#### **LENDLEASE**

# Jordan Springs East Stage 3B2 Road Safety Audit - Concept Design

SEPTEMBER 2017



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# Jordan Springs East Stage 3B2 Road Safety Audit - Concept Design

#### Lendlease

WSP Level 27, 680 George Street Sydney NSW 2000 GPO Box 5394 Sydney NSW 2001

Tel: +61 2 9272 5100 Fax: +61 2 9272 5101

wsp.com

REV	DATE	DETAILS
	11/09/2017	Draft
A	13/09/2017	Final Report

	NAME	DATE	SIGNATURE
Prepared by:	Rebecca Temperley	13/09/2017	fra
Reviewed by:	Ody Murlianto	13/09/2017	mudiante
Approved by:	Ryan Miller	13/09/2017	R. Miller

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September 2017



# TABLE OF CONTENTS

1	SUMMARY	1
2	INTRODUCTION	3
2.1	Audit scope	3
2.2	Proposed design	3
2.3	Audited documentation	4
2.4	Procedures and reference material	6
2.5	Audit team	6
2.6	Responding to the audit	6
3	ROAD SAFETY AUDIT PROGRAM	7
3.1	Commencement meeting	7
3.2	Site inspection	7
3.3	Completion meeting	7
4	ROAD SAFETY AUDIT FINDINGS	9
4.1	The risk assessment system	9
4.1.1	Estimated crash frequency	
4.1.2 4.1.3	Estimated crash severity  Deemed level of risk	
4.2	Road safety audit findings	11
5	FORMAL STATEMENT	18



LIST OF 1	TABLES	
Table 4.1	Crash frequency	9
Table 4.2	Crash severity	9
Table 4.3	Level of risk	10
Table 4.4	Road safety audit findings	11
LIST OF F	FIGURES	
Figure 2.1	Location of Stage 3B2 in Jordan Springs East	4

#### **LIST OF APPENDICES**

Appendix A Audited documents

Document Set ID: 7854157 Version: 1, Version Date: 26/09/2017

## 1 SUMMARY

Audited project:	Jordan Springs East Stage 3B2 - Concept Design Road Safety Audit
Audited for:	Lendlease
Address:	Level 2, 88 Phillip Street Parramatta NSW 2150
Telephone:	02 9392 4588
Project manager:	Sean Porter
	Development Manager, NSW/ACT Communities
	sean.porter@lendlease.com
Auditors:	Rebecca Temperley, Ody Murlianto, Ryan Miller
Audit type:	Concept Design
Commencement meeting:	8 September 2017
Audit date:	8 September 2017
Completion meeting:	12 September 2017
Previous audit:	Yes

This Road Safety Audit has been commissioned by Lendlease and assessed the road design of Stage 3B2 in Jordan Springs East.

The audit identified two high risk and one low risk safety issues related to the road design.

The auditors also identified five issues for 'note only'. These issues were identified during the audit and are for the attention of the design team. There is no obligation to respond to these issues.

Document Set ID: 7854157 Version: 1, Version Date: 26/09/2017

#### 2 INTRODUCTION

#### 2.1 AUDIT SCOPE

The purpose of this concept design audit is to identify potential road safety issues for road users based upon the road design associated with the development of Jordan Springs East Stage 3B2. The road design drawings have been prepared by Cardno for Lendlease.

#### 2.2 PROPOSED DESIGN

Jordan Springs East is located within the Penrith City Council Local Government Area (LGA) and forms part of the St Marys development site. It is bounded by existing residential development in the suburbs of Werrington County and Werrington Downs to the south, land zoned for Regional Open Space to the east and land zoned for Regional Park to the north and west. There is also an area zoned for Drainage that adjoins the northern boundary of the precinct.

Jordan Springs East covers an area of approximately 133.1 hectares and is envisaged to accommodate approximately 1,400 dwellings across a total of 1,238 lots to accommodate a population of between 3,900 and 4,300. It is also envisaged to accommodate approximately 760 jobs in light industrial and light manufacturing sectors.

The delivery of the Jordan Springs East masterplan is staged. Under the Precinct Plan amendment (2016) currently under consideration by Council the total yield from Jordan Springs East will be 1,436 residential dwellings with approximately 38 hectares of employment land use. To date, approval has been granted for approximately 746 residential lots across Stages 1, 2 and 3A, with approval sought for an additional 195 residential lots across Stages 4A, 4B and 3B1.

Stage 3B2 proposes to consist of four super-lots and are located approximately in the centre of the precinct, where commercial/retail developments may be proposed. The location of these stages relative to the Jordan Springs East development site is presented in Figure 2.1.

Project No 2197037A Jordan Springs East Stage 3B2 Road Safety Audit - Concept Design Lendlease



Figure 2.1 Location of Stage 3B2 in Jordan Springs East

#### 2.3 AUDITED DOCUMENTATION

The following drawings prepared by Cardno was provided to the audit team:

Drawing number/Report name	Revision	Description
CV-CARDNO-ST03B2-1001	1 08-09-2017	COVER SHEET & DRAWING SCHEDULE
CV-CARDNO-ST03B2-1011	1 08-09-2017	GENERAL NOTES & LEGENDS
CV-CARDNO-ST03B2-1021	1 08-09-2017	CONTEXT PLAN
CV-CARDNO-ST03B2-1031	1 08-09-2017	GENERAL ARRANGEMENT PLAN
CV-CARDNO-ST03B2-1041		DEVELOPMENT APPLICATION STAGING PLAN AND ROAD HIERARCHY PLAN
CV-CARDNO-ST03B2-1051	1	EXISTING SERVICES AND SURVEY PLAN

Drawing number/Report name	Revision	Description
	08-09-2017	
CV-CARDNO-ST03B2-1101	1 08-09-2017	EROSION AND SEDIMENTATION CONTROL PLAN
CV-CARDNO-ST03B2-1131	1 08-09-2017	EROSION AND SEDIMENTATION CONTROL DETAILS
CV-CARDNO-ST03B2-1251	1 08-09-2017	TYPICAL ROAD CROSS SECTIONS
CV-CARDNO-ST03B2-1301	1 08-09-2017	ROADS & STORMWATER PLAN
CV-CARDNO-ST03B2-1351	1 08-09-2017	ROAD LONGITUDINAL SECTIONS SHEET 1 ROAD 001
CV-CARDNO-ST03B2-1352	1 08-09-2017	ROAD LONGITUDINAL SECTIONS SHEET 2 ROAD 013 & 021
CV-CARDNO-ST03B2-1353	1 08-09-2017	ROAD LONGITUDINAL SECTIONS SHEET 3 ROAD 022 & 023
CV-CARDNO-ST03B2-1354	1 08-09-2017	ROAD LONGITUDINAL SECTIONS SHEET 4 LANE 001 & 002
CV-CARDNO-ST03B2-1601	1 08-09-2017	SITEWORKS DETAILS SHEET 1
CV-CARDNO-ST03B2-1602	1 08-09-2017	SITEWORKS DETAILS SHEET 2
CV-CARDNO-ST03B2-1701	1 08-09-2017	PAVEMENT, SIGNAGE & LINEMARKING PLAN
CV-CARDNO-ST03B2-2201	1 08-09-2017	STORMWATER DRAINAGE DETAILS SHEET 1
CV-CARDNO-ST03B2-2202	1 08-09-2017	STORMWATER DRAINAGE DETAILS SHEET 2
CV-CARDNO-ST03B2-2301	1 08-09-2017	INTERNAL STORMWATER CATCHMENT PLAN
CV-CARDNO-ST03B2-3001	1 08-09-2017	LANEWAY GARBAGE COLLECTION TURNING PATH

#### 2.4 PROCEDURES AND REFERENCE MATERIAL

The procedures used are those described in the Austroads *Guide to Road Safety: Part 6 Road Safety Audit* (Third Edition, 2009). The concept design stage audit checklist guide was used by the audit team as a reference.

Other specific documents and manuals referred to during this audit were:

- Roads and Traffic Authority 1988, Road Design Guide
- Austroads 2009, Guides to Road Design
- Austroads 2009, Guides to Road Traffic Management
- Austroads 2009, Guide to Road Safety Part 6: Road Safety Audits
- Roads and Traffic Authority 2005, NSW Bicycle Guidelines
- Penrith City Council, Design Guidelines for Engineering Works for Subdivisions and Developments, November 2013
- Penrith City Council, Engineering Construction Specification for Civil Works, June 2016.

#### 2.5 AUDIT TEAM

The audit team comprised the following members:

Ryan Miller, Level 3 lead road safety auditor

Rebecca Temperley, Level 2 road safety auditor

Ody Murlianto, Level 2 road safety auditor.

#### 2.6 RESPONDING TO THE AUDIT

An audit provides an opportunity for an independent team to highlight potential road safety problems and have them formally considered by the project manager in conjunction with all other project considerations. The responsibility of responding to the findings of a road safety audit rests with the designer and/or the project manager, not with the auditor. The designer and/or project manager is under no obligation to accept the audit findings. It is also noted that it is not the role of the auditor to agree to, or approve the project manager's responses to the audit.

WSP September 2017 Page 6

## **3 ROAD SAFETY AUDIT PROGRAM**

#### 3.1 COMMENCEMENT MEETING

A commencement meeting was held on Friday 8 September 2017. Ryan Miller led the meeting outlining the audit scope and providing a project background. Ody Murlianto and Rebecca Temperley also attended the meeting.

#### 3.2 SITE INSPECTION

The audit team did not conduct a site visit as a part of the audit. The site is currently inaccessible with no site works undertaken.

#### 3.3 COMPLETION MEETING

A formal completion meeting will be held on a date to be advised.

Project No 2197037A Jordan Springs East Stage 3B2 Road Safety Audit - Concept Design Lendlease

WSP September 2017 Page 7

Document Set ID: 7854157 Version: 1, Version Date: 26/09/2017

## 4 ROAD SAFETY AUDIT FINDINGS

#### 4.1 THE RISK ASSESSMENT SYSTEM

Each hazard has been recorded and assessed in accordance with the Austroads *Guide to Road Safety: Part 6 Road Safety Audit* (Third Edition, 2009). The guide recommends a risk matrix be used to determine the level of risk associated with each hazard. This risk matrix is described below.

#### 4.1.1 ESTIMATED CRASH FREQUENCY

The probable frequency of an incident occurring as a direct result of the hazard was determined using the criteria displayed in Table 4.1.

Table 4.1 Crash frequency

Frequency	Description	
Frequent	Once or more per week	
Probable	Probable Once or more per year (but less than once a week)	
Occasional	Once every 5 or 10 years	
Improbable Less often than once every 10 years		

Source: Austroads

#### 4.1.2 ESTIMATED CRASH SEVERITY

The likely severity of the incident which occurred as a direct result of hazard was determined using the criteria in Table 4.2

Table 4.2 Crash severity

Severity	Description	Examples		
Catastrophic Likely multiple deaths		High-speed, multi-vehicle crash on a freeway.		
		Car runs into crowded bus stop.		
		Bus and petrol tanker collide.		
		Collapse of a bridge or tunnel.		
Serious	Likely death or serious injury	High or medium-speed vehicle/vehicle collision.		
		High or medium-speed collision with a fixed roadside object.		
		Pedestrian or cyclist struck by a car.		
Minor	Likely minor injury	Some low-speed vehicle collisions.		
		Cyclist falls from bicycle at low speed.		
		Left-turn rear-end crash in a slip lane.		
Limited	Likely trivial injury or property damage only	Some low-speed vehicle collisions.		
		Pedestrian walks into object (no head injury).		
		Car reverses into post.		

Source: Austroads

#### 4.1.3 DEEMED LEVEL OF RISK

The risk matrix in Table 4.3 was used to assess the level of risk for each hazard. The risk matrix uses the Frequency and Severity determined above to determine the likely level of risk for each hazard.

Table 4.3 Level of risk

	Frequent	Probable	Occasional	Improbable
Catastrophic	Intolerable	Intolerable	Intolerable	High
Serious	Intolerable	Intolerable	High	Medium
Minor	Intolerable	High	Medium	Low
Limited	High	Medium	Low	Low

Source: Austroads

#### 4.2 ROAD SAFETY AUDIT FINDINGS

The audit findings are documented in Table 4.4 provides specific details of each of the audit findings identified during the audit including a risk level rating for each of the audit findings. This road safety audit does not include recommended actions.

Table 4.4 Road safety audit findings

No	Drawings/Location/ Road safety category	Description of findings	Why this is a safety concern	Risk rating (severity/ frequency)	Designer's response (12/09/2017)
1	CV-CARDNO-ST03B2- 1701 Pedestrians	A pedestrian desire walking line is likely to exist to and from the commercial/retail development proposed south-west of Road 001 and Road 013, which may include mid-block crossing activities in Road 001 between Road 021 and Road 022. No formalised pedestrian crossing facility has been proposed to manage the potential crossing activities mid-block in Road 001.  Pedestrian desired pathmay include mid-block crossing activities in Road 001.  Potential future commercial/retail development	Increased likelihood of vehicle/pedestrian crash along Road 001 due to non- provision of formalised pedestrian crossing facility to service the pedestrian crossing demand generated by the proposed commercial/ retail development south-west of Road 001 and Road 013.	High (Serious/ Occasional)	Pedestrian crossing points are located east and west of the site at the proposed roundabouts. It is expected that most pedestrians north of Road 001 will navigate to the retail development via Road 002 and Road 022 and utilise these crossings.  Constructing a crossing at the midpoint of the two proposed roundabouts may be a hazard in itself as pedestrians may be hidden by the proposed landscaped median. We propose to maintain the current design unless instructed otherwise by council.

