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Structural Assessment Report External Development Adjacent TfNSW Railway Corridor

For Proposed Development:
At 2 Mandala Parade, Castle Hill

Prepared For:
DeiCorp Projects Showground Pty Ltd
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REDFERN NSW 2016

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Structural Assessment Report



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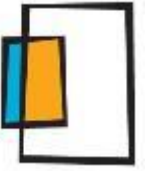
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1. Introduction

ABC Consultants has been engaged by DeiCorp Projects Showground Pty Ltd to complete the structural engineering design for the proposed multi use residential development at 2 Mandala Parade, Castle Hill.

The development site exists directly opposite the Hills Showground Metro station box and tunnels which are located across Mandala Parade.

The purpose of this report is to provide an assessment of the impact of the proposed structure on the proposed Sydney Metro infrastructure and demonstrate compliance with structural design requirements outlined in TfNSW Technical Guidelines – NWRLSRT-PBA-SRT-TU-REP-000008 – Sydney Metro Underground Corridor Protection – Revision 1.



2. Project Description

The proposed development site is located at 2 Mandala Parade, Castle Hill, NSW 2154. The site is bound by De Clambe Drive, Andalusian Way, Mandala Parade and Doran Drive to the North, East, South and West respectively. The Hills Showground Metro station is located to the south across Mandala Parade.

The metro infrastructure adjacent to the development consists of the Hills Showground station box as well as the two metro tunnels running approximately East to West which meet the station box.

The total site area is approximately 7,969m². The site is currently vacant land consisting mostly of grassed area with some trees and shrubbery throughout the site. Refer to the existing site survey prepared by Daw & Walton Pty Ltd project 5042-20 Revision 02 dated 17 August 20120 for survey details.

The proposed development is a mixed retail, commercial and residential development consisting of four residential buildings above and common retail / commercial / open space podium with associated basement parking. The residential towers range up to 20 stories in height with the proposed basement extending six levels below ground. Refer to architectural plans prepared by Turner Architects project number 19068 for full development details.



Figure 1 - Locality Map



3. Sydney Metro

The Sydney Metro Northwest is a rail infrastructure project which was completed in mid-2019. The project consists of twin metro tunnels serving stations from Tallawong through to Chatswood.

3.1. Protection Reserves

Protection reserves define the extent of zones that have been established to protect existing metro infrastructure and protect the feasibility of planned metro infrastructure from future adjacent developments.

The technical guideline defines two reserves for the protection of the Sydney Metro tunnels and station boxes. A first reserve is defined for a distance nearer to the tunnel where all works are heavily restricted and stringently reviewed. A second reserve is defined beyond the first reserve where any proposed works are still required to be assessed however less may proceed provided they meet the requirements set out by TfNSW. Table 4.5 of the technical guidelines provides a list of construction restrictions that apply to each reserve.

For the metro tunnels the reserves are defined as follows:

- First reserve extends from the tunnel edge inscribed with a square to a distance the greater of 5m or the extent of the Sydney Metro Substratum.
- Second reserve extends to a greater of 25m or the width of the tunnel from the first reserve.

For the metro station boxes the reserves are defined similarly as follows:

- First reserve extends up to the Sydney Metro Substratum or property boundary.
- Second reserve extends from the first reserve up to 25m.

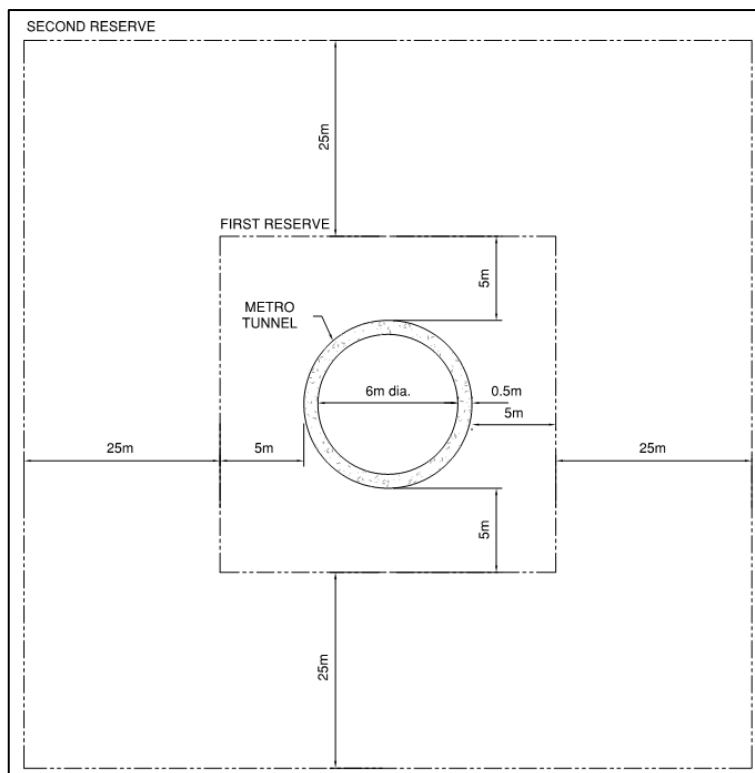
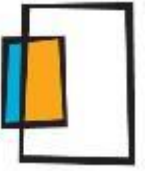


Figure 2 - Typical Metro Tunnel Reserves Section



3.2. Infrastructure location

The proposed development is located opposite the Hills Showground station box for the full length of the development site with the metro tunnels commencing beyond the development extent at either side of the station box.

As such the location of the infrastructure and protection reserves are based on the property boundary of the station box as defined in the Daw & Walton survey.

Based on the survey drawings the distance between the Sydney Metro and development site property boundaries range between 25.77m and 26.61m.

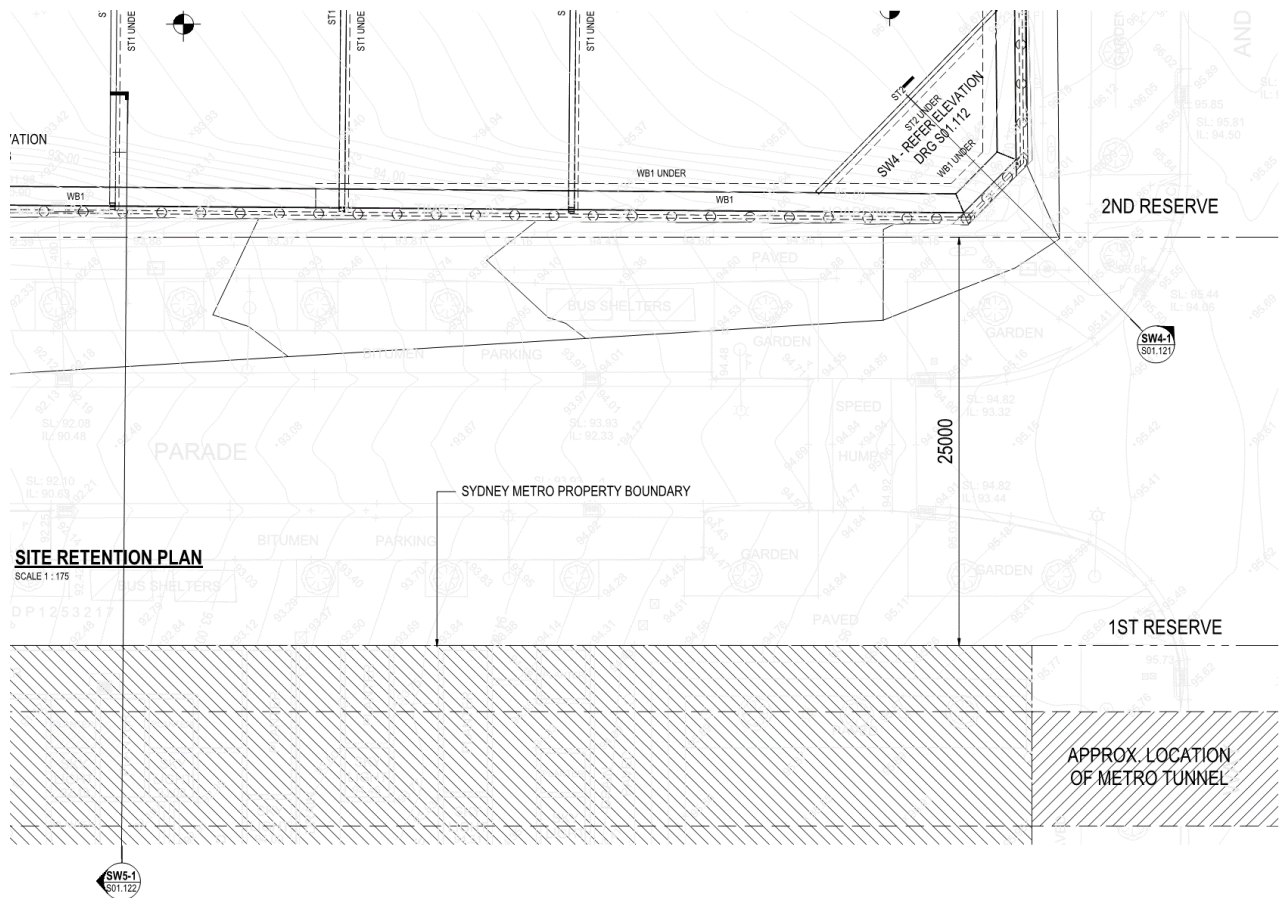


Figure 3 - Extract from structural shoring plan showing measurement to between the site boundaries

Given the second reserve is defined as extending 25m past the metro property boundary it can be seen that the development site exists completely outside of the first and second protection reserves.

A structural shoring plan has been prepared for the subject development which identifies the proximity of the shoring wall to the Sydney Metro property boundary.



4. Geotechnical Investigation

A geotechnical engineering report has been completed for the subject project by EI Australia, Report No. E24724.G03 dated 26 August January 2020. The report details a geotechnical investigation of the site which includes existing site condition, soil stratigraphy, ground water measurements and recommendations for foundation design and basement retention.

Below is a summary of the geotechnical report with relevance to the structural engineering design.

4.1. Stratigraphy

The sub-surface material described in the geotechnical engineering report generally consists of fill, residual soil, Class V/IV sandstone and Class III sandstone.

Six boreholes were completed for the site. The depth to each sub-surface material at each borehole is shown in Table 1 below.

Due to the varying depth of the sub-surface material across the site, various models have been assessed at regular distances along the shoring wall with the worst case between the two nearest boreholes taken as the soil profile.

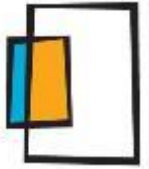
Material	BH1	BH2	BH3	BH4	BH5	BH6
Fill	0.0 (96.50)	0.0 (95.10)	0.0 (91.00)	0.0 (98.00)	0.0 (94.10)	0.0 (90.80)
Residual Soil	0.6 (95.90)	1.4 (93.70)	2.60 (88.40)	4.0 (94.00)	1.8 (92.30)	1.2 (89.60)
Class V/IV Sandstone	2.1 (94.40)	NE	NE	NE	NE	NE
Class III Sandstone	3.0 (93.50)	3.3 (91.80)	2.90 (88.10)	5.0 (93.00)	2.0 (92.10)	1.5 (89.30)

Table 1 - Approximate Depth to Sub-surface Material (m).

The geotechnical design parameters, including the earth pressure coefficients, cohesion, friction angle and unit weight adopted in the shoring wall design are shown below.

Material	Earth Pressure Coefficients			c' (kPa)	φ' (deg.)	Youngs Modulus (MPa)	Unit Weight (kN/m³)
	K_a	K_o	K_p				
Fill	0.41	0.58	2.46	0	25	10	18
Residual Soil	0.41	0.58	2.46	5	25	10	20
Class V / IV Sandstone	0.27	0.43	3.69	5	35	30	23
Class III Sandstone	0.21	0.35	4.60	30	40	200	24

Table 2 – Geotechnical design parameters for site materials.



4.2. Ground Water

Three ground water monitoring wells were installed on the site at bore holes 3M, 4M and 5M. Ground water was observed in all the monitoring wells at a level well above the bulk excavation level.

Due to the low permeability of the rock, the geotechnical engineer advises that ground water inflows should not have an adverse impact on the proposed development or neighbouring sites. The geotechnical engineer recommends that the drainage should be provided behind the shoring wall and below the basement floor slab to capture any seepage water.

It is recommended that adequate drainage is provided behind the proposed shoring walls to collect and drain any inflow water.

4.3. Excavation Support

The basement excavation is proposed near to the site boundaries and the soil material is not suitable for vertical cut. To ensure the stability of the excavation during construction, temporary batters may be provided at a ratio of 1V:1H to the BEL of the basement. Alternatively, where the batters are not feasible, a suitably designed shoring wall will need to be constructed.

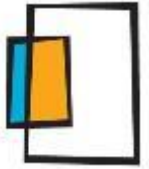
The six level basement excavation proposed for the site is not feasible to excavate using a batter slope. To ensure the stability of existing structures and infrastructure during construction the geotechnical engineer recommends an anchored or internally propped soldier pile wall to support the fill, residual soil and Class V / IV sandstone.

The Class III sandstone is considered suitable to be able to be vertically cut without support with some stabilisation measures such as rock bolts and shotcrete or dental treatment to be provided to local defects. The excavation of the unsupported rock must be completed in the presence of a geotechnical engineer.

4.4. Foundation Design

The expected material to be encountered at the site following bulk excavation is expected to be Class III sandstone. In order to limit the potential for differential settlement, the footings will be founded in a uniform material.

Basement strip and pad footings will be proportioned to suit a maximum allowable bearing capacity of 3500kPa for the bedrock.



5. Structural Design

The building structure of the proposed development is a typical concrete framed building consisting of concrete footings, walls, columns and slabs. A copy of the structural engineering documentation for the shoring wall is provided in Appendix A.

The structural engineering design for the shoring wall has been completed in accordance with the following Australian Standards:

- AS1170.0:2002 – Structural Design Actions: General Design Principals
- AS1170.1:2002 – Structural Design Actions: Permanent Imposed and Other Actions
- AS1170.2:2011 – Structural Design Actions: Wind Actions
- AS1170.4:2007 – Structural Design Actions: Earthquake Actions in Australia
- AS2159:2009 – Piling Design and Installation
- AS3600:2018 – Concrete Structures
- AS4100:2020 – Steel Structures
- AS4678:2002 – Earth Retaining Structures
- AS5100:2017 – Bridge Design

5.1. Shoring Wall

The proposed development includes six levels of basement excavation with a proposed bulk earth level of 69.90. Detailed excavations for footings, pits and services will be below this level.

The shoring wall will be analysed using WALLAP at critical cross sections along the southern elevation as part of the next design phase works for this project.

The shoring wall adjacent is generally designed as a 600mm diameter soldier pile wall with piles spaced at 2.4m centres. The piles are restrained with at least two internal braces that are supported by footings within the site.

5.1.1. Loading

The shoring wall along the southern boundary is designed to withstand the dead load applied by the site soil conditions as well as live load surcharges as shown on the structural engineering documentation.

The design live load surcharge is as nominated below;

- General construction zone - 20kPa
- Footpath zone – 5 kPa

Nil surcharge is imposed on the shoring wall from the Sydney Metro station box or tunnels.



5.1.2. Pile design

The pile specification for all piles on the project is a 600diameter pile at 2.4m centres, 40MPa concrete, 75mm cover, 6N28 vertical and N12-200 closed ties. Pile bending capacity (ϕM_u) = 332kN.m. Pile shear capacity (ϕV_u) = 400kN

The pile bending capacity and pile shear capacity have been calculated in accordance with AS3600:2018 using INDUCTA RCC.

5.1.3. Prop design

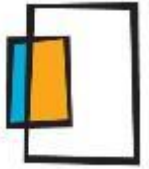
Shoring props which are raking steel struts founded at the BEL level have been nominated at regular centres to ensure the bending moment, shear force and displacement of the soldier pile walls do not exceed allowable maximums.

The final prop design is the responsibility of the shoring contractor and may need to be varied to suit site soil conditions. Any design variations will need to be reviewed by the project structural engineers.

5.1.4. Sequence

The proposed basement excavation will proceed in the following sequence:

1. Setout the location of the piles and capping beams as noted on plans, elevation and sections.
2. **Hold point** the geotechnical engineer (who shall be employed by the builder) is required to certify that the soil conditions comply with the design assumptions detailed in the geotechnical investigation report. The geotechnical engineer is to determine the level of supervision required to be able to provide this certificate. Supervision of the material removed as piles are drilled may be required.
3. Drill required bore holes to the diameter specified and depth shown on plans, elevations and sections. Ensure the socket is fully cleaned and all loose material is removed.
4. **Hold point** the structural engineer is to witness the reinforcement cages prior to placement in the bored piles. Placement of the cages within the piles for piles greater than 6m deep is to be witnessed on site.
5. Place reinforcement cages in holes ensuring that cages are orientated as per the details on this drawing. End caps are to be placed at the base of the reinforcement cage and roller chairs placed at 2m intervals along the length of the pile (a minimum of 3 per section) to ensure minimum cover to the cage is maintained.
6. Using a tremie pipe or similar from the base of the bored hole to ensure no separation of concrete aggregate, place concrete from the base of the pile to underside of capping beam. Vibrate concrete progressively from the base of the pile as the pile is filled.
7. Install capping beam reinforcement in accordance with details on these drawings.
8. **Hold point** the structural engineer is to witness the reinforcement of the capping beam.
9. Place capping beam concrete and allow to cure for a minimum of 7 days.
10. **Hold point** project surveyor is to establish a datum of the capping beam location prior to any excavation past the capping beam. Refer to monitoring notes. Monitoring of the wall is to continue on a regular basis as detailed in the monitoring notes.
11. Excavate against the piles to the top of the batter slope level as noted in sections / elevations or to a maximum of 2.0m whichever is the lesser.
12. Drill and epoxy shotcrete dowels into shoring piles as nominated on drawings. Place reinforcement to the shotcrete wall.
13. **Hold point** the structural engineer is to witness the reinforcement of the shotcrete panels and ensure minimum depth is achieved to the panel.



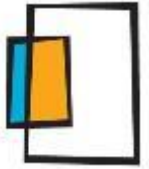
14. Place concrete to shotcrete wall. Shotcrete panels are to be formed and poured or sprayed. If shotcrete walls are sprayed, the panels are to be oversprayed and then screeded back to the design thickness. Shotcrete is to be self-compacting in accordance with AS3600
15. If the excavation is at the top of batter slope level continue excavation to B.E.L. While maintaining a maximum 1v:1h batter slope (or as advised by the geotechnical. Engineer). Stabilisation to the batter slope to be provided where required by the geotechnical engineer. The geotechnical engineer is to consider effect of seismic action on the batter slope to protect personnel against engulfment should an event occur during excavation.
16. Excavate pad footings for steel struts and install reinforcement as per details.
17. **Hold point** structural engineer to witness pad footing reinforcement prior to placement of concrete
18. Place pad footing concrete and allow to cure for a minimum of 3 days.
19. Install steel struts and their connections in accordance with plans and details. The contractor is to ensure any movement or slip of the steel work is taken up prior to loading. Note, the builder is to scan and locate any existing steel reinforcement within the concrete capping beam or pad footing prior to installed post-fixed anchors. Not reinforcement is to be cut or drilled.
20. **Hold point** structural engineer to inspect steel struts.
21. Once the pad footings have reached 32MPa minimum, excavation of the temporary batter slope may continue. Excavation is to proceed in 2.0m increments to allow for installation of shotcrete panels in accordance with notes 12 to 15
22. Provided the shotcrete panels have reached 25MPa strength excavation may continue to the next stage until bulk earth level is reached.
23. Continue construction of building structure as per structural documentation.
24. Struts may be removed provided the following is complete:
 - All Basement slabs have been completed for the full basement width.
 - Any basement slabs designed as post tensioned have been allowed to cure for a minimum of 56 days.
 - Any gaps between the shoring wall and basement slabs are filled with non-shrink 40mpa grout and the grout has fully cured.
 - All structures up to Ground Floor have been completed and have achieved a minimum design strength of 40mpa.
 - Any Ground Floor slabs designed as post tensioned have been allowed to cure for a minimum of 56 days.
 - Any capping beam to slab dowel sleeves are filled with non-shrink 40mpa grout and the grout has fully cured.

5.1.5. Displacement

A major issue associated with deep excavation is the lateral displacement of the soil mass behind the shoring wall due to the shoring wall deflection. The soil mass displacement may also cause displacement of the railway tracks. The shoring wall must be adequately designed to limit the wall deflection to within defined limits.

The shoring wall has been preliminarily analysed using engineering design software WALLAP. Analysis of the shoring wall predicts a maximum lateral deflection of 20mm.

The geotechnical engineer discusses the release of horizontal in-situ stresses in the bedrock which may result in movement at the unsupported vertical rock cut face. The lateral displacement at the top of the excavation is generally between 0.5mm to 2mm per meter depth of excavation. As the maximum depth of excavation is 28.20m, the lateral deflection at the crest of the excavation can be expected to be in the order of 14.1mm to 56.4mm.



5.1.6. Monitoring

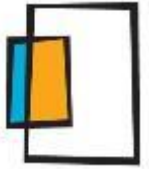
To ensure the maximum design displacement of the shoring wall discussed above is not exceeded, the shoring wall will be monitored by means of survey points installed along the wall at regular intervals prior to excavation.

A registered surveyor will monitor the points throughout excavation and construction for any lateral movement. The following monitoring stages are proposed:

- Before commencement of excavation to determine baseline readings. Two independent sets of measurements must be taken to confirm measurement accuracy.
- Following excavation to the first row of props but prior to the installation of the props.
- Following installation of the first row of props.
- At similar intervals to the first row of props for the remaining props.
- After excavation to the bulk earth level.
- Following removal of the shoring props and engagement of the permanent structure.
- One month following completion of the permanent basement structure.

The following actions are recommended following each monitoring stage depending on the observed lateral displacement:

- Less than 80% design deflection limit – up to 30mm - Excavation may continue to next stage.
- Between 80% and 100% design deflection limit – between 24mm to 30mm lateral deflection - Property owners and relevant authorities (TfNSW) should be notified, and the monitoring data reviewed. Frequency of monitoring should be increased. Allow for necessary contingency measures and additional support to the shoring wall if increased monitoring proves the wall is continuing to move.
- Greater than 100% design deflection limit – greater than 30mm lateral deflection. The project manager is advised to cease excavation works immediately. Contingency measures to be implemented. Frequency of monitoring should be increased. Excavation may not recommence until wall movement is negligible.



