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Friday 2nd June 2017
Project Reference: 2001164

DeiCorp Constructions Pty Ltd
Suite 301, Level 3
161 Redfern Street
Redfern NSW 2016

Attention: Mr. Greg Colbran

Dear Greg,

STRUCTURAL REPORT FOR
PEMULWUY DEVELOPMENT, REDFERN

Bonacci Group are the structural engineers for the proposed development known as Pemulwuy located in Redfern and bounded by Lawson St, Eveleigh St, Louis St, Vine St and the railway lines.

The new development is a mixed use development comprising three distinct precincts with the overall development containing a mixture of residential apartments, townhouses, commercial offices, student accommodation and retail facilities.

Each building will be constructed using conventional post tensioned concrete slabs and columns with Precinct One being up to 6 stories in height with a single storey below ground basement carpark level. Precinct Two is 4 stories in height with no below ground basements while Precinct Three is a 21 storey building with no basement levels.

The foundations for each precinct vary slightly to respond to both the underlying geotechnical conditions and also the adjoining railway lines.

The following is a brief description of the proposed foundation and shoring design required for this new development which will be further developed during the detailed design stage prior to construction works commencing which may change some of the systems and advice provided within this report.

For information regarding the effects of these works on the existing rail tracks, the retaining wall to the railway and the embankment stability please refer to the report undertaken by the project geotechnical engineers, SMEC.

Image courtesy of Google Earth

Railcorp Railway Lines:

The main city lines are located immediately adjacent to the site with the typical level of the tracks immediately adjacent to the site being approximately RL23 to 24.0.

All information relating to the existing railway lines has been based on the drawings received from Railcorp which are as follows:

Set-out / track centreline	4SS 1004 + adjoining 3SS1003 and 5IR1004
Track grade	SS1508 (Down) and SS1509 (Up)

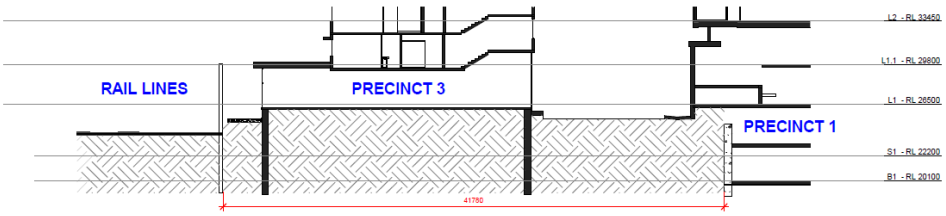
There were no available drawings relating to the construction of the engine drive tunnel. As a result no comments relating to the capacity of the existing rail tunnel is contained within this report.

Geotechnical Conditions:

The geotechnical investigation has been completed by STS Testing Services (previously SMEC Testing) and the report describes the ground conditions, the geotechnical issues associated with excavation and the groundwater issues. Refer to STS's report for a more detailed description of the geotechnical condition across the site.

Precinct One:

Precinct One contains one level of underground carpark which steps to follow the nature ground fall along Eveleigh St and hence the basement RL steps from RL20.1 down to RL16.8 along the length of the development. As a result the foundations for this building will be founded in the hard shale located close to the surface and will use a combination of strip and pad footings to support the applied loads from the maximum 6 storey and typically 2 storey buildings that form Precinct One.



The foundations for this Precinct are located a minimum horizontal distance of 29.5m from the rail boundary and extend to over 45m from boundary. Due to the footings being located a minimum of 4m and up to 8m below the level of the track level then as advised by the project geotechnical engineers SMEC then no loads will be applied to the Railcorp boundary.

The single level basement excavation will use a combination of concrete soldier piles with a sprayed shotcrete infill wall that is anchored in the temporary condition restrained by the building structure in the permanent condition. Where possible a temporary battered solution may also be adopted with the ground battered in the temporary condition and then backfilled against the permanent retaining walls of the building.

The temporary shoring system is in accordance with the recommendations of the project geotechnical engineer and is a common site retention system in Sydney. Along the Eveleigh St frontage closest to the rail boundary, these soldier piles will be founded a minimum of 1m below the bulk excavation level with a toe RL of approx RL 18.5 to 15.0.

The proposed excavation sequence would be:

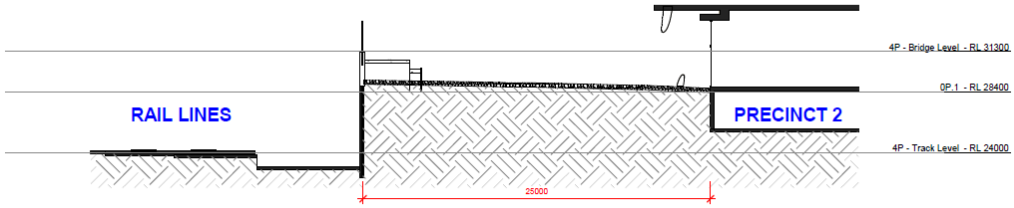
- Drill 600mm diameter holes to set out and depth shown on plans, elevations and sections. All sockets are to be dewatered if necessary and specific holes/sockets

will require an inspection from the geotechnical engineer to verify that the foundation conditions comply with the design assumptions.

- Place reinforcement in bored holes and place concrete in holes up to the underside of the capping beam.
- Excavate against the boundary to a maximum of 500mm below the top level of anchors installing the reinforced concrete shotcrete wall as excavation progresses. Drill, install and stress anchors. Repeat for each level of anchors.
- Once construction of the permanent podium structure has been completed and a minimum of 2 months after completion of podium, all ground anchors are to be distressed and have their anchor heads removed.

Precinct Two:

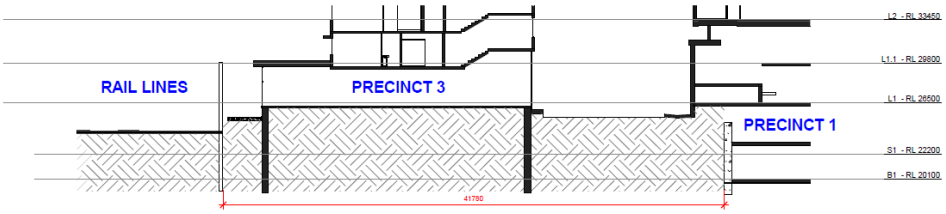
Precinct Two contains 4 levels of above ground structure and there is no basement located beneath this Precinct. The ground floor will be located at RL25.725. The foundations for this building will be a piled solution to transfer the loads to the underlying hard shale with the piles expected to be founded at approximately RL18.



This Precinct is located a minimum of 14.1m from the Railcorp boundary and with the piles founded at RL18 which is 6m below the level of the railway tracks which are located at approximately RL24.0. As a result the project geotechnical engineers SMEC have advised that no loads will be applied from this building to the Railcorp boundary.

Precinct Three:

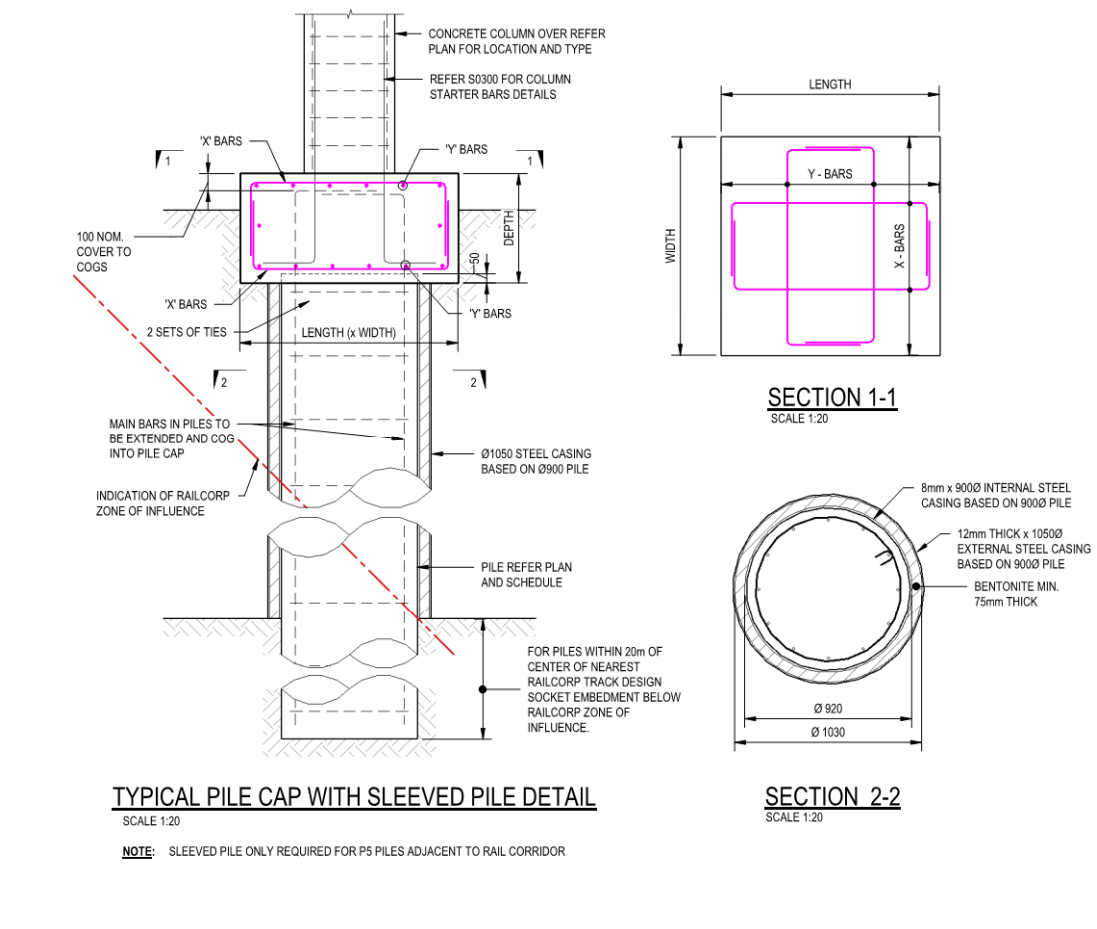
Precinct Three contains up of 21 levels of above ground structure and also has a stepping ground floor to match the existing ground levels along Eveleigh St, there is no basement beneath this Precinct. The foundations for this building will be a piled solution to transfer the applied building loads to the underlying hard shale with the ground floor located at between RL23.45 and 28.2.



This Precinct is located immediately adjacent to the Railcorp boundary with the building at the minimum distance being 1m from the railway boundary and as a result the buildings foundations will be founded beneath the level of the railway tracks. Hence these piles will vary in depth depending on their distance to the boundary but immediately adjacent to the boundary they will be founded below approximately RL17.

All piles within the zone of influence from the Railcorp boundary will be founded beneath the final basement level and embedded a sufficient distance to develop the cantilever capacity of the piles. These piles will be sleeved while within the zone of influence of the Railcorp infrastructure so as not to apply friction induced loads onto the rail infrastructure. This sleeving will also ensure that no lateral loading from the building is applied to the rail infrastructure.

The pile sleeving will have two linings, a permanent outer non load bearing lining and a permanent inner form lining with the annulus between the two linings to the filled with a suitable compressible material such as bentonite. The detail of the pile sleeving will be similar to the following:



Using this system, the project geotechnical engineers SMEC have advised that all vertical and lateral loads applied by the building will then be transferred via the piled foundation to the rock founded beneath the zone of influence of the railcorp boundary.

Existing Retaining Wall along Railcorp Boundary:

Currently there is a large retaining wall that supports the existing ground level along the Railcorp boundary which is up to 7m above the track level and extends from the Lawson St bridge to past the extent of the Pemulwuy project.

A number of test pits undertaken by DeiCorp Constructions along the length of the retaining wall (Refer Appendix D) show that there are actually two retaining walls present along this boundary. The original brick retaining wall that extends from track level and was assumed to be constructed in the 1920's when the majority of works occurred in this area and appears to comprise a mass brick retaining structure that uses gravity to retain the earth. The second wall is of newer construction and consists of a block retaining wall with concrete footing that is sitting on the existing retaining wall and primarily acts as a barrier to prevent access to the Rail property.

The heritage report undertaken by NBRS+Partners states the following:

- The railway corridor retaining wall, constructed in English bond brickwork is a standard detail of brick wall construction undertaken as part of railway stations designed at the turn of the century by the New South Wales Railways.

This heritage report also identifies that during the 20th century there was two storey brick terrace houses present along the full length of Eveleigh St from close to Lawson St down to Vine St.

This indicates that the while the current site conditions present have no buildings along Eveleigh St near Lawson St and simply a grassed area that is often used for carparking, for a significant period of time, the retaining wall was required to support the weight of 2 storey brick terrace houses.

As previously discussed the Precinct Three building will have its vertical and horizontal loads transferred to below this retaining wall. Hence the final condition will not change

from the current situation on site except that the current buildings on the site will be demolished and depending on the depth of their foundations this may reduce the loads currently applied to this retaining wall.

Pile Design:

The foundation piles have been designed in accordance with the requirements of the following Geotechnical Report and Australian Standards:

- AS2159 – 2009 "Piling – Design and Installation
- AS3600 – 2009 "Concrete Structures"
- AS1170.0 – 2002 "Structural Design Actions Part 0: General Principles"
- Geotechnical Report by SMEC Testing Services Pty Ltd

The piling design has been prepared based on the contractor implementing a high level of quality control and supervision to ensure and certify that all requirements of this design report are achieved. The contractor will need to ensure that a minimum 90% base cleanliness is achieved at the base of the piles. The contractor shall ensure the proposed piling system is appropriate for the site conditions and that the proposed plan and tooling is capable of installing the piles in accordance with the requirements of this report.

Detailed information and calculations for the foundation pile design can be found in the attached Appendices.