Page 11

No	Drawings/Location/ Road safety category	Description of findings	Why this is a safety concern	Risk rating (severity/ frequency)	Designer's response (12/09/2017)
2	CV-CARDNO-ST03B2- 1701 Pedestrians and Cyclists	The shared path crosses the roundabout at the intersection of Road013 and Road001 on the south and west approach. There is no warning signage proposed for vehicles approaching the roundabout to watch for cyclists or for cyclists on the shared path to yield to/watch for vehicles.  No advisory signs for shared path crossing	Increase likelihood of a crash due to lack of awareness by motorists of bicycle crossing activities at the shared path, or if cyclists are unaware of the priority at the crossing.	High (Serious/ Occasional)	Signage at the proposed roundabout is consistent with previously designed roundabouts in the estate and additional signage may overcomplicate and distract motorists.  We propose to maintain the current design unless instructed otherwise by council.

No	Drawings/Location/ Road safety category	Description of findings	Why this is a safety concern	Risk rating (severity/ frequency)	Designer's response (12/09/2017)
3	CV-CARDNO-ST03B2- 1701 Parking	There is an indented parking bay to allow for kerbside parking along Road 001 between Road 021 and Road 022. Moderate to high future parking demand is expected in the indented parking bay due to the commercial/retail land uses proposed within its immediate vicinity. There is a lack of on-street parking restriction proposed in Road 001 to ensure on-street parking compliance and ascertain adequate sight distance for vehicles exiting from Road 021 to Road 001.	If parking is close to an intersection driver sight lines will be impacted leading to an increased crash risk.	Low (Limited/ Occasional)	No stopping signage will be incorporated to provide adequate sight distance

No	Drawings/Location/ Road safety category	Description of findings	Why this is a safety concern	Risk rating (severity/ frequency)	Designer's response (12/09/2017)
NOTE 1	General Comment Pavement	Pavement design shown in the detailed design drawings indicate an assumed California Bearing Ratio (CBR) of 3% and 5%. Ensure confidence in CBR prior to construction as insufficient pavement thickness leads to pavement defects including potholes which may lead to an increased crash risk (for example swerving late to avoid defect).		Note only	
NOTE 2	Lighting	No lighting plan or assessment provided.	Adequate lighting particularly at any designated pedestrian crossing points and intersections has the potential to reduce crash risk.	Note only	

No	Drawings/Location/ Road safety category	Description of findings	Why this is a safety concern	Risk rating (severity/ frequency)	Designer's response (12/09/2017)
NOTE 3	Landscaping	No landscape plan has been provided as a part of the road safety audited documentation. The collector road cross section indicates that plants are proposed in the central median along the collector road main street (i.e. Road 001).  Potential for vegetation to impact sight lines  Potential for vegetation to impact sight lines  CONTROLLER 30% 35% 25% 110 25% 0.90  COLLECTOR ROAD MAIN STREET PAYTEMENT TYPE 1 SCALE 1100  COLLECTOR ROAD MAIN STREET  PAYTEMENT TYPE 1 SCALE 1100  COLLECTOR ROAD MAIN STREET  PAYTEMENT TYPE 1 SCALE 1100	If vegetation obstructs sight lines, there is an increased crash risk.	Note only	

No	Drawings/Location/ Road safety category	Description of findings	Why this is a safety concern	Risk rating (severity/ frequency)	Designer's response (12/09/2017)
NOTE 4	Access to lots	Access to the proposed super-lots (3152, 3153, 3154, 3155) has not been clarified in the audited documentation. Increased conflict between road users can be expected if access to the super-lots are proposed from the collector road, where the traffic volumes are expected to be higher than the side roads.	Turning manoeuvres from access driveways directly into/out of the collector road, instead of the rear laneway, increases the likelihood of the crash risk.	Note only	The lots in question will be rear loaded and access will be via the laneways

No	Drawings/Location/ Road safety category	Description of findings	Why this is a safety concern	Risk rating (severity/ frequency)	Designer's response (12/09/2017)
NOTE 5		The boundary lines of the super-lots appear to not be splayed at the laneways' intersections with the respective side streets.  The proposed building line is not detailed in the drawing at this stage, however should the building be built on the proposed boundary line, there is a potential that pedestrian sight lines to not be provided to the footpath or shared path.  STAGE 3B1 3127  Potential for large lot development to impact on sight lines to footpath/shared path	Impeded sight lines do not allow sufficient time for drivers to react leading to an increased crash risk.	Note only	

## 5 FORMAL STATEMENT

The findings and opinions in the report are based on the examination of the concept design drawings as well as the specific road and environs, and might not address all concerns existing at the time of the audit. The Auditors have endeavoured to identify features of the design and/or the road that could be modified or removed in order to improve safety. It should be noted that although every effort has been made to identify potential safety hazards, no guarantee can be made that every deficiency has been identified. It must also be recognised that safety cannot be guaranteed since no road can be regarded as absolutely safe. While every effort has been made to ensure the accuracy of this report, it is made available strictly on the basis that anyone relying on it does so at their own risk without any liability to the Auditors.

R. Miller	Samo
Ryan Miller	Rebecca Temperley
Level 3 Lead Road Safety Auditor	Level 2 Road Safety Auditor
Identification number: R\$A-02-0223	Identification number: RSA-02-1068
Signature date: 11/09/2017	Signature date: 11/09/2017
modiune	
Ody Murlianto	
Level 2 Road Safety Auditor	
Identification number: RSA-02-0910	
Signature date: 11/09/2017	

# APPENDIX A





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Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035 Level 9, The Forum, 203 Pacific Highway St. Leonards, NSW 2065 Tel: 02 9496 7700 Fax: 02 9439 5170

Web: www.cardno.com.au

# LENDLEASE JORDAN SPRINGS EAST STAGE 3B2 - CIVIL WORKS DRAFT DEVELOPMENT APPLICATION





# SCHEDULE OF DRAWINGS

CV-CARDNO-ST03B2-3001

DESCRIPTION DRAWING No. COVER SHEET & DRAWING SCHEDULE CV-CARDNO-ST03B2-1001 GENERAL NOTES & LEGENDS CV-CARDNO-ST03B2-1011 CV-CARDNO-ST03B2-1021 CONTEXT PLAN GENERAL ARRANGEMENT PLAN CV-CARDNO-ST03B2-1031 DEVELOPMENT APPLICATION STAGING PLAN AND ROAD HIERARCHY PLAN CV-CARDNO-ST03B2-1041 CV-CARDNO-ST03B2-1051 EXISTING SERVICES AND SURVEY PLAN CV-CARDNO-ST03B2-1101 EROSION AND SEDIMENTATION CONTROL PLAN EROSION AND SEDIMENTATION CONTROL DETAILS CV-CARDNO-ST03B2-1131 CV-CARDNO-ST03B2-1251 TYPICAL ROAD CROSS SECTIONS CV-CARDNO-ST03B2-1301 ROADS & STORMWATER PLAN CV-CARDNO-ST03B2-1351 ROAD LONGITUDINAL SECTIONS SHEET 1 ROAD 001 CV-CARDNO-ST03B2-1352 ROAD LONGITUDINAL SECTIONS SHEET 2 ROAD 013 & 021 CV-CARDNO-ST03B2-1353 ROAD LONGITUDINAL SECTIONS SHEET 3 ROAD 022 & 023 CV-CARDNO-ST03B2-1354 ROAD LONGITUDINAL SECTIONS SHEET 4 LANE 001 & 002 CV-CARDNO-ST03B2-1601 SITEWORKS DETAILS SHEET 1 SITEWORKS DETAILS SHEET 2 CV-CARDNO-ST03B2-1602 PAVEMENT, SIGNAGE & LINEMARKING PLAN CV-CARDNO-ST03B2-1701 CV-CARDNO-ST03B2-2201 CV-CARDNO-ST03B2-2202 CV-CARDNO-ST03B2-2301

LANEWAY GARBAGE COLLECTION TURNING PATH

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# **GENERAL**

- 1. ALL WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH PENRITH CITY COUNCIL ENGINEERING CONSTRUCTION SPECIFICATION FOR CIVIL WORKS.
- PENRITH CITY COUNCIL STANDARD DETAILS TO BE USED AT ALL

## **SITEWORKS NOTES**

- . ORIGIN OF LEVELS:- REFER SURVEY NOTES.
- CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES TO BE REPORTED TO CARDNO.
- MAKE SMOOTH CONNECTION WITH EXISTING WORKS AND SURFACES.
- . ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.
- . ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 75)
- . PROVIDE 10mm WIDE EXPANSION JOINTS BETWEEN BUILDINGS AND ALL CONCRETE OR UNIT PAVEMENTS.
- 7. ASPHALTIC CONCRETE SHALL CONFORM TO R.M.S. SPECIFICATION R116.
- B. ALL BASECOURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH R.M.S. FORM 3051, COMPACTED TO MINIMUM 98% MODIFIED DENSITY IN ACCORDANCE WITH AS 1289 5.2.1 FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m<sup>3</sup> OF BASECOURSE MATERIAL PLACED.
- 9. ALL SUB-BASE COURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH R.M.S. FORM 3051, AND COMPACTED TO MINIMUM 95% MODIFIED DENSITY IN ACCORDANCE WITH A.S 1289 5.2.1 FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 100m³ OF SUB-BASE COURSE MATERIAL PLACED.
- 10. AS AN ALTERNATIVE TO THE USE OF IGNEOUS ROCK AS A SUB-BASE MATERIAL IN (9) A CERTIFIED RECYCLED CONCRETE MATERIAL COMPLYING WITH R.M.S. FORM 3051 WILL BE CONSIDERED. SUBJECT TO MATERIAL SAMPLES AND APPROPRIATE CERTIFICATIONS BEING PROVIDED TO THE SATISFACTION OF PENRITH CITY COUNCIL AND THE SUPERINTENDENT.
- 11. A HANDRAIL OR SAFETY BARRIER IS TO BE PROVIDED AT THE TOP OF ALL HEADWALLS AND RETAINING WALLS GREATER THAN 1m HIGH IN ACCORDANCE WITH THE LENDLEASE GMR'S.

# BULK EARTHWORKS NOTES

- 1. ORIGIN OF LEVELS: REFER SURVEY NOTES
- STRIP ALL TOPSOIL/ORGANIC MATERIAL FROM CONSTRUCTION AREA AND STOCK PILE AS DIRECTED BY SUPERINTENDENT FOR FUTURE REUSE.
- EXCAVATED MATERIAL TO BE USED AS STRUCTURAL FILL PROVIDED THE PLACEMENT MOISTURE CONTENT OF THE MATERIAL IS +/- 2% OF THE OPTIMUM MOISTURE CONTENT.
- 4. COMPACT FILL AREAS AND SUBGRADE TO NOT LESS THAN:

LOCATION	STANDARD DRY DENSITY (AS 1289 E 5.1.1.)
LINDER BLILLDING SLARS	

ON GROUND UNDER ROADS AND CARPARKS LANDSCAPED AREAS UNLESS NOTED OTHERWISE 98%

. FOR NON COHESIVE MATERIAL, COMPACT TO 75% DENSITY INDEX.

98%

- BEFORE PLACING FILL, PROOF ROLL EXPOSED SUBGRADE WITH AN 8 TONNE (MIN) DEADWEIGHT SMOOTH DRUM VIBRATORY ROLLER TO DETECT THEN REMOVE SOFT SPOTS (AREAS WITH MORE THAN 2mm MOVEMENT UNDER ROLLER).
- FREQUENCY OF COMPACTION TESTING SHALL BE NOT LESS THAN:-(A) 1 TEST PER 1,000m<sup>3</sup> OF FILL PLACED PER LAYER OF FILL.

(B) 3 TESTS PER VISIT

- (C) 1 TEST PER 1000m<sup>2</sup> OF EXPOSED SUBGRADE "LEVEL 1" TESTING SHALL BE TESTING IN ACCORDANCE WITH AS 3798 (1996).
- B. FILLING TO BE PLACED IN MAXIMUM 300mm LOOSE LAYERS AND COMPACTED AS SPECIFIED
- P. NO FILLING SHALL TAKE PLACE TO EXPOSED SUBGRADE UNTIL THE AREA HAS BEEN PROOF ROLLED IN THE PRESENCE OF A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER AND APPROVAL GIVEN IN WRITING THAT FILLING CAN PROCEED.

# **EROSION AND SEDIMENT CONTROL**

# NOTES

#### GENERAL INSTRUCTIONS

THE MINIMUM REQUIREMENT ONLY.

- THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONTROL O EROSION AND SEDIMENTATION TO THE SATISFACTION OF COUNCIL, NSW OFFICE OF WATER, SYDNEY WATER, THE OFFICE OF ENVIRONMENT AND HERITAGE, AND LENDLEASE'S REPRESENTATIVE. TO THIS END, THE EROSION AND SEDIMENTATION CONTROLS SHOWN ON THE DRAWINGS SHALL ONLY BE USED AS A GUIDE BY THE CONTRACTOR, AND REPRESEN
- THE CONTRACTOR SHALL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS DOCUMENTED OR AS OTHERWISE DIRECTED BY THE SUPERINTENDENT.
- ALL WORK SHALL BE GENERALLY CARRIED OUT IN ACCORDANCE WITH
- a. LOCAL AUTHORITY REQUIREMENTS ь. EPA REQUIREMENTS
- c. NSW DEPARTMENT OF HOUSING MANUAL "MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION", 4th EDITION, MARCH 2004.
- MAINTAIN THE EROSION CONTROL DEVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE LOCAL AUTHORITY.
- WHEN STORMWATER PITS ARE CONSTRUCTED, PREVENT SITE RUNOFF ENTERING UNLESS SEDIMENT FENCES ARE ERECTED AROUND PITS.
- CONTRACTOR IS TO ENSURE ALL EROSION & SEDIMENT CONTROL DEVICES ARE MAINTAINED IN GOOD WORKING ORDER AND OPERATE EFFECTIVELY. REPAIRS AND OR MAINTENANCE SHALL BE UNDERTAKEN AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.