5.1.7. Shotcrete

180 thick shotcrete walls are nominated throughout the project to infill the areas between the soldier piles. Based on advice received from the geotechnical engineers, a $4H$ (where H is the height of the shoring wall) working pressure has been applied to the back of the shotcrete wall.

The shotcrete walls are specified as 32MPa concrete with 50mm cover to the front face with RL1018 mesh (main wires horizontal). The shotcrete wall is connected to the shoring piles using N16-350 dowels drilled and epoxied into the piles using HILTI Hit-RE500 chemical epoxy.

5.2. Foundations

The building foundations consist of a combination of strip and pad footings to support the concrete walls and columns above founded below the bulk earth levels at RL 69.90

Based on the bulk earth levels above and allowing for a pad footing depth ranging depth of 800mm to 1600mm; the building footings will be founded at a level of RL 68.30.

The footings will be uniformly founded on strong rock material with an Allowable Bearing pressure of 3500 kPa as described in the geotechnical engineer's report.

5.3. Lateral Design

As part of the permanent design of the development, lateral loads due to wind and earthquake will be imposed on the structure throughout its lifetime.

In order to withstand these applied loads, the buildings will utilise concrete core walls to transfer the loads through the structure and down to foundation level. The bearing pressure at the foundation level will not exceed the design Allowable Bearing pressure of 3500kPa.



6. Compliance with TfNSW Sydney Metro Technical Guidelines

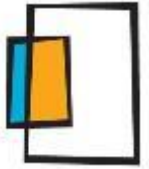
The following sections aims to demonstrate compliance with TfNSW Sydney Metro Underground Corridor Protection Technical Guidelines NWRLSRT-PBA-SRT-TU-REP-000008 which outlines the specific design requirements for external developments near the Sydney Metro tunnel.

In accordance with the standard, the structural engineering design has been completed in accordance with relevant Australian Standards. Refer to the Section 5 of this report for a full list of standards which have been referenced in the design.

6.1. Construction Restrictions Within Tunnel Reserves

Table 4.5 of Section 4.4 of the technical guidelines outline specific construction restrictions within the first and second reserves. The table below summaries compliance with these restrictions.

Type of construction	Designer comment
Excavation for basements and footings	No excavations are proposed within the first or second protection reserves.
Shallow footings or pile foundations	No footings or piles are proposed within the first or second protection reserve.
Tunnels and underground excavations	No tunnels or underground excavations are proposed within the first reserve.
Demolition of existing sub-surface structures	No demolition of existing structures is proposed within the first or second reserve.
Penetrative subsurface investigations	No additional sub-surface investigations are proposed.



6.2. Imposed Loading

Section 9.1.1 of the technical guideline *“Any temporary or permanent works adjacent to the metro could be subject to the influence of train loading and as such will need to be assessed in accordance with AS5100 for live load surcharge”*.

The level of the Sydney Metro station box is below the lowest level of the proposed shoring wall within the immediate vicinity of the site. The zone of influence of the excavation does not intersect any part of the Sydney Metro property boundary with the distance between the properties being larger than the excavation depth. As such, no loads are imposed from the Sydney Metro infrastructure on to the development site and no additional surcharge loading needs to be considered.

6.3. Induced Movement

Section 9.1.2 of the technical guideline *“Displacement of metro infrastructure as induced by the development must not affect the operational functionality and durability of the affected infrastructure. The developer must consider the possibility that future metro construction may induce movement on the development.”*

In both the temporary and permanent case, the shoring wall has been designed for a maximum lateral deflection of 30mm at any point along the wall. The deflection limit set by Section 9.1.2 of the technical guideline is 10mm at the tunnel wall. With the distance between the excavation and the station box being at least 25m, the 30mm deflection at the wall is considered to be less than 10mm at the station box.

In the long term, the shoring wall will be restrained by the basement slabs with lateral pressure acting on the back face of the pile towards the inner face of the basement.

“Any development activity, whether beneath or adjacent to contained metro tracks, that has the potential to cause track displacement must comply with the requirements of SPC 207 Track Monitoring Requirements for Undertrack Excavation”

In accordance with the requirements of the technical guideline the track is to be monitored in accordance with the requirements of SPC 207 Track Monitoring Requirements for Undertrack Excavation.

6.4. Induced Cracking

Section 9.1.3 outlines technical criteria regarding the monitoring and treatment of existing and new cracks to the tunnel lining.

A dilapidation report of the tunnel lining may need to be completed to document the existing condition of the tunnel and any existing cracks.

The cracks should continue to be monitored through the construction period with repairs required to any cracks to be completed by TfNSW on behalf of the developer.

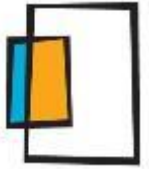


6.5. Temporary Components

Section 5.2 of T HR CI 12080 ST *“Any temporary components of shoring systems that are located such that their stability has the potential to affect the rail corridor shall have a minimum service life of 10 years excluding considerations of any support from permanent structure”.*

Compliance with the above clause has been achieved by the proposed shoring wall. The concrete components of the wall have all been designed for the permanent structure case and as such have a minimum design life of 100 years.

Shoring props which will be de-commissioned following completion of the final structure and are designed for a minimum life of 10 years.



6.6. Noise and vibration

Section 6.4 of T HR CI 12080 ST *“The effects of noise and vibration from rail operations shall be considered in the design of the development. The noise from construction and rail operation shall be considered against statutory and project noise vibration limit requirements.”*

Refer to the geotechnical and acoustic engineers report for details regarding excavation and vibration considerations.

6.7. Stray currents and electrolysis from rail operations

Section 6.5 of T HR CI 12080 ST *“The potential effects of stray electrical currents and electrolysis in the electrified area of the rail network shall be the subject of a risk assessment across the full life cycle of the asset. Such effects shall be managed to a safety SFAIRP level across the full life cycle”.*

An independent stray current electrolysis report has been completed by Cathodic Protection Services.

The report recommends the following details be incorporated into the structural design:

- Slab on ground – must be protected by a moisture barrier.
- Footings – must be a minimum 32MPa with a 50mm cover
- Piles – must be a minimum 40MPa with 70mm cover
- Shotcrete walls – must be a minimum 32MPa with 70mm cover on the soil side.

These recommendations have been adopted in the structural engineering design.



7. Conclusion

The structural assessment report demonstrates that the proposed development at 2 Mandala Parade, Castle Hill can be completed within the requirements set by Transport for New South Wales for building adjacent to the Sydney Metro.

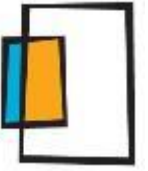
The structural engineering design has been completed to ensure existing rail infrastructure is maintained and unaffected by the proposed development. Nil reliance has been placed on the rail infrastructure or corridor for support of the development in both the temporary and permanent case.

A concrete soldier pile shoring wall is proposed to protect existing structures and infrastructure during the temporary basement excavation. The wall has been designed to limit deflection of the wall thereby limiting the risk of damage external structures.

This structural assessment report is to be read in conjunction with the ABC Consultants structural engineering documentation, project 20025 – Doran Drive Precinct – 2 Mandala Parade, Castle Hill.

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8. Appendix A – Structural Engineering Drawings



BORED PILES

- REFER TO THE GEOTECHNICAL REPORT E24724 G03 BY EI AUSTRALIA (DATED 26 AUGUST 2020) FOR A DESCRIPTION OF THE ANTICIPATED SITE CONDITIONS. THE PILING CONTRACTOR IS TO STUDY THE REPORT AND MAKE HIS OWN EVALUATION OF THE SITE CONDITIONS. ANY ADDITIONAL COSTS INCURRED SHALL BE BORNE BY THE PILING CONTRACTOR.
- THE BORED PILES ARE PROPORTIONED FOR THE SCHEDULED LOADS WITH ALLOWABLE SOCKET SKIN FRICTION AND END BEARING CAPACITY AS INDICATED IN THE REPORT. THE DEPTHS AND LENGTHS NOMINATED IN THE SCHEDULE ARE INDICATIVE ONLY. THEY MAY NEED TO BE VARIED DEPENDING ON THE SITE CONDITIONS ENCOUNTERED. THE PILING CONTRACTOR NEEDS TO INCORPORATE ANY DESIGN CHANGES REQUIRED.
- ALL WORKMANSHIP AND MATERIAL SHALL BE IN ACCORDANCE WITH AS 2159.
- THE BORED PILES SHALL BE LOCATED CONCENTRIC WITH THE COLUMNS AND WALLS UNLESS NOTED OTHERWISE.
- DRILL AND INSTALL THE BORED PILES IN THE LOCATIONS SHOWN ON THE DRAWINGS AND THE ABOVE REQUIREMENTS.
- THE PILING CONTRACTOR SHALL ALLOW FOR THE COST OF INTEGRITY TESTING OF 10% ALL BORED PILES IN ACCORDANCE WITH AS2159 CLAUSE 8.8. ALL PILE INTEGRITY TESTING IS TO BE WITNESSED BY THE PROJECT GEOTECHNICAL ENGINEER.
- BEFORE ANY CONCRETE IS POURED, ALL ROCK SOCKETS SHALL BE DEWATERED AND INSPECTED BY A GEOTECHNICAL ENGINEER WHO SHALL BE EMPLOYED BY THE BUILDER, TO VERIFY THE SOIL PARAMETERS, THE SOCKET BASE AND WALLS MUST BE CLEAN AND FREE FROM CLAY.
- IF THE CONCRETE NEEDS TO BE TREMIED, SUPER PLASTICIZER MUST BE ADDED TO THE MIX AND THE CONCRETE GRADE INCREASED BY 30% . REFER TO THE SPECIFICATIONS FOR THE INSPECTION OF THE HOLE PRIOR TO CONCRETING.
- ANY ALTERNATIVE DESIGN SHALL MEET THE ABOVE REQUIREMENTS AND THE SCHEDULED LOADS. THE PILING CONTRACTOR SHALL OBTAIN CERTIFICATION FOR THE CALCULATIONS OF THE ALTERNATIVE SYSTEM. THE DETAILS AND CALCULATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE PERFORMANCE OF THE ALTERNATIVE BORED PILES.
- PILING CONTRACTOR TO ALLOW FOR CASING OF ALL PILES IN LOOSE MATERIAL.

BULK EARTHWORKS AND SHORING NOTES

GEOTECHNICAL REPORT
REFER TO GEOTECHNICAL REPORT E24724 G03 BY EI AUSTRALIA (DATED 26 AUGUST 2020) AND THE CONTRACTOR(S) TO ENSURE GEOTECH REPORT RECOMMENDATIONS ARE ADHERED TO.

SPECIFICATION
THESE NOTES ARE TO BE READ IN CONJUNCTION WITH THE HEAD SPECIFICATION.

EROSION AND SEDIMENT CONTROL
PROVIDE GRAVEL SHAKEDOWN AREA FOR 10 METRES AT BOUNDARY OF SITE AND OTHER SEDIMENT CONTROL MEASURES GENERALLY CONSISTENT WITH THE REQUIREMENTS OF THE PUBLICATION SOIL AND WATER MANAGEMENT FOR URBAN DEVELOPMENT NSW DEPARTMENT OF HOUSING 1993. (SDO 0 7305 9423 0). FOR THE DURATION OF THE WORKS, NOTE THAT ALL WORKS ON SITE ARE TO COMPLY WITH COUNCIL SOIL AND EROSION CONTROL REQUIREMENTS. ALLOW TO SUBMIT DETAILS TO COUNCIL FOR APPROVAL IF REQUIRED. ENSURE STREETS ARE KEPT CLEAN OF ALL DEBRIS.

DUST CONTROL
THE CONTRACTOR IS TO ENSURE THAT THE DUST PREVENTION METHODS HE ADOPTS ARE SUFFICIENT TO MEET THE REQUIREMENTS OF THE COUNCIL. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ACQUAINT HIMSELF WITH THE REQUIREMENTS.

SITE SETOUT
REFER TO THE ARCHITECTS DRAWINGS FOR THE ACCURATE SETOUT OF ALL BUILDINGS, DRIVEWAYS, PARKING AREAS ETC. NOTE BULK EARTHWORKS PLAN IS INDICATIVE ONLY. CALCULATE AND CUT BATTERS FROM ARCHITECT'S PLANS AND SURVEY. CROSSOVER PROFILES TO COUNCIL REQUIREMENTS.

GENERALLY
PROCEED WITH BULK EARTHWORKS AND SHORING TO PROVIDE A STABLE SUBGRADE AND WORK SPACE FOR THE CONSTRUCTION OF THE PROPOSED DEVELOPMENT. STRIP AND DISPOSE OF TOPSOIL, REDUCE SITE TO LEVELS INDICATED AND DISPOSE OF ALL UNWANTED MATERIAL LEGALLY.

SUPERVISION
A GEOTECHNICAL ENGINEER IS TO PROVIDE SUPERVISION (AS2798) FOR ALL EARTHWORKS DURING THE COURSE OF CONSTRUCTION. AT THE COMPLETION OF THE BULK EXCAVATION CONTRACT, THE GEOTECHNICAL ENGINEER IS TO PROVIDE CERTIFICATION THAT THE WORKS HAVE BEEN CARRIED OUT IN ACCORDANCE WITH BULK EARTHWORKS SPECIFICATION.

DRAINAGE DURING CONSTRUCTION
PROVIDE ADEQUATE DRAINAGE DURING CONSTRUCTION TO ENSURE MINIMUM DISRUPTION FROM RAIN.

SERVICES
DURING EXCAVATION COORDINATE WITH ALL SERVICES INCLUDING SEWER, GAS AND POWER.

BULK EARTHWORKS PROCEDURE AND SPECIFICATION

- THE SITE IS TO BE STRIPPED OF TOPSOIL AND UNCONSOLIDATED EXISTING FILL.
- AT THE COMPLETION OF THE BULK EARTHWORKS, THE CONTRACTOR SHALL PROVIDE TEMPORARY OR PERMANENT DRAINAGE TO ENSURE NO SURFACE WATER IS RETAINED ON THE SITE, OR THAT SURFACE WATER FLOW DETRIMENTALLY SCOURS THE PREPARED BASE.

GEOTECHNICAL ENGINEER NOTES

- EXCAVATION TO BE CARRIED OUT UNDER GEOTECHNICAL ENGINEERS SUPERVISION.
- GEOTECHNICAL ENGINEER (GE) TO COMMENT ON SUITABILITY OF THE SUBCONTRACTORS METHOD OF EXCAVATION AS REMOVAL PROCEEDS.

HYDRAULICS ENGINEER

- DURING EXCAVATION COORDINATE WITH ALL HYDRAULIC ENGINEERS REQUIREMENTS FOR SEWER, GAS AND STORMWATER LINES.

AS-BUILT DRAWING

- PROVIDE AN AS-BUILT DRAWING PREPARED BY A REGISTERED SURVEYOR TO CONFIRM BULK EARTHWORKS IS COMPLETED TO REQUIRED DIMENSIONS AND LEVELS.

DILAPIDATION REPORT

- THE APPROVED SHORING WALL CONTRACTOR SHALL PREPARE A DILAPIDATION REPORT OF STREET, FOOTPATH, ROAD FEATURES AND ALL REQUESTED RAILCORP ASSETS PRIOR TO INSTALLATION OF SHORING WALL.

COMPACTION NOTES

- COMPACTION BEHIND INTERNAL FORMED RETAINING WALL BY EXCAVATION CONTRACTOR USING HAND HELD RAMMERS TO ACHIEVE 98% MODIFIED DENSITY.
- COMPACT IN MAXIMUM 300mm THICK LAYERS AT OPTIMUM MOISTURE CONTENT OF ±3%.

CONTRACTOR TO ALLOW FOR 15% INCREASE IN ANCHOR QUANTITIES OR SIZES TO ACCOMMODATE REQUIREMENTS BY GEOTECHNICAL CONSULTANT DURING EXCAVATION WORKS

BOND LENGTH AND DIAMETER OF ANCHOR HOLE TO BE CONFIRMED BY SHORING WALL CONTRACTOR. THE ANCHOR LENGTHS SHOWN ON THE STRUCTURAL DRAWINGS ARE INDICATIVE ONLY.

SHORING DESIGN CRITERIA

STRUCTURE IMPORTANCE LEVEL: 3

DESIGN WORKING LIFE: 100 YEARS OR MORE

WIND ANNUAL PROBABILITY OF EXCEEDANCE: 1/1000

EARTHQUAKE ANNUAL PROBABILITY OF EXCEEDANCE: EDC II

EARTHQUAKE DESIGN CATEGORY: 1

CONCRETE EXPOSURE CLASSIFICATION: B1

SURCHARGE: REFER LOADING PLANS

GEOTECHNICAL DESIGN PARAMETERS

ALLOWABLE END BEARING CAPACITY (INC. GEOTECHNICAL REDUCTION FACTOR OF 0.5) CLASS III

PERMANENT SHORING WALLS HAVE BEEN DESIGNED IN ACCORDANCE WITH AS3600, AS1170, AS2159 AND AS1100 WITH A DURABILITY DESIGN LIFE OF 100 YEARS

CONCRETE GRADE

ELEMENT	CONCRETE QUALITY	STRENGTH f_c	MAX SIZE AGG. mm	SLUMP mm	CEMENT TYPE	ADMIXTURE
SHORING PILES		50	20	80	GP	-
SHOTCRETE		32	10	150 - 200	GP	-
CAPPING BEAM		50	20	80	GP	-

NOTE: ALL CEMENTITIOUS MATERIAL MUST CONFORM TO TNSW SPECIFICATION 3211

COVERS			
ELEMENT	TOP	BTM	SIDES
PILES	75mm	75mm	75mm
CAPPING BEAM	50mm	50mm	50mm
SHOTCRETE	50mm	50mm	50mm

TOLERANCE

- BORES SHALL BE CENTERED WITHIN 50mm OF THE DESIGN CENTRE AS INDICATED ON THE PLANS.
- MAXIMUM "OUT OF PLUMB" OF BORES SHALL BE 75mm OR 1:500, WHICHEVER IS LESS
- GROUND ANCHORS

MONITORING

- MONITORING OF THE ADJACENT BUILDINGS AND TOP AND MIDDLE OF THE SOLDIERS SHALL BE CARRIED OUT IN ACCORDANCE WITH GEOTECHNICAL AND VIBRATION MONITORING PLANS 80016 (2.0.002) PREPARED BY DOUGLAS PARTNERS.
- MONITORING OF SURVEY POINTS SHALL BE BY A LICENSED SURVEYOR AND BE INITIALLY AT MAXIMUM THREE WEEK INTERVALS & FOR EVERY BASEMENT LEVEL EXCAVATED. SHALL BE MONITORING POINTS A MAXIMUM OF 10m APART
- IF ANY MOVEMENTS ABOVE THE LIMITS NOMINATED BY THE GEOTECHNICAL ENGINEER ARE DETECTED, ALL WORKS SHALL BE CEASED. THE ENGINEER SHALL BE IMMEDIATELY NOTIFIED. THE PROJECT MANAGER SHALL NOTIFY THE ADJOINING PROPERTY OWNERS.
- RECORDS SHALL BE KEPT OF ALL MONITORING AND BE AVAILABLE FOR INSPECTION AT ANY TIME.
- PROVIDED THE SHOTCRETE PANELS HAVE REACHED 25MPa STRENGTH AND THE SHORING ANCHORS ARE FULLY STRESSED EXCAVATION MAY CONTINUE TO THE NEXT STAGE. REPEAT STEPS 11 TO 18 UNTIL BULK EARTH LEVEL IS REACHED.
- MINIMUM 3 MONTHS AFTER GROUND FLOOR SLAB HAS BEEN CAST, REBATES AT EACH SLAB / PILE INTERFACE SHALL BE CLEANED OUT AND GROUTED UP WITH AN APPROVED NON-SHRINK GROUT (MONOLITH OR EQUAL). WHEN IN GROUT IS AT LEAST 40 MPa. TYPICAL ANCHORS / ROCK BOLTS SHALL BE DESTRESSED, ANCHOR HEADS REMOVED AND PILES MADE GOOD.