Design Methodology

The design of the piled foundations has been based on reinforced concrete bored piles founding in the Class V Shale or better. The foundation piles have been designed as single piles for each load point. (Refer to Appendix B for the pile design summary).

The piles have been designed as end bearing in the Class V Shale with the top of the socket starting below the zone of influence of the Railcorp Boundary (taken as 45 degrees from the track level).

In accordance with AS2159-2009 Clause 4.3.2, the Average Risk Rating (ARR) for this project has been assessed to be 2.38, which is in the low category. For low-redundancy foundation system, a basic geotechnical strength reduction factor (ϕ_{gb}) = 0.56 is applicable, as shown in the Appendices.

A concrete placement factor, *k*, of 1.0 has been adopted for the piles for this project, based on AS2159-2009 Table 5.3.2 and the following:

- Successful use of specified construction methods in similar ground conditions
- 10% of the total number of piles will require integrity testing

Structural Capacity

The structural capacity of the piles has been assessed in accordance with AS2159-2009 "Piling – Design and Installation" and AS3600-2009 "Concrete Structures". The structural capacity analysis has been carried out using COLDES design software. Refer to the Appendices for typical COLDES interaction charts.

Pile Testing

AS2159-2009 Clause 8.2.4 specifies the minimum requirements for pile testing. In accordance with clause 8.2.4 (c) (i) there is no requirement to carry out any load testing of the piles, as the Average risk Rating has been determined as than 2.50 and the testing benefit factor has not been used.

AS2159-2009 Table 8.2.4 (B) specifies a 5-15% integrity testing requirement for CFA and bored piles with the design load governed by the geotechnical capacity. Therefore, integrity testing is to be carried on at least 10% of all piles for this project.

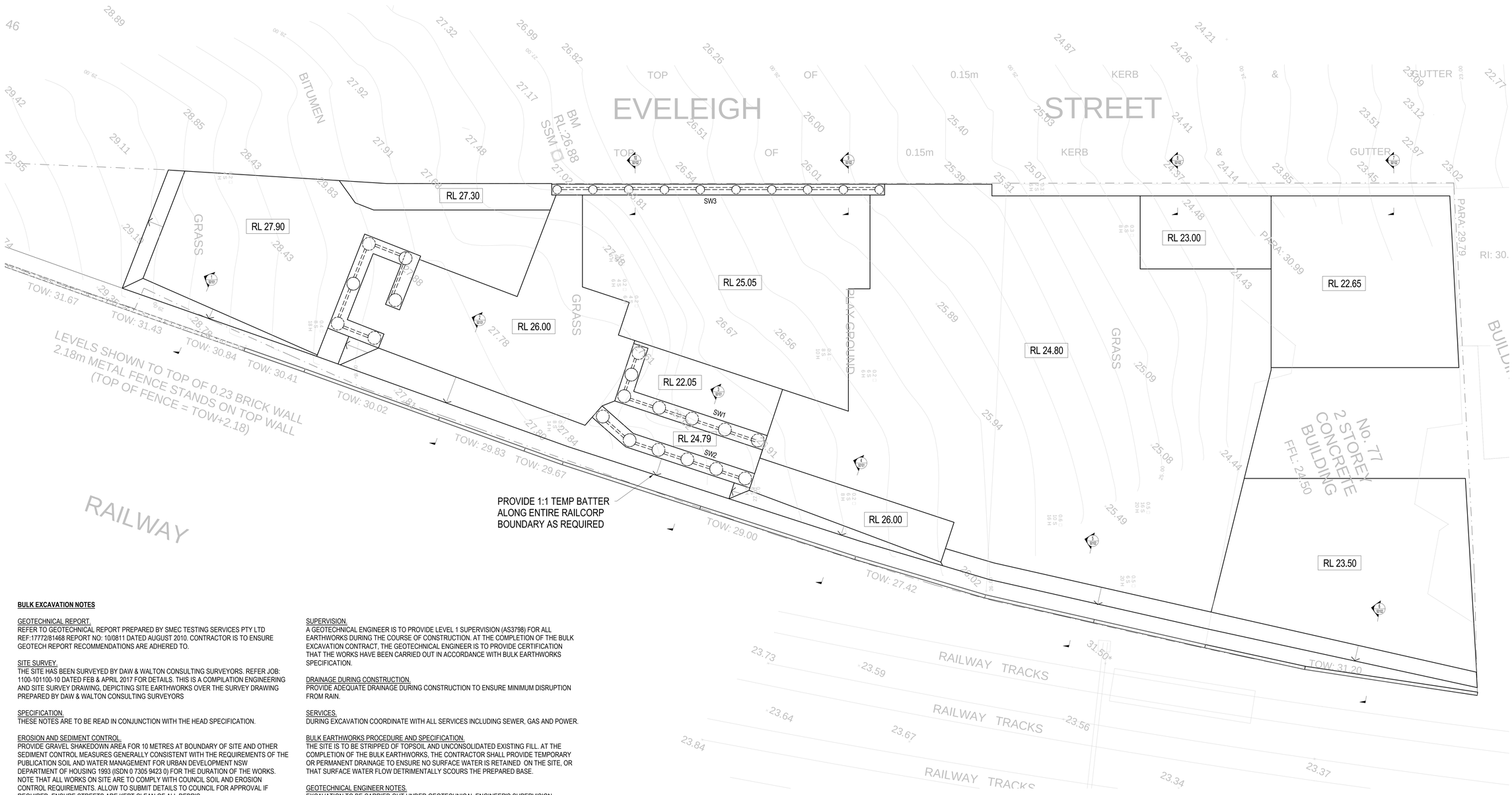
Further information regarding foundation pile design can be found in the attached Appendices.

For further information regarding the impacts of the excavation and future development on the existing railway lines and retaining walls, please refer to the report undertaken by SMEC.

Yours faithfully,
BONACCI GROUP

Ryan Campbell BE (Hons) BSc MEngSc RPEQ FIEAust MAICD MIABSE CPEng NER
Director

Appendix A
Bonacci Group Drawings



BULK EXCAVATION NOTES

GEOTECHNICAL REPORT.
REFER TO GEOTECHNICAL REPORT PREPARED BY SMEC TESTING SERVICES PTY LTD REF:17772/81468 REPORT NO: 10/0811 DATED AUGUST 2010. CONTRACTOR IS TO ENSURE GEOTECH REPORT RECOMMENDATIONS ARE ADHERED TO.

SITE SURVEY.
THE SITE HAS BEEN SURVEYED BY DAW & WALTON CONSULTING SURVEYORS. REFER JOB: 1100-101100-10 DATED FEB & APRIL 2017 FOR DETAILS. THIS IS A COMPILATION ENGINEERING AND SITE SURVEY DRAWING, DEPICTING SITE EARTHWORKS OVER THE SURVEY DRAWING PREPARED BY DAW & WALTON CONSULTING SURVEYORS

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 (ISDN 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 SYDNEY CITY COUNCIL. IT IS THE CONTRACTORS' 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 LEVEL 1 SUPERVISION (AS3798) 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 ENGINEER'S SUPERVISION. GEOTECHNICAL ENGINEER (GE) TO COMMENT ON SUITABILITY OF THE SUBCONTRACTOR'S 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.

DETAIL EXCAVATION NOTES

1. EXCAVATION LEVELS (E.L.) SHOWN ON THIS DRAWING ARE CALCULATED TO THE SOFFITS OF ALL STRUCTURAL FOUNDATIONS, BASES AND PITS. THEY DO NOT ALLOW FOR ANY NECESSARY BLINDING LAYER BELOW THE CONCRETE .
2. ADDITIONAL LOCAL EXCAVATION FOR SUBSOIL DRAINAGE SHALL BE TO HYDRAULIC ENGINEERS DETAILS.
3. B.E.L. DENOTE BULK EXCAVATION LEVEL
4. STORM WATER PITS TO FUTURE COORDINATION WITH HYDRAULIC ENGINEER
5. ALLOW FOR TEMPORARY BATTERS TO ACHIEVE ALL BULK EXCAVATION LEVELS AND STABILIZE TO GEOTECHNICAL ENGINEERS DETAILS

PRELIMINARY

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	02.06.17	PD	-

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Project Name: PEMULWUY PRECINCT 3
83-123 EVELEIGH ST
REDFERN, NSW, 2016

Drawing Title: BULK EX AND
SHORING PLAN

PRELIMINARY

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Project Director Approved Date North

Project Ref. 202188601 | Drawing No. S0100 | Rev P1

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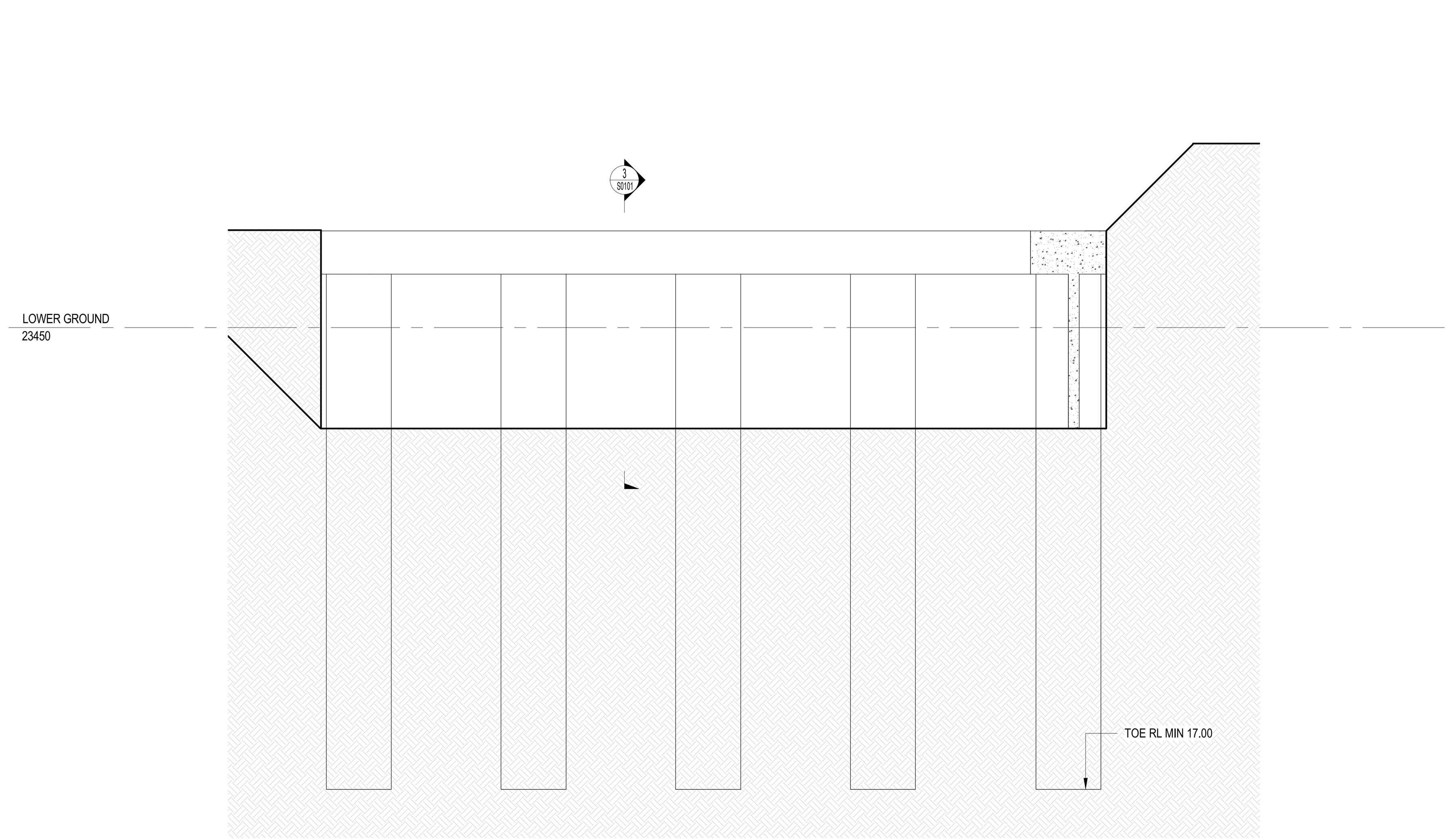