#### AND DISTURBANCE

- WHERE PRACTICAL THE SOIL EROSION HAZARD ON THE SITE WILL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE
- a. INSTALL A SEDIMENT FENCE ALONG THE BOUNDARIES AS SHOWN ON PLAN. REFER DETAIL. b. CONSTRUCT STABILISED CONSTRUCTION ENTRANCE TO LOCATION AS
- DETERMINED BY SUPERINTENDENT/ENGINEER. REFER DETAIL. c. INSTALL SEDIMENT BASIN AS SHOWN ON PLAN (D) INSTALL SEDIMENT
- TRAPS AS SHOWN ON PLAN. d. UNDERTAKE SITE DEVELOPMENT WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS. WHERE POSSIBLE, PHASE DEVELOPMENT SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE

#### EROSION CONTROL

- DURING WINDY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL.
- FINAL SITE LANDSCAPING WILL BE UNDERTAKEN AS SOON AS IS PRACTICABLE AFTER THE COMPLETION OF CONSTRUCTION ACTIVITIES.

#### SEDIMENT CONTROL

- STOCKPILES WILL NOT BE LOCATED WITHIN 2 METRES OF HAZARD AREAS INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS. WHERE THEY ARE BETWEEN 2 AND 5 METRES FROM SUCH AREAS. SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION TO DOWNSLOPE WATERS, E.G. THROUGH INSTALLATION OF SEDIMENT FENCING.
- 10. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) WILL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
- 1. WATER WILL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, I.E. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.
- ?. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES WILL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED.
- 3. ACCEPTABLE RECEPTORS WILL BE PROVIDED FOR CONCRETE AND MORTAI SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER.
- 14. ANY EXISTING TREES WHICH FORM PART OF THE FINAL LANDSCAPING PLAN WILL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY: a. PROTECTING THEM WITH BARRIER FENCING OR SIMILAR MATERIALS
- INSTALLED OUTSIDE THE DRIP LINE b. ENSURING THAT NOTHING IS NAILED TO THEM

COMPACT THE SOIL AROUND THEM.

- c. PROHIBITING PAVING, GRADING, SEDIMENT WASH OR PLACING OF STOCKPILES WITHIN THE DRIP LINE EXCEPT UNDER THE FOLLOWING CONDITIONS.
- (I) ENCROACHMENT ONLY OCCURS ON ONE SIDE AND NO CLOSER TO THE TRUNK THAN EITHER 1.5 METRES OR HALF THE DISTANCE BETWEEN THE OUTER EDGE OF THE DRIP LINE AND THE TRUNK, WHICH EVER IS THE GREATER
- (II) A DRAINAGE SYSTEM THAT ALLOWS AIR AND WATER TO CIRCULATE THROUGH THE ROOT ZONE (E.G. A GRAVEL BED) IS PLACED UNDER ALI FILL LAYERS OF MORE THAN 300 MILLIMETRES DEPTH (III) CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY NOR TO

EPA AND COUNCIL REQUIREMENTS MUST BE ADHERED TO REGARDING LEVEL OF NOISE AND WORKING HOURS TO ENSURE THAT RESIDENTS AND OTHER APPLICABLE NEIGHBORS TO THE SITE ARE NOT DISTURBED UNREASONABLY THE GENERATION OF NOISE MUST BE MINIMISED.

DUST MUST BE MINIMISED TO ENSURE THERE IS NO HEALTH RISK OR LOSS OF AMENITY.

#### STAGING OF WORKS

STRIPPING WORKS ARE TO BE STAGED TO MINIMISE EXTENT OF EXPOSED AREA. WEATHER CONDITIONS TO BE ASSESSED PRIOR TO UNDERTAKING

#### STOCKPILE PROTECTION

SEDIMENT RETENTION STRUCTURES TO BE PLACED DOWNSLOPE OF ANY STOCKPILES. STOCKPILE IN PLACE > 28 DAYS TO BE TEMPORARILY

#### VEHICLE AND ROAD MANAGEMENT

SITE ACCESS TO BE RESTRICTED TO ALLOCATED TRUCK ROUTES. EXTERNAL ROADS TO BE SWEPT REGULARLY FOR DURATION OF WORKS.

# EXISTING UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES SHOWN IN THIS SET OF DRAWINGS HAVE BEEN PLOTTED FROM SURVEY INFORMATION AND SERVICE AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE. CARDNO CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN FROM ANY CAUSE WHATSOEVER.

CONTRACTORS SHALL TAKE DUE CARE WHEN EXCAVATING ONSITE INCLUDING HAND EXCAVATION WHERE NECESSARY. CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION WORKS. CONTRACTORS ARE TO UNDERTAKE A SERVICES SEARCH, PRIOR TO COMMENCEMENT OF WORKS ON SITE. SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES.

## STORMWATER DRAINAGE NOTES

- STORMWATER DESIGN CRITERIA: (A) AVERAGE RECURRENCE INTERVAL:
- 5 YEAR ARI PIPED DRAINAGE
- 100 YEAR ARI OVERLAND FLOW (B) RAINFALL INTENSITIES: TIME OF CONCENTRATION:
- 5 YEAR ARI= 126mm/hr 100 YEAR ARI= 219mm/hr

5 MINUTES

- PIPES 375 DIA. AND LARGER TO BE REINFORCED CONCRETE CLASS '2' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS. U.N.O.
- PIPES 300 DIA AND LESS SHALL BE DWV GRADE (CLASS SN8) uPVC WITH SOLVENT WELDED JOINTS.
- . EQUIVALENT STRENGTH FRC PIPES MIN CLASS 3 MAY BE USED SUBJECT TO PRIOR APPROVAL BY PENRITH CITY COUNCIL.
- ALL PIPES ARE TO BE UNIFORMLY SUPPORTED ALONG THE LENGTH OF THE BARREL BY SUITABLE FILL MATERIAL. REFER TO BEDDING SUPPORT TYPE.
- PIPES WITH SOCKETS SHALL BE LAID IN BEDDING WHERE SUITABLE RECESSES HAVE BEEN PROVIDED TO ENSURE PIPES DO NOT BEAR ON THEIR SOCKETS.
- PIPES TO BE INSTALLED TO TYPE HS1 SUPPORT IN ACCORDANCE WITH AS 3725 (2007) IN ALL CASES BACKFILL TRENCH WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1 (OR A DENSITY INDEX OF NOT LESS THAN 75).
- REFER TO AS/NZS 3725:2007 TABLE B1 FOR REQUIRED FILL DEPTHS ABOVE PIPE BARREL PRIOR TO USE OF COMPACTION MACHINERY OR TRAVERSING OF PIPES BY GENERAL SITE EQUIPMENT.
- WHERE WORKING METHODS REQUIRE HIGHER CLASS PIPE, THE CONTRACTOR SHALL REFER TO AS 3725 (2007) TO DETERMINE THE APPROPRIATE PIPE CLASS. PROPOSED PIPE CLASS SHALL BE REVIEWED BY CARDNO PRIOR TO INSTALLATION.
- 10. ALL INTERNAL WORKS WITHIN PROPERTY BOUNDARIES ARE TO COMPLY WITH THE REQUIREMENTS OF AS 3500.3 (2015).
- . THE USE OF PRECAST PITS IS ONLY PERMITTED WITH THE PRIOR APPROVAL OF PENRITH CITY COUNCIL.
- 12. ENLARGERS, CONNECTIONS AND JUNCTIONS TO BE PREFABRICATED FITTINGS WHERE PIPES ARE LESS THAN 300 DIA.
- 13. WHERE SUBSOIL DRAINS PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS, UNSLOTTED uPVC DWV SEWER GRADE PIPE IS TO BE
- 14. CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES SHOWN ARE NOT TO BE REDUCED WITHOUT APPROVAL.
- 15. GRATES AND COVERS SHALL CONFORM TO AS 3996. MINIMUM CLASS C. UNLESS NOTED OTHERWISE.
- 16. ALL BOX CULVERTS SHALL BE STRUCTURALLY DESIGNED BY THE MANUFACTURER AND DELIVERED TO SITE AS FIT FOR PURPOSE.

#### 17. AT ALL TIMES DURING CONSTRUCTION OF STORMWATER PITS, ADEQUATE SAFETY PROCEDURES SHALL BE TAKEN TO ENSURE AGAINST THE POSSIBILITY OF PERSONNEL FALLING DOWN PITS.

# STORMWATER DRAINAGE NOTES CONTINUED

18. ALL EXISTING STORMWATER DRAINAGE LINES AND PITS THAT ARE TO REMAIN ARE TO BE INSPECTED AND CLEANED. DURING THIS PROCESS ANY PART OF THE STORMWATER DRAINAGE SYSTEM THAT WARRANTS REPAIR SHALL BE REPORTED TO THE SUPERINTENDENT/ENGINEER FOR FURTHER DIRECTIONS.

# TELSTRA - DUTY OF CARE NOTE

TELSTRA'S PLANS SHOW ONLY THE PRESENCE OF CABLES AND PLANT THEY ONLY SHOW THEIR POSITION RELATIVE TO ROAD BOUNDARIES, PROPERTY FENCES ETC. AT THE TIME OF INSTALLATION AND TELSTRA DOES NOT WARRANT OR HOLD OUT THAT SUCH PLANS ARE ACCURATE THEREAFTER DUE TO CHANGES THAT MAY OCCUR OVER TIME. DO NOT ASSUME DEPTH OR ALIGNMENT OF CABLES OR PLANT AS THESE VARY SIGNIFICANTLY. THE CONTRACTOR HAS A DUTY OF CARE WHEN EXCAVATING NEAR TELSTRA CABLES AND PLANT. BEFORE USING MACHINE EXCAVATORS TELSTRA PLANT MUST FIRST BE PHYSICALLY EXPOSED BY SOFT DIG POTHOLING TO IDENTIFY IT'S LOCATION TELSTRA WILL SEEK COMPENSATION FOR DAMAGES CAUSED TO IT'S PROPERTY AND LOSSES CAUSED TO TELSTRA AND IT'S CUSTOMERS.

# SURVEY NOTES

THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN INVESTIGATED BY RPS GROUP PLC (FORMERLY WHELANS INSITES), BEING REGISTERED SURVEYORS, THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. CARDNO DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS. SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT CARDNO.

# ROOF WATER KERB OUTLETS

- KERB OUTLETS TO BE PROVIDED IN ACCORDANCE WITH PENRITH CITY COUNCILS CIVIL WORKS SPECIFICATION AT EACH LOT WHERE INTERALLOTMENT DRAINAGE IS NOT PROVIDED
- KERB OUTLETS ARE TO BE CONSTRUCTED AT THE SAME TIME KERBS ARE POURED.
- ALIGNMENT OF KERB OUTLET PIPE TO BE ADJUSTED ON SITE TO AVOID SERVICE CLASHES.

# STREET FURNITURE

- ALL LIGHT POLES, STREET NAMES AND BUS SHELTERS IN THIS SUBDIVISION WILL BE GALVANISED BLACK POWDER COATED TO THE SATISFACTION OF PENRITH CITY COUNCIL. FURTHER THAT THESE LIGHT POLES WILL COMPLY WITH COUNCIL'S SPECIFICATIONS.
- ALL LIGHT POLES ARE TO BE TYPE 'MACARTHUR'. REFER ELECTRICAL DESIGN DRAWINGS.

# CONCRETE NOTES

- 1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
- 2. CONCRETE QUALITY ALL REQUIREMENTS OF THE CURRENT ACSE CONCRETE SPECIFICATION DOCUMENT 1 SHALL APPLY TO THE FORMWORK, REINFORCEMENT AND

C	CONCRETE UNLESS NOTED OTHERWISE.							
	ELEMENT	AS 3600 F'c MPa	SPECIFIED	NOMINAL				
		AT 28 DAYS	SLUMP	AGG. SIZE				
	VEHICULAR BASE	32	60	20				
	KERBS AND PATHS	25	80	20				
	PITS, FOUNDATIONS &	40	80	20				
	CULVERT BASE SLABS							

- CEMENT TYPE SHALL BE (ACSE SPECIFICATION) TYPE SL - PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH
- 3. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN
- WRITING BY CARDNO . CLEAR CONCRETE COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE 40mm TOP AND 70mm FOR EXTERNAL EDGES UNLESS NOTED
- OTHERWISE. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT
- ALTERNATE INTERSECTIONS THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED AND CURED IN ACCORDANCE WITH R.T.A. SPECIFICATION R83.

# PROPOSED WORKS LEGEND

EXISTING CONTOURS

SITE BOUNDARY

PROPOSED SEWER

BATTER SLOPE

EXTENT OF WORKS

TREES TO BE REMOVED AS PART OF

BULK EARTHWORKS PACKAGE.

TREES TO BE RETAINED

**BATTERS** 

LOT NUMBERS

KERB & GUTTER

STANDARD DETAIL

VEHICULAR CROSSING

STANDARD DETAIL.

STORMWATER PIPELINE

CONCRETE HEADWALL

DRAINAGE LINE No.

DRAINAGE PIT No.

DRAINAGE CAP

STORMWATER DRAINAGE PITS

EXISTING WATER COURSES AS

PER 1:10000 TOPOGRAPHIC MAPS

SCOUR PROTECTION

PRAM RAMP

DETAIL.

REFER PENRITH CITY COUNCIL

REFER PENRITH CITY COUNCIL FOR

MEDIAN KERB

REFER PENRITH CITY COUNCIL

REFER DRAWING 1601 FOR DETAILS

—··−100.0·—··— PROPOSED CONTOURS

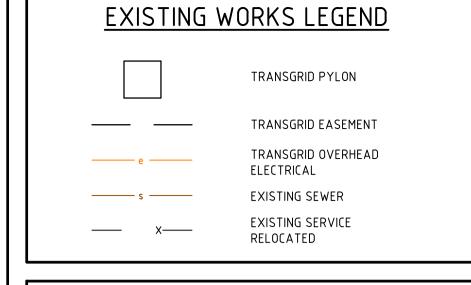
**PROPOSED** 

—··—100.0·—··—

K&G

MDK

4\2



# REINFORCEMENT NOTES

- REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY. IT IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.
- SPLICES IN THE REINFORCEMENT SHALL BE MADE ONLY IN THE POSITIONS SHOWN. THE WRITTEN APPROVAL OF THE ENGINEER SHALL BE OBTAINED FOR ANY OTHER SPLICES. WHERE THE LAP LENGTH IS NOT SHOWN IT SHALL BE SUFFICIENT TO DEVELOP THE FULL STRENGTH OF
- WELDING OF REINFORCEMENT WILL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED IN WRITING BY THE
- ENGINEER. REINFORCEMENT SYMBOLS -

NOMINAL BAR SIZE IN mm

THE REINFORCEMENT.

