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Report on Preliminary Numerical Modelling and Impact Assessment

Student Housing Development
90-102 Regent Street, Redfern

Prepared for
Wee Hur (Australia) Pty Ltd

Project 86852.03
February 2021

Douglas Partners
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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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1. Introduction

This report presents the results of preliminary numerical modelling undertaken by Douglas Partners Pty Ltd (DP) to assess the potential impact of a proposed student housing development at 90-102 Regent Street, Redfern (part of the State Significant Development Application 10382) on the new Sydney Metro City & Southwest twin tunnels. The work was commissioned by Aliza Teo of Wee Hur (Australia) Pty Ltd and was undertaken in accordance with DP's proposal SYD201105.P.001.Rev0 dated 2 October 2020.

The project will involve the demolition of the existing buildings followed by construction of an 18-storey student accommodation building over a single level basement. Excavation to depths of up to 4-6 m is anticipated for the new basement and building core raft structure on the northern half of the site with minor excavations (about 400 mm deep) on the southern part of the site where there is an existing basement. Piled foundations will be constructed from either ground level, basement level, or building core level under proposed columns/walls/core raft to support the superstructure loads.

It is understood that the new Sydney Metro City & Southwest twin tunnels (managed by Sydney Metro) are located directly below the site with the construction of the main tunnel structures (TBM excavation and permanent tunnel lining) completed recently. The piles for the proposed development will be installed within the second reserve zone of the tunnels but above the first reserve zone.

The purpose of this preliminary numerical modelling was to assess the impact of the construction works and the permanent loading from the proposed piled footings on the Sydney Metro City & Southwest twin tunnels.

The modelling included an assessment of the ground deformation near the Sydney Metro tunnels and the changes in the structural actions in the tunnel lining that could eventuate as a result of the proposed development.

One section in an east-west direction (perpendicular to the tunnel alignments) through the proposed development was modelled. A two-dimensional geotechnical finite element software package, Plaxis 2D, was used to undertake the analysis. Details of the analysis, results and recommendations are provided in this report.

2. Background Information

DP was provided with the following documents and drawings for the preparation of this modelling report:

- Survey drawing titled: “Plan of Detail and Levels Over Lots 1-3 Section 2 in DP 3954, Lot 1 in DP 184335 and SP 57425 Known as No 90-102 Regent Street, Redfern”, Drawing No. 50670 001DT, Sheet No.1 to 18, Rev F, dated 23 November 2020, Prepared by LTS Lockley;
- Drawing titled: “Foundation Plan”, Drawing No. S030, Rev P1, dated January 2021 (Print Date 05 February 2021) , Prepared by Webber Design (Job No. 20018);
- Drawing titled: “Foundation Typical Details - Sheet 1”, Drawing No. S048, Rev P1, dated January 2021 (Print Date 05 February 2021), Prepared by Webber Design (Job No. 20018);
- Drawing titled: “Basement - General Arrangement Plan”, Drawing No. S080, Rev P1, dated January 2021 (Print Date 05 February 2021), Prepared by Webber Design (Job No. 20018);
- Drawing titled: “Lower Ground - General Arrangement Plan”, Drawing No. S090, Rev P1, dated January 2021 (Print Date 05 February 2021), Prepared by Webber Design (Job No. 20018);
- Drawing titled: “Level 1 (Ground Floor) - General Arrangement Plan”, Drawing No. S100, Rev P1, dated January 2021 (Print Date 05 February 2021), Prepared by Webber Design (Job No. 20018);
- Drawing titled: “Sydney Metro Asset Plan Overlay”, Drawing No. S081, Rev P1, dated January 2021 (Print Date 05 February 2021), Prepared by Webber Design (Job No. 20018);
- Drawing titled: “Sydney Metro Asset - Section - Sheet 1”, Drawing No. S082, Rev P1, dated January 2021 (Print Date 05 February 2021), Prepared by Webber Design (Job No. 20018);
- Drawing titled: “Core Key Plans”, Drawing No. S820, Rev P1, dated January 2021 (Print Date 05 February 2021), Prepared by Webber Design (Job No. 20018);
- Drawing titled: “Stair and Lift Core Elevations -Sheet 1”, Drawing No. S825, Rev P1, dated January 2021 (Print Date 05 February 2021), Prepared by Webber Design (Job No. 20018);
- Architectural Drawing titled: “Basement & Lower Ground Floor Plan”, Drawing No. DA2000, Rev 2, dated 12 February 2021, prepared by Allen Jack + Cottier Architects (AJ + C) (Job no. 19026);
- Architectural Drawing titled: “Northern Elevation”, Drawing No. DA3002, Rev 2, dated 12 February 2021, prepared by Allen Jack + Cottier Architects (AJ + C) (Job no. 19026);
- Architectural Drawing titled: “Section E”, Drawing No. DA3105, Rev 2, dated 12 February 2021, prepared by Allen Jack + Cottier Architects (AJ + C) (Job no. 19026); and
- Extract figure (Figure 2 - Proposed Piling Extent) from document titled: “Metro Tunnel Vibration Management Plan, 90-102 Regent Street, Redfern”, Ref. 20201184.1/1501A/R0/AW, dated 15 January 2021, prepared by Acoustic Logic.

3. Previous Investigation

A previous geotechnical investigation for the proposed development was carried out and reported by DP in September 2020 (DP 86852.00.R.001.Rev1). The investigation included a total of four shallow boreholes and three deep rock cored boreholes with a maximum depth of 20 m below existing ground surface level and 12 m below the proposed new basement level.

4. Site Description

The approximately rectangular-shaped site has dimensions of about 32 m x 42 m and slopes gently down towards the south-west. The site is currently occupied by a number of two-storey buildings with car ports off the rear William Lane and a four-storey building (i.e. the southern-most building) over a split-level basement car park. Access into the existing basement car park is also from William Lane and the basement covers about one-third of the total site footprint.

The site is bordered by Marian Street to the north, Regent Street to the east, a two-storey building followed by a service (petrol) station to the south and William Lane to the west. On the northern side of Marian Street there is a new high rise development under construction. An 18-storey affordable housing building is currently under construction on the western side of William Lane.

The site is underlain by two rail tunnels, which are part of the new Sydney Metro City & Southwest rail line that are under construction at the time of this report. It is understood that the tunnel excavation by a TBM machine has been completed with the precast segmental tunnel lining installed recently. Based on a survey plan (ref: Drawing No. 50670 001DT, by LTS Lockley Pty Ltd, dated 23 November 2020), the "First and Second Reserves" extend approximately north-south below the site, with the tunnel crown at least 35 m below the ground surface.

5. Geology

Reference to the *Sydney 1:100 000 Geological Series Sheet 9130* (Geological Survey of NSW) indicates that the site is located within Quaternary-aged transgressive dunes typically comprising medium to fine-grained sand. The boundary with Triassic-aged Ashfield Shale occurs about 140 m to the west of the site. Ashfield Shale typically comprises black to dark grey shale and laminite and weathers to residual clay. More than 20 m below the site the Ashfield Shale is underlain by shale, laminite and fine grained sandstone of the Mittagong Formation and then generally medium grained Hawkesbury Sandstone.

6. Proposed Re-Development and Sydney Metro Assets

It is understood that the proposed re-development will include the demolition of the existing buildings to allow for the construction of an 18 storey student housing building, with an extension of the existing split-level basement towards the north to give a uniform basement floor level at RL 22.8 m. It is understood that the new basement walls will be setback from the property boundaries.

The proposed basement will require minor excavation of up to 400 mm on the southern side of the site where there is an existing basement, and excavations of up to about 4 and 6 m on the northern part of the site for the new basement excavation and building core raft. It is understood that the existing basement retaining walls will be re-used as the perimeter walls for the new basement and it is expected that they will be temporarily propped prior to the removal of the existing ground and basement slabs. Additional shoring walls are expected to be required where there is currently no basement. The new ground and basement slabs will provide the lateral support to the retaining walls in the long term.

Piled foundations will be constructed from either ground level or basement level under proposed columns/walls/core raft to support the superstructure loads. The proposed footing layout for the proposed development, together with the locations of the Sydney Metro Tunnels, and the 1st and 2nd Reserve zones of the tunnels are provided in Appendix B.

The piled foundations will be located within the 2nd Reserve zone of the Sydney Metro tunnels and are the subject of the current analysis and report.

7. Numerical Modelling

7.1 Methodology

The numerical modelling was undertaken using PLAXIS 2D, a two-dimensional finite element program used for the modelling of soil, rock and structural behaviour. PLAXIS is ideally suited for modelling geotechnical problems that consist of several stages, such as sequential excavation, loading and unloading. Details of the modelling approach undertaken are summarised below:

- Review of available site data, investigation results, drawings and information provided in relation to the proposed development;
- Development of a representative geotechnical model;
- Selection of appropriate geotechnical parameters for each soil or rock layer;
- Development of a finite element model in PLAXIS 2D;
- Assessment of the displacement within the first reserve zone of the tunnels, including any induced additional displacement of the tunnel lining structure; and
- Assessment of the structural actions in the tunnel lining structure before and after the final building loads are applied to the piles.

7.2 Key Assumptions

The following key assumptions have been made in the numerical modelling:

- One 2D cross-section (Section 1) was analysed. Section 1 is located at the northern corner of the site oriented perpendicular to the metro twin tunnels alignment. The analysis section extends through the future basement and the heavily-loaded zone (i.e. close to the building core). The location of the model section and the pile IDs that are referred to in this report are shown on the drawing included in Appendix B;
- The new basement retaining walls on the northern part of the site are currently under design. For the purpose of modelling, two rows of struts with the details as below were introduced to the models for the basement retaining walls, from the basement excavation phase until the final stage:
    - First row with nominal axial stiffness of 5.0E05 kN/m and spacing of 1 m at RL 25.7 m, AHD on the western wall and at RL 26.7 m, AHD on the eastern wall; and
    - Second row with nominal axial stiffness of 3.75E05 kN/m and spacing of 1 m at RL 22.7 m, AHD on the western wall and at RL 23.8 m, AHD on the eastern wall;

- The retaining structure for the building core excavation and construction is also currently under design. For the purpose of modelling, two rows of struts with the details as below were introduced to the models for the building core retaining walls, from the building core excavation phase until the final stage:
  - First row with nominal axial stiffness of 5.0E05 kN/m and spacing of 1 m at RL 23.4 m, AHD; and
  - Second row with nominal axial stiffness of 25.0E05 kN/m and spacing of 1 m at RL 21.1 m, AHD;
- The thicknesses of the basement retaining wall and the building core retaining wall have been assumed to be 250 mm thick in the model;

Given the significant burial depth of the Metro tunnels, the above preliminary assumptions of the site retention system is not expected to affect the accuracy of tunnel impact assessment.

- All piled foundations in the model section are located within the Reserve zones of the tunnels and are explicitly modelled in Plaxis, with the provided design loads (axial compression) applied to each pile. A bending moment due to the eccentric vertical compression (i.e. 75 mm out-of-position tolerance allowed) is also assumed for a single pile which is located below a row of columns (P6). Piles in the pile groups are assumed to be rigidly connected to pile caps and no out-of-position tolerance (i.e. additional bending moment) was allowed for these piles;
- The analyses have been undertaken based on “working stress” principles for the compressive load combinations (total compressive load = DL+LL);
- The pile shafts are assumed to be ‘non-sleeved’, therefore the load-transfer mechanisms along the pile shafts were fully modelled in Plaxis;
- Pile lengths and grouping schemes (individual piles, twin pile groups, three pile groups, four pile groups and building core pile group) in the model were based on the foundation layout drawings provided by the client;
- Pile diameters of 750-900 mm were nominated on the drawings with note of “D&C by others”; All piles have been modelled with a preliminary diameter of 750 mm;
- The geometrical parameters of the tunnels (i.e. the depth and diameter) have been modelled based on the information provided by the client and the drawings provided in Appendix B of this report;
- The tunnel lining is modelled as a 260 mm thick plate with the axial stiffness (EA) of 6.5E03 MN/m and flexural stiffness (EI) of 5.95 MN.m^2/m;

  The effective value of second moment of inertia for the segmental ring lining (I) is approximately calculated by the Muir Wood Method as below:

  $I_{effective} = I_{joint} + (4/n)^2 I_1$

  Where n is the number of joints and I_1 is the second moment of inertia of the ring with no joints. Assuming I_1 (the second moment of area at the joint) is zero (conservative) and the segmental linings have 8 joints, the estimated ring stiffness is calculated as $I = (4/8)^2 I_1 = I_1/4$.
- For estimating the vertical pile movements, a reduction factor of 0.75 was adopted for skin resistance and end bearing capacity for the piles within the P2 twin pile group and the P5 Tri-pile group and a reduction factor of 0.95 was adopted for skin resistance and end bearing capacity for the piles of the building core pile group to account for additional settlements due to the group effects;

- In accordance with TfNSW document Ref: NWRLSRT-PBA-SRT-TU-REP-000008 (version 1.0, dated 16 October 2017), DP has assumed that the tunnels were constructed using TBM methods, with the final support provided by precast segmental concrete lining. The β–method was adopted in PLAXIS 2D to simulate the three-dimensional arching effects in the two-dimensional modelling space. The value of β adopted in the analysis was 0.5;
- An elastic model was adopted for all structural elements. It was assumed that the structural members have been designed to behave elastically for the serviceability limit-state condition; and
- The previous investigation did not encounter any critical geological features such as fault zones, joint swarms or dykes, therefore the ground has been modelled as a continuum with no distinct discontinuities (joints or beddings)

7.3 Geotechnical Profile and Parameters

The geotechnical profile adopted was based on the information contained within the previous geotechnical report for the project (refer to Section 3). The geotechnical parameters and profile adopted for the various layers used in the analysis are summarised in Table 1.

Table 1: Geotechnical Profile and Parameters for Various Strata Used in PLAXIS 2D Analysis

Unit	Material Model	E' (MPa)	E_{ur} (MPa)	ν'	ν'_{ur}	γ (kN/m^3)	c' (kPa)	ϕ' (deg)	RL of top of Unit (m, AHD)
Fill	Hardening Soil	10	30	-	0.2	18	0	30	26.8
st-vst silty clay	Hardening Soil	15	45	-	0.2	20	1	25	22.4
h clay	Hardening Soil	30	90	-	0.2	20	5	26	18.4
VL-L Laminite	Mohr Coulomb	100	-	0.3	-	22	40	30	16.1
M laminite & Siltstone	Mohr Coulomb	1000	-	0.25	-	24	150	35	14.3
H laminite/Sandstone	Mohr Coulomb	2000	-	0.25	-	24	250	38	12.3
Cement Stabilised backfill (behind the building core retaining wall only)	Mohr Coulomb	50	-	0.25	-	22	50	45	N.A.

Notes: E' = Young's Modulus, E_{ur} = Unloading/Reloading Young's Modulus, ν'_{ur} = Unloading/Reloading Poisons ratio, γ = unit weight, c' = drained cohesion, ϕ' = drained friction angle, st-vst = stiff to very stiff, h = hard, VL-L = Very Low to Low Strength, M = Medium Strength, H = High Strength.

The properties were assessed based on the results of the previous geotechnical investigation within the site and DP's experience in similar materials in Sydney. The adopted geotechnical model and model geometry of the model section is shown in Drawing M1 in Appendix C.

7.4 Pile Geometry and Loads

The modelled pile geometry is summarised in Table 2.

Table 2: Modelled Pile Geometry in Plaxis 2D

Pile Location	Diameter (mm)	Top RL (m, AHD)	Toe RL (m, AHD)
Ground Level Piling	750	26.8	7.6
Basement Level Piling	750	22.6	
Building Core Piling	750	20.6	

Table 3 below provides the pile loads per metre run that have been adopted in the Plaxis 2D analysis, as well as the loads per pile/group of piles that were nominated by Webber Design. The pile groups under the walls with their orientations parallel to the rail lines, were modelled as a single pile row ('into the page' of the 2D cross sections) with the pile loads converted to equivalent 'per m run' values in the 2-dimensional models. The building core pile groups were modelled as three pile rows using the same principles.

Table 3: Pile Loads Used in Plaxis 2D for Section 1

Pile ID (Column ID over the Pile)	Spacing Inside the Plane (m)	Unit	Compression (DL+LL) (kN)	Bending Moment (due to eccentricity) (kN.m)
P1	4.8	Per Pile	7,150	-
		Per Metre Run	1,490	-
P2 (two pile group)	7.3	Per Pile group	7,100	-
		Per Metre Run	973	-
P3 (building core)	2.4	Per Tri-Pile group (out of 11 x piles for Building Core)	6,545	-
		Per Metre Run	2,728	-
P4	4.8	Per Pile	625	-
		Per Metre Run	131	-
P5 (three pile group)	7.3	Per Pile group	15,500	-
		Per Metre Run	2,124	-
P6 (Single Pile)	4.5	Per Pile	750	-
		Per Metre Run	167	56

7.5 In-situ stress

The following in-situ stress relationship is adopted for rocks:

Very Low to Low Strength rock:

$\sigma_{H\,(NS)} = 1.0 \times \sigma_v$
$\sigma_{h\,(EW)} = 1.0 \times \sigma_v$
$\sigma_v = \gamma \times H$

Medium Strength and High strength rock:

$\sigma_{H\,(NS)} = 3.5x\ \sigma_v$
$\sigma_{h\,(EW)} = 2.5 \times \sigma_v$
$\sigma_v = \gamma \times H$

where,

$\sigma_{H\,(NS)}$	= horizontal stress in north-south direction (major horizontal in-situ stress direction)
$\sigma_{h\,(EW)}$	= horizontal stress in east-west direction
σ_v	= vertical stress in y direction
γ	= unit weight
H	= depth below surface (m)

The initial horizontal stresses in soils were calculated by applying the 'at-rest' earth pressure coefficient K_0 (i.e. $\sigma_h = K_0 \times \sigma_v$). A value of K_0 = 0.5 for the fill layer and K_0 values of 0.6 and 0.8 were adopted for stiff to very stiff and hard clay layers, respectively.

7.6 Modelling Sequence and Adopted Surcharges

The general construction sequence adopted for the analysis is shown in Drawings M2 to M3 in Appendix C and is summarised as follows:

1. Set up geological models and run to equilibrium. (Stage 1 – initial condition);
2. Activate the surcharges;
3. Excavate and construct the metro tunnels;
4. Reset displacements, activate construction surcharges over the site (i.e. 20 kPa), and construct the ground-level piles;
5. Excavate to RL 22.6 m, AHD for the new basement and activate the basement retaining walls and the lateral supports;
6. Construct the basement-level piles;
7. Excavate locally to RL 20.6 m, AHD for the building core, activate the core retaining walls and the lateral supports, activate the cement stabilised backfill behind the building core walls, and install the building core piles;
8. Apply final new building loads (i.e. pile loads and basement slab loads).

Different Surcharges have been adopted during different analysis stages. The summary of these surcharges is given in Table 4 below:

Table 4: Adopted Surcharges in the Analyses

Surcharge	Adopted UDL Surcharge (kPa)	Location	Width (m)	Stage(s)
William Lane	20	William Lane	5.2	All (except stage 1)
Regent Street	20	Regent Street	13.5	All (except stage 1)
Footpath (2x)	10	Regent Street footpaths	3.5	All (except stage 1)
General surcharge	20	neighbouring buildings	to the model boundaries	All (except stage 1)
Construction surcharge	20	Within the site	Over the entire site	Stages 4 to 7
Permanent loads on slabs	5	Within the site	Over the entire site	Stage 8

8. Analysis Results

The predicted total displacement contours at various construction stages is shown in the attached Drawings M4 to M8.

A summary of the predicted total displacements at various points within the model and the differential displacements of the tunnel liners are provided in Table 5 and Table 6, respectively.

Table 5: Total Displacements at Various Points within the Rail Corridor

Construction Stage	Total Displacements (mm)		
	Within the Site	Within Sydney Metro tunnels 1st Reserve	At Sydney Metro tunnels
Ground level piling	9	<1	<1
New basement excavation and construction	14	<1	<1
Basement level piling	14	<1	<1
Building core excavation and piling	18	<1	<1
Final stage (permanent building loads)	20	3	3

Table 6: Total Differential Displacements in the Tunnel Linings

Construction Stage	Total Differential Displacements (mm)	Total Differential Displacements (%)
Ground level piling	<1	<0.01
New basement excavation and construction	<1	<0.01
Basement level piling	<1	<0.01
Building core excavation and piling	<1	<0.01
Final stage (permanent building loads)	1	0.02

A summary of the predicted changes in the structural actions of the metro tunnel linings are provided in Table 7 and Table 8 for the western tunnel and eastern tunnel, respectively. The graphical outputs of the changes in the structural actions in the tunnel linings is also provided in Drawings M11 to M19.

Table 7: Summary of Structural Actions of Tunnel Lining _ Western Tunnel

Stage	Maximum Axial Force (kN/m)	Maximum Shear Force (kN/m)	Maximum Moment (kN.m/m)
Tunnels Constructed	2076	3	3
Ground level piling	2092	3	3
New basement excavation and construction	2087	3	3
Basement level piling	2087	3	3
Building core excavation and piling	2086	3	3
Final Stage (Permanent Building Loads)	2189	3	2

Table 8: Summary of Structural Actions of Tunnel Lining _ Eastern Tunnel

Stage	Maximum Axial Force (kN/m)	Maximum Shear Force (kN/m)	Maximum Moment (kN.m/m)
Tunnels Constructed	2076	3	3
Ground level piling	2094	3	3
New basement excavation and construction	2085	3	3
Basement level piling	2085	3	3
Building core excavation and piling	2084	3	3
Final Stage (Permanent Building Loads)	2193	3	2

9. Comments

Based on the results of the numerical modelling, the predicted maximum total displacement in the tunnel liners is less than 3 mm, as shown in Drawings M4 to M10 attached. There is no known movement limit specifically applicable to Sydney Metro City and South West tunnels, but in accordance with "Sydney Metro Underground Corridor Protection Technical Guidelines (Ref: NWRLSRT-PBA-STR-TU-REP-00008, Rev 1)", 10 mm total movement in any direction is usually allowable for cast-in-situ lining or precast concrete lining.

Based on the results of the numerical modelling, the predicted maximum total differential displacement in the tunnel liners is about 1 mm and 0.02%. There is no known differential movement limit specifically applicable to Sydney Metro City and South West tunnels, but in accordance with "Sydney Metro Underground Corridor Protection Technical Guidelines (Ref: NWRLSRT-PBA-STR-TU-REP-00008, Rev 1)", total differential movement of 10 mm or 0.05% (whichever is less) in any plane is usually allowable for cast-in-situ lining or precast concrete lining.

The maximum increase in (compressional) axial force in the tunnel liner is predicted to be approximately 117 kN and the variations in shear force and bending moment due to the site development are about less than 1 kN and 1 kN.m, respectively.

On the basis of the numerical modelling outlined in this report, it is considered that the proposed development is likely to have minor to negligible impact on the Sydney Metro tunnels. The structural engineer for the project should check whether the structural capacity of the existing tunnel linings can cater for the changes in the axial forces induced by the proposed works.

