



PODIUM FRAMING - PLANTROOMS

REINFORCEMENT RATE = 75 kg/m³ : POST TENSIONING RATE = 7.0 kg/m³



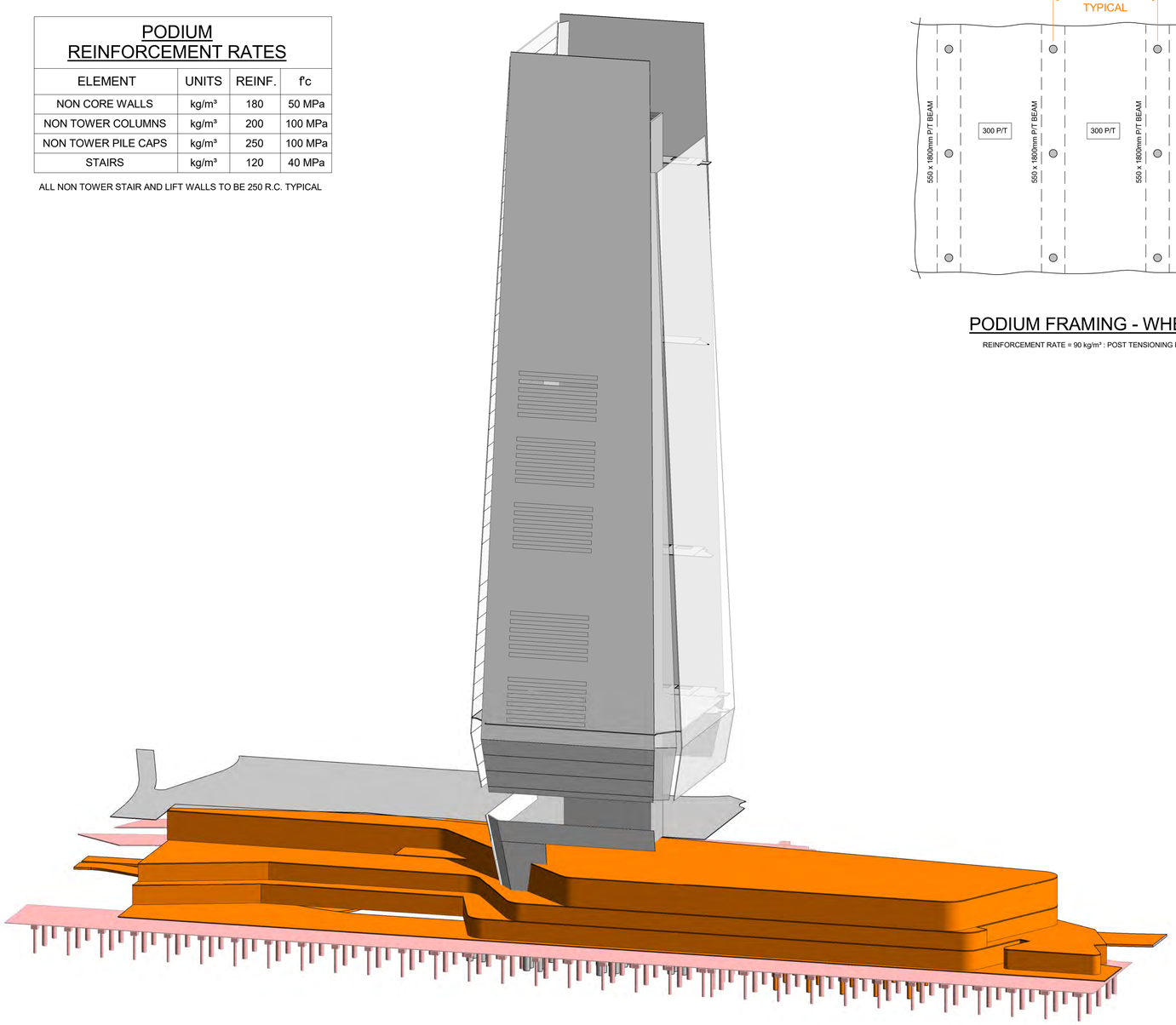
PODIUM FRAMING - LANDSCAPING

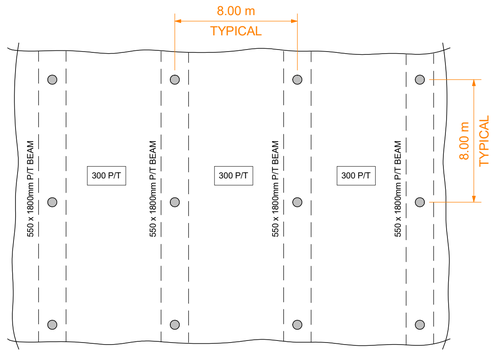
REINFORCEMENT RATE = 75 kg/m³ : POST TENSIONING RATE = 7.0 kg/m³
ASSUMED 500mm MAX. DEPTH OF SOIL