- N DENOTES GRADE 400N TEMPCORE DEFORMED BARS TO AS 1302 R - DENOTES GRADE 250R HOT ROLLED PLAIN BARS TO AS 1302 SL - DENOTES HARD-DRAWN WIRE REINFORCING FABRIC TO AS 1304
- W DENOTES HARD-DRAWN PLAIN WIRE TO AS 1303 REINFORCEMENT COGS AND EXTENSIONS TO BE IN ACCORDANCE WITH



SPACING IN mm

THE FIGURES FOLLOWING THE FABRICS SYMBOL 'SL' IS THE REFERENCE NUMBER FOR FABRIC TO AS 1304. ALL REINFORCEMENT FABRIC SHALL COMPLY WITH AS1303 AND AS1304 AND SHALL BE SUPPLIED AS FLAT SHEETS.



- FABRIC SHALL BE LAPPED 2 TRANSVERSE WIRES PLUS 50mm. BUNDLED BARS SHALL BE TIED TOGETHER AT 30 BAR DIAMETER CENTRES WITH 3 WRAPS OF WIRE. PLACE SUFFICIENT BAR CHAIRS UNDER BOTTOM REINFORCING RODS AND TOP CROSSRODS IN SLABS TO ALLOW THEM TO BE SUPPORTED
- IN THEIR CORRECT POSITIONS DURING CONCRETING (NOT GREATER THAN 900mm CENTRES BOTH WAYS) REINFORCEMENT LAYERS DENOTED THUS UNO TT - DENOTES TOP BARS LAID LAST IN TOP T - DENOTES TOP BARS LAID FIRST IN TOP

B - DENOTES BOTTOM BARS LAID SECOND IN BOTTOM

- BB DENOTES BOTTOM BARS LAID FIRST IN BOTTOM WHERE TRANSVERSE TIE BARS ARE NOT SHOWN PROVIDE N12-300 SPLICED WHERE NECESSARY AND LAP WITH MAIN BARS 450mm
- UNLESS NOTED OTHERWISE. MINIMUM LAP LENGTHS UNLESS NOTED OTHERWISE SHALL BE -500 FOR N12 BARS
- 600 FOR N16 BARS
- 900 FOR N20 BARS 1000 FOR N24 BARS 1200 FOR N28 BARS
- 1500 FOR N32 BARS 1800 FOR N36 BARS

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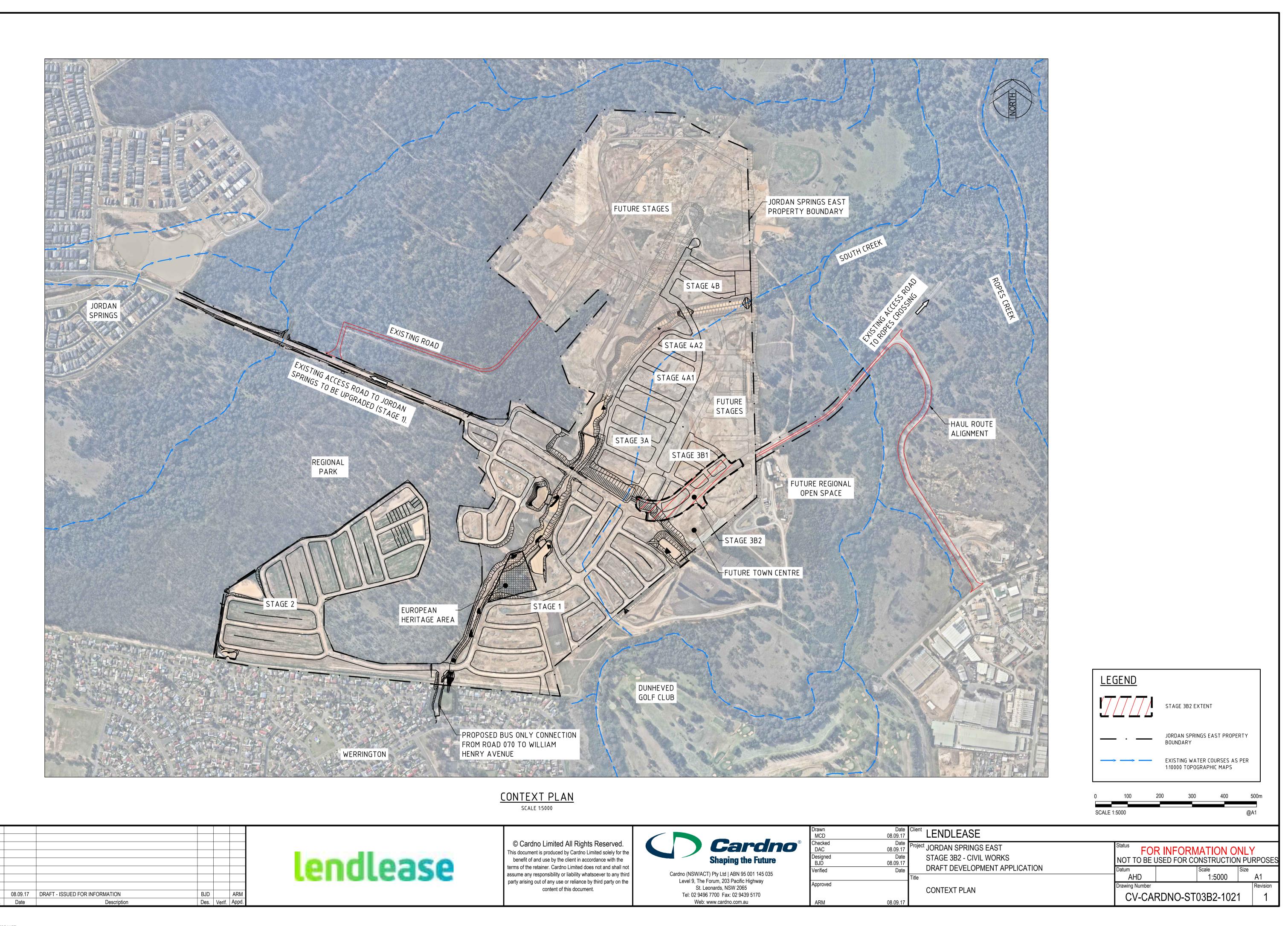
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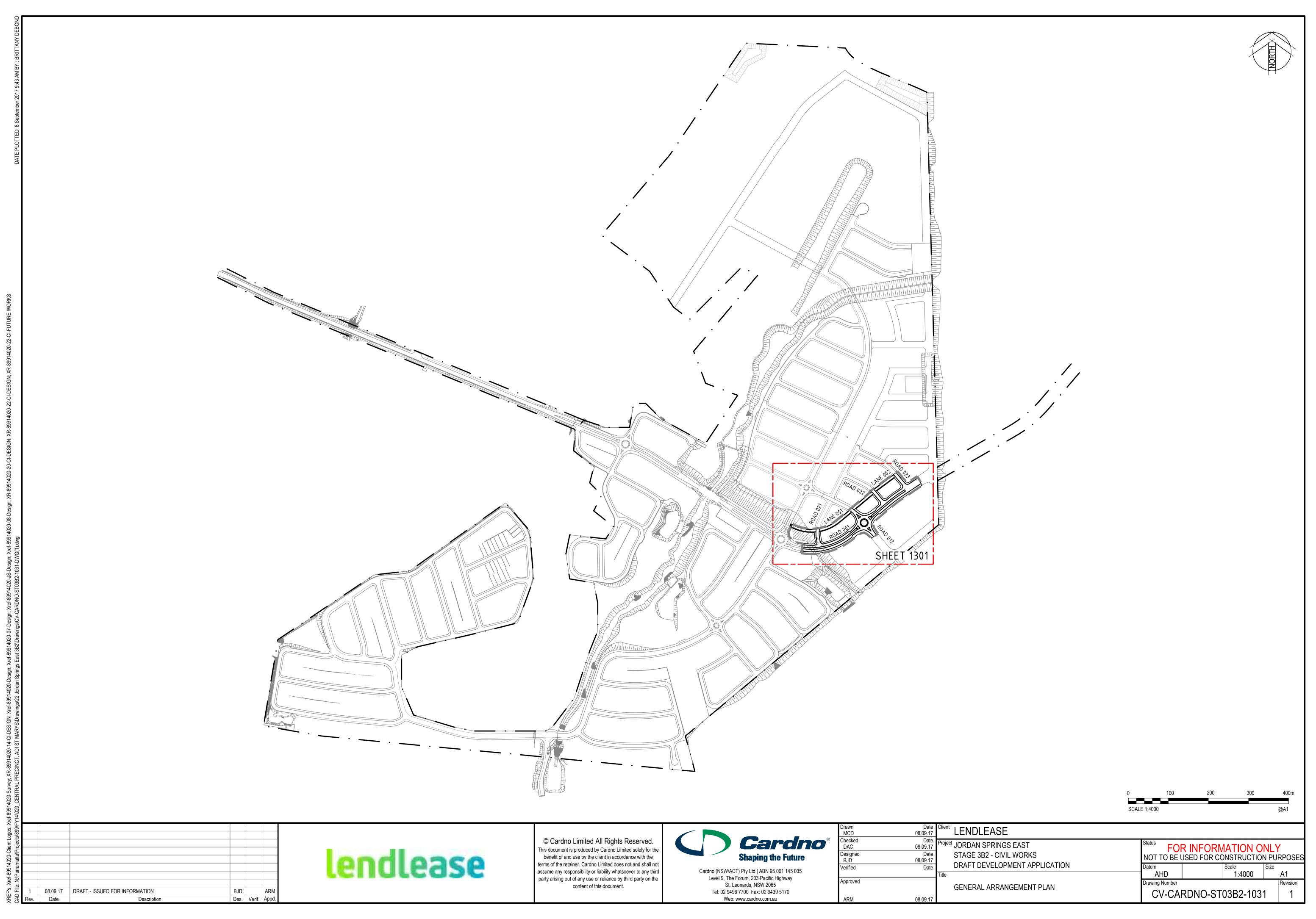