CONSTRUCTION SEQUENCE FOR EXTERNALLY BRACED SOLDIER WALLS:

- UNLESS NOTED OTHERWISE IN PLANS, DETAILS OR ELEVATIONS, THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE ADOPTED FOR THE INSTALLATION OF ANCHORED CONCRETE SOLDIER PILE WALLS.
- SETOUT THE LOCATION OF THE PILES AND CAPPING BEAMS AS NOTED ON PLANS, ELEVATION AND SECTIONS.
- HOLD POINT** THE GEOTECHNICAL ENGINEER (WHO SHALL BE EMPLOYED BY THE BUILDER) IS REQUIRED TO CERTIFY THAT THE SOIL CONDITIONS COMPLY WITH THE DESIGN ASSUMPTIONS DETAILED IN THE GEOTECHNICAL INVESTIGATION REPORT. THE GEOTECHNICAL ENGINEER IS TO DETERMINE THE LEVEL OF SUPERVISION REQUIRED TO BE ABLE TO PROVIDE THIS CERTIFICATE. SUPERVISION OF THE MATERIAL REMOVED AS PILES ARE DRILLED MAY BE REQUIRED.
- DRILL REQUIRED BORE HOLES TO THE DIAMETER SPECIFIED AND DEPTH SHOWN ON PLANS, ELEVATIONS AND SECTIONS. ENSURE THE SOCKET IS FULLY CLEANED AND ALL LOOSE MATERIAL IS REMOVED.
- HOLD POINT** THE STRUCTURAL ENGINEER IS TO WITNESS THE REINFORCEMENT CAGES PRIOR TO PLACEMENT IN THE BORED PILES. PLACEMENT OF THE CAGES WITHIN THE PILES FOR PILES GREATER THAN 6m DEEP IS TO BE WITNESSED ON SITE.
- PLACE REINFORCEMENT CAGES IN HOLES ENSURING THAT CAGES ARE ORIENTATED AS PER THE DETAILS THROUGH SOLDIER PILES FOR ANCHORS / ROCK BOLTS WILL. CLEAR ANY VERTICAL REINFORCEMENT IN PILES. END CAPS ARE TO BE PLACED AT THE BASE OF THE REINFORCEMENT CAGE AND ROLLER CHAIRS PLACED AT 2m INTERVALS ALONG THE LENGTH OF THE PILE (A MINIMUM OF 3 PER SECTION) TO ENSURE MINIMUM COVER TO THE CAGE IS MAINTAINED.
- USING A TREMIE PIPE OR SIMILAR FROM THE BASE OF THE BORED HOLE TO ENSURE NO SEPARATION OF CONCRETE AGGREGATE, PLACE CONCRETE FROM THE BASE OF THE PILE TO UNDERSIDE OF CAPPING BEAM. VIBRATE CONCRETE PROGRESSIVELY FROM THE BASE OF THE PILE AS THE PILE IS FILLED.
- INSTALL CAPPING BEAM REINFORCEMENT IN ACCORDANCE WITH DETAILS ON THESE DRAWINGS.
- HOLD POINT** THE STRUCTURAL ENGINEER IS TO WITNESS THE REINFORCEMENT OF THE CAPPING BEAM.
- PLACE CAPPING BEAM CONCRETE AND ALLOW TO CURE FOR A MINIMUM OF 7 DAYS.
- HOLD POINT** PROJECT SURVEYOR IS TO ESTABLISH A DATUM OF THE CAPPING BEAM LOCATION PRIOR TO ANY EXCAVATION PAST THE CAPPING BEAM. REFER TO MONITORING NOTES. MONITORING OF THE WALL IS TO CONTINUE ON A REGULAR BASIS AS DETAILED IN THE MONITORING NOTES.
- EXCAVATE AGAINST THE PILES TO THE TOP OF THE BATTER SLOPE LEVEL AS NOTED IN SECTIONS / ELEVATIONS.
- CONTINUE EXCAVATION TO B.E.L. WHILE MAINTAINING A MAXIMUM 1V:1H BATTER SLOPE (OR AS ADVISED BY THE GEOTECHNICAL ENGINEER). STABILISATION TO THE BATTER SLOPE TO BE PROVIDED WHERE REQUIRED BY THE GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER IS TO CONSIDER EFFECT OF SEISMIC ACTION ON THE BATTER SLOPE TO PROTECT PERSONNEL AGAINST ENGULFMENT SHOULD AN EVENT OCCUR DURING EXCAVATION.
- DRILL AND EPOXY SHOTCRETE DOWELS INTO SHORING PILES AS NOMINATED ON DRAWINGS. PLACE REINFORCEMENT TO THE SHOTCRETE WALL.
- HOLD POINT** THE STRUCTURAL ENGINEER IS TO WITNESS THE REINFORCEMENT OF THE SHOTCRETE PANELS AND ENSURE MINIMUM DEPTH IS ACHIEVED TO THE PANEL.
- PLACE CONCRETE TO SHOTCRETE WALL. SHOTCRETE PANELS ARE TO BE FORMED AND POURED OR SPRAYED. IF SHOTCRETE WALLS ARE SPRAYED, THE PANELS ARE TO BE OVERSPRAYED AND THEN SCREENED BACK TO THE DESIGN THICKNESS. SHOTCRETE IS TO BE SELF-COMPACTING IN ACCORDANCE WITH AS3600.
- IF THE EXCAVATION IS AT THE LEVEL OF THE SHORING ANCHOR, SCAN PILE FOR REINFORCEMENT PRIOR TO CORING ANCHOR HOLE. A MAXIMUM HORIZONTAL DEVIATION OF ±1° TO CLEAR ANY REINFORCEMENT IS PERMITTED. OTHERWISE CONTACT THE STRUCTURAL ENGINEER FOR FURTHER ADVICE. DRILL ANCHOR BORE HOLES, INSTALL ROCK ANCHORS / BOLTS WITH ASSOCIATED CENTRALISERS AND GROUT TUBES. PLACE GROUT WITHIN THE BORE HOLE. (REFER 'ROCK ANCHOR NOTES').
- HOLD POINT** THE GEOTECHNICAL ENGINEER IS TO WITNESS THE WEDGE LIFT OFF AND ANCHOR LIFT OFF TESTS AS REQUIRED.
- ONCE THE GROUT HAS ACHIEVED DESIGN STRENGTH AND AFTER A MINIMUM 3 DAYS, THE ROCK ANCHORS / BOLTS MAY BE STRESSED.
- PROVIDED THE SHOTCRETE PANELS HAVE REACHED 25MPa STRENGTH AND THE SHORING ANCHORS ARE FULLY STRESSED EXCAVATION MAY CONTINUE TO THE NEXT STAGE. REPEAT STEPS 11 TO 18 UNTIL BULK EARTH LEVEL IS REACHED.
- MINIMUM 3 MONTHS AFTER GROUND FLOOR SLAB HAS BEEN CAST, REBATES AT EACH SLAB / PILE INTERFACE SHALL BE CLEANED OUT AND GROUTED UP WITH AN APPROVED NON-SHRINK GROUT (MONOLITH OR EQUAL). WHEN IN GROUT IS AT LEAST 40 MPa. TYPICAL ANCHORS / ROCK BOLTS SHALL BE DESTRESSED, ANCHOR HEADS REMOVED AND PILES MADE GOOD.

CONSTRUCTION SEQUENCE FOR CONTIGUOUS WALLS BRACED INTERNALLY BY STEEL STRUTS:

- UNLESS NOTED OTHERWISE IN PLANS, DETAILS OR ELEVATIONS, THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE ADOPTED FOR THE INSTALLATION OF ANCHORED CONCRETE SOLDIER PILE WALLS.
- SETOUT THE LOCATION OF THE PILES AND CAPPING BEAMS AS NOTED ON PLANS, ELEVATION AND SECTIONS.
- HOLD POINT** THE GEOTECHNICAL ENGINEER (WHO SHALL BE EMPLOYED BY THE BUILDER) IS REQUIRED TO CERTIFY THAT THE SOIL CONDITIONS COMPLY WITH THE DESIGN ASSUMPTIONS DETAILED IN THE GEOTECHNICAL INVESTIGATION REPORT. THE GEOTECHNICAL ENGINEER IS TO DETERMINE THE LEVEL OF SUPERVISION REQUIRED TO BE ABLE TO PROVIDE THIS CERTIFICATE. SUPERVISION OF THE MATERIAL REMOVED AS PILES ARE DRILLED MAY BE REQUIRED.
- DRILL REQUIRED BORE HOLES TO THE DIAMETER SPECIFIED AND DEPTH SHOWN ON PLANS, ELEVATIONS AND SECTIONS. ENSURE THE SOCKET IS FULLY CLEANED AND ALL LOOSE MATERIAL IS REMOVED.
- HOLD POINT** THE STRUCTURAL ENGINEER IS TO WITNESS THE REINFORCEMENT CAGES PRIOR TO PLACEMENT IN THE BORED PILES. PLACEMENT OF THE CAGES WITHIN THE PILES FOR PILES GREATER THAN 6m DEEP IS TO BE WITNESSED ON SITE.
- PLACE REINFORCEMENT CAGES IN HOLES ENSURING THAT CAGES ARE ORIENTATED AS PER THE DETAILS ON THIS DRAWING. END CAPS ARE TO BE PLACED AT THE BASE OF THE REINFORCEMENT CAGE AND ROLLER CHAIRS PLACED AT 2m INTERVALS ALONG THE LENGTH OF THE PILE (A MINIMUM OF 3 PER SECTION) TO ENSURE MINIMUM COVER TO THE CAGE IS MAINTAINED.
- USING A TREMIE PIPE OR SIMILAR FROM THE BASE OF THE BORED HOLE TO ENSURE NO SEPARATION OF CONCRETE AGGREGATE, PLACE CONCRETE FROM THE BASE OF THE PILE TO UNDERSIDE OF CAPPING BEAM. VIBRATE CONCRETE PROGRESSIVELY FROM THE BASE OF THE PILE AS THE PILE IS FILLED.
- INSTALL CAPPING BEAM REINFORCEMENT IN ACCORDANCE WITH DETAILS ON THESE DRAWINGS.
- HOLD POINT** THE STRUCTURAL ENGINEER IS TO WITNESS THE REINFORCEMENT OF THE CAPPING BEAM.
- PLACE CAPPING BEAM CONCRETE AND ALLOW TO CURE FOR A MINIMUM OF 7 DAYS.
- HOLD POINT** PROJECT SURVEYOR IS TO ESTABLISH A DATUM OF THE CAPPING BEAM LOCATION PRIOR TO ANY EXCAVATION PAST THE CAPPING BEAM. REFER TO MONITORING NOTES. MONITORING OF THE WALL IS TO CONTINUE ON A REGULAR BASIS AS DETAILED IN THE MONITORING NOTES.
- EXCAVATE AGAINST THE PILES TO THE TOP OF THE BATTER SLOPE LEVEL AS NOTED IN SECTIONS / ELEVATIONS.
- CONTINUE EXCAVATION TO B.E.L. WHILE MAINTAINING A MAXIMUM 1V:1H BATTER SLOPE (OR AS ADVISED BY THE GEOTECHNICAL ENGINEER). STABILISATION TO THE BATTER SLOPE TO BE PROVIDED WHERE REQUIRED BY THE GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER IS TO CONSIDER EFFECT OF SEISMIC ACTION ON THE BATTER SLOPE TO PROTECT PERSONNEL AGAINST ENGULFMENT SHOULD AN EVENT OCCUR DURING EXCAVATION.
- EXCAVATE PAD FOOTINGS FOR STEEL STRUTS AND INSTALL REINFORCEMENT AS PER DETAILS.
- HOLD POINT** STRUCTURAL ENGINEER TO WITNESS PAD FOOTING REINFORCEMENT PRIOR TO PLACEMENT OF CONCRETE.
- PLACE PAD FOOTING CONCRETE AND ALLOW TO CURE FOR A MINIMUM OF 3 DAYS.
- INSTALL STEEL STRUTS AND THEIR CONNECTIONS IN ACCORDANCE WITH PLANS AND DETAILS. THE CONTRACTOR IS TO ENSURE ANY MOVEMENT OR SLIP OF THE STEEL WORK IS TAKEN UP PRIOR TO LOADING. NOTE: THE BUILDER IS TO SCAN AND LOCATE ANY EXISTING STEEL REINFORCEMENT WITHIN THE CONCRETE CAPPING BEAM OR PAD FOOTING PRIOR TO INSTALLED POST-FIXED ANCHORS. NO REINFORCEMENT IS TO BE CUT OR DRILLED.
- HOLD POINT** STRUCTURAL ENGINEER TO INSPECT STEEL STRUTS.
- ONCE THE PAD FOOTINGS HAVE REACHED 32MPa MINIMUM, EXCAVATION OF THE TEMPORARY BATTER SLOPE MAY CONTINUE.
- CONTINUE CONSTRUCTION OF BUILDING STRUCTURE AS PER STRUCTURAL DOCUMENTATION.
- STRUTS MAY BE REMOVED PROVIDED THE FOLLOWING IS COMPLETE: ALL STRUCTURES UP TO GROUND FLOOR HAVE BEEN COMPLETED AND HAVE ACHIEVED A MINIMUM DESIGN STRENGTH OF 40MPa. BASEMENT SLABS HAVE BEEN COMPLETED FOR THE FULL BASEMENT WIDTH AND ANY GAPS BETWEEN THE SHORING WALL AND BASEMENT SLABS IS FILLED WITH NON-SHRINK 40MPa GROUT. ANY BASEMENT SLABS DESIGNED AS POST-TENSIONED HAVE BEEN ALLOWED TO CURE FOR A MINIMUM OF 96 DAYS.

ROCK ANCHORS - POST-TENSIONED STRAND

- IN ADDITION TO ANY NOTES PROVIDED BELOW AND DETAILS SHOWN ON THESE DRAWINGS, ALL ROCK ANCHORS ARE TO BE INSTALLED IN ACCORDANCE WITH AS4378 AND TRANSPORT FOR NSW QA SPECIFICATION B14
- ANCHORS SHALL CONSIST OF LOW RELAXATION STRESS-RELIEVED SUPERGRADE STEEL STRAND TO AS4672.1 AND AS4672.2 AND ANCHORAGES AND WEDGES SHALL CONFORM TO AS1314.
- ALL STEEL ELEMENTS, INCLUDING BEARING PLATES AND WASHERS, MUST BE FABRICATED FROM GRADE 250 STEEL IN ACCORDANCE WITH AS3678. NUTS FOR THE ROCK BOLTS MUST BE GRADE C COMPLYING WITH AS1112.3 AND PROPERTY CLASS C COMPLYING WITH AS4291.2 OR EQUIVALENT TO SUIT THE END THREAD OF THE BOLT.
- THE USE OF COUPLERS TO THE ANCHOR STRANDS IS NOT PERMITTED.
- PRIOR TO ANY DRILLING OPERATIONS, THE BUILDER SHALL ACQUAINT THEMSELVES WITH ALL ADJACENT UNDERGROUND SERVICES AND ENSURE THAT NONE OF THESE ARE DISRUPTED BY ROCK ANCHORS. ALL APPROPRIATE APPROVALS, PERMITS AND AGREEMENTS SHALL BE OBTAINED BEFORE COMMENCEMENT OF THE WORK.
- BORE HOLES FOR THE ROCK BOLTS MUST BE DRILLED USING ROTARY OR ROTARY PERCUSSION DRILLING EQUIPMENT. DRILLING FLUIDS AND CORE DRILLING ARE NOT PERMITTED. BORE HOLES MUST BE INSTALLED WITH A MAXIMUM DEVIATION FROM THE DESIGN INCLINATION IN ANY DIRECTION OF 2° AND A MAXIMUM DEVIATION FROM THE ENTRY POINT OF ±25mm.
- CENTRALISERS MUST BE PROVIDED ALONG THE LENGTH OF THE STRAND AT 1000mm CENTRES WITHIN THE BOND LENGTH. 2000mm CENTRES WITHIN THE FREE LENGTH AND 300mm FROM EACH END TO ENSURE THE STRAND IS CENTRALISED TO THE CENTRE OF THE BOREHOLE. THE CENTRALISERS MUST BE NON-CORRODIBLE, FIRMLY FIXED TO THE BOLT AND A SHAPE THAT PERMITS THE FREE FLOW OF GROUT TO FULLY ENCAPSULATE THE BOLT.
- GROUT TUBES MUST EXTEND TO THE BASE OF THE LOWEST PORTION OF THE BORE HOLE AND BE SECURELY FIXED TO THE STRANDS. TUBING MUST BE OF ADEQUATE STRENGTH TO RESIST ANY DAMAGE DURING INSTALLATION AND GROUTING AND BE OF SUFFICIENT SIZE TO ALLOW PUMPING OF GROUT.
- MATERIAL PROPERTIES OF THE GROUT MUST CONFORM TO TABLE B114.2 OF TNSW QA SPECIFICATION R64. GROUTS MUST GENERALLY HAVE A HIGH BLEED RESISTANCE, LOW SHRINKAGE AND HIGH FLUIDITY. THE GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 50MPa AT THREE (3) DAYS. GROUT CYLINDERS SHALL BE TAKEN ON THE BASIS OF ONE SAMPLE (TWO CYLINDERS) FOR EVERY TEN ANCHORS AND TESTED ON THE DAY OF STRESSING. THE GROUT SHALL BE MIXED IN A HIGH-SPEED IMPELLER TYPE MACHINE.
- THE STRANDS SHALL BE PULLED TAUT AND MARKED AT THE FACE OF THE WEDGE PRIOR TO UNDERTAKING THE TENSIONING PROCEDURE. MEASUREMENTS FROM THE FACE OF THE WEDGE TO THE MARKING SHALL BE TAKEN AT 25%, 50%, 75%, 100% AND 125% AS THE STRAND IS PROGRESSIVELY TENSIONED TO THE PROOF LOAD. RESULTS OF THE MEASUREMENTS SHALL BE PROVIDED TO THE ENGINEER FOR COMPARISON AGAINST THEORETICAL EXTENSIONS.
- EACH ANCHOR SHALL BE PROOF LOADED (E) STRESSED TO 125% OF THE WORKING LOAD, HELD FOR FIVE MINUTES, AND SLOWLY EASED BACK. THE ANCHOR SHALL BE THEN STRESSED TO WORKING LOAD AND LOCKED OFF. ANY ANCHOR WHICH FAILS TO HOLD THE LOAD SHALL BE REMOVED AND REPLACED WITH ANOTHER ANCHOR. SUCH WORK SHALL BE CARRIED OUT IN THE PRESENCE OF AN ENGINEER.
- STRANDS WHICH EXTEND EXCESSIVELY BEYOND THE FACE OF THE PILE MAY BE CUT TO A MINIMUM LENGTH OF 300mm + the extension length from the pile face.
- ALL ANCHORS TO BE TESTED USING THE INDUSTRY STANDARD 'WEDGE LIFT-OFF' TEST METHODOLOGY AND IN ADDITION 10% OF ALL ANCHORS TO BE ADDITIONALLY TESTED USING THE 'ANCHOR LIFT-OFF' TESTING METHODOLOGY IMMEDIATELY FOLLOWING LOCK-OFF OF THE ANCHORS.
- ALL ROCK ANCHORS TO BE INSPECTED BY GEOTECHNICAL ENGINEER DURING INSTALLATION TO CONFIRM CORRECT INSTALLATION AND ANCHOR LOADS ACHIEVED.
- MINIMUM DESIGN LIFE OF ALL TEMPORARY ROCK ANCHORS TO BE 2 YEARS OR AS NOMINATED BY BUILDER.
- THE BUILDER SHALL KEEP ON SITE AN ADEQUATE SUPPLY OF ANCHOR CABLES, GROUT ETC. FOR EMERGENCY USE.
- THE BUILDER SHALL REGULARLY MONITOR THE STRESS IN THE ANCHORS REGULARLY BY MEANS OF A LIFT OFF TEST TO ENSURE NO MAJOR LOSSES ARE OCCURRING. IF STRESS LOSSES ARE DETECTED THEY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER.

ROCK ANCHORS - SOLID BAR

- IN ADDITION TO ANY NOTES PROVIDED BELOW AND DETAILS SHOWN ON THESE DRAWINGS, ALL ROCK BOLTS ARE TO BE INSTALLED IN ACCORDANCE WITH AS4378 AND TRANSPORT FOR NSW QA SPECIFICATION B64.
- ROCKS BOLTS MUST BE STEEL REINFORCEMENT BARS GRADE 500N DEFORMED BAR TO AS4671. THE BOLTS MUST BE THREADED AT ONE END TO ISO COARSE PITCH THREAD TO AS1275.
- ALL STEEL COMPONENTS OF THE ROCK BOLT SYSTEM, INCLUDING THE BOLT, BEARING PLATES, WASHERS AND NUTS MUST BE HOT-DIP GALVANISED TO AS/NZS4680 WITH A MINIMUM AVERAGE COATING WEIGHT OF 600 GM/2.
- ALL STEEL ELEMENTS, INCLUDING BEARING PLATES AND WASHERS, MUST BE FABRICATED FROM GRADE 250 STEEL IN ACCORDANCE WITH AS3678. NUTS FOR THE ROCK BOLTS MUST BE GRADE C COMPLYING WITH AS1112.3 AND PROPERTY CLASS C COMPLYING WITH AS4291.2 OR EQUIVALENT TO SUIT THE END THREAD OF THE BOLT.
- THE USE OF COUPLERS TO THE ROCK BOLTS IS NOT PERMITTED.
- PRIOR TO ANY DRILLING OPERATIONS, THE BUILDER SHALL ACQUAINT THEMSELVES WITH ALL ADJACENT UNDERGROUND SERVICES AND ENSURE THAT NONE OF THESE ARE DISRUPTED BY ROCK ANCHORS. ALL APPROPRIATE APPROVALS, PERMITS AND AGREEMENTS SHALL BE OBTAINED BEFORE COMMENCEMENT OF THE WORK.
- BORE HOLES FOR THE ROCK BOLTS MUST BE DRILLED USING ROTARY OR ROTARY PERCUSSION DRILLING EQUIPMENT. DRILLING FLUIDS AND CORE DRILLING ARE NOT PERMITTED. BORE HOLES MUST BE INSTALLED WITH A MAXIMUM DEVIATION FROM THE DESIGN INCLINATION IN ANY DIRECTION OF 2° AND A MAXIMUM DEVIATION FROM THE ENTRY POINT OF ±25mm.
- CENTRALISERS MUST BE PROVIDED ALONG THE LENGTH OF THE BOLT AT 2000mm CENTRES AND 300mm FROM EACH END TO ENSURE THE BOLT IS CENTRALISED TO THE CENTRE OF THE BOREHOLE. THE CENTRALISERS MUST BE NON-CORRODIBLE, FIRMLY FIXED TO THE BOLT AND A SHAPE THAT PERMITS THE FREE FLOW OF GROUT TO FULLY ENCAPSULATE THE BOLT.
- GROUT TUBES MUST EXTEND TO THE BASE OF THE LOWEST PORTION OF THE BORE HOLE AND BE SECURELY FIXED TO THE ROCK BOLT. TUBING MUST BE OF ADEQUATE STRENGTH TO RESIST ANY DAMAGE DURING INSTALLATION AND GROUTING AND BE OF SUFFICIENT SIZE TO ALLOW PUMPING OF GROUT.
- MATERIAL PROPERTIES OF THE GROUT MUST CONFORM TO TABLE R64.1 OF TNSW QA SPECIFICATION R64. GROUTS MUST GENERALLY HAVE A HIGH BLEED RESISTANCE, LOW SHRINKAGE AND HIGH FLUIDITY. THE GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 50MPa AT THREE (3) DAYS. GROUT CYLINDERS SHALL BE TAKEN ON THE BASIS OF ONE SAMPLE (TWO CYLINDERS) FOR EVERY TEN ANCHORS AND TESTED ON THE DAY OF STRESSING. THE GROUT SHALL BE MIXED IN A HIGH-SPEED IMPELLER TYPE MACHINE.
- A MINIMUM OF 1% OF THE ROCK BOLTS MUST BE TESTED IN ACCORDANCE WITH THE 'SUITABILITY TEST' AND A MINIMUM OF 3% OF THE ROCK BOLTS MUST BE TESTED IN ACCORDANCE WITH THE 'ACCEPTANCE TEST' AS DEFINED IN TRANSPORT FOR NSW QA SPECIFICATION R64.
- RE-BOLTING OF THE ROCK BOLTS AT THE DISCRETION OF THE GEOTECHNICAL AND STRUCTURAL ENGINEERS MAY BE REQUIRED WHERE THE BOLT BECOMES OVERSTRESSED DURING EXCAVATION OR EXCESSIVE DEFORMATION OF ANY INCLINED ROCK BEDS EXISTS.

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS, VERIFY DIMENSIONS ON SITE.