PODIUM REINFORCEMENT RATES

ELEMENT	UNITS	REINF.	f'c
NON CORE WALLS	kg/m³	180	50 MPa
NON TOWER COLUMNS	kg/m³	200	100 MPa
NON TOWER PILE CAPS	kg/m³	250	100 MPa
STAIRS	kg/m³	120	40 MPa

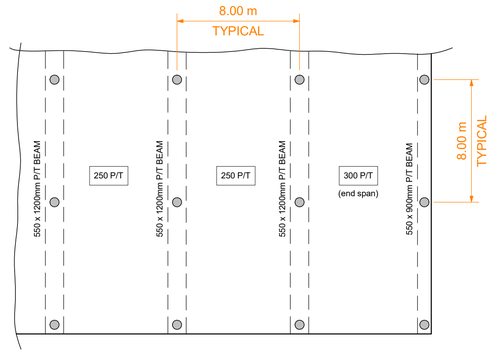
ALL NON TOWER STAIR AND LIFT WALLS TO BE 250 R.C. TYPICAL





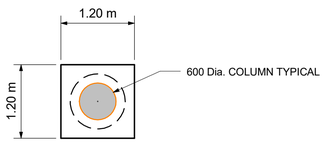
PODIUM FRAMING - WHEAT RD

REINFORCEMENT RATE = 90 kg/m³ : POST TENSIONING RATE = 8.0 kg/m³



PODIUM FRAMING - SUBSTATION / SWITCHROOM

REINFORCEMENT RATE = 90 kg/m³ : POST TENSIONING RATE = 8.0 kg/m³



PODIUM COLUMN / PILE CAP

TYPICAL FOR NON TOWER PODIUM COLUMNS

900mm DEEP WITH STEEL ENCASED 900mm Dia. REINFORCED CONCRETE PILE
3m SOCKET INTO CLASS III ROCK

CONCRETE STRENGTH f'c = 100MPa
PILE CAP REINFORCEMENT = 250 kg/m³
ASSUME 6000 kPa ALLOWABLE BEARING CAPACITY
ASSUME 600kPa ALLOWABLE SHAT ADHESION CAPACITY

Rev.	Date	Description	By
2	28.07.17	ISSUED FOR INFORMATION	ML
1	18.11.16	ISSUED FOR INFORMATION	ML

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Level 4, 2 Glen Street
Milsons Point NSW 2061
Australia