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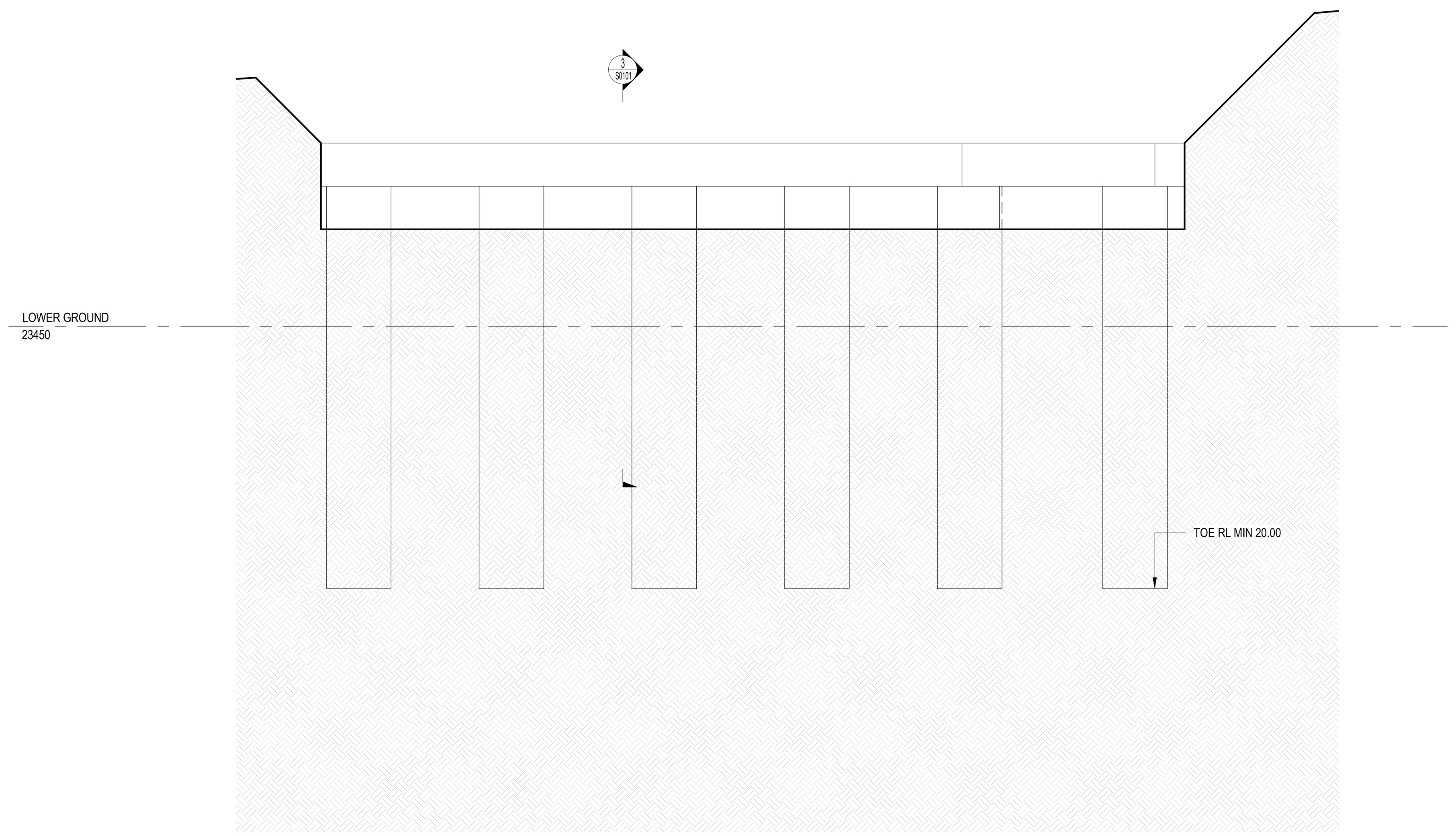

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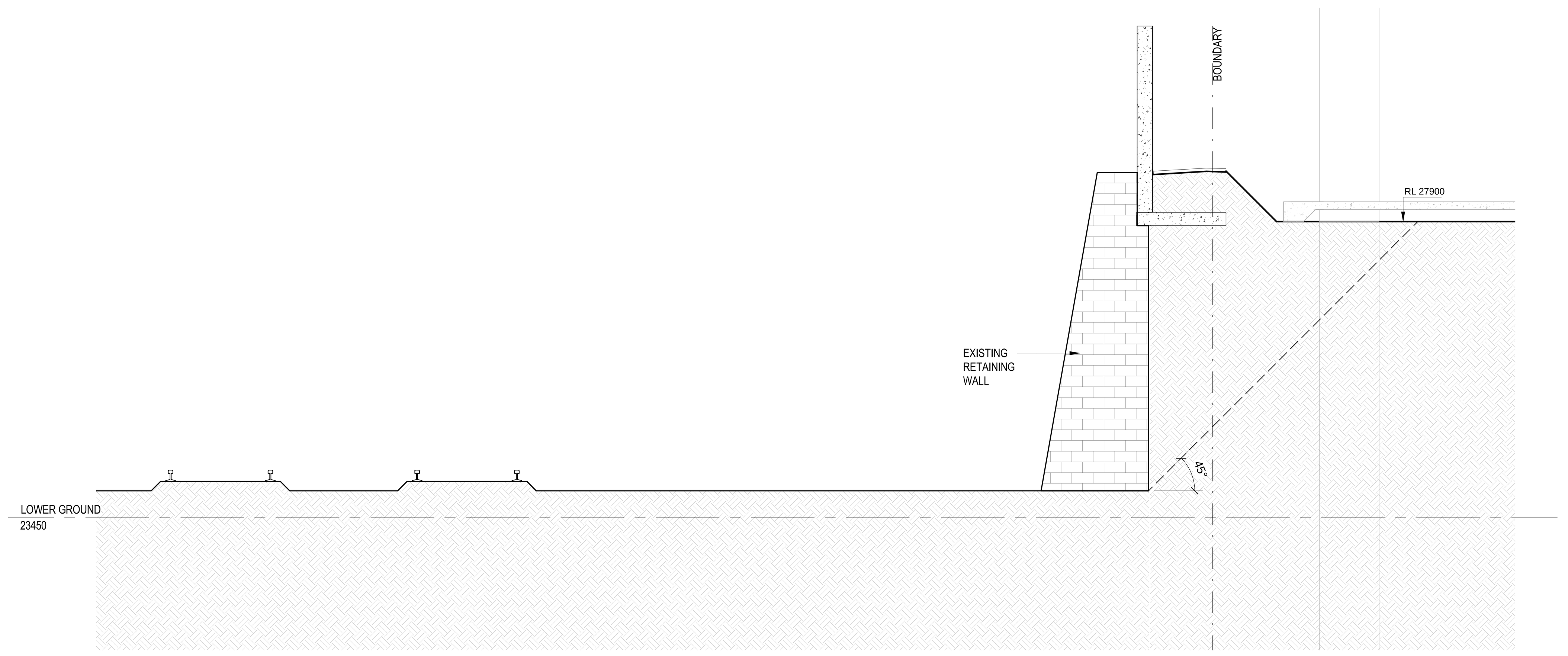

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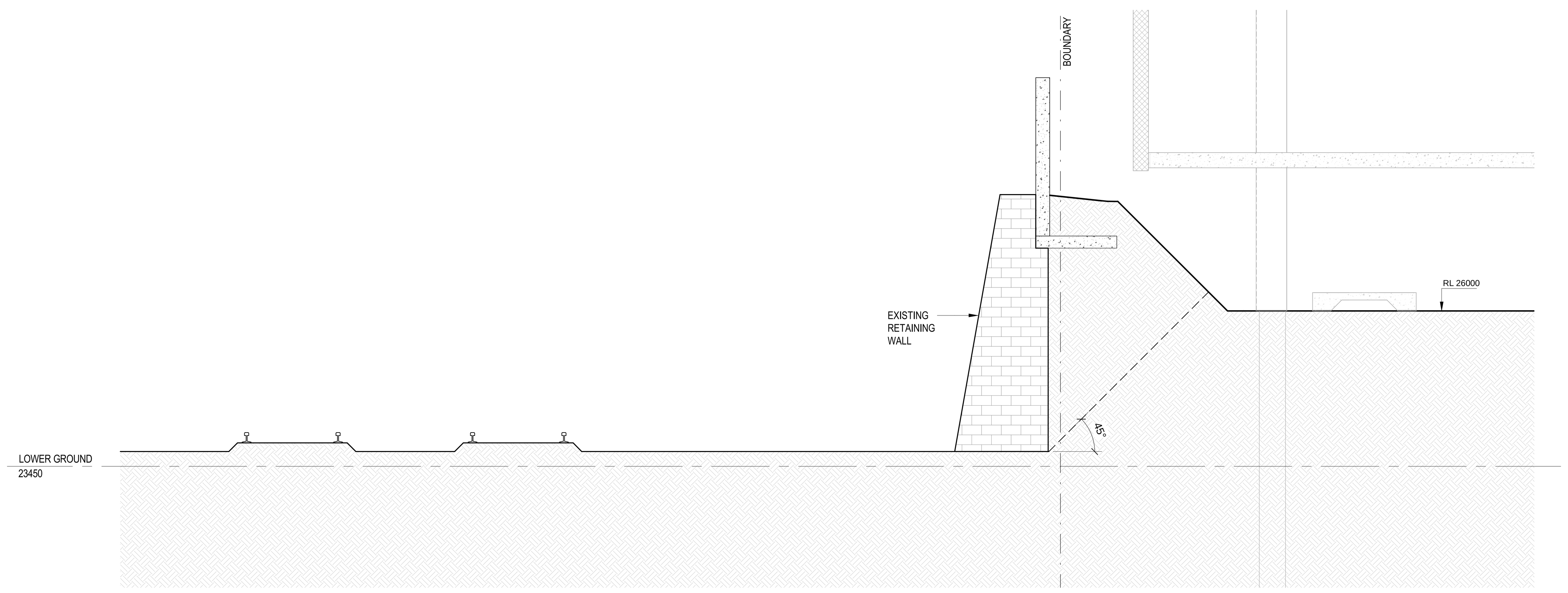

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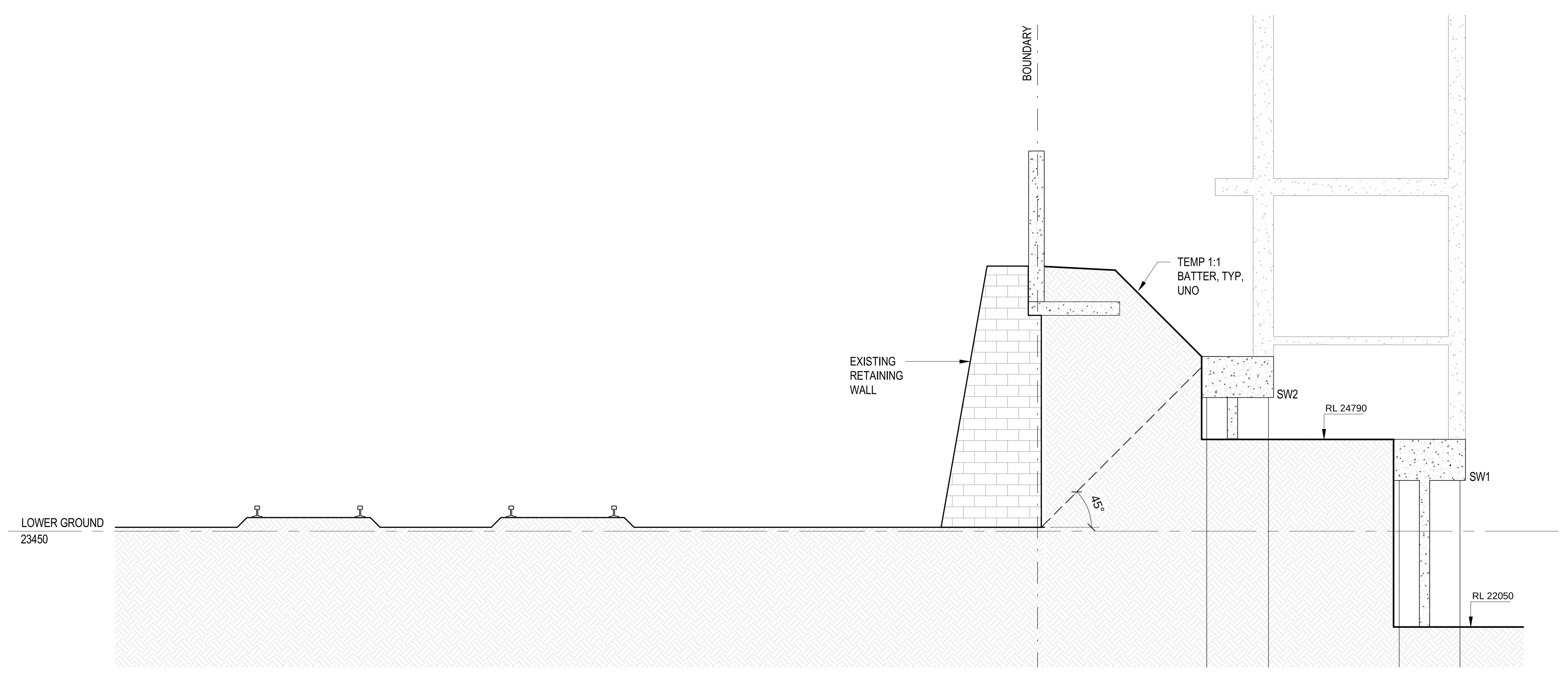

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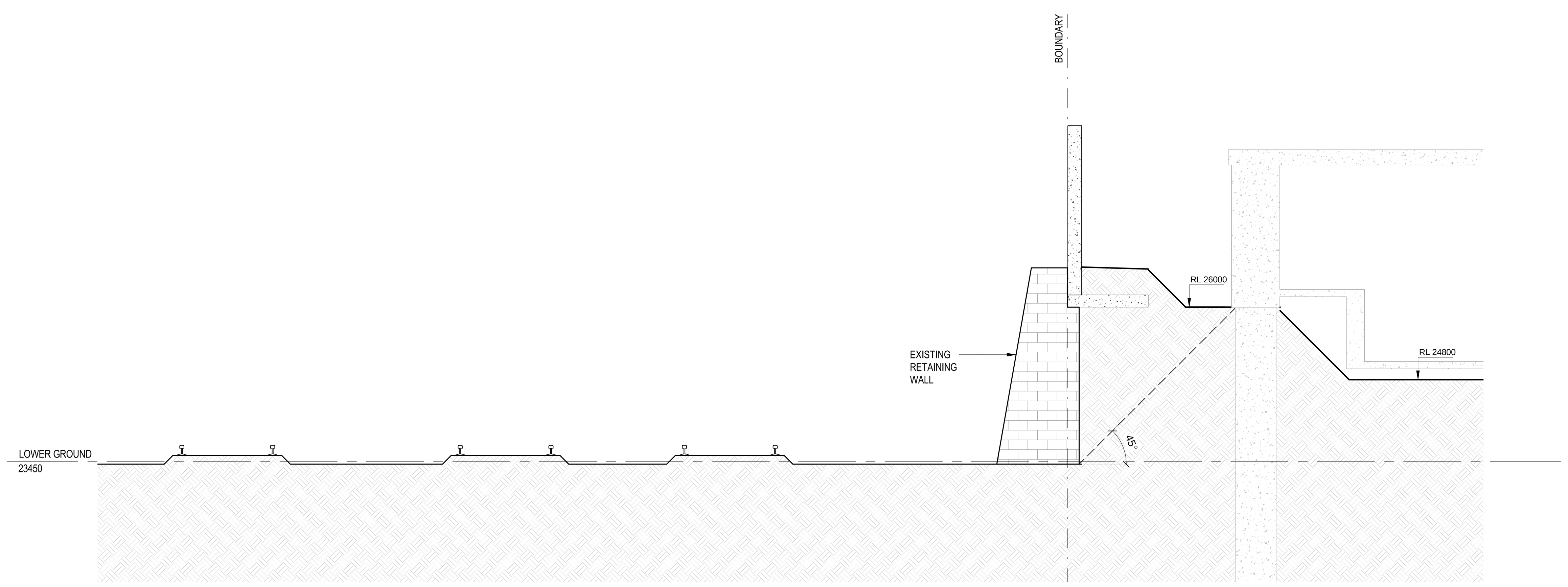

