



CIVIL ENGINEERING REPORT
INCORPORATING WATER CYCLE
MANAGEMENT STRATEGY

SSD-58978472 ▲

20 KELSO CRESCENT
MOOREBANK

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EXECUTIVE SUMMARY

Mapletree SR Australia Management Pty Ltd (Mapletree) are seeking to construct an industrial development located at 20 Kelso Crescent, Moorebank.

The Proposal is considered State Significant Development (SSD) and accordingly, an Environmental Impact Statement (EIS) has been prepared to support the SSD Application for the Proposal. This Civil Engineering Report has been prepared by Costin Roe Consulting to support the preparation of the EIS and assess the Proposal's impact on the surrounding environment in relation to water including stormwater and stormwater management for both construction and operational phases of the development.

Proposal Overview

The proposed development is for the construction and operation of a multi-storey warehouse and distribution centre over a 3.52 Ha parcel of land.

Works will include site preparation works, bulk earthworks, provision of services, building construction, and stormwater management. It is noted that demolition of existing buildings and structures has been completed.

Access to the development would be made via Kelso Crescent and Seton Road.

Purpose of this Assessment

This Civil Engineering Report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) as they related to civil engineering, including:

- Water Management; and
- Flooding Risk

Comparison between Original Scheme and Revised Scheme

This revised civil design submission is a direct response to the feedback received from DPHI, Council and other government agencies to result in a better outcome. This includes the following key improvements:

- Breakdown of large bulky building and facade
- Efficient warehouse configuration
- Reduced noise impacts
- Increased setback to Kelso Crescent
- Improved visual impact
- Improved pedestrian safety
- Simplified vehicle circulation
- Increased retention of existing trees – 7
- Improved flood storage and stormwater management
- Increased sustainability and environmental outcome

We believe this design represents a significant advancement from the original scheme — a solution that more effectively utilises the site better, responds to DPHI's expectations, and enhances flexibility to meet evolving occupier demands.

Generally, the engineering strategy will remain consistent between the original and revised scheme. A comparison of the differences and similarities between the design, engineering strategy and impacts of the development are as follows.

Site Plan

The original scheme proposes construction and operation of a single block multi-storey warehouse with an approximate building footprint of 1.78Ha and associated ancillary structures, carparks, perimeter truck circulation roads and hardstand areas.

The revised scheme comprises of two multi-storey buildings adjoined by a central hardstand with associated ancillary structures, carparks, perimeter truck circulation road, hardstand areas and an end of trip facility.

Site Works

The original scheme has a proposed basement at FFL R.L 6.00 and warehouse FFL R.L 10.00. Site works included provision of erosion and sediment control, bulk earthworks, services, building constructions and stormwater quantity and quality management in accordance with Liverpool City Council DCP 2021 requirements.

The revised scheme proposes to remove the basement under the original scheme and the revised warehouse FFL is at FFL R.L 12.00. It is noted that the proposed site works remain consistent with the original scheme.

Refer to **Section 2.3** of this report for the revised scheme plan.

Stormwater Quantity

Under the original scheme, two below-ground on-site detention tanks have been proposed at the south-eastern corner and south-western corner of the site respectively prior to discharging into council infrastructure in Seton Road. The combined storage volume of the two tanks is 400m³.

The revised scheme drainage layout for the updated scheme is shown on Costin Roe Drawings **CO14972.02-SSDA400 to 410**. The revised stormwater management strategy proposes to have one on-site detention (OSD) tank located south of the site, under the end of trip facility prior to discharge into council infrastructure in Seton Road. The OSD tank has a proposed storage volume of 412m³. It is noted that the southern portion of the site bypasses the OSD tank. Refer to Costin Roe Drawing **CO14972.02-SSDA460** for the revised OSD tank layout and **Section 5** of this report for discussion pertaining to the proposed stormwater quantity management strategy.

Stormwater Quality

The original stormwater quality management consists of a primary and tertiary treatment train. The primary treatment is performed via provision of surface inlet pits, and tertiary treatment via provision of PSORB StormFilter cartridges and OceanProtect Jellyfish.

The revised stormwater quality strategy comprises a similar primary and tertiary treatment train. The primary treatment is performed via provision of surface inlet pits and OceanProtect OceanSave GPT unit and tertiary treatment via provision of a NPSORB Stormfilters. It is noted that the southern portion of the site bypasses the tertiary treatment system. Refer to **Section 6** of this report for discussion pertaining to the proposed stormwater quality management strategy.

Construction Impacts

During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

Operational Impacts

During the operational phase of the development, the proposed stormwater quality treatment system will incorporate the use of a treatment train (gross pollutant trap and proprietary filtration cartridges) and is proposed to mitigate any increase in stormwater pollutant load generated by the development. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

The operation phase of the development will also incorporate the use of an on-site detention system to mitigate any increase in stormwater peak flows generated by the development.

Further it has been confirmed that the development considers flood and overland flow planning requirements. The building will be constructed above the flood planning level.

Conclusion

The hydrological assessment of the local site drainage confirms that recommended water quality and quantity measures will ensure that no adverse impacts result on receiving waterways as a result of the development.

The detail contained in this report provides sufficient information to show the consent authority that legal points of discharge and a suitable stormwater management strategy is available for the development and the requirements associated with the strategy. It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

1 INTRODUCTION & SCOPE

1.1 Introduction

Costin Roe Consulting Pty Ltd has been engaged by Mapletree SR Australia Management Pty Ltd to undertake a Civil Engineering Report & Water Cycle Management Strategy (WCMS) to accompany a State Significant Development Application (SSDA) with the NSW Department of Planning, Housing and Infrastructure (DPHI) for an industrial development on the land.

This report presents a civil engineering assessment of the property at 20 Kelso Crescent, Moorebank, NSW. This report provides an assessment of the civil engineering characteristics of the development site and technical considerations of the following aspects:

- Earthworks & geotechnical considerations;
- Water Cycle Management Strategy (WCMS).

The WCMS comprises several key areas of stormwater and water management which are provided below. These key areas have been established with the aim to reduce impacts from the development on the surrounding environment and neighbouring properties. The water cycle management strategy identifies management measures required to meet the targets set. The key water cycle management areas assessed in this report are:

- Stormwater Quantity;
- Stormwater Quality;
- Water Supply and Reuse;
- Erosion and Sediment Control; and
- Flooding

A request for Planning Secretary's Environmental Assessment Requirements (SEAR's) to the DPHI has been made by the applicant. Reference to **Appendix F** should be made for SSD-58978472 SEAR's dated 8 June 2023. Refer to **Section 1.2** of this report for specific responses to civil engineering and water management related items included in the SEAR's.

1.2 SEARS Response

This report supports the EIS for the proposal and to address the NSW DPHI SEARS letter dated 8 June 2023, reference SSD-58978472.

We note the below "key issues and documentation" assessments and following key areas in the document:

- Water Management; and
- Flooding

Further reference to the EIS prepared by the town planners should be made for confirmation of how the SEAR's have been addressed for non-civil engineering related items.

Table 1.1 provides a summary of the SEARs Key Issues which relate to civil engineering, and where these have been addressed in this report.

Table 1.1 - SEAR's Response

SEARS Key Item	Response and Where Addressed
Water Management	
<p>Provide an Integrated Water Management Plan for the development that:</p> <ul style="list-style-type: none"> • is prepared in consultation with the local council and any other relevant drainage or water authority. • outlines the water-related servicing infrastructure required by the development (informed by the anticipated annual and ultimate increase in servicing demand) and evaluates opportunities to reduce water demand (such as recycled water provision). • details the proposed drainage design (stormwater and wastewater) for the site including any on-site detention facilities, water quality management measures and nominated discharge points, on-site sewage management, and measures to treat, reuse or dispose of water. • demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse downstream impacts. 	<p>Design team met with council on 28 June 2023 to discuss development.</p> <p>Refer to Costin Roe Drawings Co14972.02-400 to 403 for the proposed stormwater drainage layout and Co14972.02-460 for the proposed on-site detention tank hydraulic details within the proposed development.</p> <p>Key stormwater objectives, based on the relevant LCC water sensitive urban design criteria, have been set out in Section 4, 5 and 6 of this report. MUSIC and DRAINS modelling has been completed to confirm that the requirements and objectives of council area met including provision of an on-site detention system.</p> <p>There are no requirements to provide drainage infrastructure that would be handed over to another authority.</p> <p>A recycled water provision has been put in place via the inclusion of rainwater tank. Refer to Section 6 of this report.</p>
<p>Where water and drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards of, the local council or other drainage or water authority.</p>	<p>There are no requirements to provide drainage infrastructure to be handed over to council, or other drainage or water authority.</p> <p>Refer to Section 4, 5 and 6 of this report for details on the stormwater design for the project including compliance with LCC requirements.</p>

Flooding Risk	
Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Floodplain Development Manual.	Refer to separate FIRA prepared by Costin Roe Consulting.
Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required.	Refer to separate FIRA prepared by Costin Roe Consulting.

2 DEVELOPMENT SITE

2.1 Location

The property, 20 Kelso Crescent Moorebank, is located within the Liverpool City Council (LCCC) local government area (LGA) and locality map of the site location is as shown in **Figure 2.1**.



Figure 2.1 - Locality Map

2.2 Existing Site Description

The proposal applies to land 20 Kelso Crescent, Moorebank, being Lot 1 DP1296586 (subject site). The subject site is currently vacant and demolition of the existing buildings and infrastructure has been completed.

The subject site is within E4 General Industrial zone and CA Complex Area pursuant to the Liverpool Local Environmental Plan 2008.

The subject site is located on the south of Kelso Crescent and on the north of Seton Road. The subject site is bounded by adjoining industrial developments to the south east and west. There is an existing electrical transmission and distribution facility adjoining the subject site to the north-west known as the Moorebank Zone Substation operated by Endeavour Energy.

The site generally grades down from the north towards the south. The highest level is approximately RL12.0m AHD towards the north-west corner of the site. The lowest level on the site is approximately RL7.5m AHD towards the south-east corner of the site. Kelso Crescent, which the site fronts, falls from west (RL12m AHD) to east (RL10.5m AHD). Seton Road, which the site rears, falls from east (RL7.0m AHD) to west (RL6.5m AHD).

The subject site is within the existing Moorebank industrial precinct, predominantly characterised by established industrial Moore development of similar scale. Vehicular access to the subject site is currently facilitated via existing access points on Kelso Crescent and Seton Road.



Figure 2.2 – Existing Site Aerial View (Source: Nearmap 11 July 2025)

2.3 Proposed Development

The proposed SSD Application seeks approval for the construction and operation of a warehouse and distribution centre, including:

- Site preparation works, including the removal of 31 trees
- Earthworks to achieve proposed site levels
- Provision of infrastructure comprising civil works and utilities servicing
- Construction of two warehouse buildings with eight (8) tenancies, split over two (2) storeys with ramp-up access, comprising:
 - Warehouse 1a, 1b, 2a and 2c at ground level
 - Warehouse 3a, 3b, 4a and 4b at first level
 - Total Warehousing – approximately 33,700 m²
- Ancillary office accommodation totalling 1,700 m²
- On grade car parking around the Site and undercover car parking off Kelso Road, and loading docks across the two (2) storeys of warehousing
- Onsite cycle parking and end of trip facility
- Complementary landscaping and offset planting, providing 11% coverage.
- Signage, including entry, business identification and wayfinding signage
- Diversion of overhead electricity transmission lines at the western and southern boundaries to new subterranean channels
- Allowance for operations up to 24 hours per day, seven (7) days per week

The indicative site layout prepared by Pace Architects has been included in **Figure 2.3** and **2.4**.

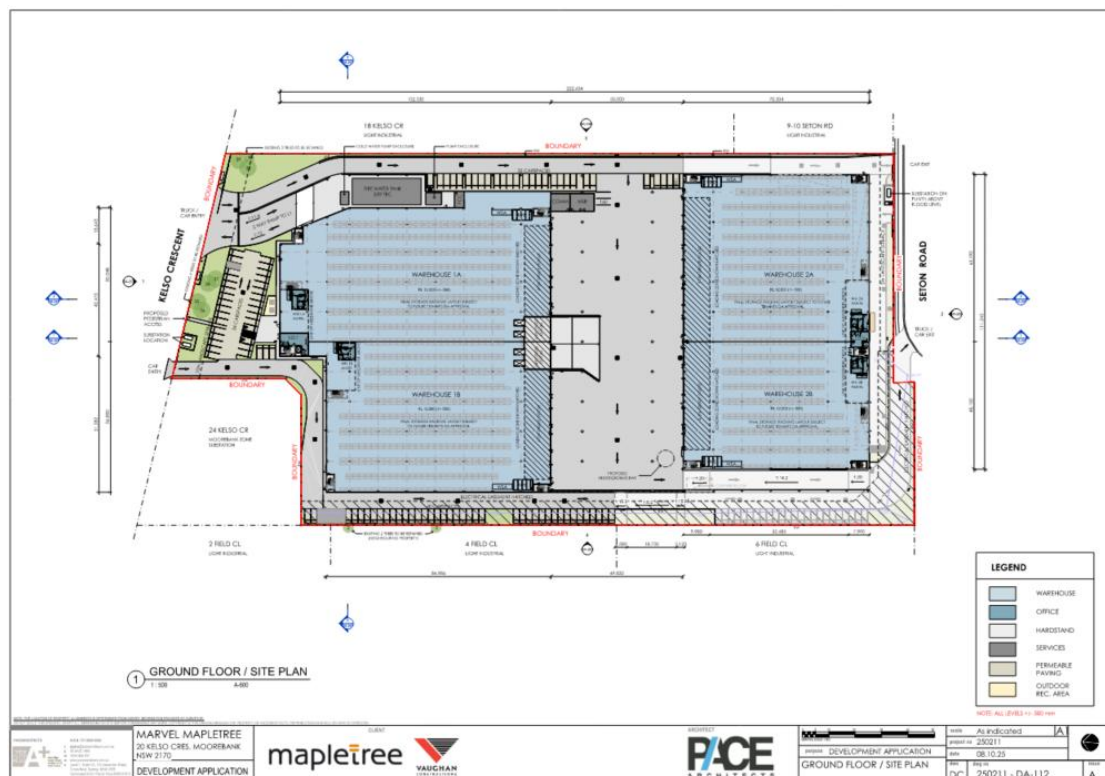


Figure 2.3 - Proposed Development – Site Plan (Source: Pace Architects)

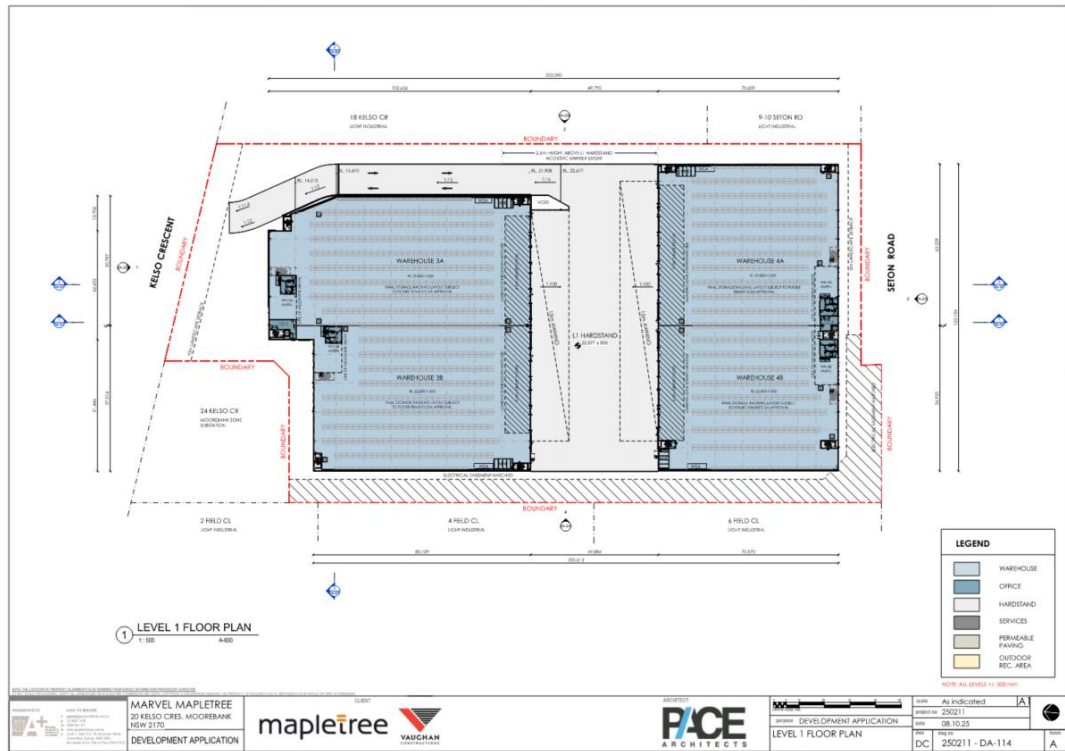


Figure 2.4 - Proposed Development – Level 1 Plan (Source: Pace Architects)

3 SITE WORKS

3.1 Soil and Geological Conditions

Assessment relating to soil have been undertaken by JK Geotechnics, Geotechnical Investigation – Referenced Project 36440PNrpt dated 5 February 2024 included in the EIS.

As referenced in the investigation by JK Geotechnics the 1:100 000 Geological Series Penrith Geological Map indicates that the site is predominantly underlain by:

- Tertiary and Quaternary age alluvial soils associated with Georges River; over
- Ashfield Shale of the Wianamatta Group.

The JK Geotechnics investigation includes preliminary geotechnical design advice to enable the site to be redevelopment as outlined in the proposal.

3.2 Bulk Earthworks

Bulk earthworks will be required to facilitate the development of the site for the proposed industrial use. The earthworks will be undertaken to provide a large flat building pad, hardstand area, a car parking area and a new truck entry/exit from Kelso Crescent and Seton Road into the site. A high-level earthwork volume estimate assessment has been completed for the site. The estimated volumes are shown on the Costin Roe drawing **CO14972.02-SSDA300** in **Appendix A**.

The earthworks analysis has been completed to a level of detail to enable general pad levels to be set and to obtain an order of magnitude cut and fill volume estimate. Given the preliminary nature of the assessment, an upper and lower bound of earthworks volumes has been included to allow for contingency in cost planning estimates.

A detailed assessment of the earthworks level will be completed during detailed design stage and some adjustment to the final pad and building floor levels (within +/-500mm).

A variance in the final adopted floor levels is provided to provide some flexibility in the design to ensure that the concept estimates provide a suitable operational outcome when detail design and all factors are known. This includes variance for integration with existing structures, final geotechnical cut to fill on the site, allowances for spoil generation, access from properties to roadways, drainage and wastewater design and other unknown elements. The intent would be, where possible to maintain the nominated floor level with minimal differences to the nominal level.

The primary drivers for the proposed earthworks levels are achieving a redevelopment which aligns with the existing structures while ensuring the required flood planning levels are met and allowing satisfactory overland flow drainage, flood compensation storage, sufficient cover above the underground stormwater pipelines while minimising cut as much as practical.

The earthworks volume estimates are included in **Table 3.1**.

Table 3.1 – Earthworks Volume Estimates

	Lower Bound (-15%)	Apparent Volume	Upper Bound (+15%)
Cut (m3)	-8,967	-10,550	-12,132
Fill (m3)	+25,678	+30,210	+34,742
Detail Excavation (@ 1,350m ³ / Ha)	-4,038	-4,750	-5,462
Building Pile Spoil (m3)	-2,125	-2,500	-2,875
Balance (m3)	+10,548	+12,410	+14,273

3.3 Retaining Walls

The civil engineering objective is to minimise retaining walls within the constraints of the redevelopment layout, allowable grading to suit industrial development and batters in landscaped areas where possible

Minor retaining walls will be required to interface with existing levels and structures around the redevelopment. These are anticipated to comprise modular masonry block system (Keystone) with reinforced soil backfill or core-filled masonry block with cantilevered footings or post and panel concrete sleeper walls.

Location and indicative heights of retaining walls are also shown on drawings **CO14972.02-SSDA600**.

3.4 Embankment Stability

To assist in maintaining embankment stability permanent batters in clay will be no steeper than 3 horizontal to 1 vertical while temporary batters will be no steeper than 2 horizontal to 1 vertical.

Permanent batters will also be adequately vegetated or turfed which will assist in maintaining embankment stability.

Stability of batters and reinstatement of vegetation shall be in accordance with the submitted drawings and the Construction Soil and Water Management Plan in **Section 7** of this report.

3.5 Groundwater

Groundwater was measured by JK Geotechnics at the southern end of the site in the installed wells at between RL 5.0m AHD and RL 5.3m AHD.

Groundwater level is noted to be above the expected bulk excavation level for the development, however installation of lift pits and services may extend below the groundwater level.

Given the limited plan dimensions of any excavations which will extend below the groundwater level, and the short duration of construction of the elements below groundwater level, the volume of water to be pumped is expected to be very limited.

We confirm that the development does not propose to utilise surface or groundwater resources. An assessment of the impact on these items is not relevant for the warehouse construction.

Surface water management, including conveyance of surface runoff, management of water quantity and water quality (using WSUD principles and best practice pollution reduction objective) has been proposed in the design.

Reference should be made the investigation prepared by JK Geotechnics ref: 36440PNrpt dated 5 February 2024 for geotechnical investigation and recommendations regarding ground water management.

4 WATER CYCLE MANAGEMENT STRATEGY & DRAINAGE METHODOLOGY

4.1 Key Areas and Objectives

Water Cycle Management (WCM) is a holistic approach that addresses competing demands placed on a region's water resources, whilst optimising the social and economic benefits of development in addition to enhancing and protecting the environmental values of receiving waters.

Developing a WCMS at the SSD stage of the land development process provides guidance on urban water management issues. This WCMS has been prepared to inform DPHI, and relevant stakeholders, that the development is able to provide and integrate WCM measures into the stormwater management strategy for the development.

The key WCM targets which have been adopted in the design are included in **Table 4.1** following, and included in the drawings found in **Appendix A**.

Table 4.1 – WCM Targets

Element	Target	Reference
Water Quantity	Minimise flooding from increased stormwater runoff due to development	Liverpool City Council DCP 2008
Water Quality	Reduce baseline annual pollutant load from the development.	Liverpool City Council DCP 2008
Water Supply	Collect and use rainwater from roof tops to reduce town water consumption	Liverpool City Council DCP 2008
Construction Stormwater Management & Erosion and Sediment Control	A construction stormwater management plan and appropriate associated erosion and sedimentation control measures must be described in the environmental assessment for all stages of construction to mitigate potential impacts to surrounding properties.	Landcom Blue Book Liverpool City Council DCP 2008 DPHI
Flooding	Buildings set 0.5m above the 1% AEP flood level.	NSW Floodplain Development Manual

A summary of the how each of the WCM objectives will be achieved are described below. Reference to the relevant sections of the report should be made for further and technical details relating to the WCM measures:

Stormwater Quantity Management (Refer **Section 5**)

- The intent of this criterion is to reduce the impact of urban development on existing drainage system by limiting post-development discharge within the receiving waters to the pre-development peak, and to ensure no affectation of upstream, downstream or adjacent properties.
- An on-site detention system has been incorporated in the design of the development.
- Refer to Section 5 of the document for further discussion pertaining to water quantity management.

Stormwater Quality Management (Refer **Section 6**)

There is a need to target pollutants that are present in stormwater runoff to minimise the adverse impact these pollutants could have on downstream receiving waters.

A series of Stormwater quality improvement devices (SQID's) have been incorporated in the design of the development. The proposed management strategy will include the following measures:

- Primary treatment of external and roofed areas will be made via gross pollutant traps and pit baskets fitting within the stormwater collection pits.
- Tertiary treatment of impervious areas will be made via proprietary filtration cartridges fitted within the on-site detention tank prior to discharge of stormwater from the site.
- Some treatment will also be present by provision of rainwater reuse tanks on development sites through reuse and settlement within the tanks.
- Reference to **Section 6** of this document should be made for detailed Stormwater Quality modelling and measures.

Water Demand Reduction/ Rainwater Reuse (refer **Section 6.4**)

- Rainwater reuse measures will be provided as part of this development design. Rainwater reuse will be required to reduce demand on non-potable uses.
- The reduction in demand will target non-potable uses such as toilet flushing and irrigation. Refer **Section 6.4**.

Stormwater Management During Construction (refer Section 7)

- A stormwater management plan and associated erosion and sediment control measures is proposed based on Landcom Blue Book and Council requirements.
- The management measures take a staged approach from initial site establishment, construction stages and the period between the completion of the proposed infrastructure works and development of site.

Flood Management (refer FIRA)

- The proposed development considered flooding and large rainfall events in relation to local runoff and overland flow paths.
- Consideration to flood requirements has been made per Council Flood Management Policy. Refer **FIRA** for details.

The following measures have been incorporated in the design:

- All proposed buildings are sited above the flood planning level.
- Flood storage within the site is maintained for the 1% AEP event.

It is noted that the proposed flood storage encroaches on an existing Endeavour Energy electrical easement approximately 9-14m wide along the western and southern site boundary. The proposed flood storage on the existing electrical easement is subject to approval by Endeavour Energy.

4.2 Existing Site Drainage

The site was previously developed as an industrial property but has since undergone demolition as described in **Section 2.2**.

An existing formal inground drainage associated with the previous use is currently on the site which carries stormwater runoff from the now demolished warehouse and surrounds offsite to Seton Road. The existing discharge point on the site is in the south-west corner of the site, into Seton Road as shown in **Figure 4.1**.

The existing site drainage system will be primarily removed as part of the new drainage for the proposed development. The existing discharge point to Seton Road is proposed to be retained and utilised as part of this development.

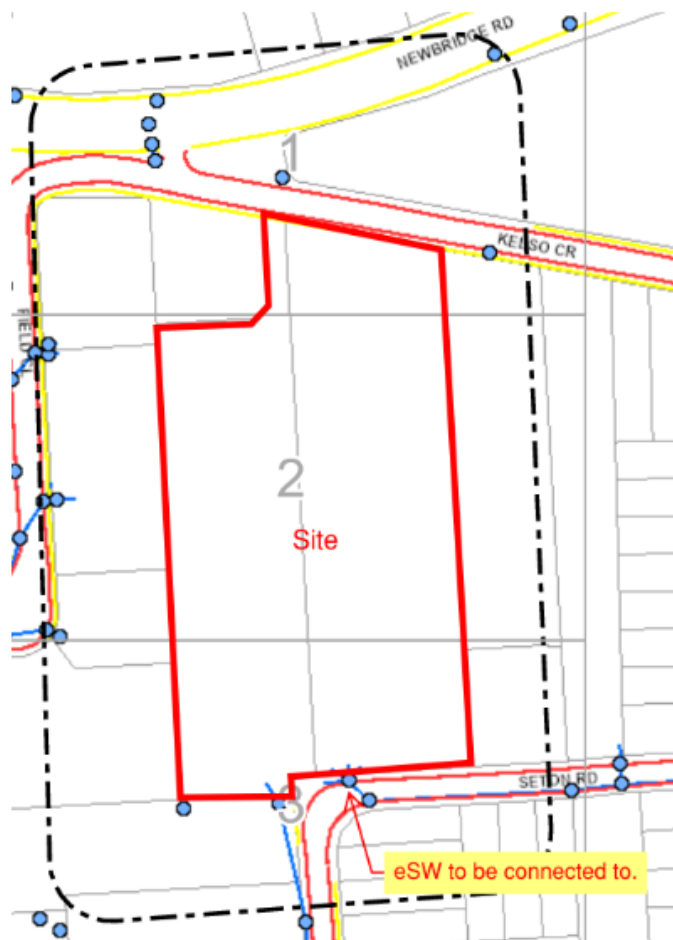


Figure 4.1 – Existing Stormwater Discharge (Source: LCC DBYD)

4.3 Proposed Surface Water Drainage System

As per general engineering practice and the guidelines of Council, the proposed stormwater drainage system for the development will comprise a minor and major system to safely and efficiently convey collected stormwater run-off from the development to the legal point of discharge.

The minor system is to consist of a piped drainage system which has been designed to accommodate the 1 in 20-year ARI storm event (5% AEP). This results in the piped system being able to convey all stormwater runoff up to and including the 5% AEP event. The major system will be designed to cater for storms up to and including the 1 in 100-year ARI storm event (1% AEP). The major system will employ the use of defined overland flow paths, such as roads and open channels, to safely convey excess run-off from the site.

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, the standards of Liverpool City Council and accepted engineering practice. Runoff from buildings will generally be designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage. Overall site runoff and stormwater management will generally be designed in accordance with the Institution of Engineers, Australia publication “Australian Rainfall and Runoff” (2019 Edition), Volumes 1 and 2 (AR&R).

Water quality and re-use are to be considered in the design to ensure that any increase in the detrimental effects of pollution is mitigated, Council Water Quality Objectives are met and that the demand on potable water resources is reduced.

The existing stormwater management system on-site are proposed to be removed as part of this development.

The legal point of discharge is a point specified by Council where stormwater from a property can be discharged. The legal point of discharge is usually Council's/ Sydney Water stormwater infrastructure (where available), the street kerb and channel for smaller developments or downstream receiving waters like an existing stream or gully, lake, pond or waterbody. The legal point of discharge for this site is into the existing stormwater drainage network within Seton Road located on the south of the subject site.

With reference to the drawings in **Appendix A**, the drainage system proposed can be described as follows:

- In-ground piped drainage system designed to the 5% AEP (1 in 20yr ARI).
- Overland drainage system designed to the 1% AEP (1 in 100yr ARI).
- Primary treatment of external areas will be made via proposed gross pollutant trap and pit baskets fitting within the stormwater collection pits.
- Tertiary treatment of stormwater via proprietary filtration cartridges fitted within the on-site detention tank.
- Part of the roof being conveyed to rainwater tank for non-potable re-use.
- Provision of an on-site detention tank to manage any increase in peak flows.
- Site discharge via the existing connection to Seton Road.

4.4 Hydrological Modelling & Analysis

4.4.1 Rainfall Data

Rainfall intensity Frequency Duration (IFD) data used as a basis for DRAINS modelling and initial pipe sizing based on rational method assessments for the 2 to 100 Year ARI events, was taken from The Bureau of Meteorology Online IFD Tool.

4.4.2 Runoff Models

In accordance with the recommendations and standards of Council, the calculation of the runoff from storms of the design ARI will be calculated with the catchment modelling software DRAINS for internal drainage only as part of future detail designs.

Detailed hydraulic assessment of the internal drainage system will be calculated at detail/ construction certificate stage.

The design parameters for the DRAINS model are to be based on the recommendations as defined by council and parameters for the area and are as follows:

Table 4.2 – DRAINS Parameters

Model	Model for Design and Analysis Run	Rational Method	
	Rational Method Procedure	ARR2019	
	Soil Type-Normal	3.0	
	Paved (Impervious) Area Depression Storage	1	mm
	Supplementary Area Depression Storage	1	mm
	Grassed (Pervious) Area Depression Storage	5	mm
AMC	Antecedent Moisture Condition (ARI=1-5 years)	2.5	
AMC	Antecedent Moisture Condition (ARI=10-20 years)	3.0	
AMC	Antecedent Moisture Condition (ARI=50-100 years)	3.5	
	Sag Pit Blocking Factor (Minor Systems)	0	
	On Grade Pit Blocking Factor (Minor Systems)	0	
	Sag Pit Blocking Factor (Major Systems)	0.5	
	On Grade Pit Blocking Factor (Major Systems)	0.2	

4.5 Hydraulics

4.5.1 General Requirements

Hydraulic calculations will be carried out utilising DRAINS modelling software during the detail design stage to ensure that all surface and subsurface drainage systems perform to or exceed the required standard.

4.5.2 Freeboard

The calculated water surface level in open junctions of the piped stormwater system will not exceed a freeboard level of 150mm below the finished ground/ grate level, for the peak runoff from the Minor System runoff.

The calculated water surface for the peak runoff from the Major System runoff will not exceed a freeboard level of 500mm below the finished floor level of the building.

4.5.3 Public Safety

For all areas subject to pedestrian traffic, the product (dV) of the depth of flow d (in metres) and the velocity of flow V (in metres per second) will be limited to 0.4, for all storms up to the 100-year ARI.

For other areas, the dV product will be limited to 0.6 for stability of vehicular traffic (whether parked or in motion) for all storms up to the 100-year ARI.

4.5.4 Inlet Pit Spacing

The spacing of inlets throughout the site will be such that the depth of flow, for the Major System design storm runoff, will not exceed the top of the kerb (150mm above gutter invert).

4.5.5 Overland Flow (locally within the development site)

Dedicated flow paths have been designed to convey all storms up to and including the 100-year ARI. These flow paths will convey stormwater from the site to the stormwater management systems prior to discharge.

5 WATER QUANTITY MANAGEMENT

5.1 General Design Principles

Liverpool City Council adopts the principles of water quantity management, also known as “On-site Detention (OSD)”, to ensure that there is no adverse impact from stormwater runoff on downstream properties as a result of development in the catchment for all storm event up to and including the 100 ARI event. The objective is to ensure on-site stormwater detention systems are incorporated into design to provide temporary storage of stormwater runoff from developments and restrict discharge from the site at a rate which Council's existing drainage system is capable of accommodating.

5.2 Methodology

Attenuation of stormwater runoff from the development is proposed to be managed via a detention tank provided in the southern portion of the development. As discussed above, the objective is to attenuate stormwater flow from the development to pre-developed flows.

Sizing of the detention system has been completed using DRAINS modelling software in accordance with the Liverpool City Council Policy for the 1 in 2-year ARI to 1 in 100-year ARI storms for various durations.

5.3 Pre-Development & Post-Development Peak Flows

Table 5.1 provides details for the pre and post development flows and storage for the proposed detention system. The critical storm duration for the 1 in 2 year, 1 in 20 year and 1 in 100-year ARI storms is 2 hours and flows and storage information are provided for this storm.

Table 5.1. Site and Detention Hydrology

ARI	Pre-developed Flow (m ³ /s)	Post Developed Flow (m ³ /s)		
		Un-attenuated	Attenuated (no bypass)	Attenuated (with bypass)
2	0.588	0.447	0.331	0.351
20	0.951	0.702	0.432	0.460
100	1.200	0.863	0.687	0.557

5.4 Proposed Detention System

The proposed detention system location can be found on drawing **CO14972.02-SSDA403** included in **Appendix A**. The final arrangement of the tank will be confirmed in detail design stage, ensuring the flow arrangements of **Table 5.1** are achieved.

Indicative hydrological and storage arrangements are shown below.

Table 5.2. Detention Tank

ARI	Post Developed Flow (m ³ /s)					Storage (m ³)
	Un-attenuated	Attenuated				
		Low Flow	High Flow	Total	Total Flow (with bypass)	
2	0.447	0.331	0	0.331	0.351	162
20	0.702	0.432	0	0.432	0.460	325
100	0.863	0.481	0.206	0.687	0.557	412

The modelling has shown that, with the provision of a total storage volume of 412m³ contained in the modelled system, stormwater flows from the development will be attenuated to pre-development flows. Detention storage will be fully active and will be provided as an underground tank.

The proposed detention system meets the policy requirements of Liverpool City Council. The modelling allows for 5% of the site to be un-attenuated and includes the southern access road and landscaped batters. We also confirm that the flow from the site being directed to the existing Seton Road system are less than the pre-developed flows.

6 STORMWATER QUALITY, REUSE AND MAINTENANCE

6.1 Stormwater Quality Objectives

There is a need to provide design which incorporates the principles of Water Sensitive Urban Design (WSUD) and to target pollutants that are present in the stormwater so as to minimise the adverse impact these pollutants could have on receiving waters and to also meet the requirements specified by Liverpool City Council.

Liverpool City Council have nominated, in *Section 6.4 of Part 1* of their *DCP 2008*, the requirements for stormwater quality to be performed on a catchment wide basis. These are presented in terms of annual percentage pollutant reductions on a developed catchment and are as follows:

Gross Pollutants	90%
Total Suspended Solids	85%
Total Phosphorus	65%
Total Nitrogen	45%

6.2 Proposed Stormwater Treatment System

Developed impervious areas including roof, hardstand, car parking, roads and other extensive impervious areas are required to be treated by the Stormwater Treatment Measures (STM's). The STM's shall be sized according to the whole catchment area of the development. The STM's for the development shall be based on a treatment train approach to ensure that all the objectives above are met.

Components of the treatment train for the development are as follows:

- Treatment of stormwater on the development is to be performed via the provision of a treatment train of proprietary systems;
- Primary treatment will be completed via the OceanProtect OceanSave Gross Pollutant Trap (GPT) approved equivalent for the northern portion of the development
- Primary treatment will be completed via provision of OceanProtect OceanGuard pit baskets or approved equivalent for the southern portion of the development.
- Tertiary treatment is to be performed via OceanProtect NPSORB Stormfilter within the combined water quantity and quality tank;
- It is noted that portion of the southern catchment will bypass tertiary treatment systems;
- A portion of the roof will also be treated via rainwater reuse and settlement within the rainwater tank.

Reference to drawing **CO14972.02-SSDA400 to 403** shows the location of the proposed STM. The proposed water quality treatment system is consistent with the other industrial developments and provides a suitable level of treatment which meets Council engineering policy.

6.3 Stormwater Quality Modelling

6.3.1 Introduction

The MUSIC modelling software was chosen to model water quality. This model has been released by the Cooperative Research Centre for Catchment Hydrology (CRCCH) and is a standard industry model for this purpose. MUSIC (the Model for Urban Stormwater Improvement Conceptualisation) is suitable for simulating catchment areas of up to 100 km² and utilises a continuous simulation approach to model water quality.

By simulating the performance of stormwater management systems, MUSIC can be used to predict if these proposed systems and changes to land use are appropriate for their catchments and are capable of meeting specified water quality objectives (CRC 2002). The water quality constituents modelled in MUSIC and of relevance to this report include Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN).

The pollutant retention criteria set out in Councils DCP and nominated in **Section 6.1** of this report were used as a basis for assessing the effectiveness of the selected treatment trains.

The MUSIC model "CO14972.02-Rev2.sqz" was set up to examine the effectiveness of the water quality treatment train and to predict if council requirements have been achieved. The layout of the MUSIC model is presented below.

6.3.2 Rainfall Data

Six minute pluviographic data which has been sourced from the Bureau of Meteorology (BOM) as nominated below. Evapo-transpiration data for the period was sourced from the Sydney Monthly Areal PET data set supplied with the MUSIC software.

Input	Data Used
Rainfall Station	67035 Liverpool (Whitlam)
Rainfall Period	1 January 1967 – 31 December 1976 (10 years)
Mean Annual Rainfall (mm)	857
Evapotranspiration	Sydney Monthly Areal PET
Model Timestep	6 minutes

6.3.3 Rainfall Runoff Parameters

Parameter	Value
Rainfall Threshold	1.40
Soil Storage Capacity (mm)	170
Initial Storage (% capacity)	30
Field Capacity (mm)	70
Infiltration Capacity Coefficient a	210
Infiltration Capacity exponent b	4.7
Initial Depth (mm)	10
Daily Recharge Rate (%)	50
Daily Baseflow Rate (%)	4
Daily Seepage Rate (%)	0

6.3.4 Pollutant Concentrations & Source Nodes

The source nodes used are based on the land use parameters defined as per the **Table 6.1**:

Table 6.1. Pollutant Concentrations

Flow Type	Surface Type	TSS (log ₁₀ values)		TP (log ₁₀ values)		TN (log ₁₀ values)	
		Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Baseflow	Roof	1.20	0.17	-0.85	0.19	0.11	0.12
	Roads	1.20	0.17	-0.85	0.19	0.11	0.12
	Landscaping	1.20	0.17	-0.85	0.19	0.11	0.12
Stormflow	Roof	1.30	0.32	-0.89	0.25	0.30	0.19
	Roads	2.43	0.32	-0.30	0.25	0.34	0.19
	Landscaping	2.15	0.32	-0.60	0.25	0.30	0.19

The MUSIC model has been setup with a treatment train approach based on the pollutant concentrations in **Table 6.1** above.

6.3.5 Treatment Nodes

Gross Pollutant Trap, Pit baskets and filtration device treatment nodes have been used in the modelling of the development as provided by the suppliers of the products based on testing completed by the product manufacturers. Detention basin nodes were also introduced to the model using typical parameters contained in MUSIC modelling guidelines.

6.3.6 Results

Table 6.2 shows the results of the MUSIC analysis. The reduction rate is expressed as a percentage and compares the post-development pollutant loads without treatment versus post-development loads with treatment.

Table 6.2. MUSIC analysis results

	Source	Residual Load	% Reduction	Target Met
Total Suspended Solids (kg/yr)	3,790	541	85.7	Y
Total Phosphorus (kg/yr)	7.97	1.73	78.3	Y
Total Nitrogen (kg/yr)	57.3	24.5	57.2	Y
Gross Pollutants (kg/yr)	682	31.9	95.3	Y

The model results indicate that, through the use of the STM's in the treatment train, pollutant load reductions for Total Suspended Solids, Total Phosphorous, Total Nitrogen and Gross Pollutants will meet the requirements of Part 1 of Liverpool City Councils DCP 2008 on an overall catchment basis.

6.3.7 Modelling Discussion and Conclusion

MUSIC modelling has been performed to assess the effectiveness of the selected treatment trains and to ensure that the pollutant retention requirements of Part 1 of Councils DCP 2008 have been met.

The MUSIC modelling has shown that the proposed treatment train of STM's will provide stormwater treatment which will meet council requirements in an effective and economical manner.

6.4 Stormwater Harvesting

Stormwater harvesting refers to the collection of stormwater from the developments internal stormwater drainage system for re-use in non-potable applications. Stormwater from the stormwater drainage system can be classified as either rainwater where the flow is from roof areas only, or stormwater where the flow is from all areas of the development.

Rainwater harvesting will be required for the development in order to meet Liverpool Council Policy and NSW Department of Planning and The Environment requirements with the aim being to reduce overall demand by providing re-use for non-potable applications. Internal uses include such applications as toilet flushing while external applications will be used for irrigation.

Rainwater tank location and indicative sizing have been nominated on the drainage design noting this would be confirmed in future detail design based on a water balance assessment as outlined in Council Policy and the document Managing Urban Stormwater: Harvesting and Reuse – 2006 (NSW DEC).

In general terms the rainwater harvesting systems are expected to comprise an in-line tank for the collection and storage of rainwater. At times when the rainwater storage tank is full rainwater can pass through the tank and continue to be discharged via gravity into the stormwater drainage system. Rainwater from the storage tank will be pumped for distribution throughout the development in a dedicated non-potable water reticulation system. This however would be, as noted, subject to future detail design.

6.5 Maintenance and Monitoring

It is important that each component of the stormwater system and water quality treatment train is properly operated and maintained. In order to achieve the design treatment objectives, an indicative maintenance schedule has been prepared and included as **Appendix D** to assist in the effective operation and maintenance of the various water quality components.

Inspection frequency may vary depending on site specific attributes and rainfall patterns in the area. In addition to the nominated frequency, it is recommended that inspections are made following large storm events.

7 CONSTRUCTION SOIL AND WATER MANAGEMENT

7.1 Soil and Water Management General

Without any mitigation measures and during typical construction activities, site runoff would be expected to convey a significant sediment load. A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP), or equivalent, would be implemented for the construction of the proposed development as part of the CEMP. The SWMP and ESCPs would be developed in accordance with the principles and requirements of Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book') (Landcom, 2004) with a staged approach.

In accordance with the principles included in the Blue Book, a number of controls have been incorporated into a preliminary ESCP (refer to accompanying Drawings in **Appendix A**) and draft SWMP in **Appendix C**. The ESCP considers initial site establishment, requirements during construction of the development, and completion of development works.

Section 1 of **Appendix C** provides a summary of the construction works for the Proposal. While all construction activities have the potential to impact on water quality, the key activities are:

- Erosion and sediment control installation.
- Grading of existing earthworks to suit building layout, drainage layout and pavements.
- Stormwater and drainage works.
- Service installation works.
- Building construction works.

The sections below outline the proposed controls for management of erosion and sedimentation during construction of the Proposal. The approach is noted to consider initial site establishment, construction of the development and the completion of the development, as included in the ESCP drawings **Appendix A**.

7.2 Typical Management Measures

Sediment Basins

Sediment basins have been sized (based on 5-days, 85th percentile rainfall) and located to ensure sediment concentrations in site runoff are within acceptable limits. Preliminary basin sizes have been calculated in accordance with the Blue Book and are based on 'Type D' soils. These soils contain a significant proportion of fine (<0.005mm) "dispersible" materials that will never settle unless flocculated.

Sediment basins for 'Type D' soils are typically wet basins which are pumped out following a rainfall event when suspended solids concentrations of less than 50 mg/L have been achieved.

Refer **CO14972.02-SSDA200** for calculations, per the Blue Book Guidelines Section 6.3.3.

Sediment Fences and Diversion Drains

Sediment fences and diversion drains are located along all boundary of the site to ensure no untreated runoff leaves the site. They have also been located around the proposed stockpiles on the site.

Stabilised Site Access

For the proposal, stabilised site access is proposed at one location at the entry to the works area. This will limit the risk of sediment being transported onto Kelso Crescent and other public roads.

7.3 Other Management Measures

Other management measures that will be employed are expected to include:

- Minimising the extent of disturbed areas across the site at any one time.
- Progressive stabilisation of disturbed areas or previously completed earthworks to suit the proposal once trimming works are complete.
- Regular monitoring and implementation of remedial works to maintain the efficiency of all controls.

It is noted that the controls included in the preliminary ESCP are expected to be reviewed and updated as the design, staging and construction methodology is further developed for the Proposal.

8 CONCLUSION

This Civil Engineering Report has been prepared to support the State Significant Development Application for a Proposed Development at 20 Kelso Crescent, Moorebank, NSW.

A civil engineering strategy for the site has been developed which provides a best practice solution within the constraints of the existing landform and proposed development layout. Within this strategy a stormwater quantity and quality management strategy has been developed to reduce peak flows and reduce pollutant loads in stormwater leaving this site. The stormwater management for the development has been designed in accordance with Liverpool City Council requirements and ensuring acceptable impacts relating to the development.

The hydrological assessment shows local post development flows from the site will be reduced to pre-development flows and demonstrates that the site discharge will not adversely affect any land, drainage systems or watercourse as a result of the development.

During the construction phase, a Soil and Water Management Plan and Sediment and Erosion Control Plan will be in place as part of the CEMP to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

During the operational phase of the development, a treatment train incorporating the use of pit baskets, gross pollutant trap and filtration cartridges is proposed to mitigate any increase in stormwater pollutant load generated by the development. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

9 REFERENCES

- Development Control Plan 2008, Liverpool City Council
- On-Site Stormwater Detention Standard 2021, Liverpool City Council
- On-Site Stormwater Detention Policy 2004, Liverpool City Council
- Handbook for Drainage Design Criteria 2003, Liverpool City Council
- Water Sensitive Urban Design (WSUD) Guideline 2015, Liverpool City Council
- NSW Government (2023). Floodplain Development Manual.
- Managing Urban Stormwater: Harvesting and Reuse – 2006 (NSW DEC);
- Managing Urban Stormwater: Source Control – 1998 (NSW EPA);
- Managing Urban Stormwater: Treatment Techniques – 1997 (NSW EPA);
- Landcom (2004). Managing Urban Stormwater – Soils and Construction – 4th Edition.