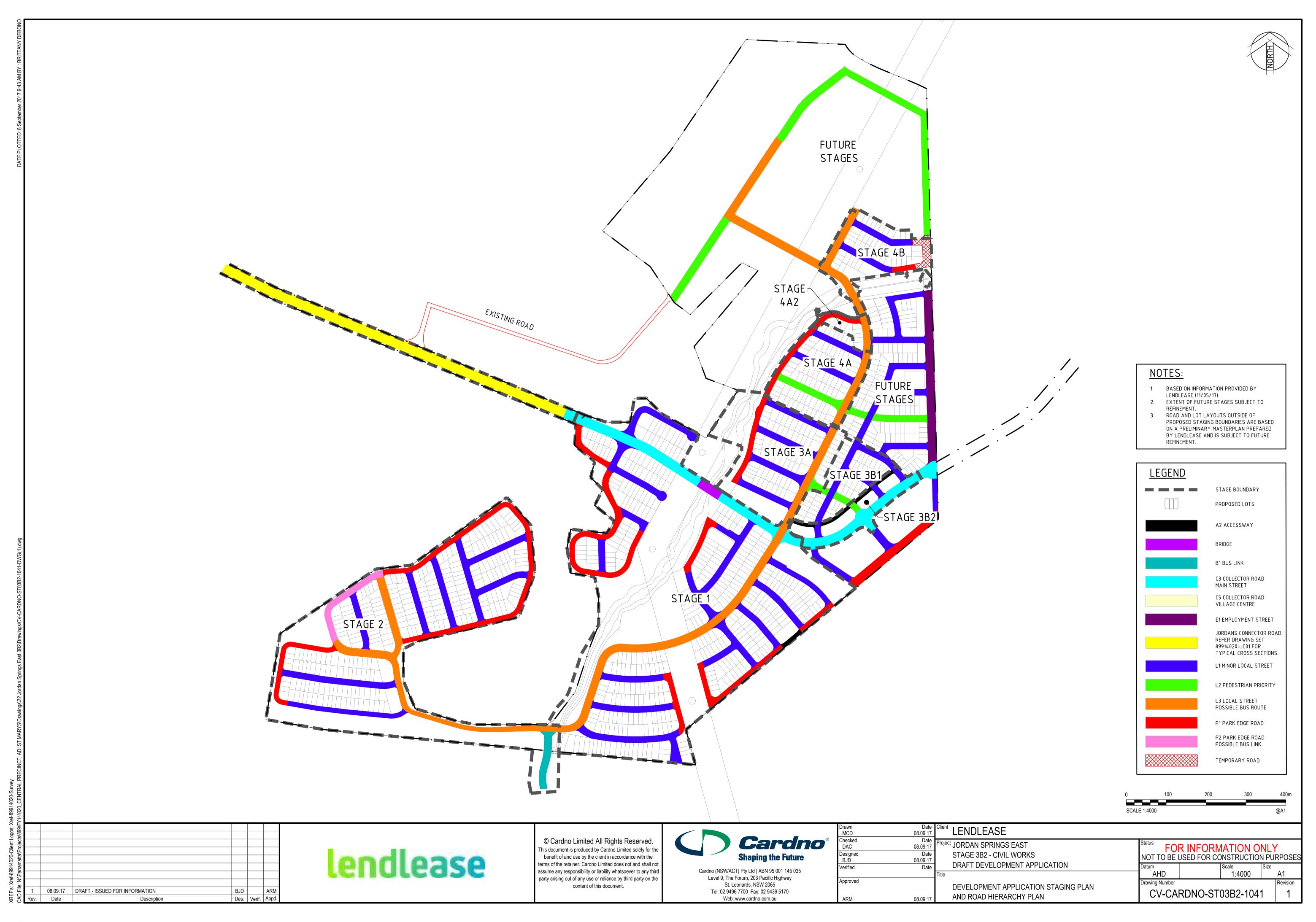
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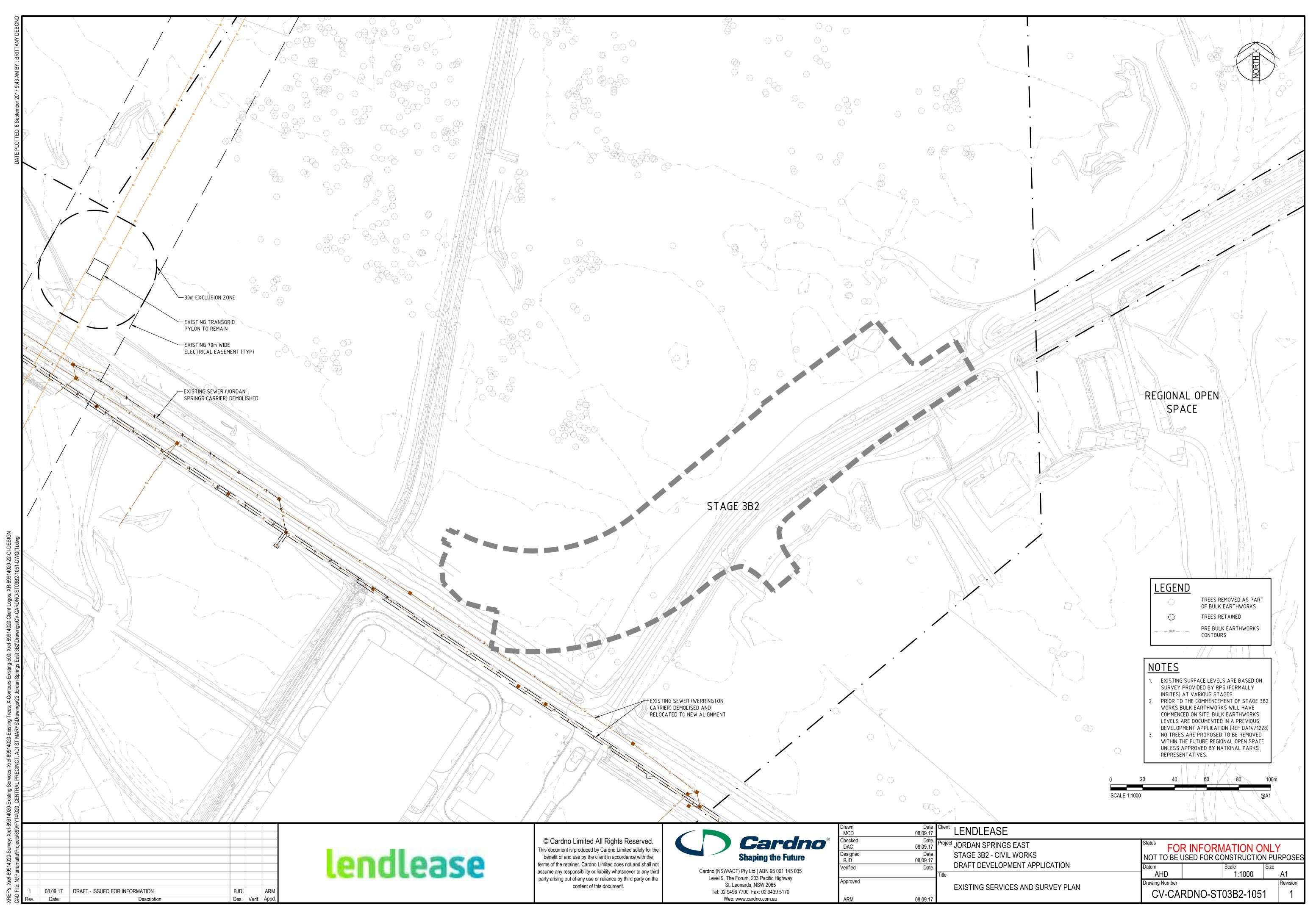
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Checked DAC	Date 08.09.17	Project JORDAN SPRINGS EAST	Status	R INFORMATION ON	ΙΥ
Designed BJD	Date 08.09.17	STAGE 3B2 - CIVIL WORKS		ISED FOR CONSTRUCTION	
Verified	Date -	DRAFT DEVELOPMENT APPLICATION  Title	Datum AHD	Scale	ize A1
Approved		GENERAL NOTES & LEGENDS	Drawing Number		Revision
ARM	08.09.17	OLIVELIA INO 120 & LEGENDO	CV-CAF	RDNO-ST03B2-1011	1

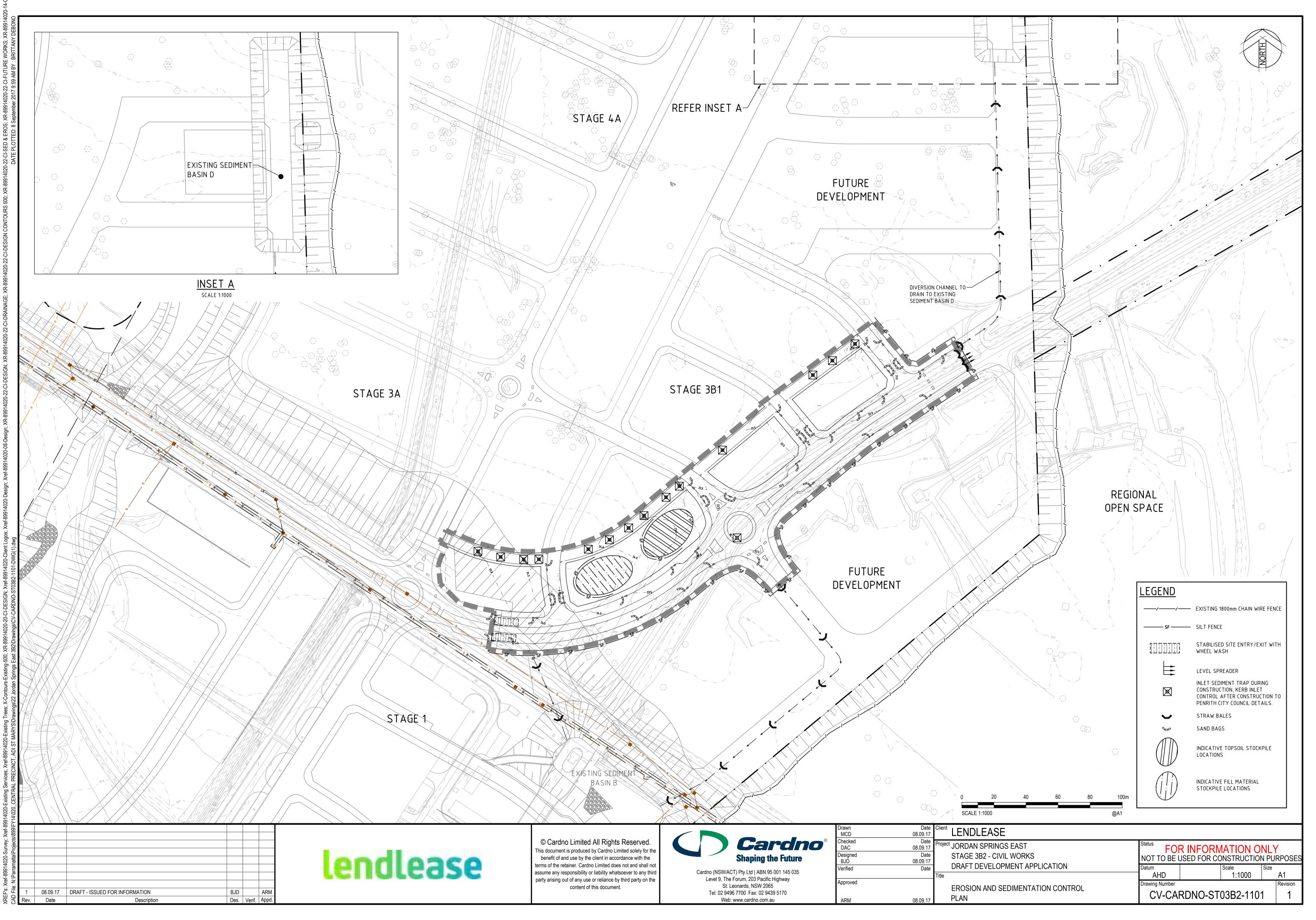


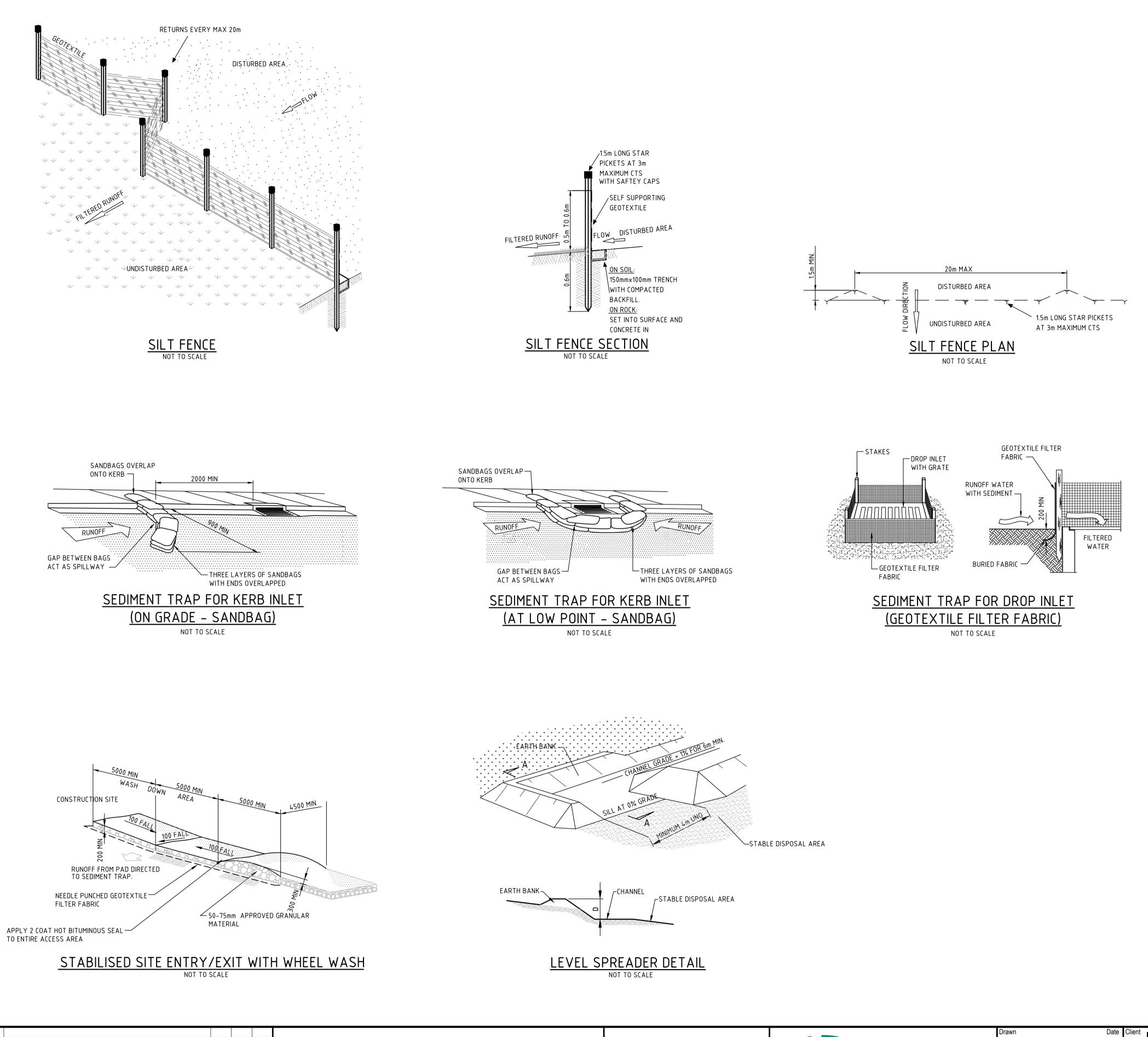
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Date 08.09.17 Client LENDLEASE **Cardno**® roject JORDAN SPRINGS EAST FOR INFORMATION ONLY 08.09.17 Date 08.09.17 STAGE 3B2 - CIVIL WORKS **Shaping the Future** NOT TO BE USED FOR CONSTRUCTION PURPOSES DRAFT DEVELOPMENT APPLICATION Verified Date Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035 AHD AS SHOWN A1 Level 9, The Forum, 203 Pacific Highway Approved Drawing Number St. Leonards, NSW 2065 EROSION AND SEDIMENTATION CONTROL Tel: 02 9496 7700 Fax: 02 9439 5170 CV-CARDNO-ST03B2-1131 **DETAILS** Web: www.cardno.com.au 08.09.17

STAPLES ON TOP EDGE —

SEDIMENT FENCE

(GEOTEXTILE FILTER FABRIC & STRAW BALE)

NOT TO SCALE

ALLOW SUFFICIENT

SPILLWAY CAPACITY

TO HOLD CLOTH

1.2m STAR PICKET DRIVEN — 0.6m INTO THE GROUND

☐GRAVEL (OPTIONAL)