REV	DATE	REVISION DESCRIPTION	BY
P4	25.05.21	ISSUED FOR PRELIMINARY INFORMATION	AV
P3	12.04.21	ISSUED FOR PRELIMINARY INFORMATION	AV
P2	11.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P1	14.07.20	ISSUED FOR PRELIMINARY INFORMATION	AV

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Client: 100-0146-0001
Project: 100-0146-0001
Drawn: 10/04/2021
Checked: 10/04/2021
Approved: 10/04/2021
Project Address: 100-0146-0001
Project Location: 100-0146-0001
Project Status: 100-0146-0001

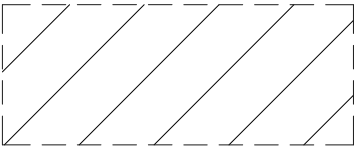
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SITE RETENTION NOTES

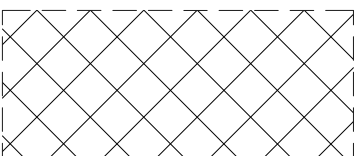
JOB NUMBER: 20025	ORG NUMBER: S01.101	
DESIGNED BY: RC	DATE:	
DRAWN BY: AV	SCALE: 1:1 @ A0	
SIZE: A0	REV: P4	



SHORING SURCHARGE KEY



5 kPa SURCHARGE LOADING



20 kPa SURCHARGE LOADING

NOTE:
5 kPa ZONE MAYBE INCREASED TO 20 kPa
AFTER INSTALLATION OF FIRST PROP.

SHORING SURCHARGE PLAN

SCALE 1:175

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO
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REV	DATE	REVISION DESCRIPTION	BY
P2	25.03.21	ISSUED FOR PRELIMINARY INFORMATION	AV
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DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SHORING SURCHARGE
LOADING PLAN

JOB NUMBER:

20025

ORIG NUMBER:

S01.106

DESIGNED BY:

RC

DATE:

DRAWN BY:

AV

SCALE:

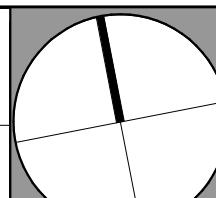
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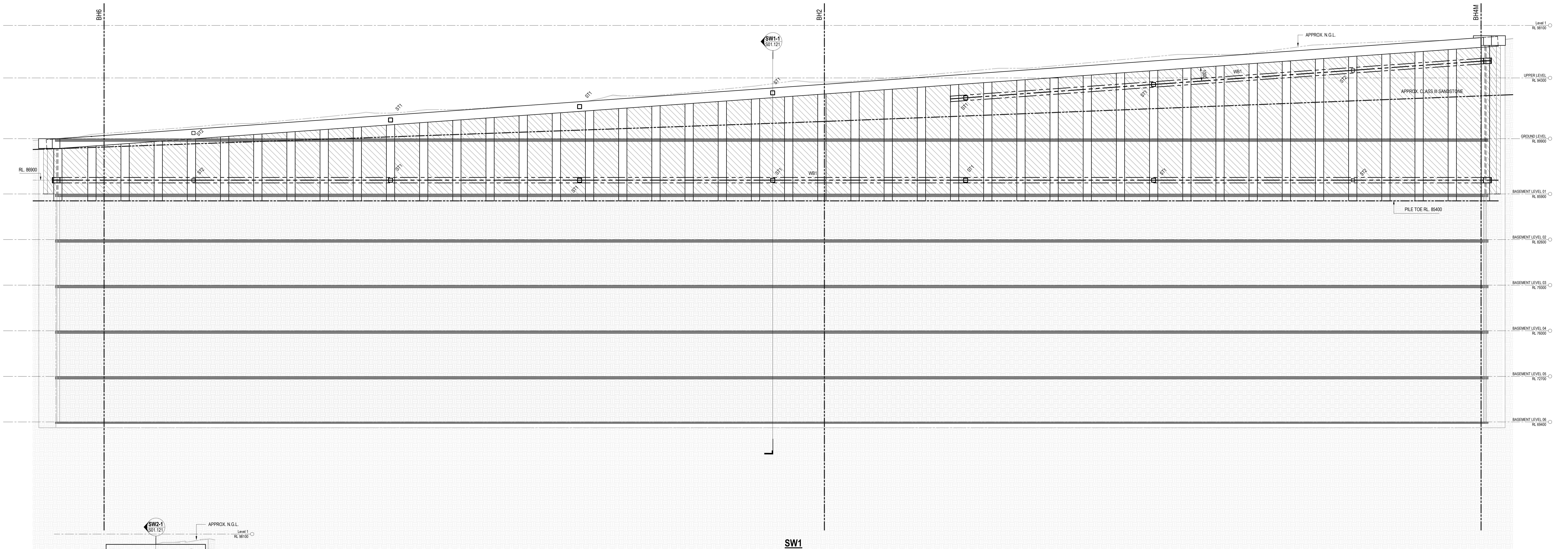
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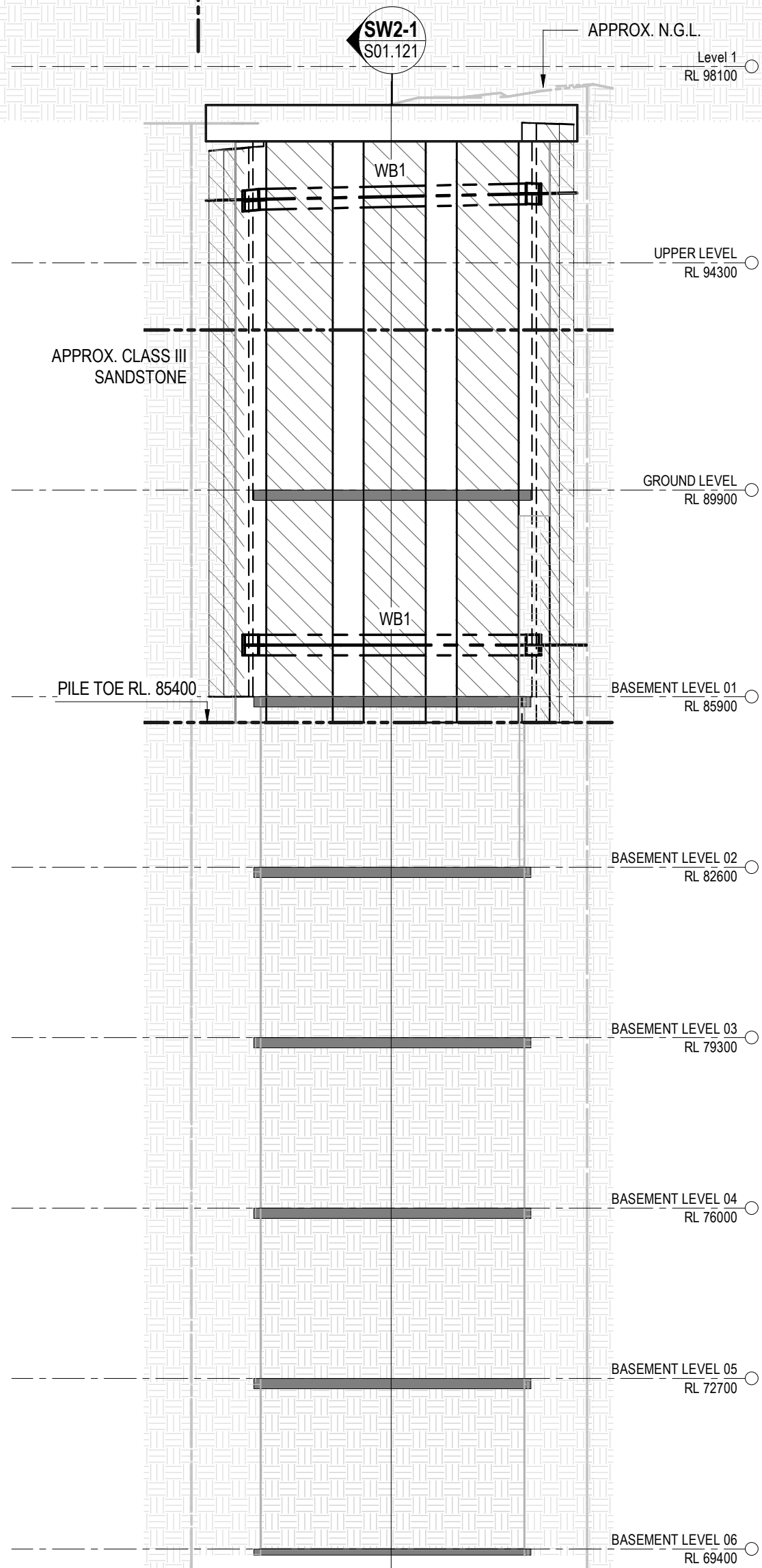
P2



25/03/2021 11:18:39 AM



SW1
SCALE 1:100



SW2
SCALE 1:100

SHORING PILE SCHEDULE			
MARK	DIA.	VERT. BARS	TIES
SP1	600	8N32	N16-150

HATCH DENOTES EXTENT OF 180mm THK SHOTCRETE BETWEEN SHORING PILES

HATCH DENOTES EXPOSED ROCK FACE TO BE RETAINED WITH SHOTCRETE AND ROCKBOLTS TO GEOTECHNICAL ENG. DETAILS

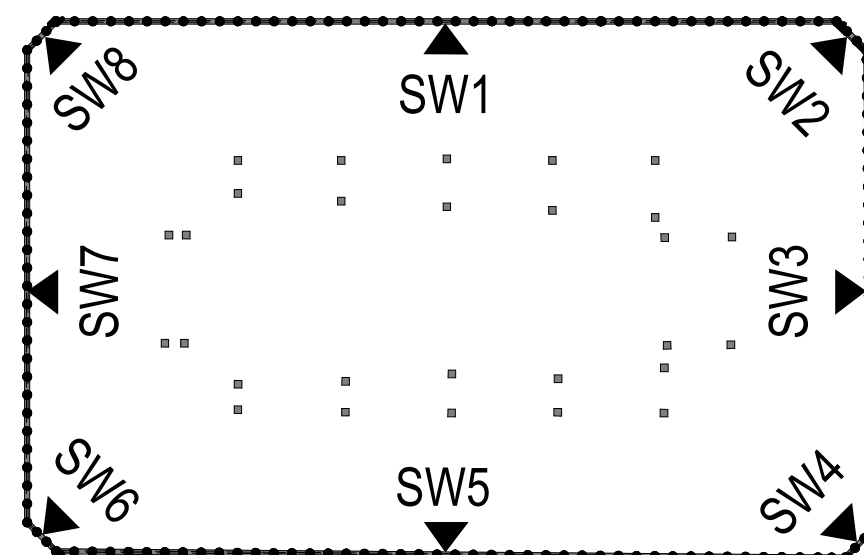
GEOTECHNICAL ENGINEER TO INSPECT EXPOSED SHALE FACE REGULARLY DURING EXCAVATION AND NOMINATE APPROPRIATE ROCK BOLTS AND SHOTCRETE AS REQUIRED TO ENSURE STABILITY AT ALL TIMES.

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWING S01.101 - SITE RETENTION PLAN FOR SHORING PILE SETOUT DIMENSIONS.

STEELWORK MEMBER SCHEDULE		
MARK	SIZE	COMMENTS
ST1	350 x 350 x 12 SHS	ADDITIONAL CROSS BRACING REQUIRED, DETAILS TBC
ST2	250 x 250 x 10 SHS	ADDITIONAL CROSS BRACING REQUIRED, DETAILS TBC
WB1	1200 WB 342	

NOTE: GROUND LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE SURVEYOR

NOTE: ROCK LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER



KEY PLAN
SCALE 1:1000

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

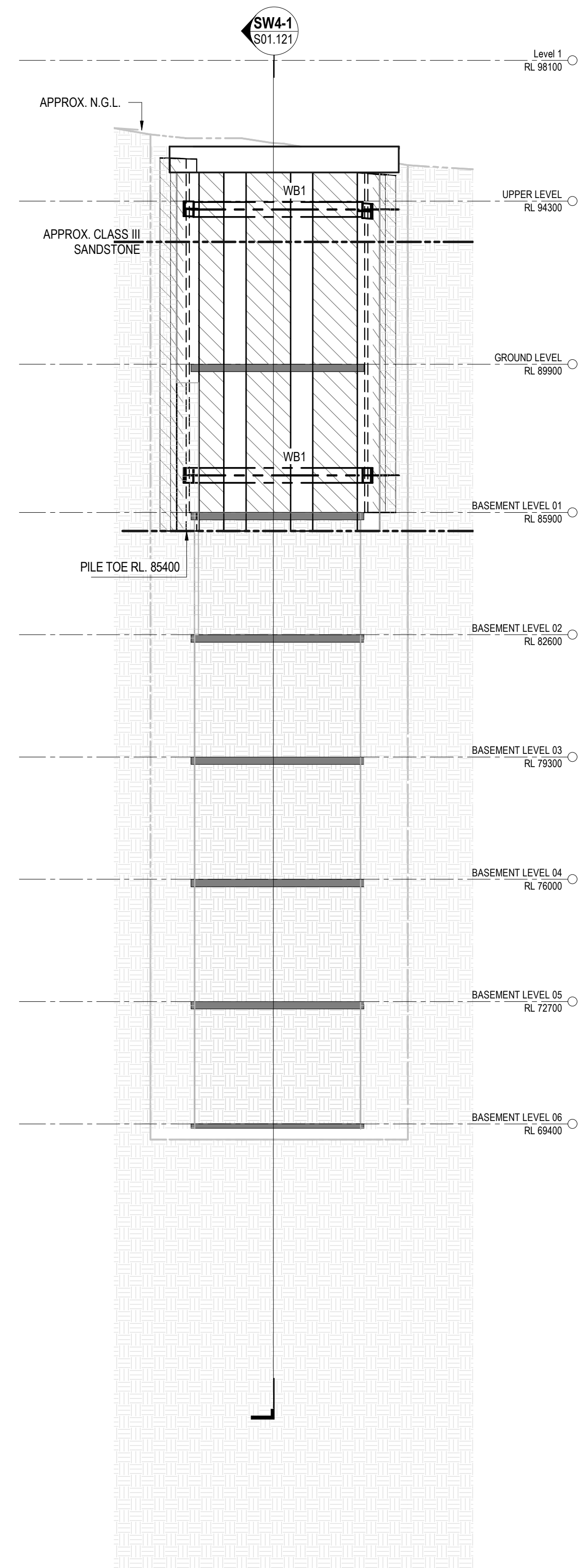
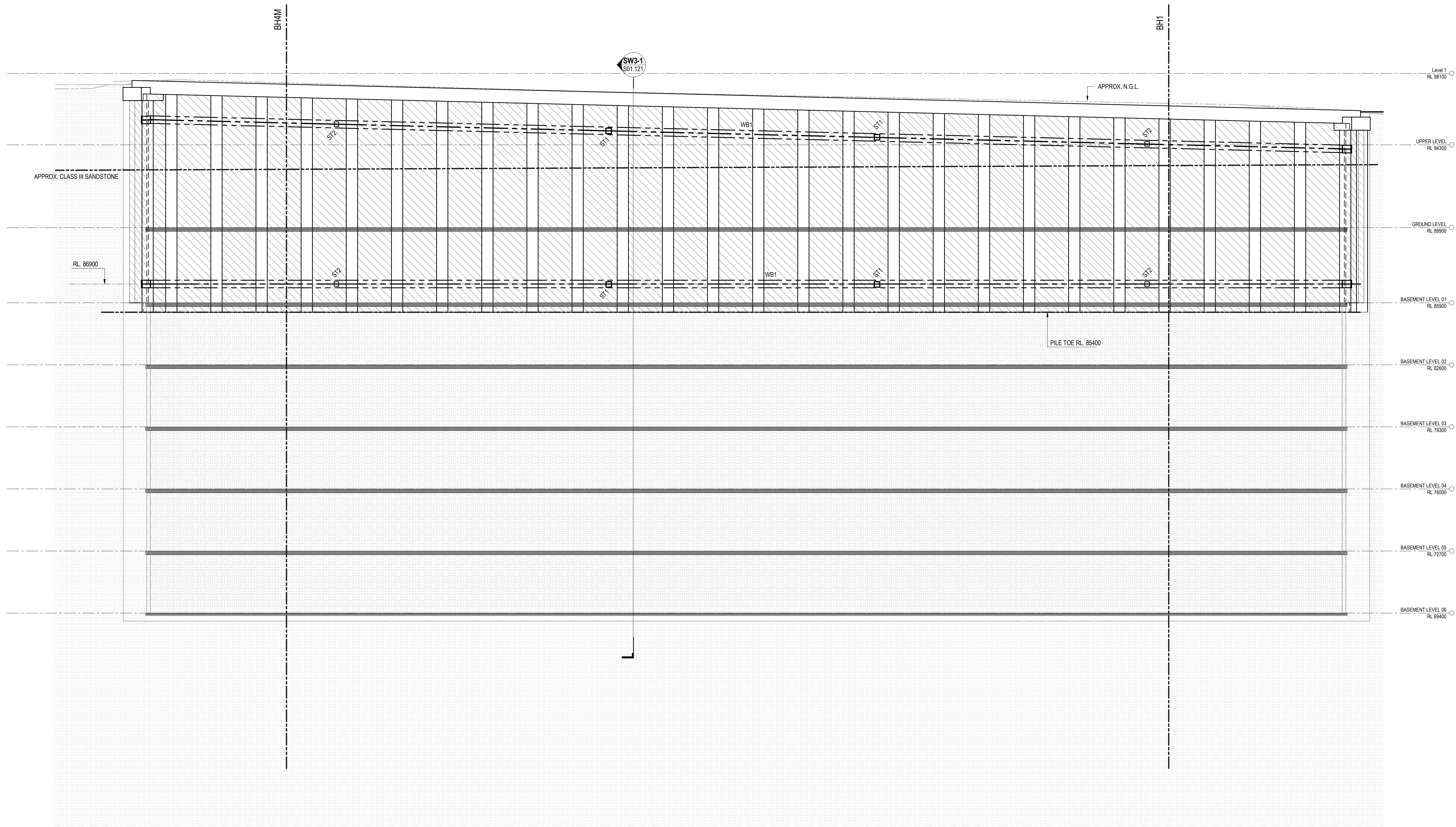
NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS. VERIFY DIMENSIONS ON SITE.

REV	DATE	REVISION DESCRIPTION	BY
P5	25.05.21	ISSUED FOR PRELIMINARY INFORMATION	AV
P4	12.04.21	ISSUED FOR PRELIMINARY INFORMATION	AV
P3	17.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P2	11.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P1	14.07.20	ISSUED FOR PRELIMINARY INFORMATION	AV

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318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 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SHORING PILE SCHEDULE			
MARK	DIA.	VERT. BARS	TIES
SP1	600	8N32	N16-150

STEELWORK MEMBER SCHEDULE		
MARK	SIZE	COMMENTS
ST1	350 x 350 x 12 SHS	ADDITIONAL CROSS BRACING REQUIRED. DETAILS TBC
ST2	250 x 250 x 10 SHS	ADDITIONAL CROSS BRACING REQUIRED. DETAILS TBC
WB1	1200 WB 342	

HATCH DENOTES EXTENT OF 180mm THK SHOTCRETE BETWEEN SHORING PILES

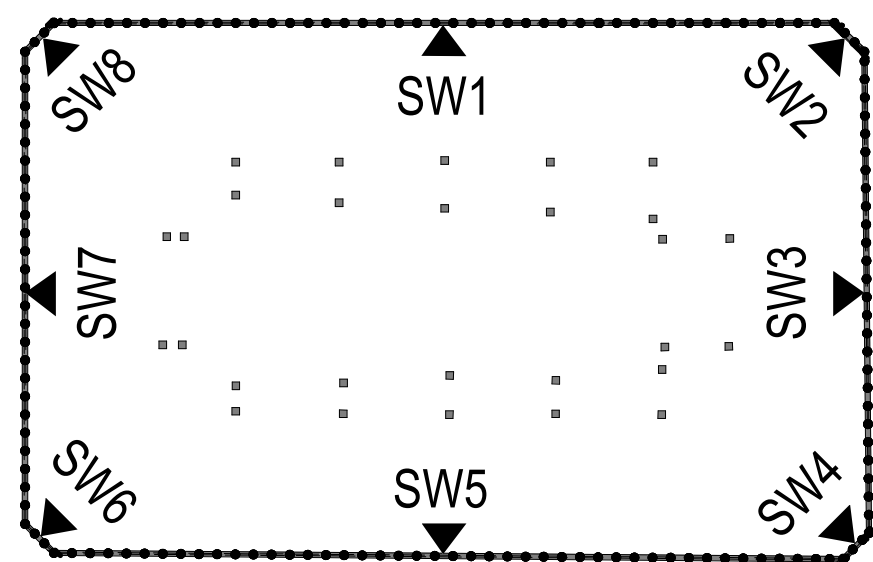
HATCH DENOTES EXPOSED ROCK FACE TO BE RETAINED WITH SHOTCRETE AND ROCKBOLTS TO GEOTECHNICAL ENG. DETAILS

GEOTECHNICAL ENGINEER TO INSPECT EXPOSED SHALE FACE REGULARLY DURING EXCAVATION AND NOMINATE APPROPRIATE ROCK BOLTS AND SHOTCRETE AS REQUIRED TO ENSURE STABILITY AT ALL TIMES.

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWING S01.101 - SITE RETENTION PLAN FOR SHORING PILE SETOUT DIMENSIONS.

NOTE: GROUND LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE SURVEYOR

NOTE: ROCK LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER



PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS. VERIFY DIMENSIONS ON SITE.