Telephone (02) 8904 1444
Facsimile (02) 8904 1555
http: //www.enstruct.com.au

project
COCKLE BAY PARK

drawing title
PODIUM LEVELS

status
FOR INFORMATION

scale at A1	drawn by	checked	date
As indicated	ML	RC	11/17/16

project no.	drawing no.	rev.
4886	ST-101-00	2

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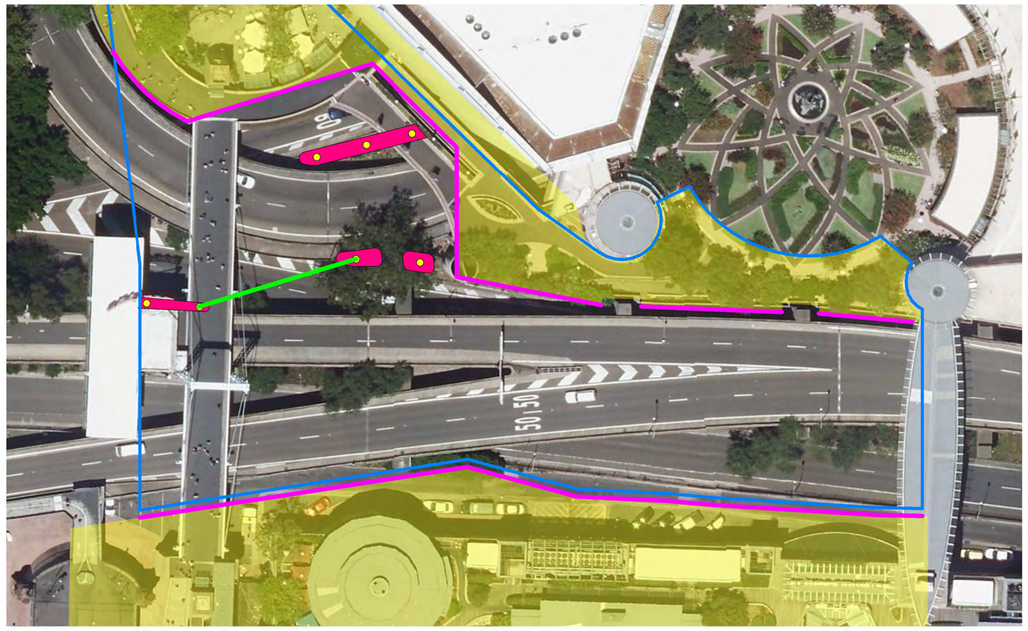
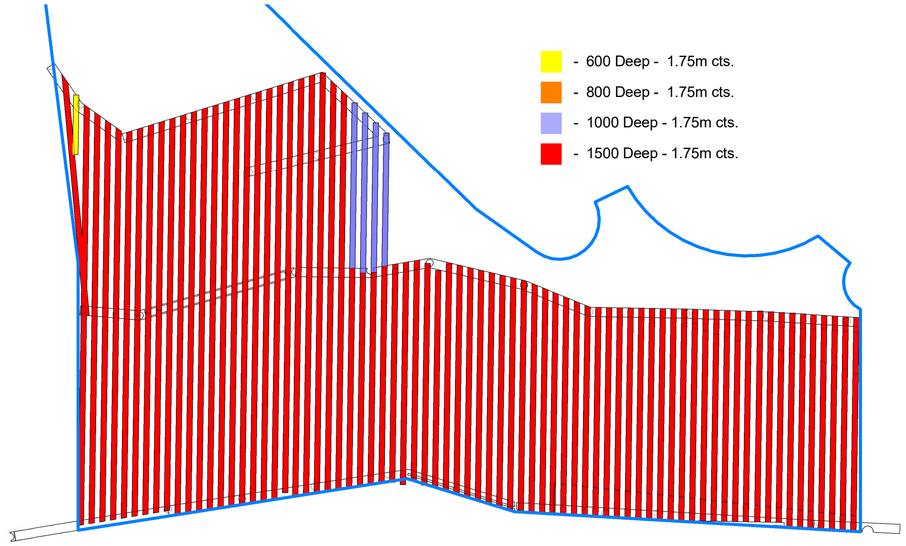
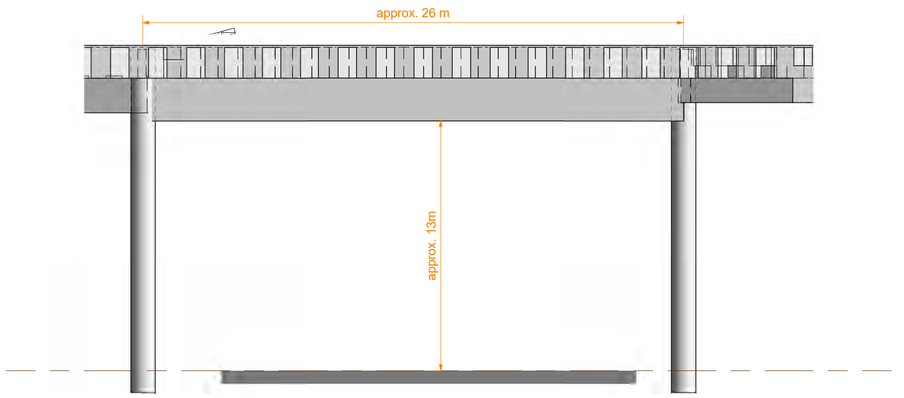


available vertical zone (indicative columns shown)
line of support within adjacent structures
adjacent structures
indicative bridge deck profile
3.5m deep precast beam