DRAINAGE AREA 0.8ha MAX

SPILLWAY AT LEAST 0.15m BELOW SIDES

<u>CHECK DAM – STRAW BALE</u>

HEIGHT 0.6M MAX

DISTURBED

AREA

ANGLE FIRST STAKE TOWARDS

NYLON OR WIRE BINDINGS

UNDISTURBED

AREA

PREVIOUSLY LAID STRAW BALE



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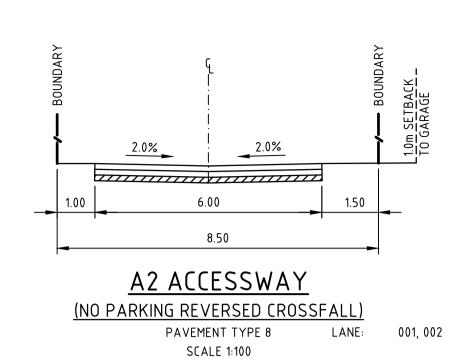
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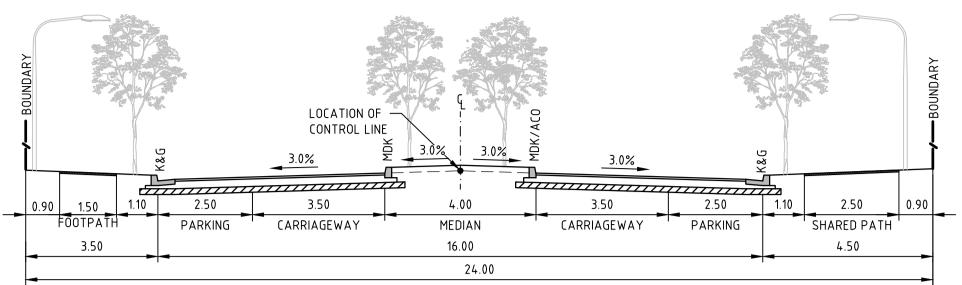
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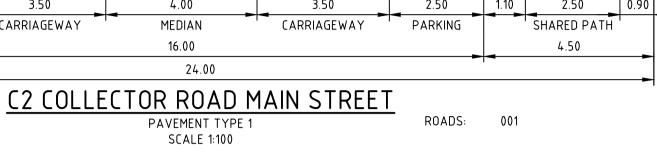
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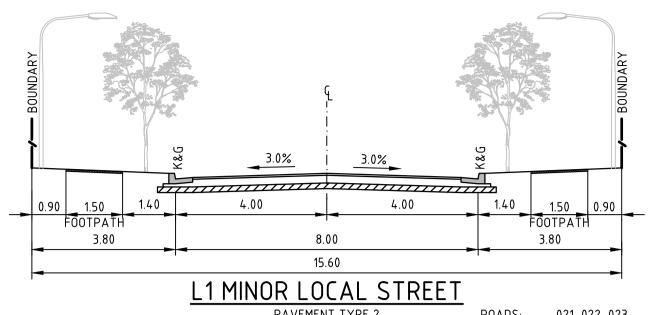
BJD

Des. Verif. Appd.









PAVEMENT TYPE 2

PAVEMENT TYPE 2 SCALE 1:100 ROADS: 021, 022, 023

50mm AC10 WEARING COURSE

(2x25mm AC10) - FINAL 25mm LAYER

TO BE CONSTRUCTED BY COUNCIL

7mm SINGLE COAT FLUSH SEAL

TO MINIMUM MODIFIED DENSITY

RATIO OF 98%

OF 95%

BASE COURSE DGB20 COMPACTED

SUB BASE DGS40 COMPACTED TO

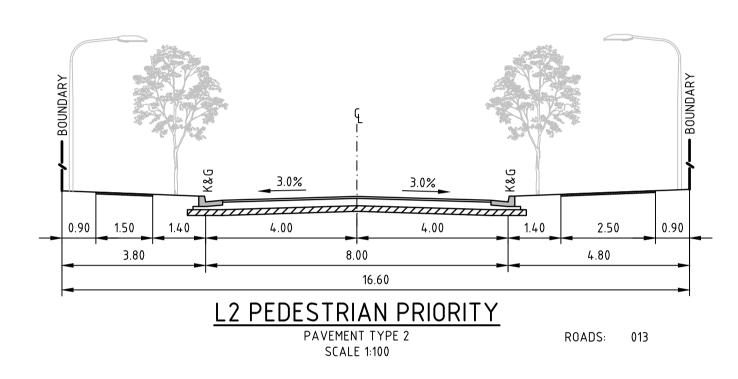
MINIMUM MODIFIED DENSITY RATIO

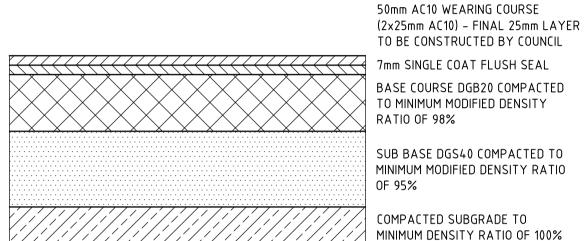
MINIMUM DENSITY RATIO OF 100%

ASSUMED CBR: REFER TABLE BELOW

COMPACTED SUBGRADE TO

ASSUMED ESA: 5x10<sup>4</sup>





PAVEMENT 1 DESIGN DESIGN SUBGRADE CBR 3% CBR 5% WEARING SURFACE 50mm AC10 50mm AC10

7mm

150mm

410mm

610mm

7mm

150mm

490mm

-4----- SL92 MESH (50mm TOP COVER)

PAVEMENT TYPE 1

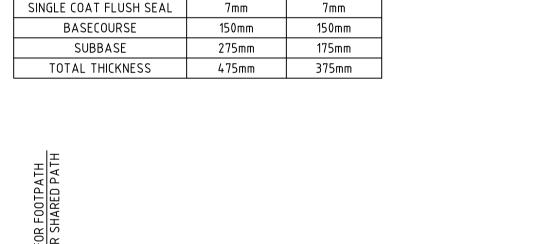
SINGLE COAT FLUSH SEAL

BASECOURSE

TOTAL THICKNESS

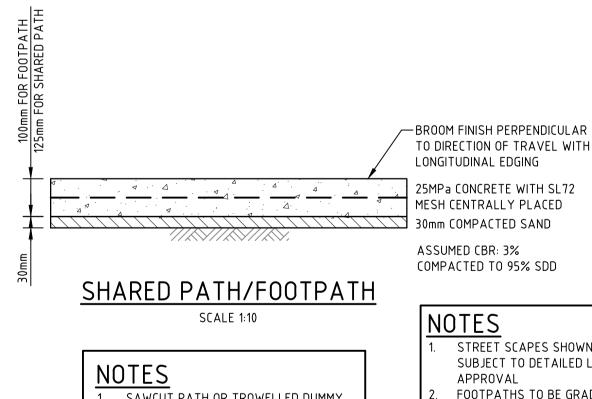
×	NATIO DI 2020
	SUB BASE DGS40 COMPACTED TO MINIMUM MODIFIED DENSITY RATIO OF 95%
	COMPACTED SUBGRADE TO MINIMUM DENSITY RATIO OF 100%
	ASSUMED CBR: REFER BELOW TABLE ASSUMED ESA: 2×10 <sup>6</sup>

PAVEMENT 2 DESIGN					
DESIGN SUBGRADE	CBR 3%	СВ			
WEARING SURFACE	50mm AC10	50m			
SINGLE COAT FLUSH SEAL	7mm				
BASECOURSE	150mm	15			
SUBBASE	275mm	1			
TOTAL THICKNESS	475mm	3			

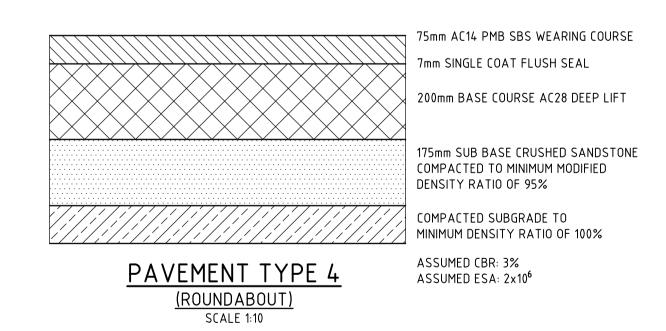


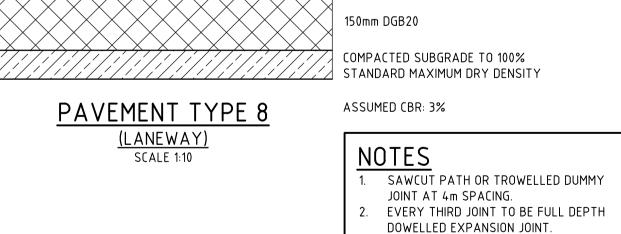
CBR 5%

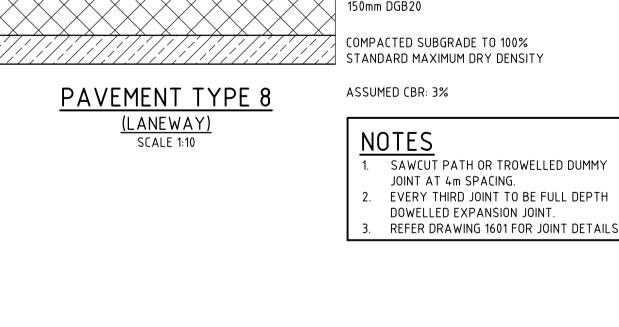
50mm AC10

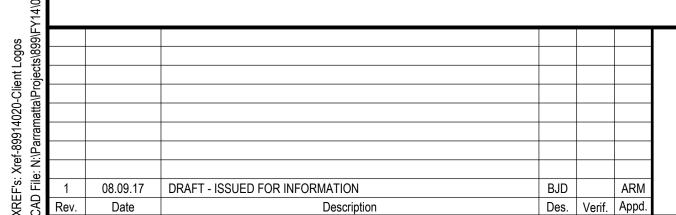


DTES  SAWCUT PATH OR TROWELLED DUMMY JOINT AT 2m SPACING. EVERY THIRD JOINT TO BE FULL DEPTH DOWELLED EXPANSION JOINT. REFER DRAWING 1601 FOR JOINT DETAILS.  1. STREET SCAPES SHOWN ARE INDICATIVE SUBJECT TO DETAILED LANDSCAPING DEAPPROVAL 2. FOOTPATHS TO BE GRADED AT MAXIMU REMAINING VERGE AREAS TO BE GRADED AT MAXIMU REMAINING VERGE		
4. REFER DRAWING 1701 FOR PAVEMENT P	ESIGN AND M 2.5%. D TO OP OF KER RED PATH HE SITE	
0 0.2 0.4 0.6	0.8	
SCALE 1:10	(	@
0 1 2 4 6	8	

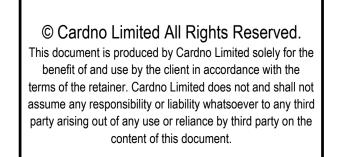








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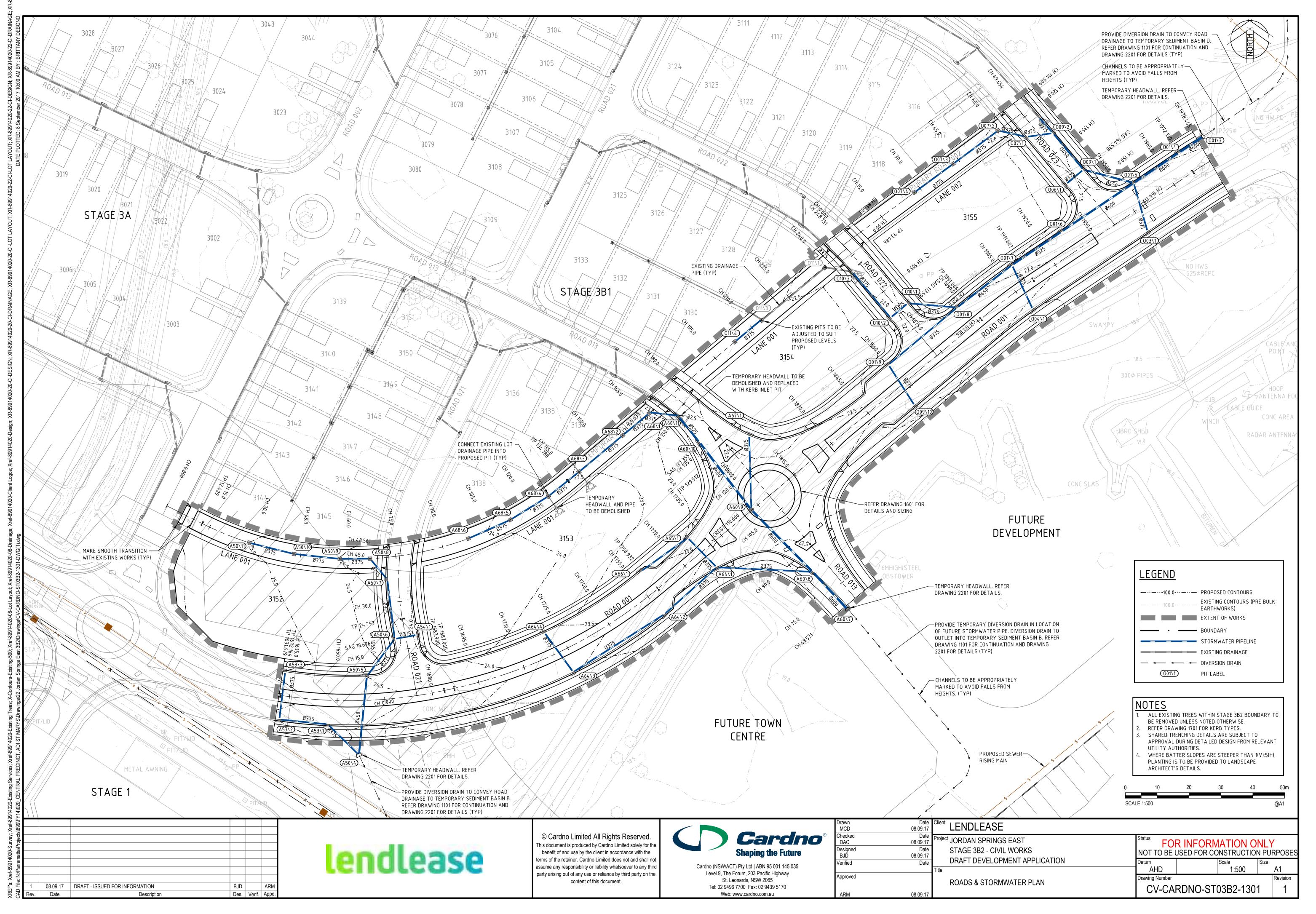