REV	DATE	REVISION DESCRIPTION	BY
P5	25.05.21	ISSUED FOR PRELIMINARY INFORMATION	AV
P4	12.04.21	ISSUED FOR PRELIMINARY INFORMATION	AV
P3	17.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P2	11.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P1	14.07.20	ISSUED FOR PRELIMINARY INFORMATION	AV

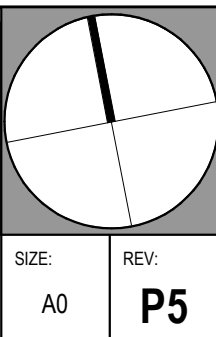
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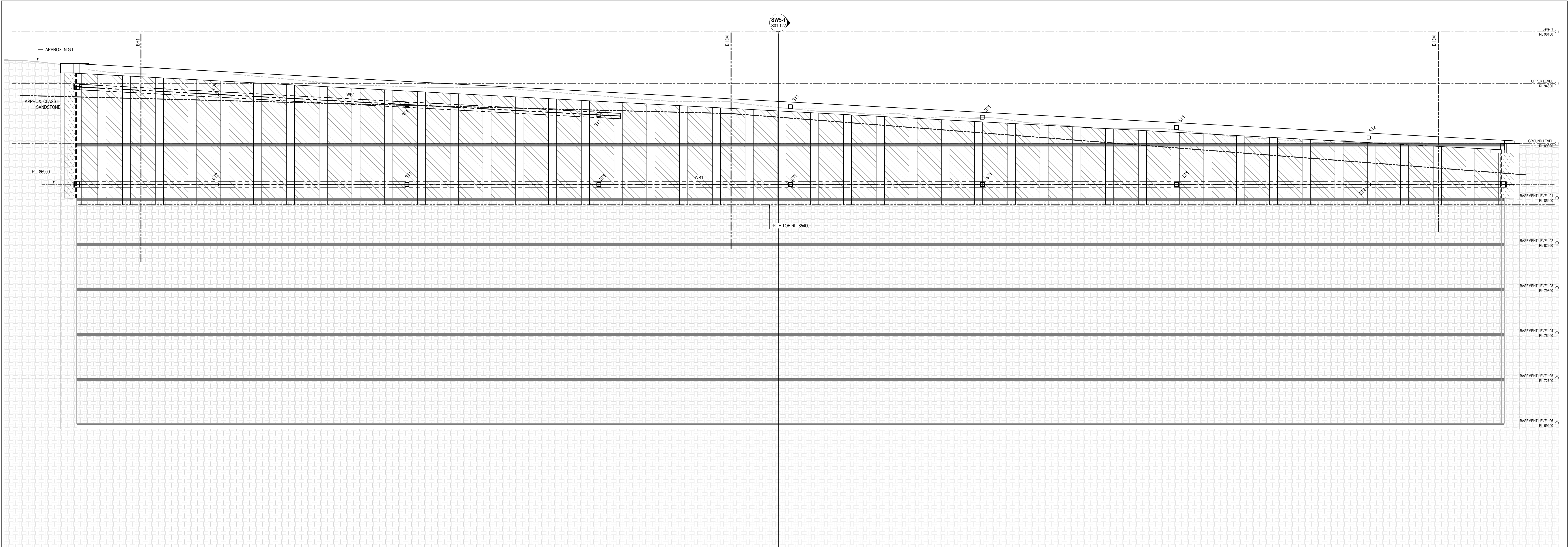
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SHORING WALL ELEVATIONS
SW3 & SW4

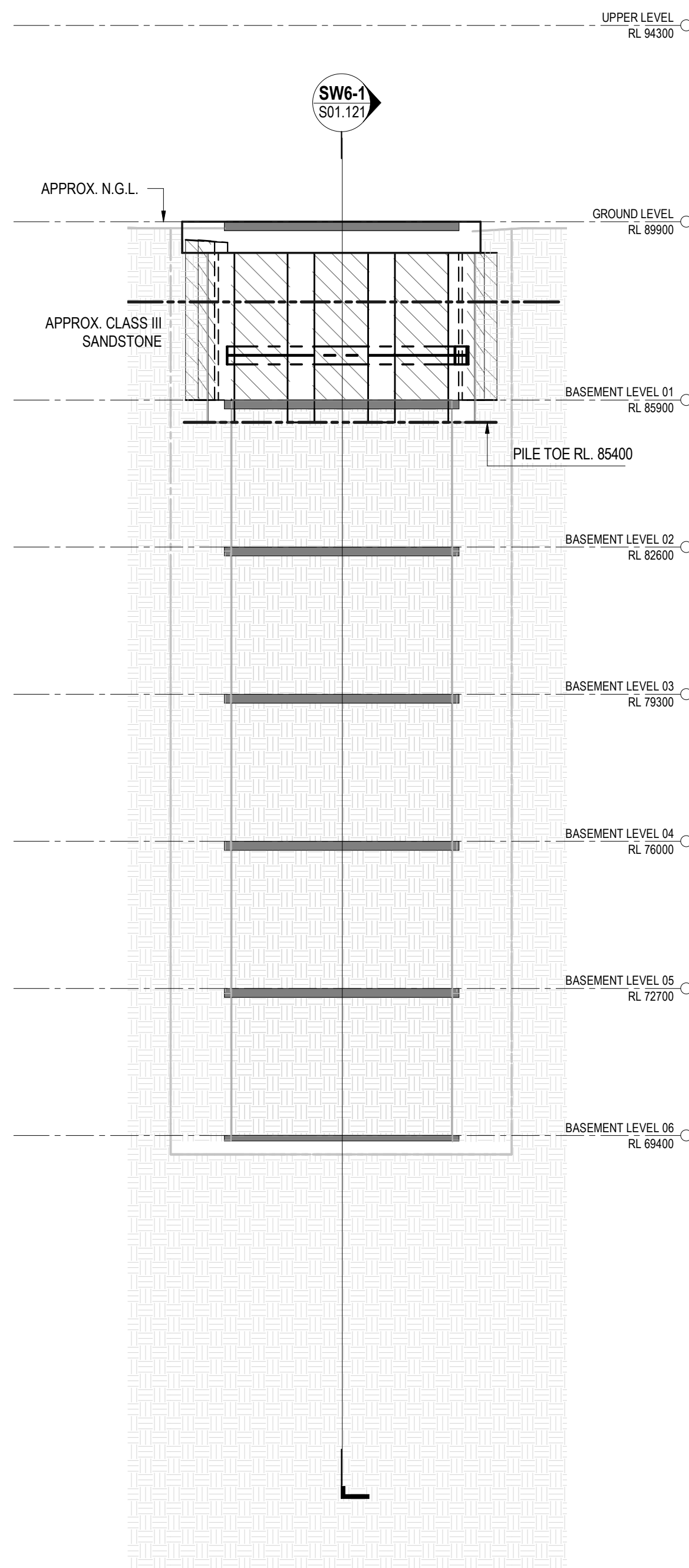
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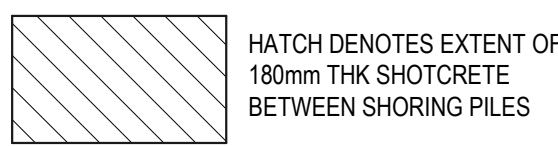


SW5
SCALE 1: 100

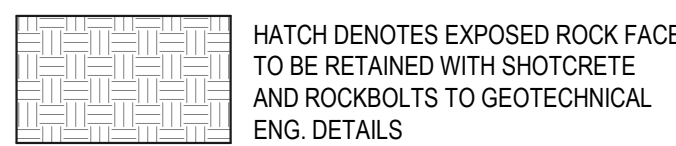


SW6
SCALE 1: 100

SHORING PILE SCHEDULE			
MARK	DIA.	VERT. BARS	TIES
SP1	600	8N32	N16-130



HATCH DENOTES EXTENT OF
18mm THK SHOTCRETE
BETWEEN SHORING PILES



HATCH DENOTES EXPOSED ROCK FACE
TO BE RETAINED WITH SHOTCRETE
AND ROCKBOLTS TO GEOTECHNICAL
ENG. DETAILS

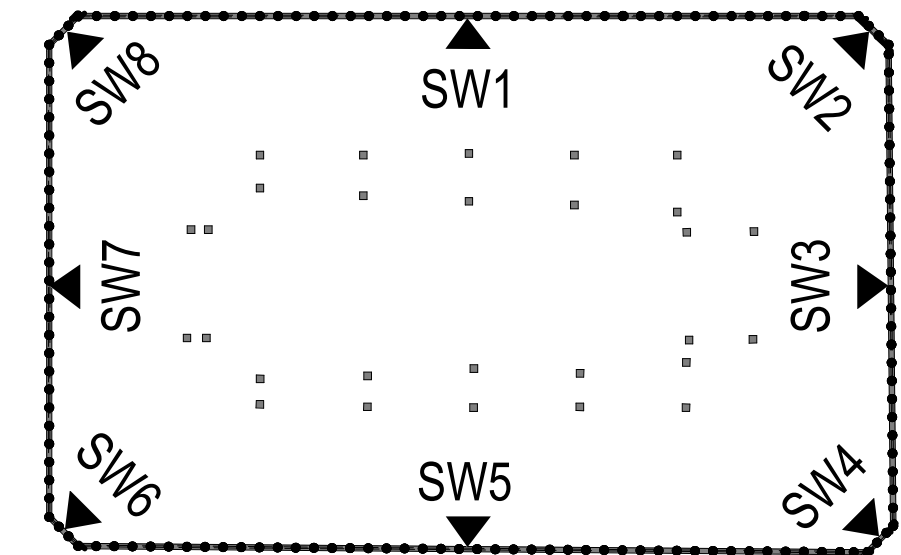
GEOTECHNICAL ENGINEER TO INSPECT EXPOSED SHALE FACE REGULARLY
DURING EXCAVATION AND NOMINATE APPROPRIATE ROCK BOLTS AND
SHOTCRETE AS REQUIRED TO ENSURE STABILITY AT ALL TIMES.

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWING
S01.101 - SITE RETENTION PLAN FOR SHORING PILE SETOUT DIMENSIONS.

STEELWORK MEMBER SCHEDULE		
MARK	SIZE	COMMENTS
ST1	350 x 350 x 12 SHS	ADDITIONAL CROSS BRACING REQUIRED. DETAILS TBC
ST2	250 x 250 x 10 SHS	ADDITIONAL CROSS BRACING REQUIRED. DETAILS TBC
WB1	1200 WB 342	

NOTE:
GROUND LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY
AND NEED TO BE CONFIRMED ON SITE BY THE SURVEYOR

NOTE:
ROCK LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY
AND NEED TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL
ENGINEER



KEY PLAN
SCALE 1:1000

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO
ARCHITECTURAL PLANS. VERIFY DIMENSIONS ON SITE.

REV	DATE	REVISION DESCRIPTION	BY
P5	25.05.21	ISSUED FOR PRELIMINARY INFORMATION	AV
P4	12.04.21	ISSUED FOR PRELIMINARY INFORMATION	AV
P3	17.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P2	11.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P1	14.07.20	ISSUED FOR PRELIMINARY INFORMATION	AV

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Company: 120, 1144 1000
Phone: 02 9146 1000
Email: info@abc-consultants.com.au
Web: www.abc-consultants.com.au

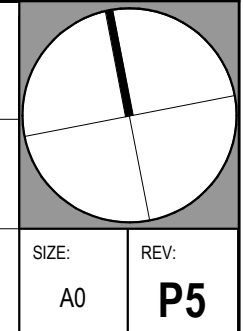
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1144 1000 1000
1144 1000 1000

Project Address: 120, 1144 1000
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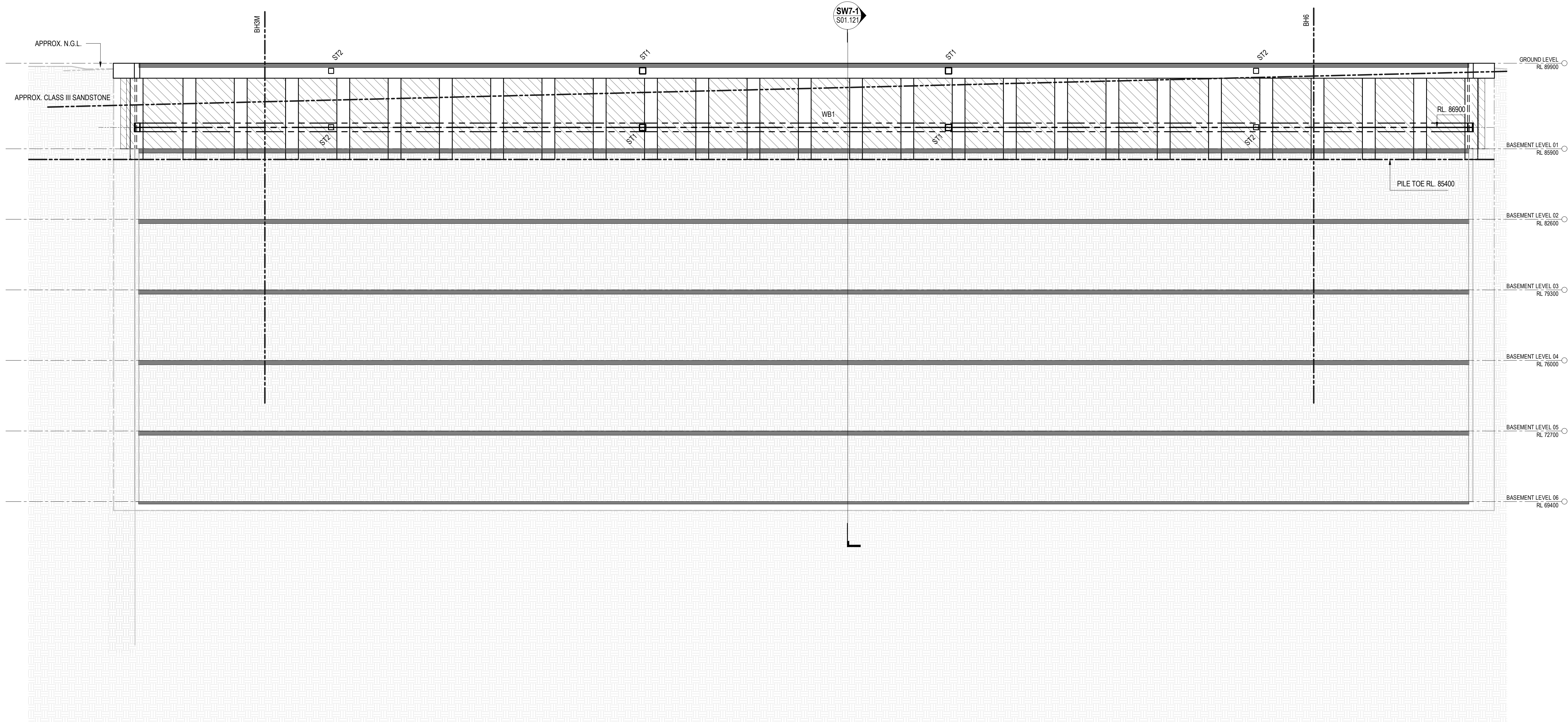
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SHORING WALL ELEVATIONS
SW5 & SW6

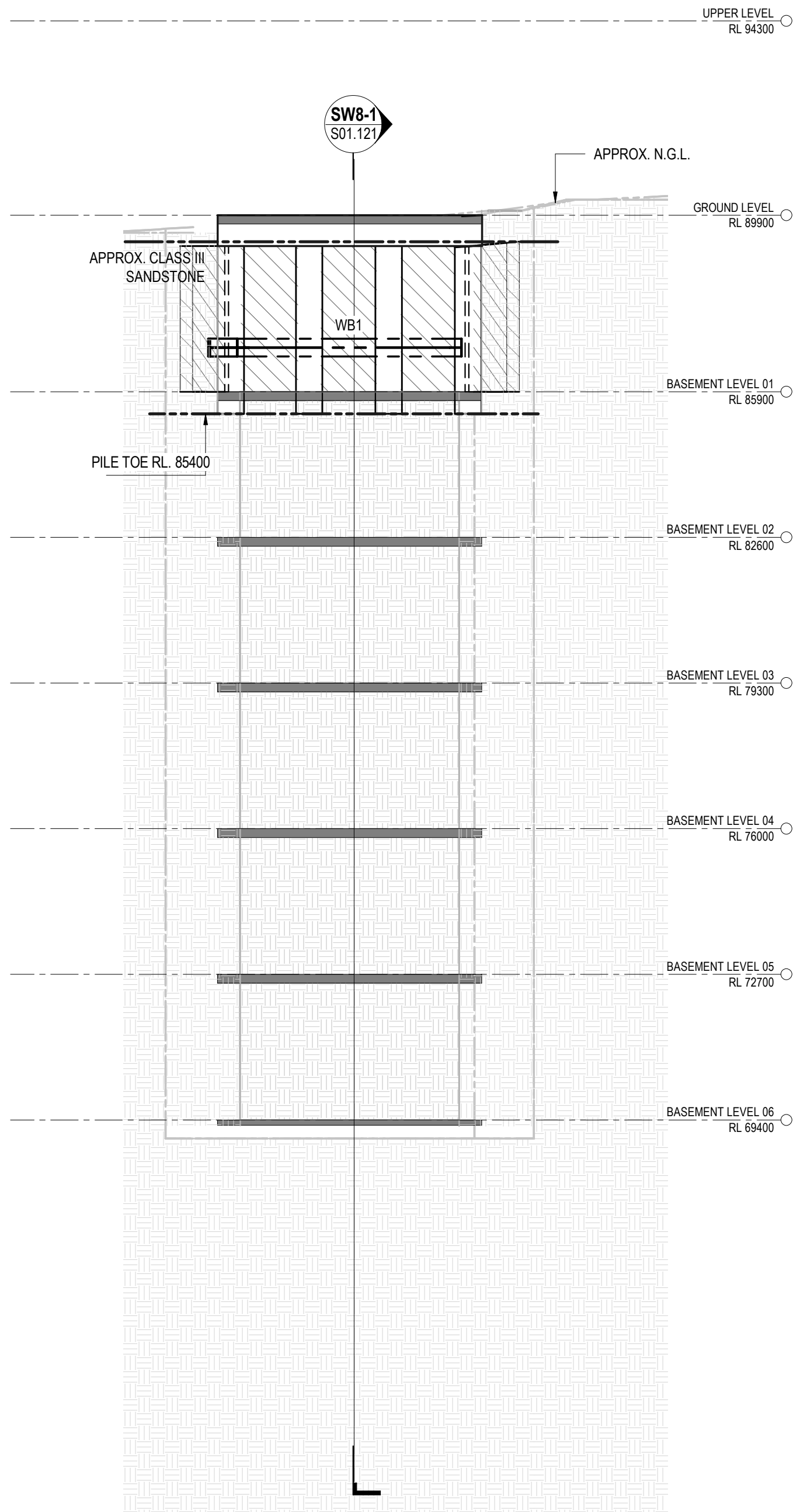
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DESIGNED BY: RC	DATE:
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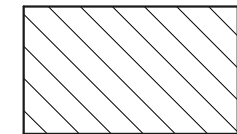


SW7
SCALE 1: 100

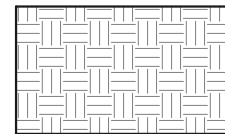


SW8
SCALE 1: 100

SHORING PILE SCHEDULE			
MARK	DIA.	VERT. BARS	TIES
SP1	600	8N32	N16-150



HATCH DENOTES EXTENT OF 18mm THK SHOTCRETE BETWEEN SHORING PILES



HATCH DENOTES EXPOSED ROCK FACE TO BE RETAINED WITH SHOTCRETE AND ROCKBOLTS TO GEOTECHNICAL ENG. DETAILS

GEOTECHNICAL ENGINEER TO INSPECT EXPOSED SHALE FACE REGULARLY DURING EXCAVATION AND NOMINATE APPROPRIATE ROCK BOLTS AND SHOTCRETE AS REQUIRED TO ENSURE STABILITY AT ALL TIMES.

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAWING S01.101 - SITE RETENTION PLAN FOR SHORING PILE SETOUT DIMENSIONS.

STEELWORK MEMBER SCHEDULE		
MARK	SIZE	COMMENTS
ST1	350 x 350 x 12 SHS	ADDITIONAL CROSS BRACING REQUIRED. DETAILS TBC
ST2	250 x 250 x 10 SHS	ADDITIONAL CROSS BRACING REQUIRED. DETAILS TBC
WB1	1200 WB 342	

NOTE: GROUND LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE SURVEYOR

NOTE: ROCK LEVEL SHOWN ON ELEVATIONS ARE APPROXIMATE ONLY AND NEED TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

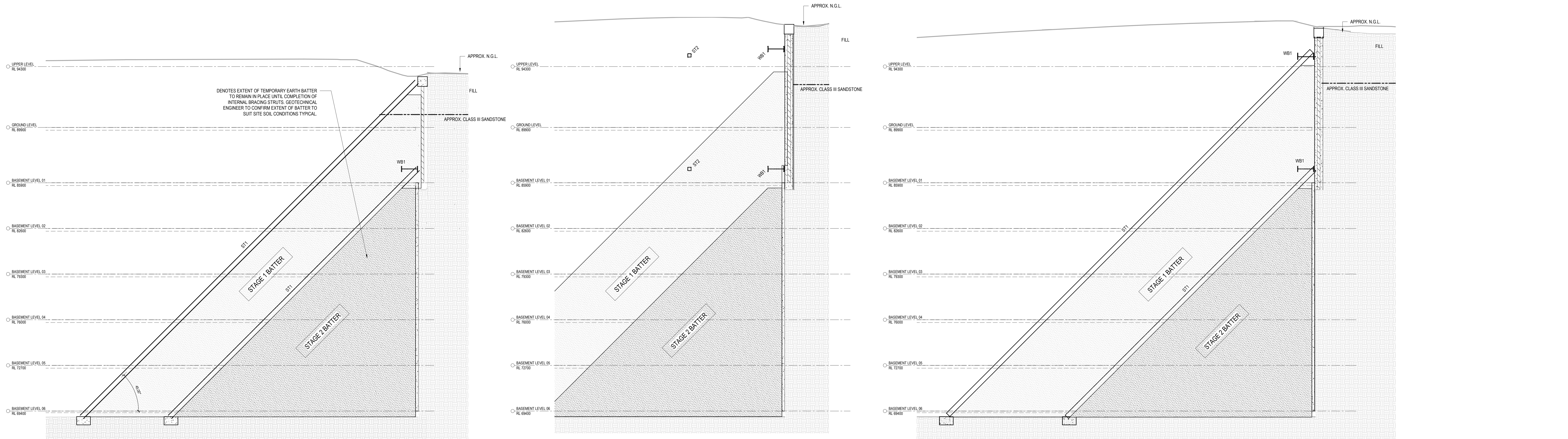
NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS. VERIFY DIMENSIONS ON SITE.