Truss Elevation
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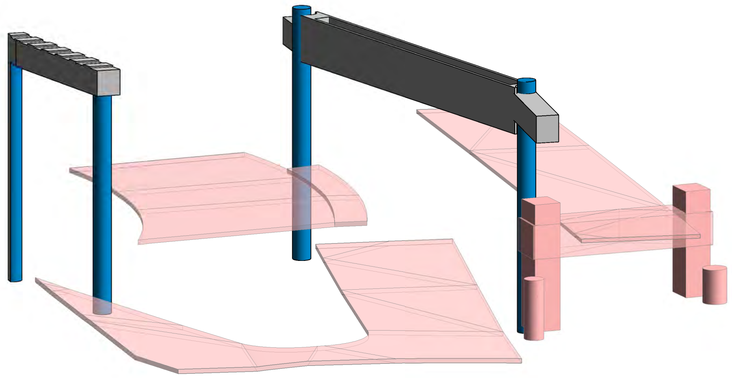

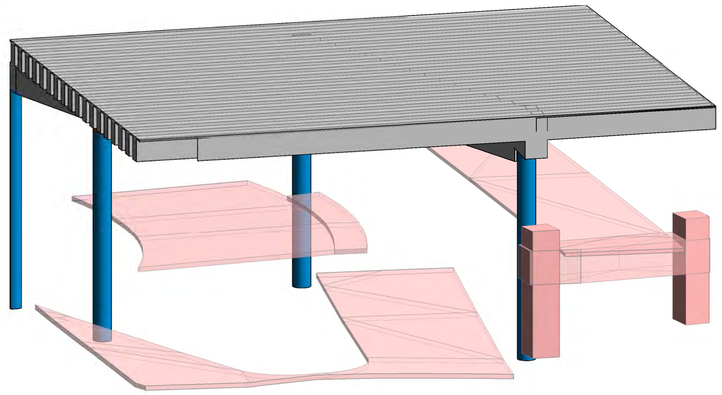

Indicative Southern column location

Indicative Northern column location

Rev.	Date	Description	By
5	15.08.17	ISSUED FOR INFORMATION	ML
4	26.07.17	ISSUED FOR INFORMATION	ML
3	14.06.17	ISSUED FOR INFORMATION	ML
2	26.05.17	ISSUED FOR INFORMATION	ML
1	18.11.16	ISSUED FOR INFORMATION	ML

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Level 4, 2 Glen Street
Milsons Point NSW 2061
Australia

Telephone (02) 8904 1444
Facsimile (02) 8904 1555
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project
COCKLE BAY PARK

drawing title
LAND BRIDGE CONCEPTS

status
FOR INFORMATION

scale at A1	drawn by	checked	date
As indicated	ML	RC	11/18/16

project no.	drawing no.	rev.
4886	ST-103-50	5

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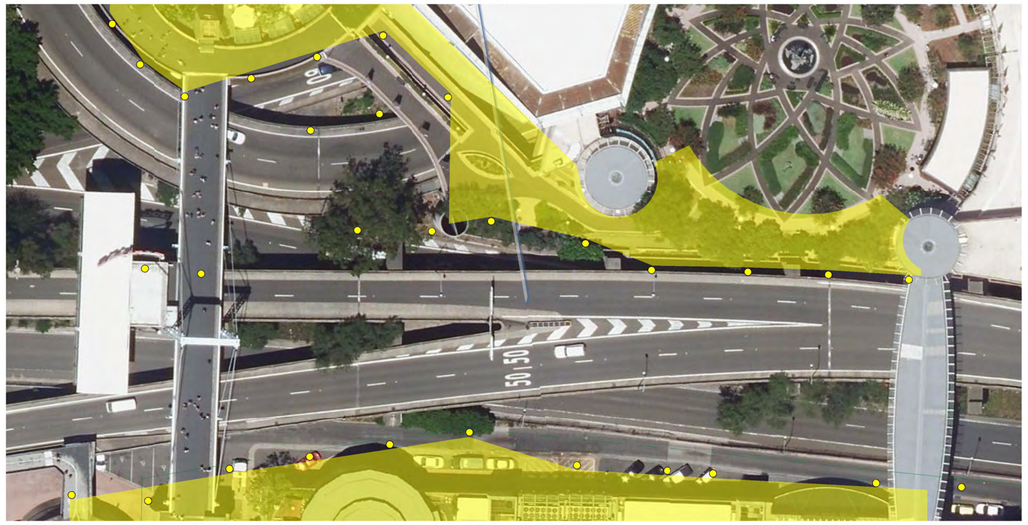