This impact assessment is preliminary and is based on preliminary design. The lateral loads of the final building that will be applied on the piles are not finalised. The detailed excavation support scheme for the new basement and the building core that is located within the 2nd Reserve of Sydney Metro tunnels are currently under design. Further modelling would be required when these details are known.

10. Limitations

Douglas Partners (DP) has prepared this report for this project at 90-102 Regent Street, Redfern in accordance with DP's proposal SYD201105.P.001.Rev0 dated 2 October 2020 and acceptance received from Aliza Teo dated 27 October 2020. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Wee Hur (Australia) Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions during previous DP investigation on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during previous investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

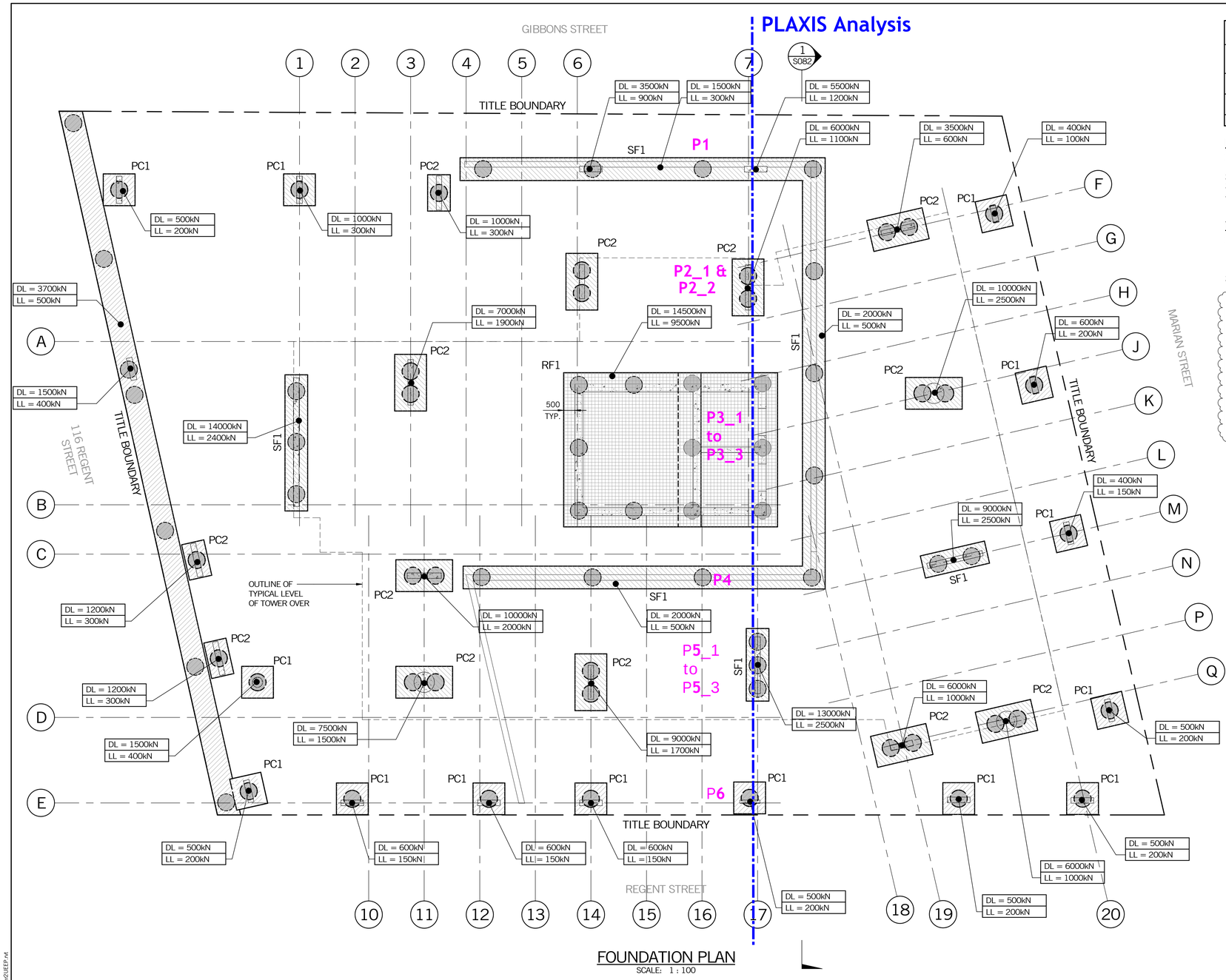
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

Extract Drawings



FOUNDATION PLAN
SCALE: 1 : 100

FOUNDATION SCHEDULE				
MARK	SIZE	f'c (MPa)	REINF. RATE (kg/m³)	REMARKS
PC1	800d x 1400 x 1400	50	-	PILE CAP (SUPPORTED OFF 750-900mm BORED PILES)
PC2	800d x 2500 x 1400	50	-	PILE CAP (SUPPORTED OFF 750-900mm BORED PILES)
RF1	1000d x AS NOTED ON PLAN	50	-	RAFT

NOTES:

1. GEOTECHNICAL ENGINEER TO ADVISE ON ALLOWABLE BEARING CAPACITIES FOR SOIL / UPPER SUB STRATUM ONTO WHICH PAD FOOTINGS WILL BE FOUNDED.
2. ALL COLUMNS TO BE CONCENTRIC TO THE PAD FOOTING U.N.O.
3. ALL PILES TO BE SOCKETED INTO MEDIUM STRENGTH ROCK (OR BETTER).
4. LATERAL EARTHQUAKE LOADS NOMINATED ARE PRELIMINARY ONLY. SUBJECT TO FURTHER REVIEW, AND DETAILED DESIGN.

WATERPROOFING NOTES:

1. CONCRETE IN WALLS, FLOOR SLABS AND BASE OF ALL PITS TO CONTAIN WATERPROOFING ADDITIVE TO MANUFACTURER'S RECOMMENDATIONS. APPLY A SLURRY COAT OF WATERPROOFING ADDITIVE TO CONSTRUCTION JOINTS AS PER MANUFACTURER'S RECOMMENDATIONS.
2. ALL PIT WALL BASES TO CONTAIN A CONTINUOUS WATERSTOP TO BASE OF WALL.

LOADING INTENSITY LEGEND

-DENOTES HEAVY LOAD - CORE

-DENOTES HEAVY LOAD - TOWER

-DENOTES LIGHTER LOAD - PODIUM LEVELS ONLY

UNDER REVIEW

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

Rev.	Description	Eng.	Draft.	Date
P1	ISSUED FOR CO-ORDINATION	BT/AJ	PAC	05.02.21

DRAWING REFERENCE	REFERENCE No.
DRAWING INDEX	S000
GENERAL NOTES	S001-S002
RETENTION	S010-S029
CONCRETE COLUMNS	S800-S819
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PRECAST WALLS	S880-S909
SLAB ON GROUND DETAILS	S950-S951
COMPOSITE SLAB DETAILS	S955
SUSPENDED CONCRETE SLABS	S960-S962
POST TENSIONING DETAILS	S965-S966
R.C. STAIR DETAILS	S970
MASONRY DETAILS	S980-S981
COMPOSITE SLAB DETAILS	S985
STEEL DETAILS	S990-S991

CO-ORDINATION ISSUE

Status

STRUCTURAL DRAWING

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CLIENT

WEE HUR

PROJECT

WEE HUR REGENT
90-102 REGENT ST.
REDFERN NSW 2016

TITLE

FOUNDATION PLAN

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JAN '21	BT/AJ	AC
SCALES AT A1	DRAWN BY	APPROVED BY
1:100	PAC	PW
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20018	S030	P1

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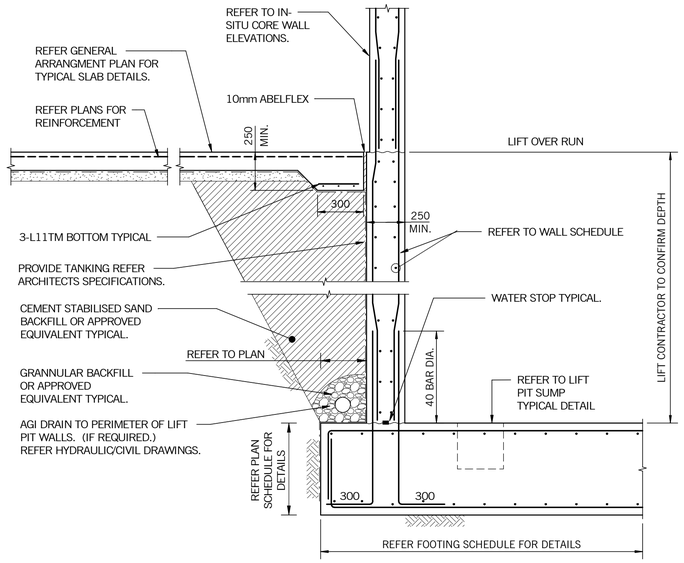
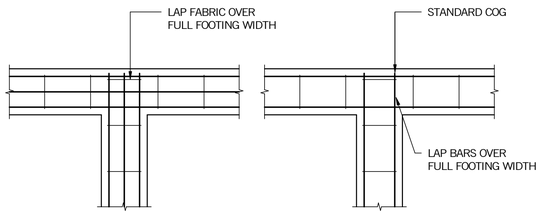


LIFT PIT NOTES:

1. ALL LIFT PIT ELEMENTS ie..CONCRETE WALLS, PILE CAPS,CAPPING BEAM AND BASE OF ALL PITS (AS APPLICABLE) TO CONTAIN WATERPROOFING ADDITIVE TO MANUFACTURERS RECOMMENDATIONS.
2. ALL PIT WALL BASES TO CONTAIN A CONTINUOUS WATERSTOP TO BASE OF WALL.
3. PROVIDE BLINDING CONCRETE TO FULL EXTENT OF EXCAVATED PIT (AS REQUIRED.)

TYPICAL SLAB ON GROUND LIFT PIT DETAIL - IN-SITU WALLS OVER

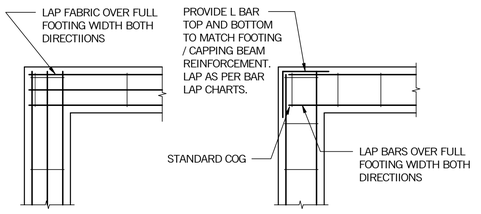
SCALE 1:20



TRENCH MESH PLAN REINFORCING BARS PLAN

TYPICAL STRIP FOOTING / CAPPING BEAM INTERSECTION DETAIL

NOT TO SCALE



TRENCH MESH PLAN REINFORCING BARS PLAN

TYPICAL STRIP FOOTING / CAPPING BEAM CORNER DETAIL

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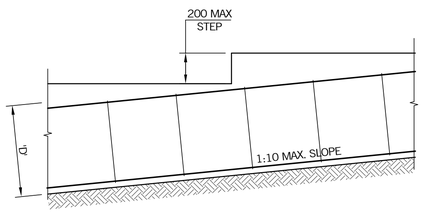

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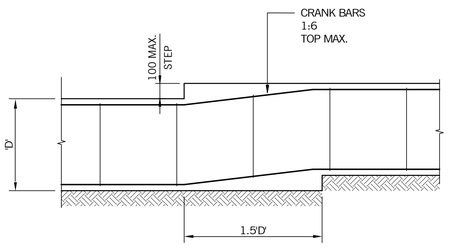

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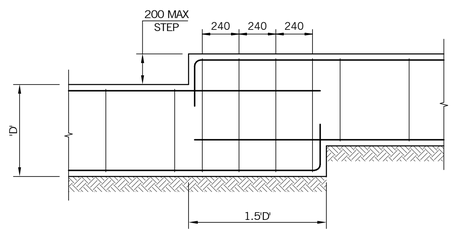

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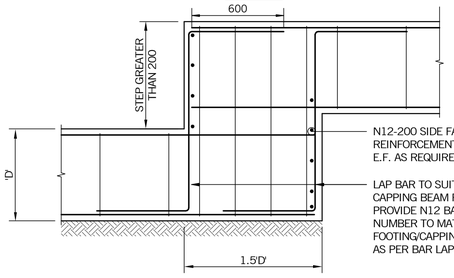
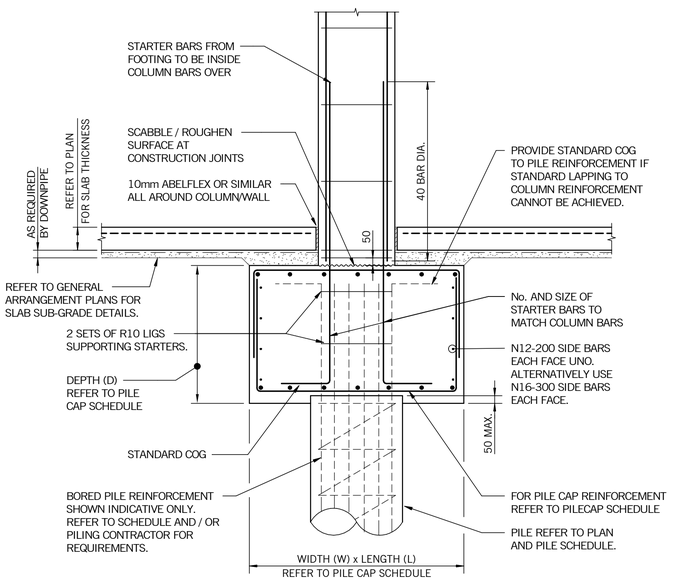


SECTION

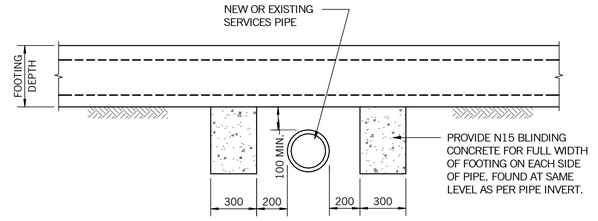
TYPICAL STEP IN STRIP FOOTING / CAPPING BEAM DETAILS

NOT TO SCALE



TYPICAL PILE CAP DETAIL

NOT TO SCALE



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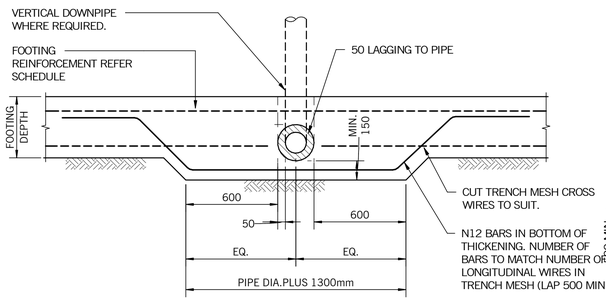
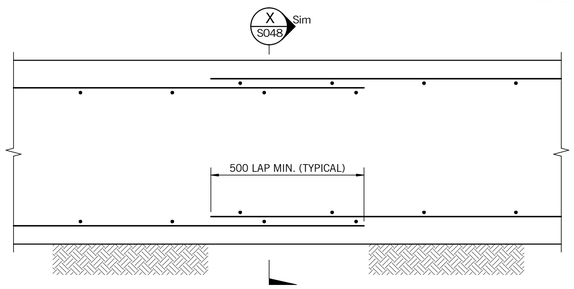


THROUGH FOOTING

SERVICES PENETRATION

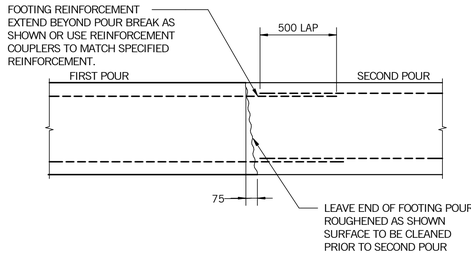
NTS



TYPICAL FABRIC REINFORCEMENT SPLICE DETAIL FOR STRIP FOOTING

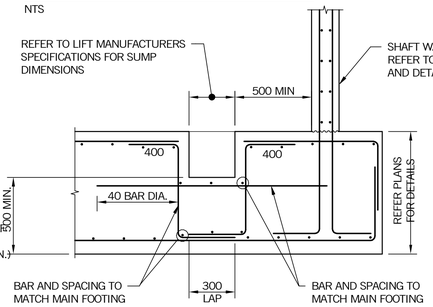
N.T.S

NOTE:
BOTTOM REINFORCEMENT SHOWN, TOP REINFORCEMENT SIMILAR



STRIP FOOTING / CAPPING BEAM CONSTRUCTION JOINT DETAIL

NTS



LIFT SUMP DETAIL

SCALE 1:20

SECTION X S048

SCALE: 1 : 10

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

Rev.	Description	Eng.	Draft.	Date
P1	ISSUED FOR CO-ORDINATION	BT/AJ	PAC	05.02.21

CO-ORDINATION ISSUE

Status

STRUCTURAL DRAWING

WEBBER DESIGN
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CLIENT

WEE HUR

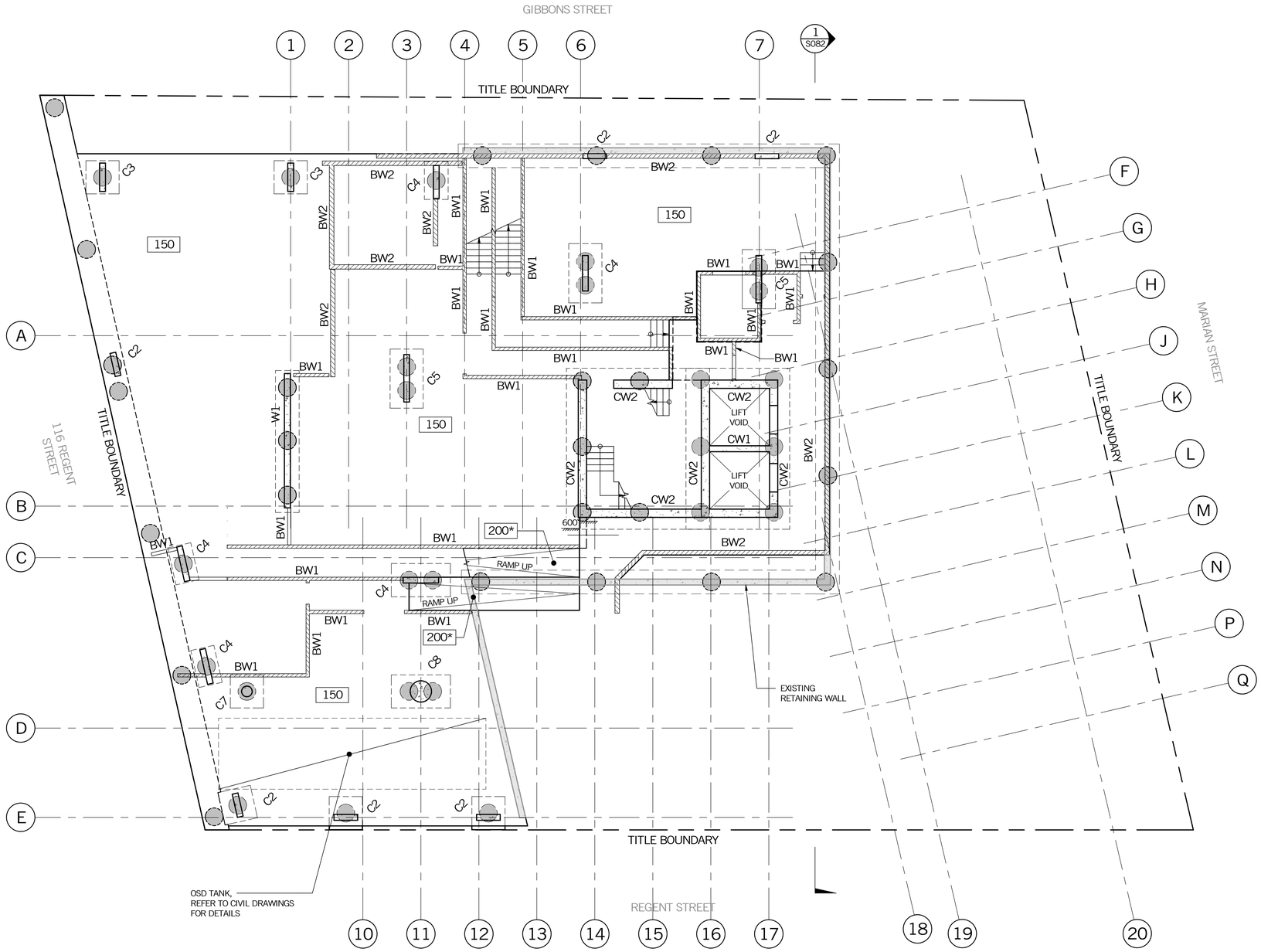
PROJECT

WEE HUR REGENT
90-102 REGENT ST.
REDFERN NSW 2016

TITLE

FOUNDATION TYPICAL DETAILS - SHEET 1

DATE	DESIGNED BY	CHECKED BY
JAN '21	BT/AJ	AC
SCALES AT A1	DRAWN BY	APPROVED BY
1:10, 1:20	PAC	PW
JOB No.	DRAWING No.	REV.
20018	S048	P1



BASEMENT - GENERAL ARRANGEMENT PLAN

SCALE: 1 : 100

BASEMENT - SLAB SCHEDULE

THICKNESS	f'c (MPa)	REINF. RATE (kg/m³)	P.T. RATE (kg/m²)	REMARKS
150	MPa	kg/m³	N/A	R.C. SLAB ON GROUND. ALLOW FOR SAW CUTS AT APPROX. 5m CTS. E.W. & MOVEMENT JOINTS AT APPROX. 20m CTS. E.W. ALLOW FOR SAW CUTS AT APPROX. 5m CTS. E.W. & MOVEMENT JOINTS AT APPROX. 20m CTS. E.W.
200*	MPa	kg/m³	N/A	R.C. RAMP SLAB

BASEMENT - CONCRETE COLUMN SCHEDULE

MARK	SIZE	f'c (MPa)	REINF. RATE (kg/m³)	REMARKS
C1	250 x 800	-	-	INSITU CONCRETE COLUMN
C2	250 x 1000	-	-	INSITU CONCRETE COLUMN
C3	250 x 1200	-	-	INSITU CONCRETE COLUMN
C4	240 x 1500	-	-	INSITU CONCRETE COLUMN
C5	240 x 2000	-	-	INSITU CONCRETE COLUMN
C7	450 DIA.	-	-	INSITU CONCRETE COLUMN
C8	900 DIA.	-	-	INSITU CONCRETE COLUMN

BASEMENT - WALL SCHEDULE

MARK	WIDTH	f'c (MPa)	REINF. RATE (kg/m³)	REMARKS
BW1	140	MPa	kg/m³	BLOCKWORK (INFILL f'c = 20 MPa)
BW2	190	MPa	kg/m³	BLOCKWORK (INFILL f'c = 20 MPa)
CW1	250	MPa	kg/m³	CORE WALL
CW2	350	MPa	kg/m³	CORE WALL
W1	250	MPa	kg/m³	INSITU WALL

NOTES:

1. ALL PENETRATIONS TO BE REVIEWED AND RESOLVED.
2. ALL SERVICES PENETRATIONS TO BE CO-ORDINATED AND APPROVED BY WEBBER DESIGN.
3. REBATES AND CAST IN PLATES FOR STRUCTURAL STEEL WORK AND FACADE TO BE CO-ORDINATED WITH ARCHITECT.
4. CONTRACTOR SHALL ALLOW FOR CONSTRUCTION JOINTS AS REQUIRED