10 APPENDICES

APPENDIX A
COSTIN ROE CONSULTING - CIVIL DRAWINGS

MARVEL MOOREBANK

20 KELSO CRESCENT, MOOREBANK, NSW 2170

CIVIL DRAWINGS FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

DRAWING LIST

DRAWING NO.	DRAWING TITLE
C014972.02-SSDA100	DRAWING LIST & GENERAL NOTES
C014972.02-SSDA200	EROSION AND SEDIMENT CONTROL PLAN
C014972.02-SSDA250	EROSION AND SEDIMENT CONTROL DETAILS - SHEET 1
C014972.02-SSDA251	EROSION AND SEDIMENT CONTROL DETAILS - SHEET 2
C014972.02-SSDA300	BULK EARTHWORKS PLAN
C014972.02-SSDA310	CUT FILL PLAN
C014972.02-SSDA350	BULK EARTHWORKS SECTIONS - SHEET 1
C014972.02-SSDA351	BULK EARTHWORKS SECTIONS - SHEET 2
C014972.02-SSDA400	STORMWATER DRAINAGE KEY PLAN - LOWER GF 1 & GF
C014972.02-SSDA401	STORMWATER DRAINAGE PLAN AT LOWER GF 1 & GF - SHEET 1
C014972.02-SSDA402	STORMWATER DRAINAGE PLAN AT LOWER GF 1 & GF - SHEET 2
C014972.02-SSDA403	STORMWATER DRAINAGE PLAN AT LOWER GF 1 & GF - SHEET 3
C014972.02-SSDA410	STORMWATER DRAINAGE KEY PLAN - LEVEL 1
C014972.02-SSDA450	STORMWATER DRAINAGE DETAILS - SHEET 1
C014972.02-SSDA451	STORMWATER DRAINAGE DETAILS - SHEET 2
C014972.02-SSDA452	STORMWATER DRAINAGE DETAILS - SHEET 3
C014972.02-SSDA460	ON-SITE DETENTION TANK DETAILS
C014972.02-SSDA500	FINISHED LEVELS KEY PLAN - LOWER GF 1 & GF
C014972.02-SSDA501	FINISHED LEVELS PLAN AT LOWER GF 1 & GF - SHEET 1
C014972.02-SSDA502	FINISHED LEVELS PLAN AT LOWER GF 1 & GF - SHEET 2
C014972.02-SSDA503	FINISHED LEVELS PLAN AT LOWER GF 1 & GF - SHEET 3
C014972.02-SSDA510	FINISHED LEVELS PLAN - LEVEL 1
C014972.02-SSDA550	FINISHED LEVELS TYPICAL SECTIONS - SHEET 1
C014972.02-SSDA600	RETAINING WALL PLAN
C014972.02-SSDA650	RETAINING WALL DETAILS
C014972.02-SSDA800	EXTERNAL PAVEMENT PLAN
C014972.02-SSDA850	EXTERNAL PAVEMENT DETAILS - SHEET 1
C014972.02-SSDA851	EXTERNAL PAVEMENT DETAILS - SHEET 2

GENERAL NOTES:

- THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT STANDARDS AUSTRALIA CODES AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.
- ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS. ENGINEER'S DRAWINGS ISSUED IN ANY ELECTRONIC FORMAT MUST NOT BE USED FOR DIMENSIONAL SETOUT.
- REFER TO THE ARCHITECT'S DRAWINGS FOR ALL DIMENSIONAL SETOUT INFORMATION. DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.
- UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.
- ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ACCEPTABLE SAFETY STANDARDS & APPROPRIATE SAFETY SIGNS SHALL BE INSTALLED AT ALL TIMES DURING THE PROGRESS OF THE JOB.

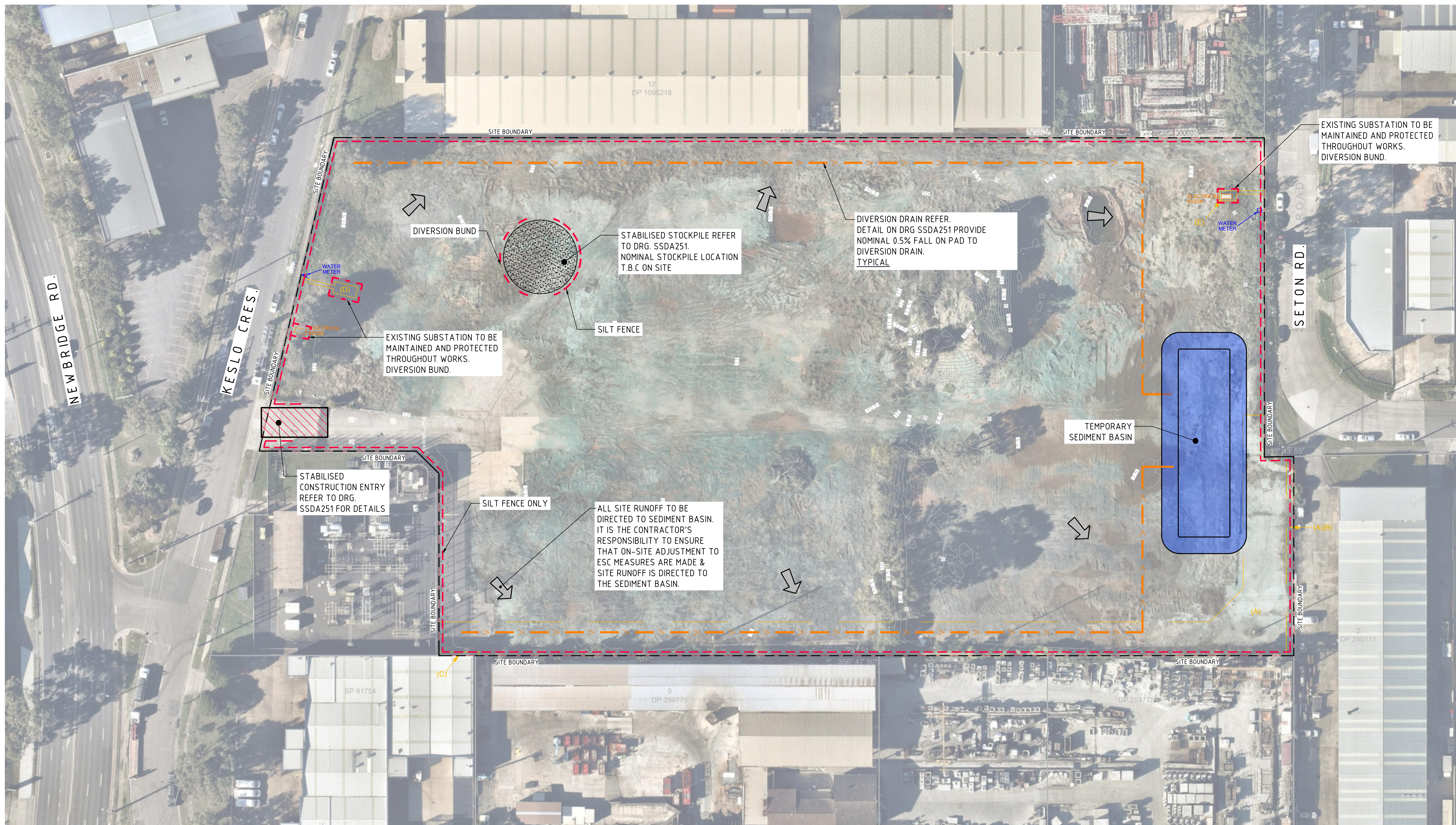
ELECTRONIC INFORMATION NOTES:

- THE ISSUED DRAWINGS IN HARD COPY OR PDF FORMAT TAKE PRECEDENCE OVER ANY ELECTRONICALLY ISSUED INFORMATION, LAYOUTS OR DESIGN MODELS.
- THE CONTRACTOR'S DIRECT AMENDMENT OR MANIPULATION OF THE DATA OR INFORMATION THAT MIGHT BE CONTAINED WITHIN AN ENGINEER-SUPPLIED DIGITAL TERRAIN MODEL AND ITS SUBSEQUENT USE TO UNDERTAKE THE WORKS WILL BE SOLELY AT THE DISCRETION OF AND THE RISK OF THE CONTRACTOR.
- THE CONTRACTOR IS REQUIRED TO HIGHLIGHT ANY DISCREPANCIES BETWEEN THE DIGITAL TERRAIN MODEL AND INFORMATION PROVIDED IN THE CONTRACT AND/OR DRAWINGS AND IS REQUIRED TO SEEK CLARIFICATION FROM THE SUPERINTENDENT.
- THE ENGINEER WILL NOT BE LIABLE OR RESPONSIBLE FOR THE POSSIBLE ON-GOING NEED TO UPDATE THE DIGITAL TERRAIN MODEL, SHOULD THERE BE ANY AMENDMENTS OR CHANGES TO THE DRAWINGS OR CONTRACT INITIATED BY THE CONTRACTOR.



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION 17.10.25 C ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION 14.10.25 B ISSUED FOR INFORMATION 16.09.25 A		ARCHITECT PACE ARCHITECTS	CLIENT VAUGHAN CONSTRUCTIONS	PROJECT MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170	CONSULT AUSTRALIA	Costin Roe Consulting Pty Ltd. ABN 50 003 696 446 PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 f: +61 2 9241 3731 e: mail@costinroe.com.au w: costinroe.com.au	CRC COSTIN ROE CONSULTING CIVIL & STRUCTURAL ENGINEERS	DRAWING TITLE DRAWING LIST & GENERAL NOTES DRAWING No C014972.02-SSDA100	ISSUE C
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EROSION & SEDIMENT CONTROL PLAN
SCALE 1:500

EROSION CONTROL NOTES:

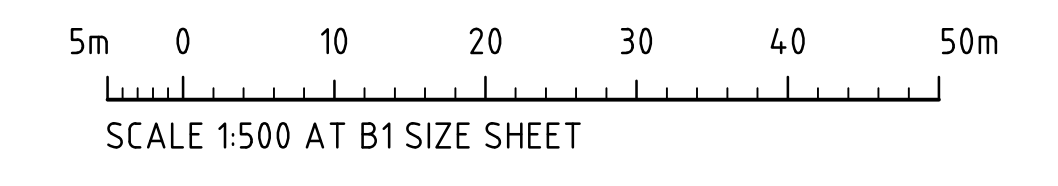
- ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.
- SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
 - HAY BALE BARRIERS AND GEOTEXTILE FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
 - ALL TEMPORARY EARTH BERM, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
 - CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
 - THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ONGOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
 - ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING. TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
 - ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
 - ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
 - ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200mm.
 - ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
 - AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
 - ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
 - ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
 - ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
 - ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FROM MOTOR VEHICLES.
 - THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
 - THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES. WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

DUST CONTROL NOTES:

- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE DUST CONTROL MEASURES ARE APPLIED AND MAINTAINED IN ACCORDANCE WITH THE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN.
- THE APPLICATION OF LIQUID BASED DUST SUPPRESSION MEASURES MUST BE SUCH THAT SEDIMENT LADEN RUNOFF RESULTING FROM SUCH MEASURES DOES NOT CREATE A TRAFFIC OR ENVIRONMENTAL HAZARD. (EG USING HAY BALES)
- DUST GENERATION ASSOCIATED WITH WIND EROSION IS TO BE CONTROLLED USING WATER TRUCKS, DUST SUPPRESSING FOG MIST GENERATORS, SEALANT PLACED OVER THE SOIL, SURFACE ROUGHENING OR RE-VEGETATION.
- THE FOLLOWING ACTIVITIES SHALL BE ADOPTED, IF NECESSARY, TO MANAGE DUST CONTROL ON SITE:
 - LIMITING THE AREA OF SOIL DISTURBANCE AT ANY GIVEN TIME
 - REPLACING TOPSOIL AFTER COMPLETION OF EARTHWORKS
 - PROGRAMMING WORK TO MINIMISE THE LIFE OF STOCKPILES
 - TEMPORARILY STABILISING LONG-TERM STOCKPILES
 - GRAVELLING UNSEALED ACCESS AND HAUL ROADS
 - MINIMISING TRAFFIC MOVEMENT ON EXPOSED SURFACES
 - LIMITING VEHICULAR TRAFFIC TO 15km/h
 - RETAINING EXISTING VEGETATION AS WIND BREAKS
- OR, LANDFILL GAS CONDENSATE OR ANY CONTAMINATED LEACHATE OR STORMWATER IS NOT TO BE USED FOR DUST SUPPRESSION.

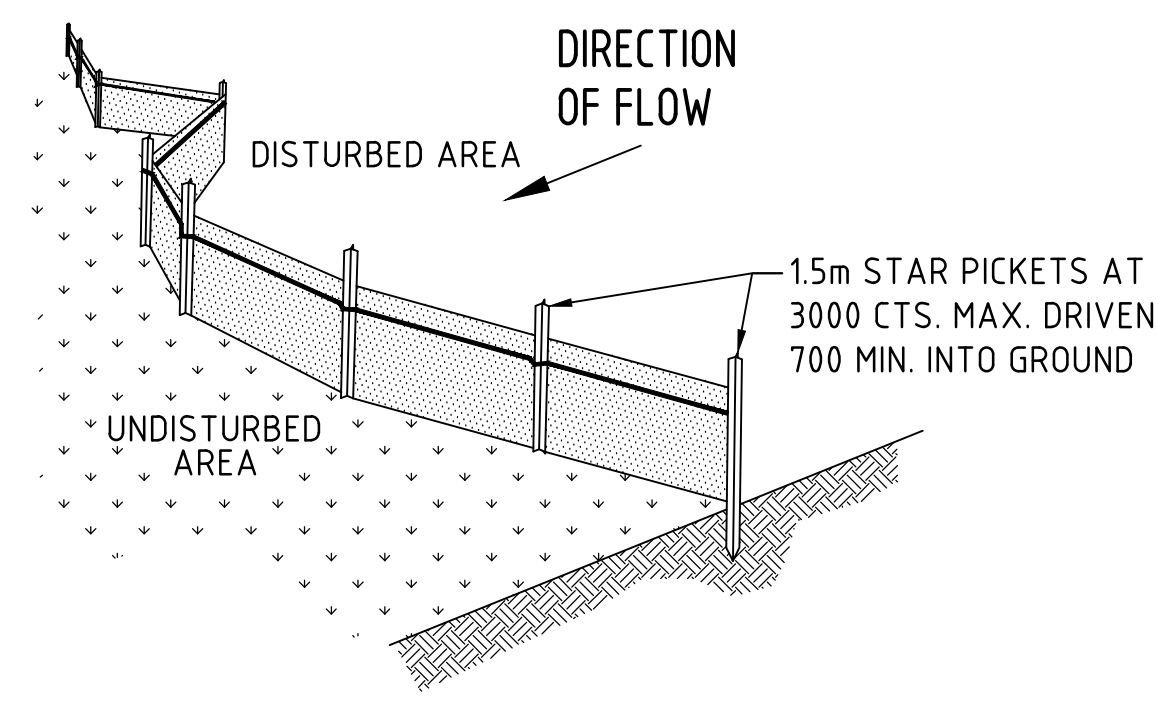
LEGEND:

- PROVIDE 1m RETURNS TO SILT FENCE AT 30m MAX. INTERVALS. TYPICAL (N.S.O.P.)
- DENOTES DIVERSION DRAIN
 - DENOTES SILT FENCE WITH CATCH DRAIN
 - DENOTES SILT FENCE ONLY
 - DENOTES CONSTRUCTION ENTRY
 - DENOTES OVERLAND FLOW PATH
 - DENOTES EXISTING POND TO BE DEWATERED



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

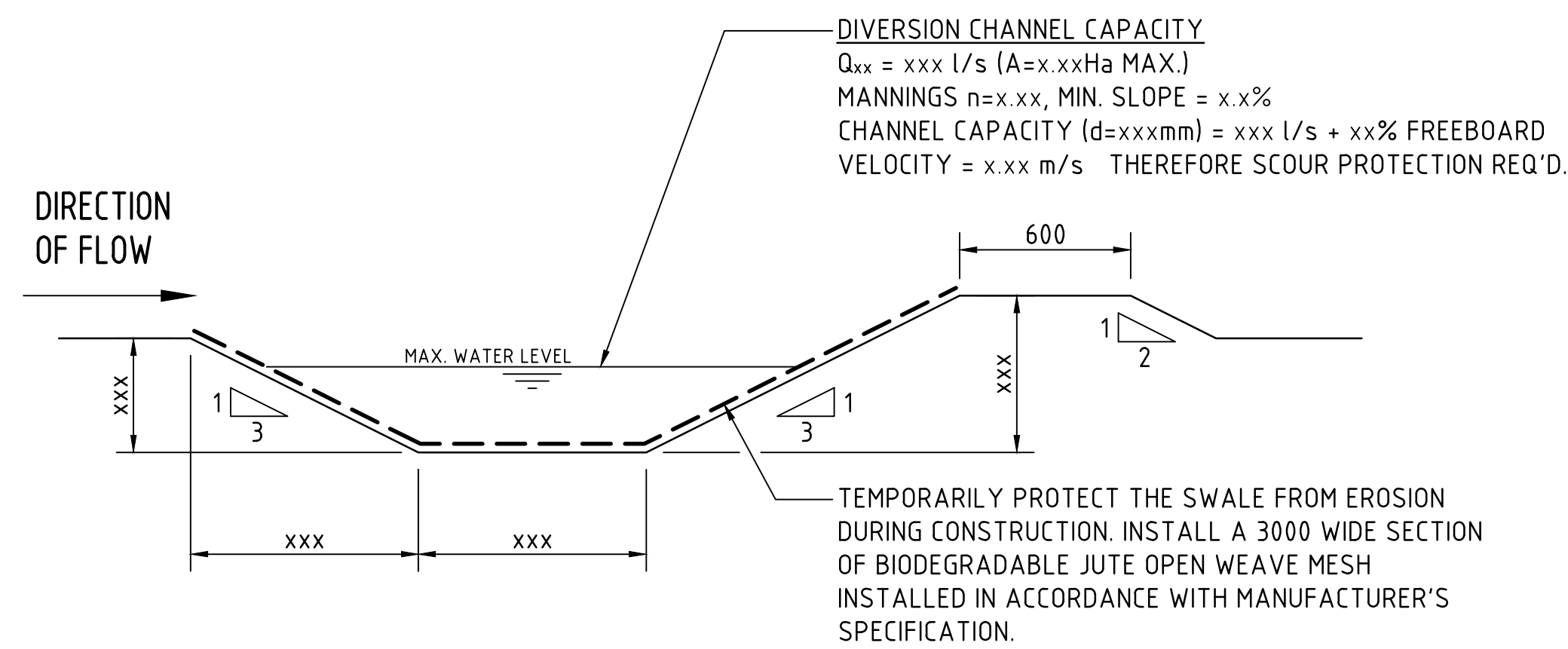
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT		CLIENT		PROJECT		COSTIN ROE CONSULTING PTY LTD.		DRAWING TITLE	
ISSUED FOR INFORMATION		16.09.25	A	PACE ARCHITECTS		VAUGHAN CONSTRUCTIONS		MARVEL MOOREBANK 20 KESLO CRESCENT, MOOREBANK NSW 2170		Costin Roe Consulting Pty Ltd. ABN 50 003 696 446		EROSION & SEDIMENT CONTROL PLAN	
AMENDMENTS		DATE	ISSUE	AMENDMENTS		DATE		DESIGNED		DRAWN		DRAWING No	
								HC		QP		C014972.02-SSDA200	
								DATE		CHECKED		ISSUE	
								XC		SIZE		ISSUE	
								AS SHOWN		SCALE		ISSUE	
								CAD REF:		C014972.02-SSDA200		B	
										CONSULT AUSTRALIA		CRC CIVIL & STRUCTURAL ENGINEERS	
										PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 f: +61 2 9241 3751 e: mail@costinroe.com.au w: costinroe.com.au		C014972.02-SSDA200	



TYPICAL SILT FENCE DETAIL

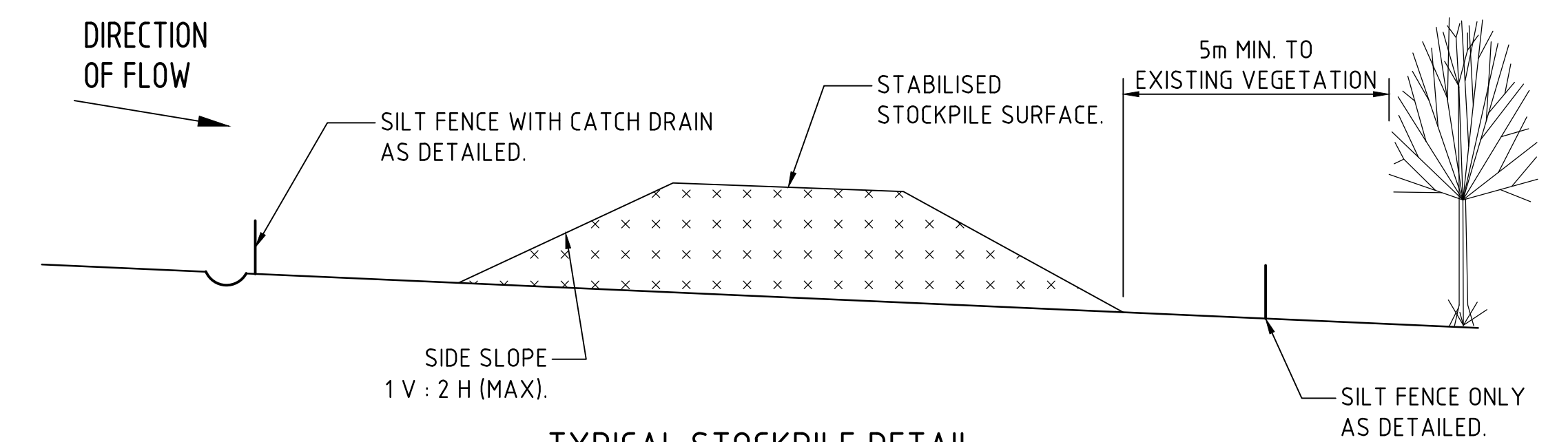
N.T.S

NOTE: PROVIDE 1m RETURNS AT 30m INTERVALS. TYPICAL



DIVERSION DRAIN SECTION

SCALE 1:20

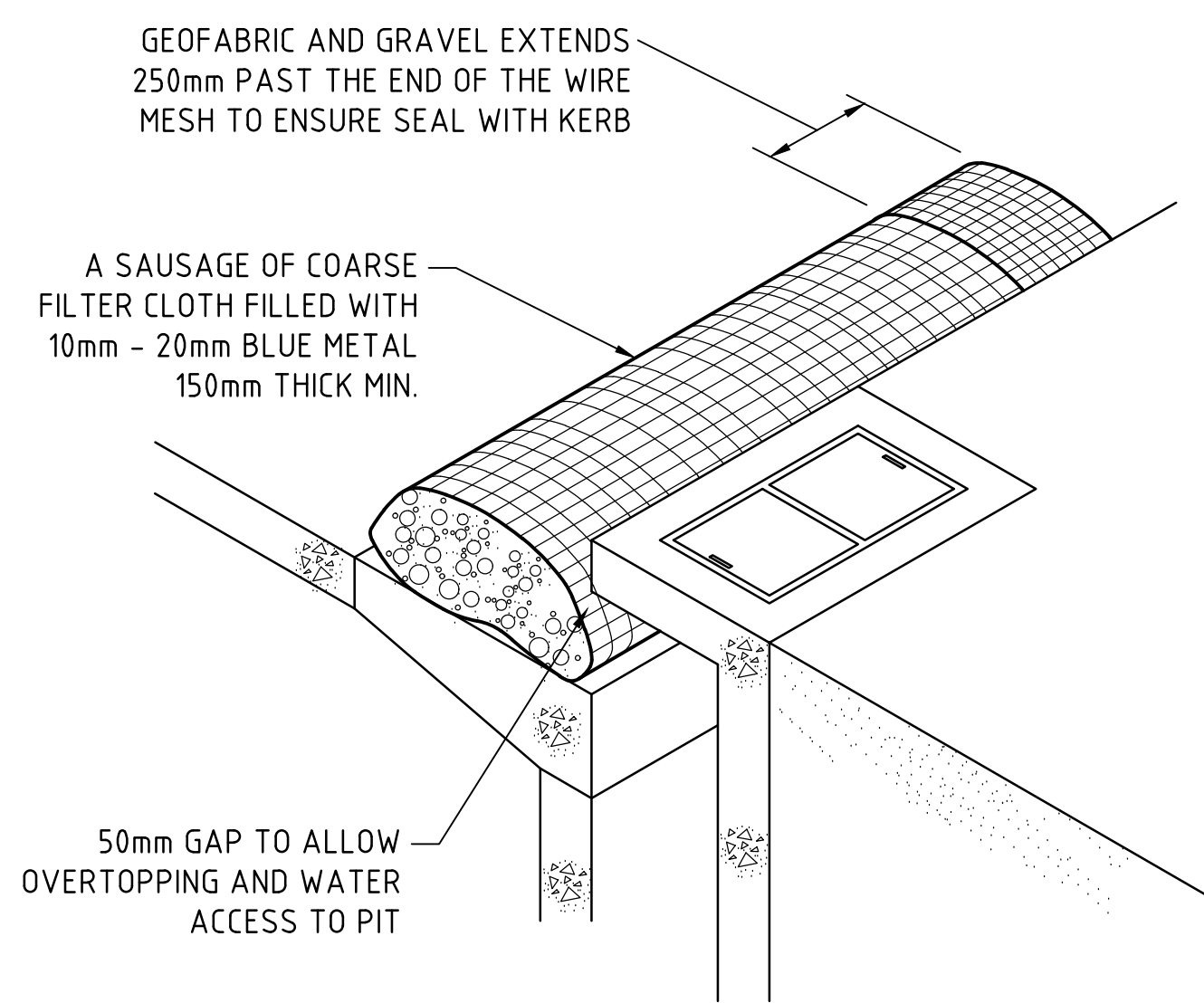


TYPICAL STOCKPILE DETAIL

N.T.S

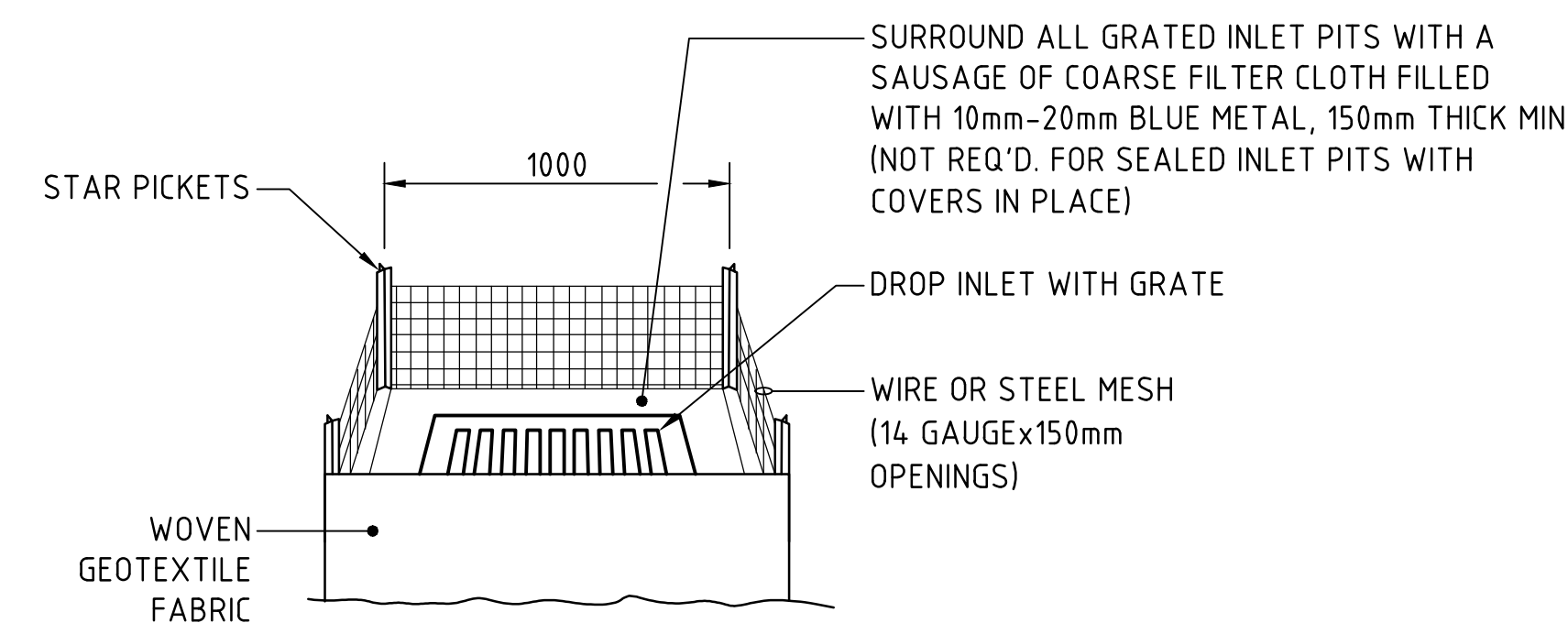
STOCKPILE NOTES

1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V : 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE USING WOOD CHIP MULCH - 16 TONNE/Ha.
5. CONSTRUCT SILT FENCE WITH CATCH DRAIN ON UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES & SILT FENCE ONLY 1 TO 2m DOWNSLOPE AS SHOWN.



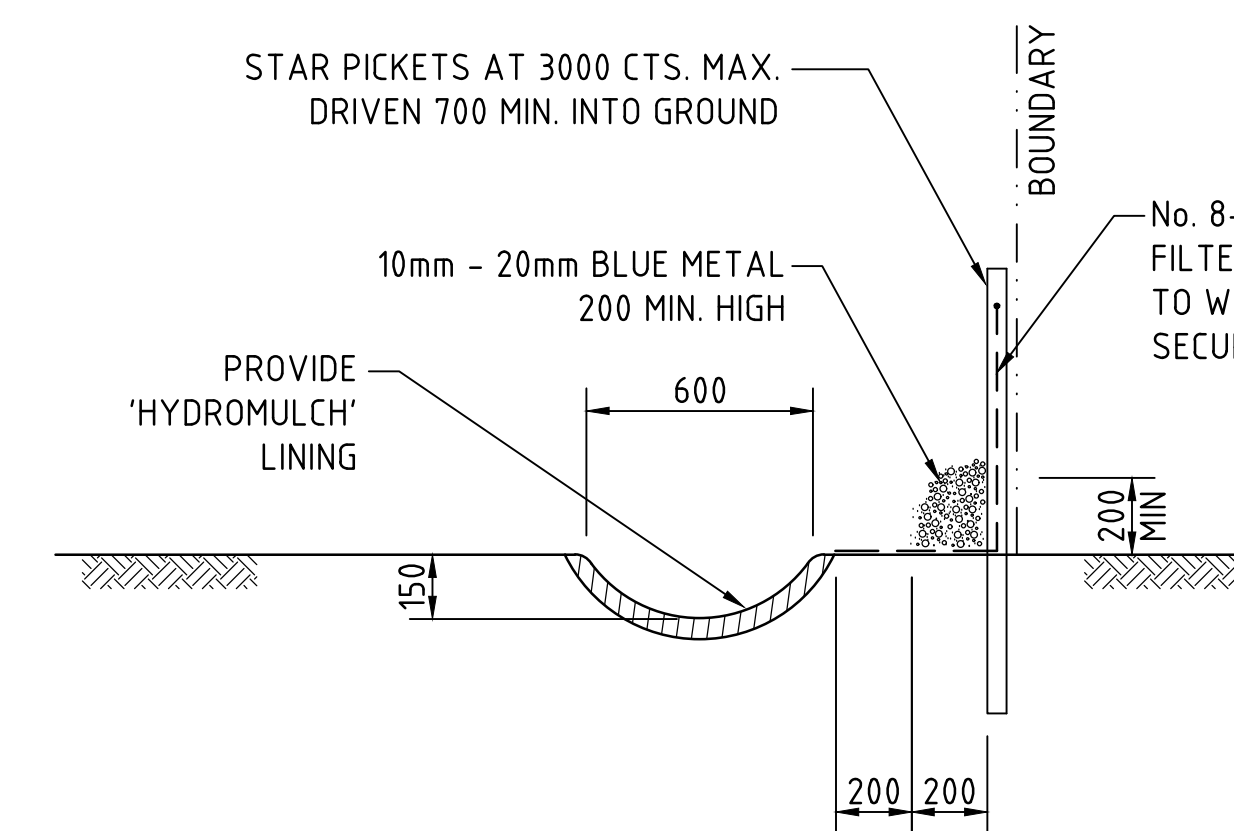
KERB INLET CONTROL

N.T.S



GRADED INLET PIT FILTER DETAIL

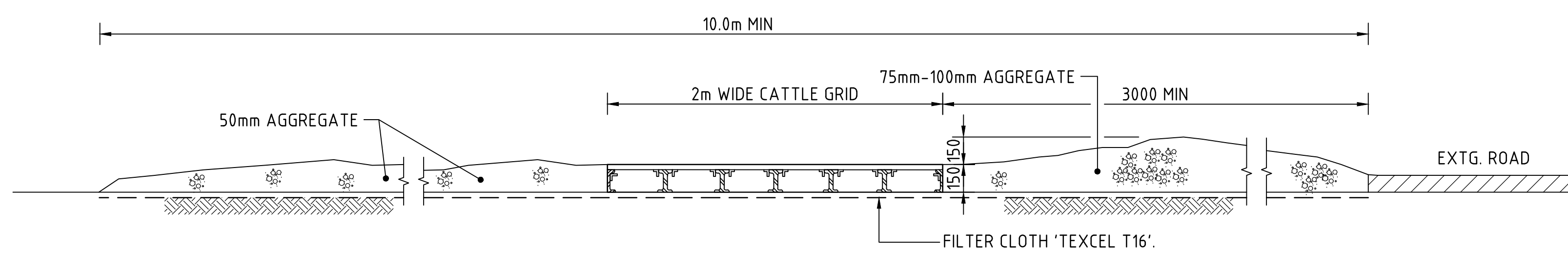
N.T.S



TYPICAL OPEN DRAIN & SILT FENCE

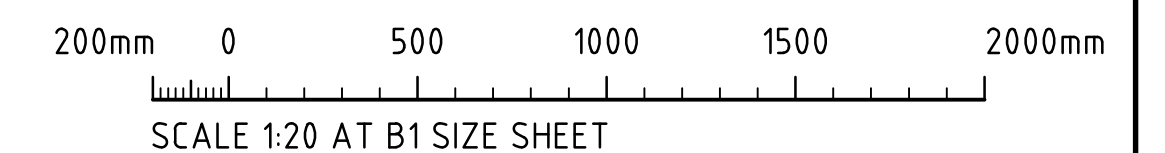
SCALE 1:20

NOTE :
ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.



SECTION 1:20 ① : STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'

NOTES:
ALL EROSION & SEDIMENT CONTROL MEASURES TO BE INSPECTED & MAINTAINED DAILY BY SITE MANAGER.
MINIMISE DISTURBED AREAS.
ROADS & FOOTPATHS TO BE SWEEPED DAILY.
1.2m TURF TO BE PLACED BEHIND KERBS.
DUST MINIMISATION CONTROL BY WATERING TO BE IMPLEMENTED BY SITE MANAGER AS REQUIRED OR AS DIRECTED BY THE EPA.



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	B		
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AMENDMENTS	DATE	ISSUE	AMENDMENTS	DATE

ARCHITECT
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CLIENT
VAUGHAN
CONSTRUCTIONS

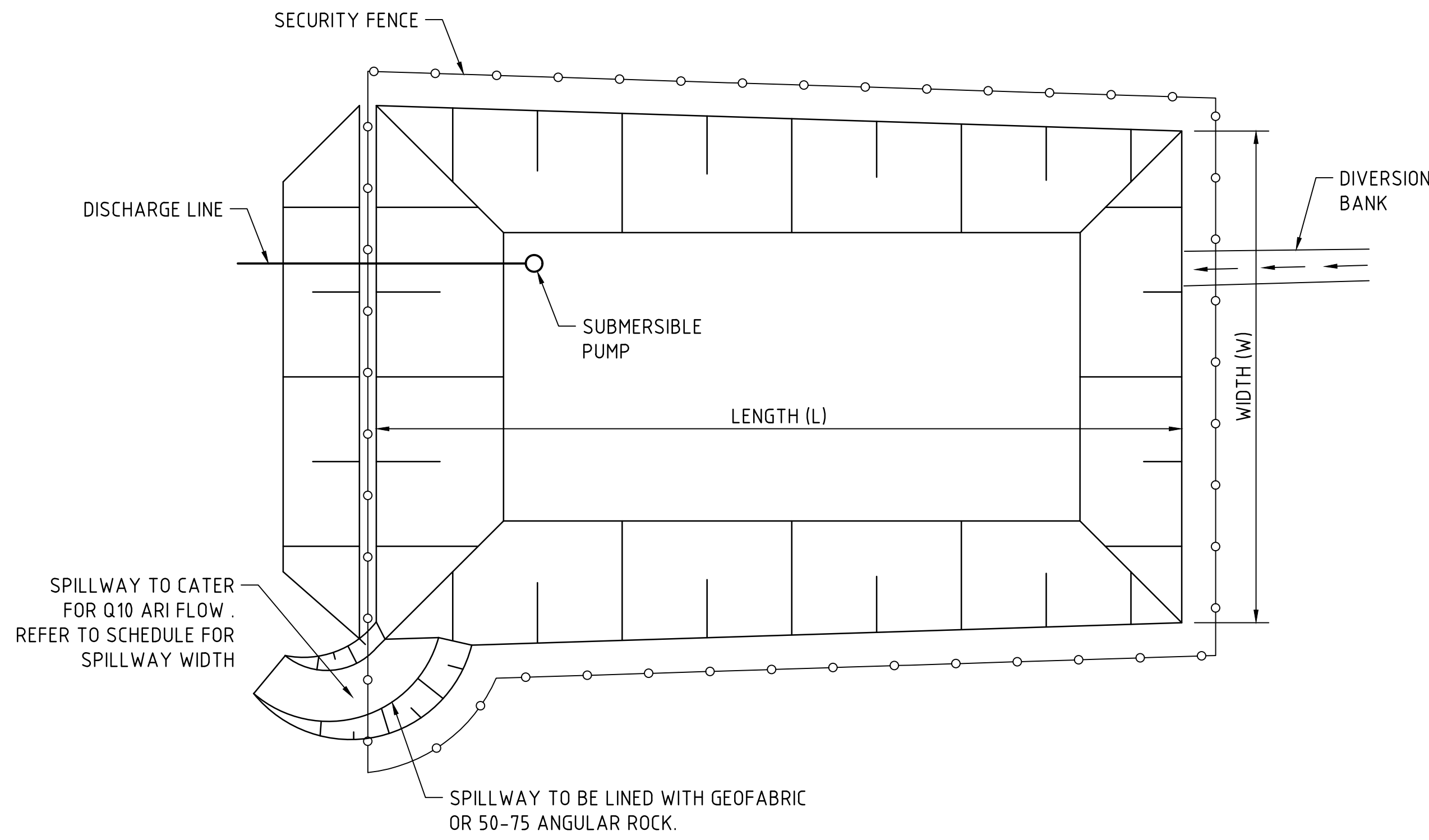
PROJECT
MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
NSW 2170

CONSULT AUSTRALIA

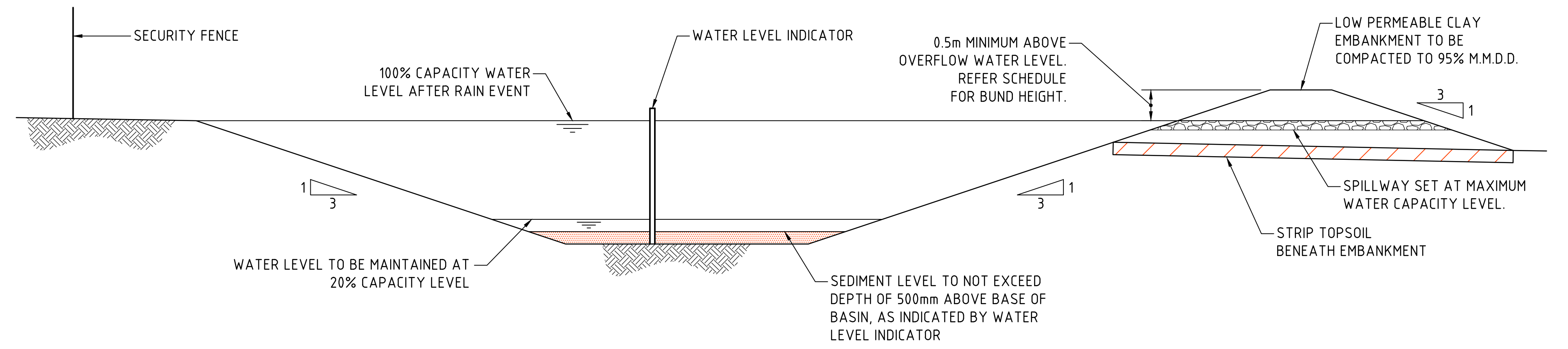
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EROSION & SEDIMENT CONTROL DETAILS
SHEET 1
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ISSUE
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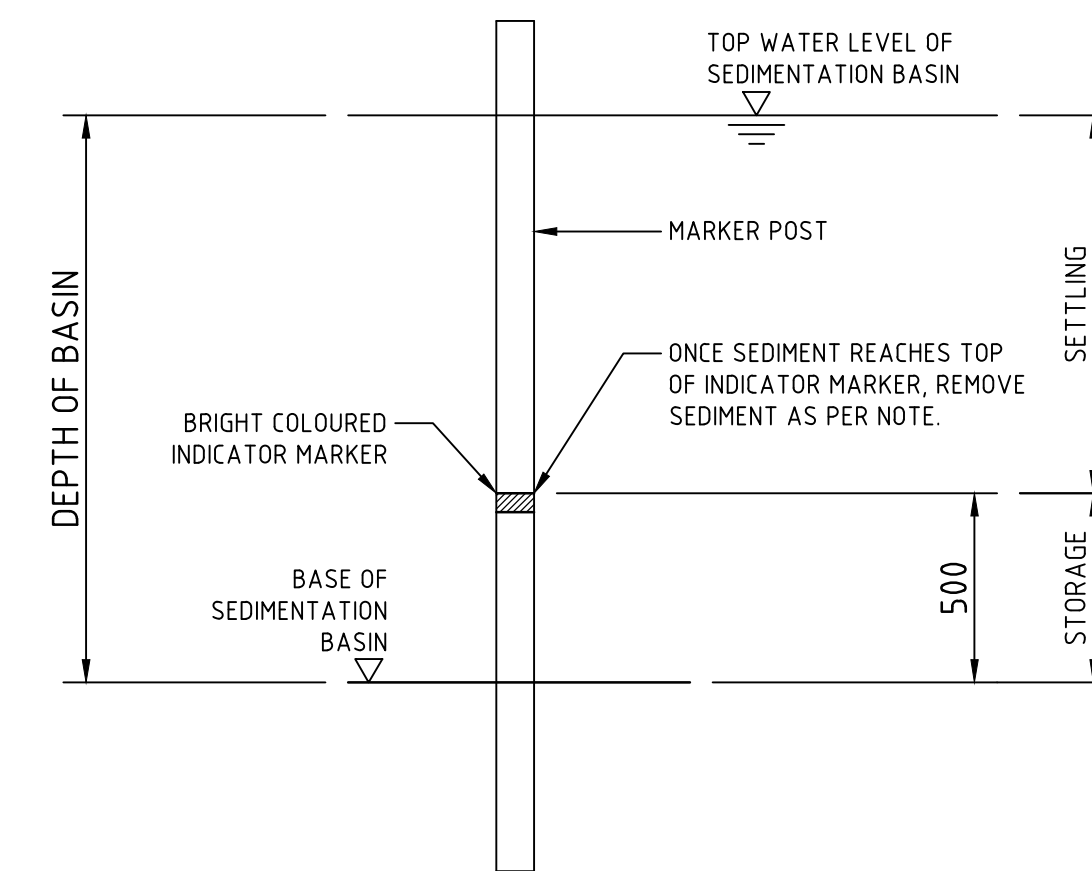


TYPICAL SEDIMENT CONTROL POND PLAN
SCALE 1:250

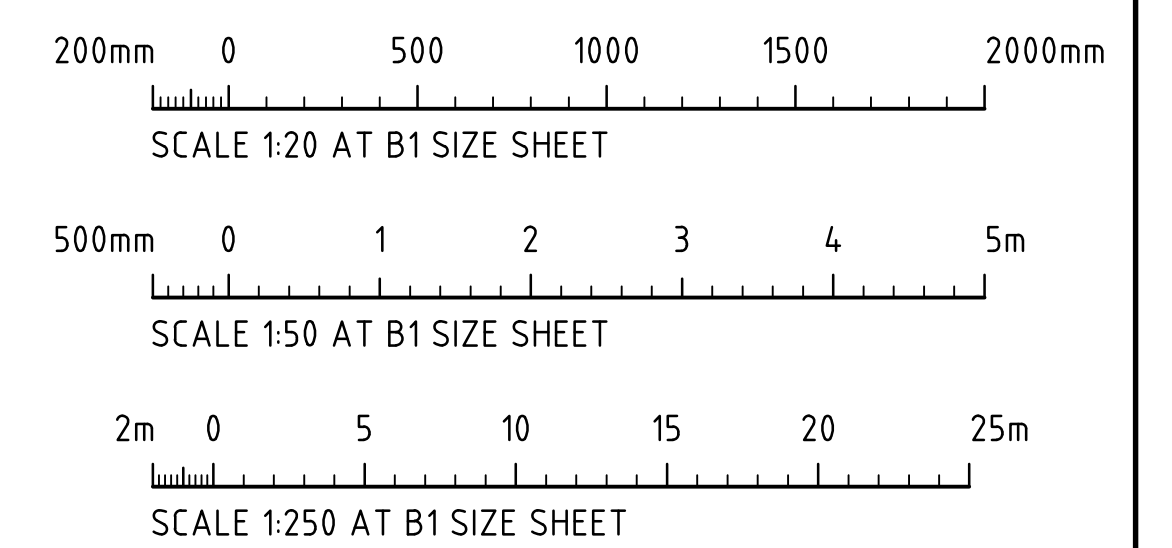


TYPICAL SEDIMENT CONTROL BASIN SECTION
SCALE 1:50

SPILLWAY DETAIL & SCHEDULE					
CATCHMENT (Ha)	FLOW (m³/s)	WIDTH (mm)	FLOW DEPTH (mm)	ROCK SIZE (mm)	BUND HEIGHT ABOVE SPILLWAY (mm)
0.20	0.14	1000	200	-	600
0.5	0.2	2000	200	-	600
1	0.3	2000	200	-	700
2	0.6	4000	200	-	700
5	1.4	5000	300	200	800
10	2.8	8000	350	200	850
20	5.5	14000	400	250	900
40	11.0	20000	500	250	1000



SEDIMENT STORAGE MARKER
SCALE 1:20



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

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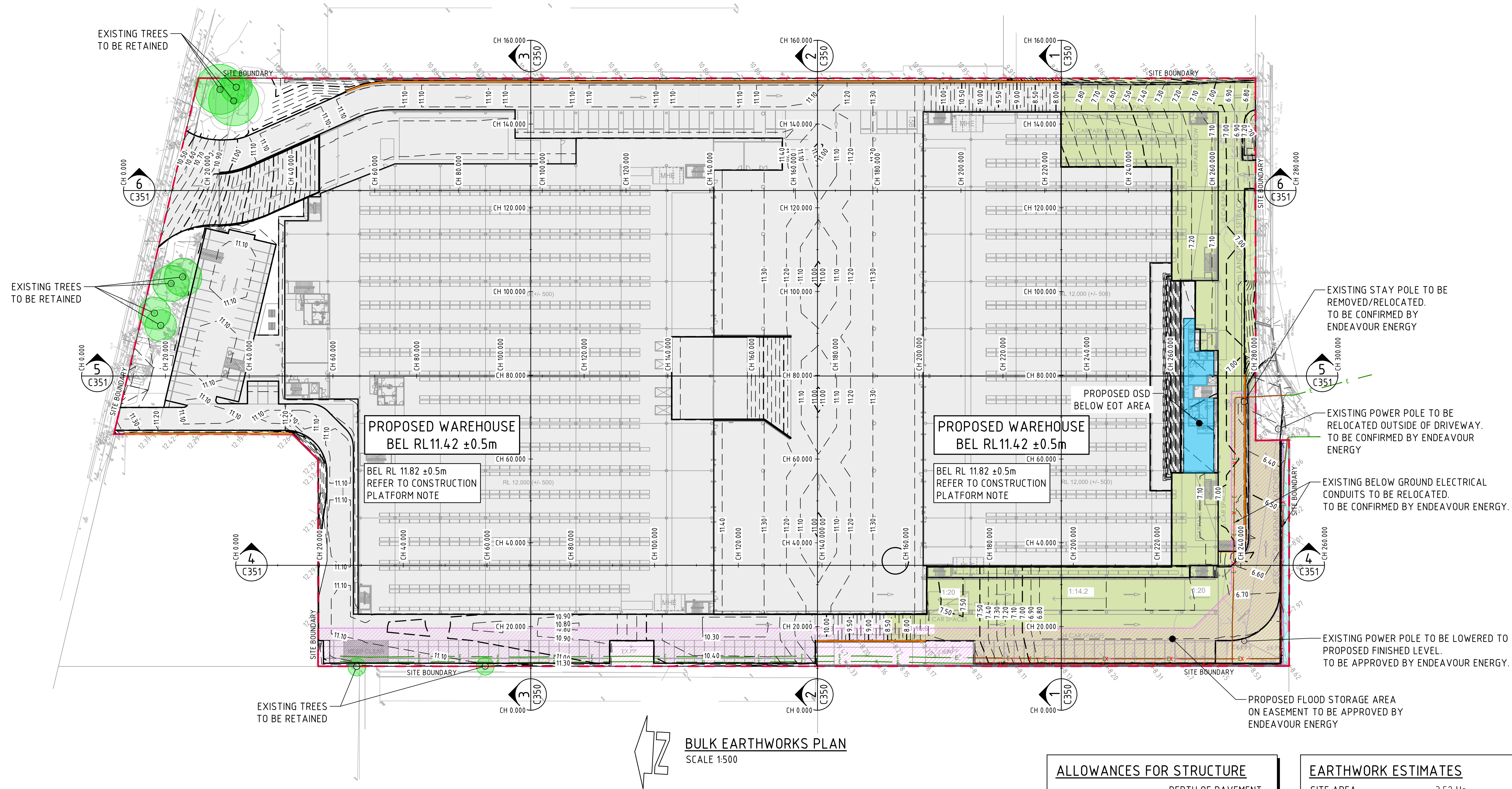
CLIENT
VAUGHAN
CONSTRUCTIONS

PROJECT
MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
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EROSION & SEDIMENT CONTROL DETAILS SHEET 2
DRAWING No
C014972.02-SSDA251
ISSUE
A



BULK EARTHWORKS PLAN
SCALE 1:500

- SITE PREPARATION NOTES:**
- ALL EARTHWORKS SHALL BE COMPLETED GENERALLY IN ACCORDANCE WITH THE GUIDELINES SPECIFIED BY THE GEOTECHNICAL REPORT 36440PNrpf PROVIDED BY JKGEOTECHNICS DATED 05.02.2024.
 - EXISTING LEVELS ARE BASED ON INFORMATION PROVIDED BY BOXALL SURVEYORS DATED 26.06.2024.
 - STRIP ANY TOP SOIL OR DELETERIOUS MATERIAL AND DISPOSE OF FROM SITE OR STORE AS DIRECTED. TOPSOIL BLENDING IS NOT ACCEPTABLE. ANY BLENDING PROPOSAL IS TO BE REFERRED TO THE ENGINEER.
 - COMPLETE CUT TO FILL EARTHWORKS TO ACHIEVE THE REQUIRED LEVELS AS INDICATED ON THE DRAWINGS WITHIN A TOLERANCE OF +0mm/-10mm THROUGH BUILDING PADS/PAVEMENTS AND +0mm/-20mm ELSEWHERE.
 - PREPARE STEEP BATTERS TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION. WHERE EXPOSED ROCK (WEATHERED SHALE OR SANDSTONE) IS ENCOUNTERED AT CUT SUBGRADE LEVEL, THE EARTHWORKS CONTRACTOR IS TO ALLOW TO RIP THE SURFACE TO A NOMINAL 0.3-0.4m DEPTH AND RECOMPACT (PER THE ENGINEERING SPEC) AS REQUIRED.
 - AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT. PROOF ROLLING TO BE INSPECTED BY A GEOTECHNICAL ENGINEER OR THE EARTHWORKS DESIGNER.
 - SITE WON FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
 - IMPORTED FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
 - ALL ENGINEERED FILL PARTICLES SHALL BE ABLE TO BE INCORPORATED WITHIN A SINGLE LAYER. FURTHER, LESS THAN 30% OF PARTICLES SHALL BE RETAINED ON THE 37.5 mm SIEVE. ENGINEERED FILL SHALL BE ABLE TO BE TESTED IN ACCORDANCE WITH THE STANDARD COMPACTION METHOD (AS1289.5.4.1) OR HILF TEST METHOD (AS1289.5.7.1). THESE METHODS REQUIRE LESS THAN 20% RETAINED ON THE 37.5 mm SIEVE. WHERE BETWEEN 20% AND 30% OF PARTICLES ARE RETAINED ON THE 37.5 mm SIEVE THE ABOVE TEST METHODS SHALL STILL BE ADOPTED AND TEST REPORTS ANNOTATED APPROPRIATELY. THESE REQUIREMENTS SHOULD BE MET BY THE MATERIAL AFTER PLACEMENT AND COMPACTION.
 - ALL EARTHWORKS SHALL BE COMPLETED UNDER LEVEL 1 CONTROL IN ACCORDANCE WITH AS 3798-2007.
 - PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
 - EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
 - MATCH EXISTING LEVELS AT BATTER INTERFACE.
 - CONTRACTOR TO MATCH EXISTING LEVELS AT THE INTERFACE OF EARTHWORKS AND EXISTING SURFACE AT BATTER LOCATIONS OR WHERE NO RETAINING WALLS ARE PRESENT. ANY DISCREPANCY BETWEEN DESIGN AND EXISTING LEVELS TO BE REFERRED TO THE ENGINEER FOR DIRECTION OR ADJUSTMENTS TO DESIGN LEVELS.
 - DURING EARTHWORKS THE CONTRACTOR IS TO ENSURE ALL AREAS ARE FREE DRAINING & WILL NOT RETAIN WATER DURING RAINFALL. PROVIDE TEMPORARY MEASURES AS REQUIRED TO ENSURE FREE FLOWING RUNOFF THROUGH MANAGED DRAINAGE PATHS, DIVERSION DRAINS OR OTHER SUITABLE DISPOSAL METHOD AS AGREED DURING THE WORKS. REFER ANY CONCERNS TO THE ENGINEER. REFER TO EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES.