Land Bridge Columns

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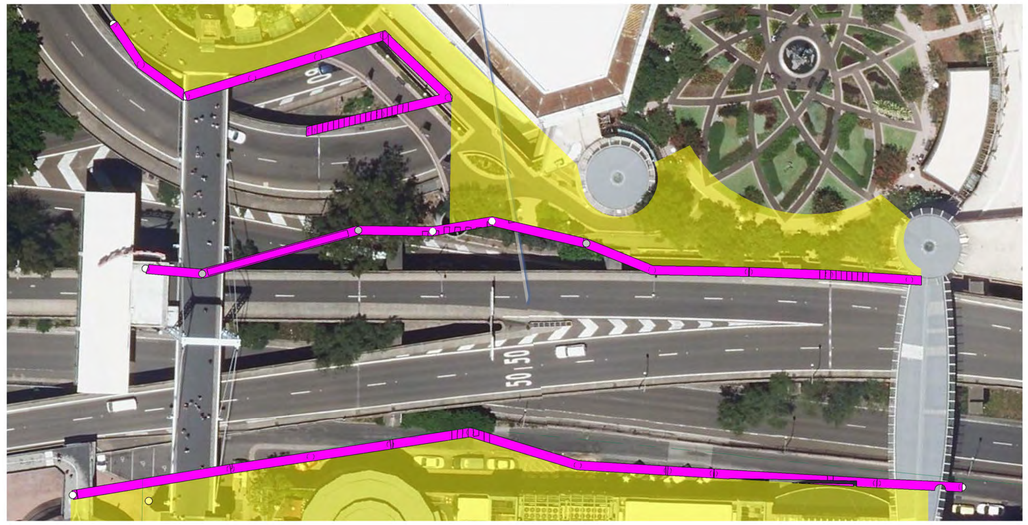
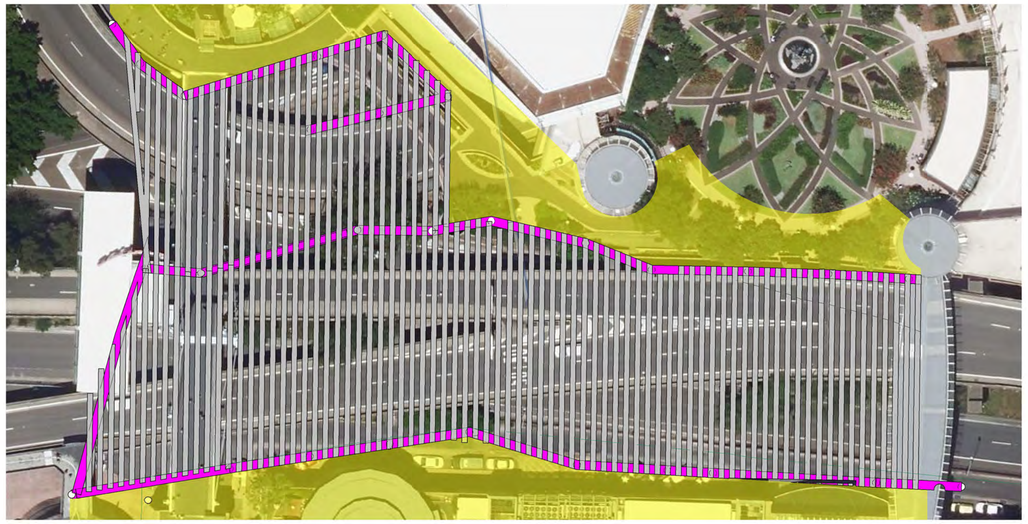