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Rev.	Description	Eng.	Draft.	Date
P1	ISSUED FOR CO-ORDINATION	BT/AJ	PAC	05.02.21

DRAWING REFERENCE	REFERENCE No.
DRAWING INDEX	S000
GENERAL NOTES	S001-S002
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R.C. STAIR DETAILS	S970
MASONRY DETAILS	S980-S981
COMPOSITE SLAB DETAILS	S985
STEEL DETAILS	S990-S991

GENERAL ARRANGEMENT LEGEND

- xx* — -DENOTES SLAB/BAND BEAM THICKNESS
- C1 (01) — -DENOTES COLUMN OVER
- -DENOTES WALL OVER
- -DENOTES LOAD BEARING ELEMENT UNDER
- -DENOTES LOAD BEARING ELEMENT UNDER & OVER
- -DENOTES BLOCK WALL OVER
- S.C.J. — -DENOTES SAWCUT JOINT
- C.J. — -DENOTES CONSTRUCTION JOINT
- STEP — -DENOTES SLAB SETDOWN. REFER TO ARCH. DETAILS FOR ALL LEVELS.
- -DENOTES SLAB PENETRATION ZONE FOR CAST IN SERVICES. REFER TO ARCH/SERVICES DRAWINGS FOR EXACT LOCATIONS.
- -DENOTES SLAB PENETRATION REFER TO SERVICES / ARCH DRAWINGS FOR EXACT LOCATIONS
- -DENOTES BRICKWORK WALL

CO-ORDINATION ISSUE

Status

STRUCTURAL DRAWING

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CLIENT

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PROJECT

WEE HUR REGENT
90-102 REGENT ST.
REDFERN NSW 2016

TITLE

BASEMENT - GENERAL ARRANGEMENT PLAN

DATE	DESIGNED BY	CHECKED BY
JAN '21	BT/AJ	AC
SCALES AT A1	DRAWN BY	APPROVED BY
1:100	PAC	PW
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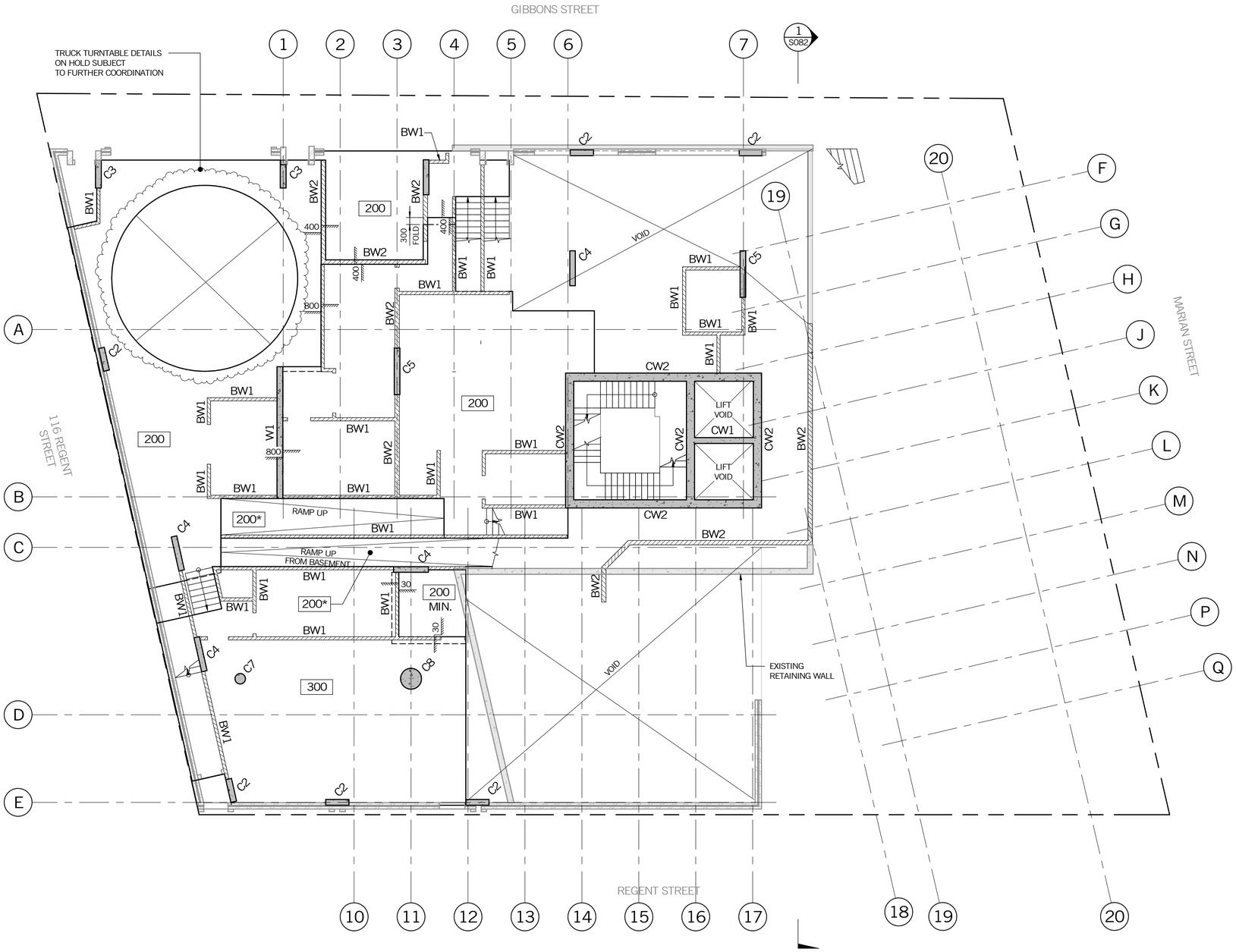

LOWER GROUND - GENERAL ARRANGEMENT PLAN

SCALE: 1 : 100

LOWER GROUND - SLAB SCHEDULE				
THICKNESS	f'c (MPa)	REINF. RATE (kg/m³)	P.T. RATE (kg/m²)	REMARKS
200	-	-	-	P.T. SLAB BY D&C CONTRACTOR
200*	-	-	-	R.C. RAMP SLAB
300	-	-	-	P.T. SLAB BY D&C CONTRACTOR

LOWER GROUND - CONCRETE COLUMN SCHEDULE				
MARK	SIZE	f'c (MPa)	REINF. RATE (kg/m³)	REMARKS
C1	250 x 800	-	-	INSITU CONCRETE COLUMN
C2	250 x 1000	-	-	INSITU CONCRETE COLUMN
C3	250 x 1200	-	-	INSITU CONCRETE COLUMN
C4	240 x 1500	-	-	INSITU CONCRETE COLUMN
C5	240 x 2000	-	-	INSITU CONCRETE COLUMN
C7	450 DIA.	-	-	INSITU CONCRETE COLUMN
C8	900 DIA.	-	-	INSITU CONCRETE COLUMN

LOWER GROUND - WALL SCHEDULE				
MARK	WIDTH	f'c (MPa)	REINF. RATE (kg/m³)	REMARKS
BW1	140	MPa	kg/m³	BLOCKWORK (INFILL f'c = 20 MPa)
BW2	190	MPa	kg/m³	BLOCKWORK (INFILL f'c = 20 MPa)
CW1	250	MPa	kg/m³	CORE WALL
CW2	350	MPa	kg/m³	CORE WALL
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NOTES:

1. ALL PENETRATIONS TO BE REVIEWED AND RESOLVED.
2. ALL SERVICES PENETRATIONS TO BE CO-ORDINATED AND APPROVED BY WEBBER DESIGN.
3. REBATES AND CAST IN PLATES FOR STRUCTURAL STEEL WORK AND FACADE TO BE CO-ORDINATED WITH ARCHITECT.
4. CONTRACTOR SHALL ALLOW FOR CONSTRUCTION JOINTS AS REQUIRED.

GENERAL NOTES:

- ALL CONCRETE SLABS AND BEAMS TO BE POST-TENSIONED U.N.O. PT AND REINFORCEMENT TO BE DESIGNED BY PT CONTRACTOR.
- SLABS TO BE MINIMUM 200mm THICK, f'c = 40MPa AND POST- TENSION BY OTHERS U.N.O.
- THE POST TENSIONING CONTRACTOR SHALL ENSURE POTENTIAL INTERNAL FORCES AND CRACKS INDUCED BY PRESTRESSING, SHRINKAGE, AND/OR TEMPERATURE ARE CONTROLLED IN THE VICINITY OF RESTRAINING ELEMENTS AND MAKE PROVISION FOR MOVEMENT AND SHRINKAGE AS REQUIRED THROUGHOUT, INCLUDING MOVEMENT JOINTS, POUR STRIPS, LOW SHRINKAGE CONCRETE MIX ETC.
- NO COLUMN STIFFNESS SHOULD BE USED IN THE SLAB AND BEAM DESIGN.
- SLABS TO BE CHECKED FOR PUNCHING SHEAR WITH MOMENT DERIVED WITH 100% COLUMN STIFFNESS. PT CONTRACTOR TO MAKE ALLOWANCE FOR SHEAR HEAD REINFORCEMENT (WHERE REQUIRED) TO SATISFY PUNCHING SHEAR REQUIREMENTS.
- Ieff TO Igross MAX RATIO TO BE DETERMINED BY THE DESIGNER BUT IN NO INSTANCE SHALL BE GREATER THAN 0.7 FOR THE SLAB AND BEAM CALCULATIONS.
- PT CONTRACTOR TO MAKE ALLOWANCE FOR STRUCTURAL INTEGRITY REINFORCEMENT IN ACCORDANCE WITH CL9.2.2 OF AS3600-2018 FOR ALL SLABS AND BEAMS.
- PT CONTRACTOR TO PROVIDE A MINIMUM P/A OF 1.4MPA (AFTER FINAL LOSSES) TO ALL INTERNAL CONCRETE SLABS AND BEAMS, AND 2.0MPa (AFTER FINAL LOSSES) TO ALL EXTERNAL AREAS (BALCONIES, TERRACES, EXPOSED ROOFS, ETC.) PLUS SL82 TOP MESH U.N.O.
- ALL EXPOSED SLABS/BEAMS CRACK WIDTH TO BE LIMITED TO 0.3mm MAX.

EXPOSURE CLASSIFICATION
- A2 INTERNAL
- B1 EXTERNAL
- B1 SURFACES IN CONTACT WITH THE GROUND

FIRE RATING
- RESIDENTIAL -- 90 MINUTES FRL
- CARPARK -- 120 MINUTES FRL
- LOADING DOCK -- 240 MINUTES FRL

SERVICEABILITY
- TOTAL LONG TERM DEFLECTION -- SPAN / 250 OR 25mm MAXIMUM, CANTILEVER -- SPAN / 125 OR 15mm MAXIMUM
- TRANSFER SLABS & BEAMS -- SPAN/1000 OR 10mm MAXIMUM
- INCREMENTAL DEFLECTION LIMITS FOR SLABS AND BEAMS SUPPORTING BRITTLE ELEMENTS -- SPAN/500, CANTILEVER -- SPAN/125
- DIFFERENTIAL DEFLECTION BETWEEN FLOORS TO BE LIMITED TO SPAN/500 OR 15mm MAXIMUM AT FACADE LOCATIONS

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CLIENT

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90-102 REGENT ST.
REDFERN NSW 2016

TITLE

LOWER GROUND - GENERAL ARRANGEMENT PLAN

DATE	DESIGNED BY	CHECKED BY
JAN '21	BT/AJ	AC
SCALES AT A1	DRAWN BY	APPROVED BY
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JOB No.	DRAWING No.	REV.
20018	S090	P1

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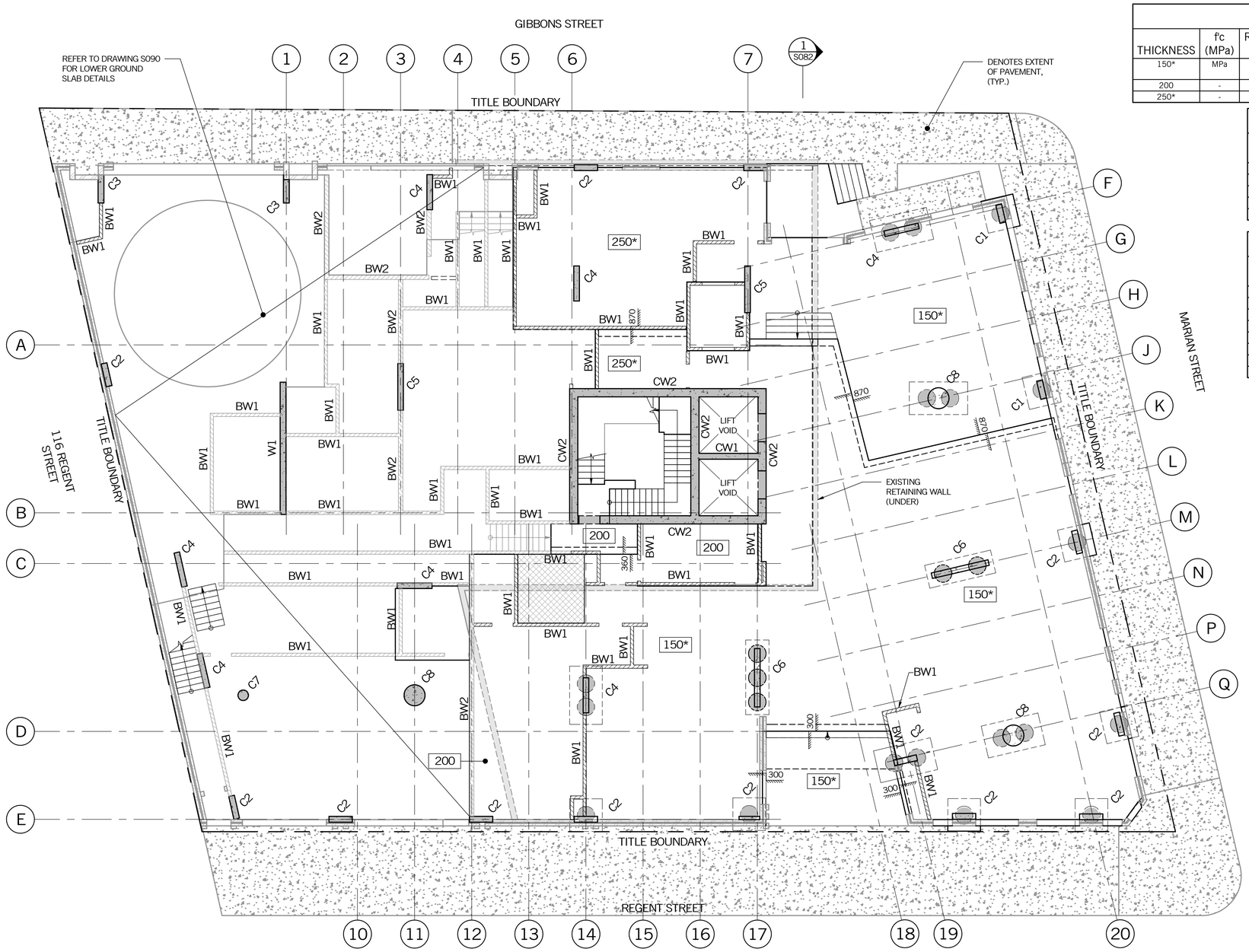

LEVEL 1 (GROUND FLOOR) - GENERAL ARRANGEMENT PLAN

SCALE: 1 : 100

LEVEL 1 (GROUND FLOOR) - SLAB SCHEDULE

THICKNESS	f'c (MPa)	REINF. RATE (kg/m³)	P.T. RATE (kg/m²)	REMARKS
150*	MPa	kg/m³	N/A	R.C. SLAB ON GROUND. ALLOW FOR SAW CUTS AT APPROX. 5m CTS. E.W. & MOVEMENT JOINTS AT APPROX. 20m CTS.
200	-	-	-	R.C. SUSPENDED SLAB
250*	-	-	-	R.C. SUSPENDED SLAB

LEVEL 1 - WALL SCHEDULE

MARK	WIDTH	f'c (MPa)	REINF. RATE (kg/m³)	REMARKS
BW1	140	MPa	kg/m³	BLOCKWORK (INFILL f'c = 20 MPa)
BW2	190	MPa	kg/m³	BLOCKWORK (INFILL f'c = 20 MPa)
CW1	250	MPa	kg/m³	CORE WALL
CW2	350	MPa	kg/m³	CORE WALL
W1	250	MPa	kg/m³	INSITU WALL

LEVEL 1 - CONCRETE COLUMN SCHEDULE

MARK	SIZE	f'c (MPa)	REINF. RATE (kg/m³)	REMARKS
C1	250 x 800	-	-	INSITU CONCRETE COLUMN
C2	250 x 1000	-	-	INSITU CONCRETE COLUMN
C3	250 x 1200	-	-	INSITU CONCRETE COLUMN
C4	240 x 1500	-	-	INSITU CONCRETE COLUMN
C5	240 x 2000	-	-	INSITU CONCRETE COLUMN
C6	240 x 2500	-	-	INSITU CONCRETE COLUMN
C7	450 DIA.	-	-	INSITU CONCRETE COLUMN
C8	900 DIA.	-	-	INSITU CONCRETE COLUMN

NOTES:

1. ALL PENETRATIONS TO BE REVIEWED AND RESOLVED.
2. ALL SERVICES PENETRATIONS TO BE CO-ORDINATED AND APPROVED BY WEBBER DESIGN.
3. REBATES AND CAST IN PLATES FOR STRUCTURAL STEEL WORK AND FACADE TO BE CO-ORDINATED WITH ARCHITECT.
4. CONTRACTOR SHALL ALLOW FOR CONSTRUCTION JOINTS AS REQUIRED.

GENERAL NOTES:

- ALL CONCRETE SLABS AND BEAMS TO BE POST-TENSIONED U.N.O. PT AND REINFORCEMENT TO BE DESIGNED BY PT CONTRACTOR.
- SLABS TO BE MINIMUM 200mm THICK, f'c = 40MPa AND POST- TENSION BY OTHERS U.N.O.
- THE POST TENSIONING CONTRACTOR SHALL ENSURE POTENTIAL INTERNAL FORCES AND CRACKS INDUCED BY PRESTRESSING, SHRINKAGE, AND/OR TEMPERATURE ARE CONTROLLED IN THE VICINITY OF RESTRAINING ELEMENTS AND MAKE PROVISION FOR MOVEMENT AND SHRINKAGE AS REQUIRED THROUGHOUT, INCLUDING MOVEMENT JOINTS, POUR STRIPS, LOW SHRINKAGE CONCRETE MIX ETC.
- NO COLUMN STIFFNESS SHOULD BE USED IN THE SLAB AND BEAM DESIGN.
- SLABS TO BE CHECKED FOR PUNCHING SHEAR WITH MOMENT DERIVED WITH 100% COLUMN STIFFNESS. PT CONTRACTOR TO MAKE ALLOWANCE FOR SHEAR HEAD REINFORCEMENT (WHERE REQUIRED) TO SATISFY PUNCHING SHEAR REQUIREMENTS.
- Ieff TO Igross MAX RATIO TO BE DETERMINED BY THE DESIGNER BUT IN NO INSTANCE SHALL BE GREATER THAN 0.7 FOR THE SLAB AND BEAM CALCULATIONS.
- PT CONTRACTOR TO MAKE ALLOWANCE FOR STRUCTURAL INTEGRITY REINFORCEMENT IN ACCORDANCE WITH CL9.2.2 OF AS3600-2018 FOR ALL SLABS AND BEAMS.
- PT CONTRACTOR TO PROVIDE A MINIMUM P/A OF 1.4MPA (AFTER FINAL LOSSES) TO ALL INTERNAL CONCRETE SLABS AND BEAMS, AND 2.0MPa (AFTER FINAL LOSSES) TO ALL EXTERNAL AREAS (BALCONIES, TERRACES, EXPOSED ROOFS, ETC.) PLUS SL82 TOP MESH U.N.O.
- ALL EXPOSED SLABS/BEAMS CRACK WIDTH TO BE LIMITED TO 0.3mm MAX.