REV	DATE	REVISION DESCRIPTION	BY
P5	25.05.21	ISSUED FOR PRELIMINARY INFORMATION	AV
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P2	11.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P1	14.07.20	ISSUED FOR PRELIMINARY INFORMATION	AV

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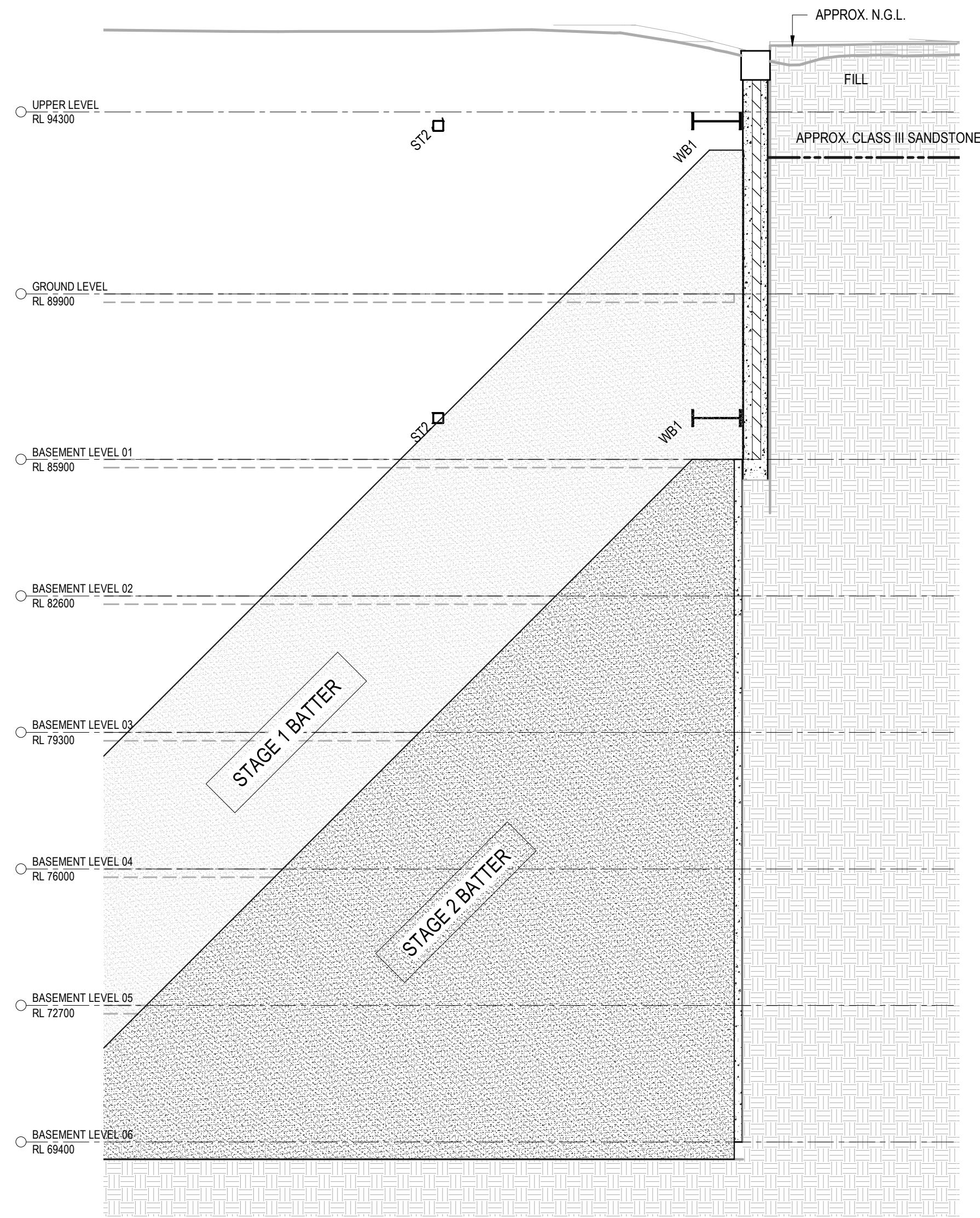
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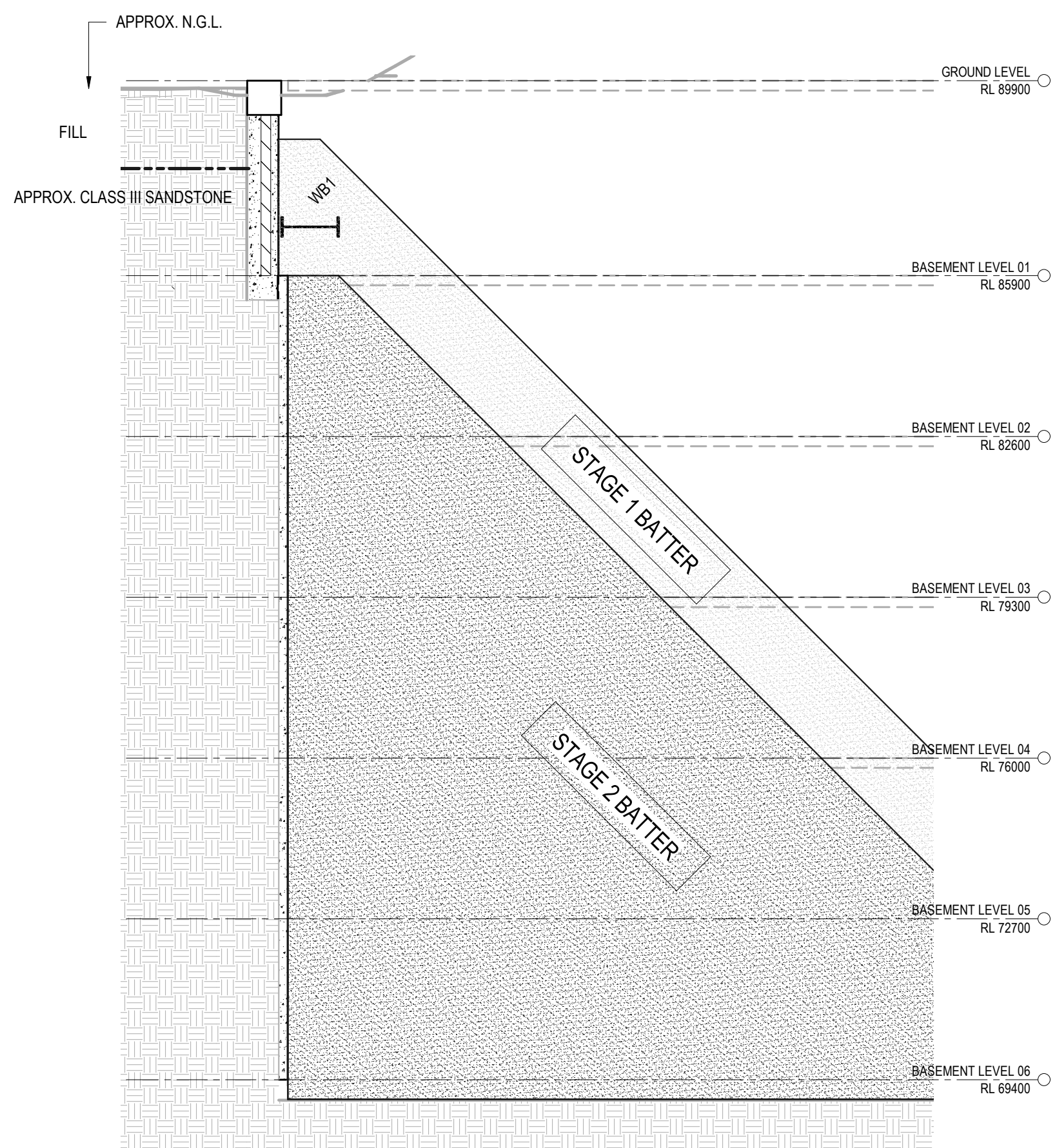
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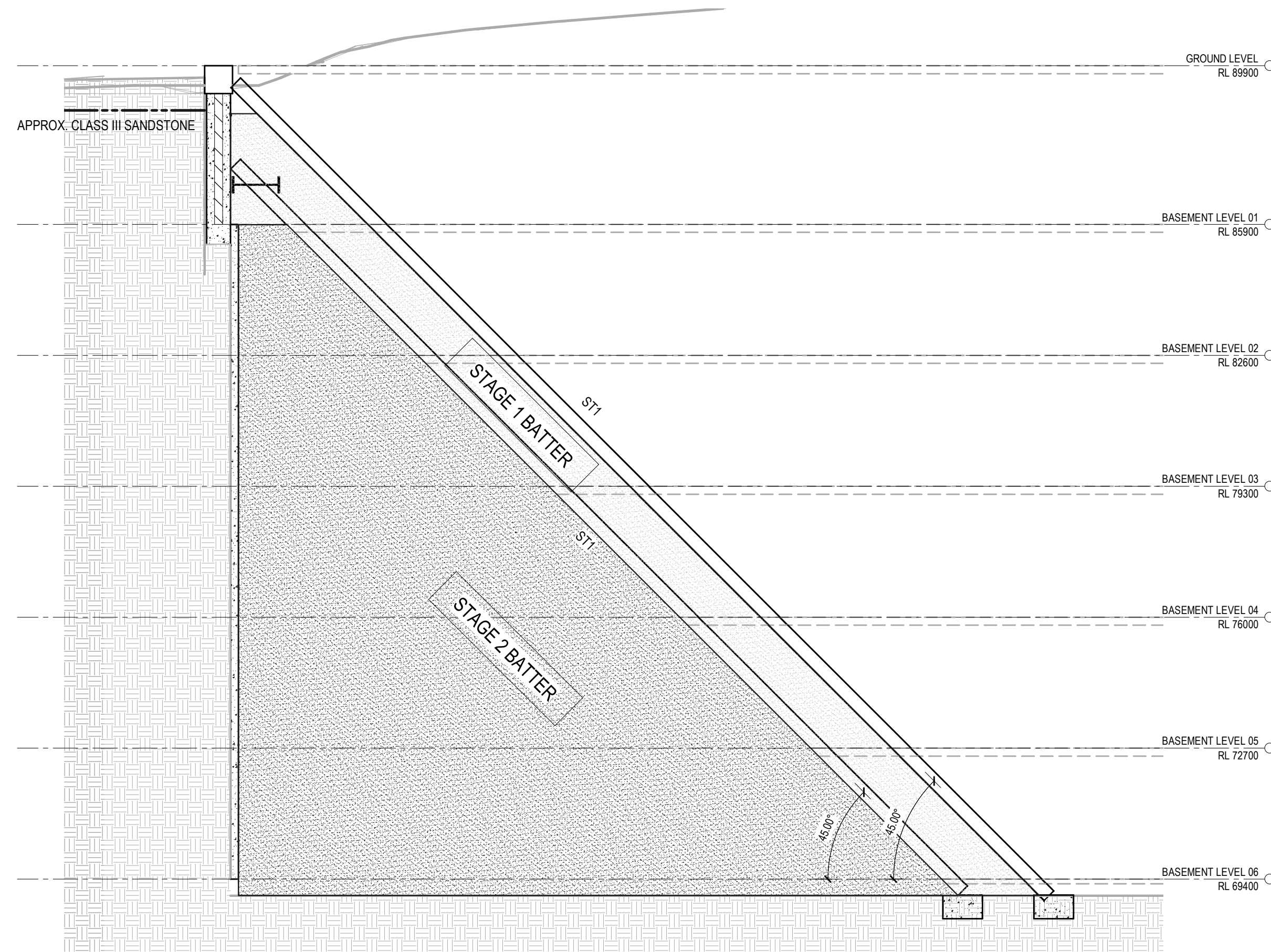
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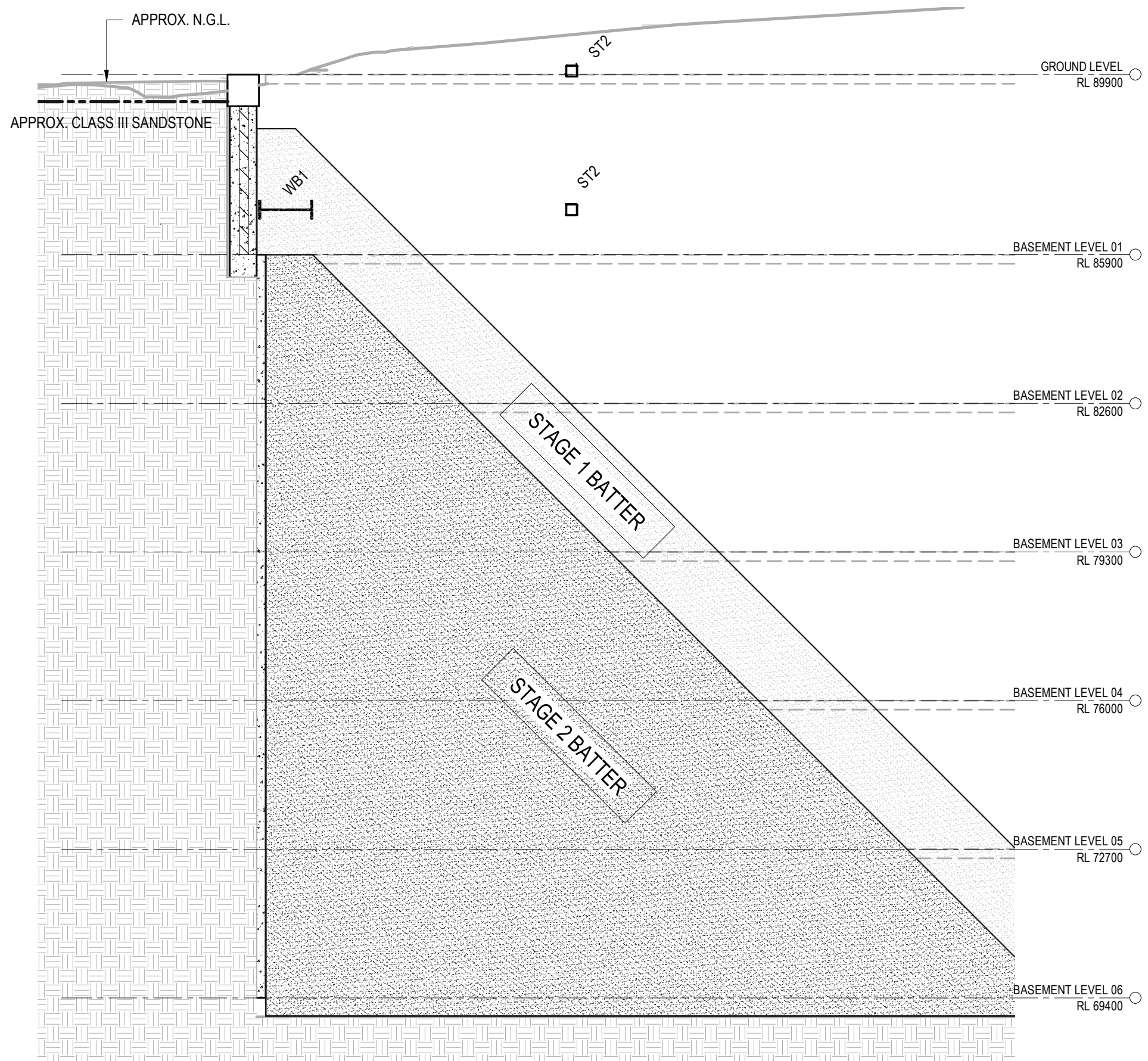
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SECTION SW5-1
Scale 1:100 S01.105



SECTION SW6-1
Scale 1:100 S01.105



SECTION SW7-1
Scale 1:100 S01.105

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P2	11.09.20	ISSUED FOR PRELIMINARY INFORMATION	AV
P1	14.07.20	ISSUED FOR PRELIMINARY INFORMATION	AV
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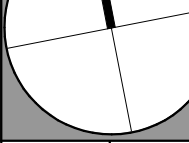
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SHORING SECTIONS
SHEET 1

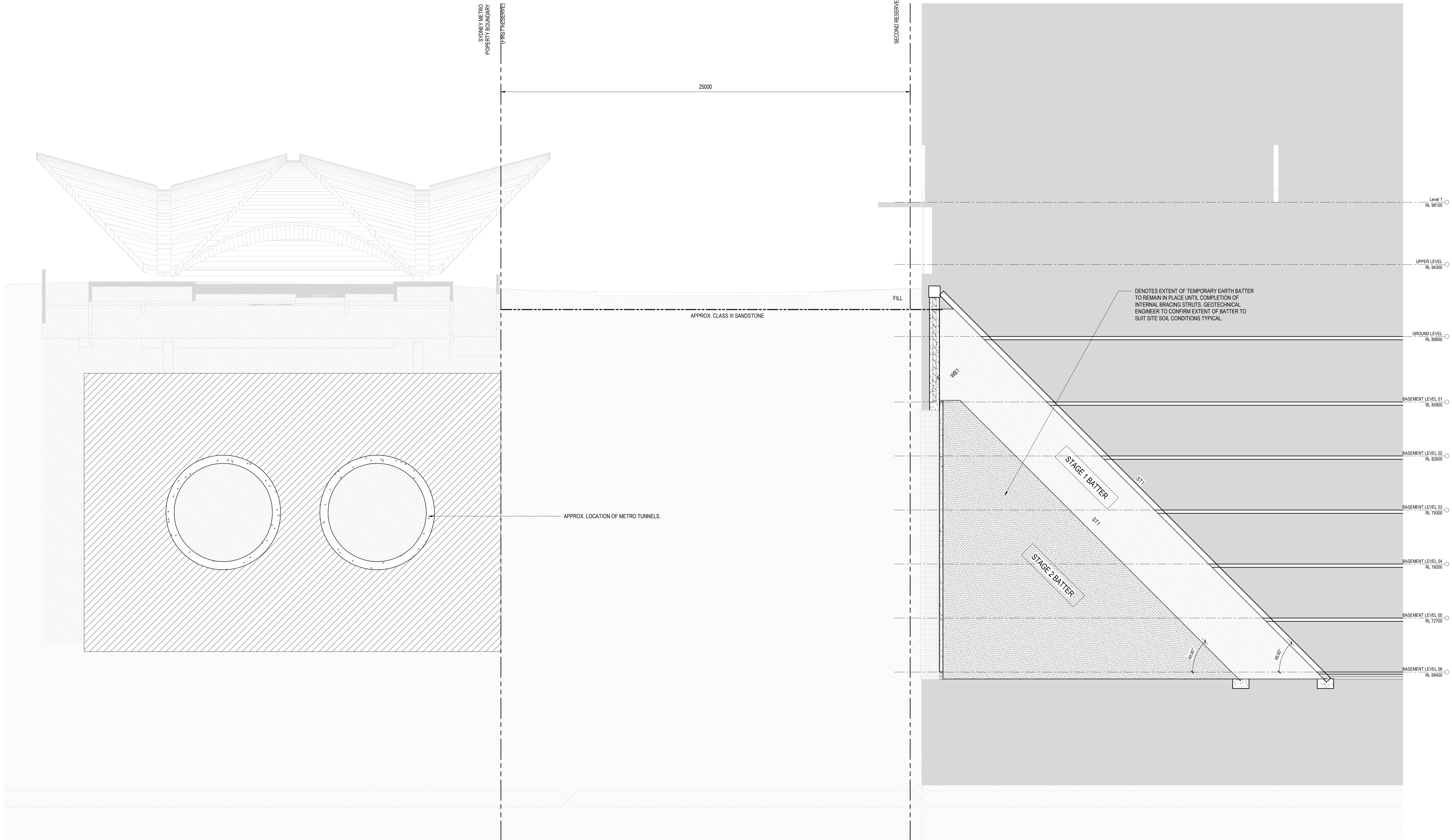
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DESIGNED BY:	RC
DRAWN BY:	AV

DATE:	
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REV:	P5



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SECTION SWS-1
Scale 1:100 S91.105

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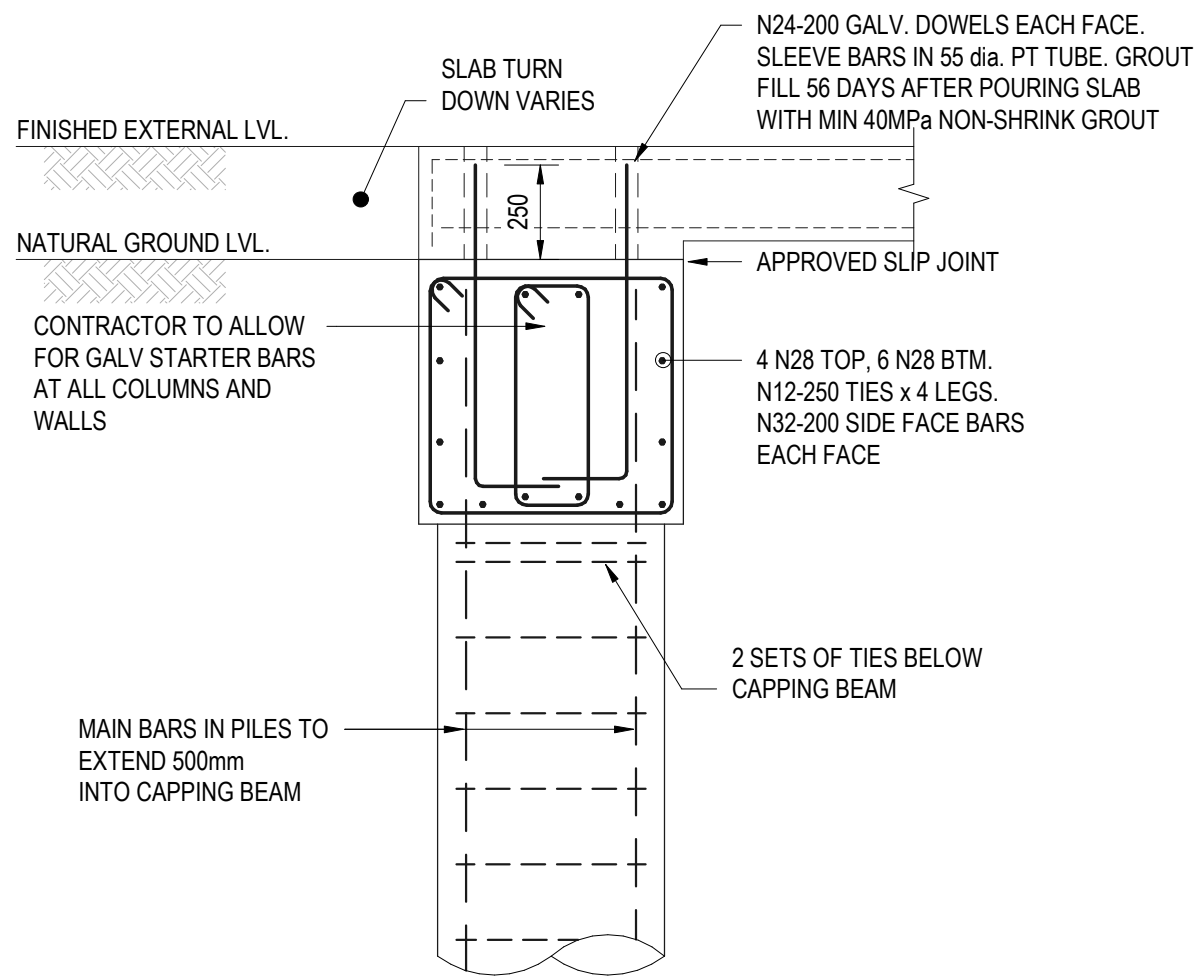
DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