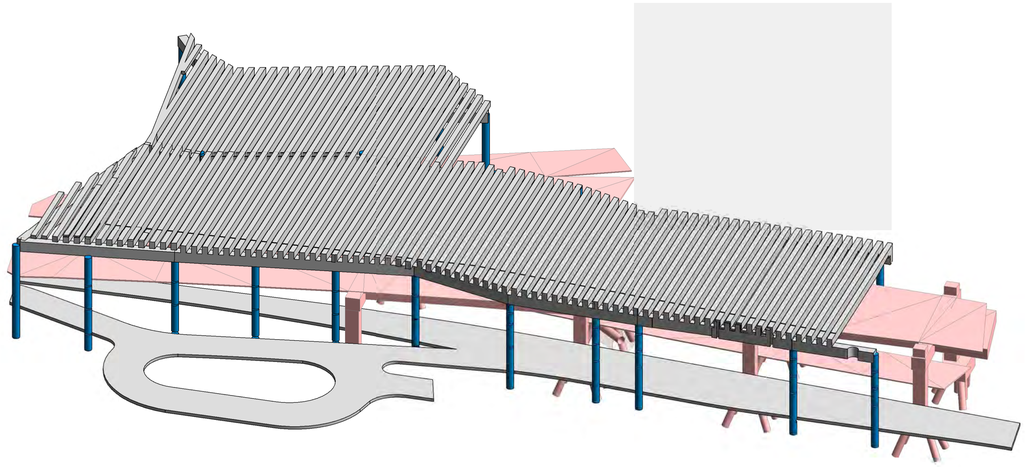
Land Bridge Headstocks

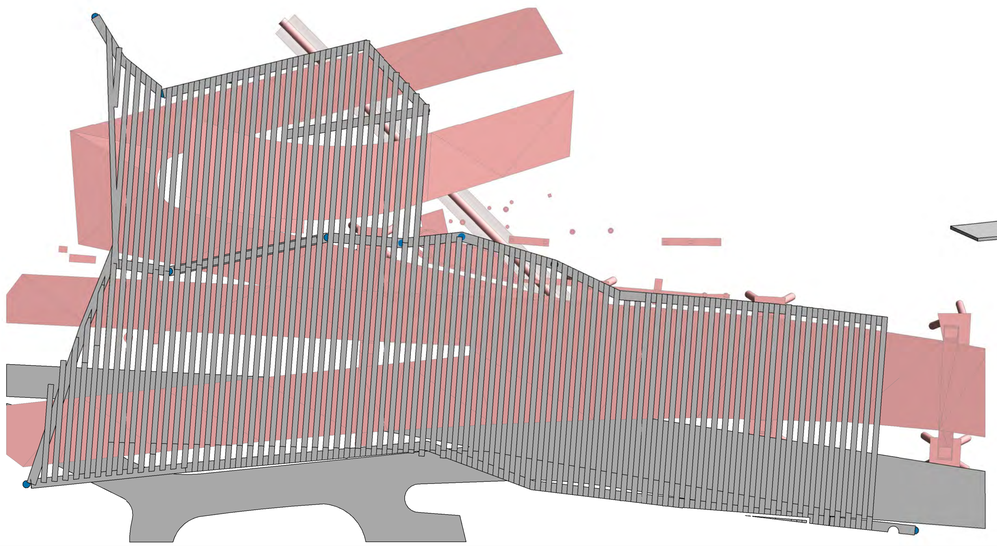
SCALE: 1 : 500

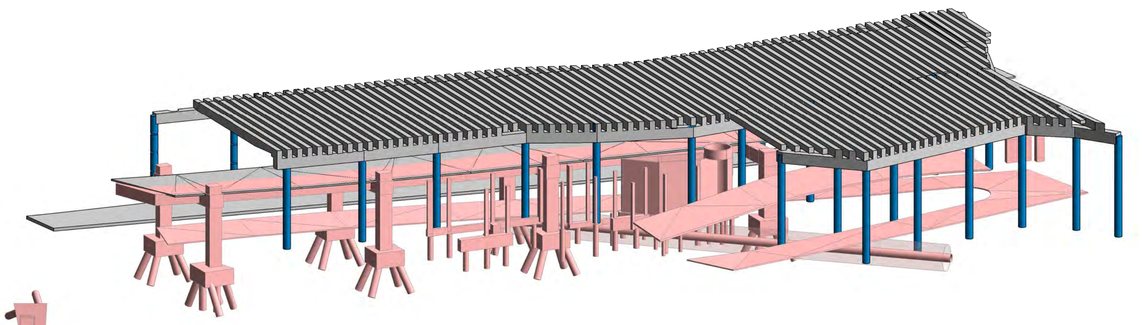


Land Bridge Precast Beams

SCALE: 1 : 500







Rev.	Date	Description	By
1	26.07.17	ISSUED FOR INFORMATION	ML

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Level 4, 2 Glen Street
Milsons Point NSW 2061
Australia

Telephone (02) 8904 1444
Facsimile (02) 8904 1555
http: //www.enstruct.com.au

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project

COCKLE BAY PARK

drawing title

LAND BRIDGE INDICATIVE STRUCTURAL SUPPORTS

status

FOR INFORMATION

scale at A1	drawn by	checked	date
1 : 500	ML	RC	07/26/17

project no.	drawing no.	rev.
4886	ST-103-51	1

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