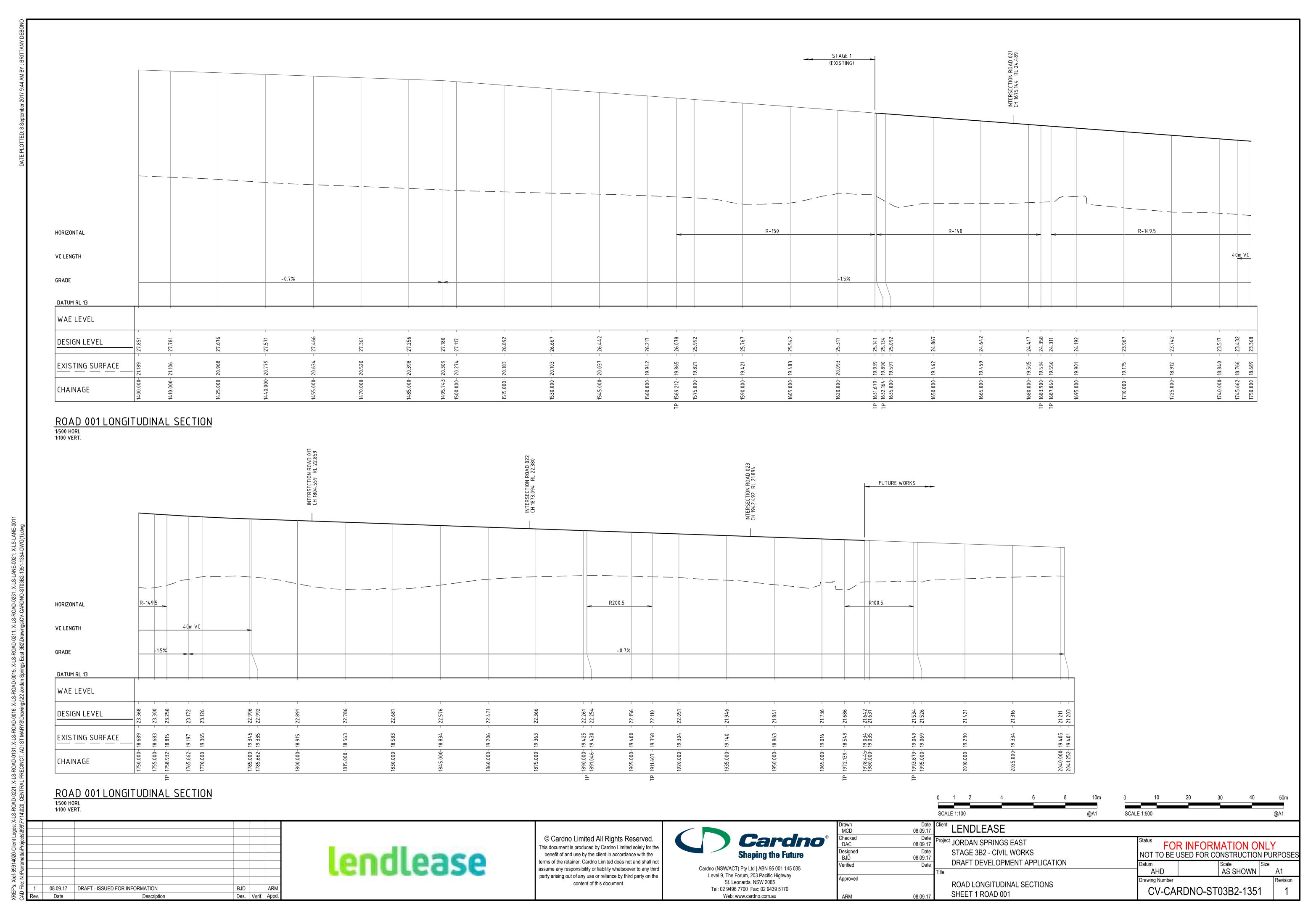


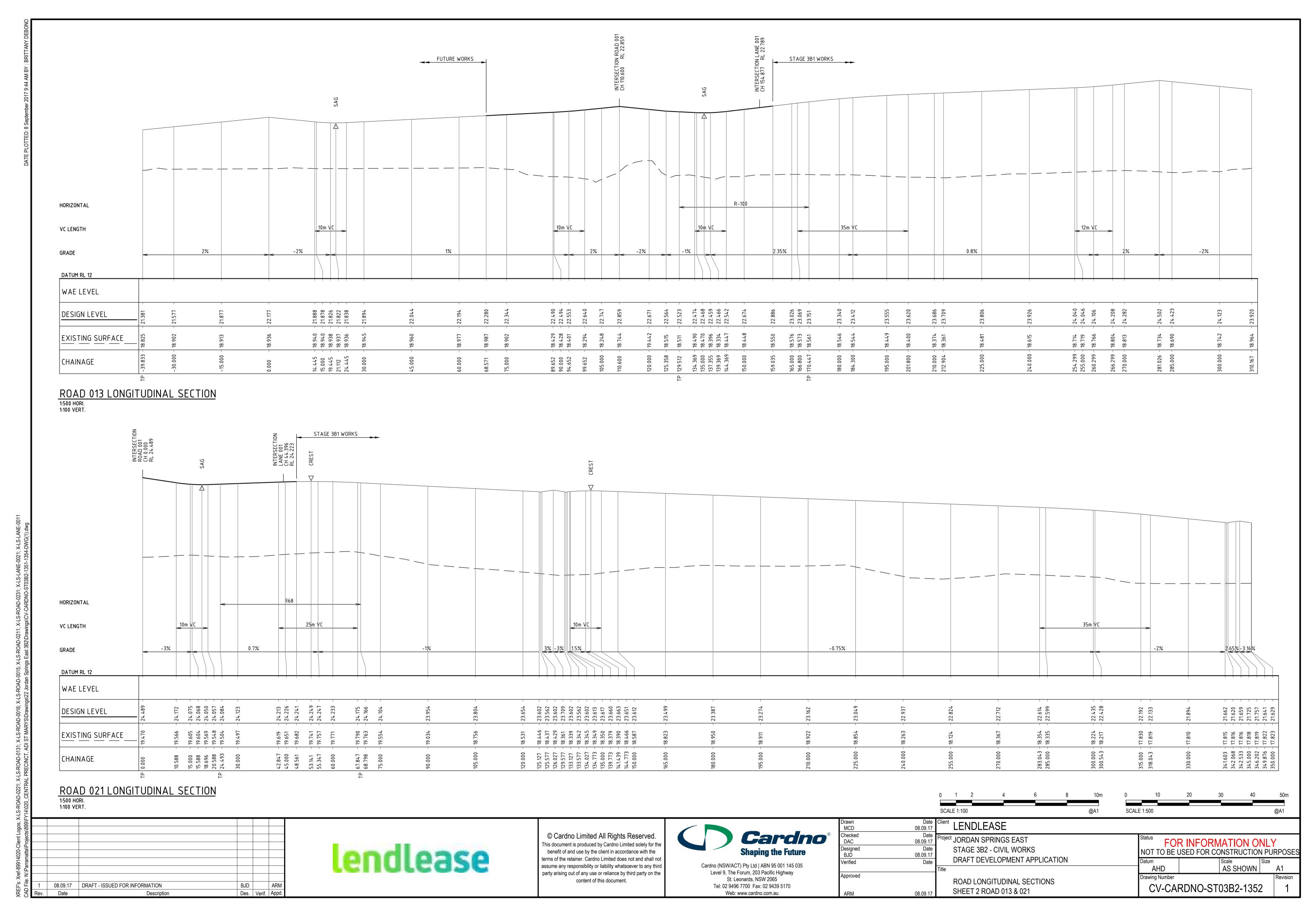
170mm 40MPa CONCRETE

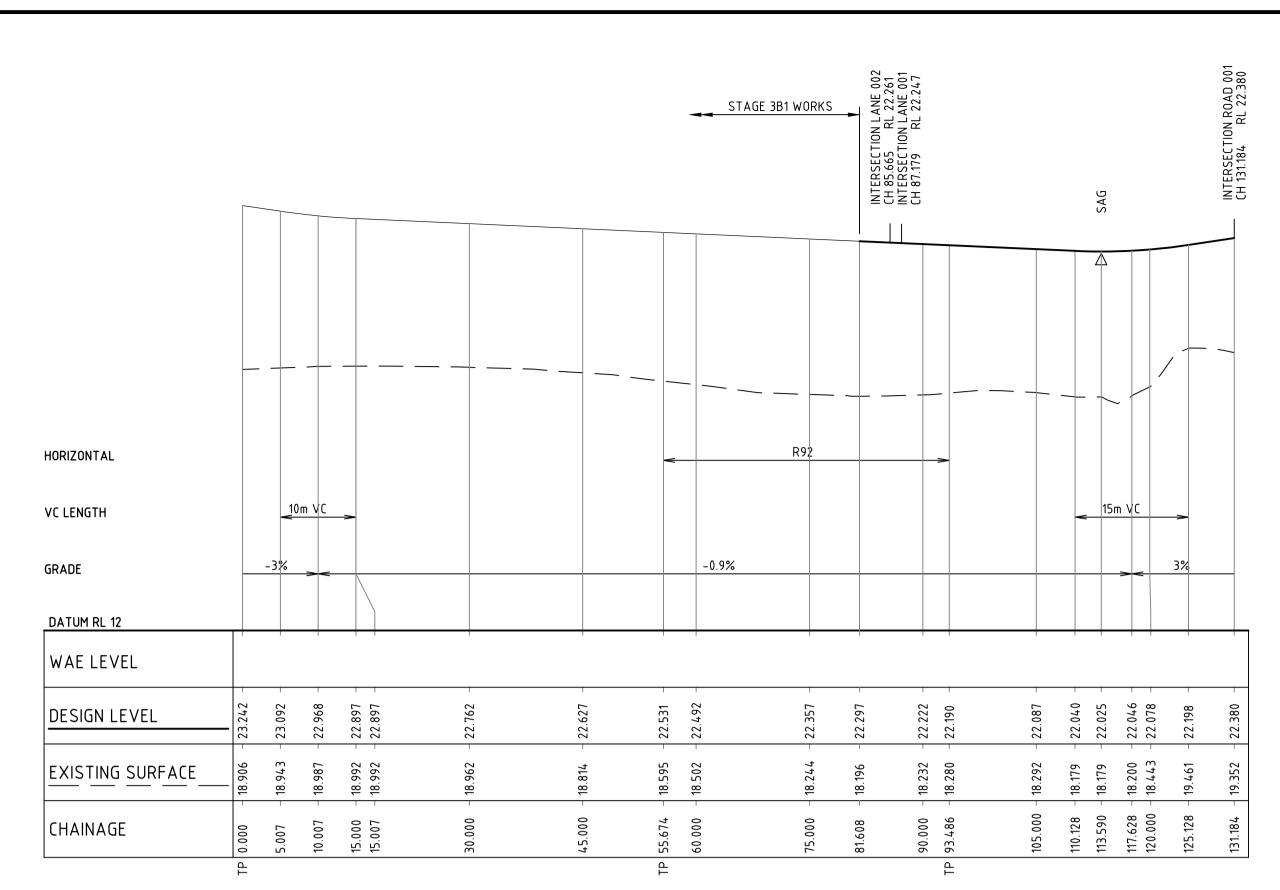
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Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au

				SCALE 1:100			@A1	
0		Date 08.09.17	Client LENDLEASE					
R)	Checked DAC 0	Date 08.09.17	Project JORDAN SPRINGS EAST	Status	R INFORM	ATION ONL	Υ	
	Designed BJD 0	Date 08.09.17	STAGE 3B2 - CIVIL WORKS		NOT TO BE USED FOR CONSTRUCTION PU			
	Verified	Date	DRAFT DEVELOPMENT APPLICATION  Title	Datum AHD		Scale Size AS SHOWN	• A1	
Ì	Approved		TYPICAL ROAD CROSS SECTIONS	Drawing Number		710 0110 7717	Revision	
	ARM 0	08.09.17	TIFICAL ROAD CROSS SECTIONS	CV-CARDNO-ST03B2-1251			1	