SHORING SECTIONS
SHEET 2

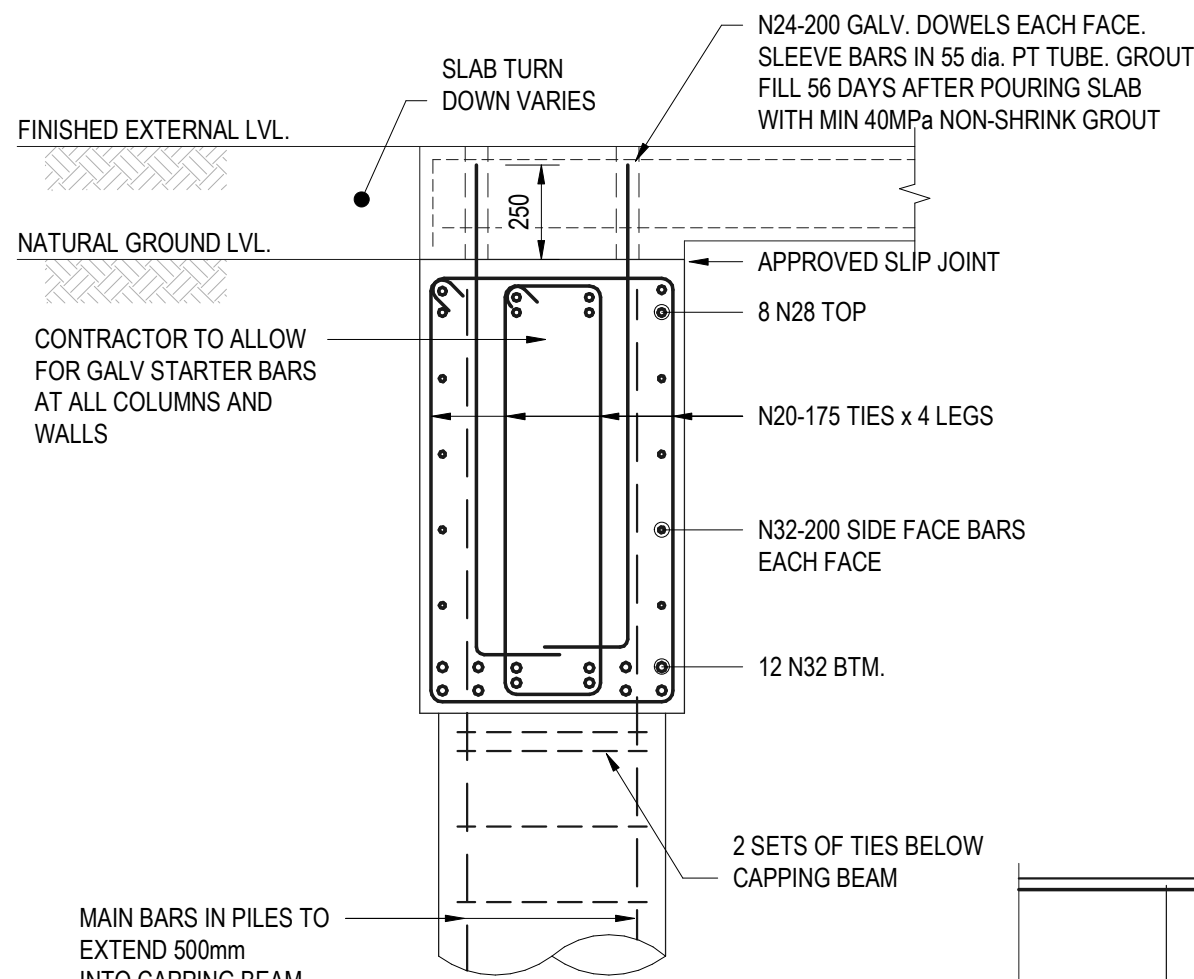
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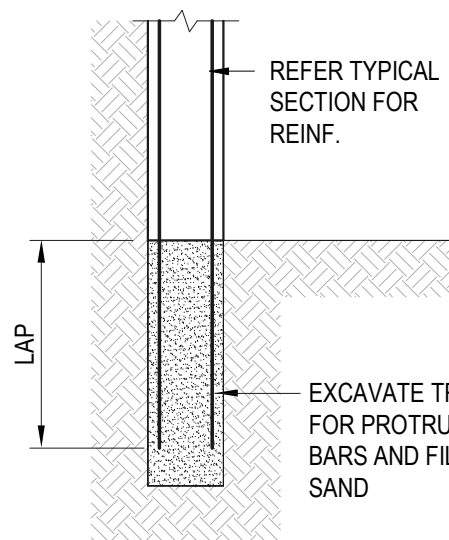
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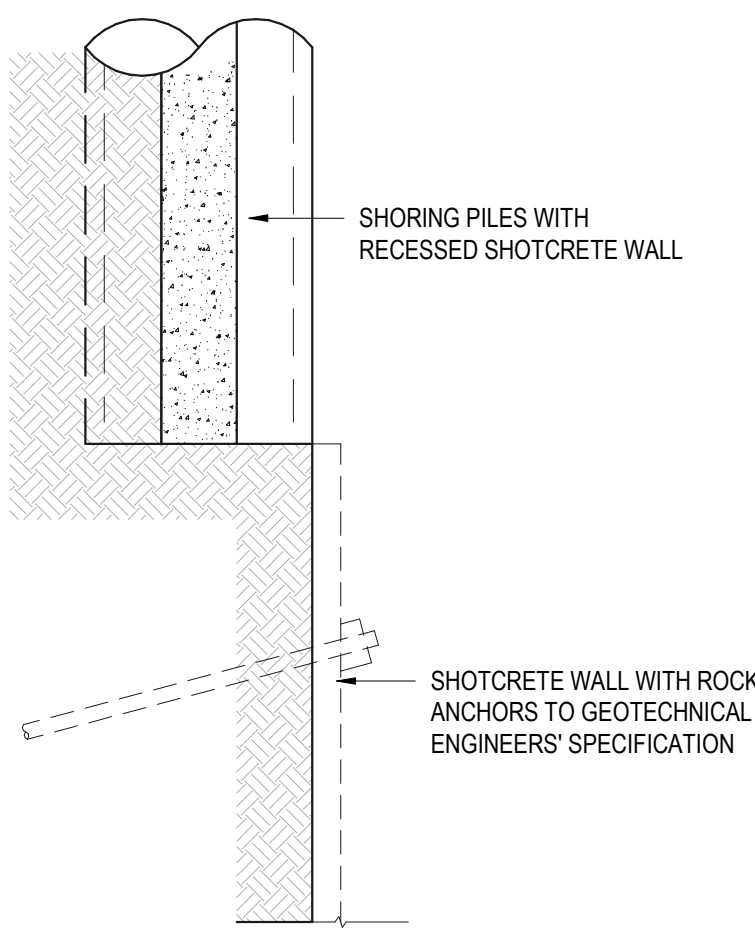
CAPPING BEAM - CB1
NOTE: SHOTCRETE WALL OMITTED FOR CLARITY



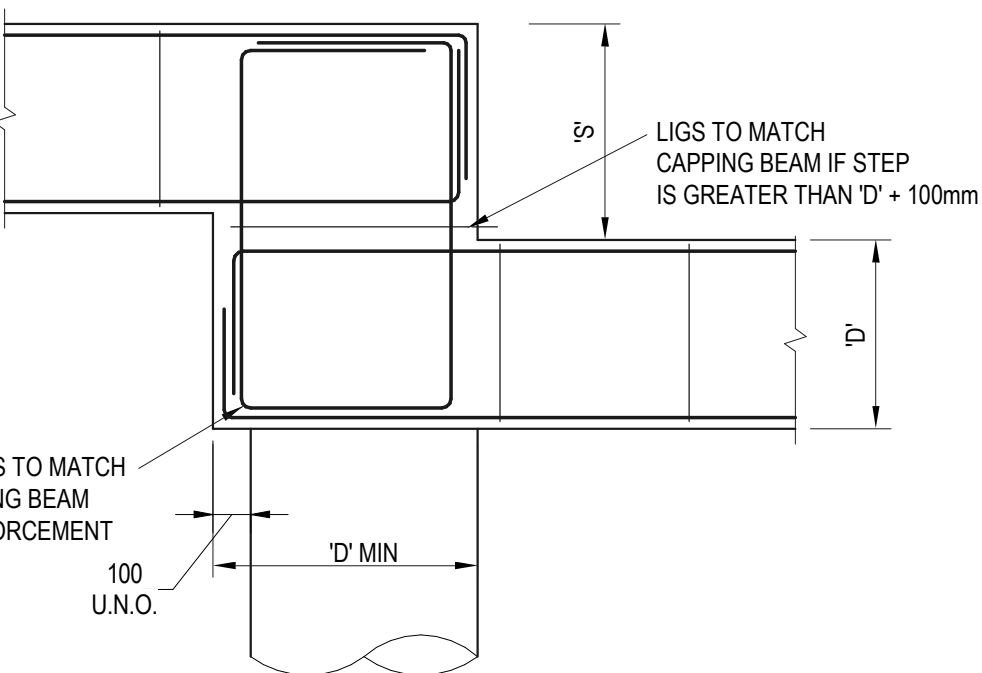
CAPPING BEAM - CB2
NOTE: SHOTCRETE WALL OMITTED FOR CLARITY



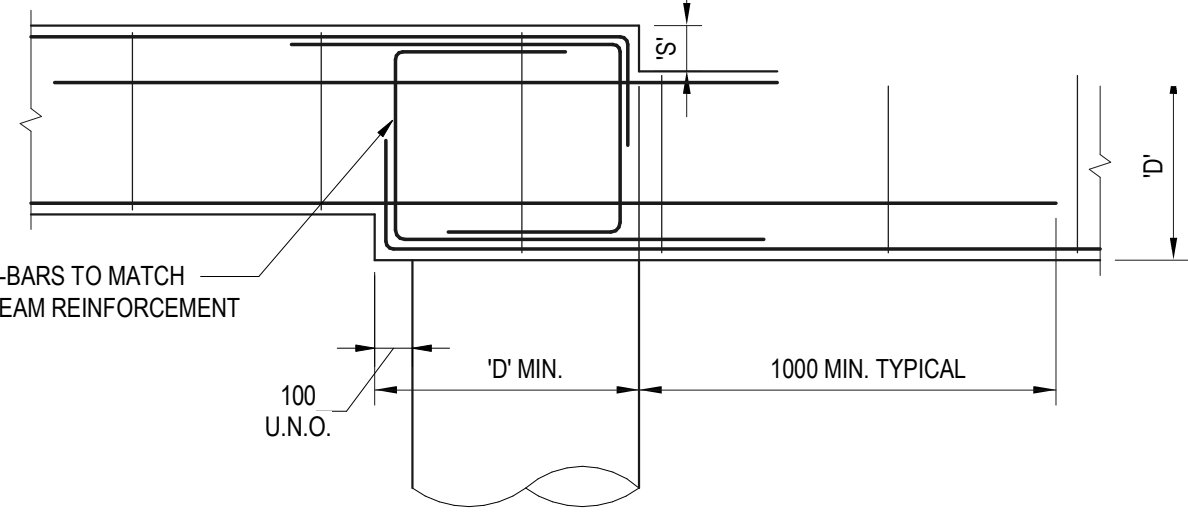
HORIZONTAL SHOTCRETE
CONSTRUCTION JOINT



TYPICAL MID-LEVEL PILE BASE

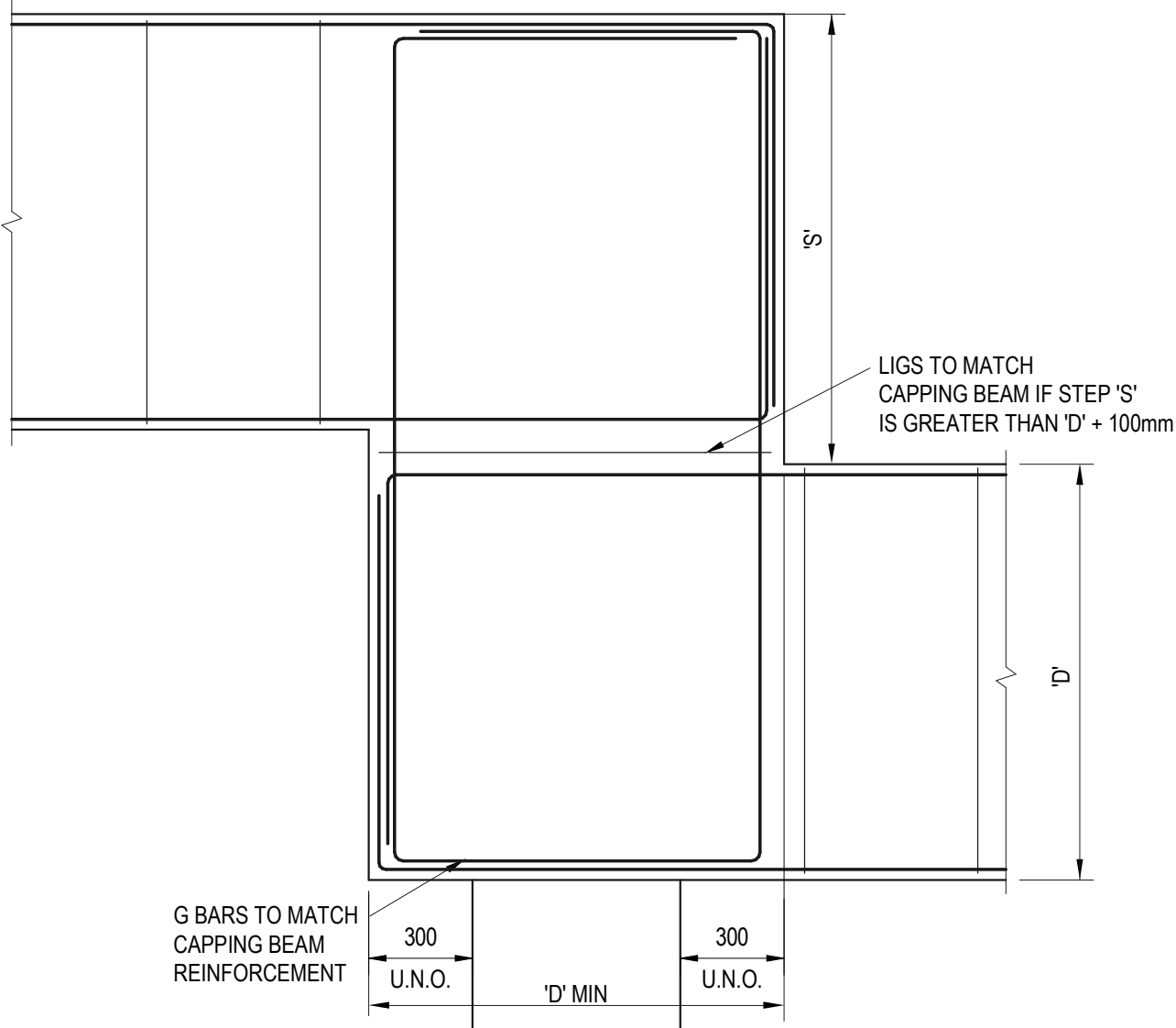


SETDOWN : 'S' = STEP GREATER THAN 'D' + 50mm

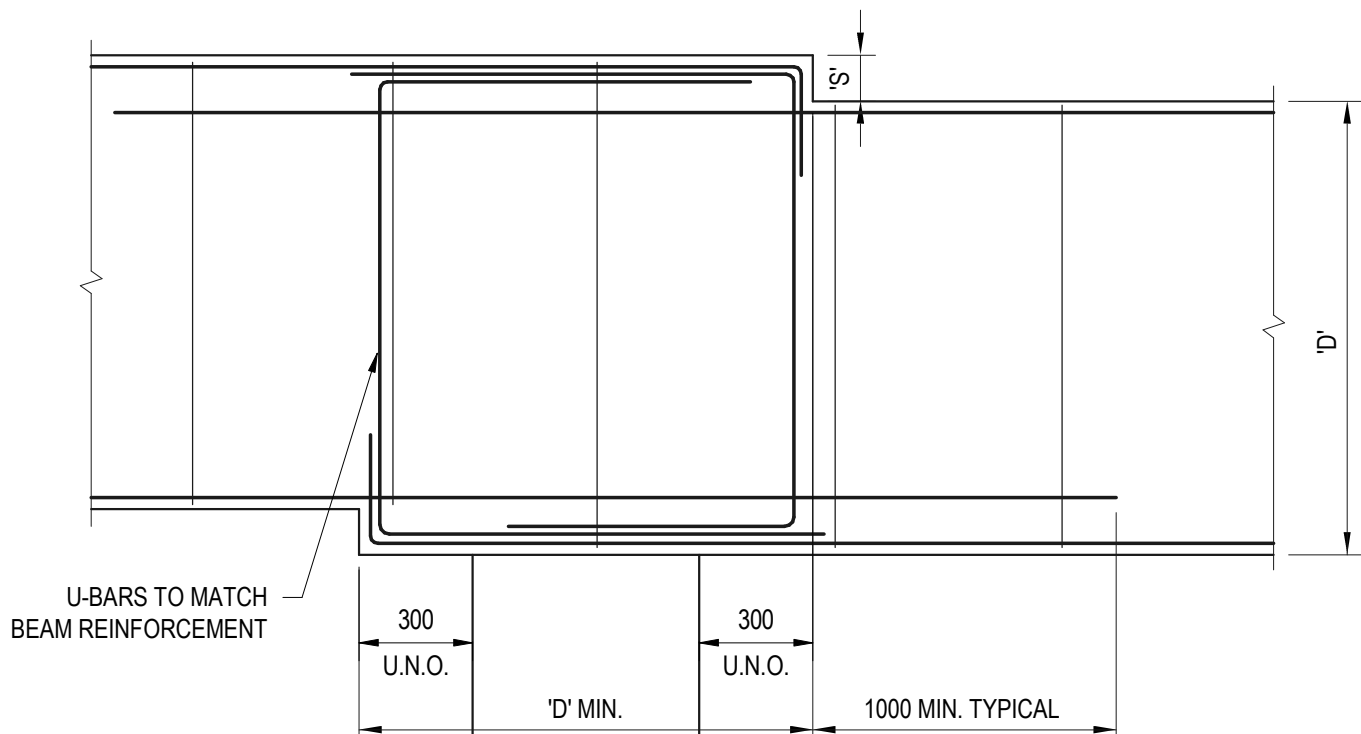


SETDOWN : 'S' = STEP LESS THAN 'D' + 50mm

TYPICAL CAPPING BEAM STEP DETAILS - CB1

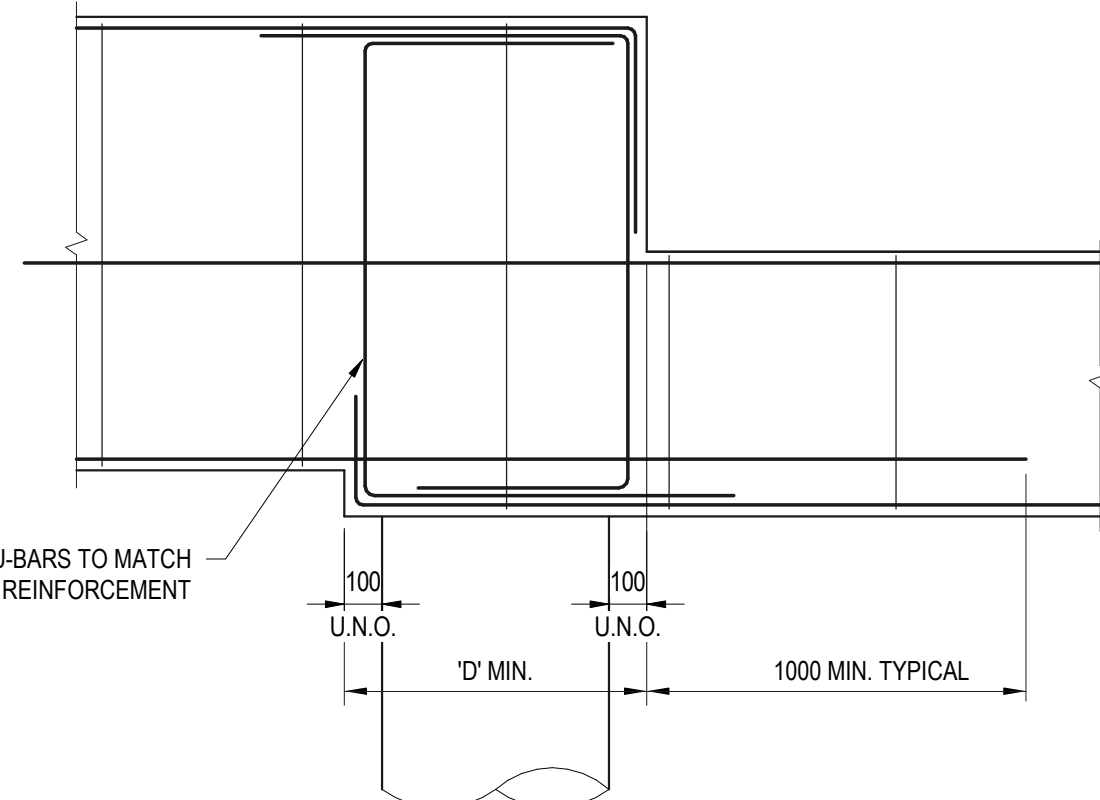


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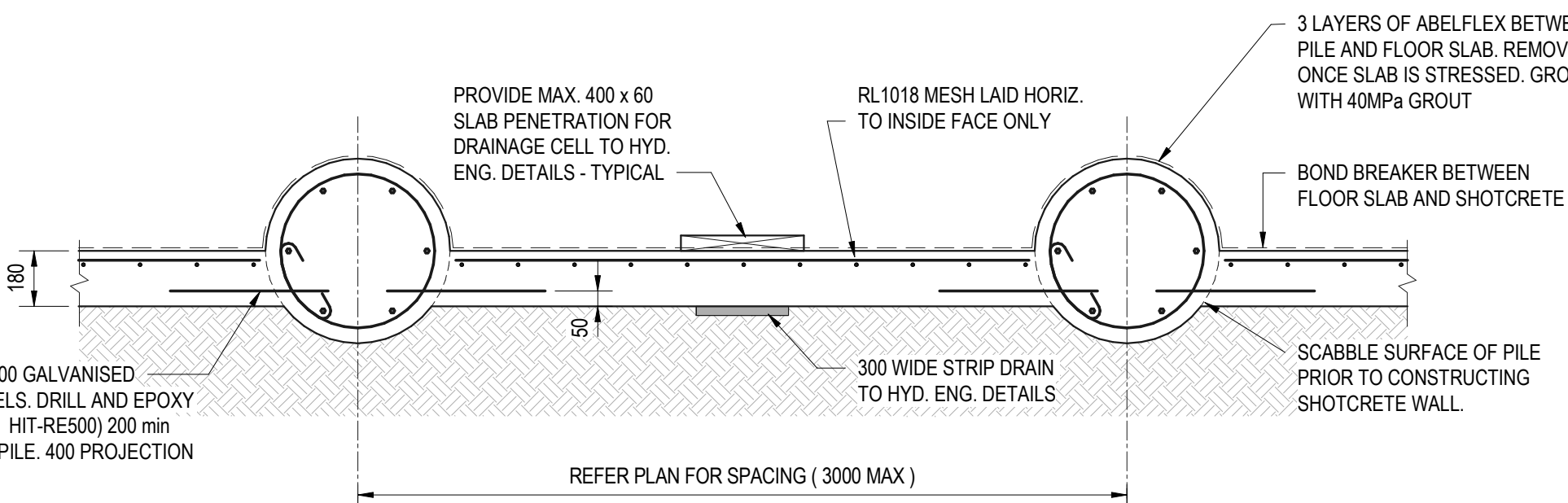