EXPOSURE CLASSIFICATION
- A2 INTERNAL
- B1 EXTERNAL
- B1 SURFACES IN CONTACT WITH THE GROUND

FIRE RATING
- RESIDENTIAL -- 90 MINUTES FRL
- CARPARK -- 120 MINUTES FRL
- LOADING DOCK -- 240 MINUTES FRL

SERVICEABILITY
- TOTAL LONG TERM DEFLECTION -- SPAN / 250 OR 25mm MAXIMUM, CANTILEVER -- SPAN / 125 OR 15mm MAXIMUM
- TRANSFER SLABS & BEAMS -- SPAN/1000 OR 10mm MAXIMUM
- INCREMENTAL DEFLECTION LIMITS FOR SLABS AND BEAMS
- SUPPORTING BRITTLE ELEMENTS -- SPAN/500, CANTILEVER -- SPAN/125
- DIFFERENTIAL DEFLECTION BETWEEN FLOORS TO BE LIMITED TO SPAN/500 OR 15mm MAXIMUM AT FACADE LOCATIONS

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

Rev.	Description	Eng.	Draft.	Date
P1	ISSUED FOR CO-ORDINATION	BT/AJ	PAC	05.02.21

DRAWING REFERENCE	REFERENCE No.
DRAWING INDEX	S000
GENERAL NOTES	S001-S002
RETENTION	S010-S029
CONCRETE COLUMNS	S800-S819
IN-SITU WALLS	S820-S879
PRECAST WALLS	S880-S909
SLAB ON GROUND DETAILS	S950-S951
COMPOSITE SLAB DETAILS	S955
SUSPENDED CONCRETE SLABS	S960-S962
POST TENSIONING DETAILS	S965-S966
R.C. STAIR DETAILS	S970
MASONRY DETAILS	S980-S981
COMPOSITE SLAB DETAILS	S985
STEEL DETAILS	S990-S991

GENERAL ARRANGEMENT LEGEND

- xx* -DENOTES SLAB/BAND BEAM THICKNESS
- Cx (o) -DENOTES COLUMN OVER
- -DENOTES WALL OVER
- -DENOTES LOAD BEARING ELEMENT UNDER
- -DENOTES LOAD BEARING ELEMENT UNDER & OVER
- -DENOTES BLOCK WALL OVER
- S.C.J. -DENOTES SAWCUT JOINT
- C.J. -DENOTES CONSTRUCTION JOINT
- STEP -DENOTES SLAB SETDOWN. REFER TO ARCH. DETAILS FOR ALL LEVELS.
- -DENOTES SLAB PENETRATION ZONE FOR CAST IN SERVICES. REFER TO ARCH/SERVICES DRAWINGS FOR EXACT LOCATIONS.
- -DENOTES SLAB PENETRATION REFER TO SERVICES / ARCH DRAWINGS FOR EXACT LOCATIONS
- -DENOTES BRICKWORK WALL

CO-ORDINATION ISSUE

Status

STRUCTURAL DRAWING

WEBBER DESIGN
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CLIENT

WEE HUR

PROJECT

WEE HUR REGENT
90-102 REGENT ST.
REDFERN NSW 2016

TITLE

LEVEL 1 (GROUND FLOOR) - GENERAL ARRANGEMENT PLAN

DATE	DESIGNED BY	CHECKED BY
JAN '21	BT/AJ	AC
SCALES AT A1	DRAWN BY	APPROVED BY
1:100	PAC	PW
JOB No.	DRAWING No.	REV.
20018	S100	P1

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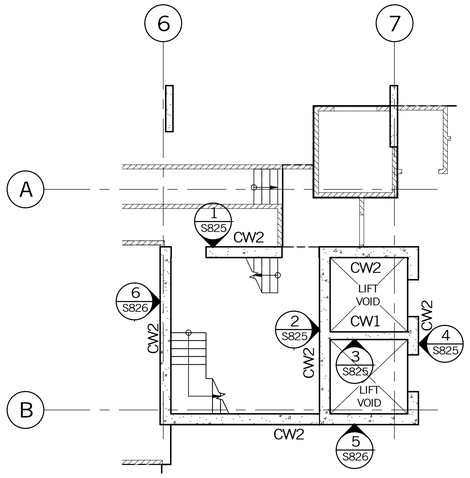
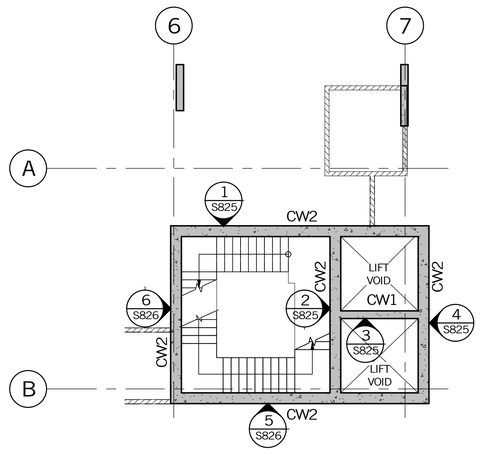


BASEMENT - CORE WALL KEY PLAN

SCALE: 1 : 100



LOWER GROUND - CORE WALL KEY PLAN (LEVEL 1 SIMILAR)

SCALE: 1 : 100

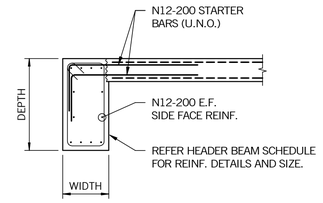
INSITU CORE WALL SCHEDULE				
MARK	WIDTH	f'c (MPa)	REINF. RATE (kg/m³)	REMARKS
CW1	250	MPa	kg/m³	CORE WALL
CW2	350	MPa	kg/m³	CORE WALL

IN-SITU WALL REINFORCEMENT & CONCRETE NOTES:

1. ALL SERVICES PENETRATION TO BE COORDINATED AND APPROVED BY WEBBER DESIGN.
2. CONTRACTOR SHALL ALLOW FOR CONSTRUCTION JOINT AS REQUIRED.
3. PROVIDE 25mm CLEAR COVER TO CORE WALL REINFORCEMENT (U.N.O.).
4. WHERE BARS OF DIFFERENT DIAMETERS ARE SPLICED,USE THE SPLICE OF THE LARGER BAR DIAMETER.
5. FOR WALLS WITH BARS ANCHORED OR SPLICED AT LESS THAN 150 CTS. MULTIPLY THE ABOVE LENGTHS BY 1.4
6. UNLESS SHOWN ON DRAWINGS, THE SPLICE LOCATIONS MUST BE APPROVED BY THE ENGINEER.
7. IF BARS HAVE STANDARD COGS AT THE ENDS, HALVE THE ABOVE LENGTHS.
8. N36 AND N40 BARS IN TENSION ARE NOT TO BE SPLICED.

NOTES:-
CO-ORDINATE ALL PENETRATION SIZES AND LOCATIONS WITH SERVICES CONSULTANTS. NO PENETRATION TO BE INCREASED IN SIZE OR MOVED WITHOUT THE WRITTEN AGREEMENT OF WEBBER DESIGN PTY. LTD.

ANCHORAGE AND SPLICE LENGTH FOR INSITU/PRECAST WALLS UNO.	
N12	600
N16	800
N20	1000
N24	1200
N28	1400
N32	1400
N36	1400 (COMPRESSION SPLICE)
GENERAL	45 BAR DIA.



HEADER BEAM DETAIL FOR IN-SITU WALLS

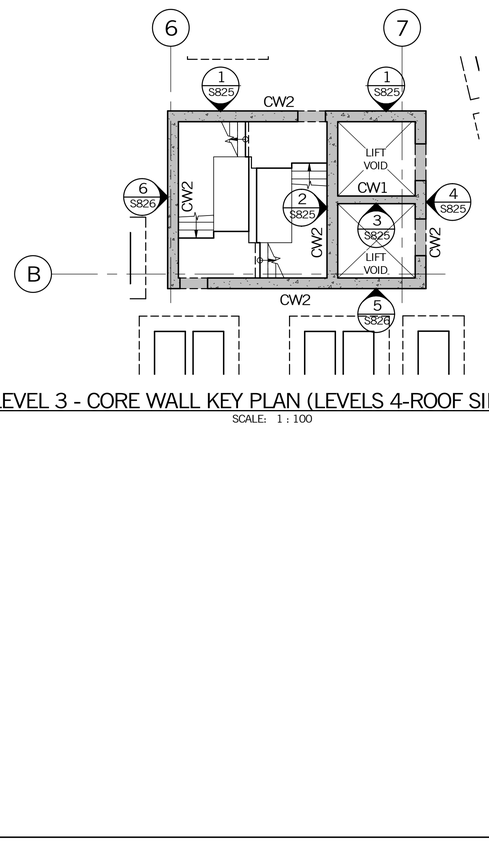
SCALE 1:20

1. REFER TO LIFT SHAFT MANUFACTURER SHOP DRAWINGS FOR LIFT DETAILS, REQUIREMENTS AND DIMENSIONS.
2. CO-ORDINATE ALL LIFT SHAFT PENETRATION SIZES AND LOCATIONS WITH SERVICES CONSULTANTS. NO PENETRATION TO BE INCREASED IN SIZE OR MOVED WITHOUT THE WRITTEN AGREEMENT OF THIS OFFICE.
3. REFER TO LIFT MANUFACTURER FOR ALL ADDITIONAL CAST IN ITEMS AND BLOCK OUTS.
4. REFER TO LIFT SUPPLIERS DRAWINGS FOR DETAILS AND LOCATIONS OF ALL CAST IN FERRULES, UNI-STRUTS ETC. FOR FIXING OF ALL LIFT EQUIPMENT.

IN-SITU CORE HEADER BEAM SCHEDULE			
MARK	WIDTH	DEPTH	REINF.
CW1	200	800 MIN.	- kg/m³
CW2	250	800 MIN.	- kg/m³
CW3	350	800 MIN.	- kg/m³

LEVEL 2 - CORE WALL KEY PLAN

SCALE: 1 : 100



LEVEL 3 - CORE WALL KEY PLAN (LEVELS 4-ROOF SIMILAR)

SCALE: 1 : 100

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Rev.	Description	Eng.	Draft.	Date
P1	ISSUED FOR CO-ORDINATION	BT/AJ	PAC	05.02.21

DRAWING REFERENCE	REFERENCE No.
DRAWING INDEX	S000
GENERAL NOTES	S001-S002
RETENTION	S010-S029
CONCRETE COLUMNS	S800-S819
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R.C. STAIR DETAILS	S970
MASONRY DETAILS	S980-S981
COMPOSITE SLAB DETAILS	S985
STEEL DETAILS	S990-S991

CO-ORDINATION ISSUE

Status

STRUCTURAL DRAWING

WEBBER DESIGN
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PROJECT

WEE HUR REGENT
90-102 REGENT ST.
REDFERN NSW 2016

TITLE

CORE KEY PLANS

DATE	DESIGNED BY	CHECKED BY
JAN '21	BT/AJ	AC
SCALES AT A1	DRAWN BY	APPROVED BY
1:100	PAC	PW
JOB No.	DRAWING No.	REV.
20018	S820	P1

PRINT TIME: 5/02/2021 10:48:52 AM C:\Users\peter\Documents\W20018 - 90-102 Regent Street_Central_peter2UEEP.vt

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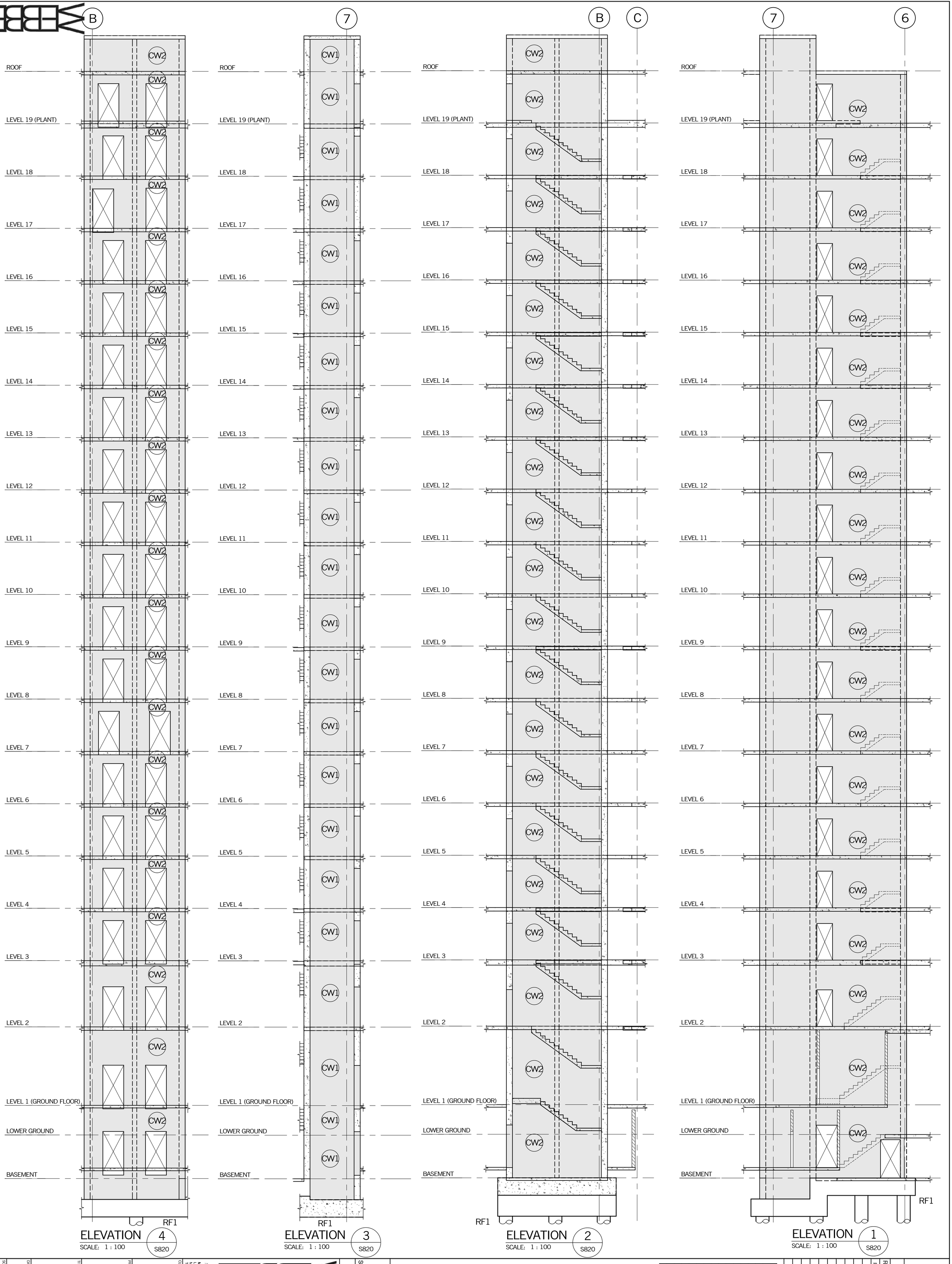

ELEVATION 4 S820 — SCALE: 1 : 100

ELEVATION 3 S820 — SCALE: 1 : 100

ELEVATION 2 S820 — SCALE: 1 : 100

ELEVATION 1 S820 — SCALE: 1 : 100

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STEEL DETAILS	S990-S991

CO-ORDINATION ISSUE

Status

STRUCTURAL DRAWING

STRUCTURAL ENGINEERING
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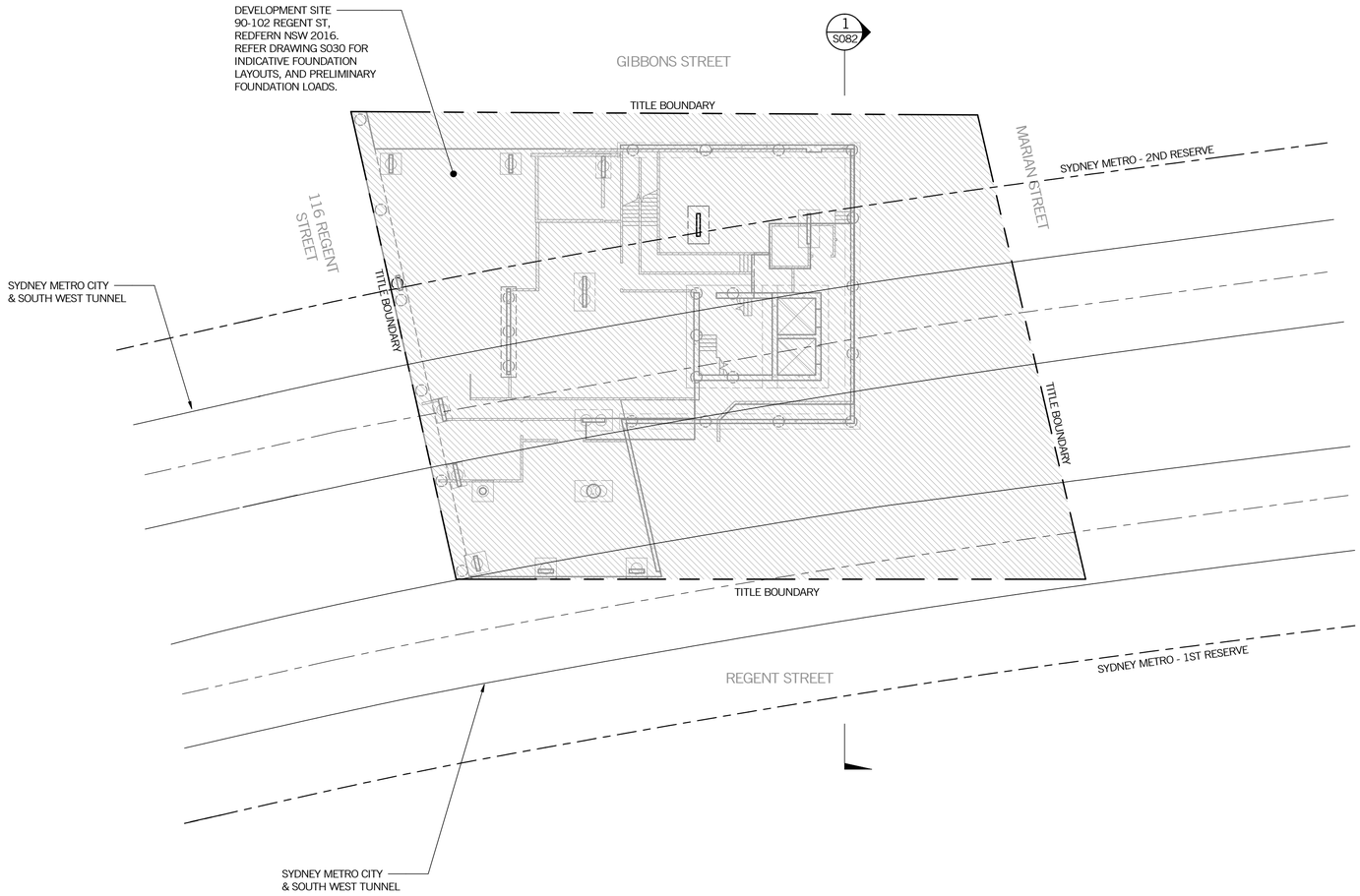
REDFERN NSW 2016

TITLE

STAIR AND LIFT CORE
ELEVATIONS - SHEET 1

DATE	DESIGNED BY	CHECKED BY
JAN '21	BT/AJ	AC
SCALES AT A1	DRAWN BY	APPROVED BY
1:100	PAC	PW
JOB No.	DRAWING No.	REV.
20018	S825	P1

SYDNEY METRO TUNNEL INFORMATION OBTAINED FROM LTS LOCKLEY SURVEY DRAWINGS (REF. NO.: 50670 004BH, REV. A)



SYDNEY METRO ASSET PLAN - OVERLAY

SCALE: 1 : 200

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Rev.	Description	Eng.	Draft.	Date
P1	ISSUED FOR CO-ORDINATION	BT/AJ	PAC	05.02.21

DRAWING REFERENCE	REFERENCE No.
DRAWING INDEX	S000
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CO-ORDINATION ISSUE

Status

STRUCTURAL DRAWING

STRUCTURAL ENGINEERING

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REDFERN NSW 2016

TITLE

SYDNEY METRO ASSET PLAN - OVERLAY

DATE	DESIGNED BY	CHECKED BY
JAN '21	BT/AJ	AC
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1:200	PAC	PW
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20018	S081	P1

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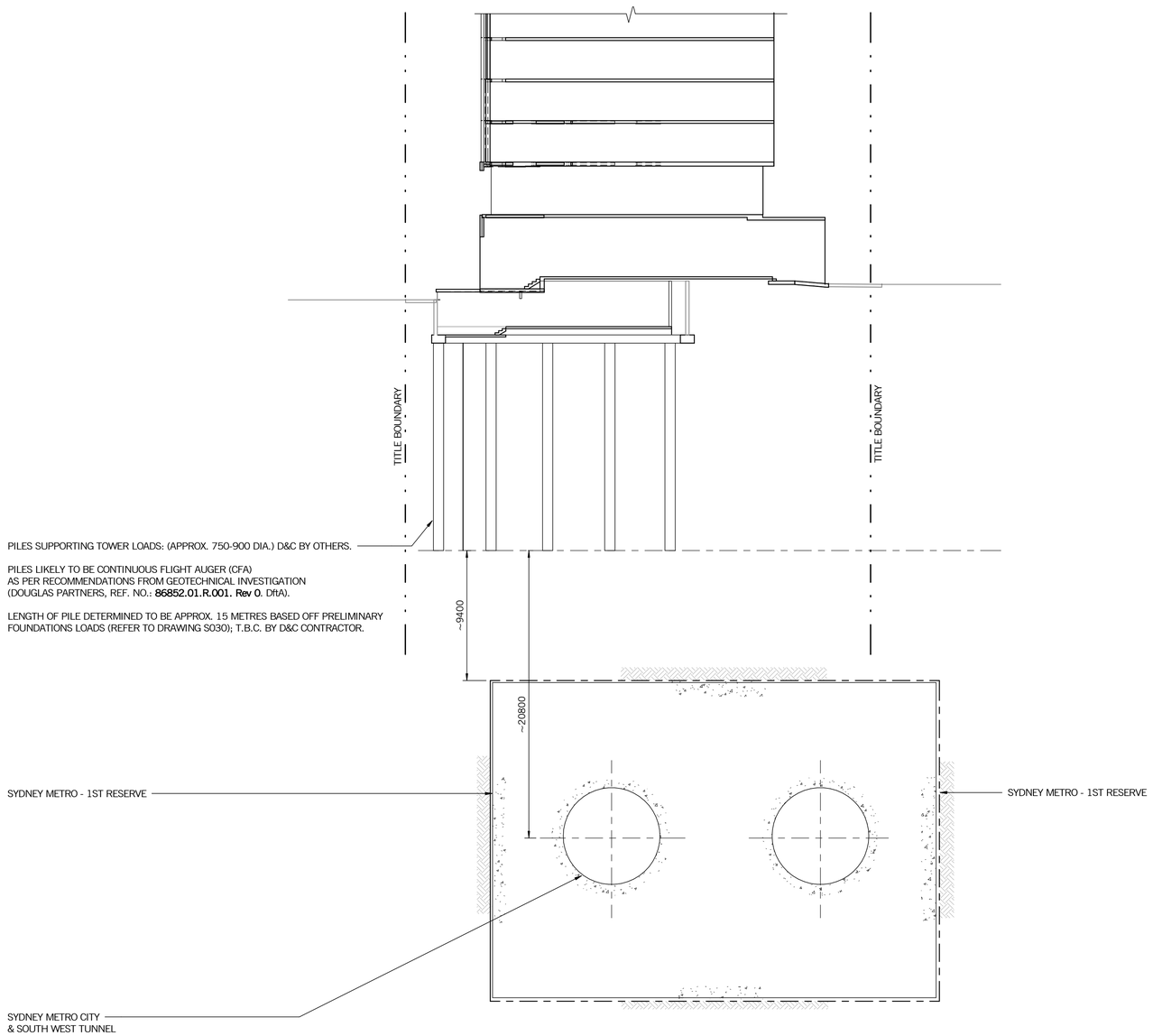

SECTION 1
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DRAWING REFERENCE	REFERENCE No.
DRAWING INDEX	S000
GENERAL NOTES	S001-S002
RETENTION	S010-S029
CONCRETE COLUMNS	S800-S819
IN-SITU WALLS	S820-S879
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MASONRY DETAILS	S980-S981
COMPOSITE SLAB DETAILS	S985
STEEL DETAILS	S990-S991

CO-ORDINATION ISSUE

Status

STRUCTURAL DRAWING

WEBBER DESIGN

STRUCTURAL ENGINEERING

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WEE HUR REGENT
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TITLE

SYDNEY METRO ASSET -
SECTION - SHEET 1

DATE	DESIGNED BY	CHECKED BY
JAN '21	BT/AJ	AC
SCALES AT A1	DRAWN BY	APPROVED BY
1:200	PAC	PW
JOB No.	DRAWING No.	REV.
20018	S082	P1

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WEBBER DESIGN

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SEE SHEET 1 FOR LEGEND & NOTES

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SCALE 1:100 @ A1

Revision	Date	Description	Reference
-	00/00/00	-	00
-	00/00/00	-	00
-	00/00/00	-	00
G	26/11/20	DETAIL & LEVELS ADDED, DETECTED SERVICES ADDED	007

Revision	Date	Description	Reference
F	23/11/20	COORDINATES FOR PROPOSED BUILDING LIFT OVERRUN ADDED	50670 006
E	12/10/20	COORDINATES FOR PROPOSED BUILDING ADDED	50670 006
D	30/09/20	SYDNEY METRO TUNNELS, RESERVES AND CROSS SECTIONS ADDED	50670 006
C	18/09/20	STORMWATER PIPT INVERTS ADDED	50670 005