LEGEND:
LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY BOXALL SURVEYORS DATED 26.06.24.

- 50.00 — - EXISTING CONTOUR (0.2m INTERVAL)
- - 50.00 - - B.E.L. CONTOUR (MAJOR 1.0m)
- - 50.10 - - B.E.L. CONTOUR (MINOR 0.25m)
- ▲ 50.00 - B.E.L. SPOT LEVEL
- — - PROPOSED RETAINING WALL
- — — EXISTING BELOW GROUND ELECTRICAL CONDUIT
- — — EXISTING BELOW GROUND ELECTRICAL CONDUIT TO BE RELOCATED
- - ON SITE DETENTION TANK
- - FLOOD STORAGE
- - CONSTRUCTION PLATFORM
- - ELECTRICAL EASEMENT

NOMINATED B.E.L. DETAIL
NTS

The detail shows a cross-section of the nominated B.E.L. (Below Earth Level). It includes a 'PAVEMENT FFL' (Finished Floor Level) above a 'PAVEMENT' layer. Below the pavement is a '100mm DGB20' (Durable Gravel Base) layer, followed by a '300mm SANDSTONE' layer. The 'NOMINATED B.E. LEVEL' is indicated by a dashed line. The 'DEPTH OF PAVEMENT' is also shown, with a note to refer to structural plans for details.

ALLOWANCES FOR STRUCTURE

	DEPTH OF PAVEMENT
INTERNAL WAREHOUSE	180mm
OFFICE	110mm
EXTERNAL	
HARDSTAND	280mm
HARDSTAND UNDER BREZZEWAY ONLY	180mm
CAR PARK	280mm
LANDSCAPING	300mm
PEDESTRIAN	100mm

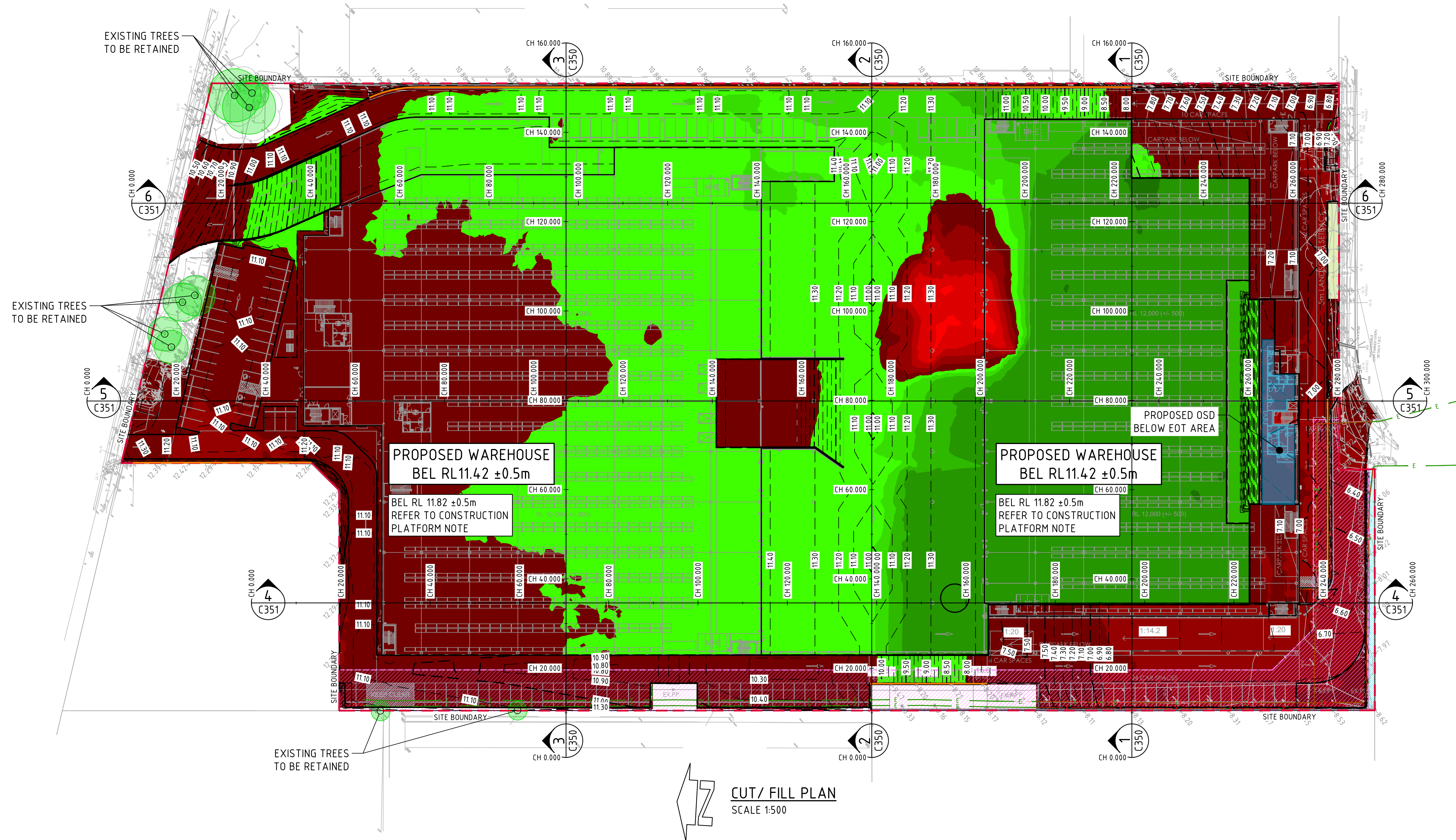
EARTHWORK ESTIMATES

SITE AREA	= 3.52 Ha
CUT	= -10,550m ³
FILL	= +30,210m ³
ALLOWANCES	
DETAILED EXCAVATION (1,350m ³ /Ha)	= -4,750m ³
PILE SPOIL (280 PILES, 18m LONG)	= -2,500m ³
DIFFERENCE	= +12,410m ³ (i.e. FILL OVER CUT)

- CONSTRUCTION PLATFORM NOTE:**
- CONTRACTOR TO ALLOW FOR A CONSTRUCTION PLATFORM COMPRISING 100mm DGS20 (COMPACT TO 98% MMDD WITHIN 2% OF OMC) OVER 300mm CBR 35% SANDSTONE (COMPACT TO 100% SMDD WITHIN 2% OF OMC).
 - BUILDING BEL (AS SHOWN TO BE RL 11.42 ± 0.5m). TOP OF CONSTRUCTION PLATFORM TO BE 400mm ABOVE (BEL=11.82 ± 0.5m OVER BUILDING FOOTPRINT).
 - ALLOW TO VARY LEVELS OVER CENTRAL HARDSTAND/BREEZEWAY AS SHOWN. TOP OF PLATFORM TO BE 400mm ABOVE NOMINATED BEL. REFER SECTIONS FOR FURTHER CLARIFICATION OF PROFILE.

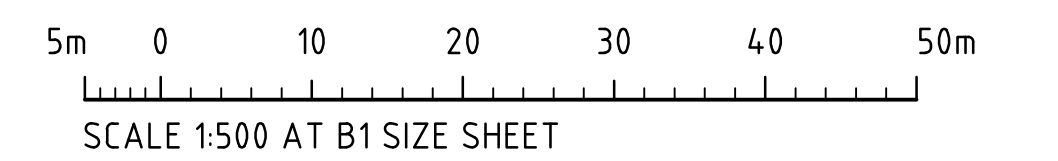
NOTE:
EARTHWORKS VOLUMES ARE APPROXIMATE ONLY. NO ALLOWANCE HAS BEEN MADE FOR DELETERIOUS MATERIAL, EROSION AND SEDIMENT CONTROL, BULKING OR COMPACTION OF FILLED SOILS, THE REMOVAL OF UNCONTROLLED OR CONTAMINATED MATERIAL OR ANY OTHER UNSPECIFIED EXCAVATION RELATED TO CONSTRUCTION ACTIVITIES. DETAILED EXCAVATION ALLOWANCE IS APPROXIMATE ONLY AND ACCOUNTS FOR STORMWATER/SERVICES TRENCHING AND FOUNDATIONS. THE DETAILED EXCAVATION VOLUMES ARE TO BE CONFIRMED BY THE CONTRACTOR. REFER ANY CONCERNS TO ENGINEER.

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION



DEPTH RANGE			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	-5.000	-4.000	Red
2	-4.000	-3.000	Red
3	-3.000	-2.000	Red
4	-2.000	-1.000	Red
5	-1.000	0.000	Red
6	0.000	1.000	Light Green
7	1.000	2.000	Light Green
8	2.000	3.000	Light Green
9	3.000	4.000	Light Green
10	4.000	5.000	Light Green
11	5.000	6.000	Light Green

CUT/FILL PLAN
SCALE 1:500



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE	AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	17.10.25	D			
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	C			
REVISED AS CLOUDED	10.09.25	B			
ISSUED FOR INFORMATION	10.09.25	A			

ARCHITECT
PACE
ARCHITECTS

CLIENT
VAUGHAN
CONSTRUCTIONS

PROJECT
MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
NSW 2170

DESIGNED: HC
DRAWN: GP
DATE: DATE
CHECKED: XC
SIZE: B1
SCALE: AS SHOWN
CAD REF: C014972.02-SSDA310

CONSULT AUSTRALIA

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CRC
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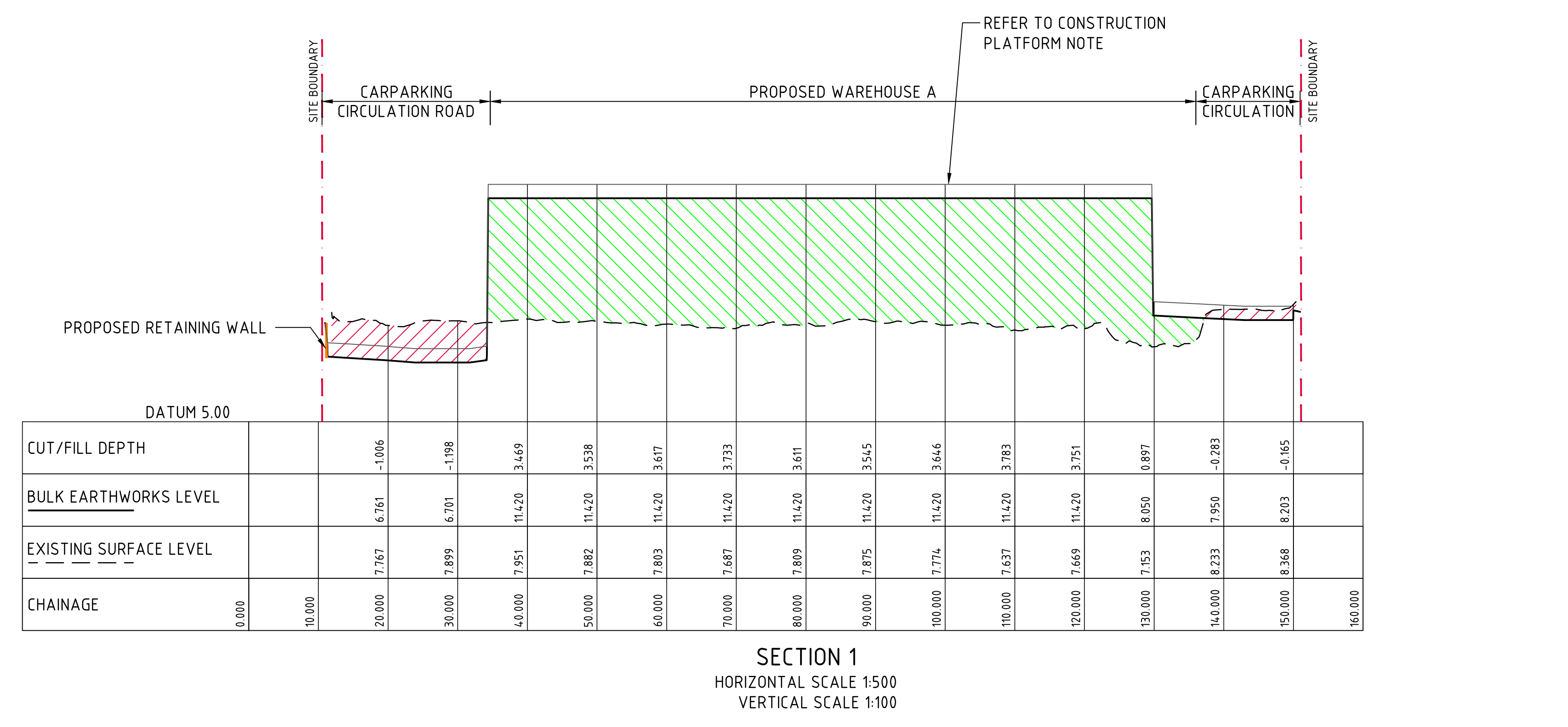
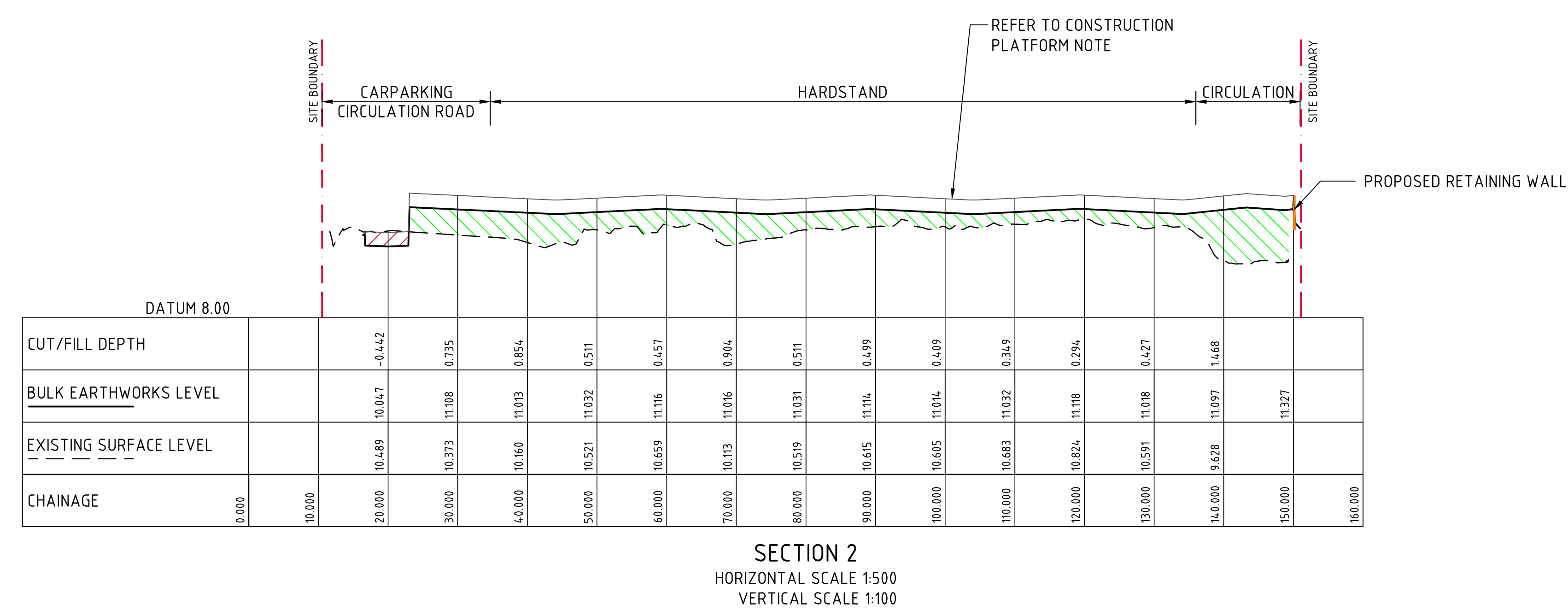
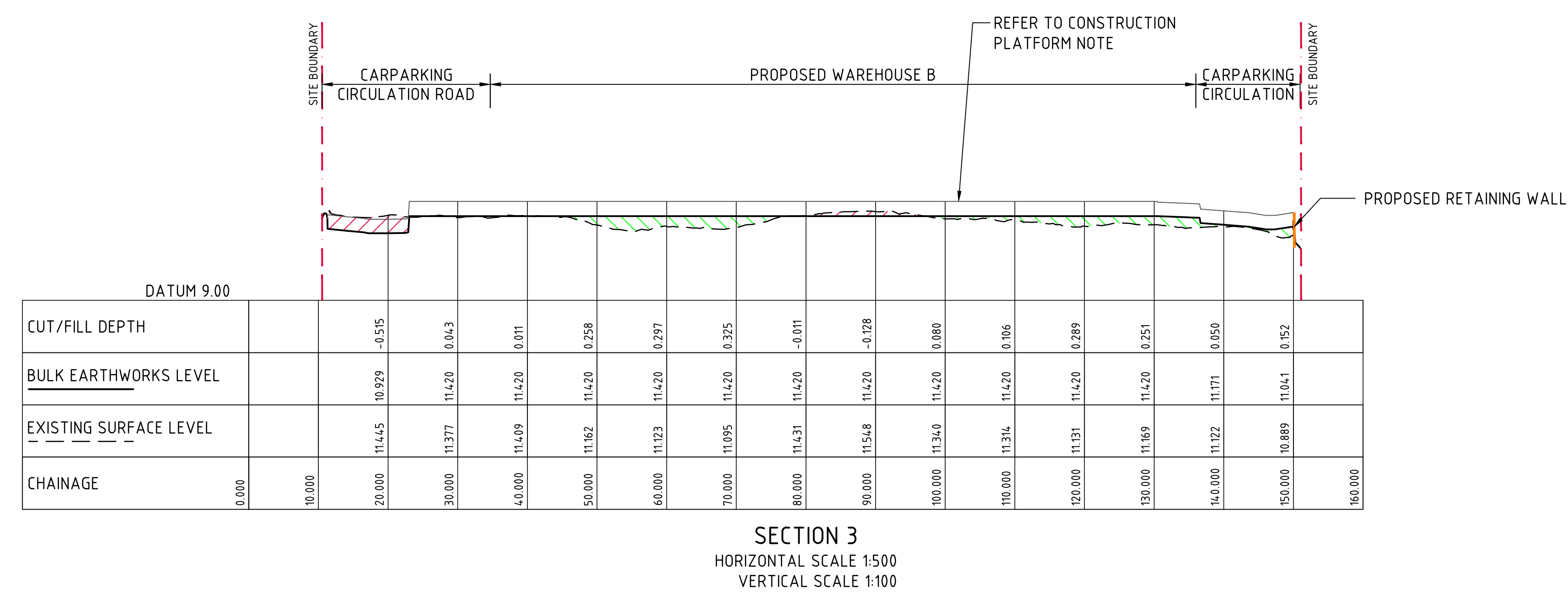
DRAWING TITLE
CUT / FILL PLAN

DRAWING No
C014972.02-SSDA310

ISSUE
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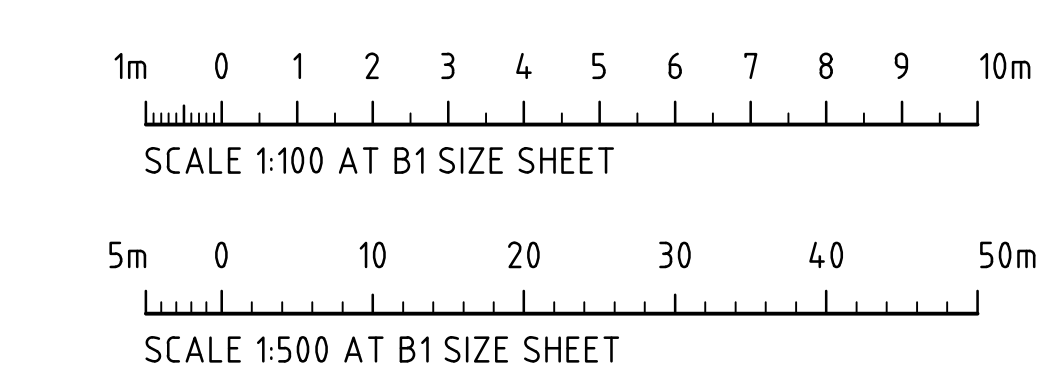
LEGEND:

- DENOTES BULK EARTHWORKS PROFILE
- DENOTES EXISTING PROFILE
- DENOTES CONSTRUCTION PLATFORM
- DENOTES AREA IN CUT
- DENOTES AREA IN FILL



CONSTRUCTION PLATFORM NOTE:

- CONTRACTOR TO ALLOW FOR A CONSTRUCTION PLATFORM COMPRISING 100mm DGS20 (COMPACT TO 98% MDD WITHIN 2% OF OMC) OVER 300mm CBR 35% SANDSTONE (COMPACT TO 100% SMDD WITHIN 2% OF OMC).
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- ALLOW TO VARY LEVELS OVER CENTRAL HARDSTAND/BREEZEWAY AS SHOWN. TOP OF PLATFORM TO BE 400mm ABOVE NOMINATED BEL. REFER SECTIONS FOR FURTHER CLARIFICATION OF PROFILE.



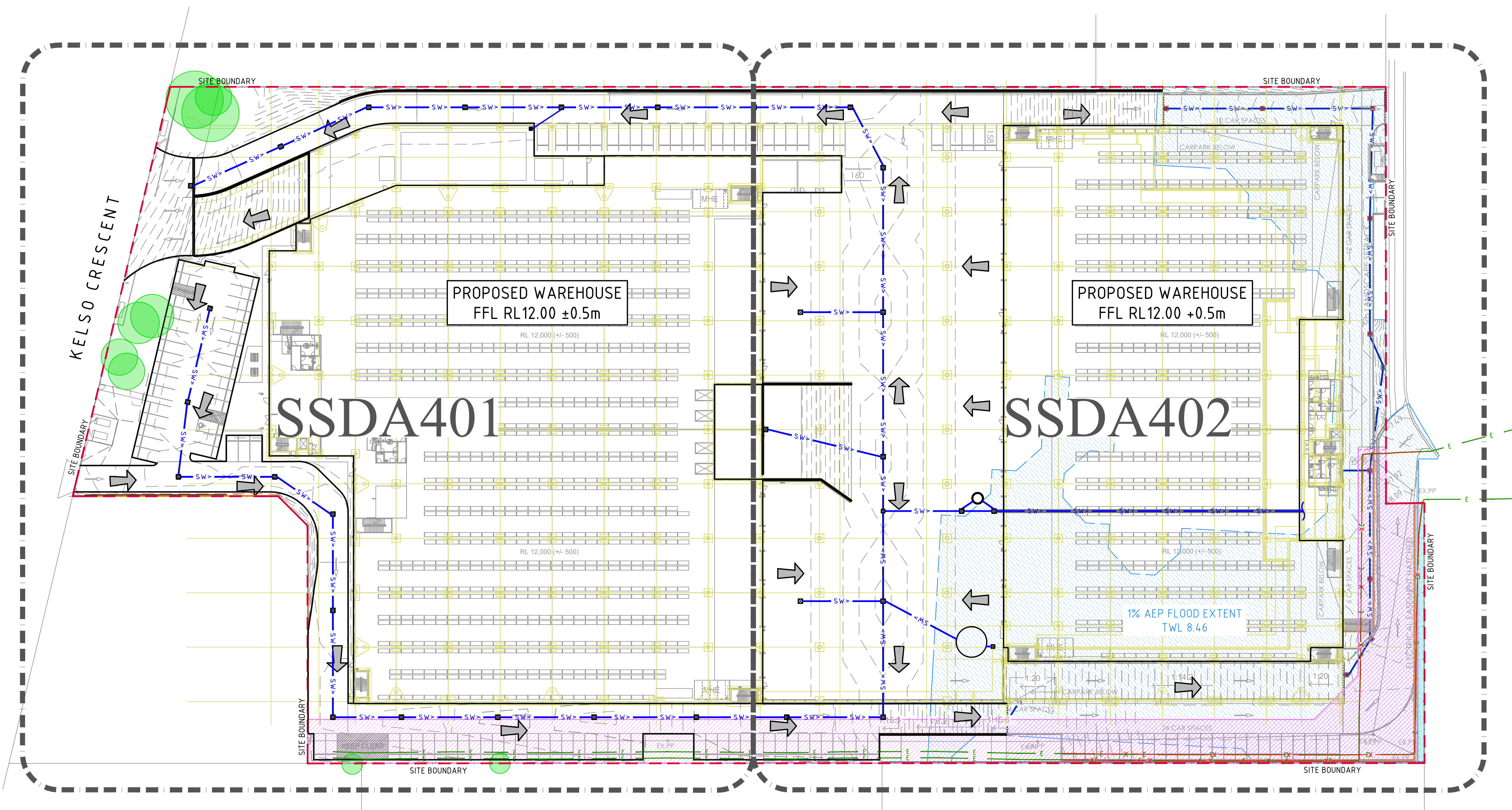
FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT	CLIENT		PROJECT	COSTIN ROE CONSULTING PTY LTD.		DRAWING TITLE BULK EARTHWORKS SECTIONS SHEET 1	DRAWING No C014972.02-SSDA350	ISSUE B	
ISSUED FOR INFORMATION		16.09.25	A	PACE ARCHITECTS	VAUGHAN CONSTRUCTIONS		20 KELSO CRESCENT, MOOREBANK NSW 2170	PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 e: mail@costinroe.com.au					
AMENDMENTS		DATE	ISSUE	AMENDMENTS	DATE	ISSUE	DESIGNED HC	DRAWN QP	DATE	CHECKED XC	SCALE AS SHOWN	CAD REF: C014972.02-SSDA350	COSTIN ROE CONSULTING CIVIL & STRUCTURAL ENGINEERS

STORMWATER DRAINAGE NOTES:

STORMWATER DRAINAGE NOTES ARE APPLICABLE FOR PRIVATE INTERNAL STORMWATER DRAINAGE WORKS ONLY. REFERENCE SHOULD BE MADE TO THE RELEVANT COUNCIL/ROADS AUTHORITY GUIDELINES AND SPECIFICATIONS FOR ALL STORMWATER DRAINAGE WORKS NOT PART OF THE PRIVATE INTERNAL WORKS.

- ALL STORMWATER WORKS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500.3 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE.
- THE MINOR (PIPED) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 20 YEAR ARI STORM EVENT AND THE MAJOR (OVERLAND) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 100 YEAR ARI STORM EVENT.
- ALL FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLANS.
- PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
- EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
- ALL STORMWATER PIPES Ø375 OR GREATER SHALL BE CLASS 2 (WITH HS2 SUPPORT) REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
- ALL PIPES UP TO AND INCLUDING Ø300 TO BE uPVC GRADE SN8 UNO.
- PIPE CLASS NOMINATED ARE FOR IN-SERVICE LOADING CONDITIONS ONLY. CONTRACTOR IS TO MAKE ANY NECESSARY ADJUSTMENTS REQUIRED FOR CONSTRUCTION CONDITIONS.
- ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c=25 MPa. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
- IN ADDITION TO ITEM 9 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
- PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND PACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
- CONCRETE PIPES UNDER, OR WITHIN THE ZONE OF INFLUENCE OF PAVED AREAS SHALL BE LAID USING HS2 TYPE SUPPORT, AS A MINIMUM, IN ACCORDANCE WITH AS 3725. AGGREGATE BACKFILL SHALL NOT BE USED FOR PIPE BEDDING AND OR HAUNCH/SIDE SUPPORT.
- WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED Ø100 uPVC TO EACH SIDE OF PIPE.
- ALL SUBSOIL DRAINAGE LINES SHALL BE Ø100 SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS (AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
- WHERE SUBSOIL DRAINAGE PASSES UNDER A PAVEMENT OR A SLAB, UNSLOTTED UPVC ARE TO BE PROVIDED UNLESS NOTED OTHERWISE.
- ALL PIPE GRADES 1 IN 200 MINIMUM UNO.
- PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
- MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
- PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY'. WHERE FORKLIFT USE IS REQUIRED EXTERNAL TO THE BUILDING PIT COVERS SHALL BE MIN. CLASS E. PIT COVERS IN CONTAINER PAVEMENTS ARE TO BE MIN. CLASS G. REFER TO ENGINEER FOR SPECIAL DETAILS. THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
- PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS.
- DOWN PIPES (DP) TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE U.N.O. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
- PIPE LENGTHS NOMINATED ON PLAN OR LONGSECTIONS ARE MEASURED FROM CENTER OF PITS TO THE NEAREST 0.5m AND DO NOT REPRESENT ACTUAL LENGTH. THE CONTRACTOR IS TO ALLOW FOR THIS.
- WHERE CONNECTION TO EXISTING INGROUND DRAINAGE SYSTEMS, OPEN SWALES, CHANNELS OR ANY OTHER EXISTING SYSTEM, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION AND INVERT ON SITE AT THE BEGINNING OF THE CONSTRUCTION PERIOD. REFER ANY VARIANCE FROM DOCUMENTATION OR SURVEYS TO THE ENGINEER FOR CLARIFICATION.



STORMWATER DRAINAGE KEY PLAN - LOWER GF 1 & GROUND FLOOR
SCALE 1:500

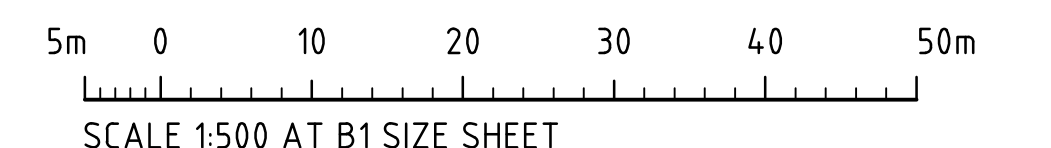
PIT SCHEDULE - NETWORK X				
PIT No.	GRATE RL	TYPE	GRATE SIZE	COMMENT
PIT A01	11.55	SGGP	900X900	
PIT A02	11.55	SGGP	900X900	
PIT A03	11.60	SGGP	900X900	
PIT A04	11.64	SGGP	900X900	
PIT A05	11.60	SGGP	900X900	
PIT A06	11.60	SGGP	900X900	
PIT A07	11.58	SGGP	900X900	
PIT A08	11.52	SGGP	900X900	
PIT A09	11.43	SGGP	900X900	
PIT A10	11.35	SGGP	900X900	
PIT A11	11.00	SGGP	900X900	
PIT A12	10.80	SGGP	900X900	
PIT A13	10.80	SGGP	900X900	
PIT A14	11.55	SGGP	900X900	
PIT A14A	11.92	SJP	900X900	
PIT A15	11.66	SJP	900X900	
PIT A16	11.91	SGGP	900X900	
PIT A17	11.98	SGGP	900X900	
PIT A18	7.45	SGGP	900X900	◇
PIT A19	7.40	SGGP	900X900	

PIT SCHEDULE - NETWORK B				
PIT No.	GRATE RL	TYPE	GRATE SIZE	COMMENT
PIT B01	11.51	SGGP	900X900	GD
PIT B02	11.60	SGGP	900X900	
PIT B03	11.60	SGGP	900X900	
PIT B04	11.60	SGGP	900X900	
PIT B05	11.60	SGGP	900X900	
PIT B05A	11.87	SGGP	600X600	
PIT B06	11.60	SGGP	900X900	
PIT B07	11.60	SGGP	900X900	
PIT B08	11.60	SGGP	900X900	
PIT B09	11.55	SGGP	900X900	
PIT B10	11.55	SGGP	900X900	
PIT B11	11.55	SGGP	900X900	

PIT SCHEDULE - NETWORK C				
PIT No.	GRATE RL	TYPE	GRATE SIZE	COMMENT
PIT C01	8.48	SGGP	900X900	◇
PIT C02	7.94	SGGP	900X900	◇
PIT C03	7.34	SGGP	900X900	◇
PIT C04	7.45	SGGP	900X900	◇
PIT C05	7.45	SGGP	900X900	◇

PIT SCHEDULE - NETWORK D				
PIT No.	GRATE RL	TYPE	GRATE SIZE	COMMENT
PIT D01	8.18	SGGP	900X900	◇
PIT D02	8.00	SGGP	900X900	◇
PIT D03	7.20	SGGP	900X900	◇
PIT D04	7.20	SGGP	900X900	◇
PIT D05	7.35	SGGP	900X900	◇
PIT D06	7.05	SGGP	900X900	◇
PIT D07	7.45	SGGP	900X900	◇

NOTE:
PITS TO BE FITTED WITH 'ATLAN STORMSACK' INSERT. SHOWN THUS
TOTAL NUMBER OF PIT INSERTS ◇ =13



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

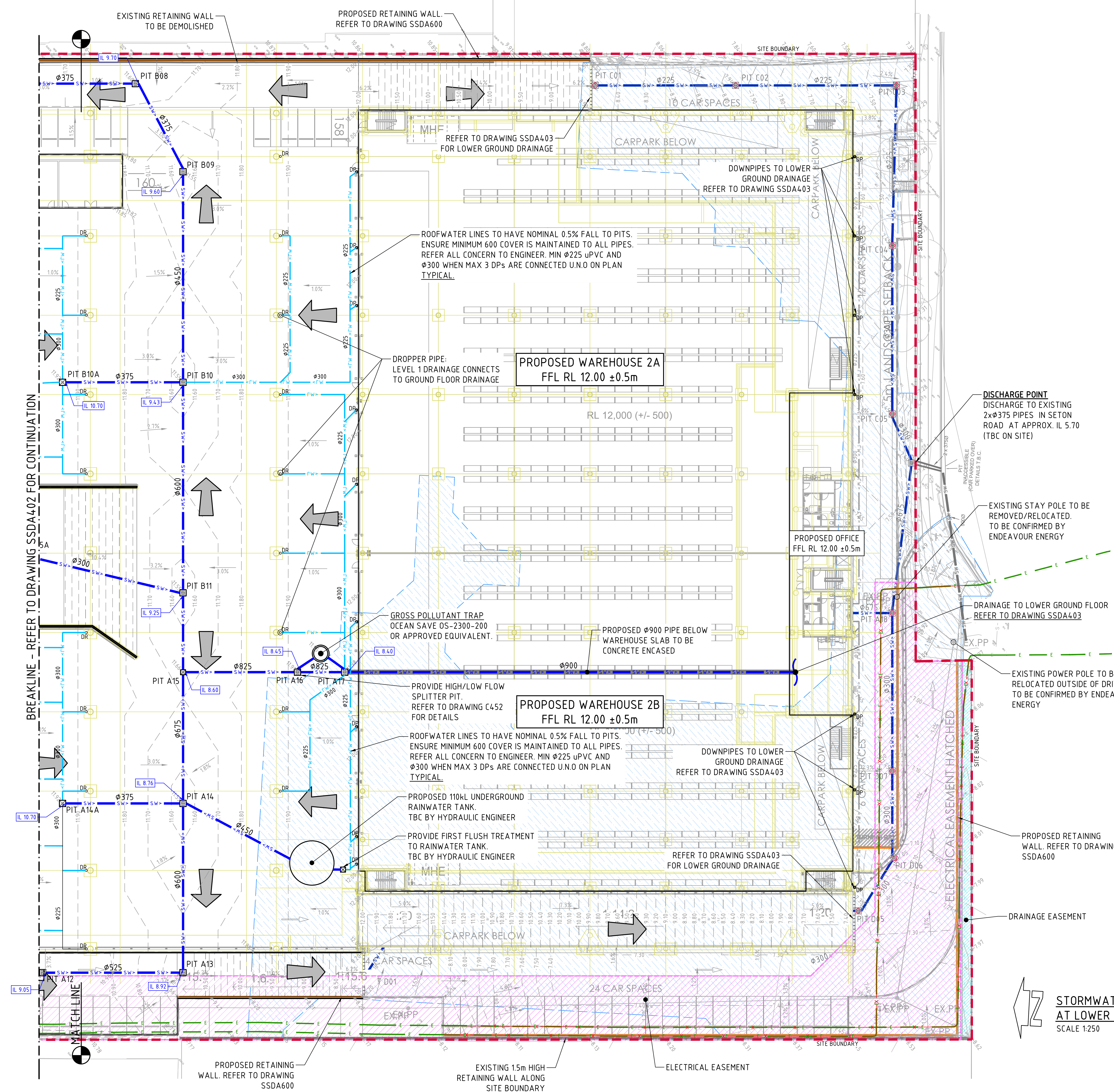
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT	CLIENT	PROJECT	Costin Roe Consulting Pty Ltd. ABN 50 003 696 446			DRAWING TITLE STORMWATER DRAINAGE KEY PLAN LOWER GF 1 & GROUND FLOOR	DRAWING No C014972.02-SSDA400	ISSUE B
ISSUED FOR INFORMATION		16.09.25	A			20 KELSO CRESCENT, MOOREBANK NSW 2170 DESIGNED: HC DRAWN: GP DATE: DATE CHECKED: XC SIZE: B1 SCALE: AS SHOWN CAD REF: C014972.02-SSDA400	PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 e: mail@costinroe.com.au f: +61 2 9241 3731 w: costinroe.com.au					

LEGEND:
LEVELS DATUM IS AHD.

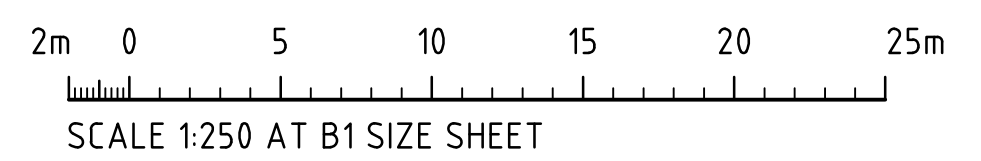
EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY BOXALL SURVEYORS DATED 26.06.24.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- PROPOSED DRAINAGE LINE
- EXISTING DRAINAGE LINE
- ROOFWATER DOWNPIPE (INDICATIVE)
- RAINWATER DROPPER (INDICATIVE)
- ROOFWATER LINE
- SUBSOIL LINE
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- RETAINING WALL
- EXISTING BELOW GROUND ELECTRICAL CONDUIT
- EXISTING BELOW GROUND ELECTRICAL CONDUIT TO BE RELOCATED
- ELECTRICAL EASEMENT
- ON SITE DETENTION TANK
- FLOOD STORAGE
- 1% AEP FLOOD EXTENT - TL: 8.46
- EXISTING TREES TO BE RETAINED

NOTES:
1. REFER TO DRAWING SSDA4.00 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING SSDA4.00 FOR PIT SCHEDULE.

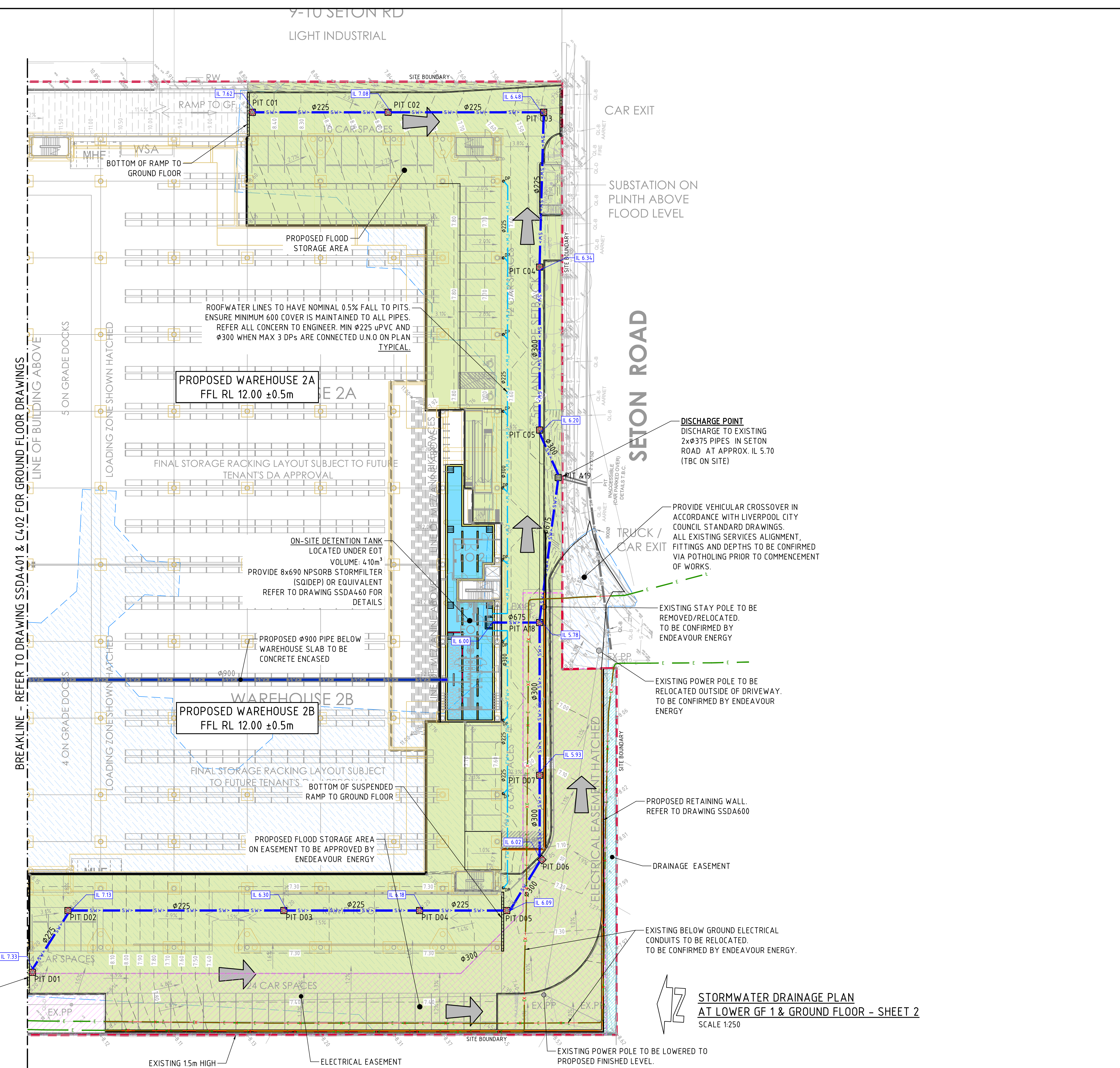


**STORMWATER DRAINAGE PLAN
AT LOWER GF 1 & GROUND FLOOR - SHEET 2**
SCALE 1:250



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT	PACE ARCHITECTS	CLIENT	VAUGHAN CONSTRUCTIONS	PROJECT	MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170	CONSULT AUSTRALIA	Costin Roe Consulting Pty Ltd. ABN 50 003 696 446	CRC COSTIN ROE CONSULTING	CIVIL & STRUCTURAL ENGINEERS	DRAWING TITLE	STORMWATER DRAINAGE PLAN LOWER GF 1 & GROUND FLOOR - SHEET 2	DRAWING No	C014972.02-SSDA402	ISSUE	B	
ISSUED FOR INFORMATION		16.09.25	A	DATE	ISSUE	DATE	ISSUE	DESIGNED	HC	DRAWN	GP	DATE	CHECKED	XC	SCALE	AS SHOWN	CAD REF:	C014972.02-SSDA402	PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 e: mail@costinroe.com.au w: costinroe.com.au	F: +61 2 9241 3731 w: costinroe.com.au



LEGEND:
LEVELS DATUM IS AHD.