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Project Name: PEMULWUY PRECINCT 3
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Drawing Title: BULK EX AND SHORING
SECTIONS
SHEET 1

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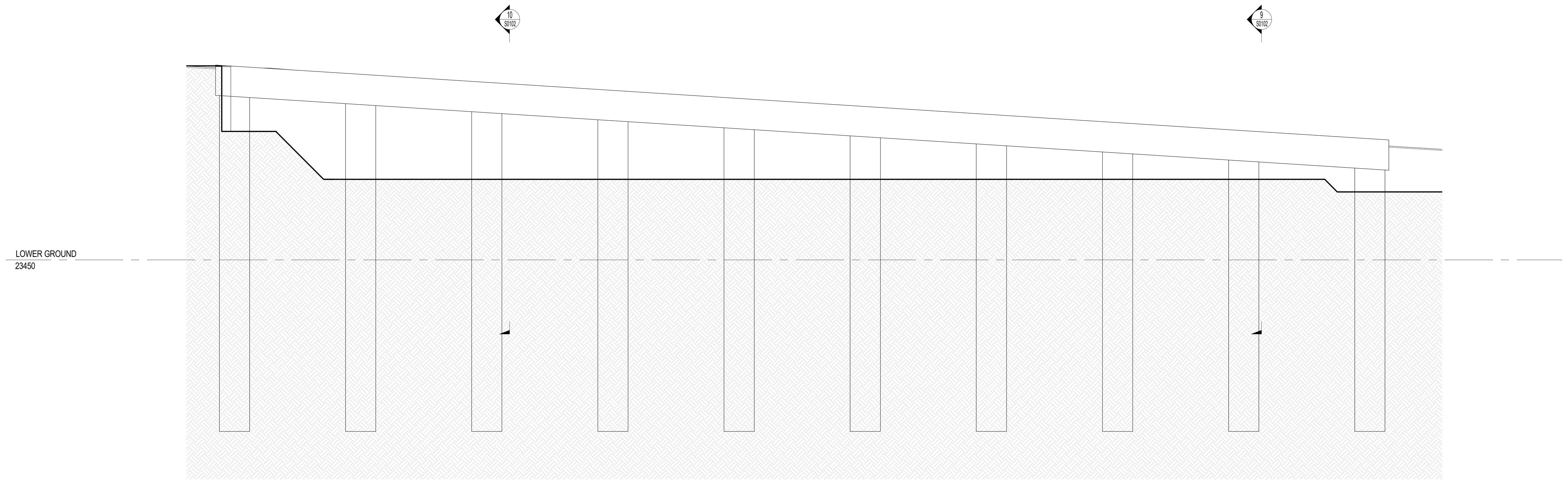

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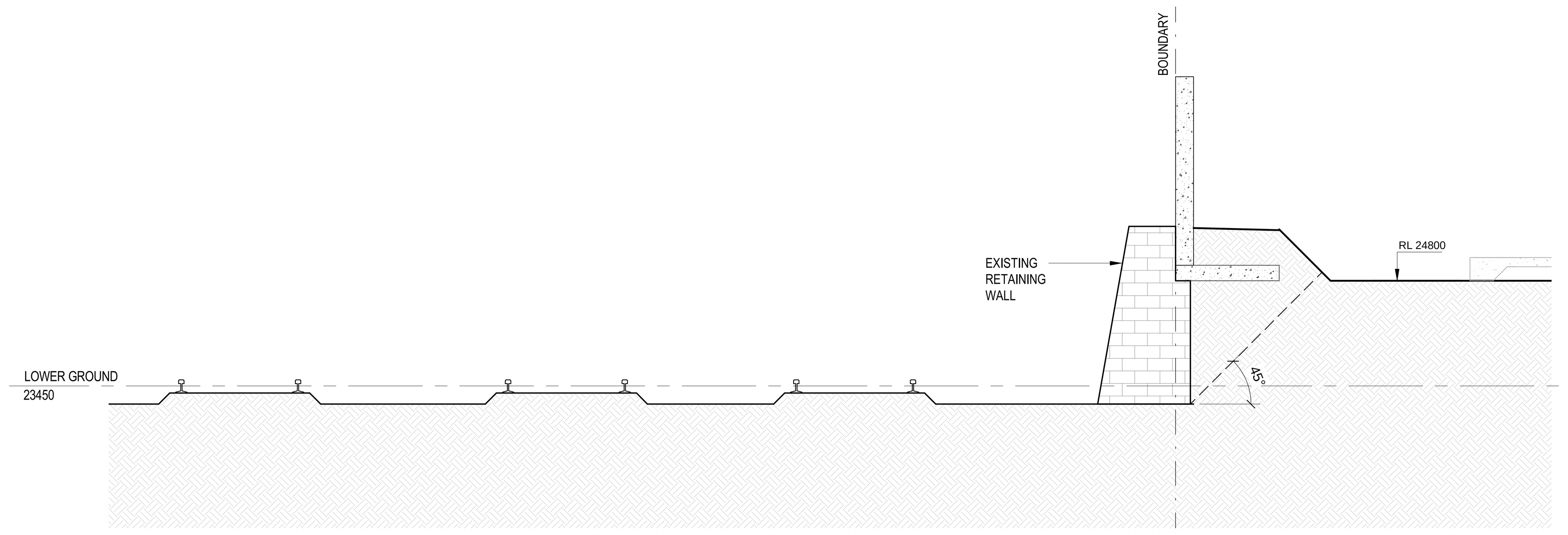

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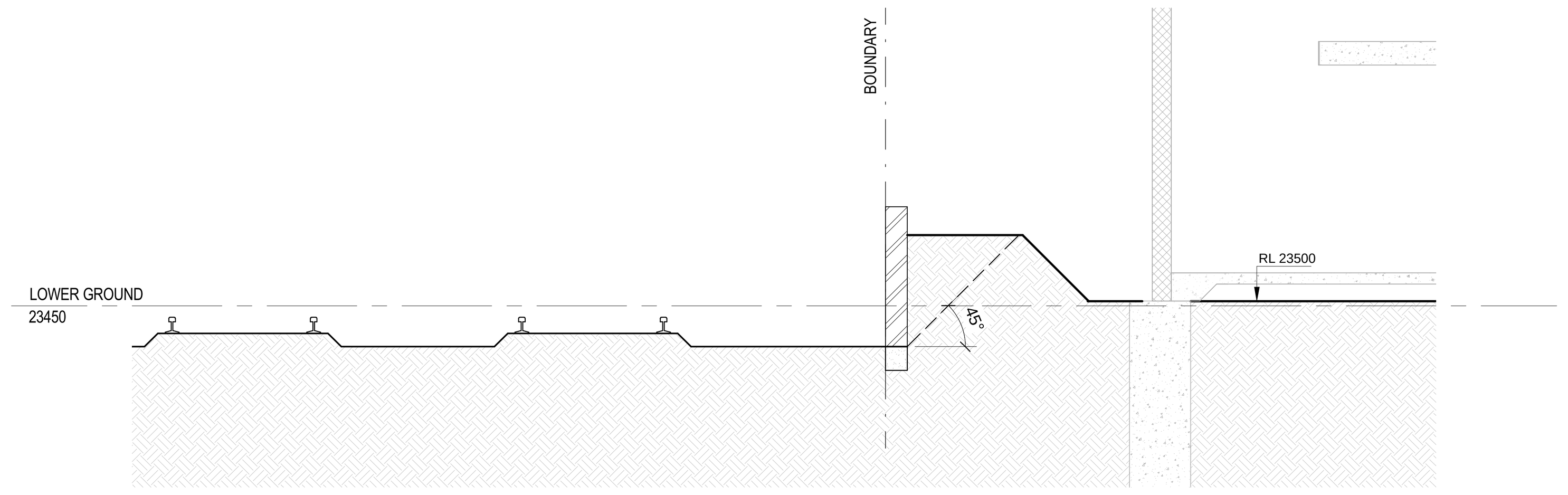

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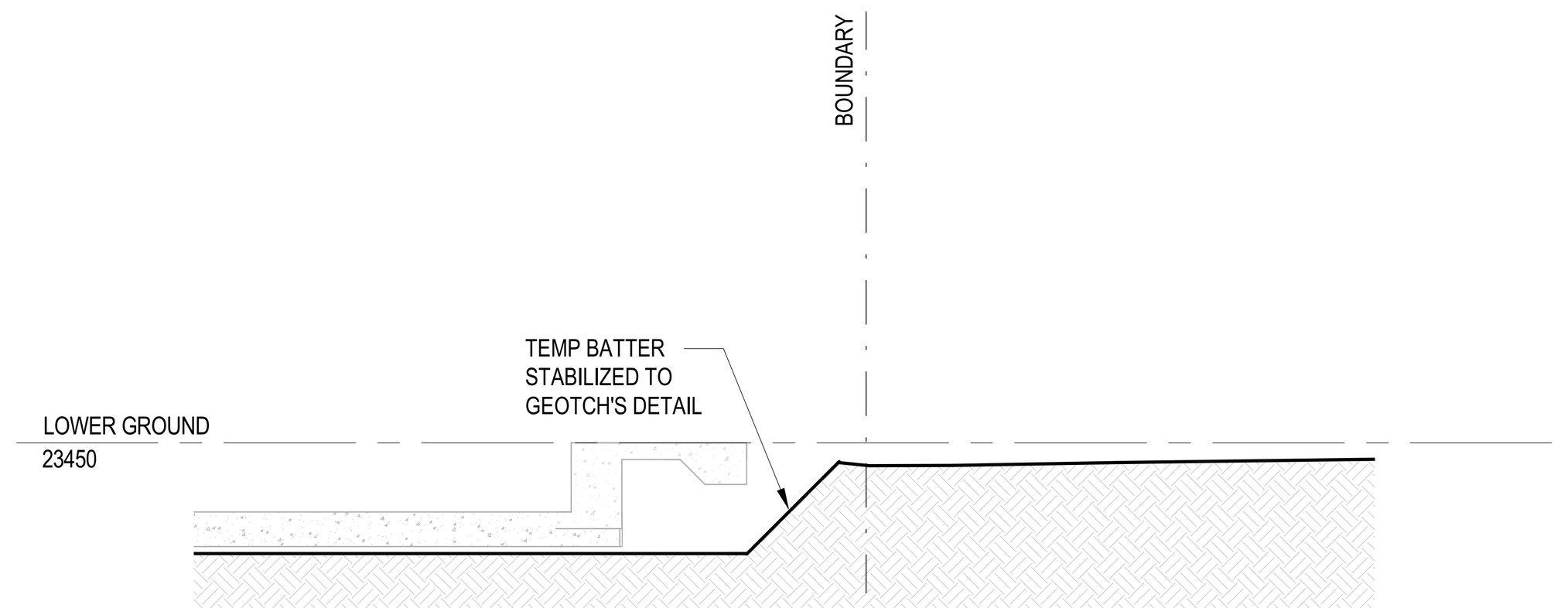