LTS CONFIDENCE TOGETHER
www.ltsl.com.au | P 1300 587 000

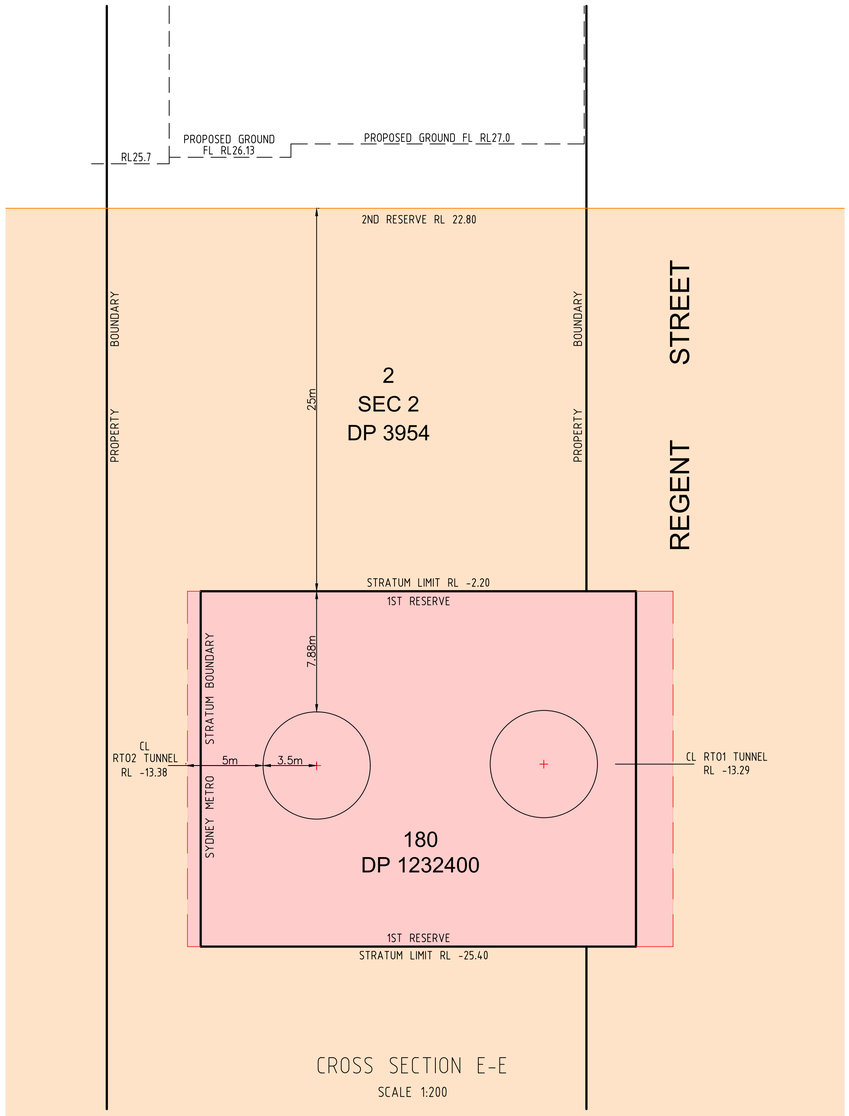
THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

....
Registered Surveyor NSW

Client THE TRUST COMPANY (AUSTRALIA) LIMITED ATF HW REGENT TRUST

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOTS 1-3 SECTION 2 IN DP 3954, LOT 1 IN DP 184335 AND SP 57425 KNOWN AS No 90-102 REGENT STREET, REDFERN

datum AHD
site Area 1287m²
LGA SYDNEY
reference number 50670 001DT
scale 1:100 @A1
date of survey 23/04/2019
SHEET 11 OF 18



CROSS SECTION E-E

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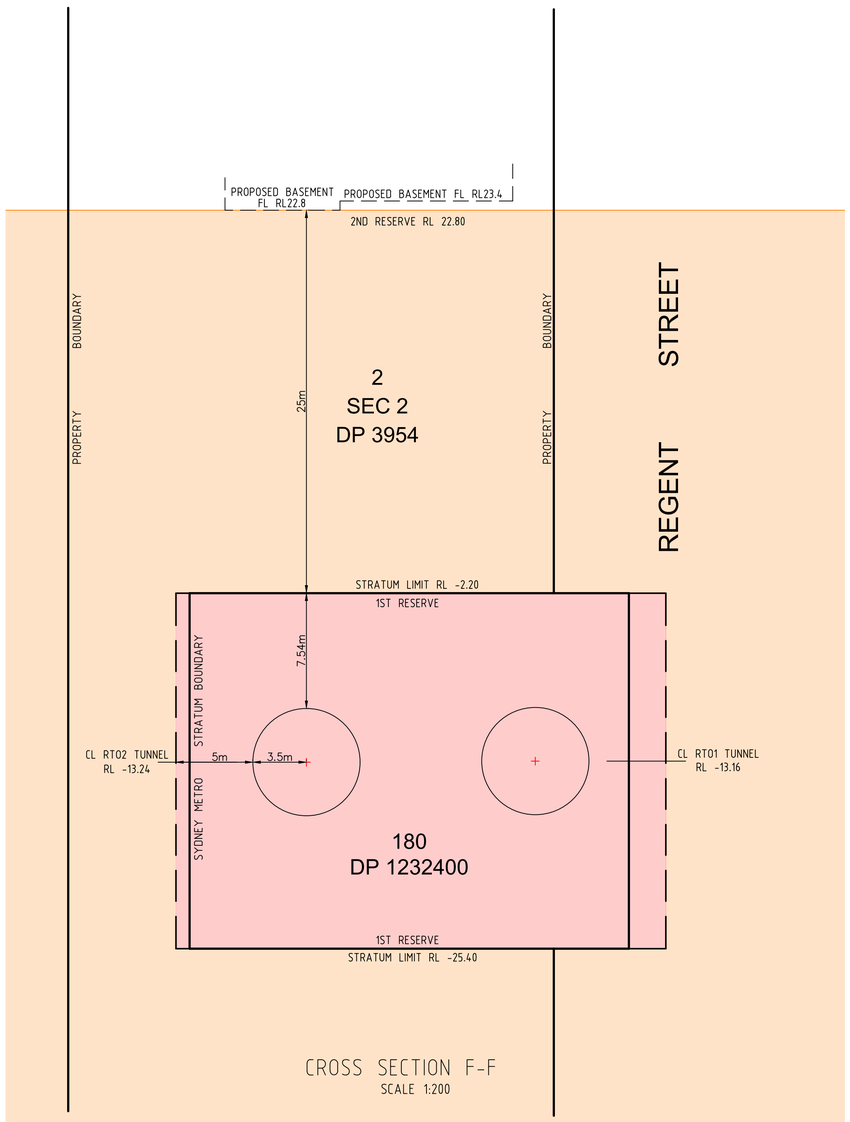

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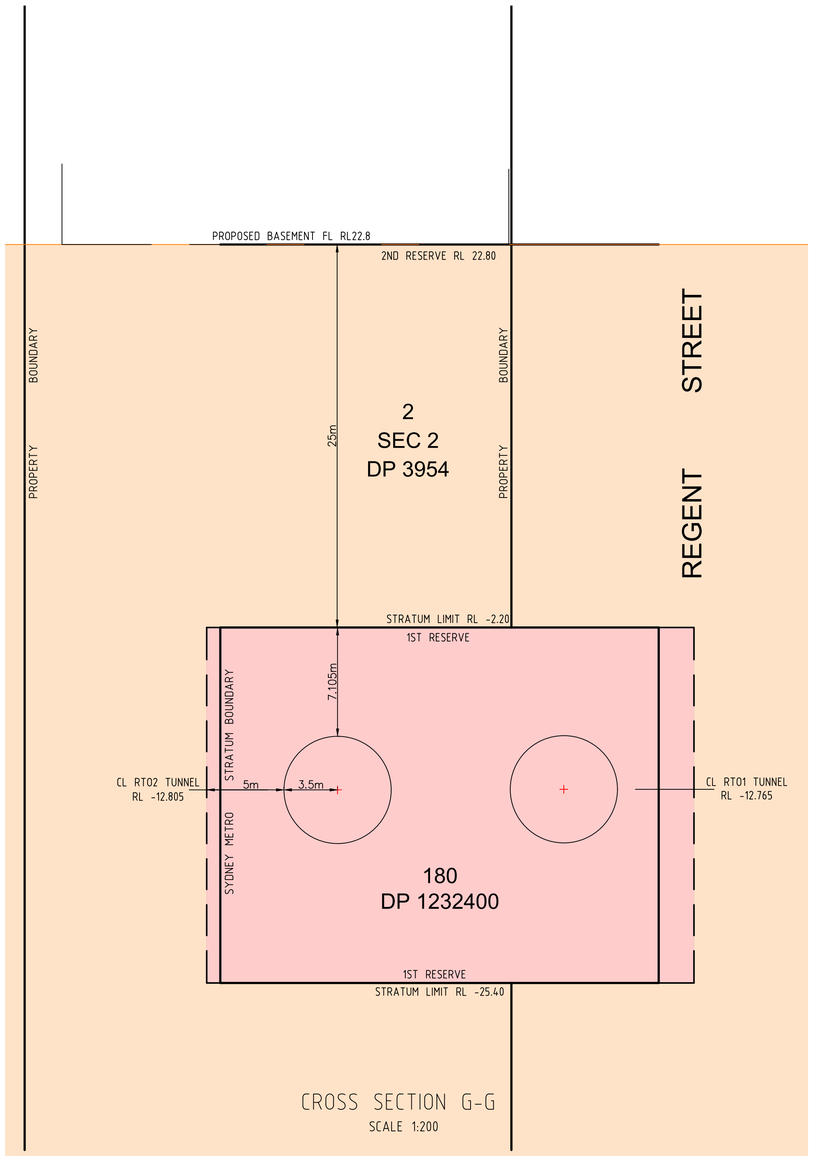
SCALE 1:200



CROSS SECTION G-G

SCALE 1:200

SYDNEY METRO TUNNEL CROSS SECTIONS

SEE SHEET 1 FOR LEGEND & NOTES

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GDA2020

0 4 8 12 16 20

SCALE 1: 200 @ A1

Revision	Date	Description	Reference
-	00/00/00	-	00
-	00/00/00	-	00
-	00/00/00	-	00
G	26/11/20	DETAIL & LEVELS ADDED, DETECTED SERVICES ADDED	007
F	23/11/20	COORDINATES FOR PROPOSED BUILDING LIFT OVERRUN ADDED	50670 006
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D	30/09/20	SYDNEY METRO TUNNELS, RESERVES AND CROSS SECTIONS ADDED	50670 006
C	18/09/20	STORMWATER PIPT INVERTS ADDED	50670 005

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Registered Surveyor NSW

Client THE TRUST COMPANY (AUSTRALIA) LIMITED ATF HW REGENT TRUST

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PLAN OF DETAIL AND LEVELS OVER LOTS 1-3 SECTION 2 IN DP 3954, LOT 1 IN DP 184335 AND SP 57425 KNOWN AS No 90-102 REGENT STREET, REDFERN

datum AHD

site Area 1287m²

LGA SYDNEY

reference number 50670 001DT

scale 1:200 @A1

date of survey 23/04/2019

SHEET 18 OF 18

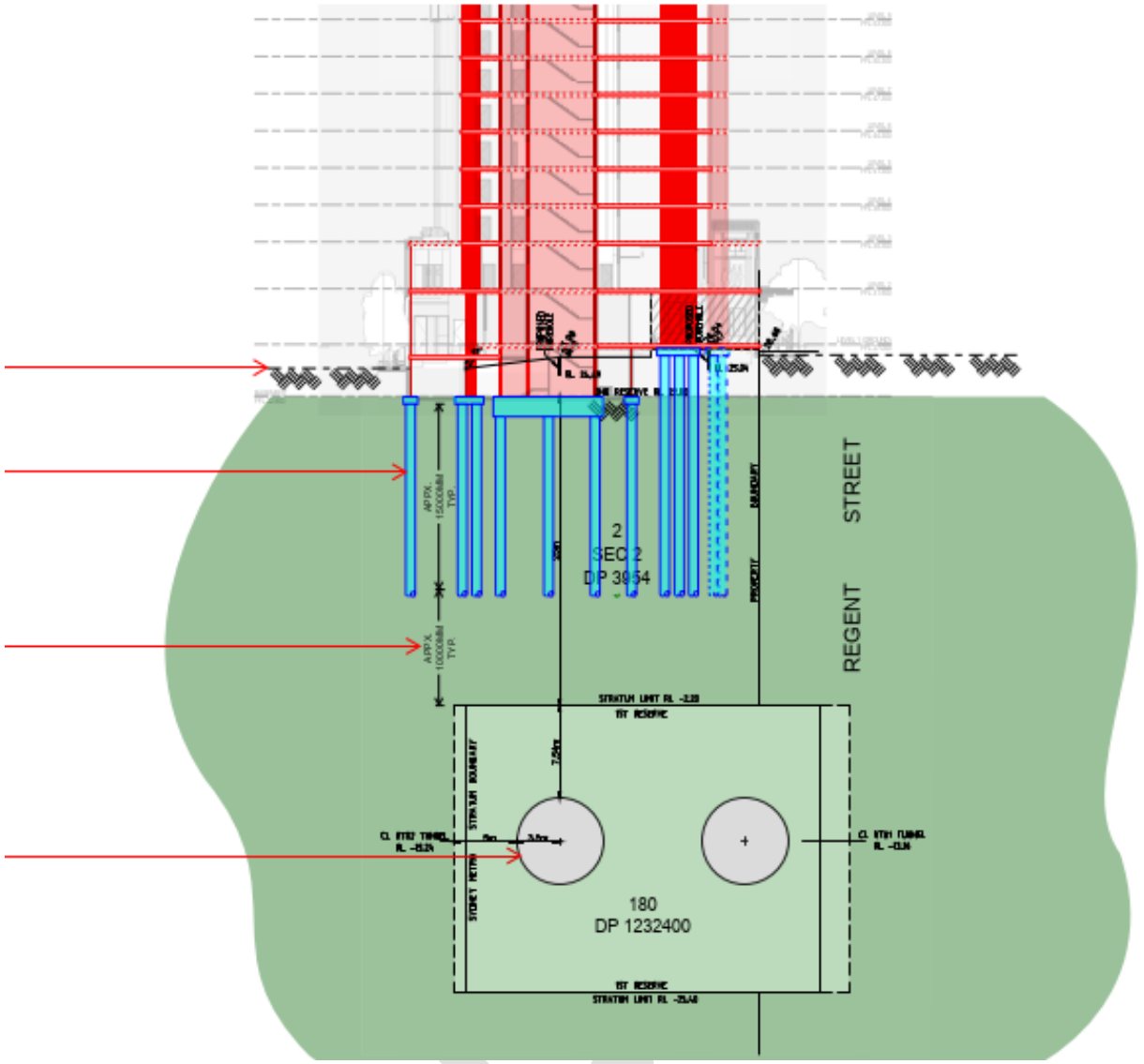
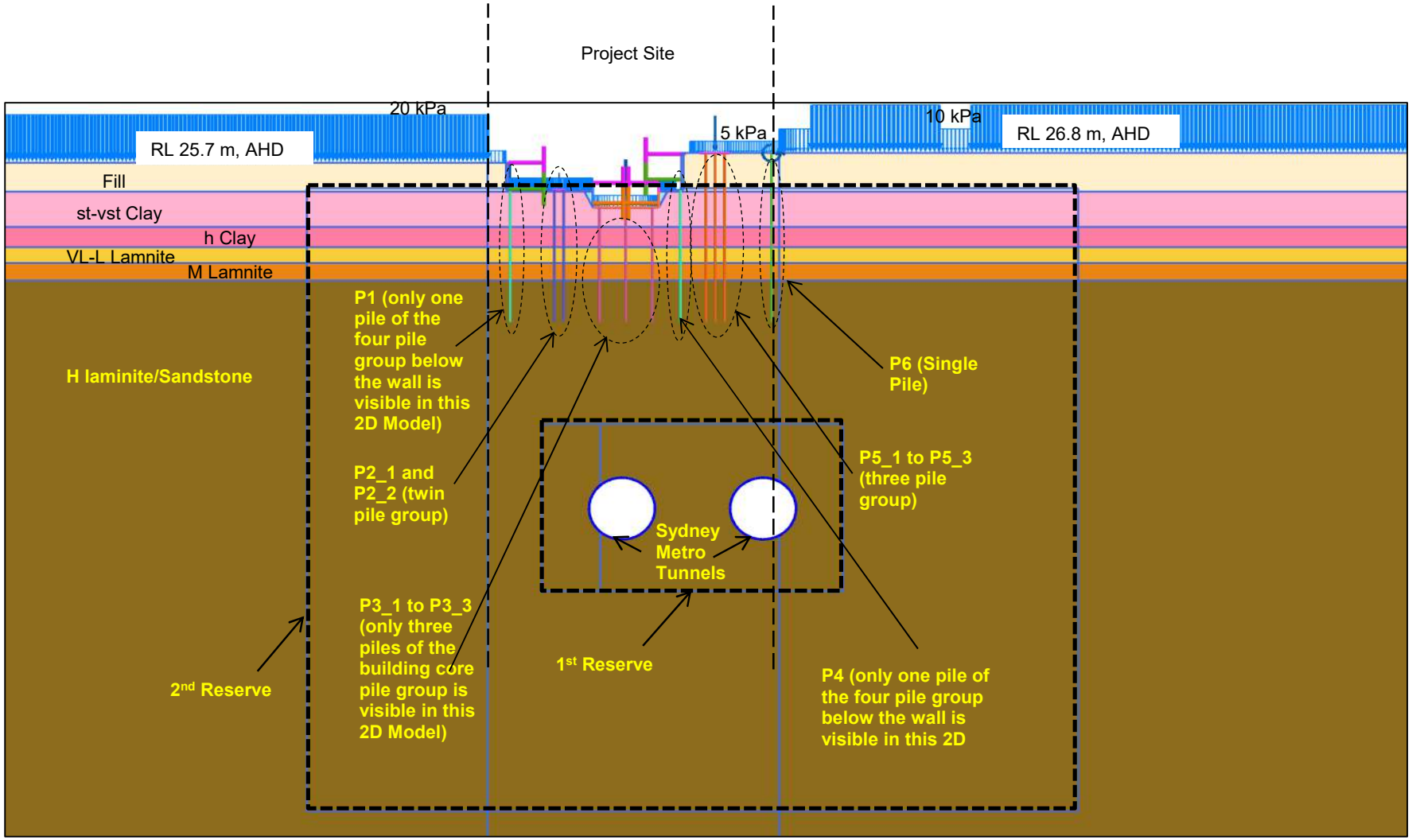


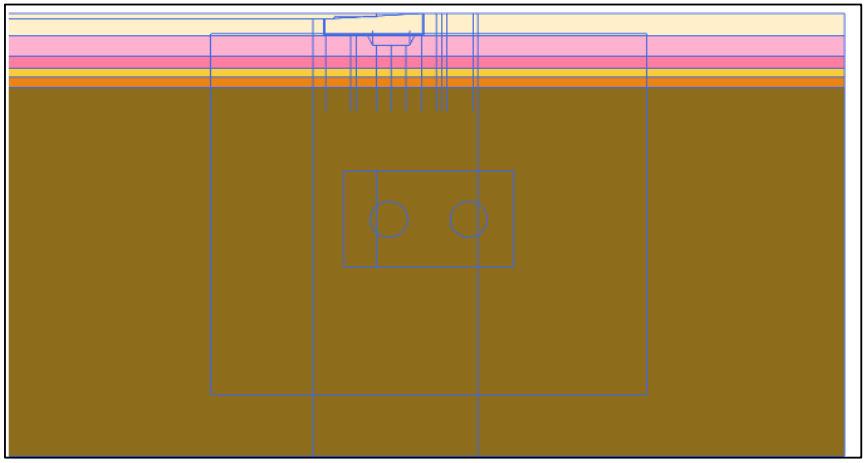
Figure 2 – Proposed Piling Extent

Appendix C

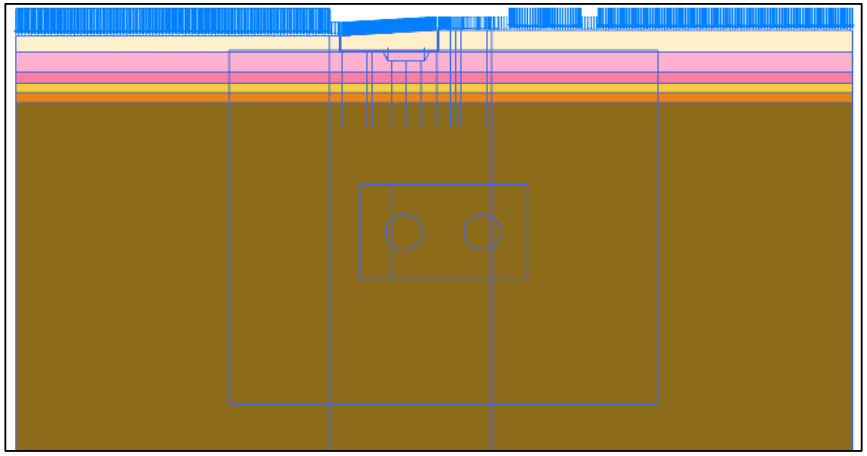
Analysis Outputs



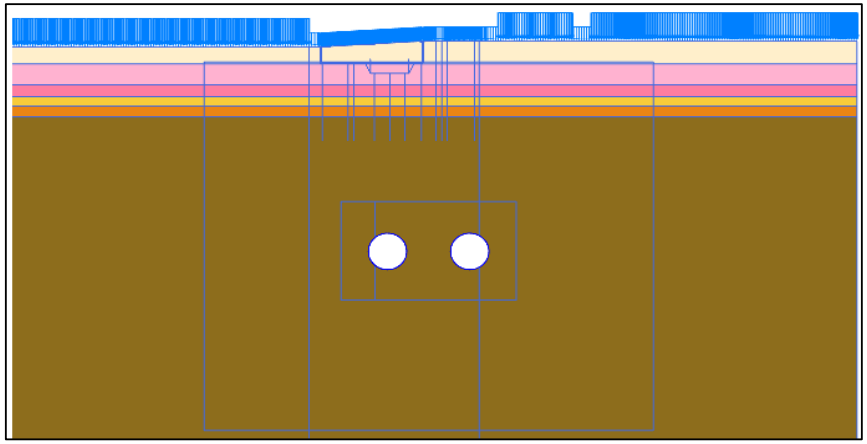
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Adopted Model Geometry**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M1
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