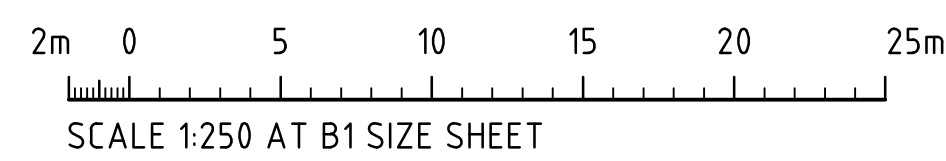
EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY BOXALL SURVEYORS DATED 26.06.24.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- PROPOSED DRAINAGE LINE
- EXISTING DRAINAGE LINE
- ROOFWATER DOWNPIPE (INDICATIVE)
- RAINWATER DROPPER (INDICATIVE)
- ROOFWATER LINE
- SUBSOIL LINE
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- RETAINING WALL
- EXISTING BELOW GROUND ELECTRICAL CONDUIT
- EXISTING BELOW GROUND ELECTRICAL CONDUIT TO BE RELOCATED
- ELECTRICAL EASEMENT
- DRAINAGE EASEMENT
- ON SITE DETENTION TANK
- FLOOD STORAGE
- 1% AEP FLOOD EXTENT - TWL: 8.46
- EXISTING TREES TO BE RETAINED

NOTES:

- REFER TO DRAWING SSDA400 FOR STORMWATER DRAINAGE NOTES.
- REFER TO DRAWING SSDA400 FOR PIT SCHEDULE.

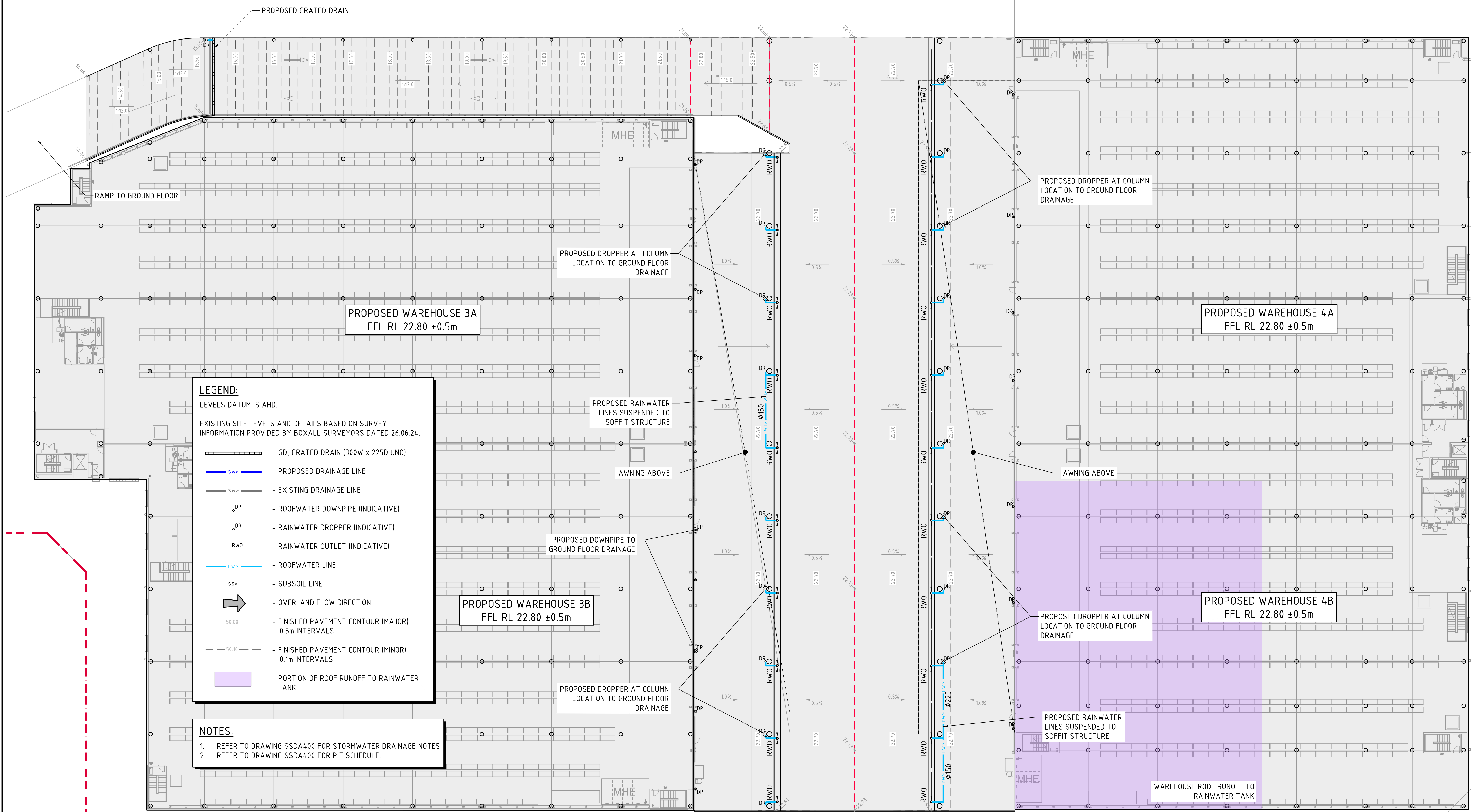
**STORMWATER DRAINAGE PLAN
AT LOWER GF 1 & GROUND FLOOR - SHEET 2**
SCALE 1:250



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT	PACE ARCHITECTS	CLIENT	VAUGHAN CONSTRUCTIONS	PROJECT	MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170	CONSULT AUSTRALIA	Costin Roe Consulting Pty Ltd. ABN 50 003 696 446	CRC CIVIL & STRUCTURAL ENGINEERS	DRAWING TITLE	STORMWATER DRAINAGE PLAN LOWER GF 1 & GROUND FLOOR - SHEET 3									
ISSUED FOR INFORMATION		16.09.25	A	DATE	ISSUE	DATE	ISSUE	DESIGNED	HC	DRAWN	GP	CHECKED	XC	SCALE	AS SHOWN	CAD REF:	C014972.02-SSDA403	PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 e: mail@costinroe.com.au w: costinroe.com.au	F: +61 2 9241 3731	DRAWING No	C014972.02-SSDA403	ISSUE	B

SITE BOUNDARY



LEGEND:
LEVELS DATUM IS AHD.

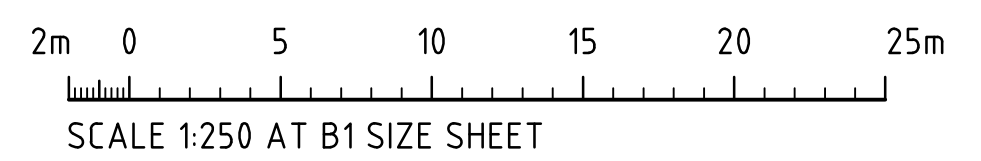
EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY BOXALL SURVEYORS DATED 26.06.24.

- GD, GRATED DRAIN (300W x 225D UNO)
- PROPOSED DRAINAGE LINE
- EXISTING DRAINAGE LINE
- ROOFWATER DOWNPIPE (INDICATIVE)
- RAINWATER DROPPER (INDICATIVE)
- RAINWATER OUTLET (INDICATIVE)
- ROOFWATER LINE
- SUBSOIL LINE
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- PORTION OF ROOF RUNOFF TO RAINWATER TANK

NOTES:

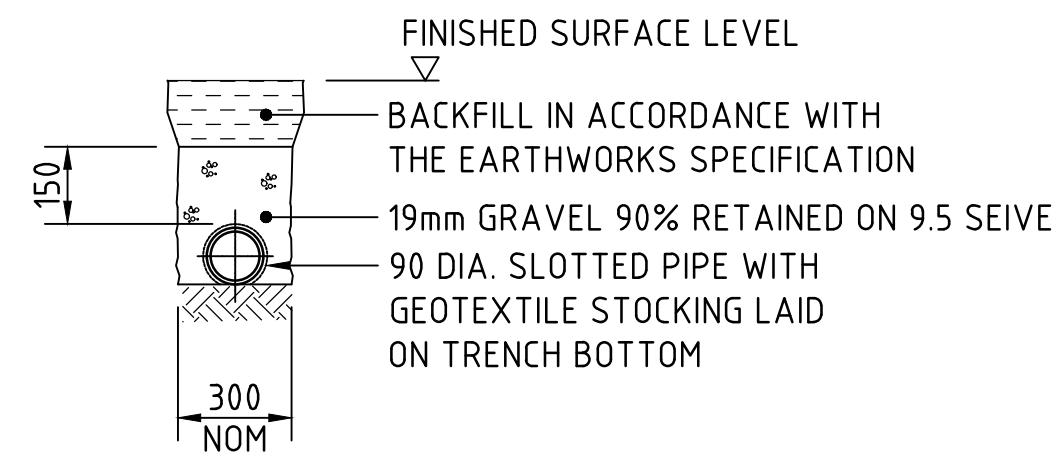
- REFER TO DRAWING SSSDA400 FOR STORMWATER DRAINAGE NOTES.
- REFER TO DRAWING SSSDA400 FOR PIT SCHEDULE.

STORMWATER DRAINAGE PLAN - LEVEL 1
SCALE 1:250



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

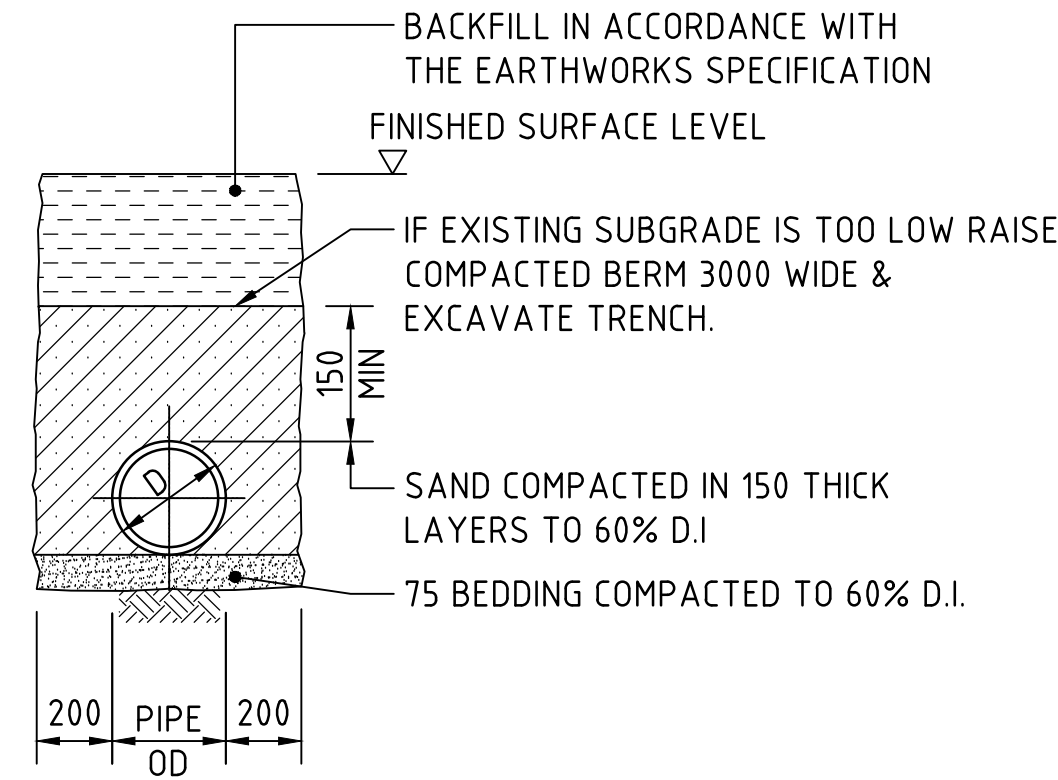
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT	PACE ARCHITECTS	CLIENT	VAUGHAN CONSTRUCTIONS	PROJECT	MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170	CONSULT AUSTRALIA	Costin Roe Consulting Pty Ltd. ABN 50 003 696 446	CRC CIVIL & STRUCTURAL ENGINEERS	DRAWING TITLE	STORMWATER DRAINAGE PLAN LEVEL 1										
ISSUED FOR INFORMATION		16.09.25	A	DATE	ISSUE	DATE	ISSUE	DESIGNED	HC	DRAWN	QP	CHECKED	XC	SIZE	B1	SCALE	AS SHOWN	CAD REF:	C014972.02-SSDA410	PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 f: +61 2 9241 3731 e: mail@costinroe.com.au w: costinroe.com.au	DRAWING No	C014972.02-SSDA410	ISSUE	B



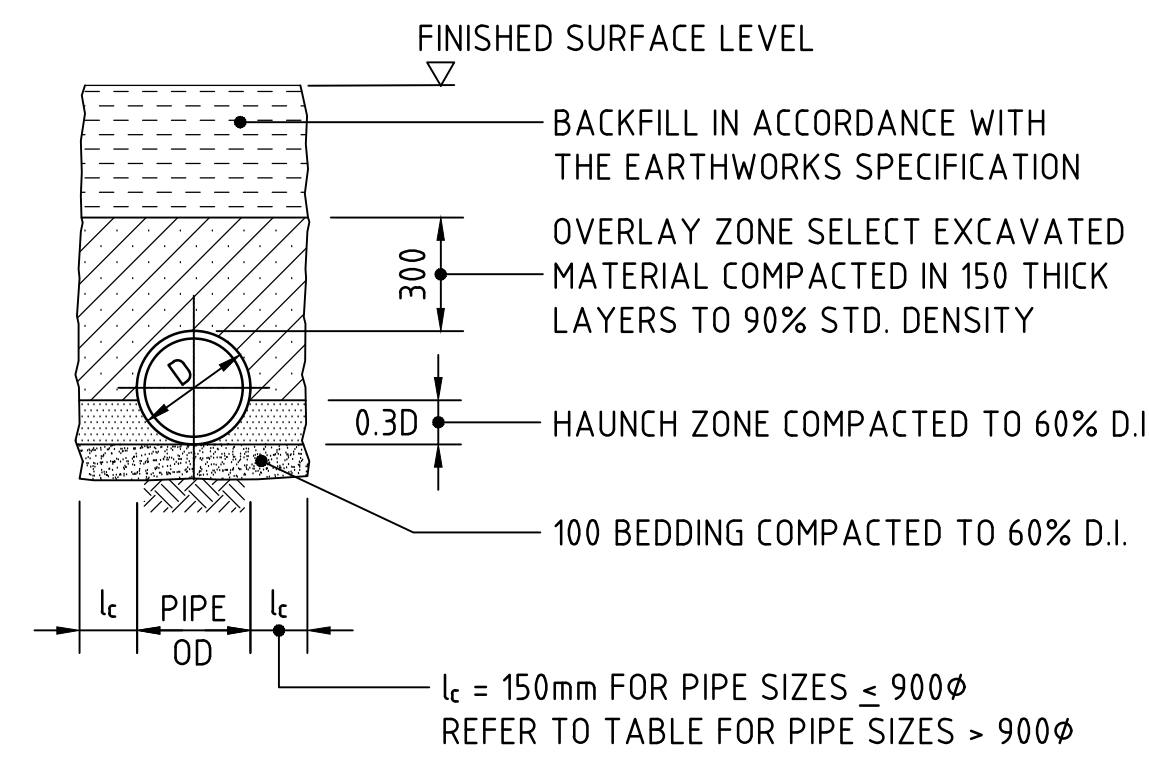
SUPPORT TO AGRICULTURAL DRAIN
SCALE 1:20

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
75.0	100
9.5	100 TO 50
2.36	100 TO 30
0.60	50 TO 15
0.075	25 TO 0

SELECT FILL MATERIAL IN ACCORDANCE WITH TABLE 1 AS 3725



SUPPORT TO uPVC PIPES
SCALE 1:20

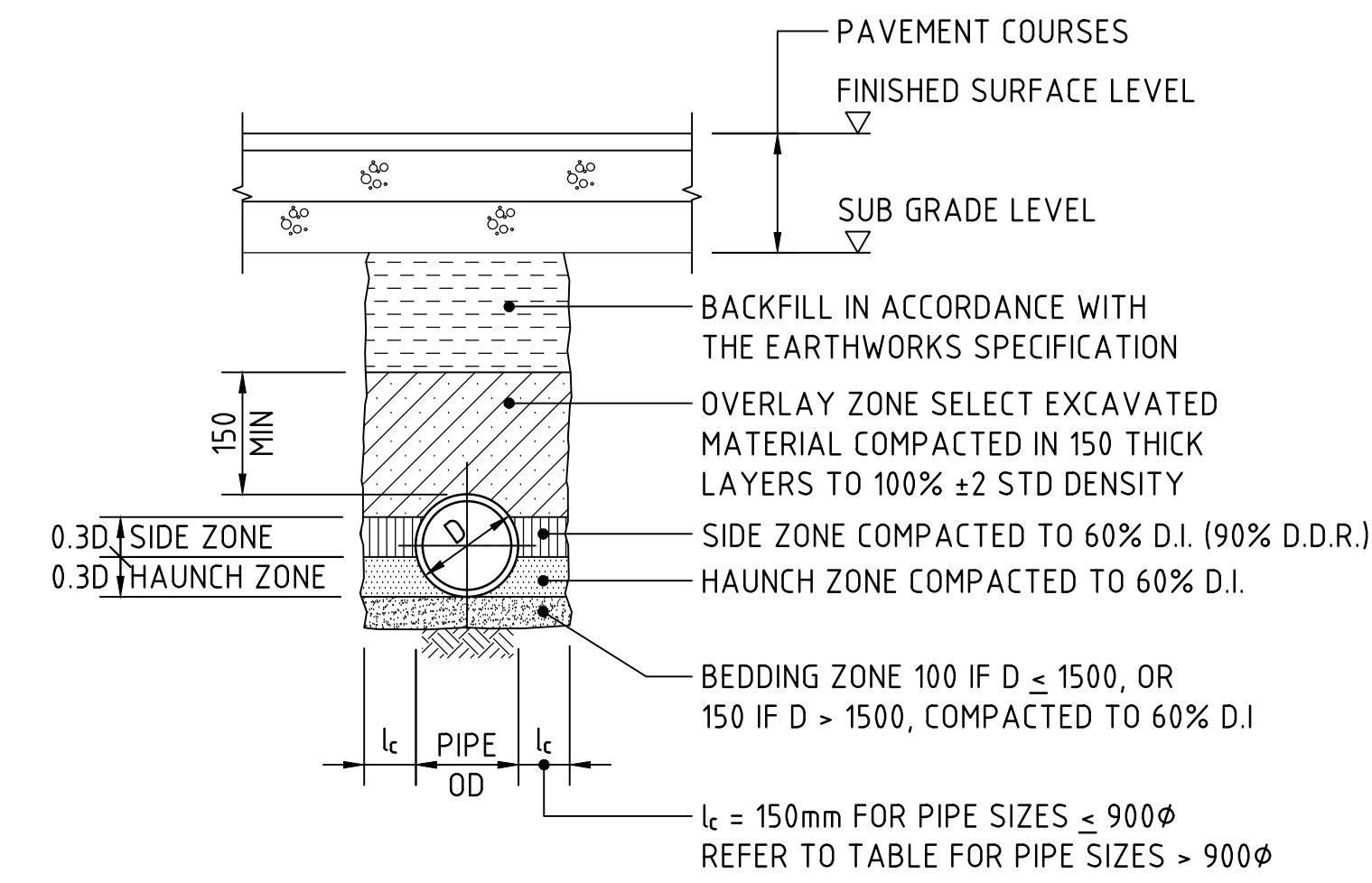


TYPE H1 SUPPORT TO CONCRETE PIPES AT LANDSCAPED AREAS
SCALE 1:20

BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 20
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

SIDE ZONE WIDTH	
PIPE SIZE (mm)	l _c (mm)
≤ 900φ	150
1050φ	175
1200φ	200
1350φ	225
1500φ	250
1650φ	275
1800φ	300

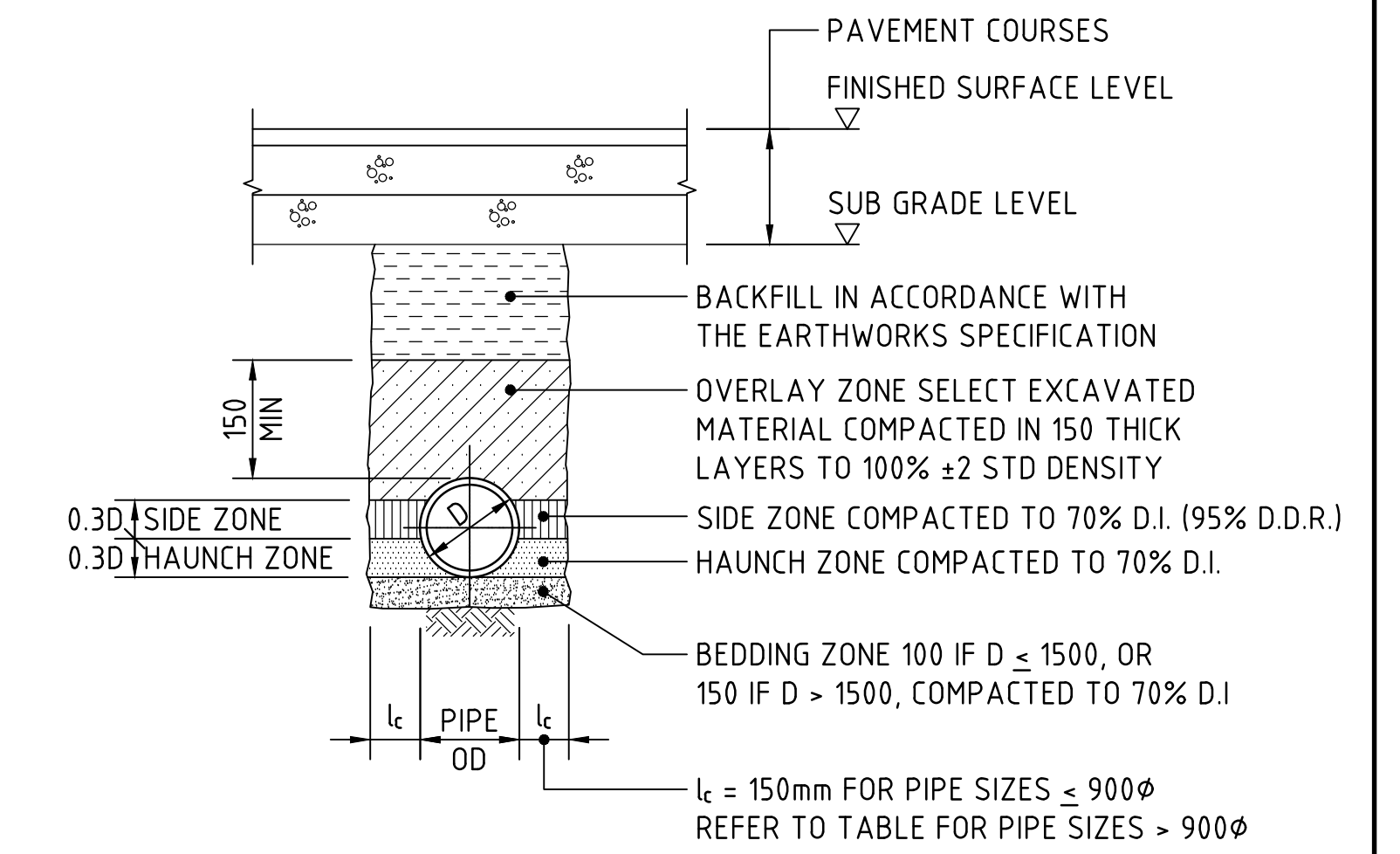
ENGINEER TO SPECIFY TRENCH WIDTHS FOR PIPE SIZES GREATER THAN 1800φ



TYPE HS2 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT

SCALE 1:20
D ≤ 1350, MAX FILL = 4.0m
D > 1350, MAX FILL = 3.0m

BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 20
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

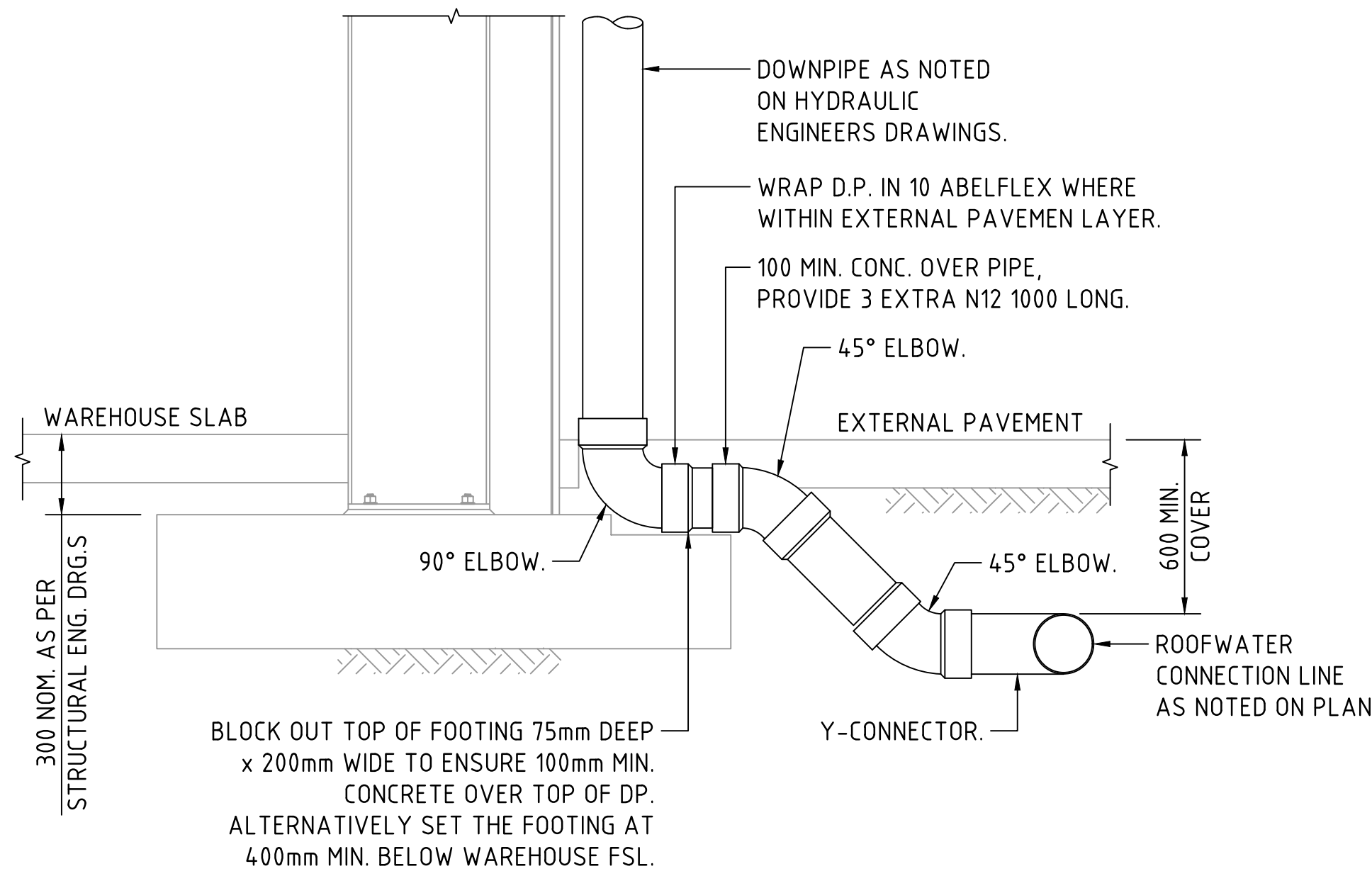


TYPE HS3 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT

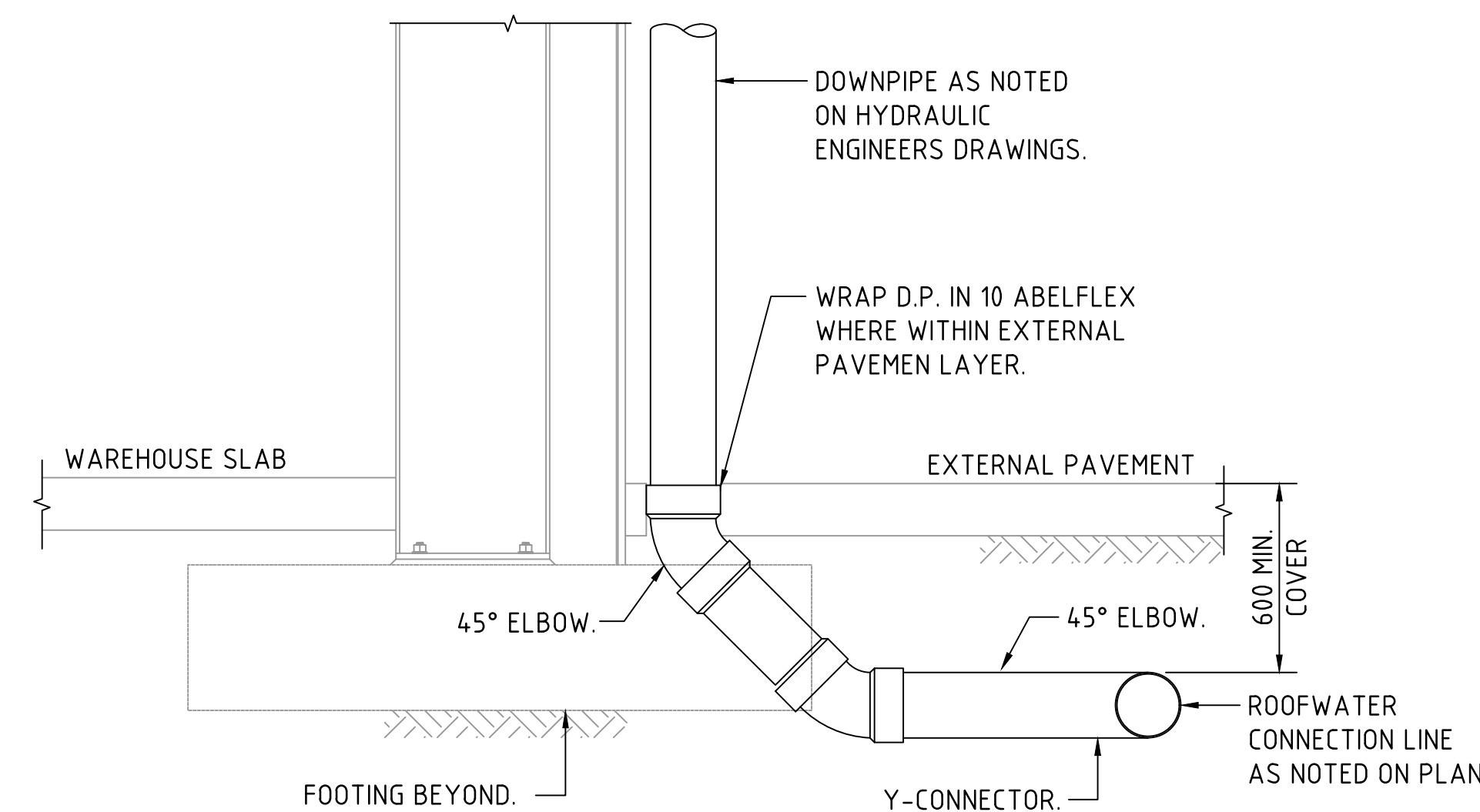
SCALE 1:20
D ≤ 1050, MAX FILL = 6.0m
D > 1050, MAX FILL = 4.8m

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
75.0	100
9.5	100 TO 50
2.36	100 TO 30
0.60	50 TO 15
0.075	25 TO 0

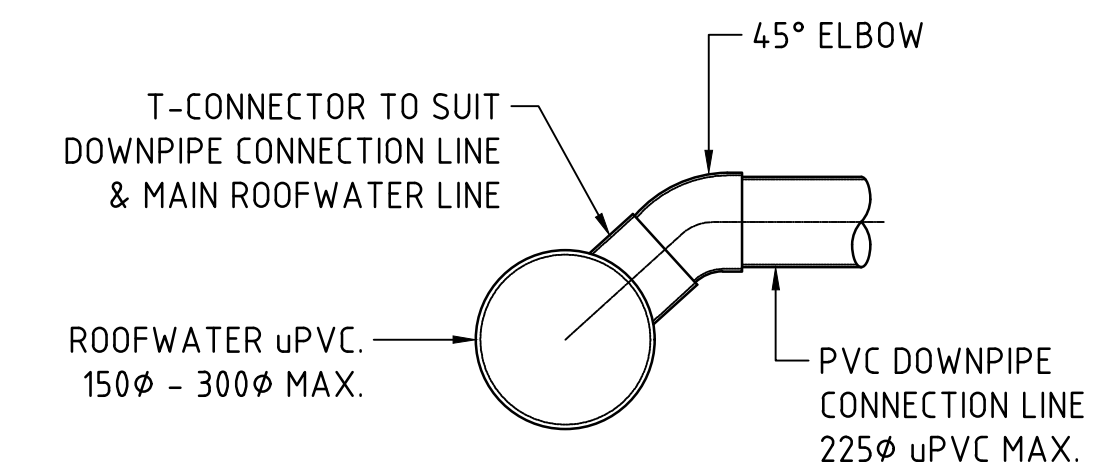
SELECT FILL MATERIAL IN ACCORDANCE WITH TABLE 1 AS 3725



DOWNPIPE TURN-UP DETAIL A
(AT FOOTING LOCATION)
SCALE 1:20



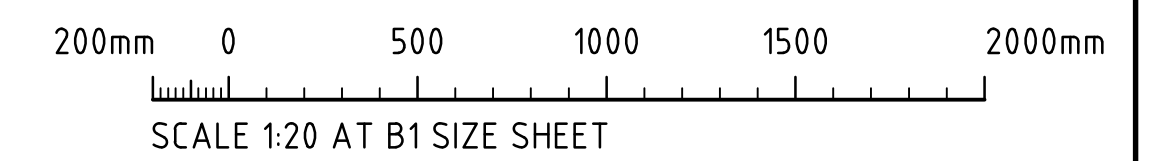
DOWNPIPE TURN-UP DETAIL B
(CLEAR OF FOOTING)
SCALE 1:20



DOWN PIPE CONNECTION TO uPVC PIPE
SCALE 1:20

- PROPRIETARY T-PIECE CONNECTORS SHALL BE USED TO WHERE DIRECT CONNECTIONS ARE REQUIRED TO uPVC PIPES.
- ALL JOINTS TO BE SEALED WITH SOLVENT WELDED JOINTS.
- THE PVC PIPE SHALL NOT PROTRUDE BEYOND THE INNER SURFACE OF THE STORMWATER PIPE.

DOWNPIPE CONNECTION DETAILS



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	B
ISSUED FOR INFORMATION	16.09.25	A
AMENDMENTS	DATE	ISSUE

ARCHITECT
PACE
ARCHITECTS

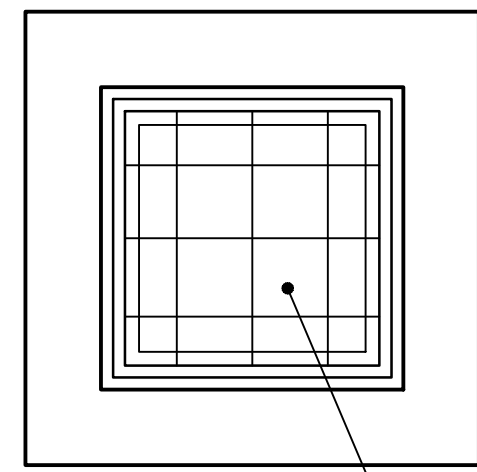
CLIENT
VAUGHAN
CONSTRUCTIONS

PROJECT
MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
NSW 2170

CONSULT AUSTRALIA
Costin Roe Consulting Pty Ltd.
ABN 50 003 696 446
PO Box N419 Sydney NSW 1220
Level 4, 8 Windmill Street, Millers Point NSW 2000
p: +61 2 9251 7699 f: +61 2 9241 3731
e: mail@costinroe.com.au w: costinroe.com.au