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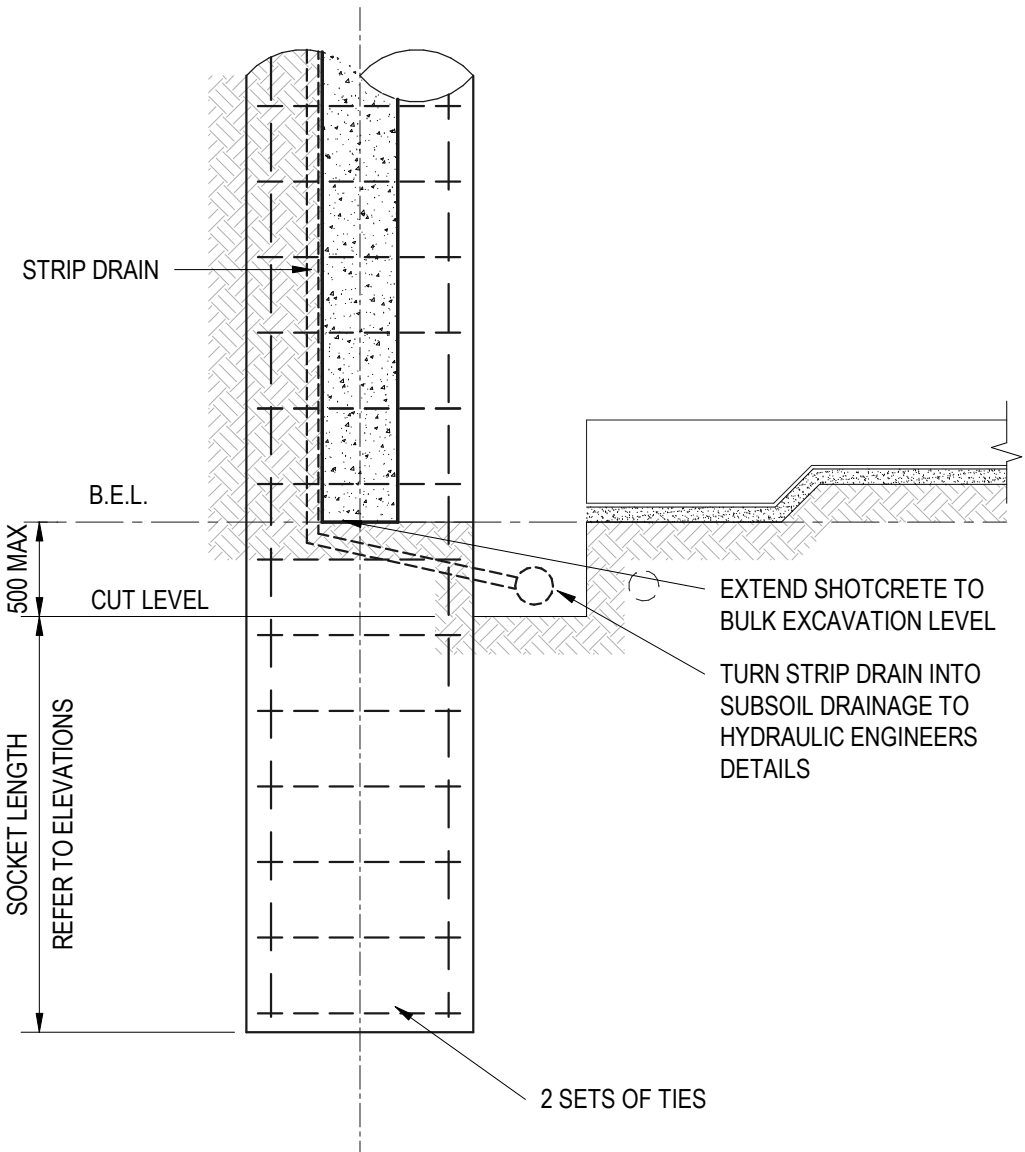
TYPICAL CAPPING BEAM STEP DETAILS - CB2



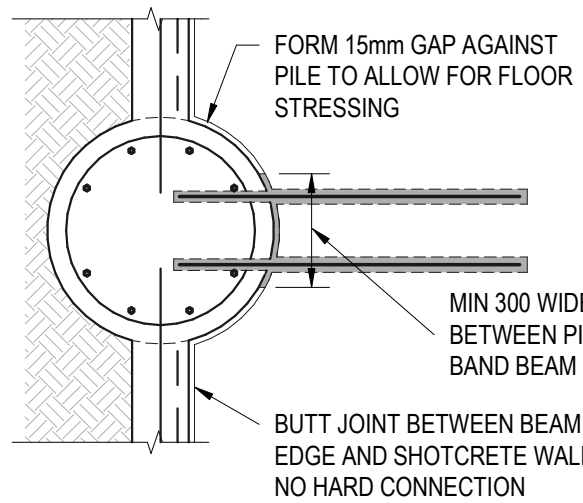
TYPICAL CAPPING BEAM STEP DETAIL - CB1 TO CB2



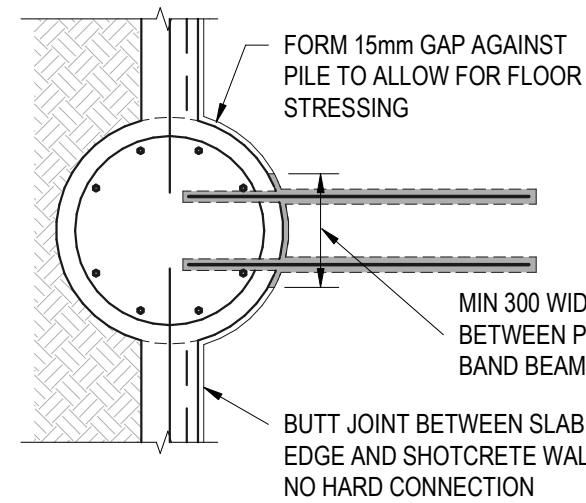
TYPICAL SHORING PILE & 180 THK SHOTCRETE WALL PLAN - 40MPa



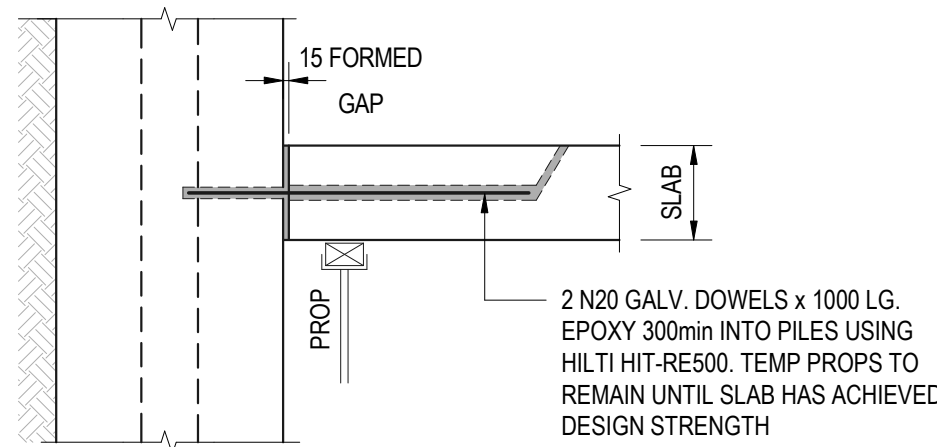
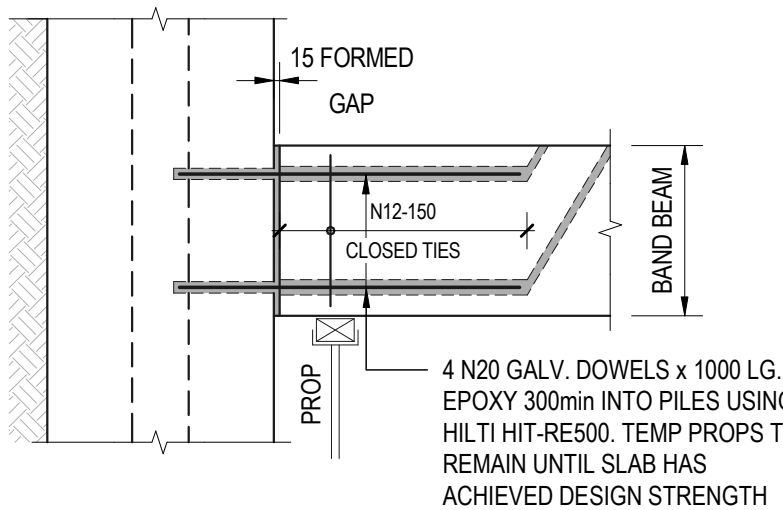
TYPICAL PILE SOCKET



TYPICAL PILE TO BAND BEAM
CONNECTION DETAIL



TYPICAL PILE TO SLAB
CONNECTION DETAIL



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DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

TYPICAL SITE RETENTION DETAILS
SHEET 1

JOB NUMBER: 20025	ORIG. NUMBER: S01.125
DESIGNED BY: RC	DATE:
DRAWN BY: AV	SCALE: 1:20 @ A0

SIZE: A0	REV: P4
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NOTE: ALL EXTERNAL STEEL TO BE HOT DIPPED GALVANISED



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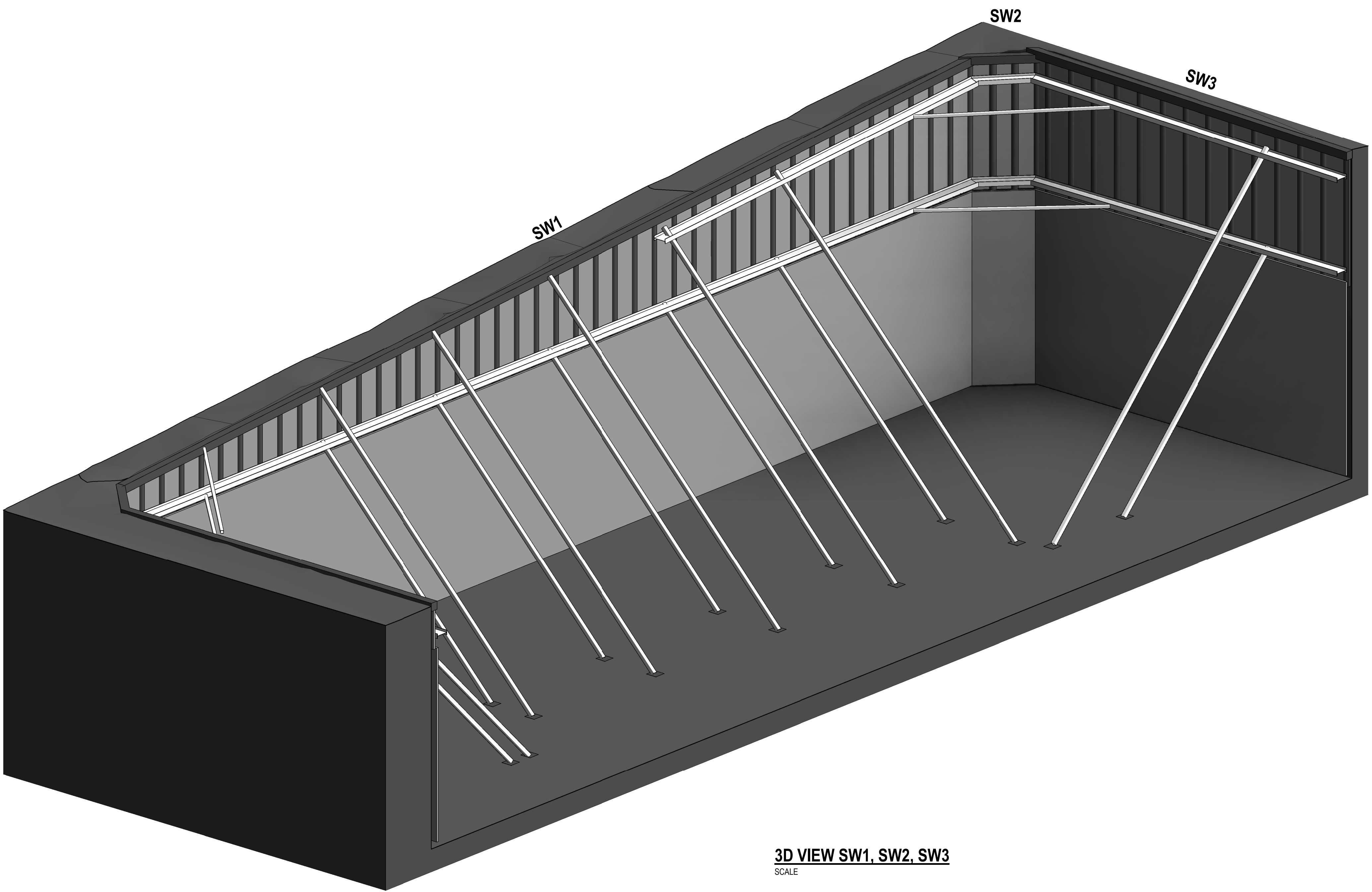
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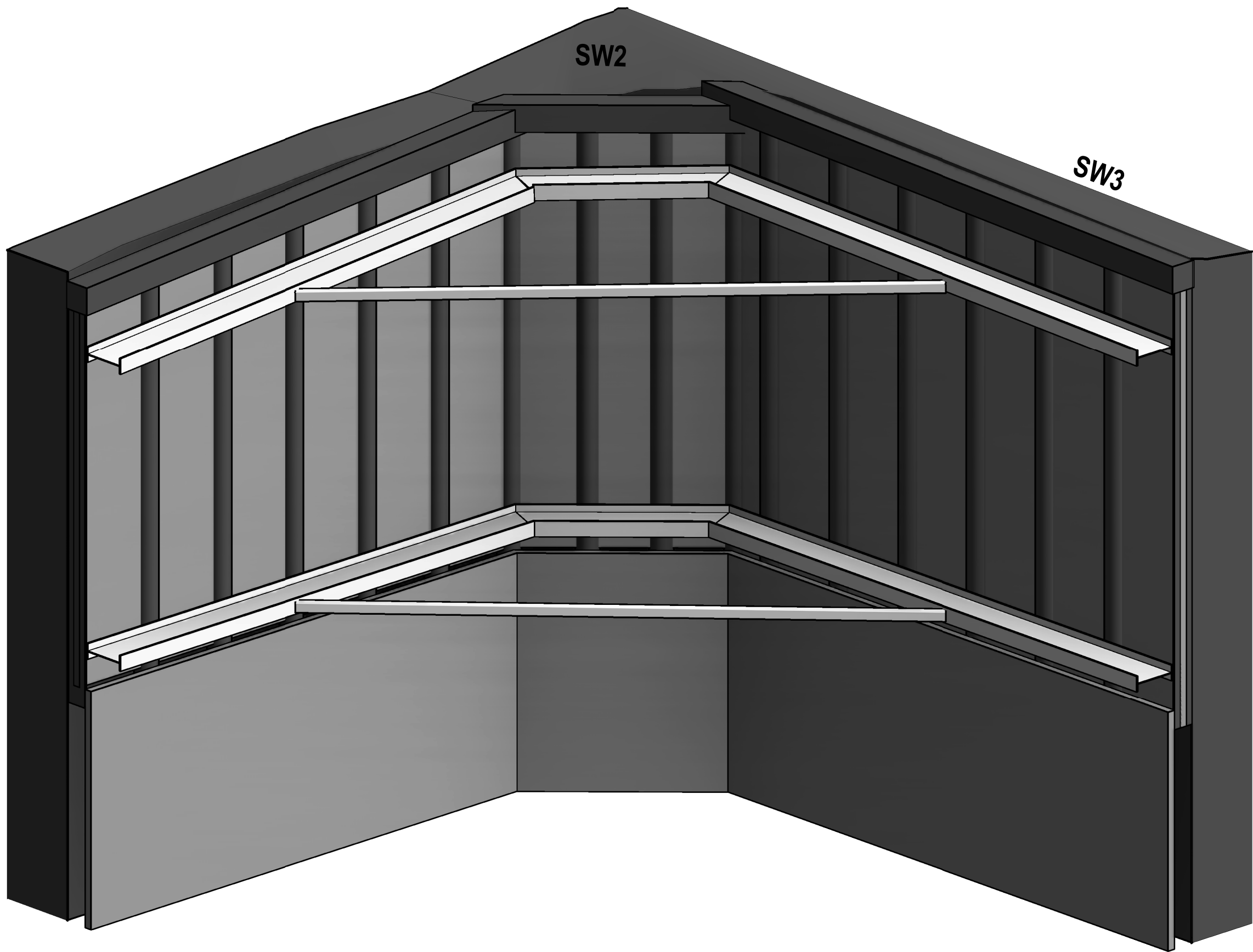
Contact Phone: (02) 9348 9001 Email: info@abc-consultants.com.au Web: www.abc-consultants.com.au	Street Address Suite 2, Level 2 3 Thomas Hill Drive MACQUARIE PARK NSW 2113	Postal Address PO Box 77 NORTH RYDE BC NSW 1570
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**TYPICAL SITE RETENTION DETAILS
SHEET 2**

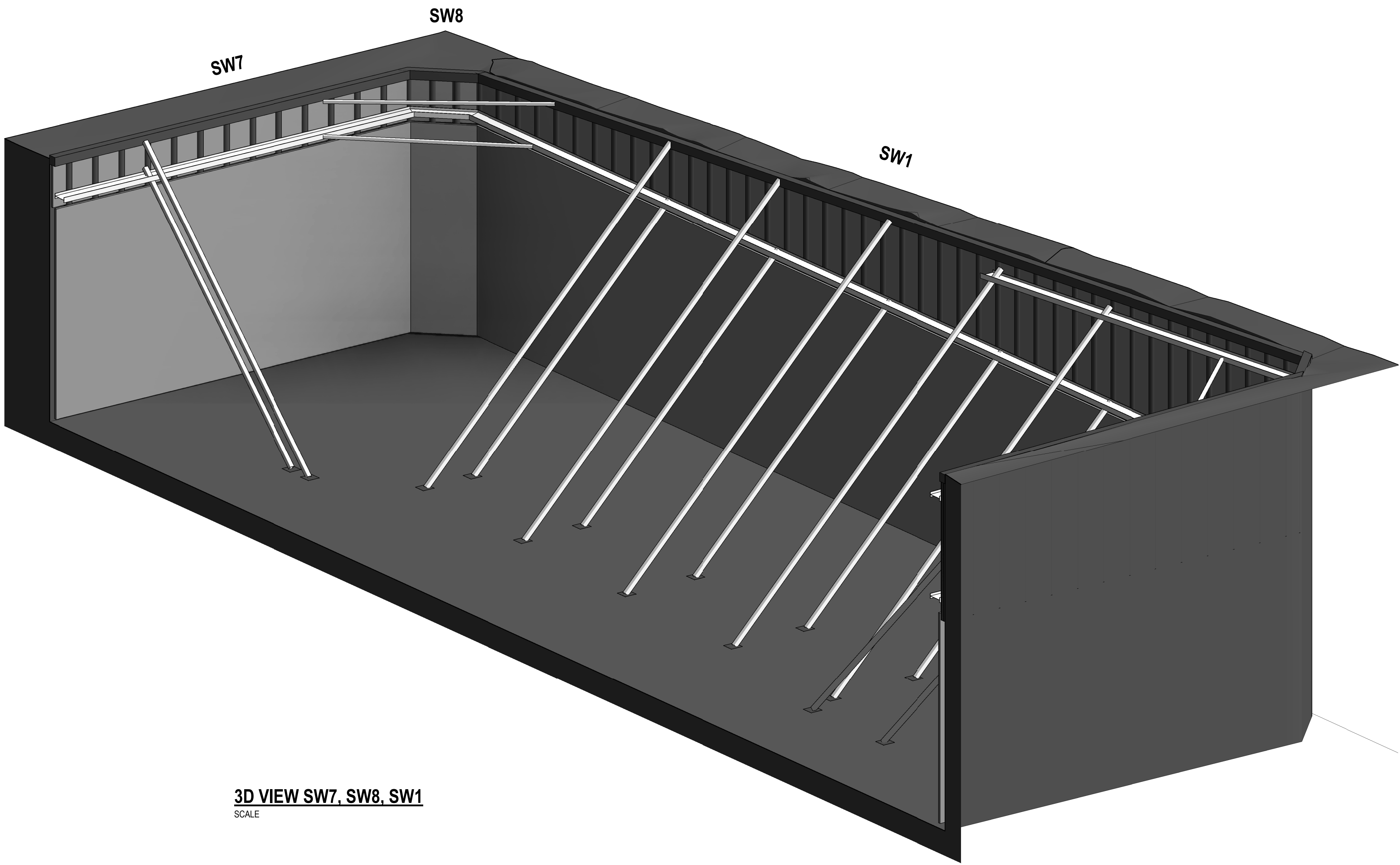
REV: P1



3D VIEW SW1, SW2, SW3
SCALE



3D VIEW SW2 CORNER STRUTS
SCALE



3D VIEW SW7, SW8, SW1
SCALE

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DORAN DRIVE PRECINCT
2 MANDALA PARADE
CASTLE HILL

3D VIEW SW1, SW2, SW3

JOB NUMBER:

20025

DRG NUMBER:

S09.100

DESIGNED BY:

DATE:

DRAWN BY:

SCALE:

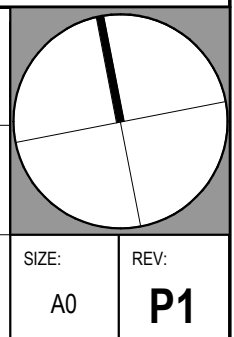
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SIZE:

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REV:

P1



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