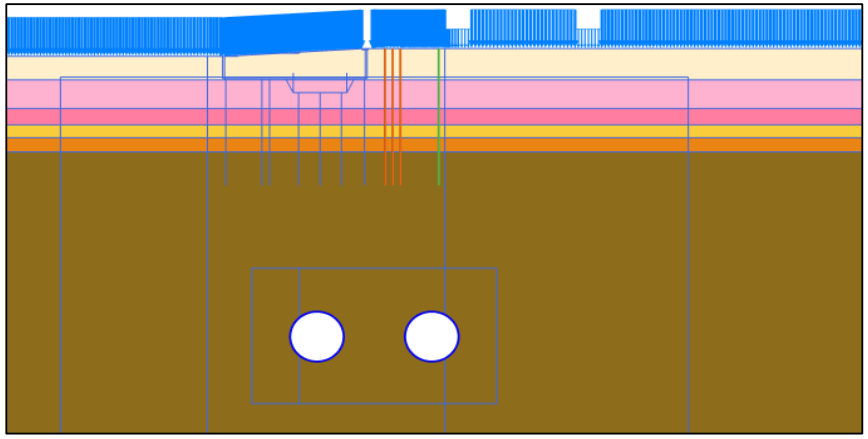
Stage 1 - Initial equilibrium



Stage 2 - Activate the surcharges

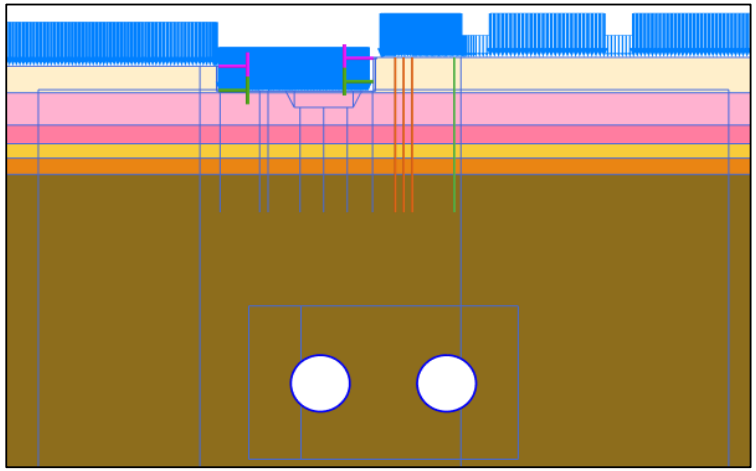


Stage 3 - Construct Tunnels

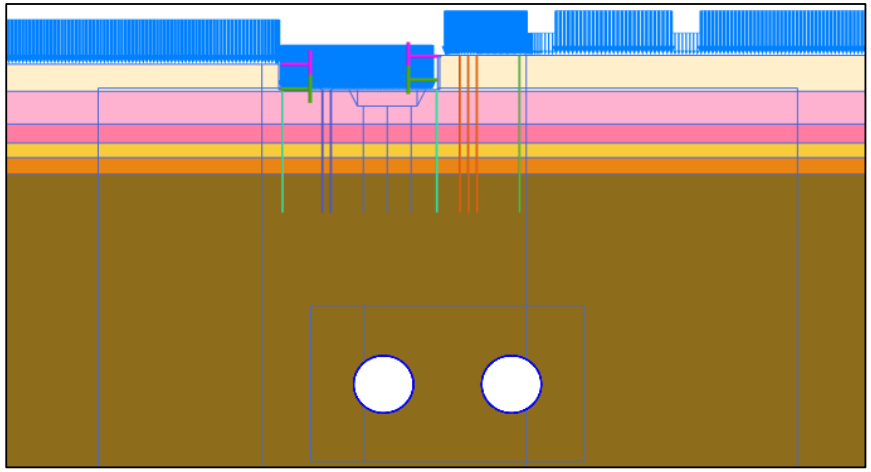


Stage 4 - Ground-Level Piling

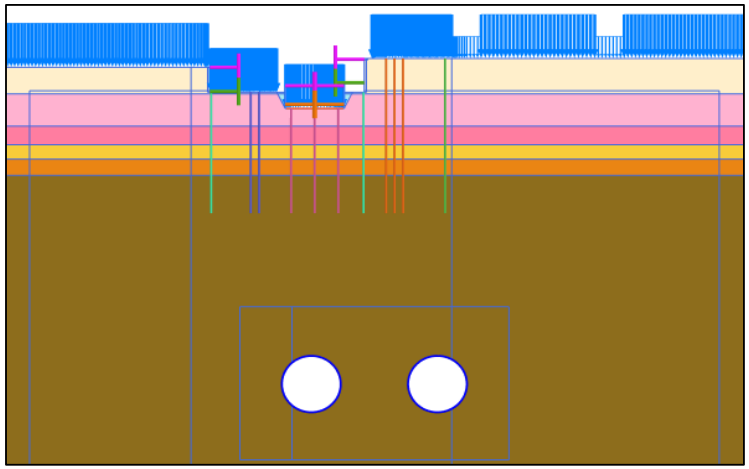
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Model Stages 1-4**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M2
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



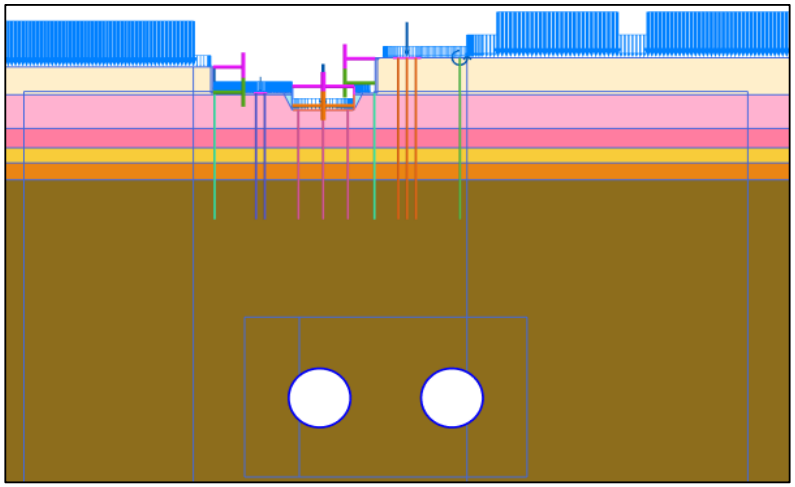
Stage 5 - Excavate and construct the new basement retaining walls and lateral supports



Stage 6 - Basement Level Piling

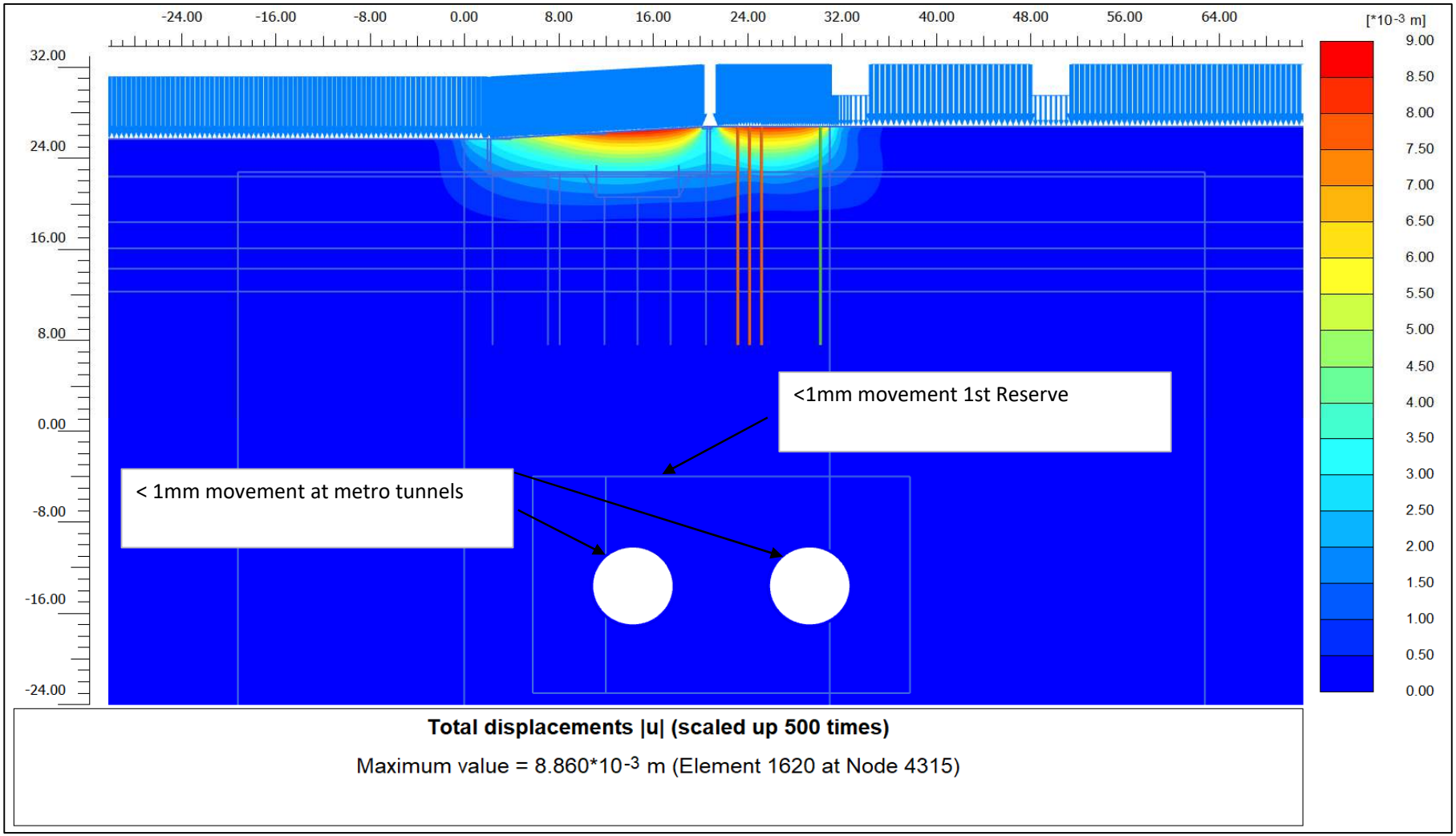


Stage 7 - Core Excavation and Piling

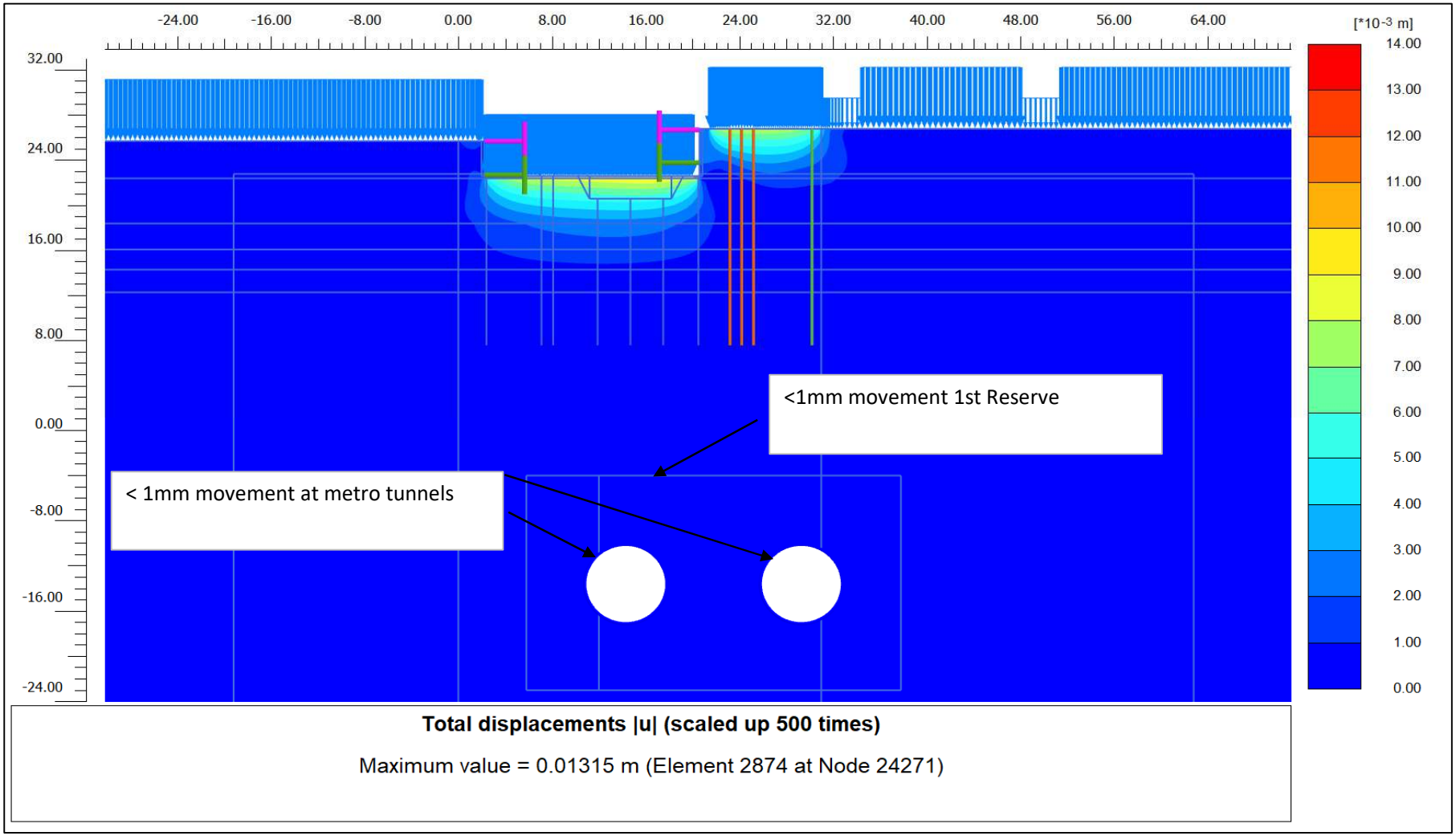


Stage 8 - Apply new building loads

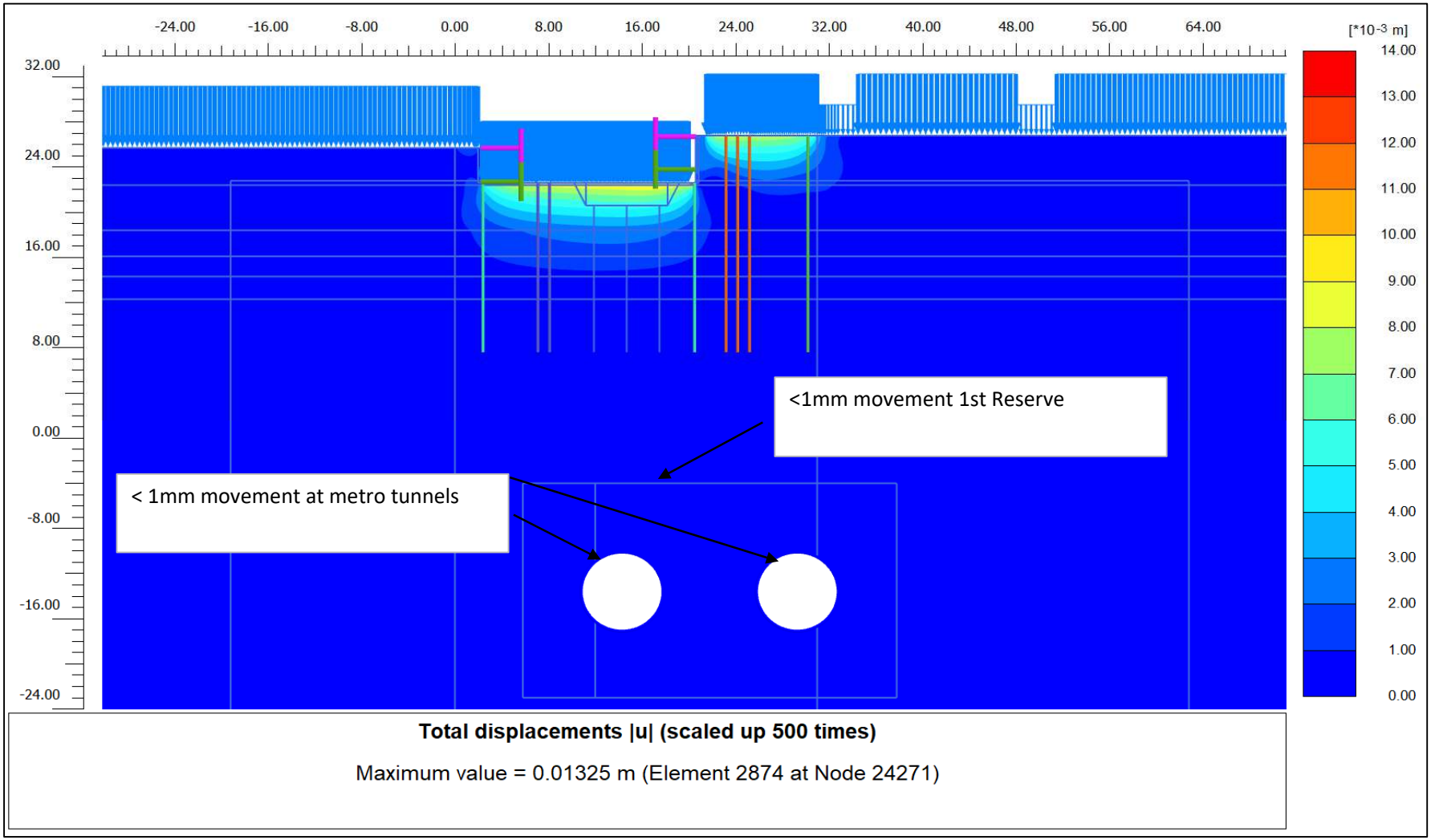
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Model Stages 5-8**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M3
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



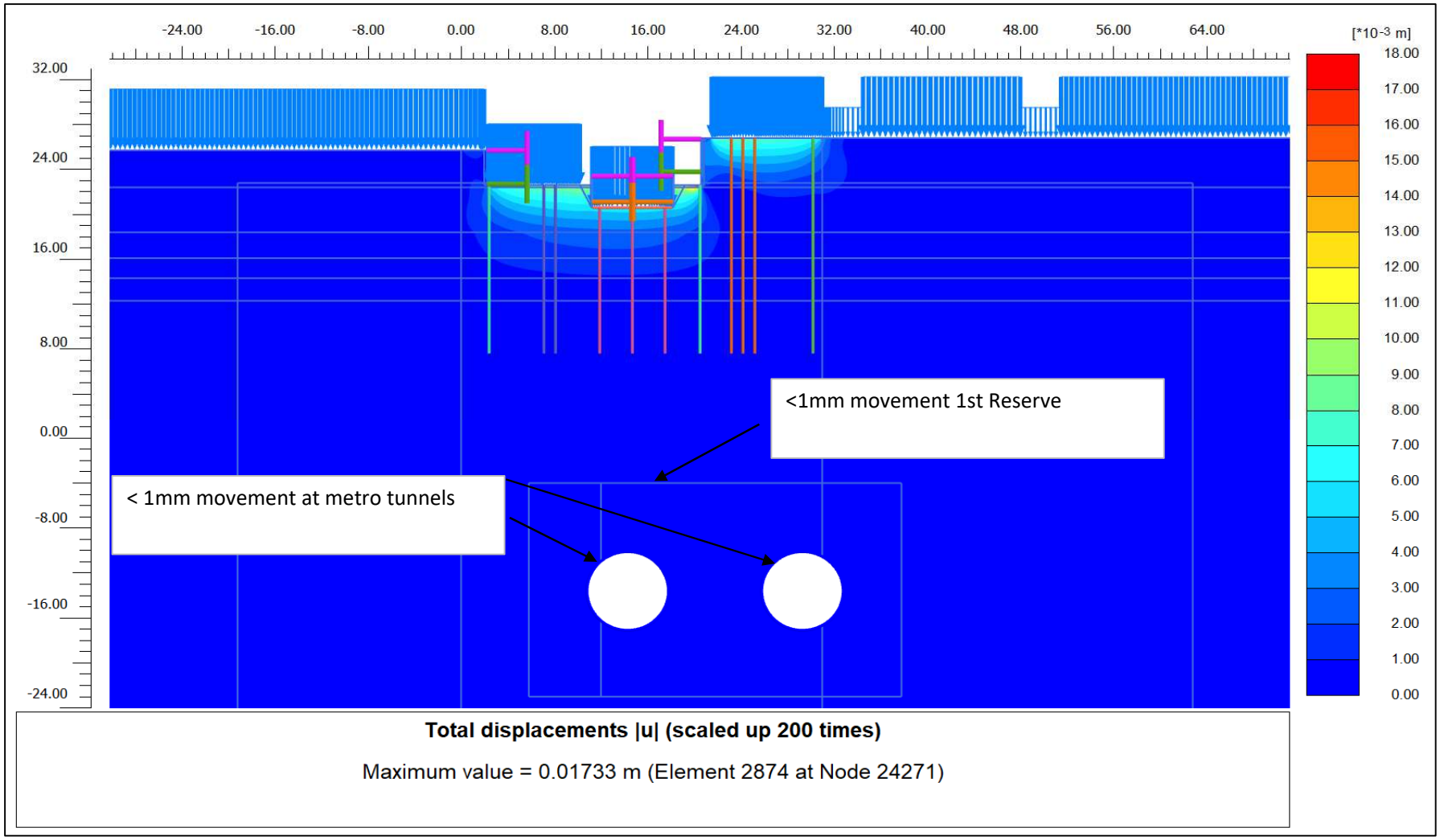
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Total Displacement Contour (Ground Level Piling)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M4
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Total Displacement Contour (New Basement Construction)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M5
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



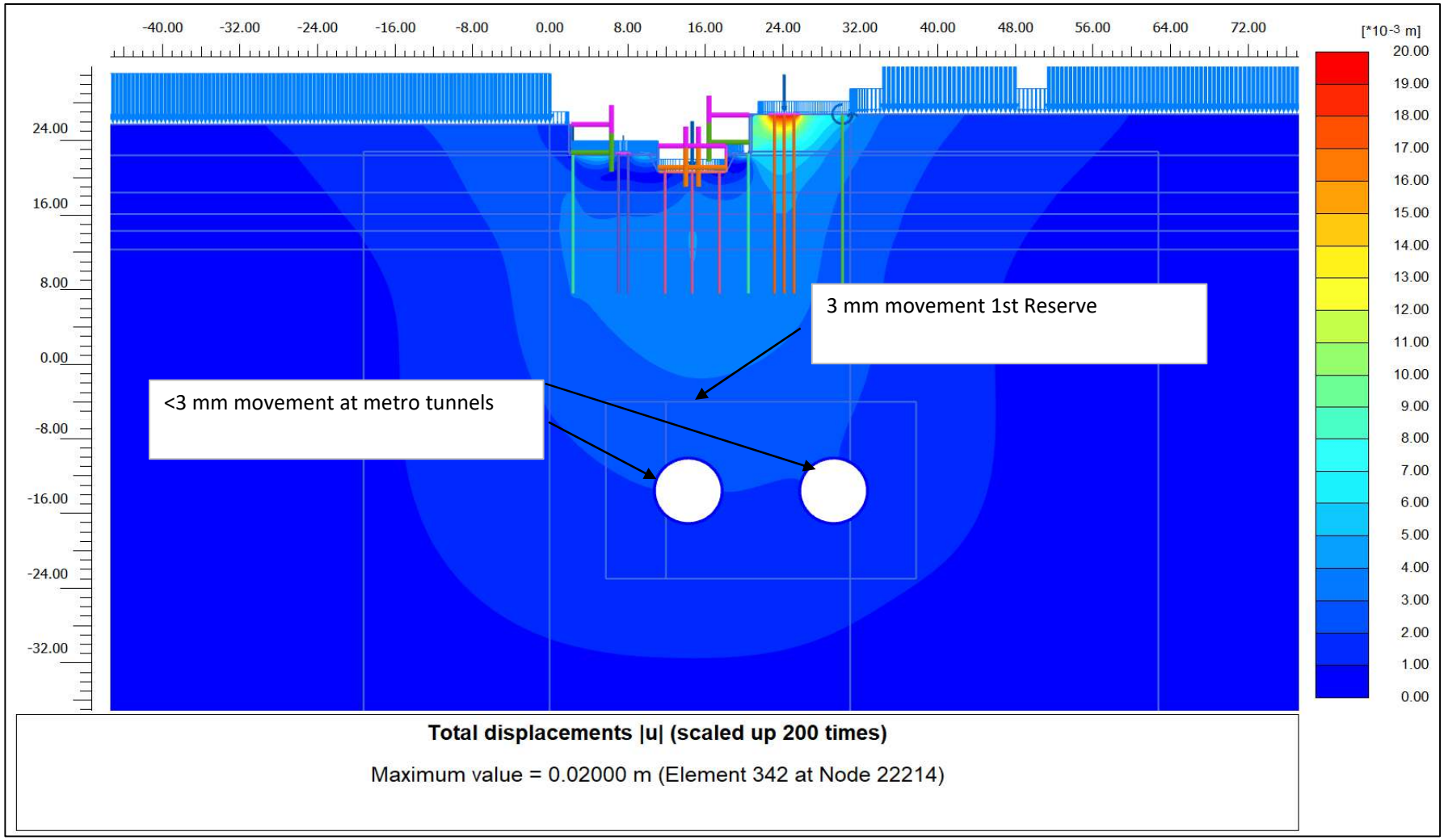
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Total Displacement Contour (Basement Piling)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M6
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