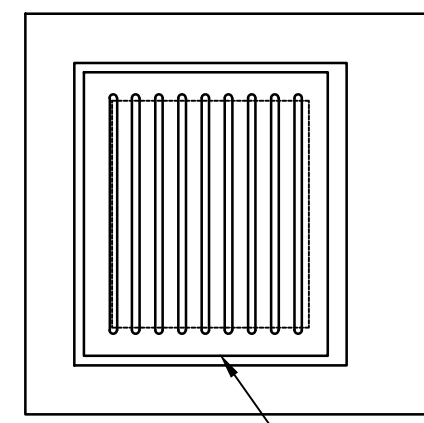
CRC
COSTIN ROE CONSULTING
CIVIL & STRUCTURAL ENGINEERS

DRAWING TITLE
STORMWATER DRAINAGE DETAILS
SHEET 1
DRAWING No
C014972.02-SSDA450
ISSUE
B



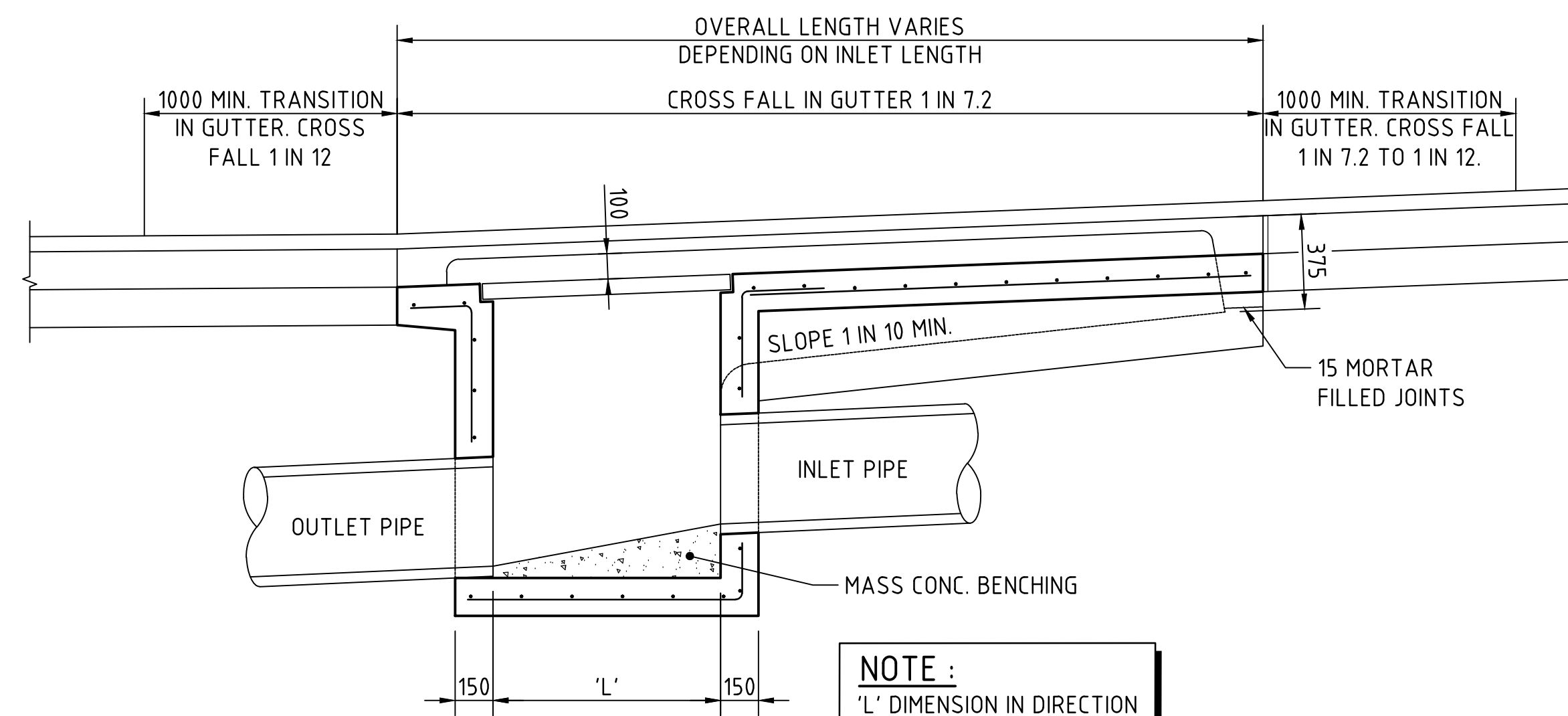
PLAN
SCALE 1:20

CONCRETE FILLED CAST IRON COVER & FRAME (GATIC OR EQUAL) SEE SCHEDULE



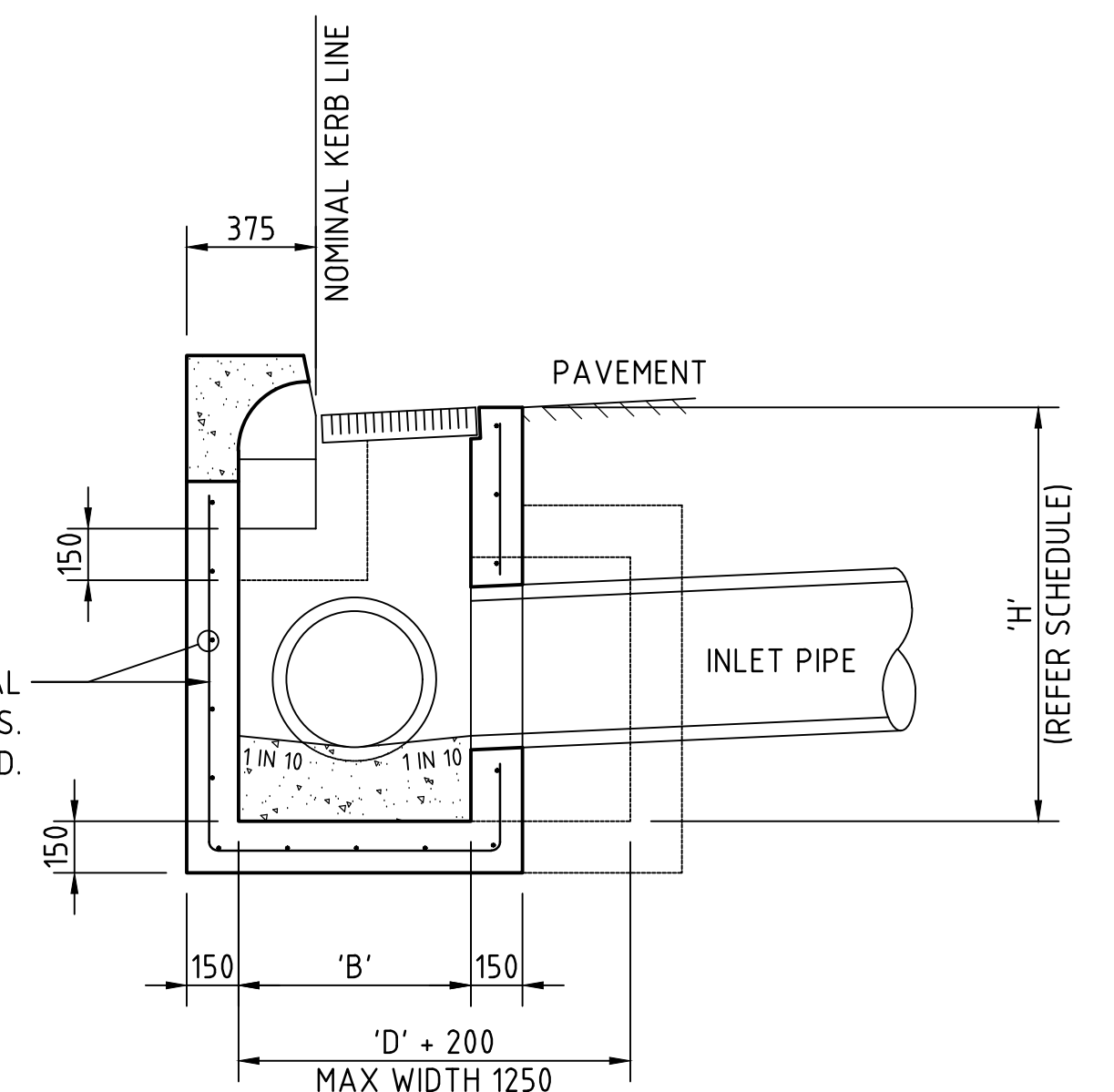
PLAN
SCALE 1:20

H.D. CAST IRON GRATE & TEE BAR FRAME (HINGED) 'GATIC' OR EQUAL. SEE SCHEDULE

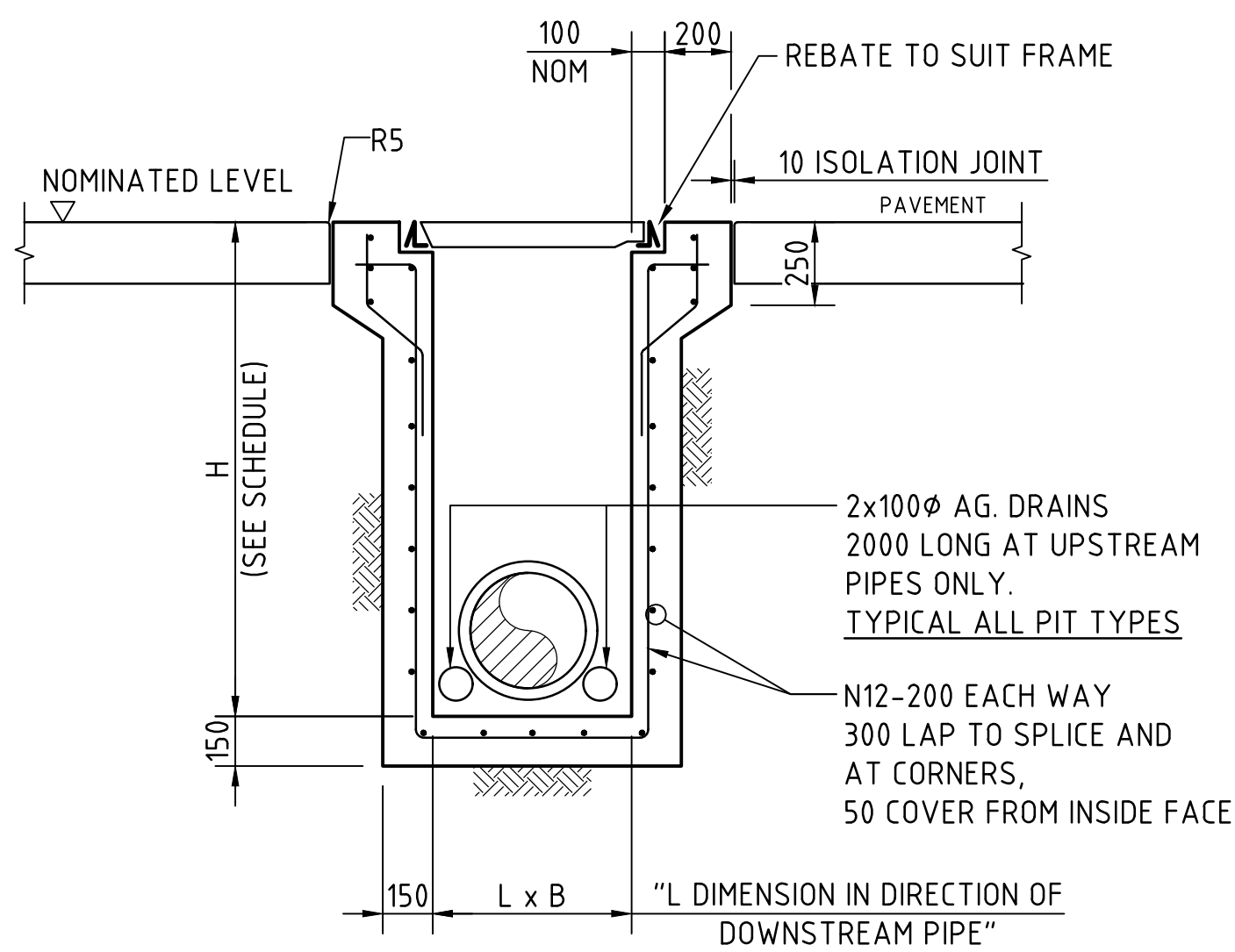


LONG SECTION
SCALE 1:20

NOTE:
'L' DIMENSION IN DIRECTION OF DOWNSTREAM PIPE

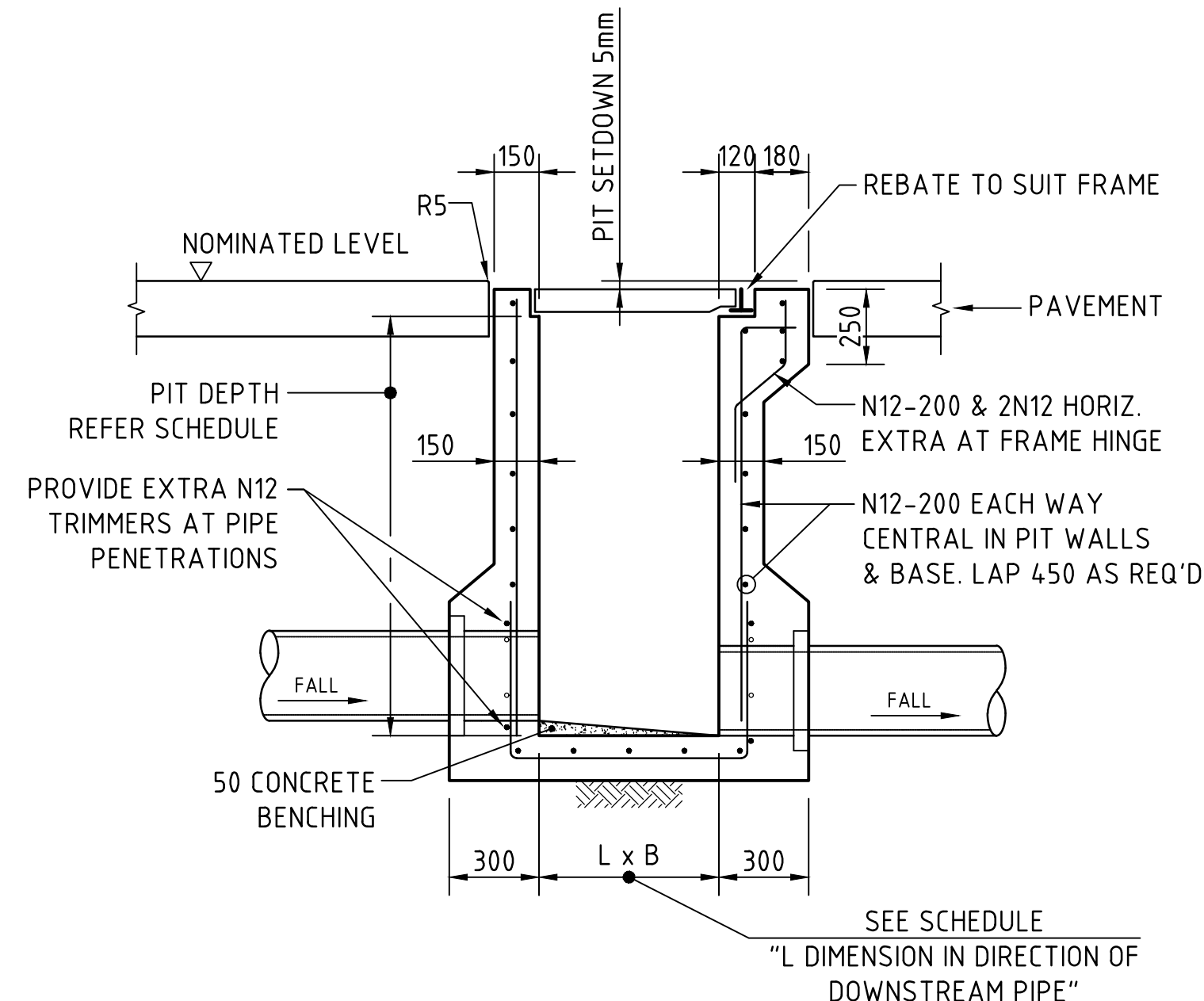


CROSS SECTION
SCALE 1:20



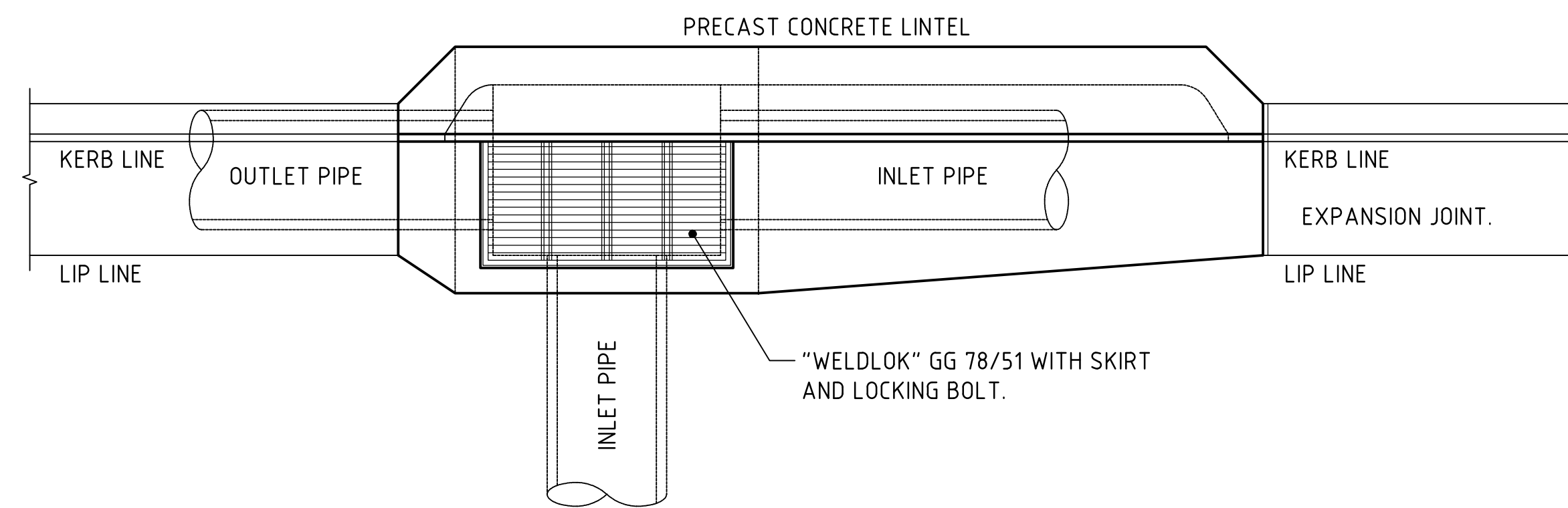
SECTION
SCALE 1:20

SEALED JUNCTION PIT - SJP



SECTION
SCALE 1:20

SINGLE GRATED GULLY PIT - SGGP

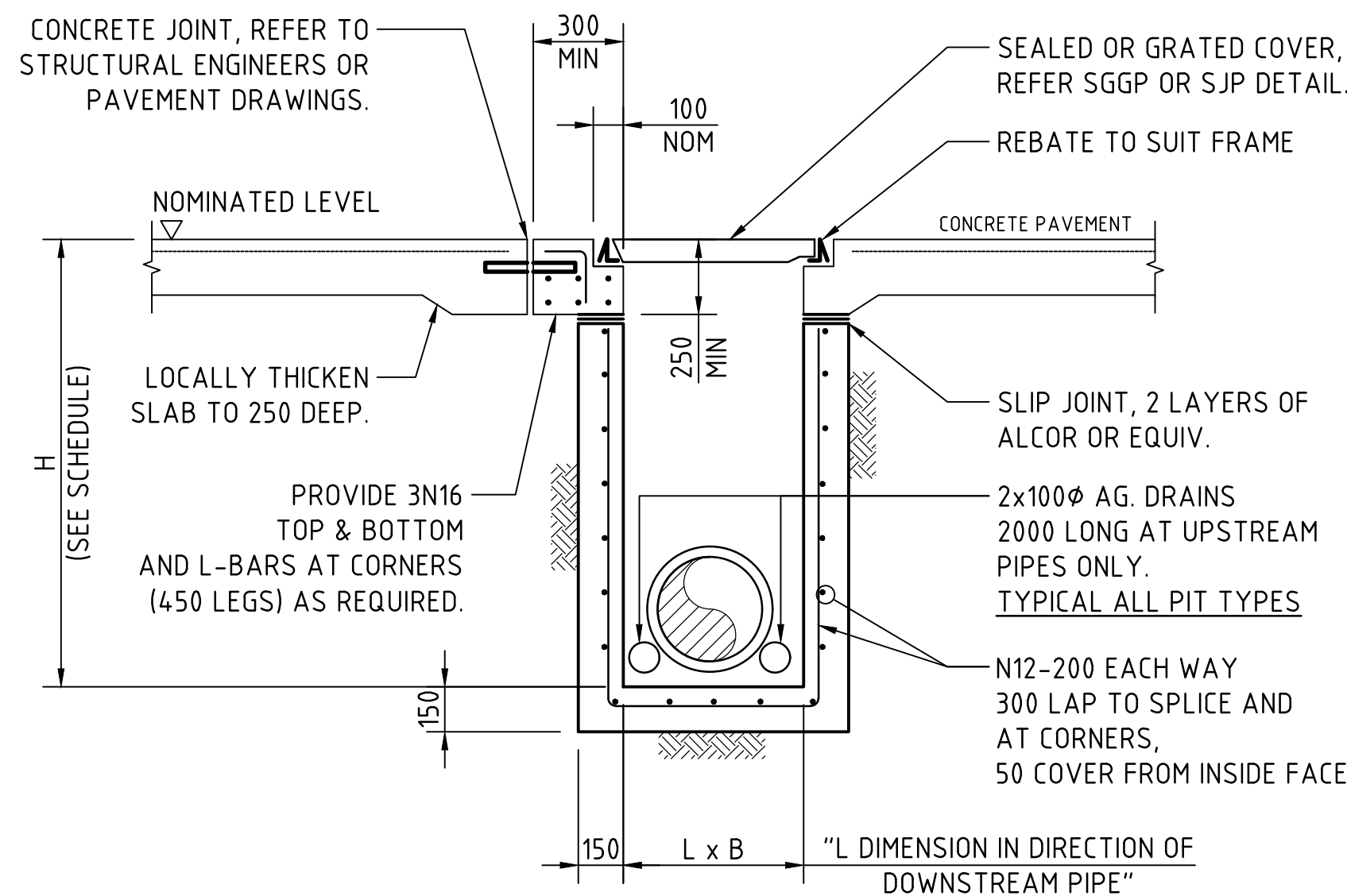


PLAN
SCALE 1:20

KERB INLET PIT - KIP

CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	AD MIXTURE	F _{ck} (MPa)
PIT	80	20	GP	NIL	32

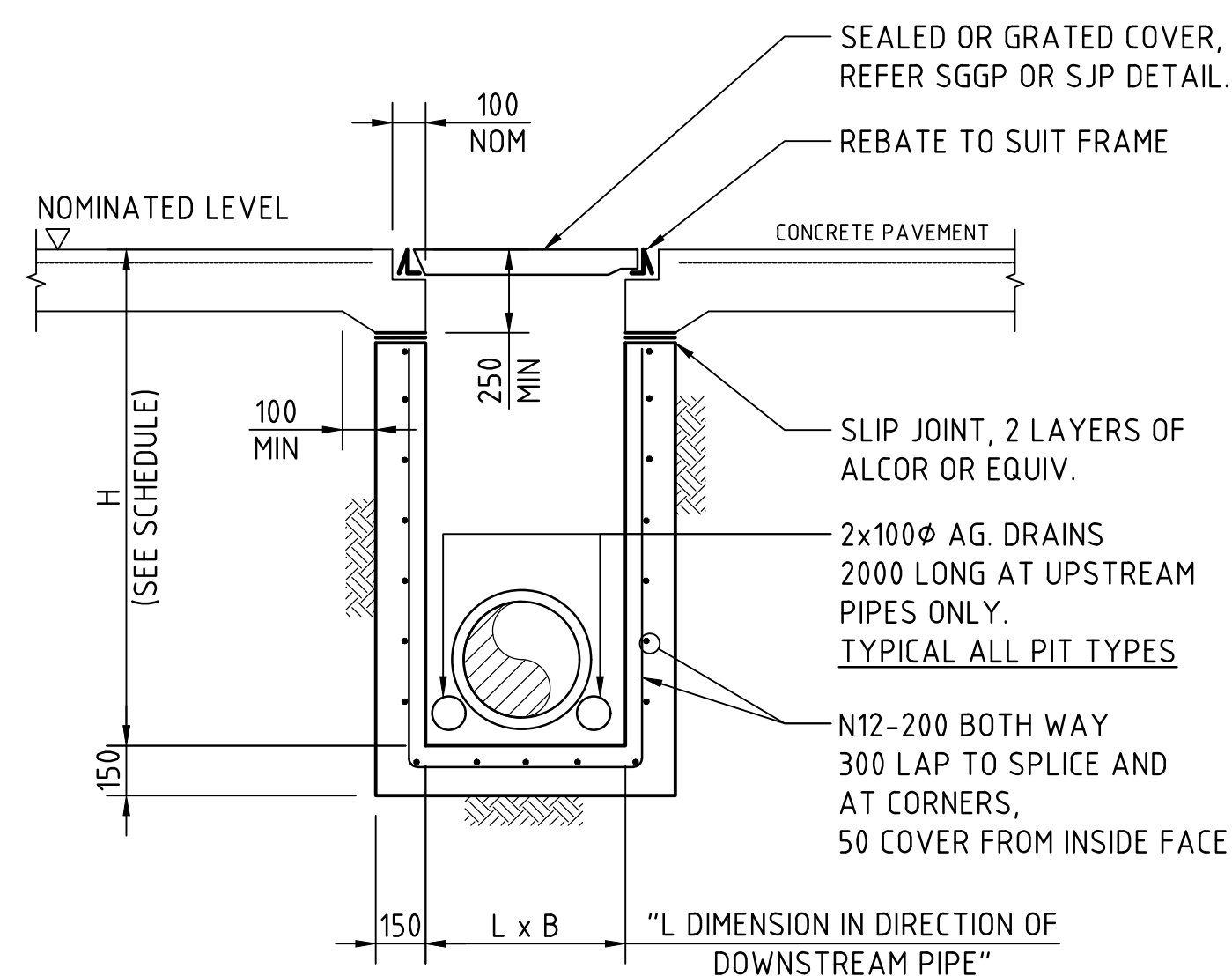
- NOTE:
- WHERE GULLY PIT IS LOCATED ON KERB RETURNS OR BULB OF CUL-DE-SACS PROVIDE CURVED PRECAST CONCRETE LINTELS.
 - SAG PITS SHALL HAVE LINTEL PLACED CENTRALLY ABOUT THE GRATE.
 - ALL REINFORCING TO HAVE 30 MIN. CLAER CONCRETE COVER.
 - FOR PITS DEEPER THAN 1000mm CLIMB RAILS SHALL BE PROVIDED.



SECTION
SCALE 1:20

**SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL
GRATE/COVER SUPPORT
CAST-INTO PAVEMENT SLAB**

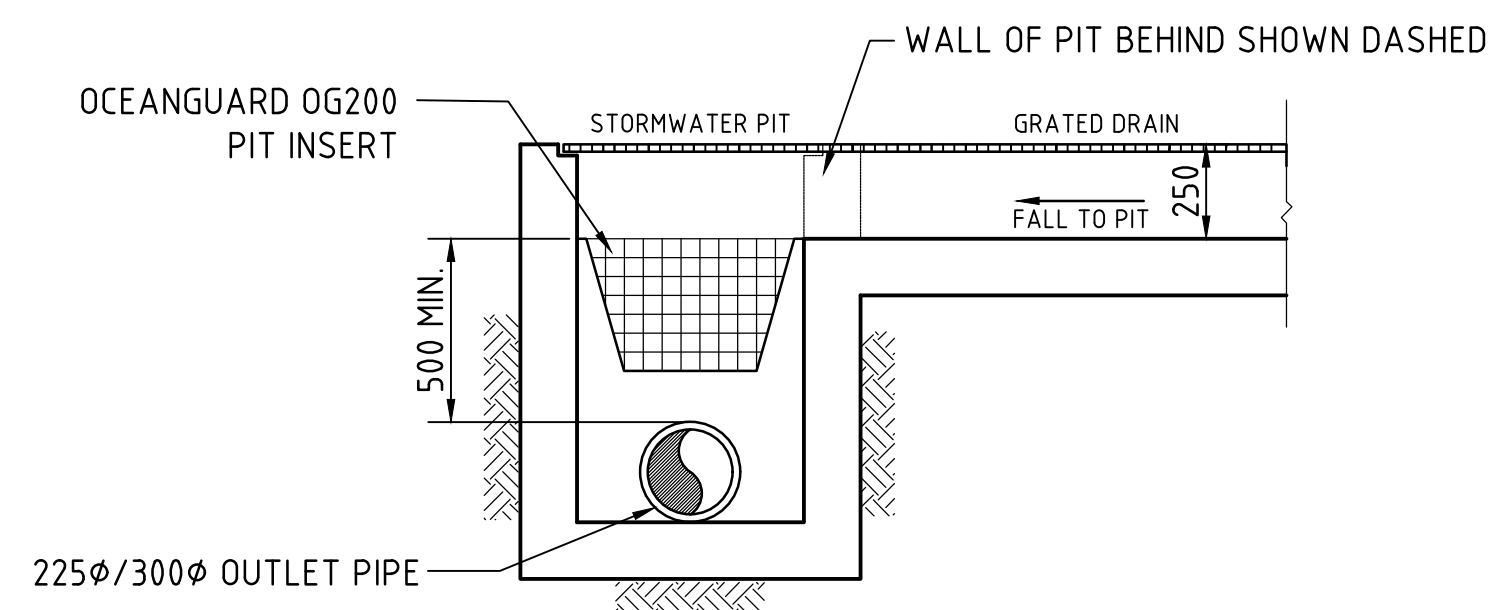
(ADOPT IN CONCRETE PAVEMENT FOR SGGP's & SJP's, WHERE PITS ARE LOCATED IN THE CORNER OF SLAB PANELS OR ADJACENT TO SLAB PANEL JOINTS)



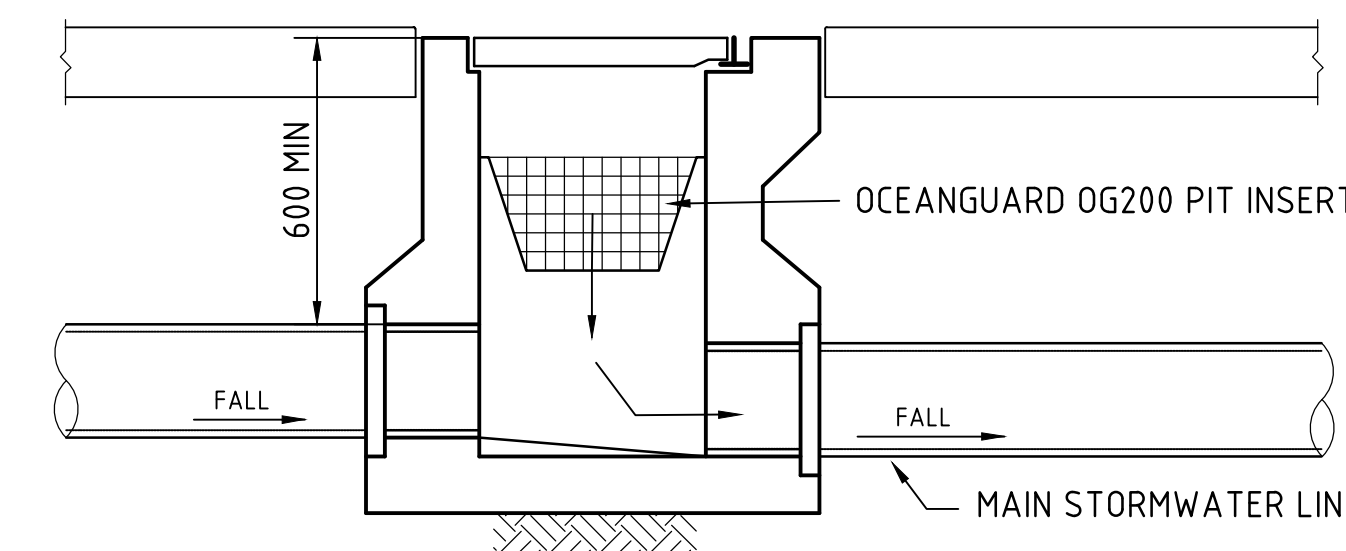
SECTION
SCALE 1:20

**SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL
GRATE/COVER SUPPORT
CAST-INTO PAVEMENT SLAB**

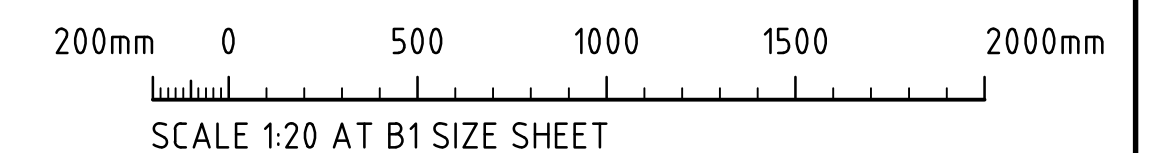
(ADOPT IN CONCRETE PAVEMENTS FOR SGGP's & SJP's, WHERE JOINTS ARE NOT LOCATED WITHIN PROXIMITY OF THE GRATE)



GRATED DRAIN/STORMWATER PIT WITH
ATLAN STORMSACK CONFIGURATION
SCALE 1:20



STORMWATER PIT WITH ATLAN STORMSACK
CONFIGURATION
SCALE 1:20



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	B
ISSUED FOR INFORMATION	16.09.25	A
AMENDMENTS	DATE	ISSUE

ARCHITECT
PACE
ARCHITECTS

CLIENT
VAUGHAN
CONSTRUCTIONS

PROJECT
MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
NSW 2170

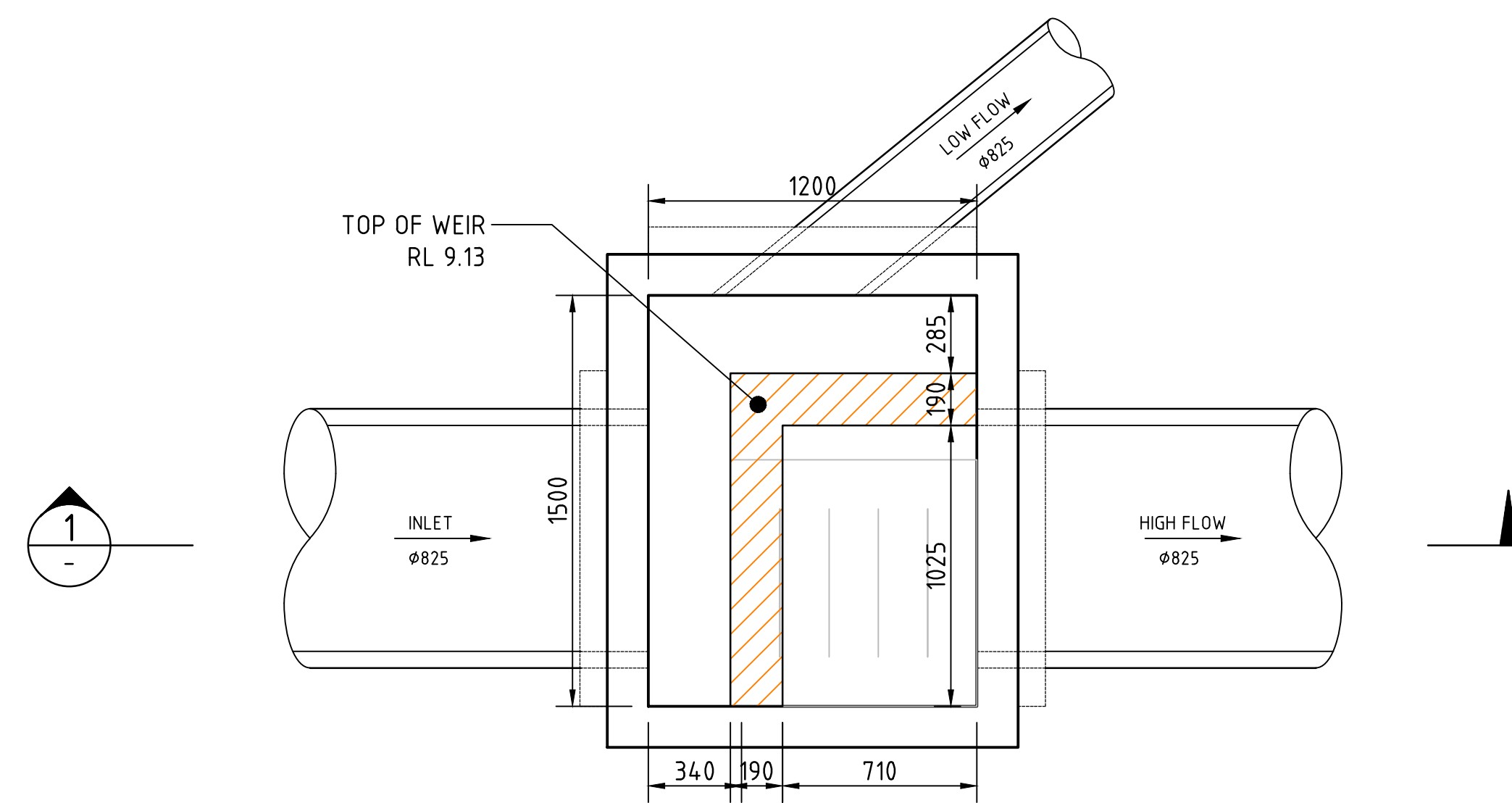
CONSULT AUSTRALIA
Costin Roe Consulting Pty Ltd.
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CIVIL & STRUCTURAL ENGINEERS

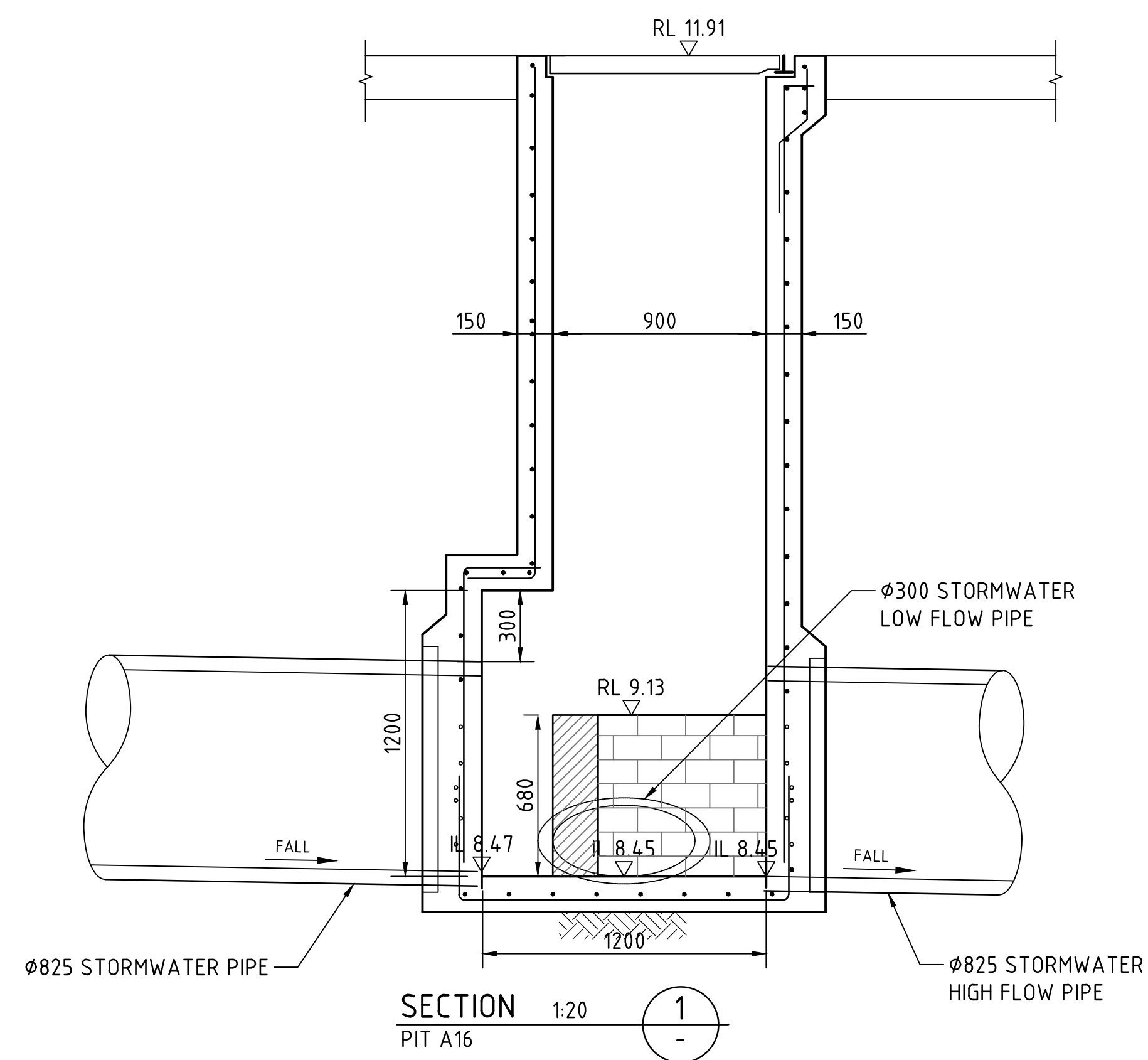
DRAWING TITLE
**STORMWATER DRAINAGE DETAILS
SHEET 2**

DRAWING No
C014972.02-SSDA451

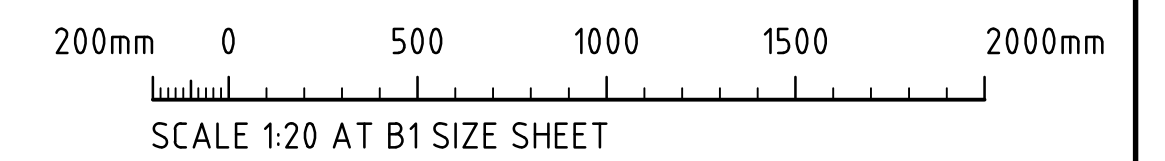
ISSUE
B



LOW/HIGH FLOW SPLITTER PIT A16 DETAIL
SCALE 1:20



PIT A15 DETAILS
 LOW FLOW PIPE ø300
 WEIR HEIGHT Hw =680mm
NOTE:
 REFER TO DRAWING C451 FOR
 STRUCTURAL DETAILS



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	A
AMENDMENTS	DATE	ISSUE

ARCHITECT
PACE
 ARCHITECTS

CLIENT
VAUGHAN
 CONSTRUCTIONS

PROJECT
MARVEL MOOREBANK
 20 KELSO CRESCENT, MOOREBANK
 NSW 2170

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
HC	QP	DATE	XC	B1	AS SHOWN	C014972.02-SSDA52

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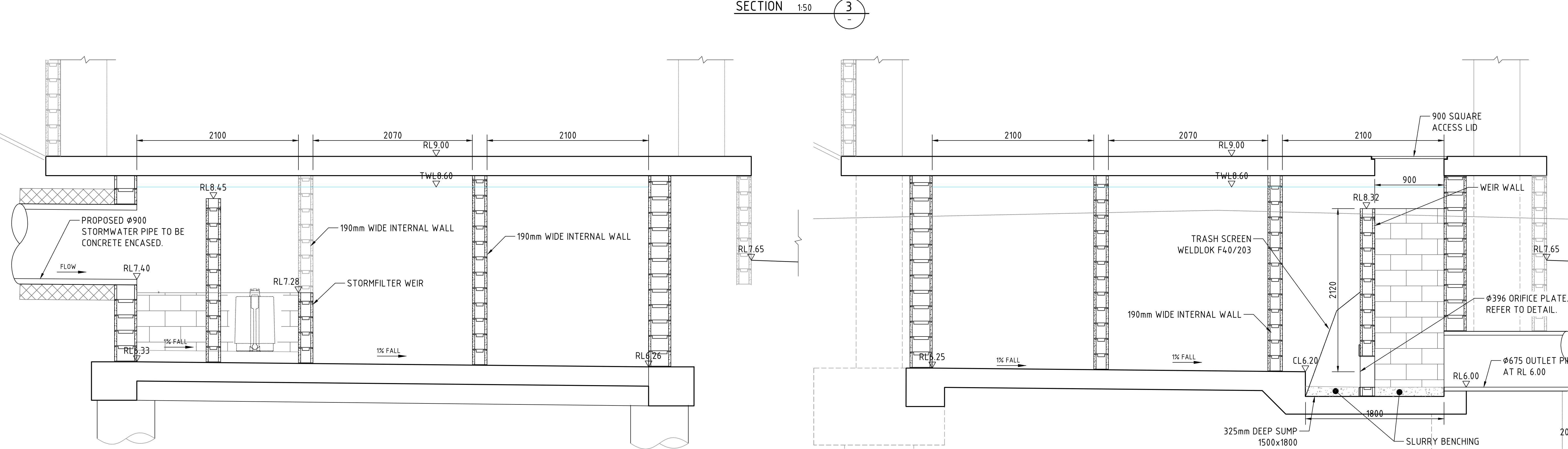
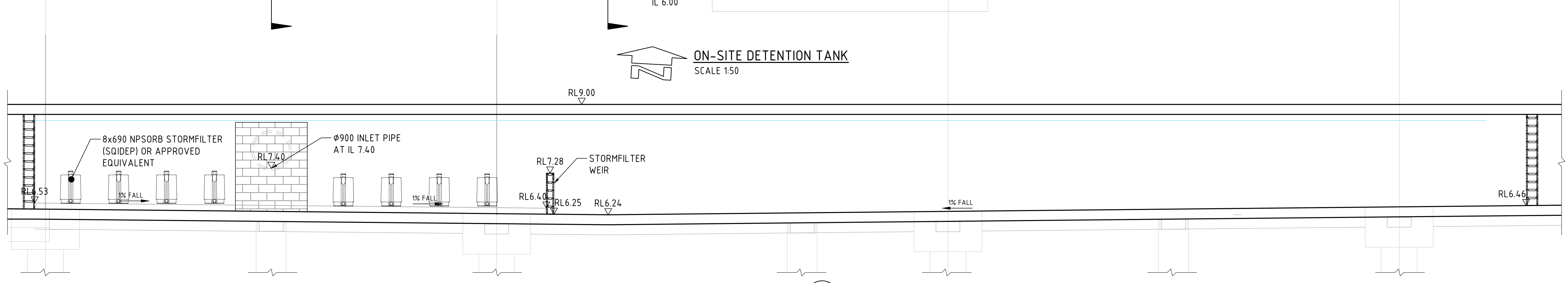
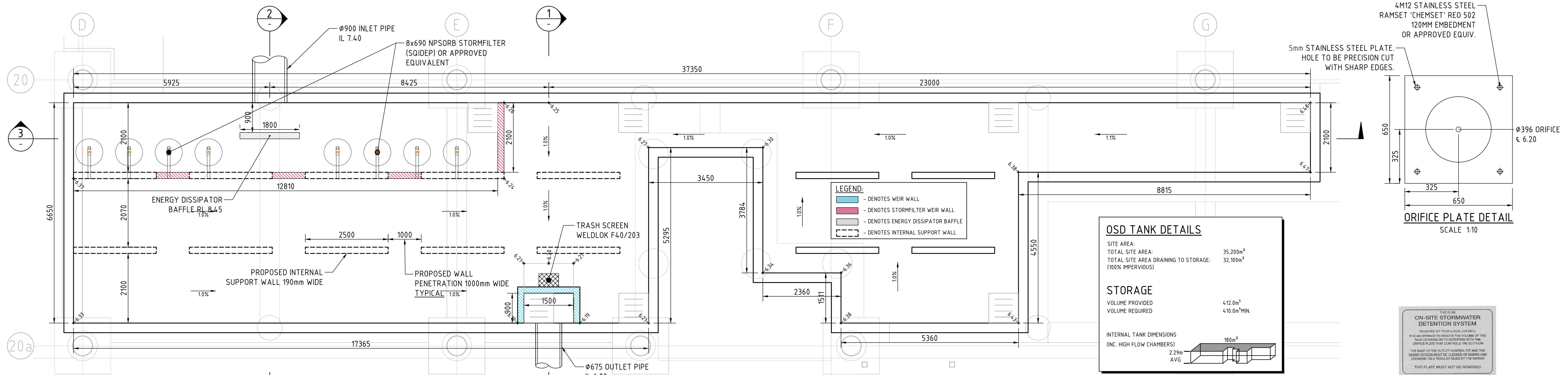
CRC
 COSTIN ROE
 CONSULTING

**CIVIL &
 STRUCTURAL
 ENGINEERS**

DRAWING TITLE
STORMWATER DRAINAGE DETAILS
 SHEET 3

DRAWING No
C014972.02-SSDA452

ISSUE
A

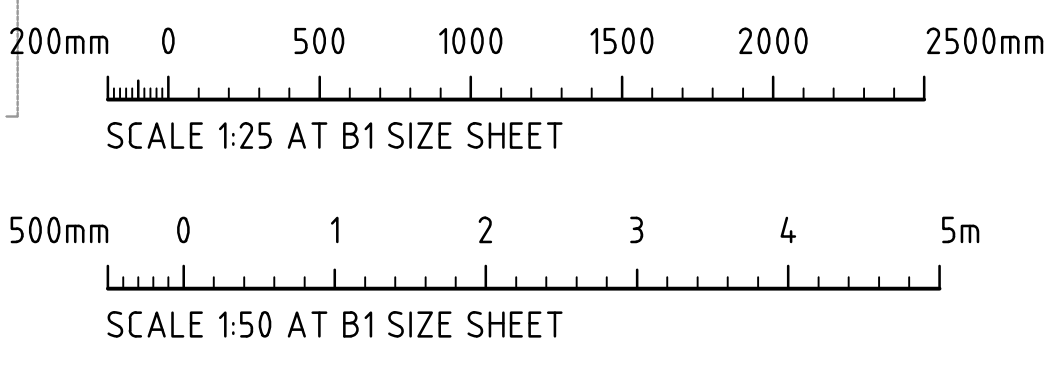


OSD WARNING SIGN
N.T.S
SUGGESTED SIZE 600mm x 450mm
TO BE PROVIDED ADJACENT TO OSD TANKS IN SUITABLE AREA T.B.C ON SITE

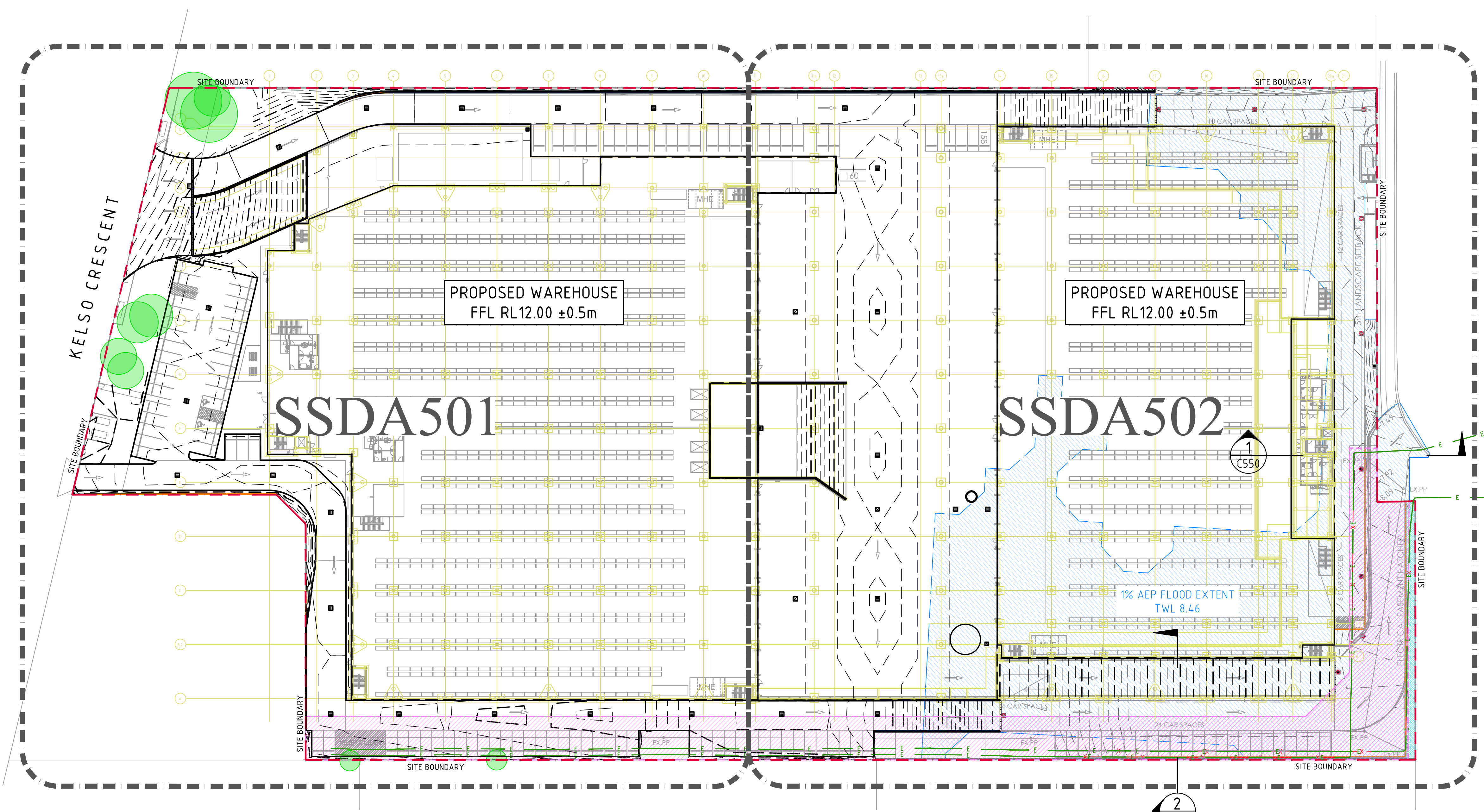


CONFINED SPACE SIGN
N.T.S
SUGGESTED SIZE 300mm x 450mm
TO BE PROVIDED ADJACENT TO OSD TANKS IN SUITABLE AREA T.B.C ON SITE

NOTE
1. REFER TO LIVERPOOL CITY COUNCIL - ON-SITE DETENTION STANDARD FOR SIGN REQUIREMENTS.

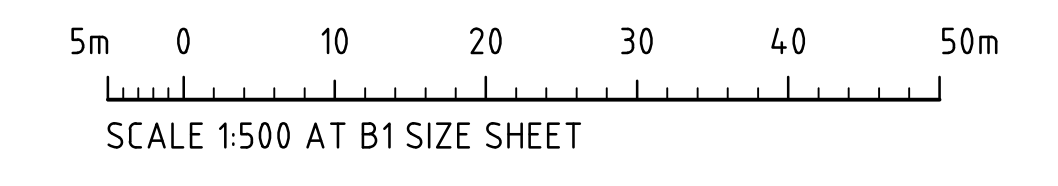


FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION



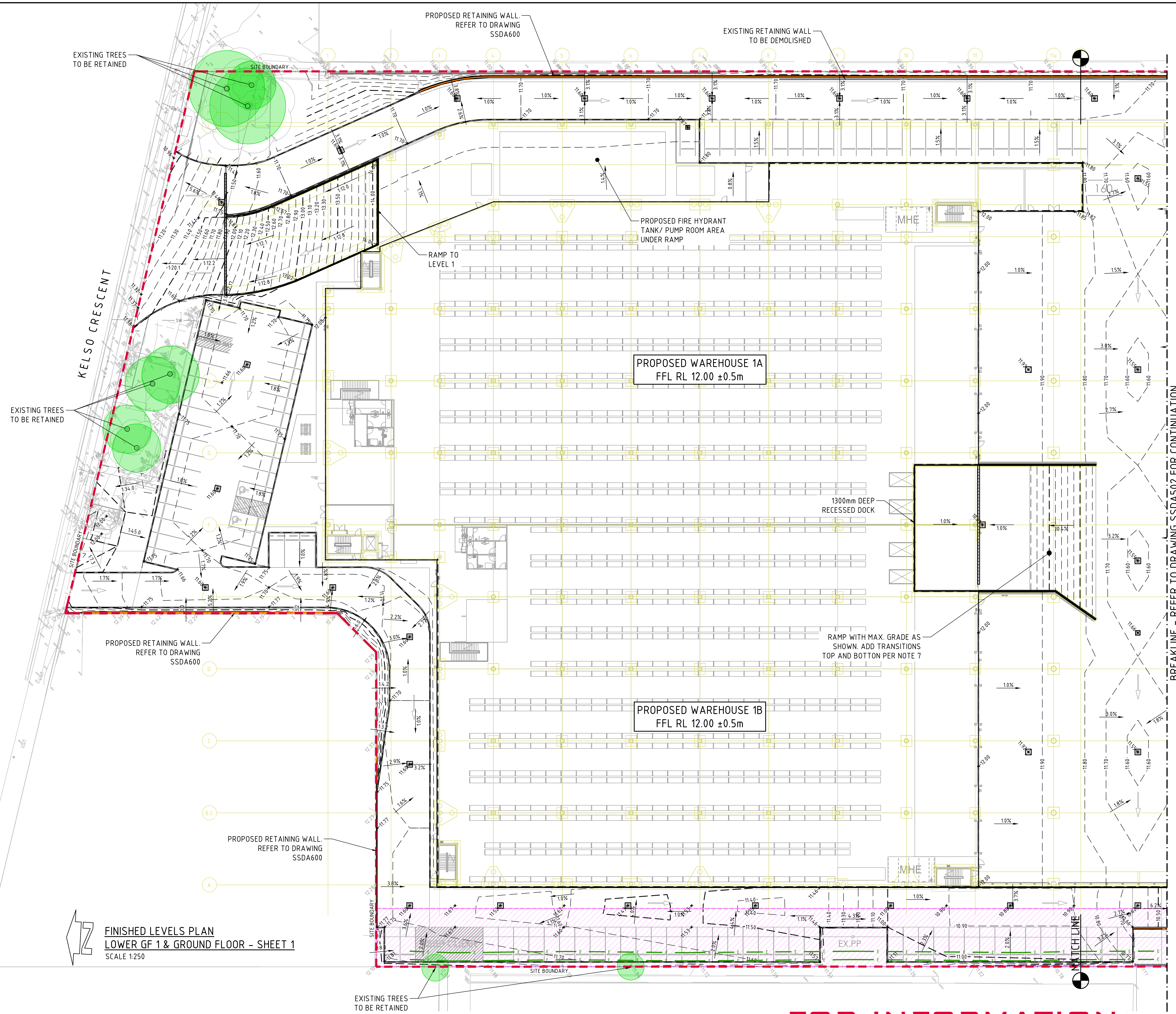
FINISHED LEVELS KEY PLAN - LOWER GF 1 & GROUND FLOOR
SCALE 1:500

- FINISHED LEVELS PLAN NOTES:**
- LEVELS DATUM IS AUSTRALIAN HEIGHT DATUM (A.H.D.).
 - GRADING REQUIREMENTS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890.1, AS2890.2 AND AS2890.6.
 - ALL CONTOUR LINES & SPOT LEVELS INDICATE FINISHED PAVEMENT LEVELS U.N.O. ON PLAN.
 - CONTOUR INTERVALS
 - THE MINOR CONTOUR INTERVAL IS 0.1m.
 - THE MAJOR CONTOUR INTERVAL IS 0.5m.
 - HARDSTAND GRADING
 - MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%).
 - GRADING OF ON-GRADE DOCKS TO BE 1:100 (1%) FALL AWAY FROM THE DOCK FACE FOR A LENGTH OF 15m U.N.O.
 - GRADING OF TRUCK CIRCULATION ZONES TO BE MINIMUM AS NOTED ABOVE, 3-4% NOMINAL AND MAX. 5%.
 - CAR PARKING AREA GRADES
 - MINIMUM PAVEMENT GRADE IS TO BE 1:100 (1%), DESIRABLE MINIMUM GRADE 1:50 (2%).
 - MAXIMUM PAVEMENT GRADE IS TO BE 1:20 (5%) IN CARPARKING AREAS AND 1:25 (4%) ELSEWHERE.
 - DISABLED ACCESS PARKING ZONES AND SHARED SPACE TO BE MAXIMUM OF 1:33 (3%) IN ASPHALT PAVEMENT AND MAXIMUM OF 1:40 (2.5%) IN CONCRETE PAVEMENT.
 - CARPARK RAMP GRADES TO BE MAX 1:5 WITH 2.5m SMOOTH TRANSITION AT TOP AND BOTTOM U.N.O.
 - TRUCK RAMP GRADES
 - MAXIMUM B-DOUBLE OR 19.0m AV RAMP GRADES ARE TO BE 1:8.3 (12%) U.N.O. ON PLAN.
 - PROVIDE MINIMUM 4.0m LONG TRANSITION WHERE CHANGES OF GRADE EXCEED 1:20 (5%) AT A CREST U.N.O.
 - PROVIDE MINIMUM 3.0m LONG TRANSITION WHERE CHANGE OF GRADE EXCEED 1:20 (5%) AT A SAG U.N.O.
 - TRANSITIONS ARE TO PROVIDE A SMOOTH CONTINUOUS CIRCULAR AND TANGENTIAL CHANGE IN GRADE TO ENSURE NO SHARP OR ACUTE CHANGES IN GRADE ARE PRESENT.
 - WHERE FIRE BRIGADE ACCESS IS REQUIRED, MAXIMUM RAMP GRADIENTS ARE TO BE 1:6 (16.6%), DESIRABLE RAMP GRADIENTS ARE TO BE 1:8 (12.5%) WITH 7m TRANSITION TOP AND BOTTOM U.N.O. ON PLAN.
 - PERMANENT BATTER SLOPES ARE TO HAVE A MAXIMUM GRADE OF 1V:3H U.N.O. BASED ON GEOTECHNICAL ASSESSMENT. PROVIDE MINIMUM 0.5m BERM BETWEEN THE BACK OF KERB OR PAVEMENT EDGES AND THE TOP OR TOE OF A BATTER.
 - ALL BATTER SLOPE WITH GRADES AT OR EXCEEDING 1V:6H ARE TO BE TURFED IMMEDIATELY OR APPROPRIATE EROSION CONTROL IS TO BE PROVIDED TO THE SATISFACTION OF THE ENGINEER.
 - ALL FOOTPATHS ARE TO FALL AWAY FROM THE BUILDING AT 2.5% NOMINAL GRADE.
 - ALL PAVEMENTS ARE TO BE SET AT 30mm BELOW THE FINISHED FLOOR LEVEL OF THE WAREHOUSE AND OFFICE AREAS. PROVIDE LOCAL FEATHERING AT DOORWAYS OR ROLLER SHUTTERS TO PROVIDE FLUSH FINISH AS REQUIRED.
 - WHERE NEW AND EXISTING INTERFACING IS REQUIRED, MATCH EXISTING LEVELS AND PROVIDE SMOOTH INTERFACE BETWEEN NEW AND EXISTING GRADIENTS. REFER ANY CONCERNS TO THE ENGINEER.