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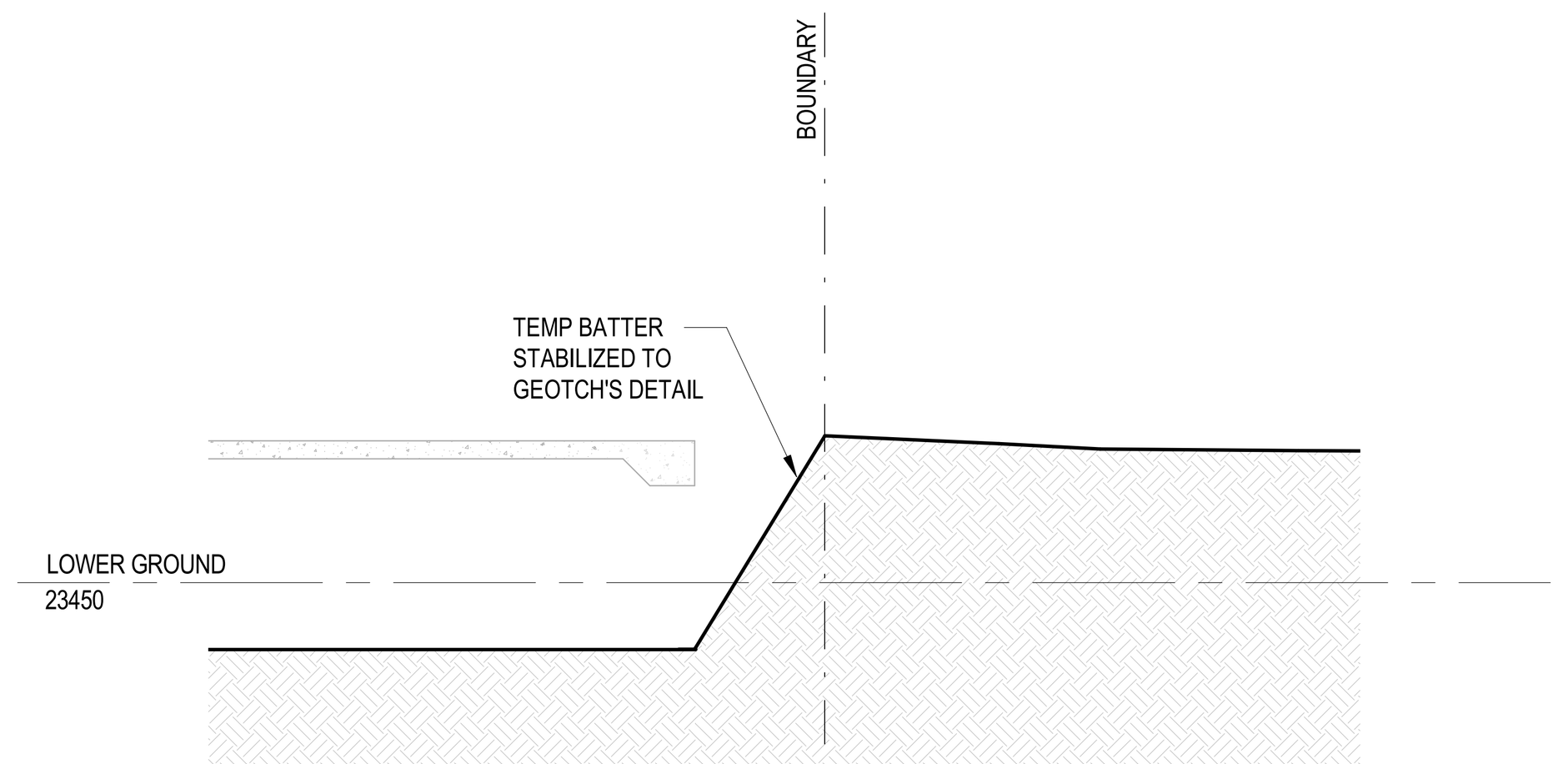

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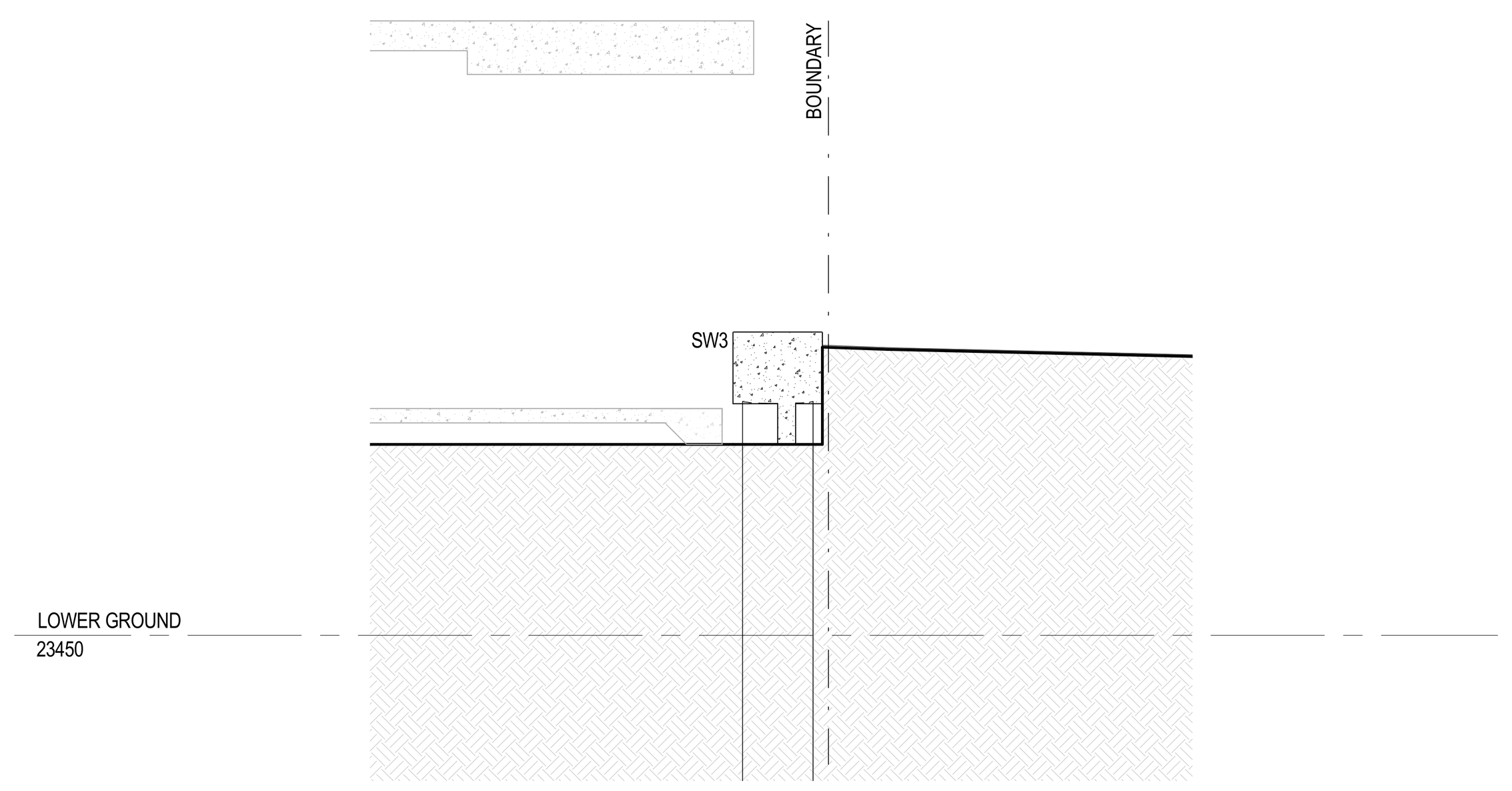

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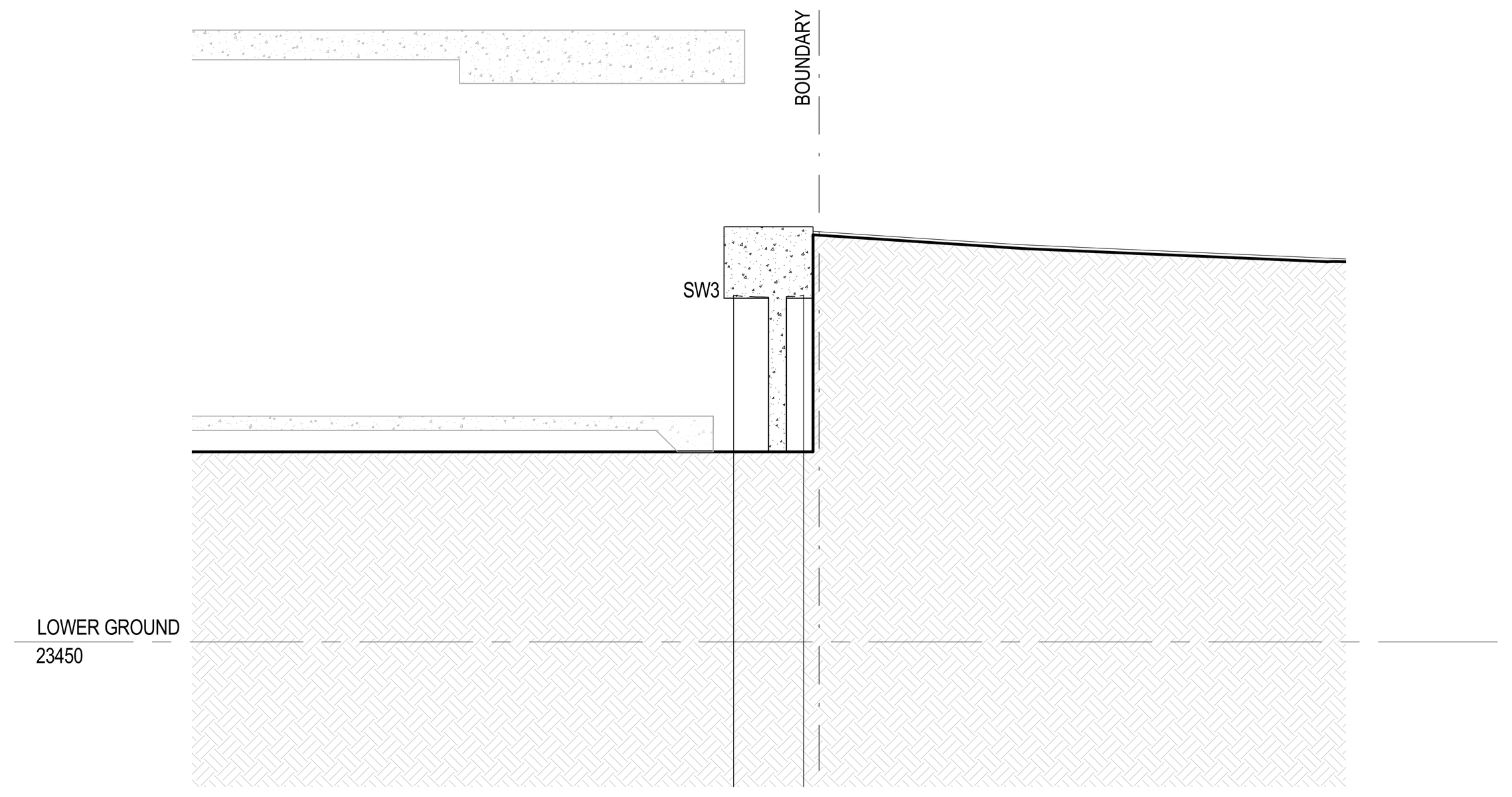

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Drawing Title: BULK EX AND SHORING SECTIONS SHEET 2

PRELIMINARY

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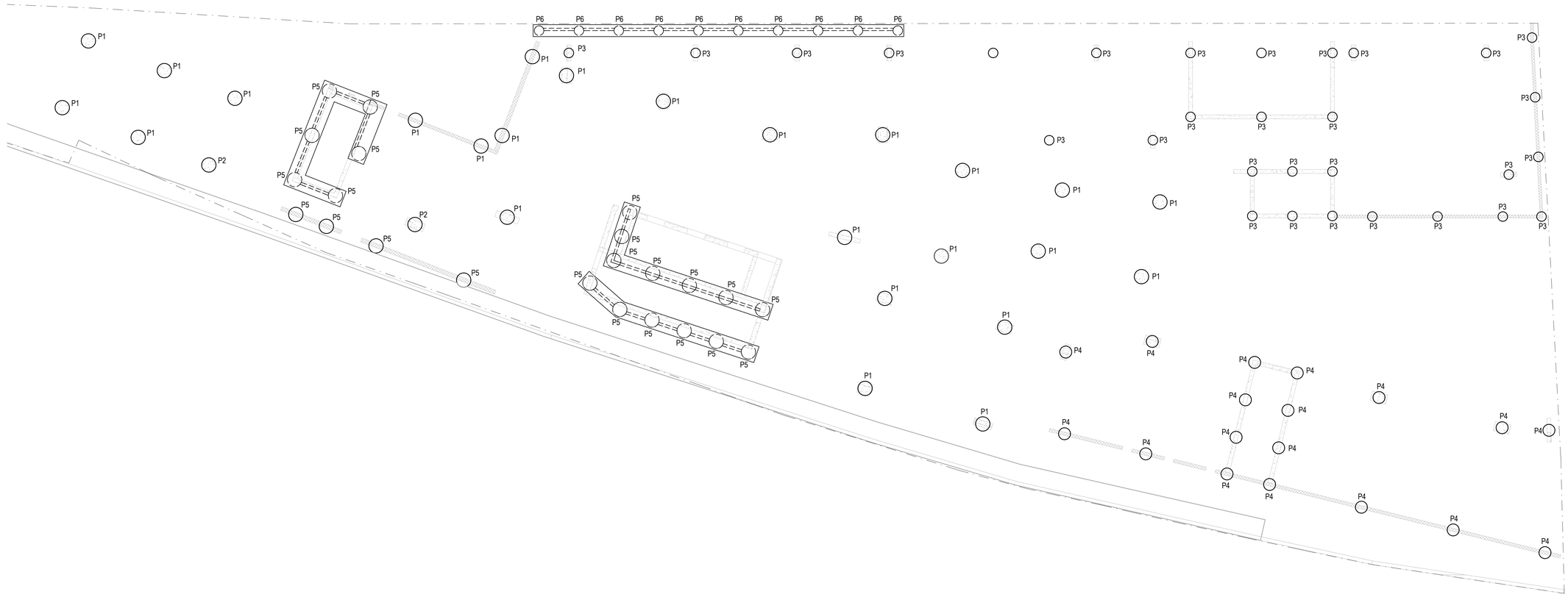

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Project Name: PEMULWUY PRECINCT 3
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Drawing Title: PILE LAYOUT

PRELIMINARY

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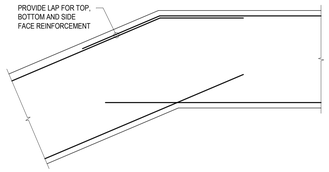

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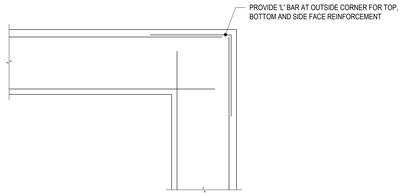
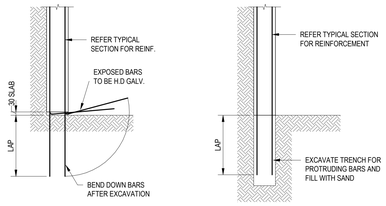
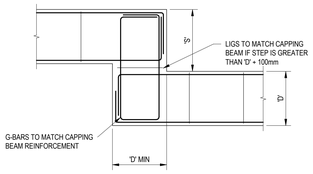