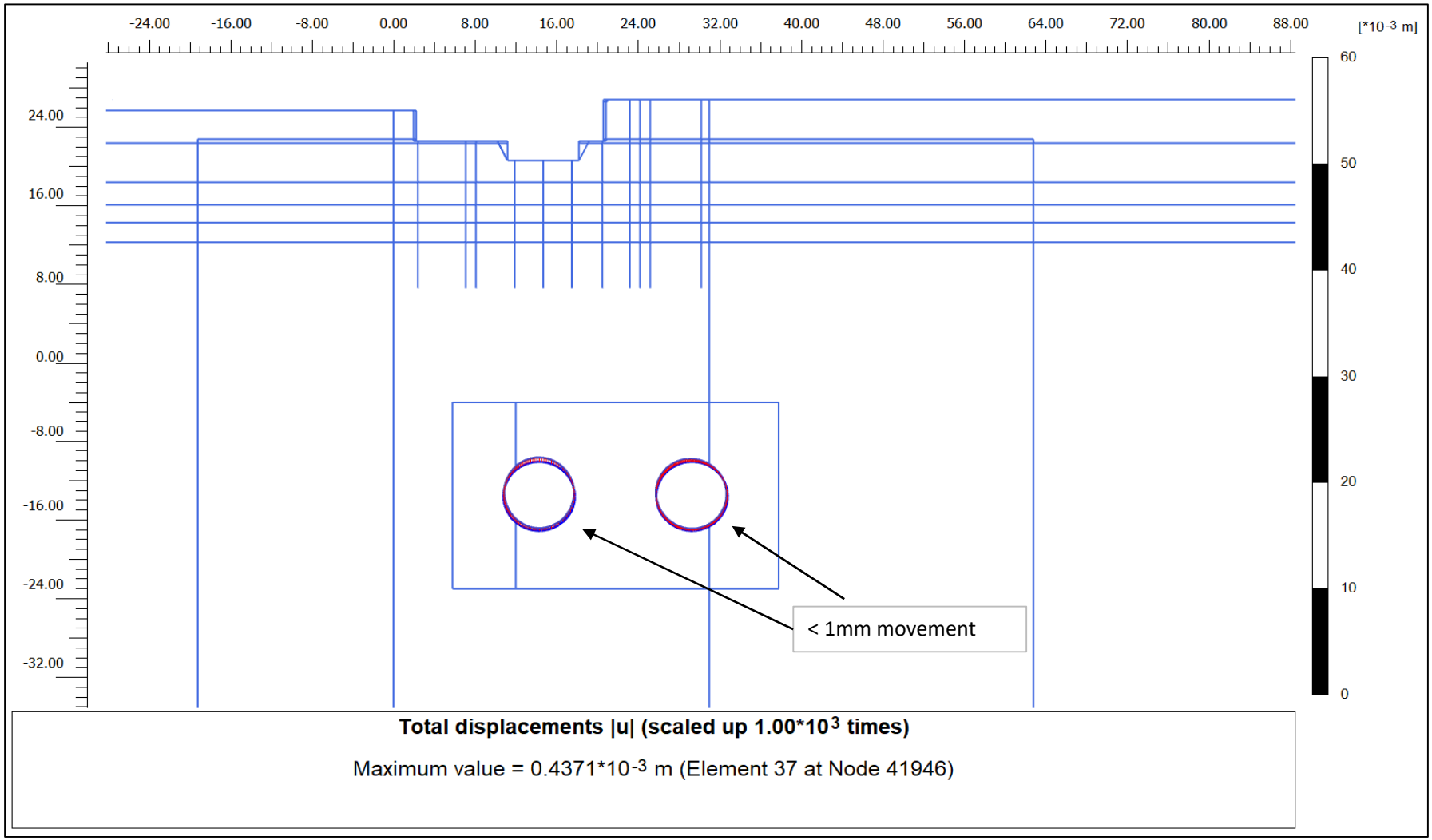
Total displacements |u| (scaled up 200 times)

Maximum value = 0.01733 m (Element 2874 at Node 24271)

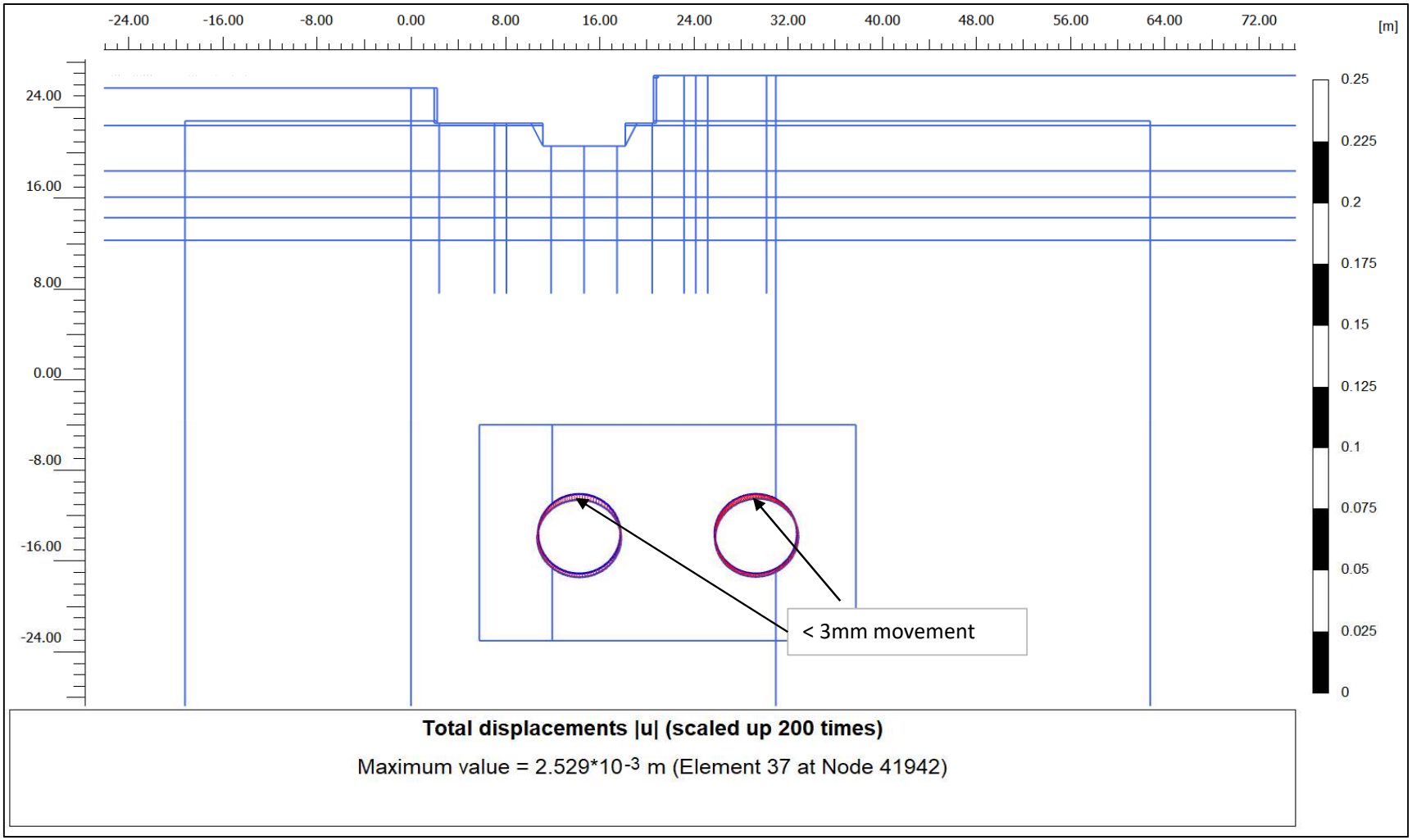
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Total Displacement Contour (Building Core construction and piling)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M7
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



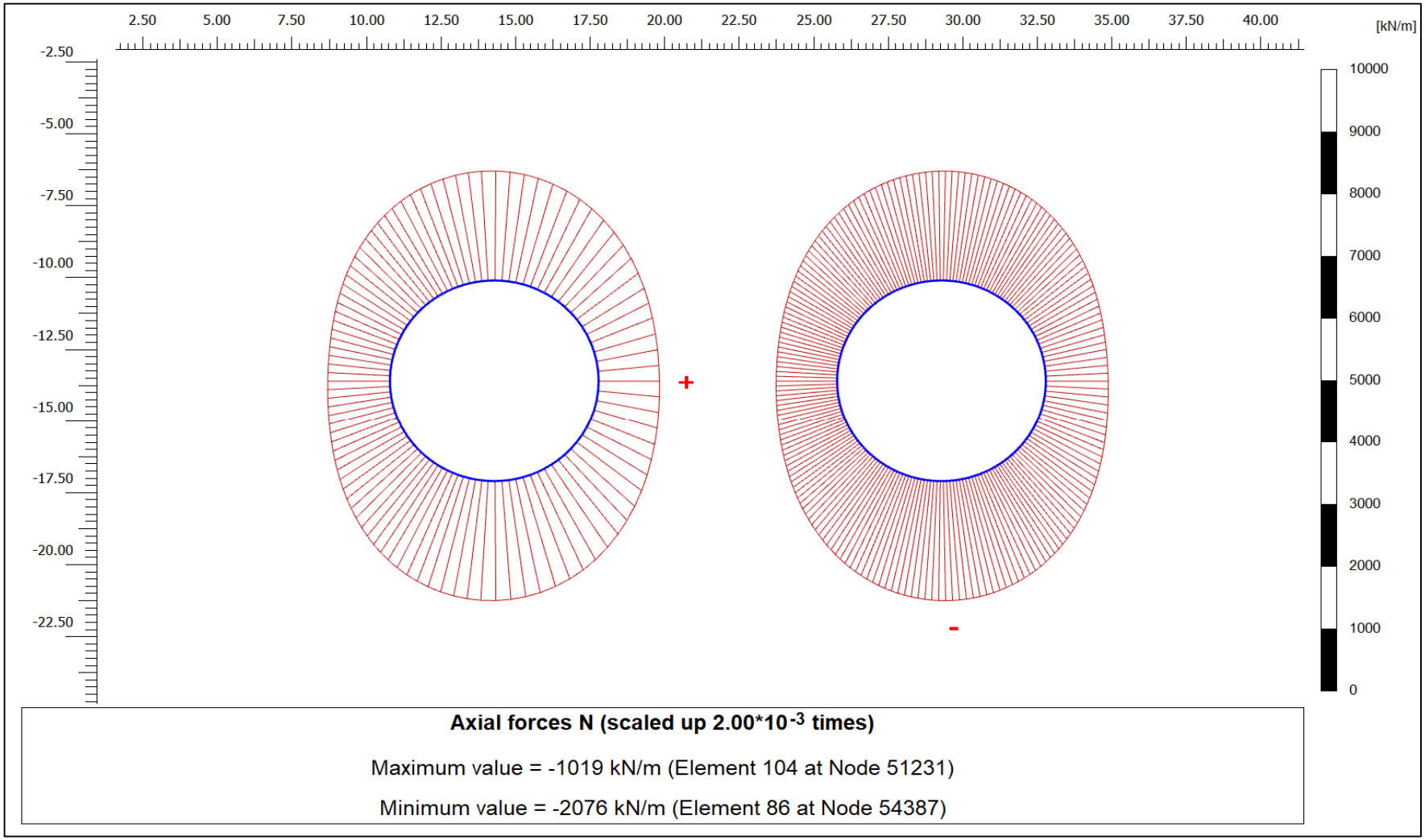
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Total Displacement Contour After Final Building loads**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M8
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Total Displacements of the Tunnels Linings in (Building Core Excavation and Piling (before final loads applied))**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M9
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Total Displacements of the Tunnels Linings in (Final Stage)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M10
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0

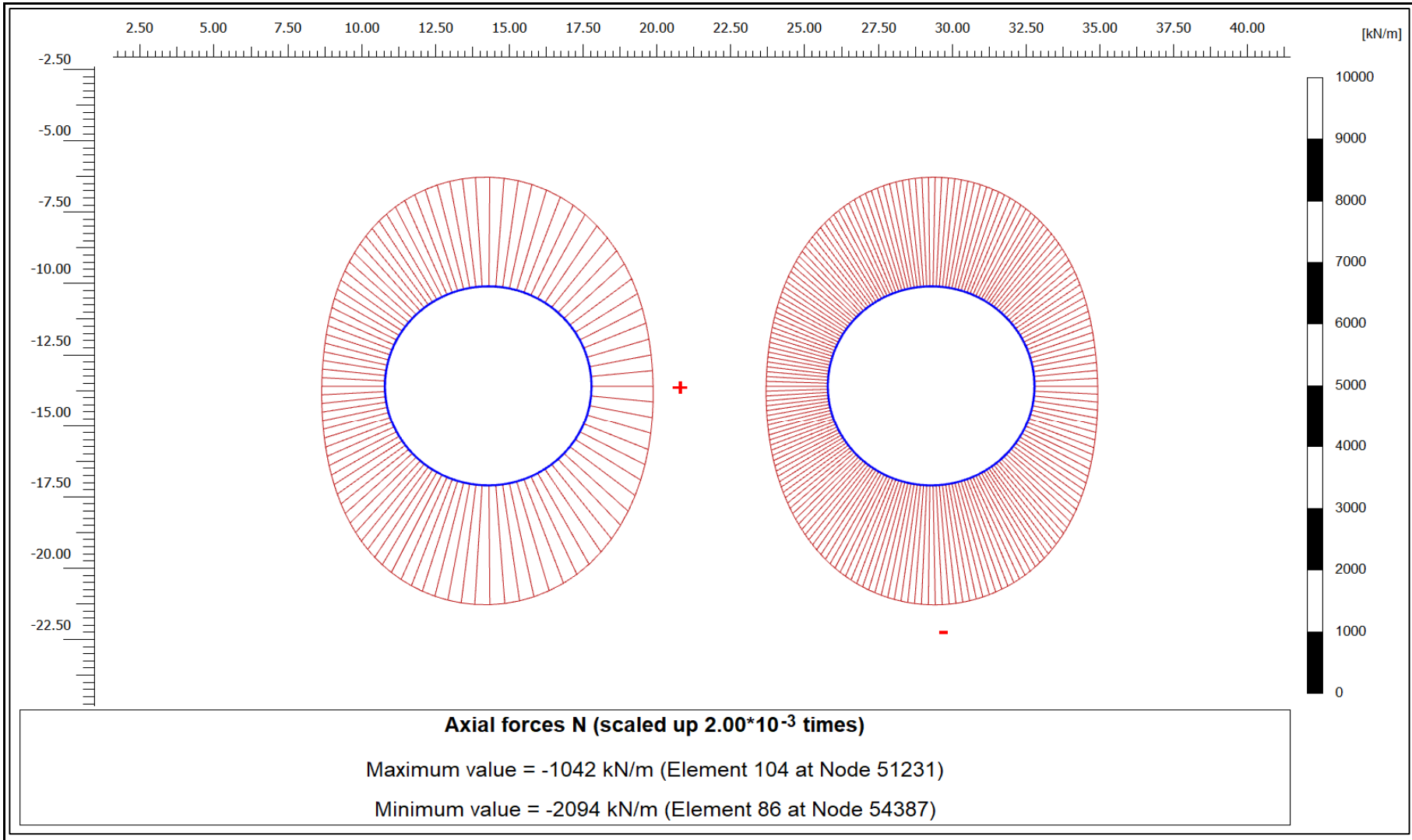


Axial forces N (scaled up $2.00*10^{-3}$ times)

Maximum value = -1019 kN/m (Element 104 at Node 51231)

Minimum value = -2076 kN/m (Element 86 at Node 54387)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Axial Forces in theTunnel Linings (Existing Conditions)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M11
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0

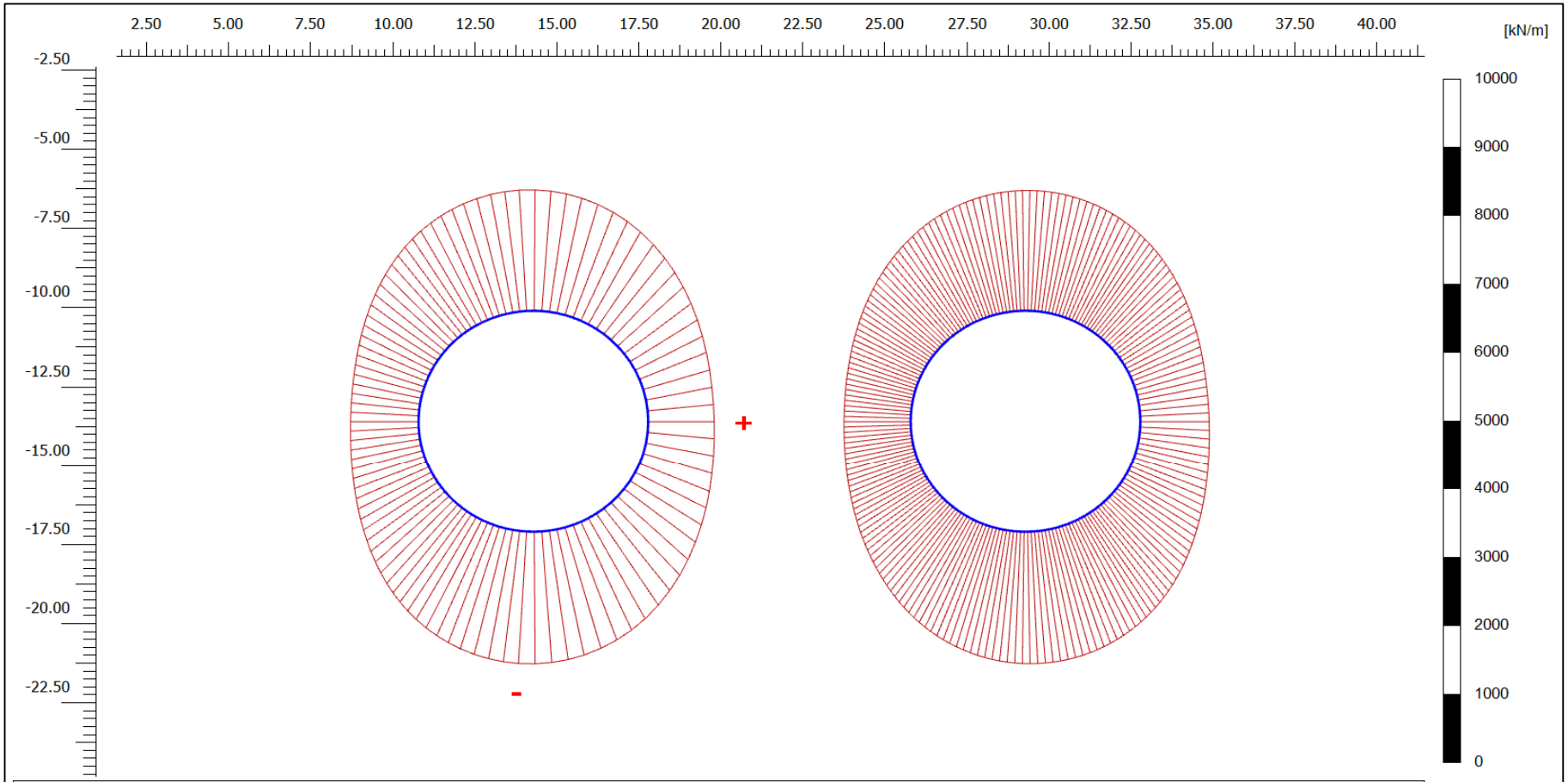


Axial forces N (scaled up $2.00*10^{-3}$ times)

Maximum value = -1042 kN/m (Element 104 at Node 51231)

Minimum value = -2094 kN/m (Element 86 at Node 54387)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Axial Forces in theTunnel Linings (Ground Level Piling)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M12
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0