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT	CLIENT	PROJECT	COSTIN ROE CONSULTING PTY LTD.			DRAWING TITLE FINISHED LEVELS KEY PLAN LOWER GF 1 & GROUND FLOOR				
ISSUED FOR INFORMATION		16.09.25	A			MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170	PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 f: +61 2 9241 3731 e: mail@costinroe.com.au w: costinroe.com.au				DRAWING No	ISSUE		
AMENDMENTS	DATE	ISSUE	AMENDMENTS	DATE	ISSUE	DESIGNED	DRAWN	DATE	CHECKED	SCALE	CAD REF:	C014972.02-SSDA500	C014972.02-SSDA500	B

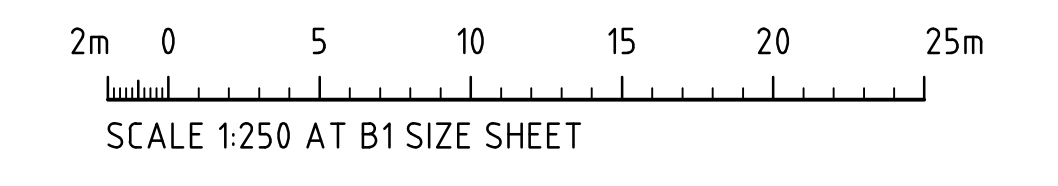


LEGEND:
LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- RETAINING WALL
- EXISTING BELOW GROUND ELECTRICAL CONDUIT
- EXISTING BELOW GROUND ELECTRICAL CONDUIT TO BE RELOCATED
- ELECTRICAL EASEMENT
- ON SITE DETENTION TANK
- FLOOD STORAGE
- 1% AEP FLOOD EXTENT - TWL: 8.46
- EXISTING TREES TO BE RETAINED

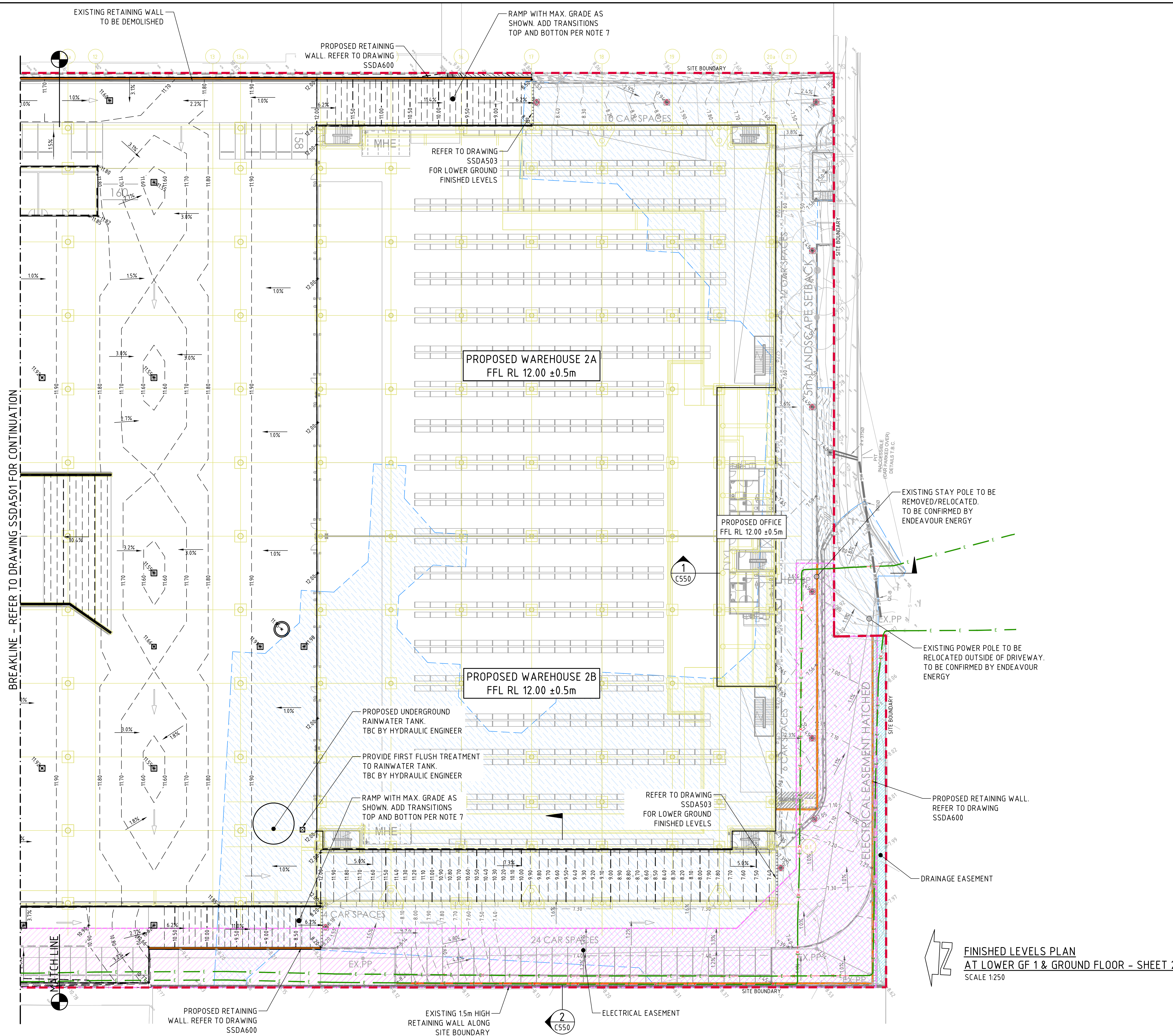
NOTES:
1. REFER TO DRAWING SSDA500 FOR FINISHED LEVELS NOTES.

FINISHED LEVELS PLAN
LOWER GF 1 & GROUND FLOOR - SHEET 1
SCALE 1:250



FOR INFORMATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT		CLIENT		PROJECT		COSTIN ROE CONSULTING PTY LTD.		DRAWING TITLE	
ISSUED FOR INFORMATION		16.09.25	A	PACE ARCHITECTS		VAUGHAN CONSTRUCTIONS		MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170		PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 f: +61 2 9241 3731 e: mail@costinroe.com.au w: costinroe.com.au		FINISHED LEVELS PLAN LOWER GF 1 & GROUND FLOOR - SHEET 1	
AMENDMENTS		DATE	ISSUE	DATE	ISSUE	DESIGNED	DRAWN	CHECKED	SCALE	CAD REF.	DRAWING No		ISSUE
						HC	GP	XC	AS SHOWN	C014972.02-SSDA501	C014972.02-SSDA501		B

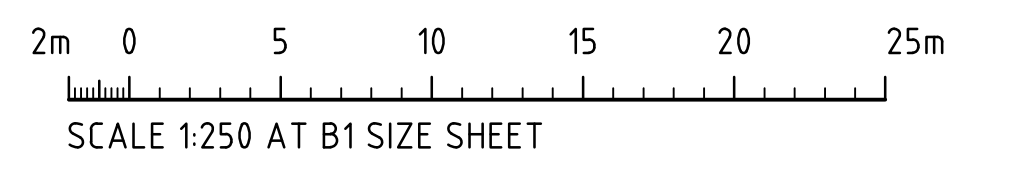


LEGEND:
LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- RETAINING WALL
- EXISTING BELOW GROUND ELECTRICAL CONDUIT
- EXISTING BELOW GROUND ELECTRICAL CONDUIT TO BE RELOCATED
- ELECTRICAL EASEMENT
- DRAINAGE EASEMENT
- ON SITE DETENTION TANK
- FLOOD STORAGE
- 1% AEP FLOOD EXTENT - TWL: 8.46
- EXISTING TREES TO BE RETAINED

NOTES:

- REFER TO DRAWING SSDA500 FOR FINISHED LEVELS NOTES.



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	B
ISSUED FOR INFORMATION	16.09.25	A
AMENDMENTS	DATE	ISSUE

ARCHITECT

ARCHITECTS

CLIENT

CONSTRUCTIONS

PROJECT

MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
NSW 2170

DESIGNED: HC
DRAWN: GP
DATE: DATE

CHECKED: XC
SCALE: AS SHOWN
SIZE: B1

CAD REF: C014972.02-SSDA502

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CRC
COSTIN ROE CONSULTING

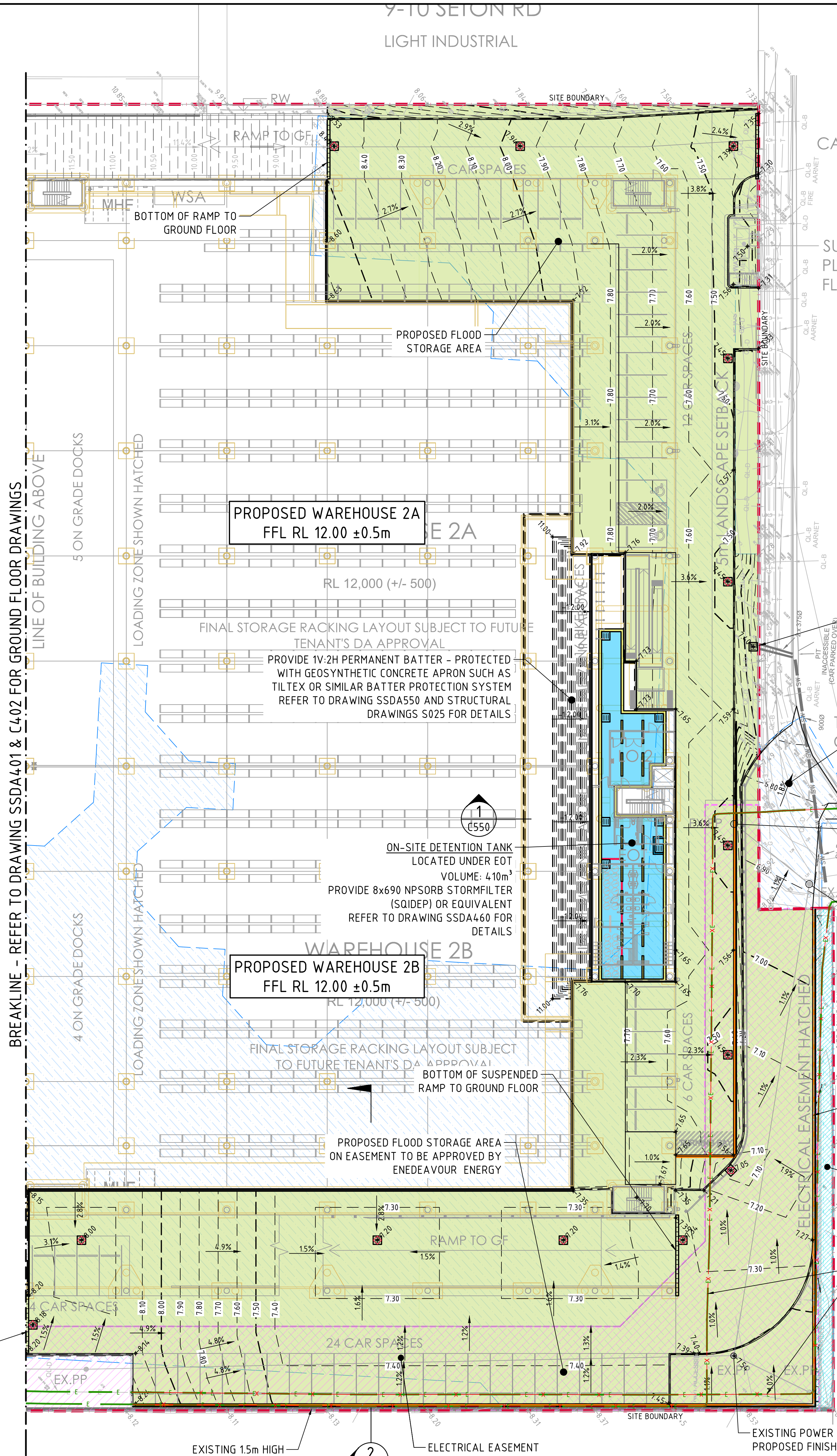
CIVIL & STRUCTURAL ENGINEERS

DRAWING TITLE

**FINISHED LEVELS PLAN
LOWER GF 1 & GROUND FLOOR - SHEET 2**

DRAWING No: C014972.02-SSDA502

ISSUE B

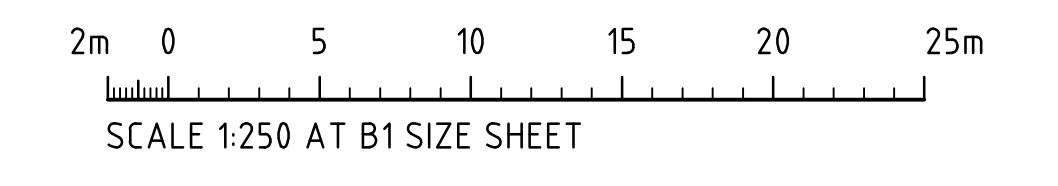


LEGEND:
LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- RETAINING WALL
- ELECTRICAL EASEMENT
- DRAINAGE EASEMENT
- ON SITE DETENTION TANK
- FLOOD STORAGE
- 1% AEP FLOOD EXTENT - TWL: 8.46
- EXISTING TREES TO BE RETAINED

NOTES:
1. REFER TO DRAWING SSDA500 FOR FINISHED LEVELS NOTES.

**FINISHED LEVELS PLAN
AT LOWER GF 1 & GROUND FLOOR - SHEET 2**
SCALE 1:250

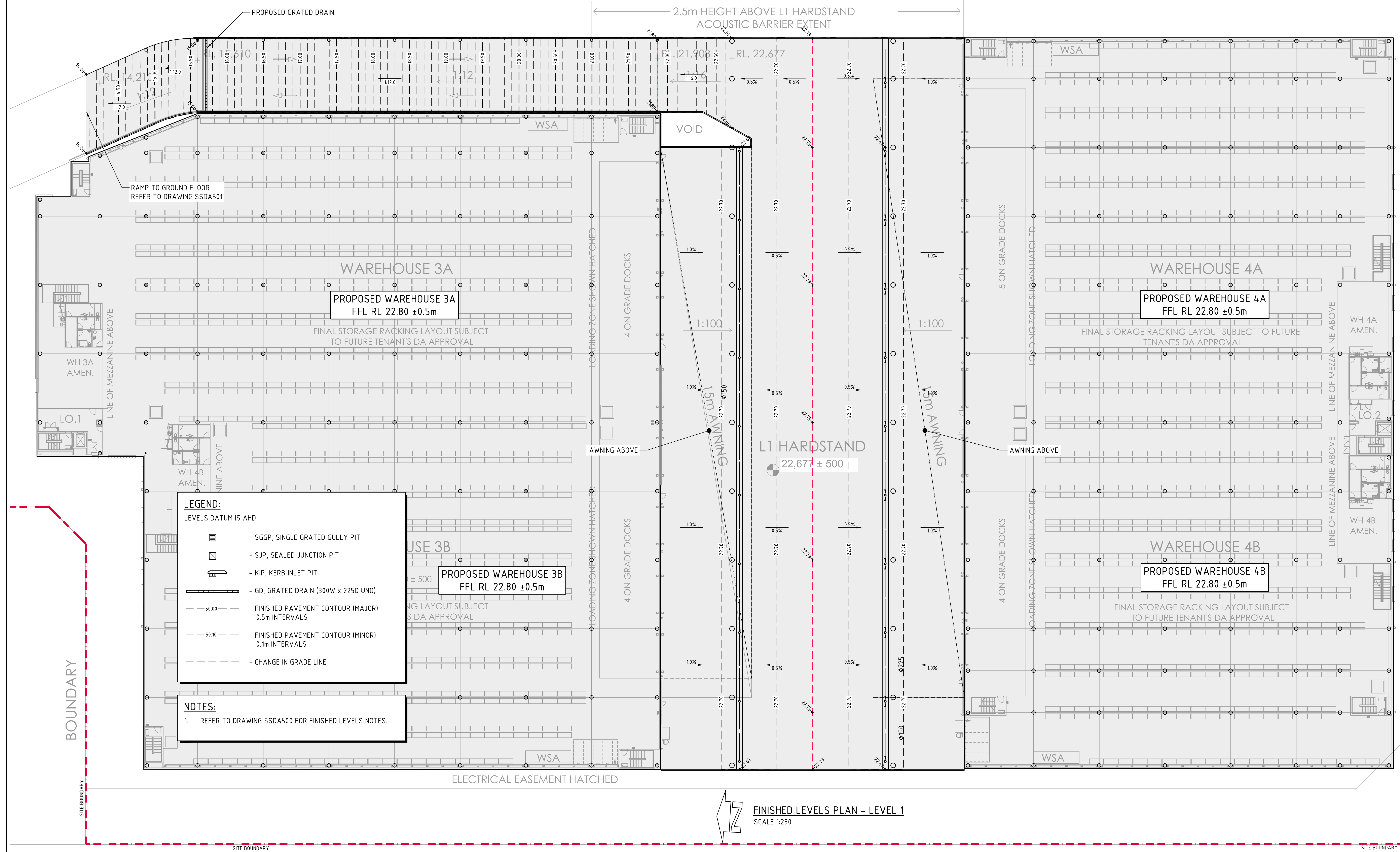


FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

<p>ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION 14.10.25 B</p> <p>ISSUED FOR INFORMATION 16.09.25 A</p> <p>AMENDMENTS DATE ISSUE AMENDMENTS DATE ISSUE</p>	<p>ARCHITECT</p> <p>PACE ARCHITECTS</p>	<p>CLIENT</p> <p>VAUGHAN CONSTRUCTIONS</p>	<p>PROJECT</p> <p>MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170</p>	<p>CONSULT AUSTRALIA</p>	<p>Costin Roe Consulting Pty Ltd. ABN 50 003 696 446</p> <p>PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 f: +61 2 9241 3731 e: mail@costinroe.com.au w: costinroe.com.au</p>	<p>CRC COSTIN ROE CONSULTING</p> <p>CIVIL & STRUCTURAL ENGINEERS</p>	<p>DRAWING TITLE</p> <p>FINISHED LEVELS PLAN LOWER GF 1 & GROUND FLOOR - SHEET 3</p> <p>DRAWING No C014972.02-SSDA503 ISSUE B</p>
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BOUNDARY

SITE BOUNDARY

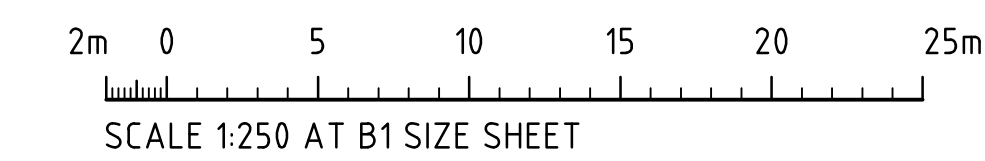


LEGEND:
LEVELS DATUM IS AHD.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- CHANGE IN GRADE LINE

NOTES:
1. REFER TO DRAWING SSDA500 FOR FINISHED LEVELS NOTES.

FINISHED LEVELS PLAN - LEVEL 1
SCALE 1:250



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	B		
ISSUED FOR INFORMATION	16.09.25	A		
AMENDMENTS	DATE	ISSUE	AMENDMENTS	DATE

ARCHITECT
PACE
ARCHITECTS

CLIENT
VAUGHAN
CONSTRUCTIONS

PROJECT
MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
NSW 2170

DESIGNED: HC
DRAWN: GP
DATE: DATE
CHECKED: XC
SIZE: B1
SCALE: AS SHOWN
CAD REF: C014972.02-SSDA510

CONSULT AUSTRALIA

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CRC
COSTIN ROE CONSULTING

CIVIL & STRUCTURAL ENGINEERS

DRAWING TITLE
FINISHED LEVELS PLAN LEVEL 1

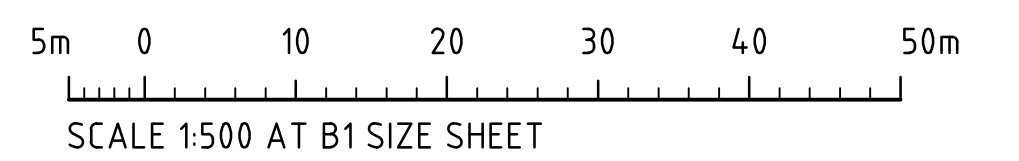
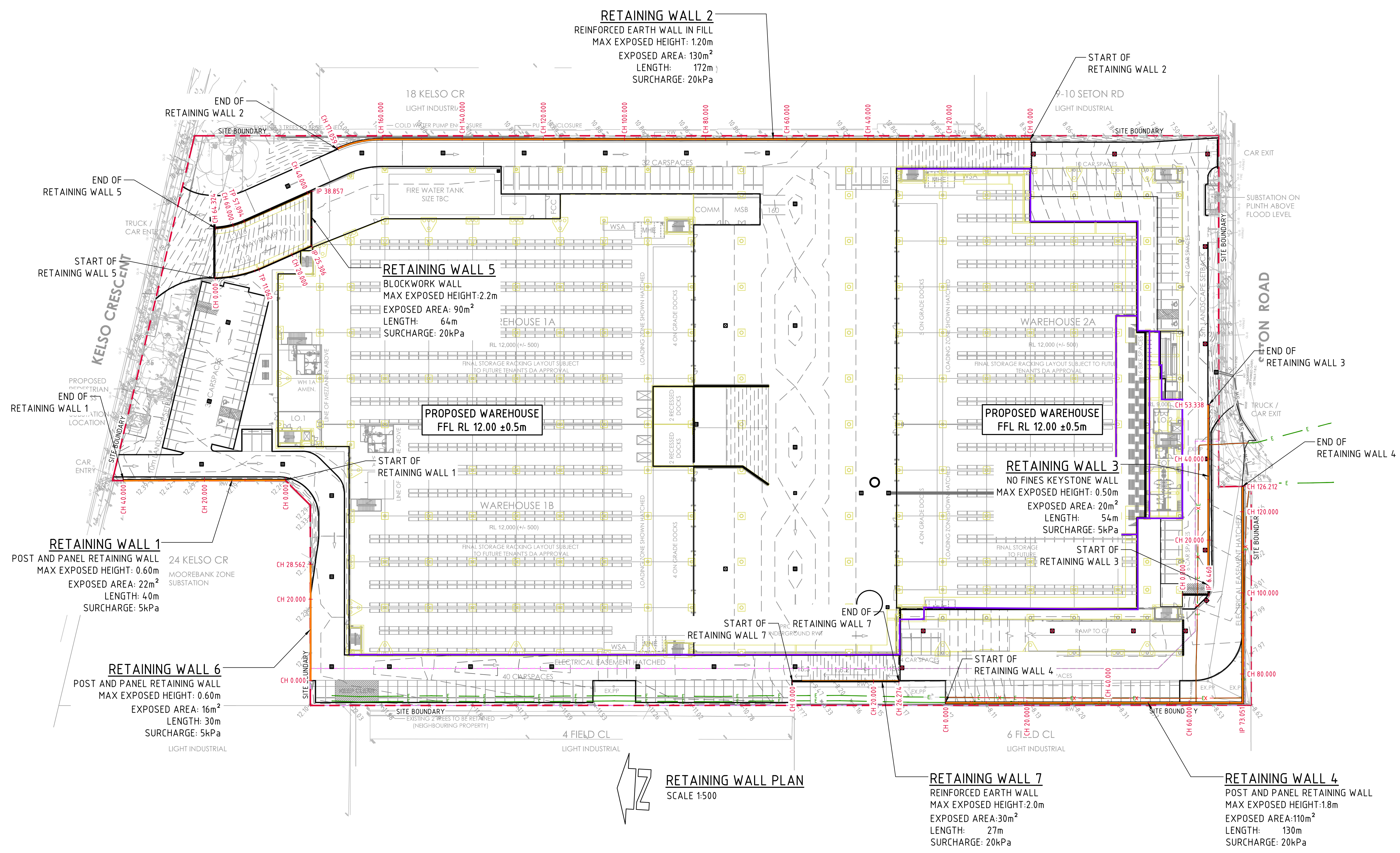
DRAWING No
C014972.02-SSDA510

ISSUE
B

- RETAINING WALL NOTES:**
- ALL COMPONENTS AND INSTALLATION SHALL COMPLY WITH AS4678 AND THE STANDARDS REFERRED TO THEREIN.
 - MINIMUM BEARING CAPACITY OF FOUNDATION TO BE AS FOLLOWS :
 - H MAX. 2.0m = 100 kPa
 - H MAX. 3.5m = 150 kPa
 - H MAX. 5.0m = 200 kPa
 - BEFORE COMMENCEMENT OF CONSTRUCTION THE FOUNDATION SHALL BE INSPECTED AND VERIFIED BY A QUALIFIED GEOTECHNICAL ENGINEER.
 - WHERE MINIMUM BEARING IS NOT ACHIEVABLE OR NOT MEETING DESIGN REQUIREMENT, THE FOUNDATION MATERIAL IS TO BE EXCAVATED AND REPLACED WITH APPROVED MATERIAL PLACED IN ACCORDANCE WITH THE FILLING SPECIFICATION TO A MINIMUM COMPACTION OF 100% SMDM AND PLACED WITHIN 2% OF OMC.
 - MINIMUM SURCHARGE LOADS TO BE APPLIED AS FOLLOWS U.N.O. ON PLAN :
 - LIVE LOAD = 20 kPa
 - DEAD LOAD = 5 kPa
 - CONSTRUCTION TRAFFIC LIVE LOAD = 10 kPa
 - MINIMUM WALL EMBEDMENT AT THE TOE OF THE WALL TO BE 300mm MINIMUM UNLESS NOTED OTHERWISE.
 - DESIGN LIFE OF STRUCTURE IS TO BE 100 YEARS.
 - TIED WALLS ARE TO BE TEMPORARILY PROPPED AT TOP UNTIL SUCH TIME THE TOP OF WALL IS TIED TO THE SLAB AND 28-DAY CONCRETE STRENGTH HAS BEEN ACHIEVED.
 - CONSTRUCTION EQUIPMENT WEIGHING MORE THAN 500KG STATIC WEIGHT IS TO BE KEPT BACK 15m FROM THE REAR FACE OF THE WALL FACING UNITS. COMPACTION OF THE SELECT FILL MATERIAL WITHIN THE 15m STRIP ADJACENT TO THE WALL SHALL BE ACHIEVED BY LIGHT MECHANICAL TAMPERS (VIBRATING PLATE, TRENCH COMPACTOR OR SIMILAR) TO GIVE THE SAME DENSITY AS IN THE REMAINDER OF THE SELECT FILL.
 - ALL DESIGN AND CONSTRUCT WALL SYSTEM TO BE COMPLETED IN ACCORDANCE WITH THESE NOTES.
 - WALL ELEVATIONS ALLOW FOR NOMINAL EMBEDMENT DEPTHS. WHERE DESIGN AND CONSTRUCT (D-C) WALL SYSTEMS ARE PROPOSED IT IS THE CONTACTORS RESPONSIBILITY TO ALLOW FOR THE FINAL EMBEDMENT DEPTHS AS PER THE D-C DESIGN. ALLOWANCE FOR OVERALL WALL AREAS TO CONSIDER THE FINAL EMBEDMENT DEPTH. WALL ELEVATIONS AND AREAS ARE BASED ON THE VERTICAL PLAN AREA. CONTRACTOR TO ALLOW ADDITIONAL SURFACE AREA WHERE WALLS ARE NOT VERTICAL OR HAVE BACKSLOPES.

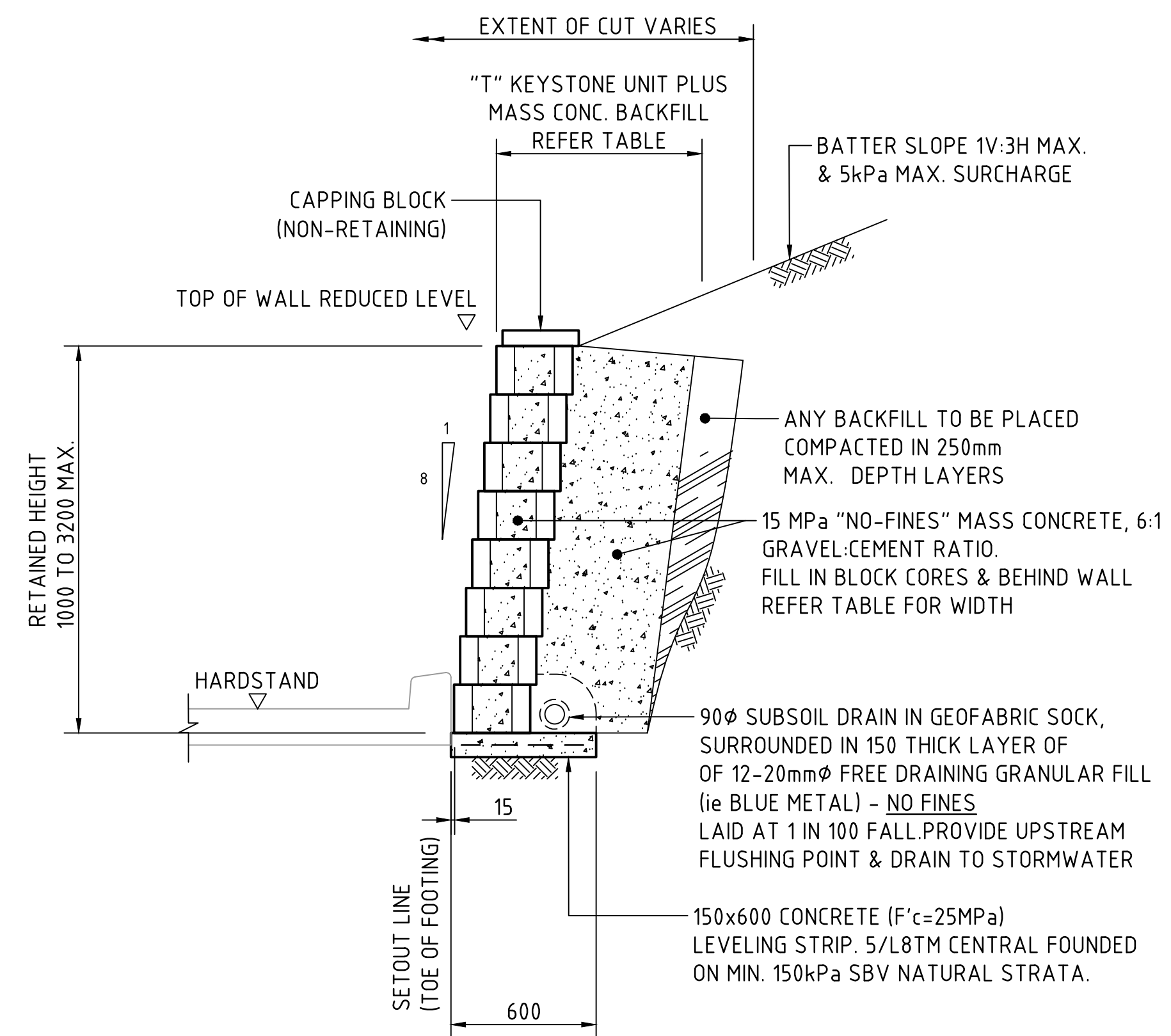
LEGEND:
LEVELS DATUM IS AHD.

- - PROPOSED RETAINING WALL
- - PROPOSED RETAINING BY STRUCTURE
- - FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- - FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS



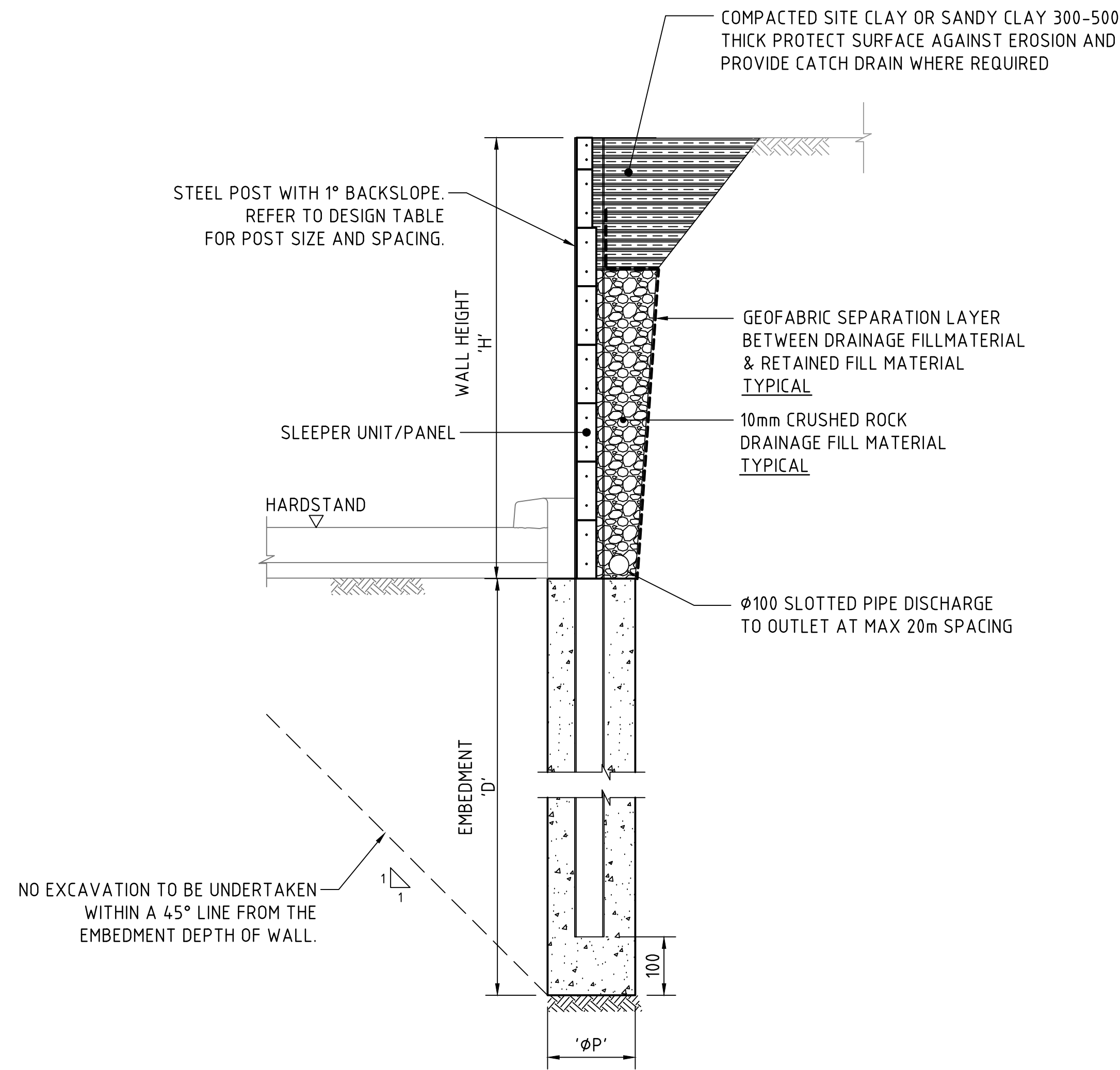
FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION		14.10.25	B	ARCHITECT	CLIENT	PROJECT	COSTIN ROE CONSULTING PTY LTD.			DRAWING TITLE RETAINING WALL PLAN		
ISSUED FOR INFORMATION		16.09.25	A			MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170	Costin Roe Consulting Pty Ltd. ABN 50 003 696 446 PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 f: +61 2 9241 3731 e: mail@costinroe.com.au w: costinroe.com.au				DRAWING No C014972.02-SSDA600	
AMENDMENTS	DATE	ISSUE	AMENDMENTS	DATE	ISSUE	DESIGNED	DRAWN	DATE	CHECKED	SCALE	CAD REF:	ISSUE
						HC	GP	DATE	XC	AS SHOWN	C014972.02-SSDA600	B



TYPICAL NO-FINES KEYSTONE RETAINING WALL
(1000 TO 2500 MAXIMUM RETAINED HEIGHT)
SCALE 1:20

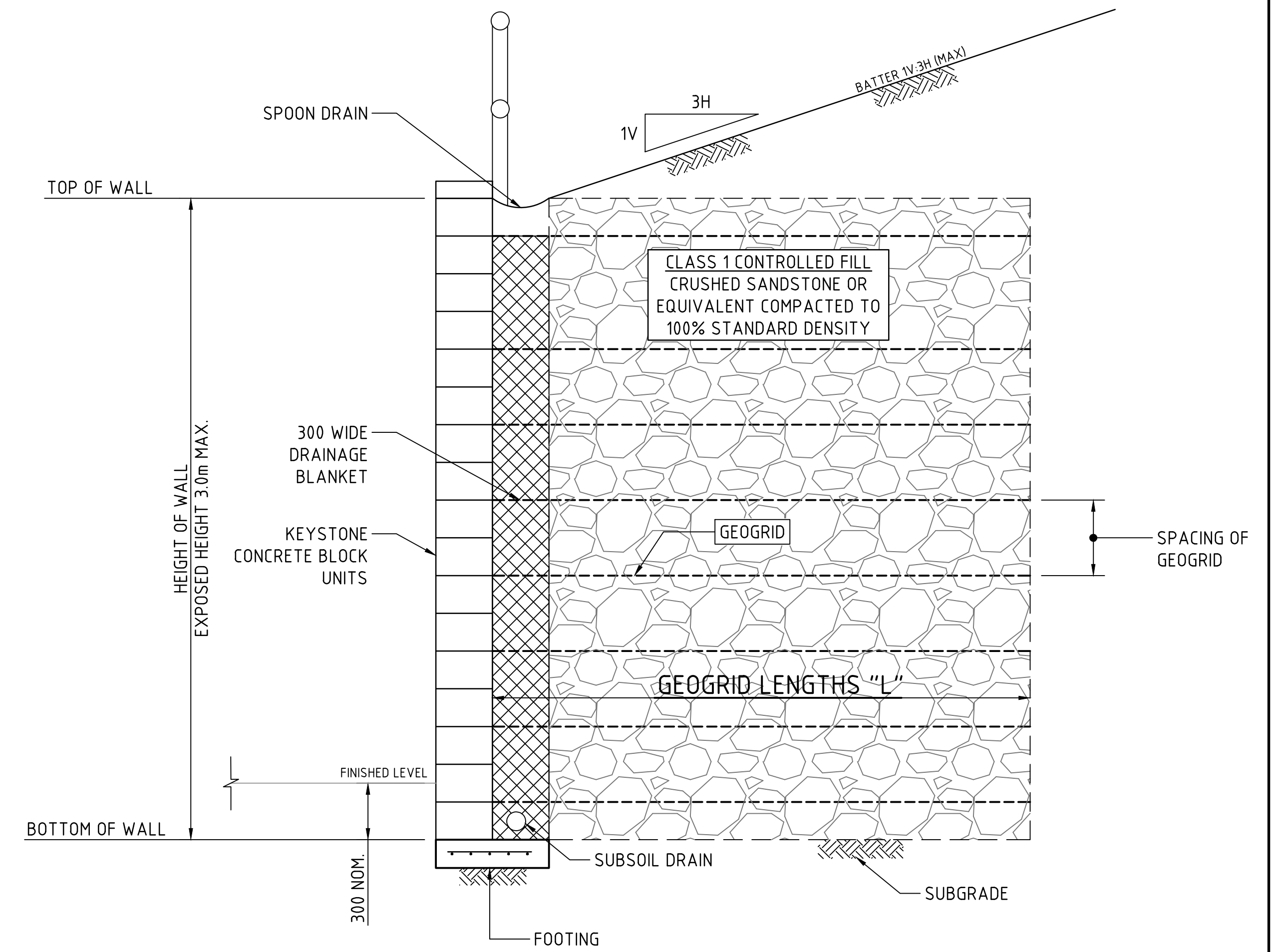
RETAINED HEIGHT (mm)	OVERALL THICKNESS "T" (mm)
UP TO 1000	600 - NO FINES MASS. CONC. FILL
1000 TO 1200	700 - NO FINES MASS. CONC. FILL
1200 TO 1800	950 - NO FINES MASS. CONC. FILL
1800 TO 2400	1200 - NO FINES MASS. CONC. FILL
2400 TO 2500	1450 - NO FINES MASS. CONC. FILL



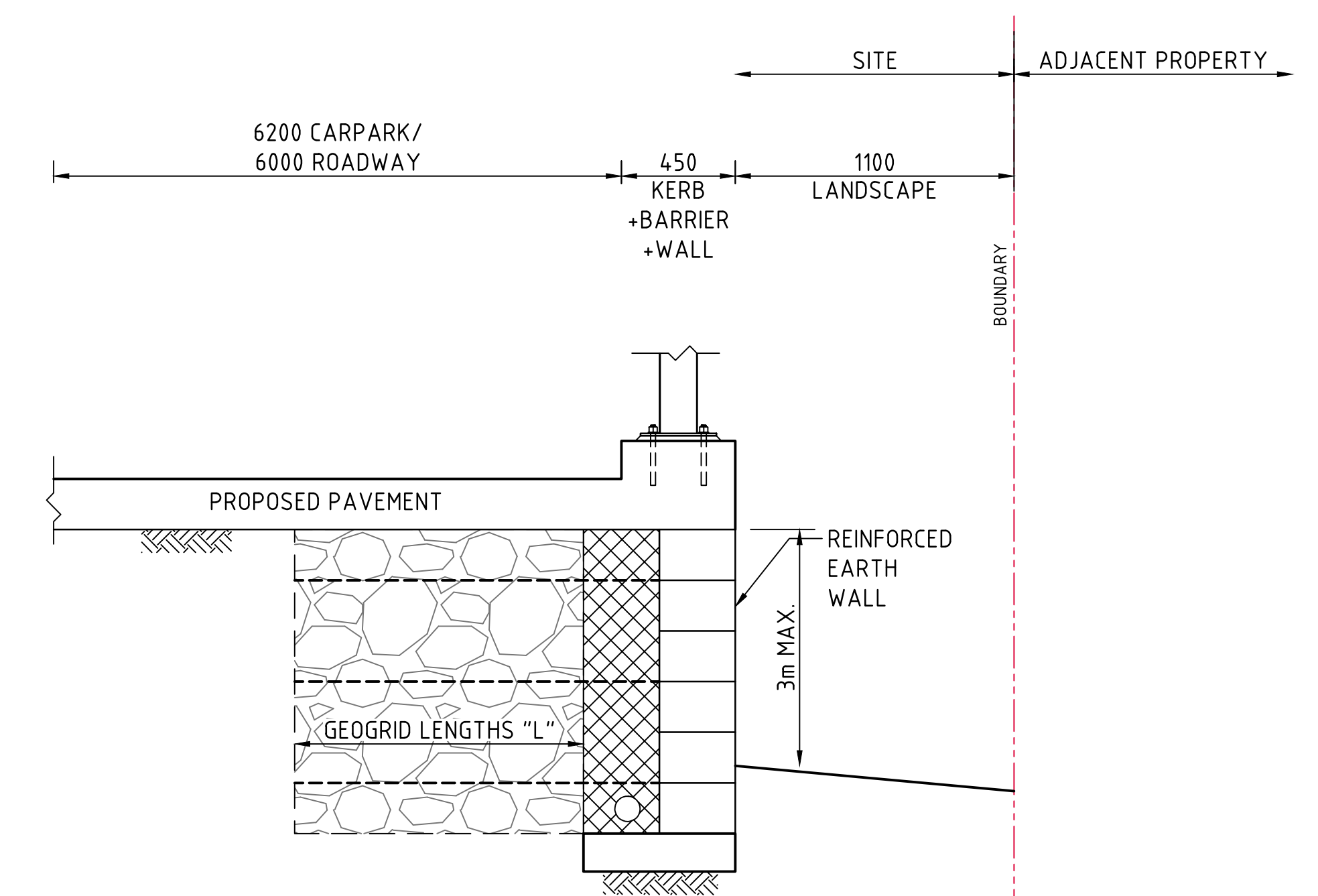
BORED PIER, POST AND WHALER DETAIL
20kPa MAX. SURCHARGE
SCALE 1:20

BORED PIER, POST AND WHALER WALL SPECIFICATIONS					
RETAINED HEIGHT H	SLEEPER DESIGNATION (QTY @ THICKNESS IN mm)	STEEL POST SIZE	PIER DIAMETER ØP	EMBEDMENT D	SPACING S
400	2 @ 80	100UC 14.8	450	1200	2000
600	TOP 2 @ 80, 1 @ 100 BTM	150UC 23.4	450	1550	2000
800	TOP 2 @ 80, 2 @ 100 BTM	150UC 23.4	450	1850	2000
1000	TOP 2 @ 80, 3 @ 100 BTM	150UC 30.0	450	2150	2000
1200	TOP 2 @ 80, 4 @ 100 BTM	150UC 30.0	450	2450	2000
1400	TOP 2 @ 80, 5 @ 100 BTM	150UC 37.2	450	2450	2000

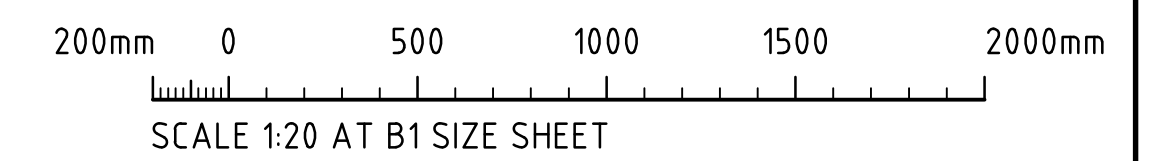
CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	F'c (MPa)	
PIER	80	20	SL	NIL	25
SHOT CRETE	230	10	SL	NIL	32



RETAINING WALL (REINFORCED EARTH WALL)
SCALE: 1:20





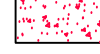


RETAINING WALL 2 - TYPICAL SECTION ALONG EAST BOUNDARY
SCALE: 1:20



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

LEGEND:
LEVELS DATUM IS AHD.

-  - DENOTES CONCRETE PAVEMENT
-  - DENOTES PERMEABLE PAVEMENT (TRAFFICABLE)
-  - DENOTES INDUSTRIAL VEHICULAR CROSSOVER
-  - DENOTES SPRINKLER TANK SLAB
-  - DENOTES PEDESTRIAN PAVEMENT

PROVIDE VEHICULAR CROSSOVER IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL STANDARD DRAWINGS. ALL EXISTING SERVICES ALIGNMENT, FITTINGS AND DEPTHS TO BE CONFIRMED VIA POTHOLING PRIOR TO COMMENCEMENT OF WORKS. TYPICAL

EXTERNAL SLAB NOTES:

PAVEMENT SLABS TO BE 32 MPa, 180 THICK U.N.O.
SLAB REINFORCEMENT TO BE SL82 MESH WITH 40mm TOP COVER U.N.O.

ISOLATE ALL COLUMNS, WALLS & PITS USING 10mm ABELFLEX OR EQUIVALENT.