TYPICAL CAPPING BEAM CORNER DETAIL - PLAN

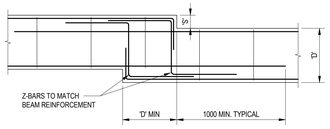


OPTION A OPTION B

SHOTCRETE HORIZONTAL C.J - SECTION
SCALE 1:20

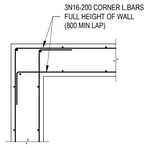


SETDOWN: 'S' = STEP GREATER THAN 'D' - 50mm



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

TYPICAL CAPPING BEAM STEP DETAILS
BUILDER MUST ENSURE CAGE IS ORIENTATED AS DETAILED.
REFER SCHEDULE FOR REINFORCEMENT



TYPICAL SHOTCRETE WALL CORNER
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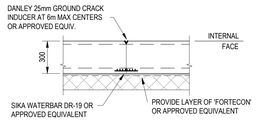
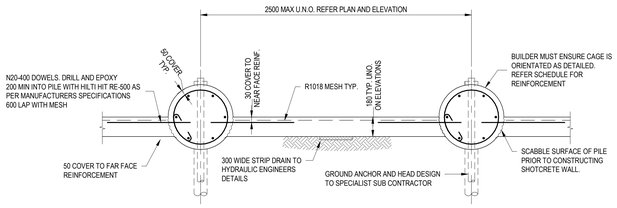
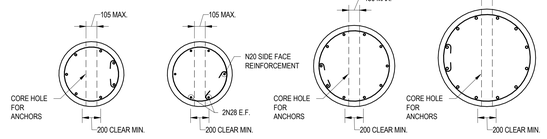


TYPICAL SHORING WALL CONSTRUCTION JOINT
SCALE 1:20

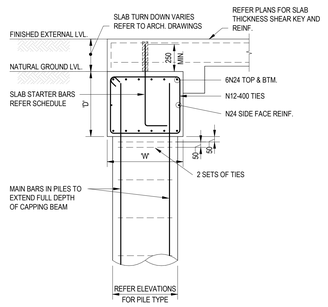
PILE SCHEDULE						
MARK	DIA	VERTICAL REINF	TIES	CONC GRADE	SWL (kN)	COMMENTS
P1	900	12N28	N12-300	50		
P2	900	12N28	N12-200	50		PILE TO BE SLEEVED TO RL 26.0
P3	600	7N24	N12-300	40		
P4	750	10N28	N12-300	40		
P5	900	12N28	N12-200	50		PILE TO BE INSTALLED FROM NGL
P6	600	7N24	N12-300	40		SHORING PILE



TYPICAL SOLDIER PILE AND SHOTCRETE INFILL WALL DETAIL
CONCRETE GRADE FOR INFILL WALL: N40

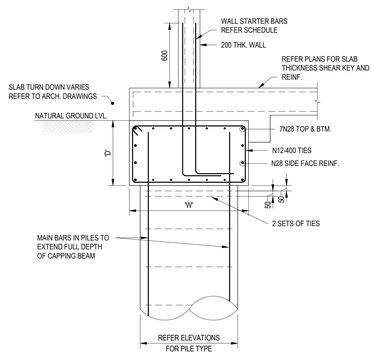


TYPE P1 ALT. TYPE P1 TYPE P2 TYPE P4
TYPE P3 SIM. TYPE P7 SIM.



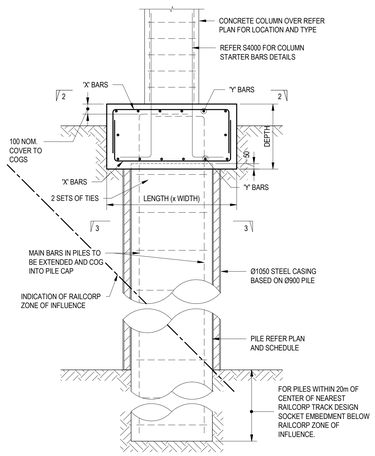
CAPPING BEAM CB1
SCALE 1:20

NOTE: SHOTCRETE WALL OMITTED FOR CLARITY



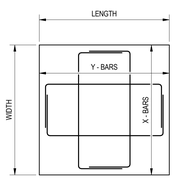
CAPPING BEAM CB2
SCALE 1:20

NOTE: SHOTCRETE WALL OMITTED FOR CLARITY



TYPICAL PILE CAP WITH SLEEVED PILE DETAIL
SCALE 1:20

NOTE: SLEEVED PILE ONLY REQUIRED FOR P2 PILES ADJACENT TO RAIL CORRIDOR



SECTION 2-2
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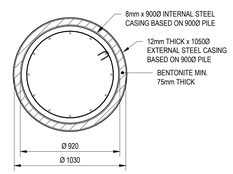

SECTION 3-3
SCALE 1:20

PRELIMINARY

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	02.06.17	PD	

DEICORP BONACCI

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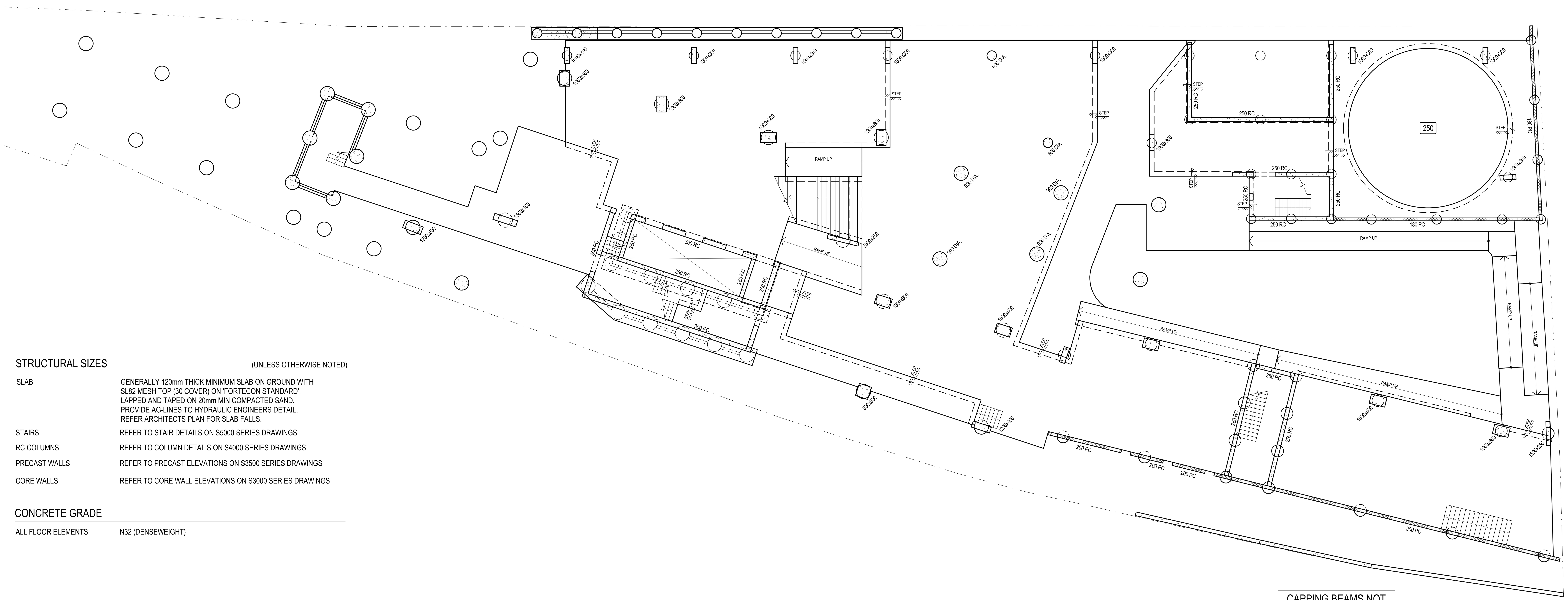
Project Name: PEMULWUY PRECINCT 3
83-123 EVELEIGH ST
REDFERN, NSW, 2016

Drawing Title: SHORING DETAILS
SHEET 1

PRELIMINARY

Designed	RC	Project Director Approved	Date / North
Drawn	PD		
Scale	1: 20	Project Ref.	Drawing No. / Rev
Date		202188601	S0110 P1
Sheet	A0		

A0



STRUCTURAL SIZES

(UNLESS OTHERWISE NOTED)

SLAB	GENERALLY 120mm THICK MINIMUM SLAB ON GROUND WITH SL82 MESH TOP (30 COVER) ON 'FORTECON STANDARD', LAPPED AND TAPED ON 20mm MIN COMPACTED SAND. PROVIDE AG-LINES TO HYDRAULIC ENGINEERS DETAIL. REFER ARCHITECTS PLAN FOR SLAB FALLS.
STAIRS	REFER TO STAIR DETAILS ON S5000 SERIES DRAWINGS
RC COLUMNS	REFER TO COLUMN DETAILS ON S4000 SERIES DRAWINGS
PRECAST WALLS	REFER TO PRECAST ELEVATIONS ON S3500 SERIES DRAWINGS
CORE WALLS	REFER TO CORE WALL ELEVATIONS ON S3000 SERIES DRAWINGS

CONCRETE GRADE

ALL FLOOR ELEMENTS	N32 (DENSEWEIGHT)

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	02.06.17	PD	-

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Project Name: PEMULWUY PRECINCT 3
83-123 EVELEIGH ST
REDFERN, NSW, 2016

Drawing Title: LOWER GROUND STRUCTURAL PLAN

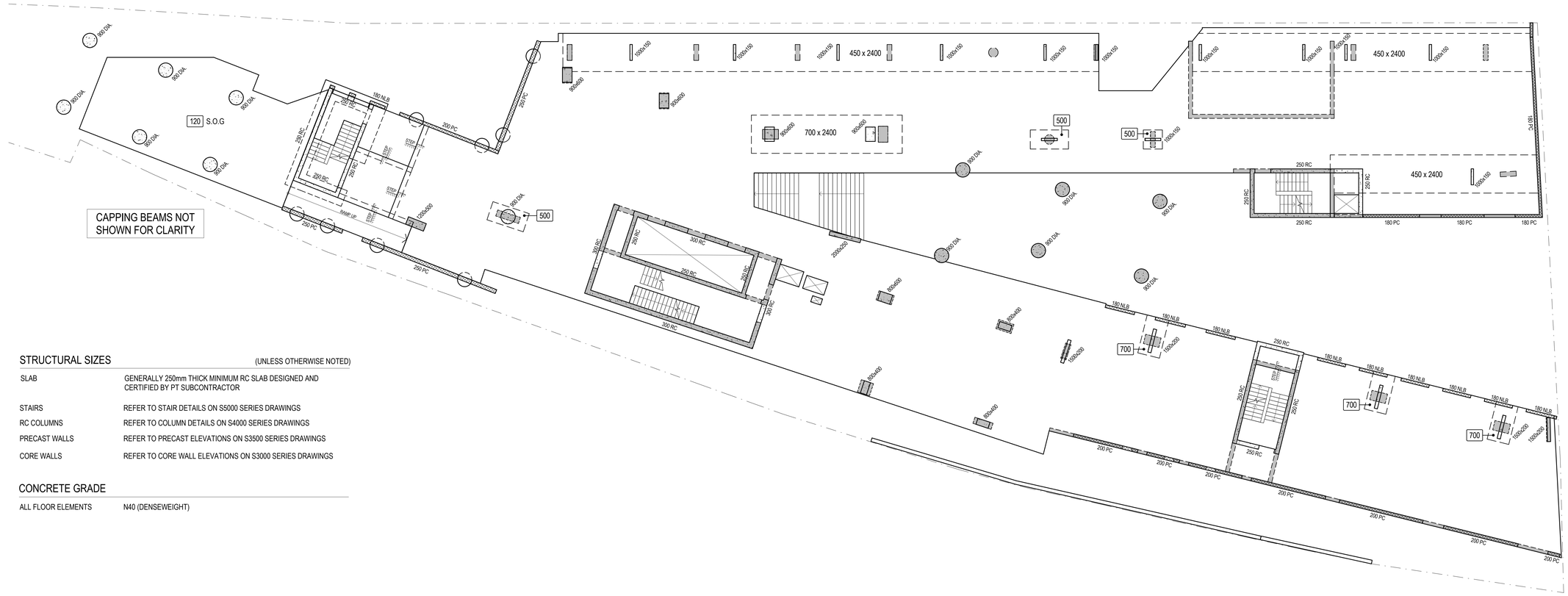
PRELIMINARY

Designed	RC
Drawn	PD
Scale	1 : 100
Date	
Sheet	A0

Project Director Approved | Date | North

Project Ref.	Drawing No.	Rev
202188601	S1020	P1

A0

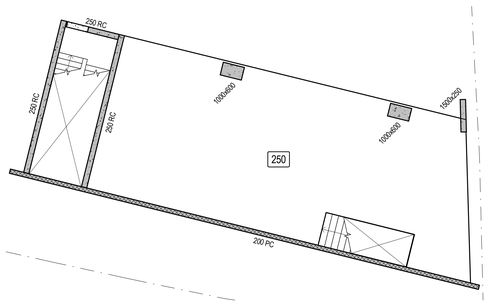


STRUCTURAL SIZES (UNLESS OTHERWISE NOTED)