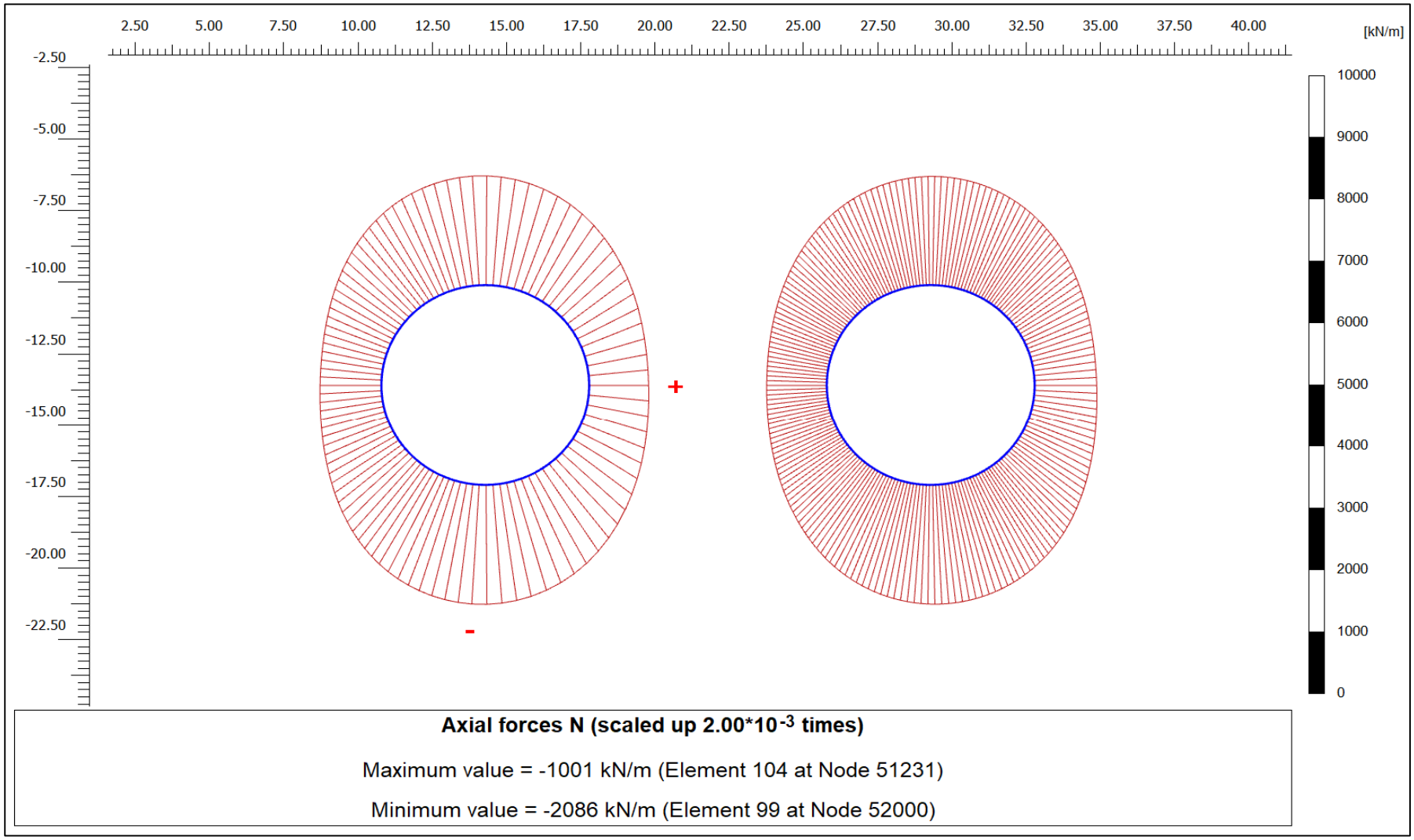


Axial forces N (scaled up $2.00*10^{-3}$ times)

Maximum value = -1005 kN/m (Element 104 at Node 51231)

Minimum value = -2087 kN/m (Element 99 at Node 52000)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Axial Forces in theTunnel Linings (Basement Piling)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M13
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0

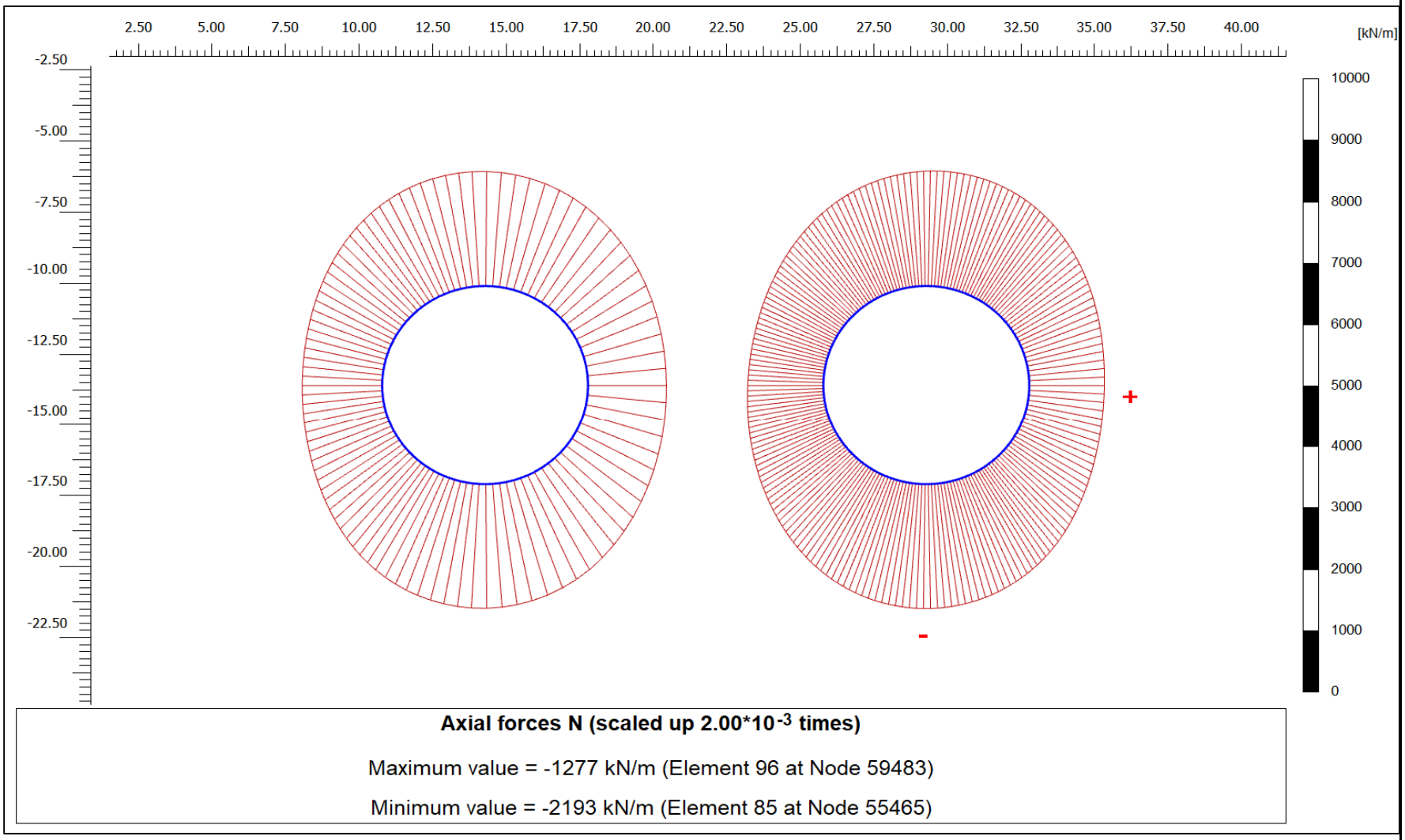


Axial forces N (scaled up $2.00*10^{-3}$ times)

Maximum value = -1001 kN/m (Element 104 at Node 51231)

Minimum value = -2086 kN/m (Element 99 at Node 52000)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Axial Forces in theTunnel Linings (Building Core Piling)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M14
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0

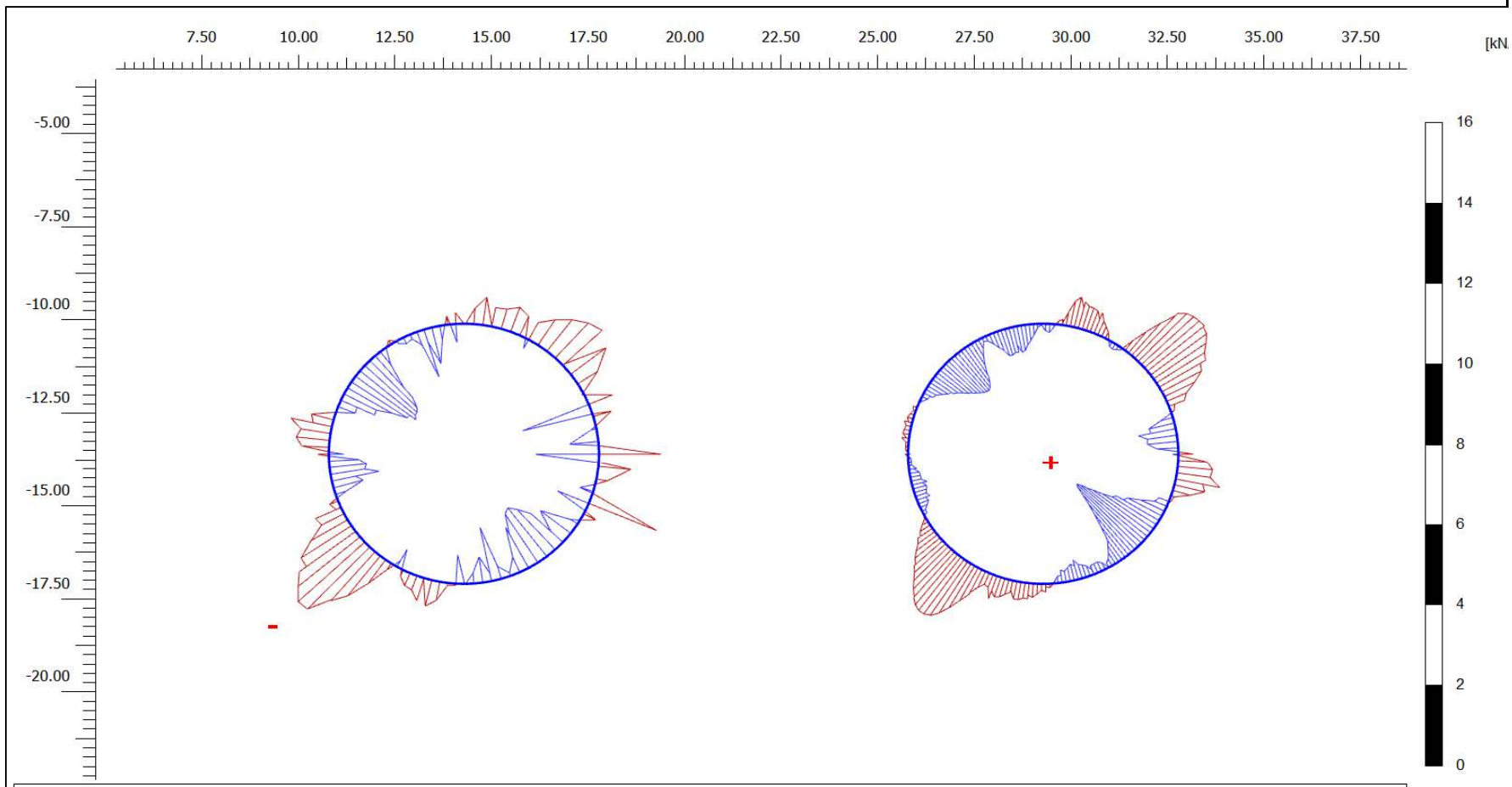


Axial forces N (scaled up $2.00*10^{-3}$ times)

Maximum value = -1277 kN/m (Element 96 at Node 59483)

Minimum value = -2193 kN/m (Element 85 at Node 55465)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Axial Forces in theTunnel Linings (Final Stage)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M15
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0

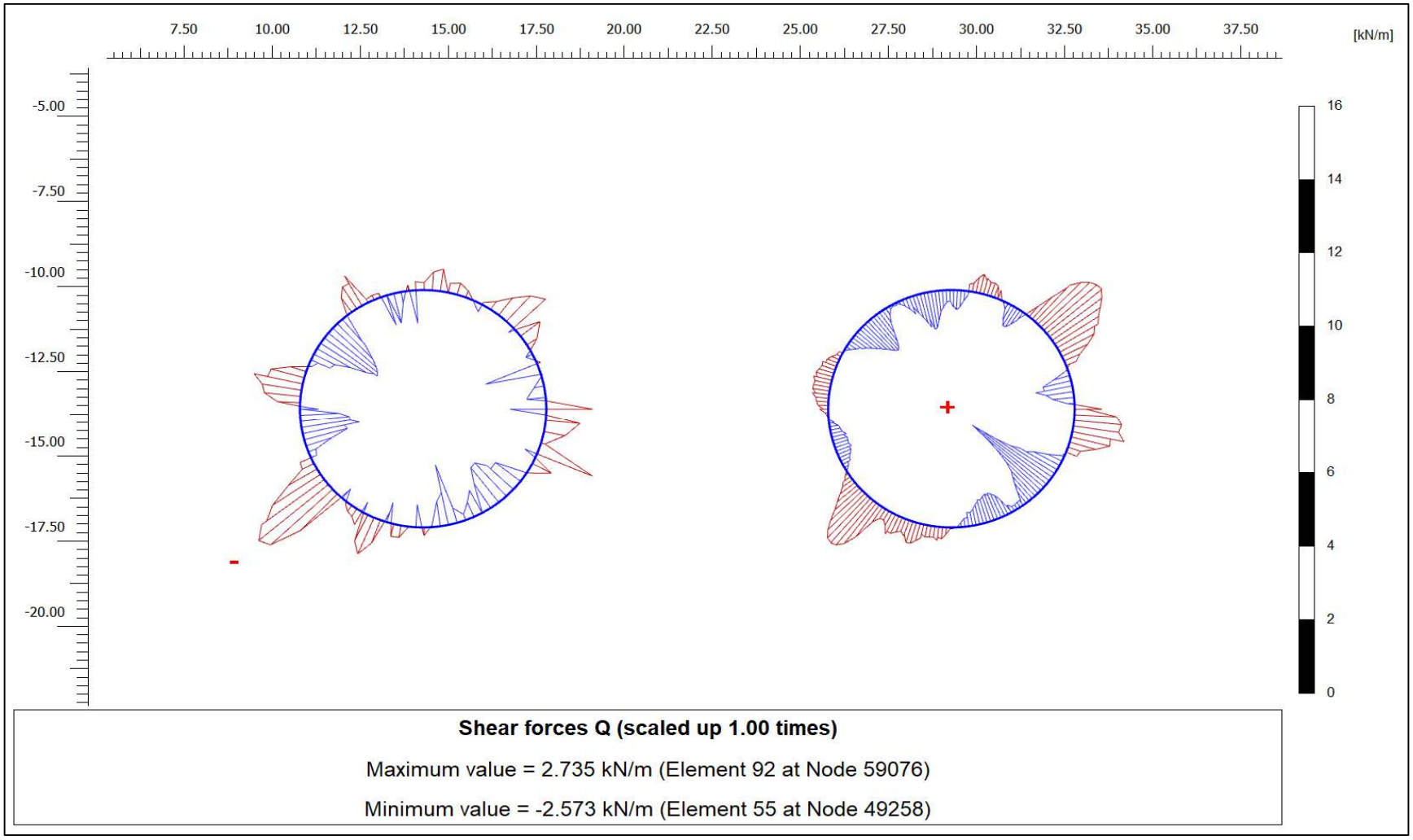


Shear forces Q (scaled up 1.00 times)

Maximum value = 2.302 kN/m (Element 92 at Node 58282)

Minimum value = -2.352 kN/m (Element 55 at Node 49259)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Shear Forces in theTunnel Linings (Existing Conditions)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M16
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0

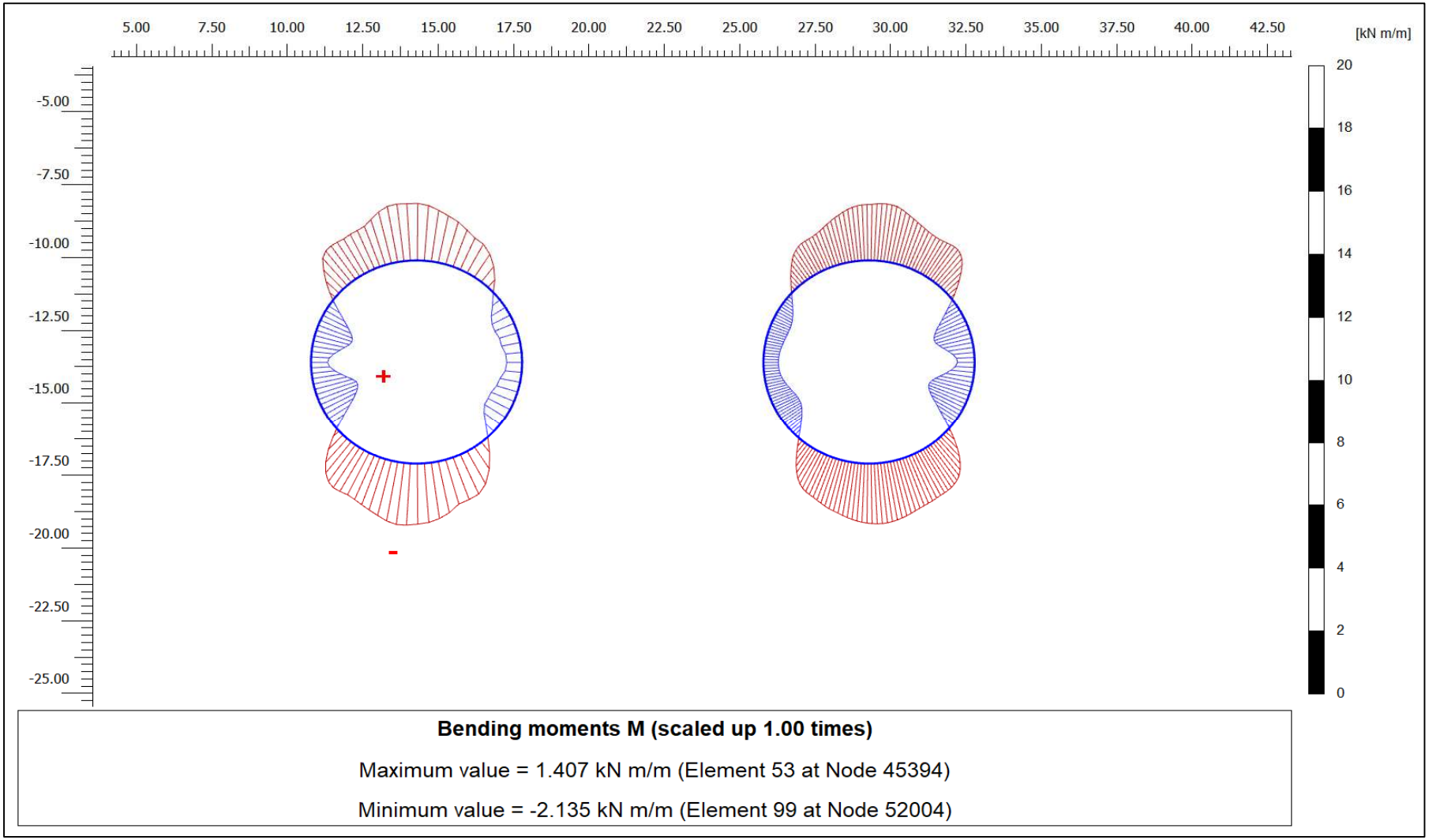


Shear forces Q (scaled up 1.00 times)

Maximum value = 2.735 kN/m (Element 92 at Node 59076)

Minimum value = -2.573 kN/m (Element 55 at Node 49258)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Shear Forces in theTunnel Linings (Final Stage)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M17
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0

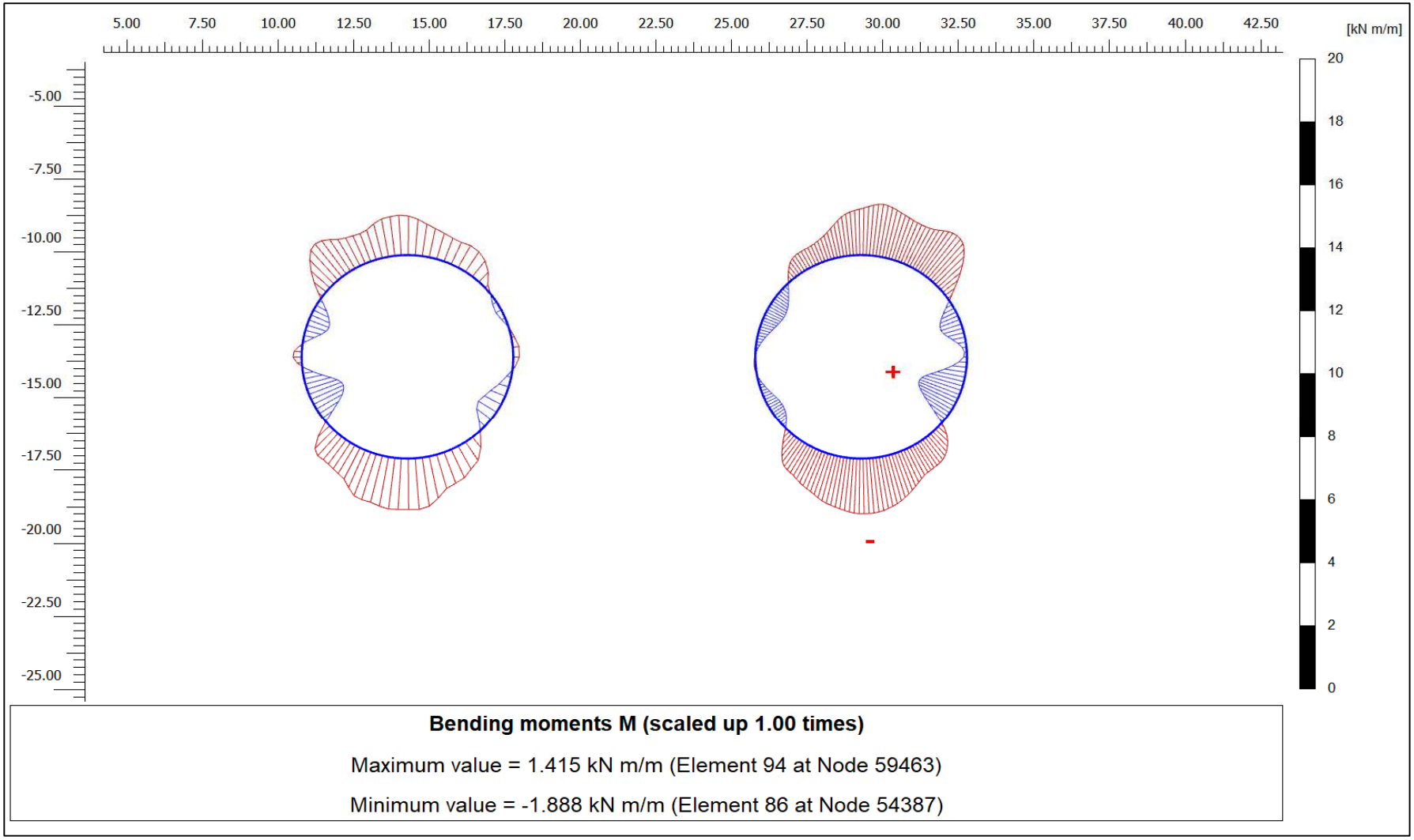


Bending moments M (scaled up 1.00 times)

Maximum value = 1.407 kN m/m (Element 53 at Node 45394)

Minimum value = -2.135 kN m/m (Element 99 at Node 52004)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Bending Moment in theTunnel Linings (Existing Conditions)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M18
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0



Bending moments M (scaled up 1.00 times)

Maximum value = 1.415 kN m/m (Element 94 at Node 59463)

Minimum value = -1.888 kN m/m (Element 86 at Node 54387)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Wee Hur (Australia) Pte Ltd	**Bending Moments in theTunnel Linings (Final Stage)**	PROJECT No: 86852.03
	OFFICE: Sydney	**Student Housing Development**	DWG No: M19
	DATE: 23 Feb 2021	**90-102 Regent Street, Redfern**	REVISION: 0