RECESSES, LEVELS AND FALLS IN SLAB TO CIVIL ENGINEER'S, ARCHITECT'S & HYDRAULIC ENGINEER'S DETAILS.

BAR CHAIRS AT 600 CENTRES EACH WAY.

SLAB CURING METHOD TO BE COMPATIBLE WITH ARCHITECTURAL FINISHES AND CURRENT AUSTRALIAN STANDARDS.

TEXTURED STEEL TROWEL FINISH U.N.O. ON PLAN.

PROVIDE TIED SAW CUTS (T-SC) AT TYPICAL 4500 CTS.

PROVIDE ALTERNATING DOWEL JOINTS (DJ) AND EXPANSION JOINTS (EJ) AT TYPICAL 25m.

NOTES:

ATTENTION IS DRAWN TO THE FACT THAT DUE TO THE NATURE OF CONCRETE, CRACKING OF A NON-STRUCTURAL NATURE MAY OCCUR. REINFORCEMENT HAS BEEN ADDED TO THE SLABS TO MITIGATE THE EXTENT OF CRACKING, HOWEVER IT IS NOT POSSIBLE TO GUARANTEE COMPLETE ELIMINATION OF SLAB CRACKING.

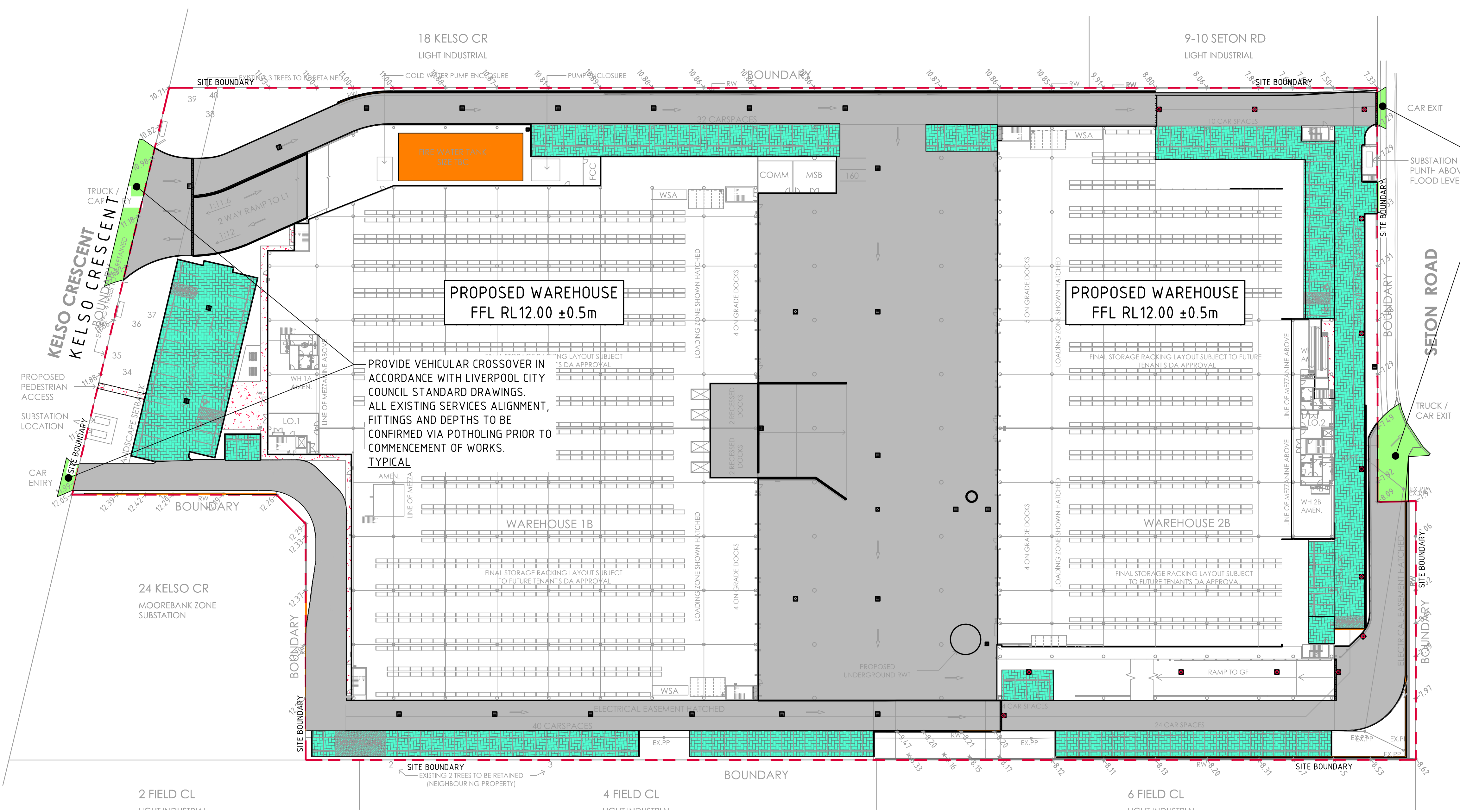
NOTES:

ENSURE JOINTS ARE MIN 300mm FROM EDGE OF PIT GRATE. REFER TO PIT IN SLAB DETAIL ON DRAWING S5DA451. TYPICAL

NOTES:

NO WATER IS TO BE ADDED TO CONCRETE ON SITE

CONCRETE QUALITY						
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F _t (MPa)	F _c (MPa)
PAVEMENT SLABS	80	20	SL	NIL	4.25 FLEX	32
MAXIMUM 56 DAY SHRINKAGE 650 MICROSTRAIN						
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F _t (MPa)	F _c (MPa)
PEDESTRIAN SLABS	80	20	SL	NIL	-	25

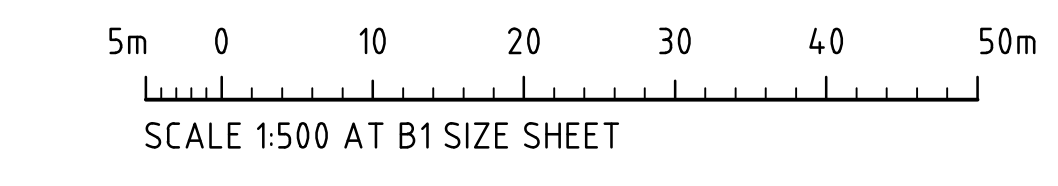


PROPOSED WAREHOUSE
FFL RL12.00 ±0.5m

PROPOSED WAREHOUSE
FFL RL12.00 ±0.5m

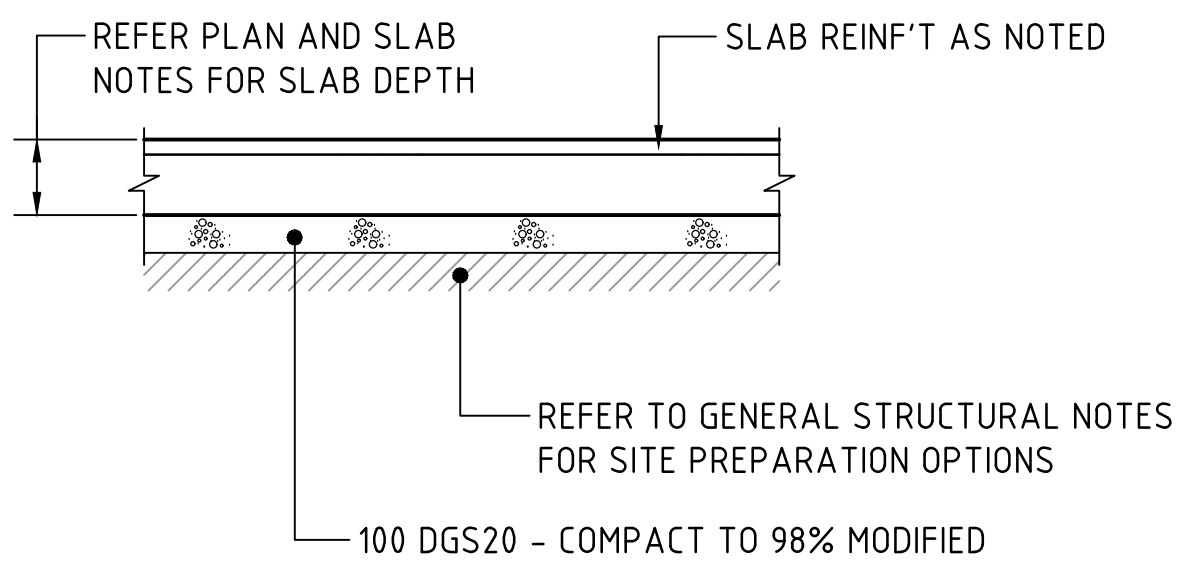
PROVIDE VEHICULAR CROSSOVER IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL STANDARD DRAWINGS. ALL EXISTING SERVICES ALIGNMENT, FITTINGS AND DEPTHS TO BE CONFIRMED VIA POTHOLING PRIOR TO COMMENCEMENT OF WORKS. TYPICAL

EXTERNAL PAVEMENT PLAN
SCALE 1:500

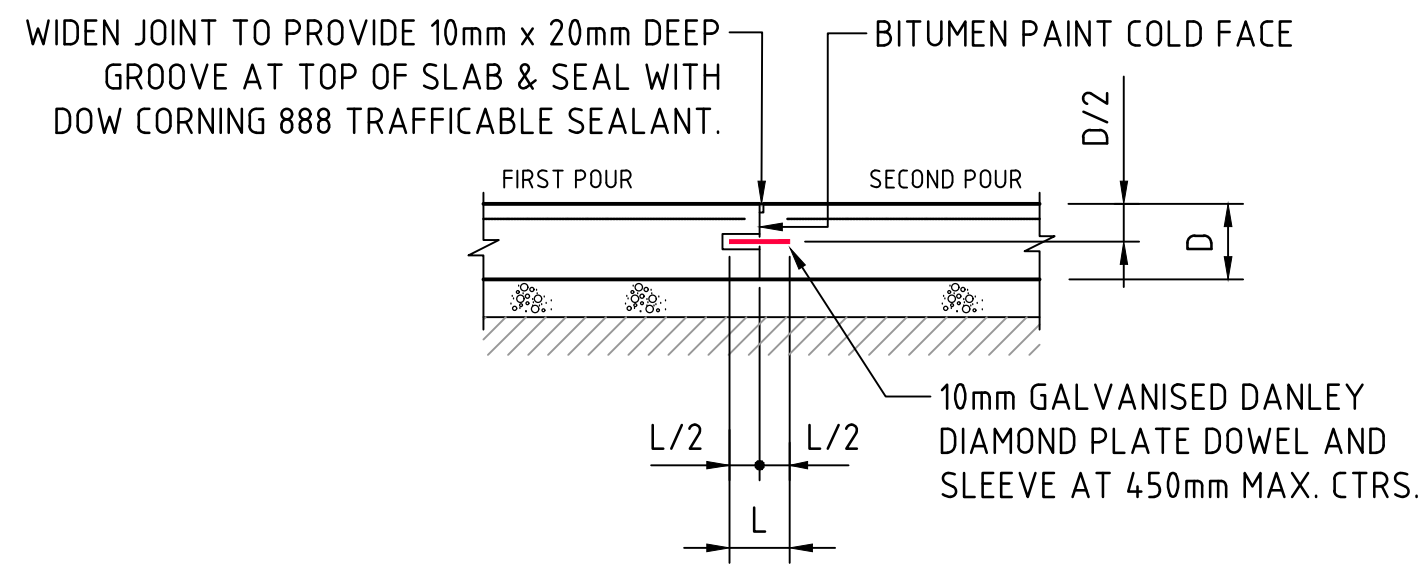


FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

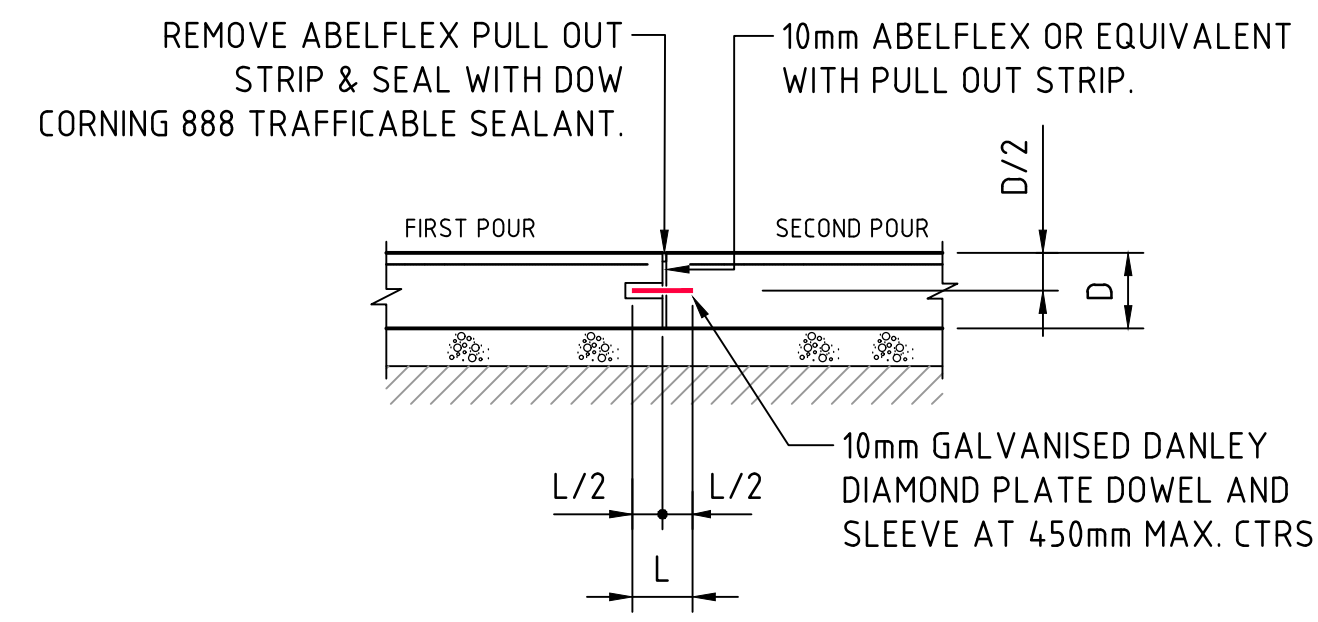
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION 17.10.25 C ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION 14.10.25 B ISSUED FOR INFORMATION 16.09.25 A AMENDMENTS	ARCHITECT 	CLIENT 	PROJECT MARVEL MOOREBANK 20 KELSO CRESCENT, MOOREBANK NSW 2170	DESIGNED: HC DRAWN: GP DATE:	CHECKED: XC SIZE: B1 SCALE: AS SHOWN CAD REF: C014972.02-SSDA800	CONSULT AUSTRALIA 	Costin Roe Consulting Pty Ltd. ABN 50 003 696 446 PO Box N419 Sydney NSW 1220 Level 4, 8 Windmill Street, Millers Point NSW 2000 p: +61 2 9251 7699 f: +61 2 9241 3731 e: mail@costinroe.com.au w: costinroe.com.au		DRAWING TITLE EXTERNAL PAVEMENT PLAN DRAWING No C014972.02-SSDA800	ISSUE C
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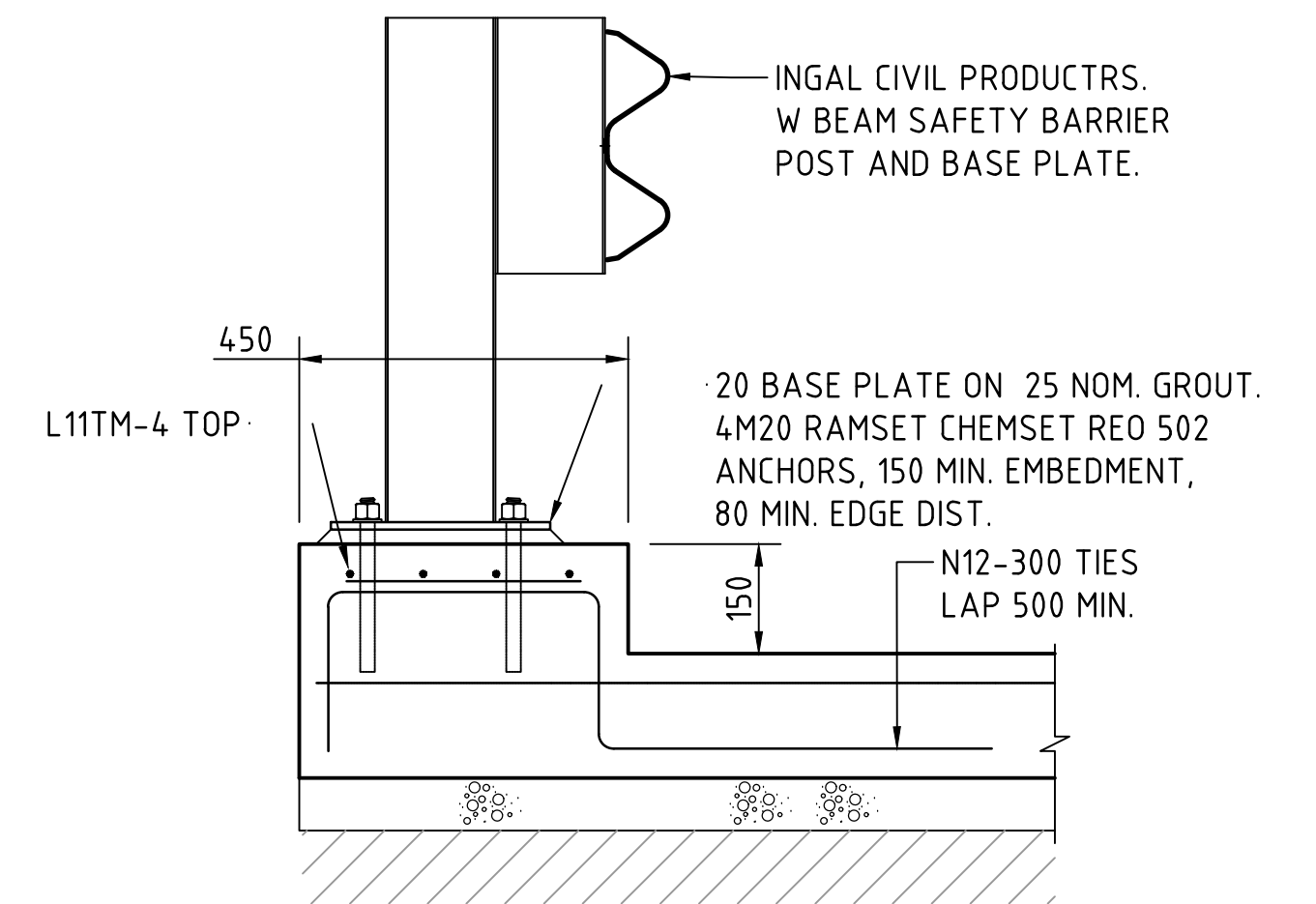
SLAB PREPARATION DETAIL
SCALE 1:20



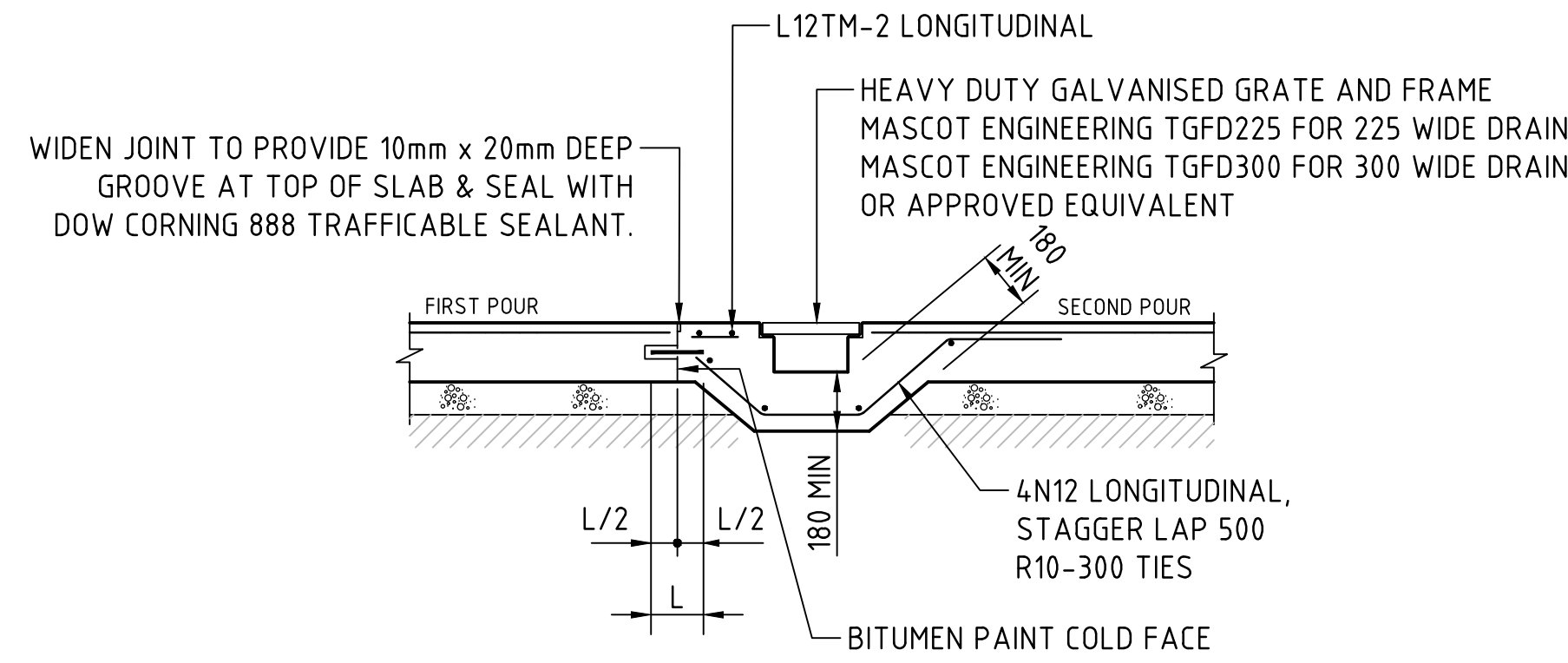
DOWELLED JOINT : DJ
SCALE 1:20



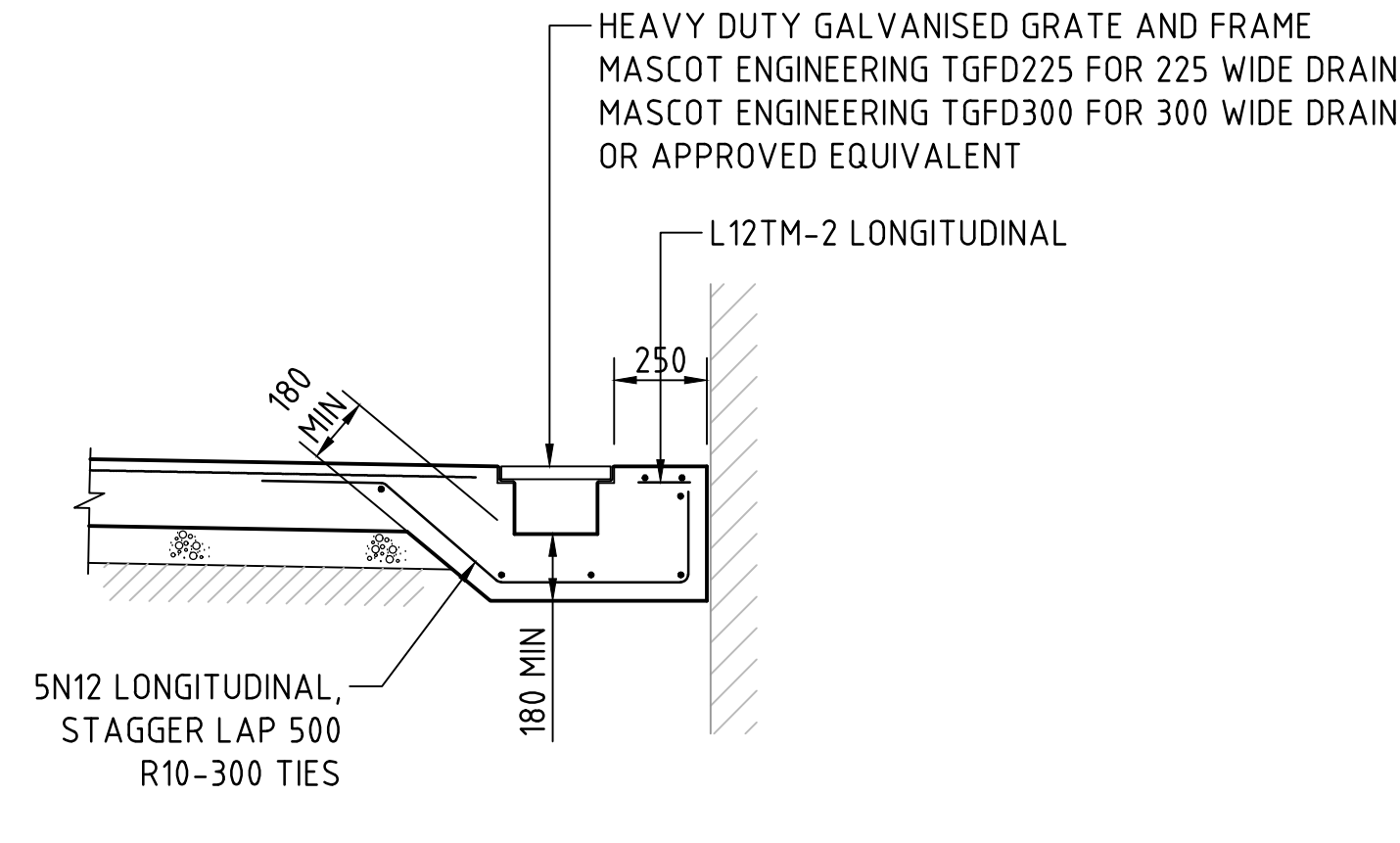
EXPANSION JOINT : EJ
SCALE 1:20



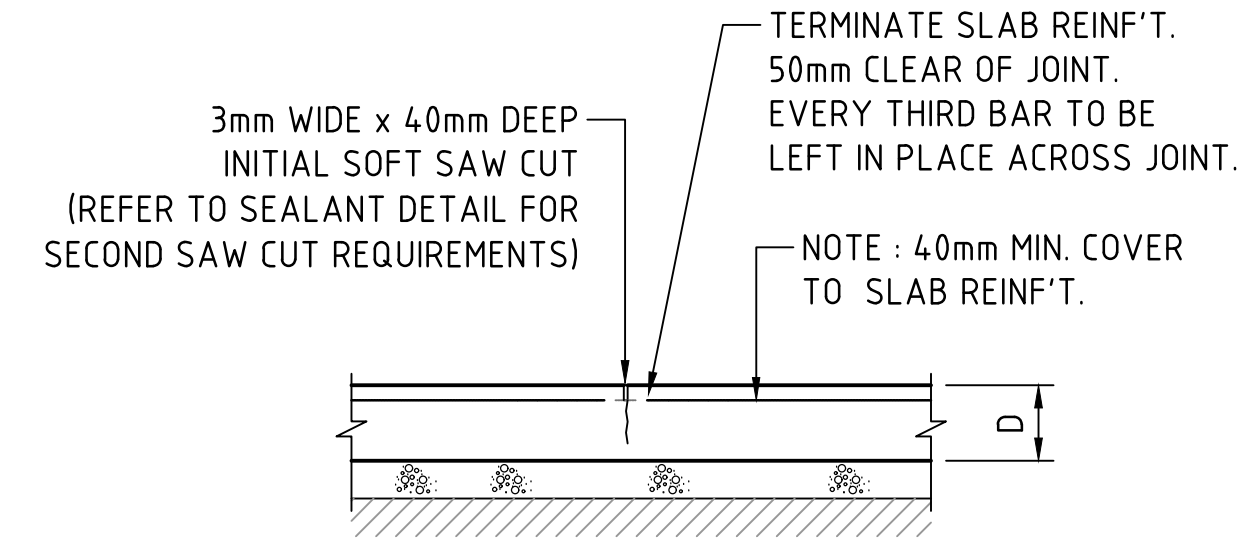
W-BEAM BARRIER & KERB - WBK
SCALE 1:10



FALL 1:100 TO PITS
DOWEL JOINT AND GRATED DRAIN DETAIL
SCALE 1:20

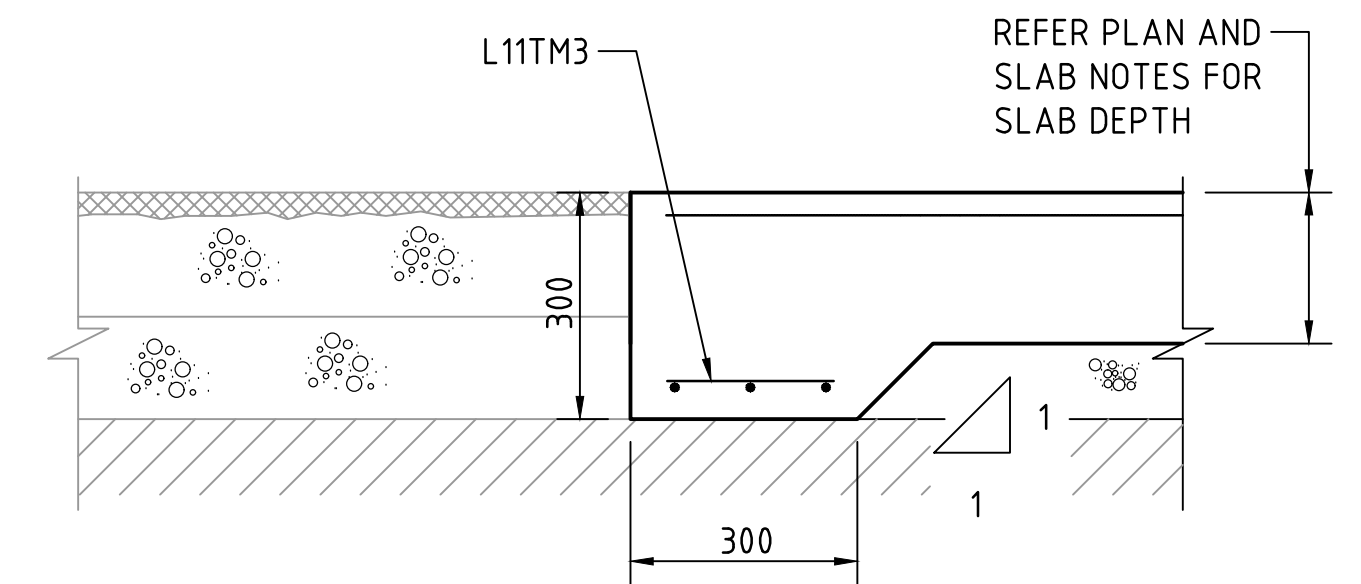


FALL 1:100 TO PITS
GRATED DRAIN DETAIL
SCALE 1:20

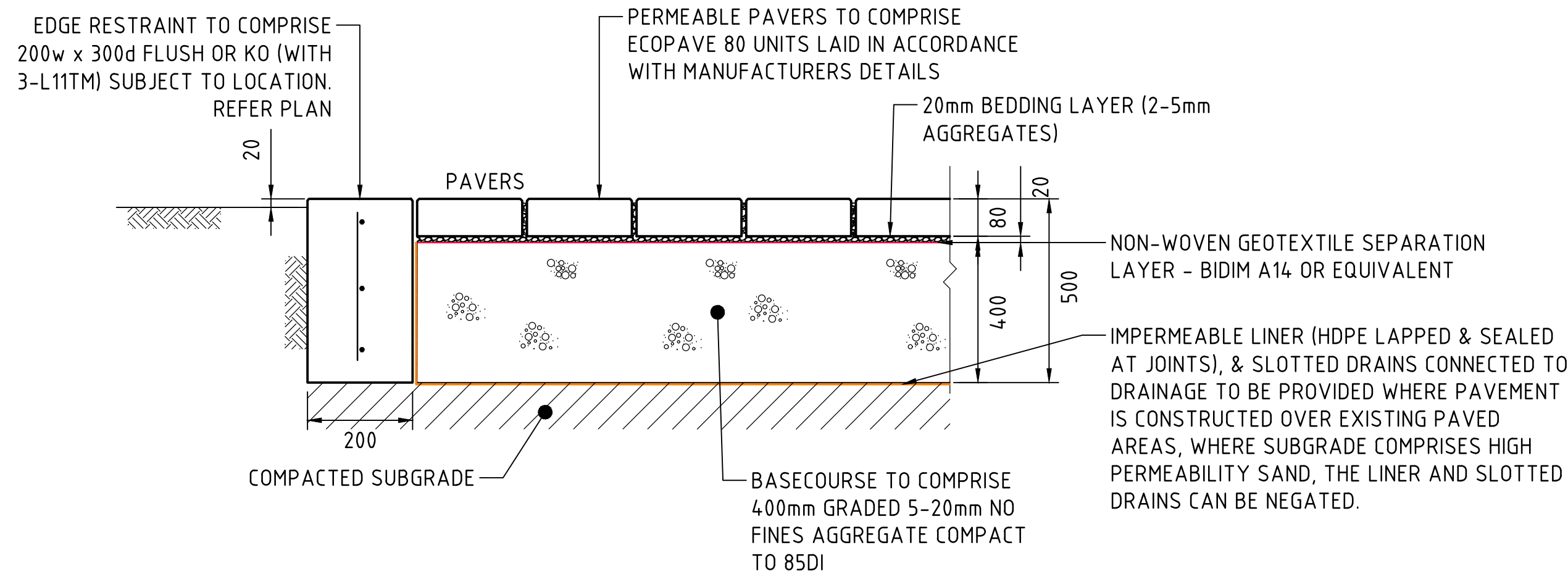


INITIAL SAWCUTS TO BE CARRIED OUT AS SOON AS PRACTICABLE AFTER POUR. THE CUTS ARE TO BE MADE BEFORE ANY CRACKING TO THE SLABS OCCUR. THE CONTRACTOR IS RESPONSIBLE FOR THE TIMING OF THE SAWCUTS. ENSURE SAWCUTS EXTEND FOR FULL LENGTH TO FACE OF WALLS.

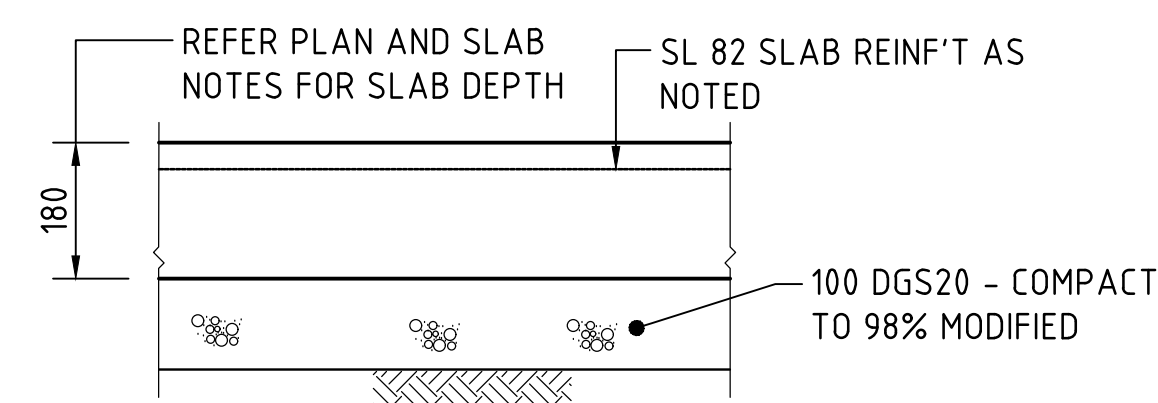
TIED SAW CUT : T-SC
SCALE 1:20



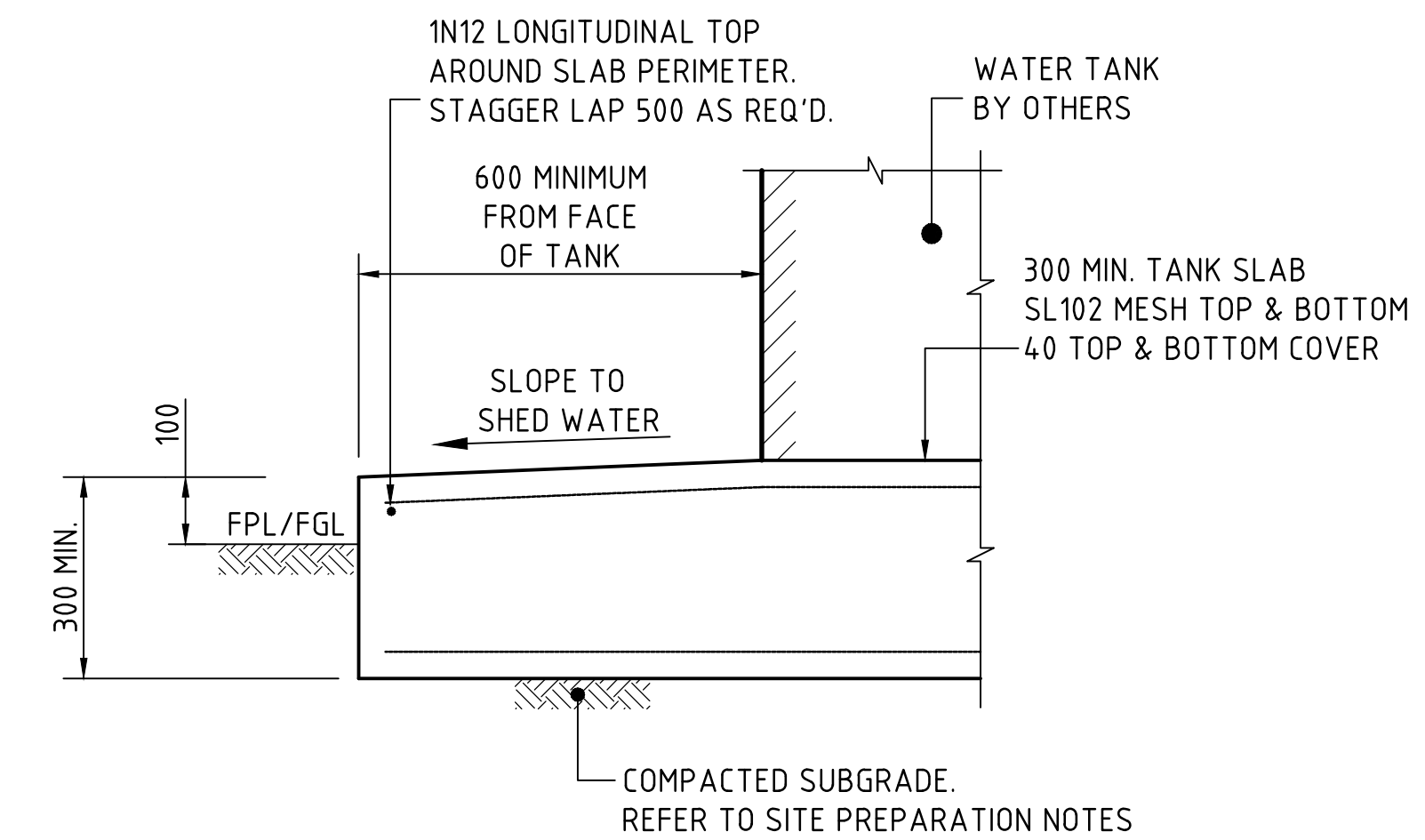
EDGE THICKENING : ET
SCALE 1:10



PERMEABLE PAVEMENT (TRAFFICABLE)
SCALE 1:10

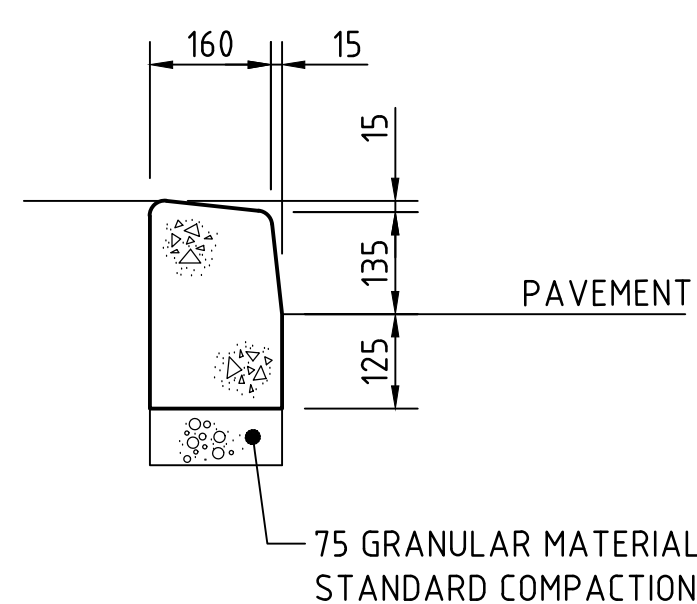


HEAVY DUTY CONCRETE DETAIL
SCALE 1:10
DESIGN TRAFFIC: UNLIMITED REPETITIONS OF B-DOUBLE

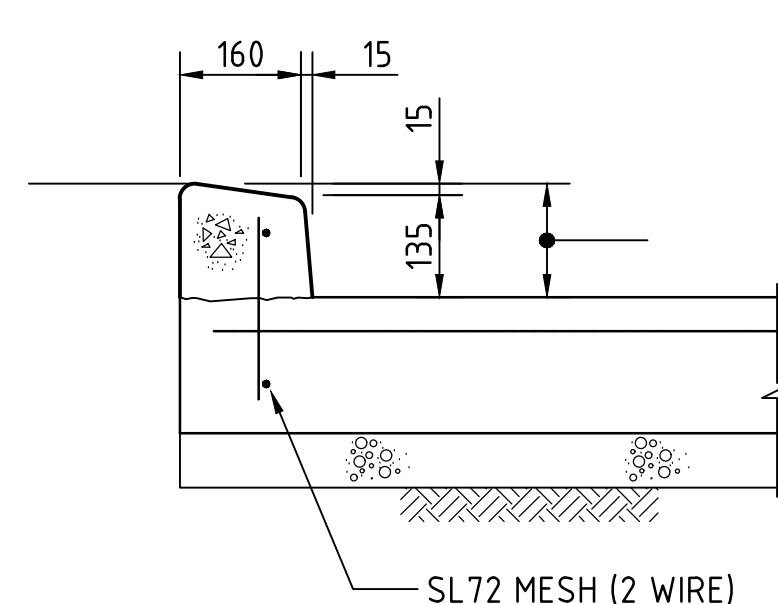


SPRINKLER TANK SLAB DETAILS
SCALE 1:10

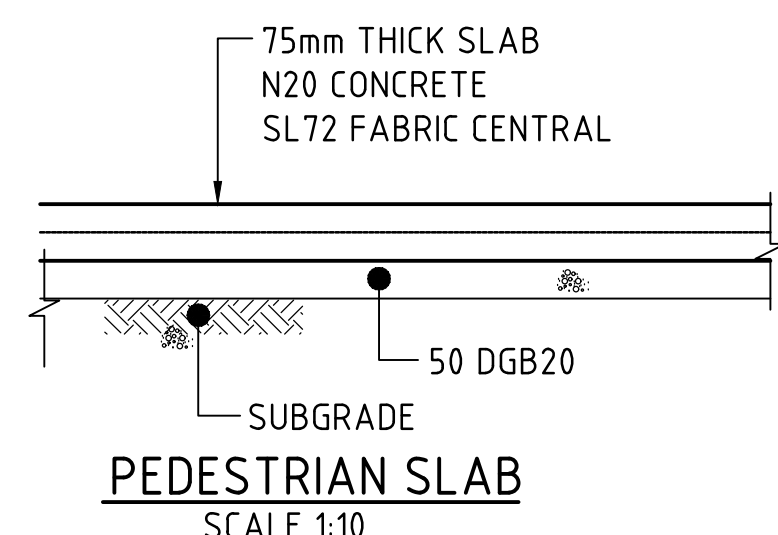
ALLOWANCE FOR SETTLEMENT :
ALLOWANCE FOR SETTLEMENT OF TANK SLAB UP TO 100mm MUST BE MADE FOR ALL SERVICES CONNECTIONS. HYDRAULIC ENGINEER / PLUMBER TO PROVIDE SUITABLY DESIGNED FLEXIBLE CONNECTIONS FOR ALL SERVICES.