SLAB	GENERALLY 250mm THICK MINIMUM RC SLAB DESIGNED AND CERTIFIED BY PT SUBCONTRACTOR
STAIRS	REFER TO STAIR DETAILS ON S5000 SERIES DRAWINGS
RC COLUMNS	REFER TO COLUMN DETAILS ON S4000 SERIES DRAWINGS
PRECAST WALLS	REFER TO PRECAST ELEVATIONS ON S3500 SERIES DRAWINGS
CORE WALLS	REFER TO CORE WALL ELEVATIONS ON S3000 SERIES DRAWINGS

CONCRETE GRADE

ALL FLOOR ELEMENTS	N40 (DENSEWEIGHT)



MEZZANINE PART PLAN
SCALE: 1 : 100

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	02.06.17	PD	-

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Project Name: PEMULWUY PRECINCT 3
83-123 EVELEIGH ST
REDFERN, NSW, 2016

Drawing Title: UPPER GROUND
STRUCTURAL PLAN

PRELIMINARY

Designed	RC
Drawn	PD
Scale	1 : 100
Date	
Sheet	A0

Project Director Approved | Date | North

Project Ref. 202188601 | Drawing No. S1030 | Rev P1

A0

APPENDIX B

Geotechnical Strength Reduction Factor

Calculation for Geotechnical Strength Reduction Factor (Φg)
AS2159-2009 "Piling - Design and Installation"

Geotechnical Strength Reduction Factor (Φg) - Low Redundancy

$\Phi g = \Phi gb + (\Phi tf - \Phi gb)K \geq \Phi gb$

Φg =	**0.56**

Φgb =	0.56	(basic geotechnical strength reduction factor)
Testing Type =	No Testing	
Φtf =	0.56	(intrinsic test factor)
No. Tests	0	
Total No. Piles	0	
p	0.00	
Dynamic (D) or Static/Rapid (SR)	-	
K =	0.0000	(testing benefit factor)

Basic Geotechnical Strength Reduction Factor (Φgb)

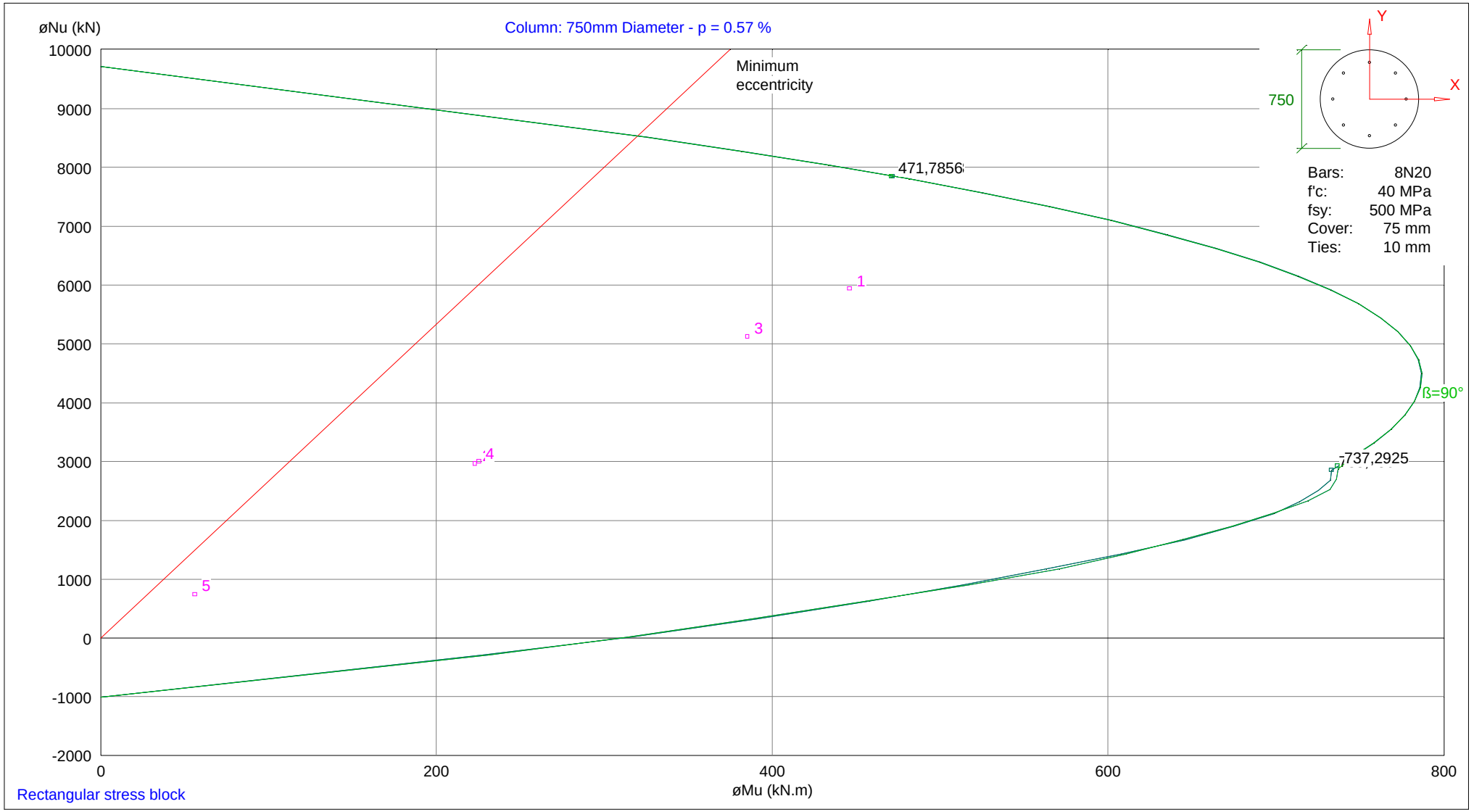
Table 4.3.2 (A) Weighting Factors and Individual Risk Ratings for Risk Factors

Risk Factor	**Weighting Factor**	**Typical Description of Risk Circumstances for individual risk rating (IRR)**			
	(w_i)	**1 (Very Low Risk)**	**3 (Moderate)**	**5 (Very High Risk)**	**Apply Risk Rating**
SITE					
Geological Complexity of the Site	2	Horizontal Strata, well-defined soil and rock characteristics	Some variability over site, but without abrupt changes in stratigraphy	Highly variable profile or prescence of karstic features or steeply dipping rock levels or faults present on site, or combinations of these	**2**
Extent of Ground Investigation	2	Extensive drillling investigation covering whole site to an adequate depth	Some boreholes extending to at least 5 pile diameters below the base of the proposed pile foundation level	Very limited investigation with few shallow boreholes	**3**
Amount and Quality of Geotechnical Data	2	Detailed information on strength compressibility of the the main strata	CPT probes over full depth of proposed piles or boreholes confirming rock as proposed founding level for piles	Limited amount of simple in-situ testing (eg. SPT) or index tests only	**3**
DESIGN					
Experience with Similar Foundations in similar geological conditions	1	Extensive	Limited	None	**1**
Method of assessment of geotechnical parameters for design	2	Based on appropriate laboratory or in-situ tests or relevant existing pile load test data	Based on site-specific correlations or on conventional laboratory or in-situ testing	Based on non-site-specific correlations with (for example) SPT data	**1**
Design Method Adopted	1	Well-Established and Soundly Based method or methods	Simplified methods with well-established basis	Simple empirical methods or sophisticated methods that are not well established	**1**
Method of utilising results of in-situ test data and installation data	2	Design values based on minimum measured values on piles loaded to failure	Design methods based on average values	Design values based on maximum measured values on test piles loaded up only to working load, or indirect measurements used during installation, and not calibrated to static loading tests	**3**
INSTALLATION					
Level of Construction Control	2	Detailed with professional geotechnical supervision, construction processes that are well established and relatively straightforward	Limited degree of professional geotechnical involvement in supervision, conventional construction procedures	Very limited or no involvement by designer, construction processes that are not well established or complex	**3**
Level of performance monitoring of the supported structure during and after construction	0.5	Detailed measurements of movements and pile loads	Correlation of installed parameters with on-site static load tests carried out in accordance with this standard	No monitoring	**5**
			$ARR = \Sigma(w_i IRR_i)/\Sigma w_i$	ARR =	2.38
				Risk Category =	Low
				Redundancy =	LOW
				Φgb =	0.56

APPENDIX C

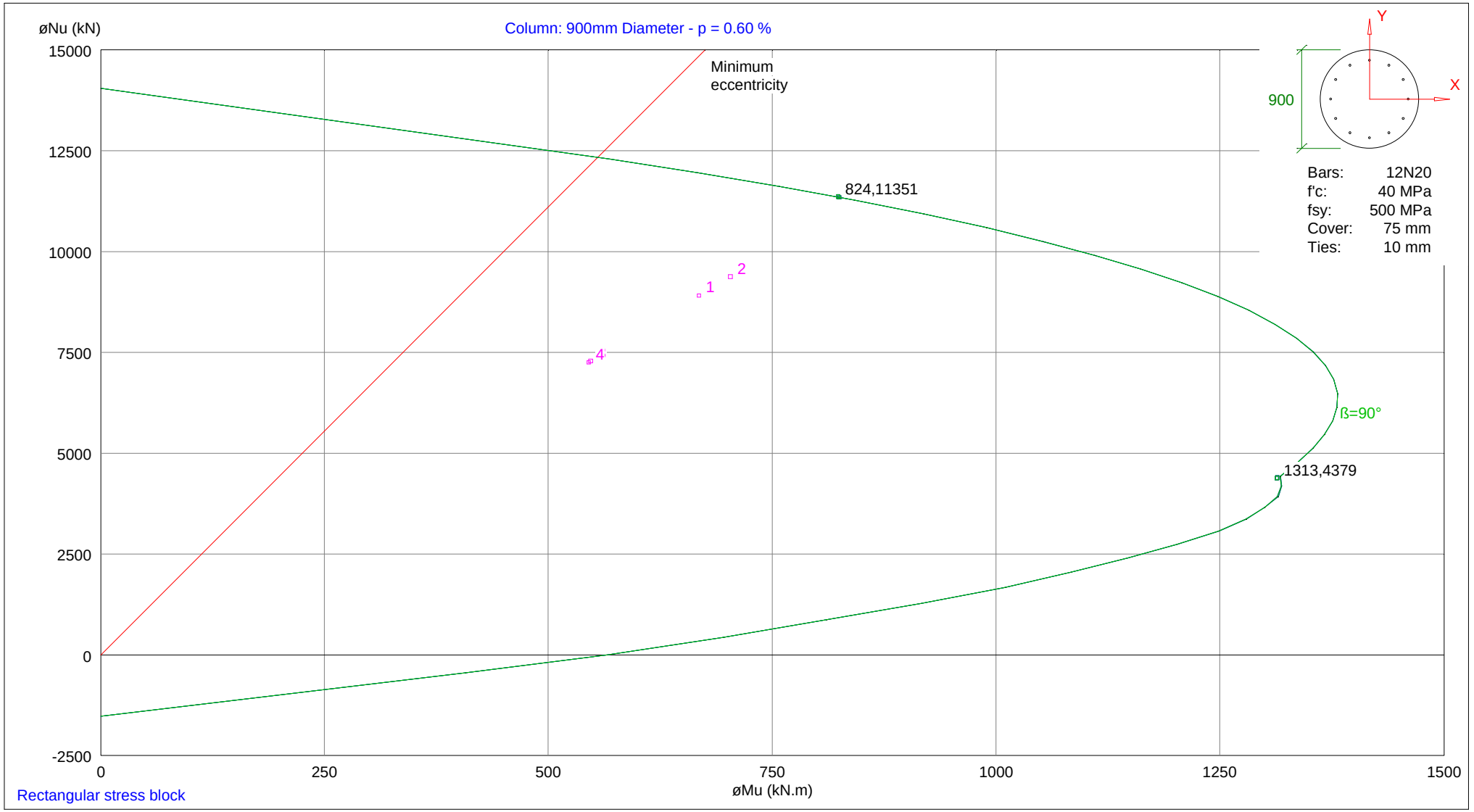
COLDES Interaction Charts & Shear Analysis

Coldes V4



Coldes [V4.09.120926]

Coldes V4



Coldes [V4.09.120926]