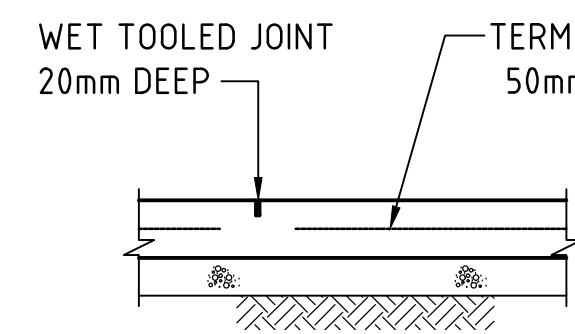
KERB ONLY - KO
SCALE 1:10
PROVIDE JOINTS IN KERB AT 5.0m MAX. CENTRES



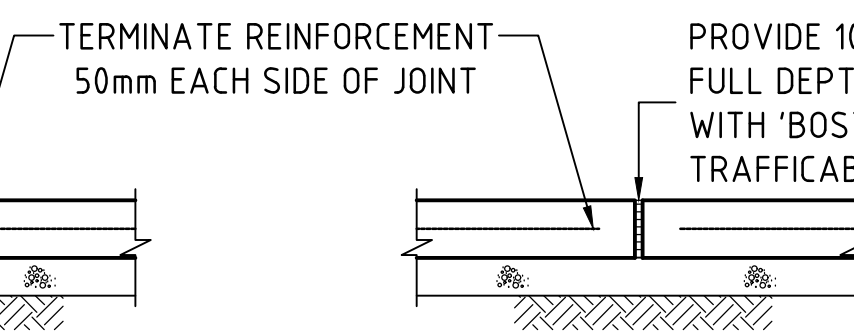
INTEGRAL KERB - IK
SCALE 1:10
PROVIDE JOINTS IN KERB TO MATCH JOINTS IN PAVEMENT



PEDESTRIAN SLAB
SCALE 1:10



WET TOOLED JOINT
SCALE 1:10

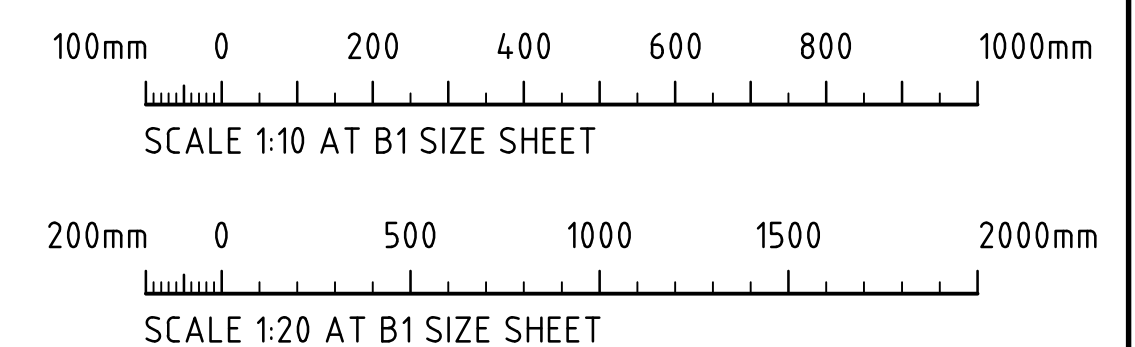


BUTT JOINT
SCALE 1:10

NOTE: PROVIDE SAWCUT JOINTS AT 2000 MAX. CTS. AND AT 1200 MAX. CTS. FOR PUBLIC DOMAIN

NOTE: PROVIDE EXPANSION JOINTS AT 6000 MAX. CTS. AND AT 3600 MAX. CTS. FOR PUBLIC DOMAIN

PEDESTRIAN SLAB DETAILS



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	B
ISSUED FOR INFORMATION	16.09.25	A
AMENDMENTS	DATE	ISSUE

ARCHITECT

PACE
ARCHITECTS

CLIENT

VAUGHAN
CONSTRUCTIONS

PROJECT

MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
NSW 2170

DESIGNED: HC
DRAWN: GP
DATE: DATE

CHECKED: XC
SIZE: B1
SCALE: AS SHOWN

CAD REF: C014972.02-SSDA850

CONSULT AUSTRALIA

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CRC
COSTIN ROE CONSULTING

CIVIL & STRUCTURAL ENGINEERS

DRAWING TITLE

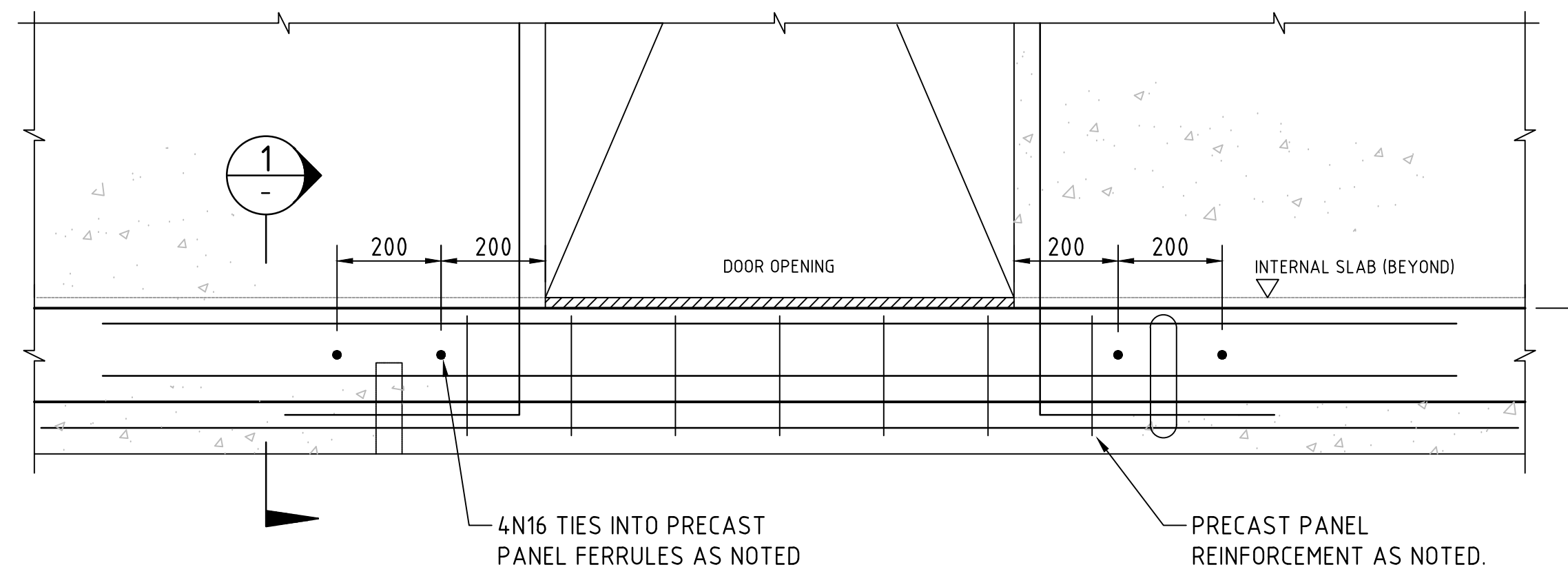
EXTERNAL PAVEMENT DETAILS
SHEET 1

DRAWING No

C014972.02-SSDA850

ISSUE

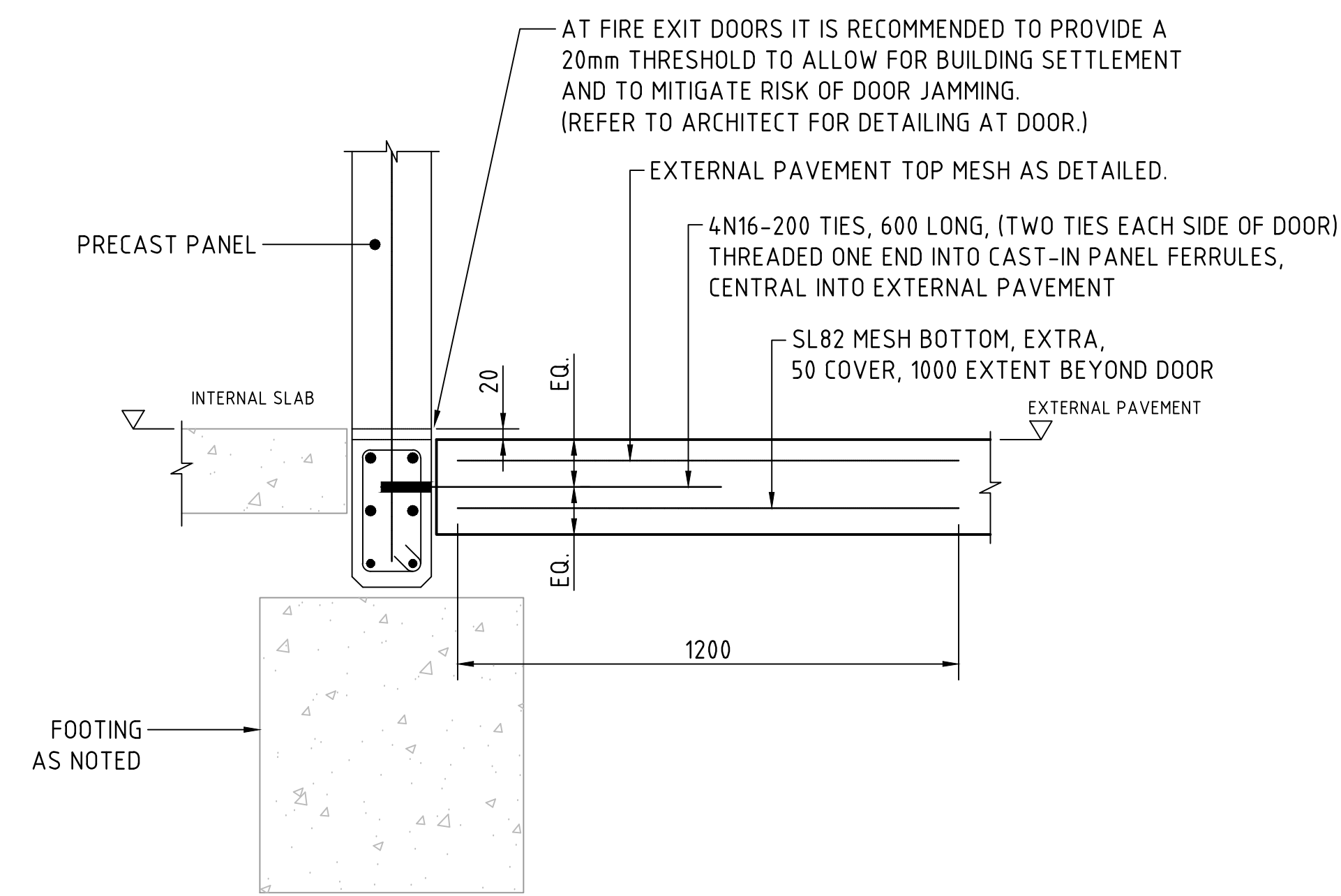
B



EXTERNAL PAVEMENT DETAIL AT PEDESTRIAN DOORS - PD

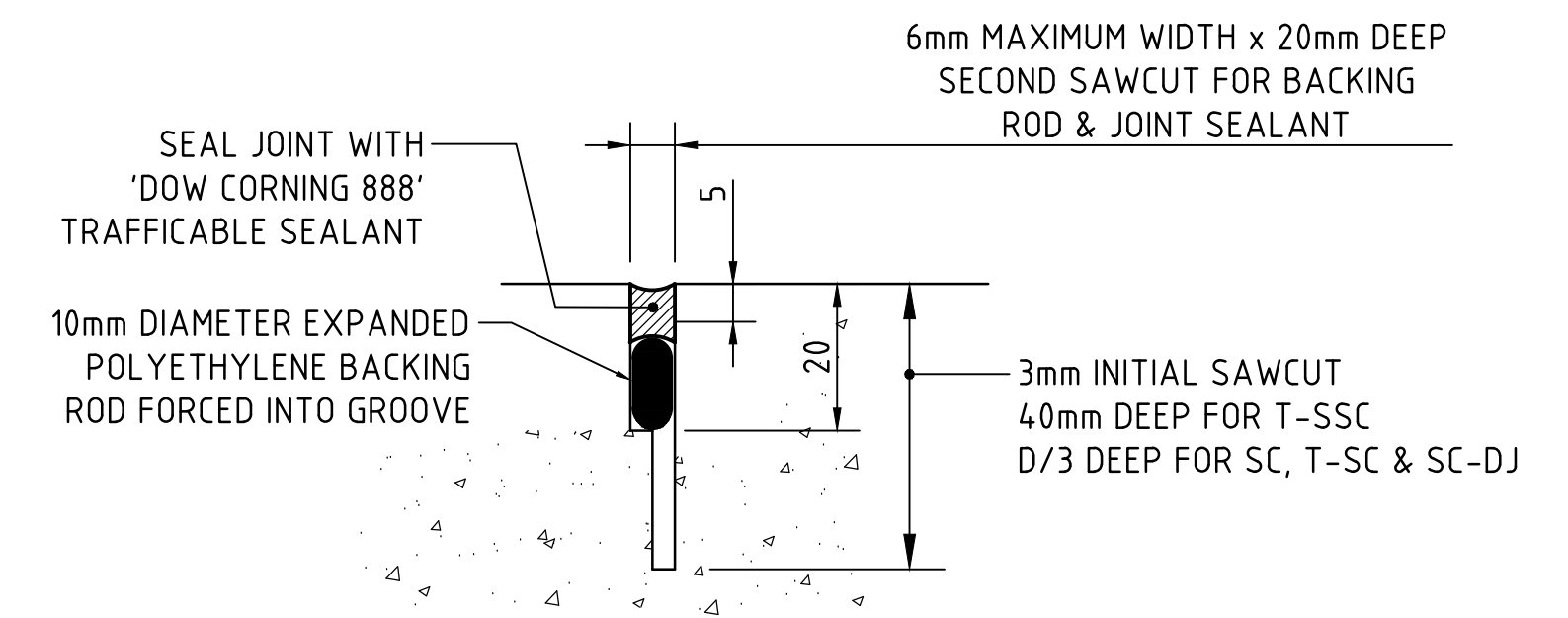
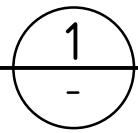
SCALE 1:10

(NOTE: EXTERNAL PAVEMENT SLAB REINF'T. NOT SHOWN FOR CLARITY)



SECTION 1:10

AT HARDSTAND

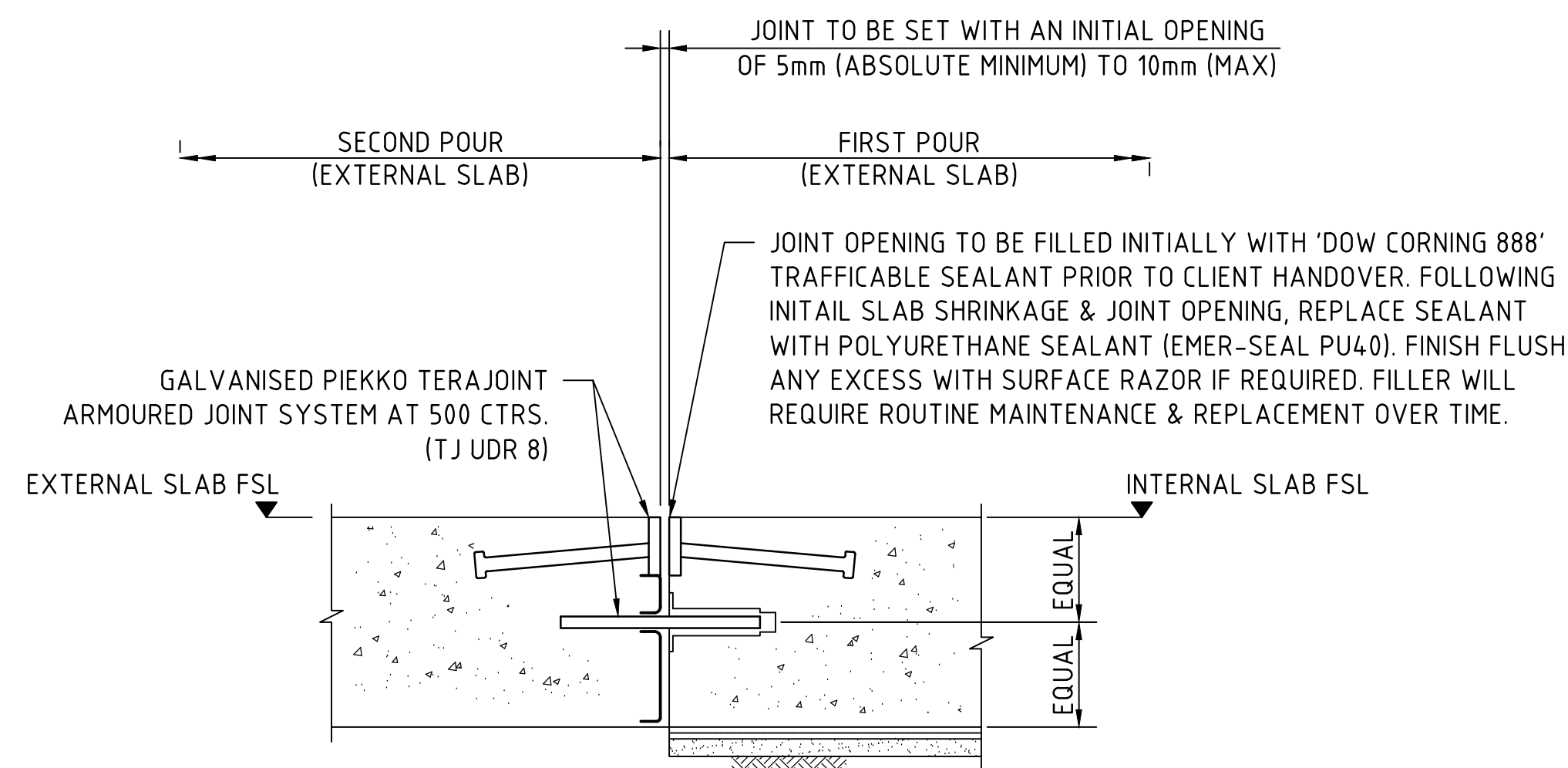


EXTERNAL PAVEMENT SLAB JOINT SEALANT DETAIL

N.T.S

INSTALLATION PROCEDURE:

1. CLEAN SLURRY FROM 20mm DEEP x 6mm WIDE SAW CUT
2. ALLOW TO DRY FULLY
3. INSTALL 10mm DIAMETER EXPANDED POLYETHYLENE BACKING ROD (FORCE ROD TO BOTTOM OF SAWCUT)
4. SEAL WITH 'DOW CORNING 888' TRAFFICABLE SEALANT

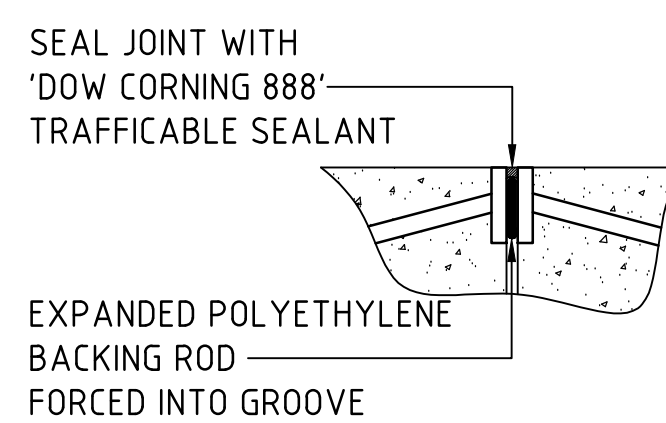


INSTALL AS PER MANUFACTURER'S RECOMMENDATION

INTERNAL TO EXTERNAL SLAB GALVANIZED ARMOURD DOWEL JOINT G-ADJ

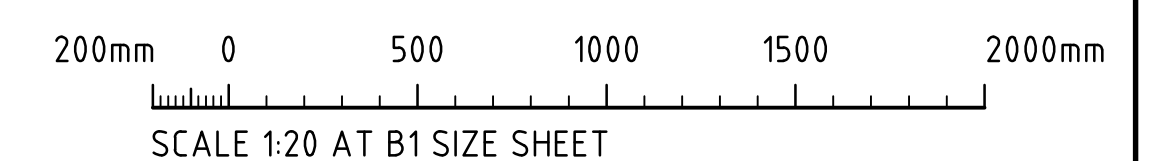
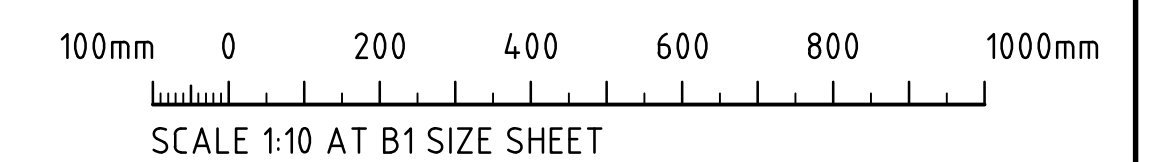
(APPLICABLE AT ROLLER DOORS)

SCALE 1:5



GALVANIZED/ARMOURD DOWEL JOINT SEALANT DETAIL

SCALE 1:5



FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	14.10.25	B
ISSUED FOR INFORMATION	16.09.25	A
AMENDMENTS	DATE	ISSUE

ARCHITECT

CLIENT

PROJECT

MARVEL MOOREBANK
20 KELSO CRESCENT, MOOREBANK
NSW 2170

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF.
HC	QP	DATE	XC	B1	AS SHOWN	[014972.02-SSDA851]

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CRC
COSTIN ROE CONSULTING

CIVIL & STRUCTURAL ENGINEERS

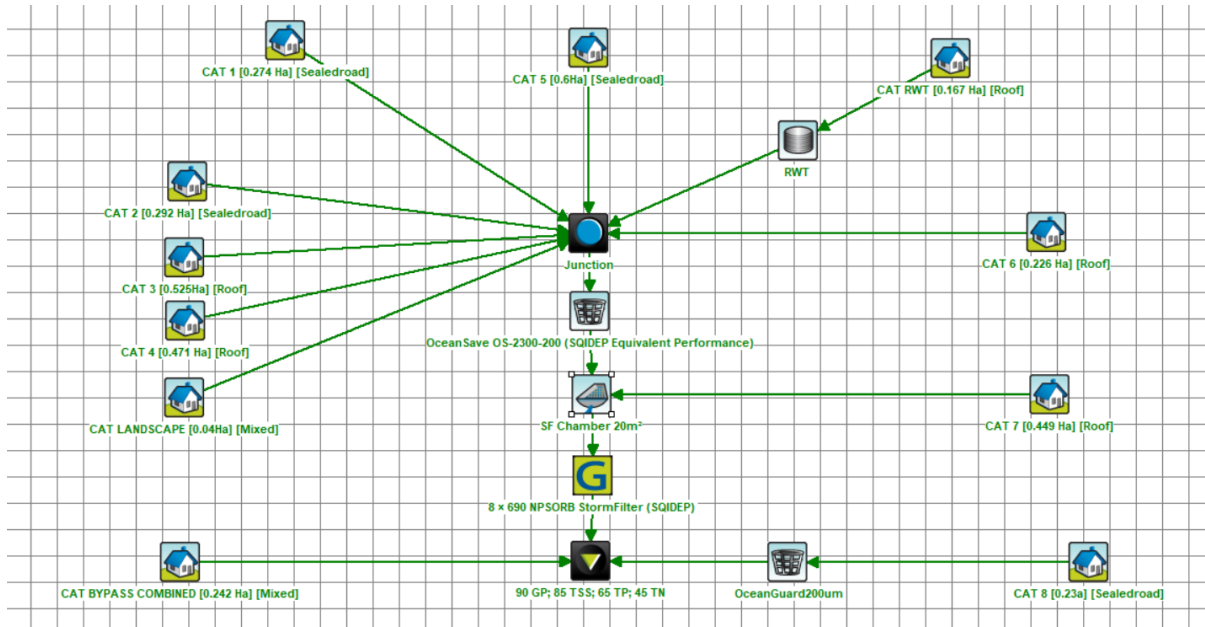
DRAWING TITLE

EXTERNAL PAVEMENT DETAILS
SHEET 2

DRAWING No **C014972.02-SSDA851** ISSUE **B**

**APPENDIX B
MUSIC MODEL CONFIGURATION**

Post-Developed MUSIC Layout



MUSIC Results

Treatment Train Effectiveness - 90 GP; 85 TSS; 65 TP; 45 TN

	Sources	Residual Load	% Reduction
Flow (ML/yr)	25.3	24.2	4.1
Total Suspended Solids (kg/yr)	3790	541	85.7
Total Phosphorus (kg/yr)	7.97	1.73	78.3
Total Nitrogen (kg/yr)	57.3	24.5	57.2
Gross Pollutants (kg/yr)	682	31.9	95.3

APPENDIX C
DRAFT SOIL AND WATER MANGEMENT PLAN

B1. Introduction

An erosion and sediment control plan (ESCP) is shown on drawing **CO14972.02-SSDA200** with details on **SSDA250 and SSDA251**. These are conceptual plans only providing sufficient detail to clearly show that the works can proceed without undue pollution to receiving waters. A detailed plan will be prepared once consent is given and before works start.

B2. General Conditions

- The ESCP will be read in conjunction with the engineering plans, and any other plans or written instructions that may be issued in relation to development at the subject site.
- Contractors will ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated in:
- Best Practice Erosion and Sediment Control document International Erosion Control Association (ICEA) Australasia – “The White Book”.
- Managing Urban Stormwater – Soils & Construction Volume 1 (‘Blue Book’)(Landcom, 2004).
- All subcontractors will be informed of their responsibilities in minimising the potential for soil erosion and pollution to down slope areas.

B3. Land Disturbance

Where practicable, the soil erosion hazard on the site will be kept as low as possible and as recommended in Table B.1.

Table B.1 Limitations to Access

Land Use	Limitation	Comments
Construction areas	Limited to 5 (preferably 2) metres from the edge of any essential construction activity as shown on the engineering plans.	All site workers will clearly recognise these areas that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope), or similar materials.
Access areas	Limited to a maximum width of 5 metres	The site manager will determine and mark the location of these zones onsite. They can vary in position so as to best conserve existing vegetation and protect downstream areas while being considerate of the needs of efficient works activities. All site workers will clearly recognise these boundaries.
Remaining lands	Entry prohibited except for essential management works	

B4. Erosion Control Conditions

- Clearly visible barrier fencing shall be installed as shown on the plan and elsewhere at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site only through the stabilised access points.
- Soil materials will be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils remain on the surface at the completion of works.
- Where practicable, schedule the construction program so that the time from starting land disturbance to stabilisation has a duration of less than six months.
- Notwithstanding this, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 20 working days.
- Land recently established with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed might be necessary later in areas of inadequate vegetation establishment.
- Where practical, foot and vehicular traffic will be kept away from all recently established areas
- Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as law a gradient as practical but not steeper than:
 - 2H:1V where slope length is less than 7 metres
 - 2.5H:1V where slope length is between 7 and 10 metres
 - 3H:1V where slope length is between 10 and 12 metres
 - 4H:1V where slope length is between 12 and 18 metres
 - 5H:1V where slope length is between 18 and 27 metres
 - 6H:1V where slope length is greater than 27 metres
- All earthworks, including waterways/drains/spillways and their outlets, will be constructed to be stable in at least the design storm event.
- During windy weather, large, unprotected areas will be kept moist (not wet) by sprinkling with water to keep dust under control. In the event water is not available in sufficient quantities, soil binders and/or dust retardants will be used or the surface will be left in a cloddy state that resists removal by wind.

B5. Pollution Control Conditions

1. Stockpiles will not be located within 5 metres of hazard areas, including likely areas of high velocity flows such as waterways, paved areas and driveways. Silt/sediment fences and appropriate stabilisation of stockpiles are to be provided as detailed on the drawings.
2. Sediment fences will:
 - a. Be installed where shown on the drawings, and elsewhere at the discretion of the site superintendent to contain the coarser sediment fraction (including aggregated fines) as near as possible to their source.
 - a. Have a catchment area not exceeding 720 square meters, a storage depth (including both settling and settled zones) of at least 0.6 meters, and internal dimensions that provide maximum surface area for settling, and

- b. Provide a return of 1 metre upslope at intervals along the fence where catchment area exceeds 720 square meters, to limit discharge reaching each section to 10 litres/second in a maximum 20-year tc discharge.
2. Sediment removed from any trapping device will be disposed in locations where further erosion and consequent pollution to down slope lands and waterways will not occur.
3. Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free (i.e. the catchment area has been permanently landscaped and/or likely sediment has been treated in an approved device). Nevertheless, stormwater inlets will be protected.
4. Temporary soil and water management structures will be removed only after the lands they are protecting are stabilised.

B6. Waste Management Conditions

Acceptable bins will be provided for any concrete and mortar slurries, paints, acid washings, lightweight waste materials and litter. Clearance service will be provided at least weekly.

B7. Site Inspection and Maintenance

1. A self-auditing program will be established based on a Check Sheet. A site inspection using the Check Sheet will be made by the site manager:
 - At least weekly.
 - Immediately before site closure.
 - Immediately following rainfall events in excess of 5mm in any 24-hour period.

The self-audit will include:

- Recording the condition of every sediment control device
 - Recording maintenance requirements (if any) for each sediment control device
 - Recording the volumes of sediment removed from sediment retention systems, where applicable
 - Recording the site where sediment is disposed
 - Forwarding a signed duplicate of the completed Check Sheet to the project manager/developer for their information
2. In addition, a suitably qualified person will be required to oversee the installation and maintenance of all soil and water management works on the site. The person shall be required to provide a short monthly written report. The responsible person will ensure that:
 - The plan is being implemented correctly
 - Repairs are undertaken as required
 - Essential modifications are made to the plan if and when necessary
 3. The report shall carry a certificate that works have been carried out in accordance with the plan.
 4. Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the Site Superintendent.

5. Proper drainage will be maintained. To this end drains (including inlet and outlet works) will be checked to ensure that they are operating as intended, especially that,
 - a. No low points exist that can overtop in a large storm event
 - b. Areas of erosion are repaired (e.g. lined with a suitable material) and/or velocity of flow is reduced appropriately through construction of small check dams or installing additional diversion upslope.
 - c. Blockages are cleared (these might occur because of sediment pollution, sand/soil/spoil being deposited in or too close to them, breached by vehicle wheels, etc.).
6. Sand/soil/spoil materials placed closer than 2 meters from hazard areas will be removed. Such hazard areas include and areas of high velocity water flows (e.g. waterways and gutters), paved areas and driveways
7. Recently stabilised lands will be checked to ensure that erosion hazard has been effectively reduced. Any repairs will be initiated as appropriate.
8. Excessive vegetation growth will be controlled through mowing or slashing.
9. All sediment detention systems will be kept in good, working condition. In particular, attention will be given to:
 - a. Recent works to ensure they have not resulted in diversion of sediment laden water away from them
 - b. Degradable products to ensure they are replaced as required, and
 - c. Sediment removal, to ensure the design capacity or less remains in the settling zone.
10. Any pollutants removed from sediment basins or litter traps will be disposed of in areas where further pollution to down slope lands and waterways should not occur.
11. Additional erosion and/or sediment control works will be constructed as necessary to ensure the desired protection is given to down slope lands and waterways, i.e. make ongoing changes to the plan where it proves inadequate in practice or is subjected to changes in conditions at the work site or elsewhere in the catchment.
12. Erosion and sediment control measures will be maintained in a functioning condition until all earthwork activities are completed and the site stabilised
13. Litter, debris and sediment will be removed from the gross pollutant traps and trash racks as required.

**EROSION AND SEDIMENT CONTROL
WEEKLY SITE INSPECTION SHEET**

LOCATION

INSPECTION OFFICER DATE

SIGNATURE

Legend: OK Not OK N/A Not applicable

Item	Consideration	Assessment
1	Public roadways clear of sediment.	.....
2	Entry/exit pads clear of excessive sediment deposition.	.....
3	Entry/exit pads have adequate void spacing to trap sediment.	.....
4	The construction site is clear of litter and unconfined rubbish.	.....
5	Adequate stockpiles of emergency ESC materials exist on site.	.....
6	Site dust is being adequately controlled.	.....
7	Appropriate drainage and sediment controls have been installed prior to new areas being cleared or disturbed.	.....
8	Up-slope "clean" water is being appropriately diverted around/through the site.	.....
9	Drainage lines are free of soil scour and sediment deposition.	.....
10	No areas of exposed soil are in need of erosion control.	.....
11	Earth batters are free of "rill" erosion.	.....
12	Erosion control mulch is not being displaced by wind or water.	.....
13	Long-term soil stockpiles are protected from wind, rain and stormwater flow with appropriate drainage and erosion controls.	.....
14	Sediment fences are free from damage.	.....
15	Sediment-laden stormwater is not simply flowing "around" the sediment fences or other sediment traps.	.....
16	Sediment controls placed up-slope/around stormwater inlets are appropriate for the type of inlet structure.	.....
17	All sediment traps are free of excessive sediment deposition.	.....
18	The settled sediment layer within a sediment basin is clearly visible through the supernatant prior to discharge such water.	.....
19	All reasonable and practicable measures are being taken to control sediment runoff from the site.	.....
20	All soil surfaces are being appropriately prepared (i.e. pH, nutrients, roughness and density) prior to revegetation.	.....
21	Stabilised surfaces have a minimum 70% soil coverage.	.....
22	The site is adequately prepared for imminent storms.	.....
23	All ESC measures are in proper working order.	.....

**APPENDIX D
DRAFT MAINTENANCE SCHEDULE**

Maintenance Action	Frequency	Responsibility	Procedure
Swales/Landscaped Areas			
Check density of vegetation and ensure minimum height of 150mm is maintained. Check for any evidence of weed infestation	Six monthly	Maintenance Contractor	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications
Inspect swale for excessive litter and sediment build up	Six monthly	Maintenance Contractor	Remove sediment and litter and dispose in accordance with local authorities' requirements.
Check for any evidence of channelisation and erosion	Six monthly/ After Major Storm	Maintenance Contractor	Reinstate eroded areas so that original, designed swale profile is maintained
Weed Infestation	Three Monthly	Maintenance Contractor	Remove any weed infestation ensuring all root ball of weed is removed. Replace with vegetation where required.
Inspect swale surface for erosion	Six Monthly	Maintenance Contractor	Replace top soil in eroded area and cover and secure with biodegradable fabric. Cut hole in fabric and revegetate.
Inlet & Junction Pits			
Inside of pits	Six Monthly	Maintenance Contractor	Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter.
Outside of pits	Four Monthly/ After Major Storm	Maintenance Contractor	Clean grate of collected sediment,

			debris, litter and vegetation.
Proprietary Treatment Devices (OceanSave GPT, Pit Baskets and Filters)			
Refer to Manufacturers Operation and Maintenance Manuel	Annually	Maintenance Contractor	Refer to Manufacturers Operation and Maintenance Manuel
Rainwater Tanks			
Check for any clogging and blockage of the first flush device	Monthly	Maintenance Contractor	First flush device to be cleaned out
Check for any clogging and blockage of the tank inlet -leaf/litter screen	Six monthly	Maintenance Contractor	Leaves and debris to be removed from the inlet leaf/litter screen
Check the level of sediment within the tank	Every two years	Maintenance Contractor	Sediment and debris to be removed from rainwater tank floor if sediment level is greater than the maximum allowable depth as specified by the hydraulic consultant
Stormwater System			
General Inspection of complete stormwater drainage system	Bi-annually	Maintenance Contractor	Inspect all drainage structures noting any dilapidation in structures and carry out required repairs.

**APPENDIX E
TOPOGRAPHIC SURVEY**



EASEMENTS:
 (A) EASEMENT FOR TRANSMISSION LINE (K022590)
 (B) EASEMENT TO DRAIN WATER TO WIDE (D000046)
 (C) EASEMENT FOR SEWERAGE (D000003)
 (D) EASEMENT FOR ELECTRICITY PURPOSES (M015048)
 (E) EASEMENT FOR ELECTRICITY PURPOSES (M015047)

NOTES:
 1. ONLY SERVICES WHICH WERE VISIBLE & ACCESSIBLE AT THE TIME OF THE SURVEY ARE SHOWN. FULL DETAILS OF SEWER AND OTHER SERVICES SHOULD BE OBTAINED FROM THE RELEVANT AUTHORITIES. UNDERGROUND SERVICES INFORMATION CAN BE OBTAINED FROM DIAL BEFORE YOU DIG (P1 1100) OR www.dialbeforeyoudig.com.au
 2. CONTOURS ARE APPROXIMATE ONLY. PREFERENCE TO BE GIVEN TO SIGHT HEIGHTS.
 3. CONTOURS ARE DERIVED FROM UAV PHOTOGRAMMETRY CAPTURED 15.08.2024.
 4. MAJOR TREES SHOWN ONLY.
 5. PROJECT CO-ORDINATES ARE MGA2000 (ZONES)
 6. THIS PLAN HAS BEEN PREPARED FOR THE SOLE PURPOSE OF LODGING A DEVELOPMENT APPLICATION WITH THE LOCAL COUNCIL. THIS PLAN IS NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE EXPRESS PERMISSION OF BOXALL SURVEYORS (P1) LTD.

Detail Survey Certificate
 I, Shawn LeCler: Being (Geo) MIS of Boxall Surveyors, a surveyor registered under the Surveying and Spatial Information Act 2023, certify that the survey represented in this plan was made in accordance with Clause 10 of the Surveying and Spatial Information Regulation 2017 with regard to the location of the boundaries shown on this plan.
 Signature: *[Signature]* Dated: 26.08.2024
 Surveyor registered under the Surveying and Spatial Information Act 2022

BEFORE YOU DIG
 www.dialbeforeyoudig.com.au
PRINT IN COLOUR

CLIENT: MANN GROUP NSW
ADDRESS: No.20 KELSO CRESCENT MOOREBANK LOT 1 IN DP 1296586

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 Liability limited by a scheme approved under Professional Standards Legislation
 PO Box 519 Sutherland NSW 1459 | Suite B405-51 Elton Street
 02 9521 5737 | www.boxallsurveyors.com.au | A/CN 114 664 058

TITLE:		PLAN OF SITE LEVELS DERIVED FROM UAV PHOTOGRAMMETRY		ORIGIN LEVELS:	GNS3	CORSNET
REV	DATE	REVISION DETAILS		AZIMUTH:	MGA20	DATUM:
				SURVEY:	LC	DATE:
				DRAWN:	LC	DATE:
				APPROVED:	SL	DATE:
				DRAWING No:	11611-005	SCALE:
				REV:	---	SHEET:
				SIZE:	A1	1 OF 1

**APPENDIX F
SEARS**

Development details

Application number	SSD-58978472
Project name	Kelso Crescent Multi Level Warehouse, Moorebank
Location	20 Kelso Crescent within Liverpool City
Applicant	MAPLETREE SR AUSTRALIA MANAGEMENT PTY LTD
Date of issue	8 June 2023

Content and guidance

Any Environmental Impact Statement (EIS) must meet the minimum form and content requirements as prescribed by Part 8 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) and the *State Significant Development Guidelines*.

Relevant policies and guidelines can be found at <https://www.planningportal.nsw.gov.au/major-projects/assessment/policies-and-guidelines>.

Key issues and documentation

Issue and Assessment Requirements	Documentation
<p>1. Statutory Context</p> <ul style="list-style-type: none">Address all relevant legislation, environmental planning instruments (EPIs) (including drafts), plans, policies and guidelines.Identify compliance with applicable development standards and provide a detailed justification for any non-compliances.If the development is only partly State significant development (SSD) declared under Chapter 2 of SEPP (Planning Systems) 2021, provide an explanation of how the remainder of the development is sufficiently related to the component that is SSD.Address the requirements of any approvals applying to the site, including any concept approval or recommendation from any Gateway determination.	<ul style="list-style-type: none">Address in EIS
<p>2. Capital Investment Value and Employment</p> <ul style="list-style-type: none">Provide a detailed calculation of the capital investment value (CIV) of the development prepared by a AIQS Certified Quantity Surveyor or RICS Chartered Quantity Surveyor in accordance with <i>Planning Circular PS 21-020: Calculation of Capital Investment Value</i>. The calculation of the estimated CIV is to be accurate at the date of application and include details of all components and assumptions from which it is derived.	<ul style="list-style-type: none">Quantity Surveyor Report

Planning Secretary's Environmental Assessment Requirements



Warehouses and distribution centres

Issue and Assessment Requirements	Documentation
<ul style="list-style-type: none"> Provide an estimate of the retained and new jobs that would be created during the construction and operational phases of the development, including details of the methodology to determine the figures provided. 	
<p>3. Design Quality</p> <ul style="list-style-type: none"> Demonstrate how the development will achieve: <ul style="list-style-type: none"> design excellence in accordance with any applicable EPI provisions. good design in accordance with the seven objectives for good design in <i>Better Placed</i>. Where required by an EPI or concept approval, demonstrate that the development has been subject to a competitive design process, or reviewed by the State Design Review Panel (SDRP) consistent with the <i>NSW SDRP: Guidelines for Project Teams</i>. Recommendations are to be addressed prior to lodgement. 	<ul style="list-style-type: none"> Address in EIS <p>If required:</p> <ul style="list-style-type: none"> Design Review Report (where the project has been reviewed by the SDRP) Design Excellence Strategy (where design excellence is required by an EPI) Competition Report (where a competitive design process has been held)
<p>4. Built Form and Urban Design</p> <ul style="list-style-type: none"> Explain and illustrate the proposed built form, including a detailed site and context analysis to justify the proposed site planning and design approach. Demonstrate how the proposed built form (layout, height, bulk, scale, separation, setbacks, interface and articulation) addresses and responds to the context, site characteristics, streetscape and existing and future character of the locality. Demonstrate how the building design will deliver a high-quality development, including consideration of façade design, articulation, materials, finishes, colours, any signage and integration of services. Assess how the development complies with the relevant accessibility requirements. 	<ul style="list-style-type: none"> Architectural drawings Design Report Survey Plan Building Code of Australia Compliance Report Accessibility Report
<p>5. Visual Impact</p> <ul style="list-style-type: none"> Provide a visual analysis of the development from key viewpoints, including photomontages or perspectives showing the proposed and likely future development. Where the visual analysis has identified potential for significant visual impact, provide a visual impact assessment that addresses the impacts of the development on the existing catchment. 	<ul style="list-style-type: none"> Visual Analysis Visual Impact Assessment

Issue and Assessment Requirements	Documentation
<p>6. Traffic, Transport and Accessibility</p> <ul style="list-style-type: none"> • Provide a transport and accessibility impact assessment, which includes: <ul style="list-style-type: none"> ○ details of all traffic types and volumes likely to be generated during construction and operation, including a description of key access and haul routes. ○ an assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts on existing performance levels of nearby intersections (using industry standard modelling). ○ plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network. ○ details and plans of any proposed internal road network, loading dock provision and servicing, on-site parking provisions, and sufficient pedestrian and cyclist facilities, in accordance with the relevant Australian Standards. ○ swept path analysis for the largest vehicle requiring access to the development. ○ details of road upgrades, infrastructure works, or new roads or access points required for the development if necessary. • Provide a Construction Traffic Management Plan detailing predicted construction vehicle, routes, access and parking arrangements, coordination with other construction occurring in the area, and how impacts on existing traffic, pedestrian and bicycle networks would be managed and mitigated. 	<ul style="list-style-type: none"> • Transport and Accessibility Impact Assessment • Construction Traffic Management Plan • Green Travel Plan or equivalent
<p>7. Trees and Landscaping</p> <ul style="list-style-type: none"> • Provide a detailed site-wide landscape plan, that: <ul style="list-style-type: none"> ○ identifies the number and location of trees to be removed and retained, and how opportunities to retain significant trees have been explored and/or informs the plan. ○ details the proposed site planting, including location, number and species of plantings, heights of trees at maturity and proposed canopy coverage (as a percentage of the site area). ○ demonstrates how the proposed development would: <ul style="list-style-type: none"> ▪ contribute to long term landscape setting in respect of the site and streetscape. ▪ mitigate the urban heat island effect and ensure appropriate comfort levels on-site. ▪ contribute to the objective of increased urban tree canopy cover. 	<ul style="list-style-type: none"> • Landscape Plan

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Issue and Assessment Requirements	Documentation
<ul style="list-style-type: none"> ▪ maximise opportunities for green infrastructure, consistent with <i>Greener Places</i> and having regard to any bush fire risk. 	
<p>8. Ecologically Sustainable Development (ESD)</p> <ul style="list-style-type: none"> • Identify how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development. • Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards. • Demonstrate how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources. 	<ul style="list-style-type: none"> • ESD Report
<p>9. Biodiversity</p> <ul style="list-style-type: none"> • Assess any biodiversity impacts associated with the development in accordance with the <i>Biodiversity Conservation Act 2016</i> and the <i>Biodiversity Assessment Method 2020</i>, including the preparation of a Biodiversity Development Assessment Report (BDAR), unless a waiver is granted, or the site is on biodiversity certified land. • If the development is on biodiversity certified land, provide information to identify the site (using associated mapping) and demonstrate the proposed development is consistent with the relevant biodiversity measure conferred by the biodiversity certification. 	<ul style="list-style-type: none"> • Biodiversity Development Assessment Report or BDAR Waiver
<p>10. Air Quality</p> <ul style="list-style-type: none"> • Identify significant air emission sources at the proposed development (during construction and operation), assess their potential to cause adverse off-site impacts, and detail proposed management and mitigation measures that would be implemented. Where air emissions during operation have the potential to cause adverse off-site impacts, provide a quantitative air quality impact assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. 	<ul style="list-style-type: none"> • Address in EIS <p>If required:</p> <ul style="list-style-type: none"> • Air Quality Impact Assessment
<p>11. Noise and Vibration</p> <ul style="list-style-type: none"> • Provide a noise and vibration assessment prepared in accordance with the relevant EPA guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented. 	<ul style="list-style-type: none"> • Noise and Vibration Impact Assessment

Issue and Assessment Requirements	Documentation
<p>12. Ground and Water Conditions</p> <ul style="list-style-type: none"> • Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site, including soil erosion, salinity and acid sulfate soils. • Provide a Surface and Groundwater Impact Assessment that assesses potential impacts on: <ul style="list-style-type: none"> ○ surface water resources (quality and quantity) including related infrastructure, hydrology, dependent ecosystems, drainage lines, downstream assets and watercourses. ○ groundwater resources in accordance with the <i>Groundwater Guidelines</i>. 	<ul style="list-style-type: none"> • Geotechnical Assessment • Surface and Groundwater Impact Assessment • Salinity Management Plan and/or Acid Sulfate Soils Management Plan
<p>13. Water Management</p> <ul style="list-style-type: none"> • Provide an Integrated Water Management Plan for the development that: <ul style="list-style-type: none"> ○ is prepared in consultation with the local council and any other relevant drainage or water authority. ○ outlines the water-related servicing infrastructure required by the development (informed by the anticipated annual and ultimate increase in servicing demand) and evaluates opportunities to reduce water demand (such as recycled water provision). ○ details the proposed drainage design (stormwater and wastewater) for the site including any on-site detention facilities, water quality management measures and nominated discharge points, on-site sewage management, and measures to treat, reuse or dispose of water. ○ demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse downstream impacts. • Where water and drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards of, the local council or other drainage or water authority. 	<ul style="list-style-type: none"> • Integrated Water Management Plan
<p>14. Flooding Risk</p> <ul style="list-style-type: none"> • Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the <i>NSW Floodplain Development Manual</i>. • Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required. 	<ul style="list-style-type: none"> • Flood Risk Assessment

Planning Secretary's Environmental Assessment Requirements



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Issue and Assessment Requirements	Documentation
<p>15. Hazards and Risks</p> <ul style="list-style-type: none"> Where there are dangerous goods and hazardous materials associated with the development provide a preliminary risk screening in accordance with Chapter 3 of SEPP (Resilience and Hazards) 2021. Where required by SEPP (Resilience and Hazards) 2021, provide a Preliminary Hazard Analysis prepared in accordance with <i>Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis and Multi-Level Risk Assessment</i>. If the development is adjacent to or on land in a pipeline corridor, report on consultation outcomes with the operator of the pipeline, and prepare a hazard analysis. 	<ul style="list-style-type: none"> Preliminary Hazard Analysis <p>If required:</p> <ul style="list-style-type: none"> Hazard Analysis (Pipeline)
<p>16. Contamination and Remediation</p> <ul style="list-style-type: none"> In accordance with Chapter 4 of SEPP (Resilience and Hazards) 2021, assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable (or will be suitable, after remediation) for the development. 	<ul style="list-style-type: none"> Preliminary Site Investigation <p>If required:</p> <ul style="list-style-type: none"> Detailed Site Investigation Remedial Action Plan Preliminary Long-term Environmental Management Plan
<p>17. Waste Management</p> <ul style="list-style-type: none"> Identify, quantify and classify the likely waste streams to be generated during construction and operation. Provide the measures to be implemented to manage, reuse, recycle and safely dispose of this waste. Identify appropriate servicing arrangements for the site. If buildings are proposed to be demolished or altered, provide a hazardous materials survey. 	<ul style="list-style-type: none"> Waste Management Plan Hazardous Material Survey
<p>18. Aboriginal Cultural Heritage</p> <ul style="list-style-type: none"> Provide an Aboriginal Cultural Heritage Assessment Report prepared in accordance with relevant guidelines, identifying, describing and assessing any impacts on any Aboriginal cultural heritage values on the land. 	<ul style="list-style-type: none"> Aboriginal Cultural Heritage Assessment Report
<p>19. Environmental Heritage</p> <ul style="list-style-type: none"> Where there is potential for direct or indirect impacts on the heritage significance of environmental heritage, provide a Statement of Heritage Impact and Archaeological Assessment (if potential impacts to 	<ul style="list-style-type: none"> Statement of Heritage Impact Archaeological Assessment

Planning Secretary's Environmental Assessment Requirements



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Issue and Assessment Requirements	Documentation
<p>archaeological resources are identified), prepared in accordance with the relevant guidelines, which assesses any impacts and outlines measures to ensure they are minimised and mitigated.</p>	
<p>20. Social Impact</p> <ul style="list-style-type: none"> Provide a Social Impact Assessment prepared in accordance with the <i>Social Impact Assessment Guidelines for State Significant Projects</i>. 	<ul style="list-style-type: none"> Social Impact Assessment
<p>21. Infrastructure Requirements and Utilities</p> <ul style="list-style-type: none"> In consultation with relevant service providers: <ul style="list-style-type: none"> assess the impacts of the development on existing utility infrastructure and service provider assets surrounding the site. identify any infrastructure required on-site and off-site to facilitate the development and any arrangements to ensure that the upgrades will be implemented on time and be maintained. provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be co-ordinated, funded and delivered to facilitate the development. 	<ul style="list-style-type: none"> Infrastructure Delivery, Management and Staging Plan
<p>22. Bush Fire Risk</p> <ul style="list-style-type: none"> If the development is on bush fire prone land, or a bush fire threat is identified on or adjoining the site, provide a bush fire assessment that details proposed bush fire protection measures and demonstrates compliance with <i>Planning for Bush Fire Protection</i>. 	<ul style="list-style-type: none"> Bush Fire Assessment
<p>23. Construction, Operation and Staging</p> <ul style="list-style-type: none"> If staging is proposed, provide details of how construction and operation would be managed and any impacts mitigated. 	<ul style="list-style-type: none"> Address in EIS
<p>24. Contributions and Public Benefit</p> <ul style="list-style-type: none"> Address the requirements of any relevant contribution plan(s), planning agreement or EPI requiring a monetary contribution, dedication of land and/or works-in-kind and include details of any proposal for further material public benefit. Where the development proposes alternative public benefits or a departure from an existing contributions framework, the local council, the Department and relevant State agencies are to be consulted prior to lodgement and details, including how comments have been addressed, are to be provided. 	<ul style="list-style-type: none"> Address in EIS

Issue and Assessment Requirements	Documentation
<p>25. Engagement</p> <ul style="list-style-type: none">• Detail engagement undertaken and demonstrate how it was consistent with the <i>Undertaking Engagement Guidelines for State Significant Projects</i>. Detail how issues raised and feedback provided have been considered and responded to in the project. In particular, applicants must consult with:<ul style="list-style-type: none">○ the relevant Department assessment team.○ any relevant local councils.○ any relevant agencies (including the Western Parkland City Authority for development within the Western Parkland City).○ the community.○ if the development would have required an approval or authorisation under another Act but for the application of s 4.41 of the EP&A Act or requires an approval or authorisation under another Act to be applied consistently by s 4.42 of the EP&A Act, the agency relevant to that approval or authorisation.	<ul style="list-style-type: none">• Engagement Report