Appendix D
DeiCorp Report of
Existing Rail Retaining Wall

Report of Test Pits Along Precinct 3 Retaining Wall

Report No – Pemulwuy 170511 rev A, May 2017

Prepared by Deicorp Constructions (NSW) Pty Ltd

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Location of test Pits

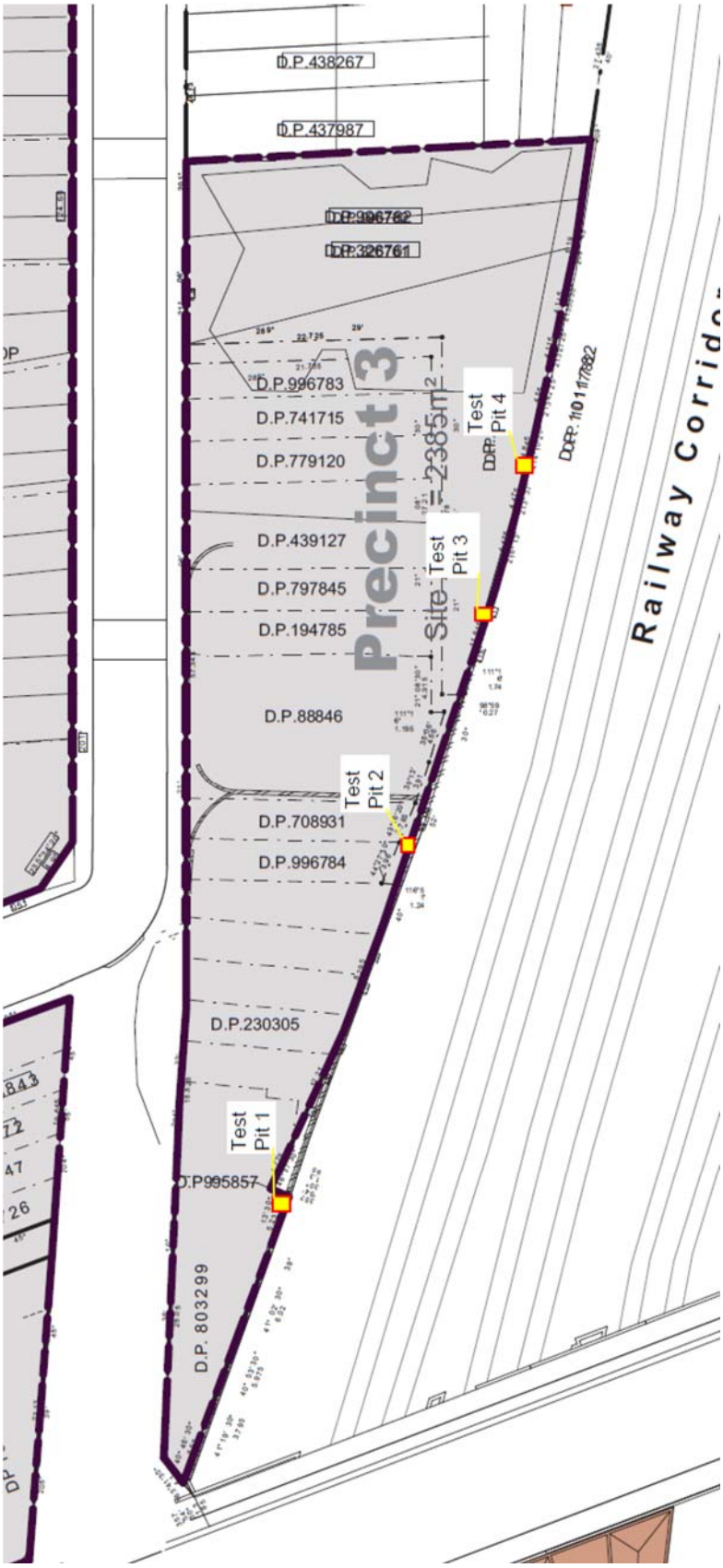

Photo of Test Pit 1

Diagram of Test Pit 1

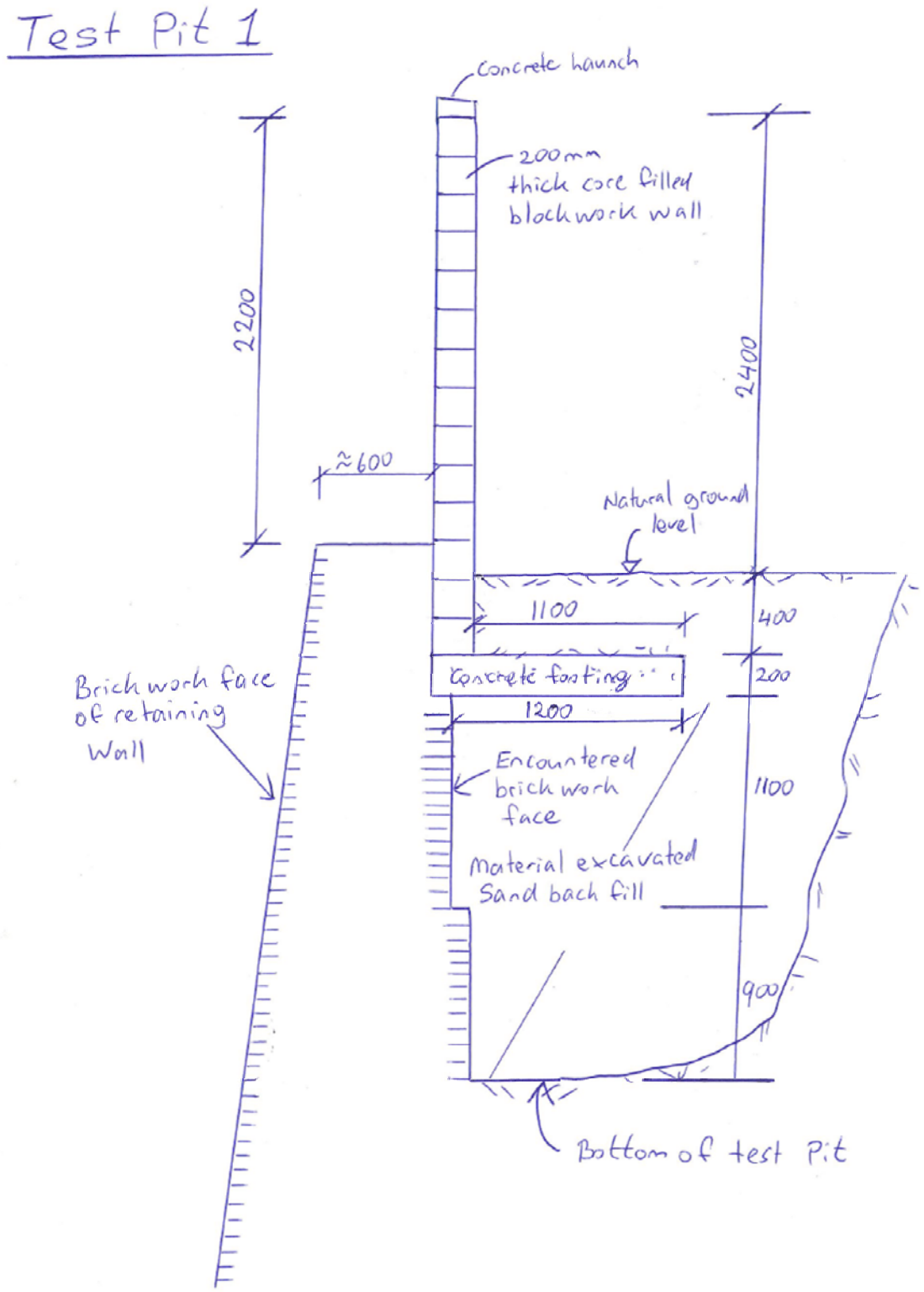

Photo of Test Pit 2

Diagram of Test Pit 2

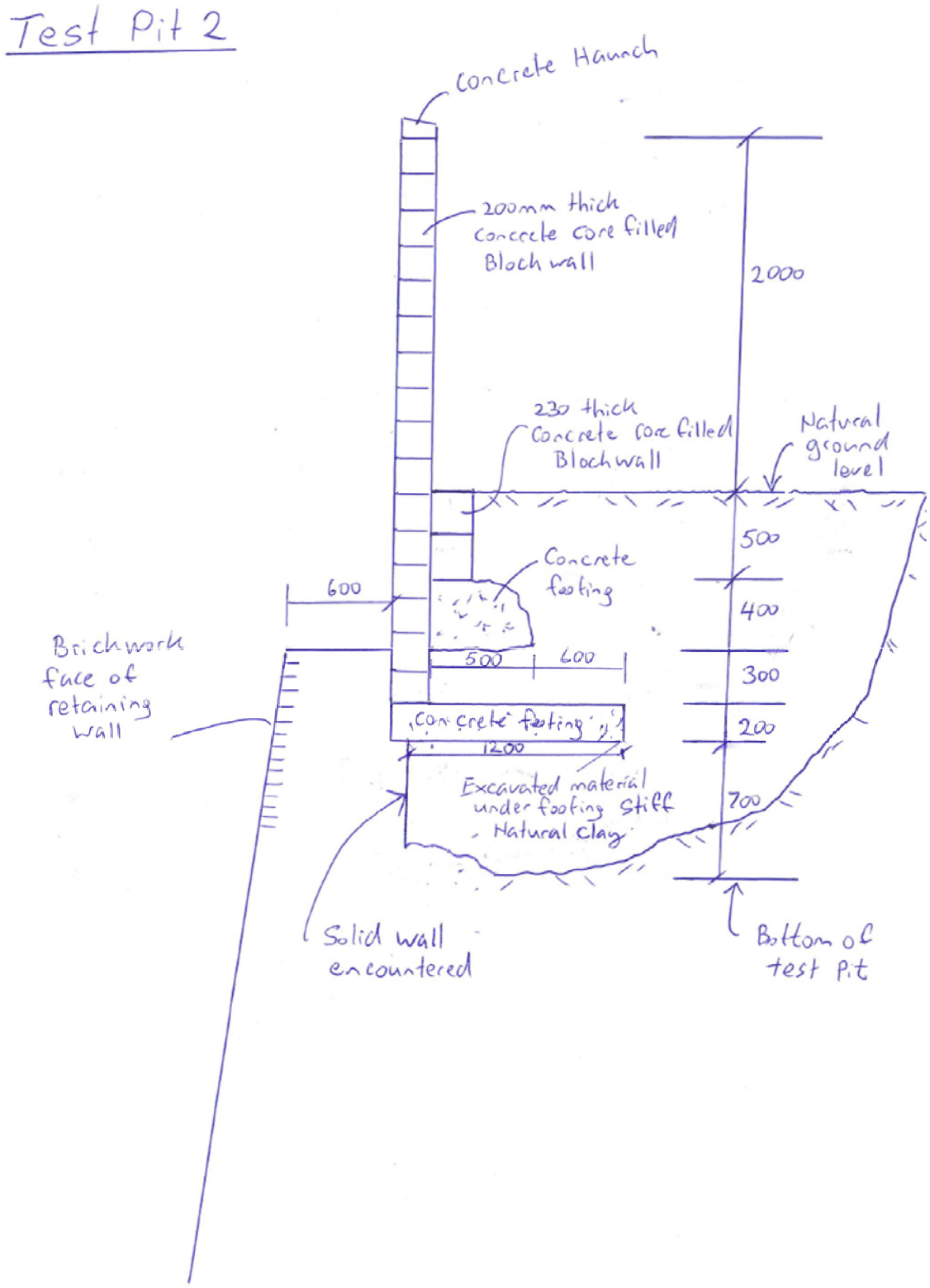

Photo of Test Pit 3

Diagram of Test Pit 3

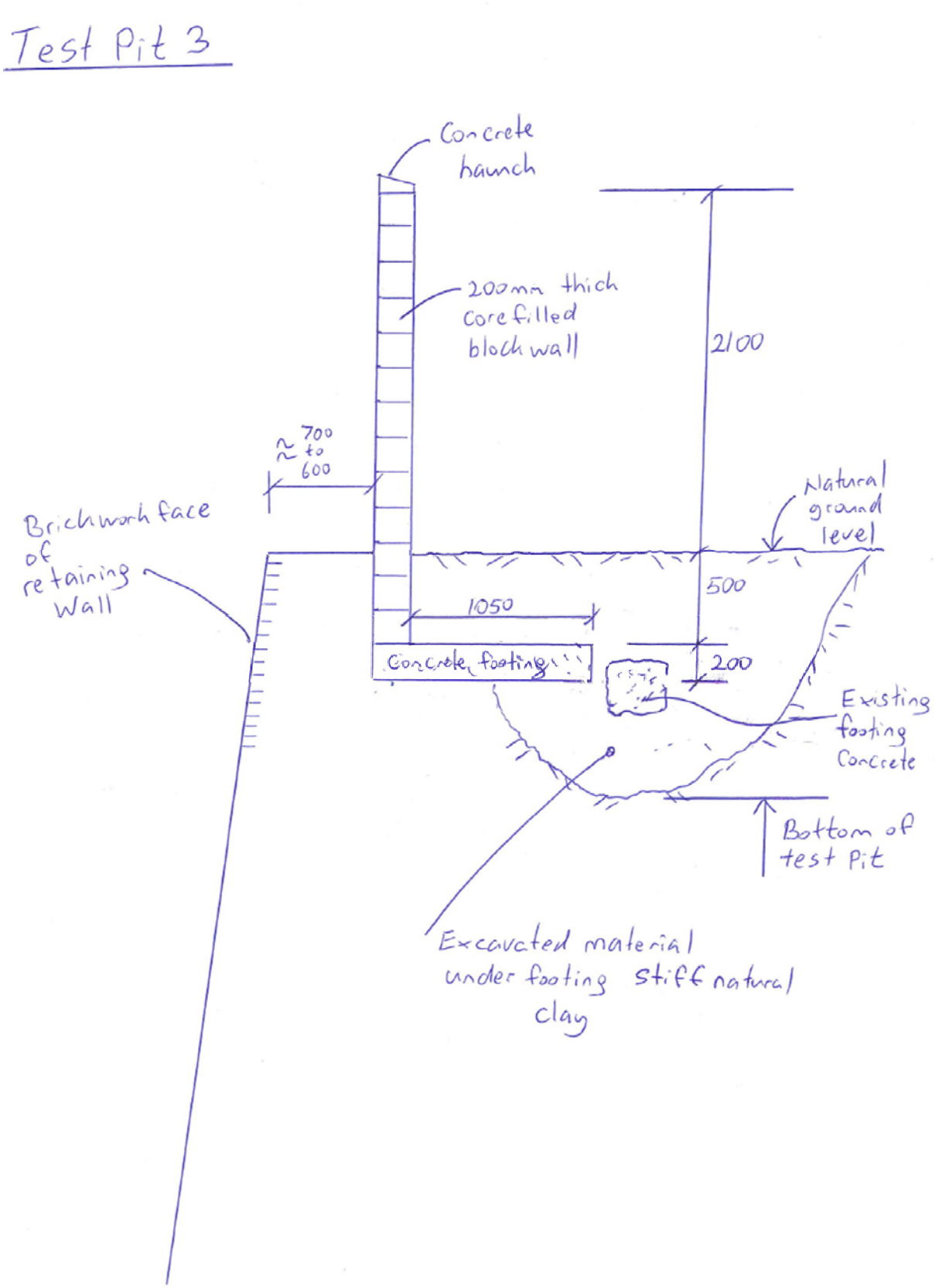

Photo of Test Pit 4

Diagram of Test Pit 4