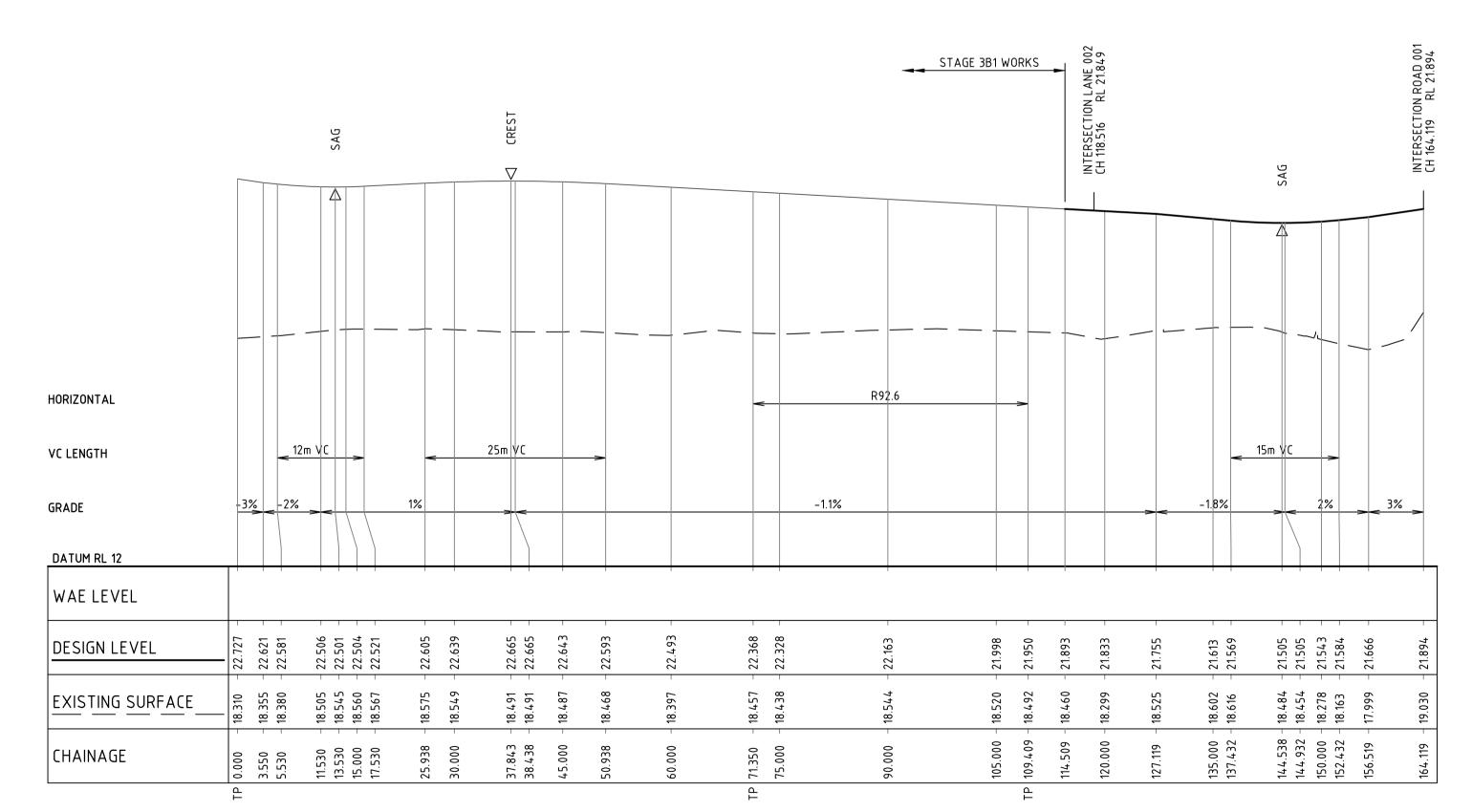






ROAD 022 LONGITUDINAL SECTION

1:500 HORI. 1:100 VERT.



# ROAD 023 LONGITUDINAL SECTION

1:500 HORI. 1:100 VERT.

1	08.09.17	DRAFT - ISSUED FOR INFORMATION	BJD		ARM
Rev	Date	Description	Des	\/erif	Appd.

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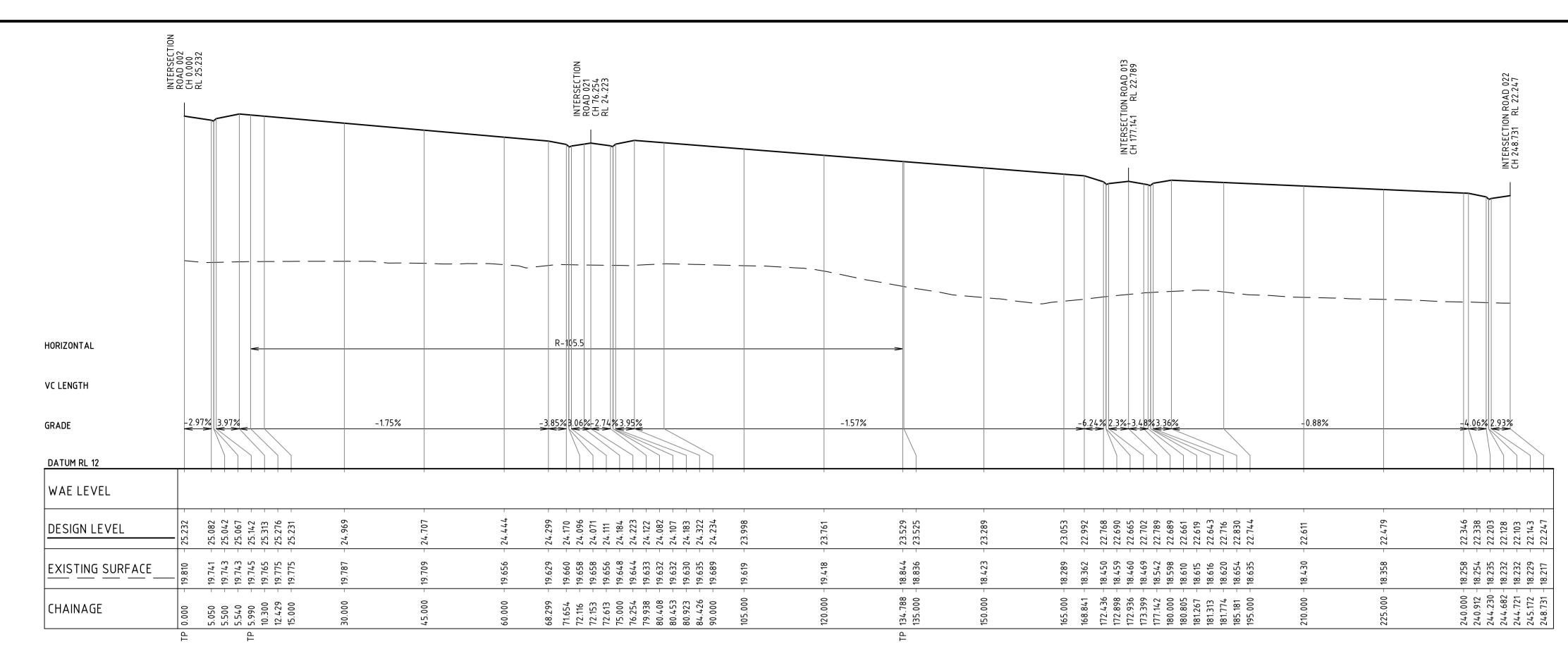
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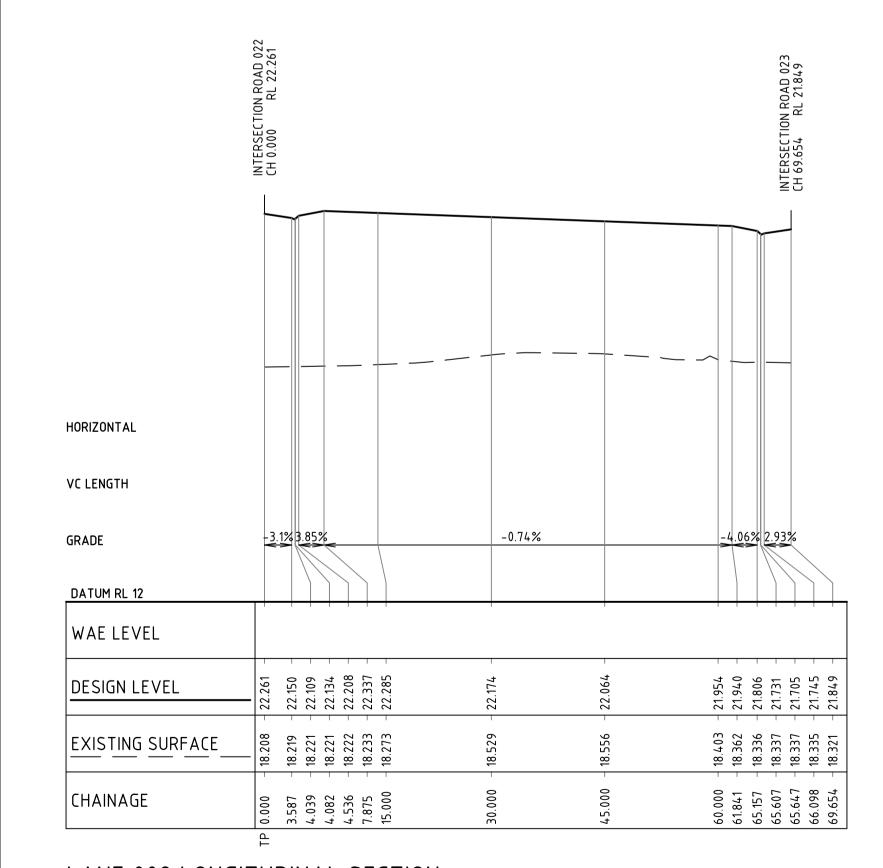
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Checked DAC Designed BJD	Date 08.09.17 Date 08.09.17	Project JORDAN SPRINGS EAST STAGE 3B2 - CIVIL WORKS			R INFORMATION ONL USED FOR CONSTRUCTION P	
Verified	Date	DRAFT DEVELOPMENT APPLICATI	ON	Datum	Scale Size	
Approved		ROAD LONGITUDINAL SECTIONS		AHD Drawing Number	AS SHOWN	A1 Revision
ARM	08.09.17	SHEET 3 ROAD 022 & 023		CV-CAF	RDNO-ST03B2-1353	1

Document Set ID: 7854157 Version: 1, Version Date: 26/09/2017



LANE 001 LONGITUDINAL SECTION 1:500 HORI.

1:100 VERT.



LANE 002 LONGITUDINAL SECTION

1:500 HORI. 1:100 VERT.

1	08.09.17	DRAFT - ISSUED FOR INFORMATION	BJD		ARM
Rev.	Date	Description	Des.	Verif	Appd.

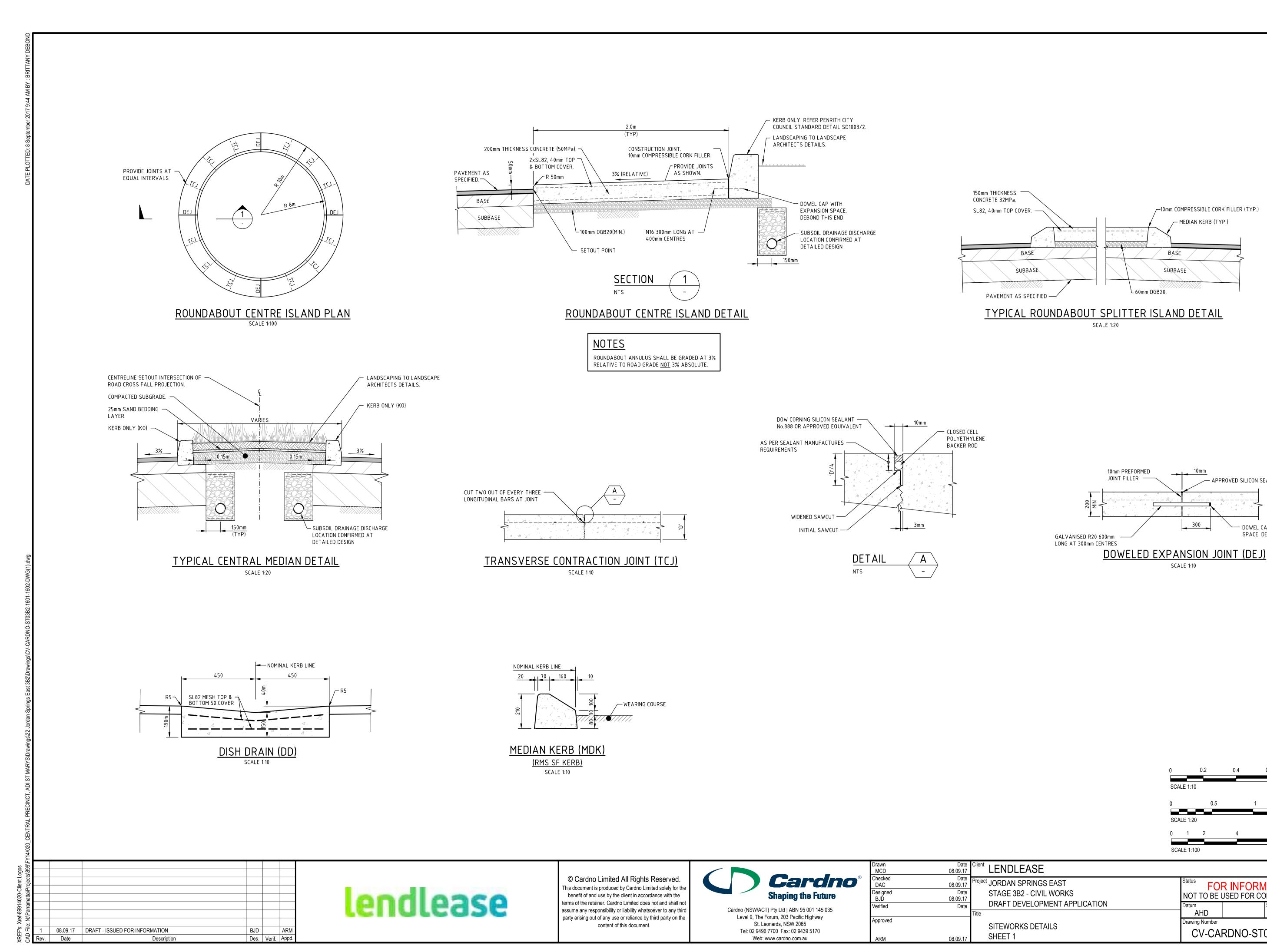
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Checked DAC	Date 08.09.17	Project JORDAN SPRINGS EAST	Status FOR INFOR	RMATION ONLY
Designed BJD	Date 08.09.17	STAGE 3B2 - CIVIL WORKS		CONSTRUCTION PURPOSE
Verified	Date	DRAFT DEVELOPMENT APPLICATION  Title	Datum AHD	Scale Size A1
Approved		ROAD LONGITUDINAL SECTIONS	Drawing Number	Revision
ARM	08.09.17	SHEET 4 LANE 001 & 002	CV-CARDNO-S	ST03B2-1354   1



- MEDIAN KERB (TYP.)

— APPROVED SILICON SEALANT

DOWEL CAP WITH EXPANSION

FOR INFORMATION ONLY

AS SHOWN A1

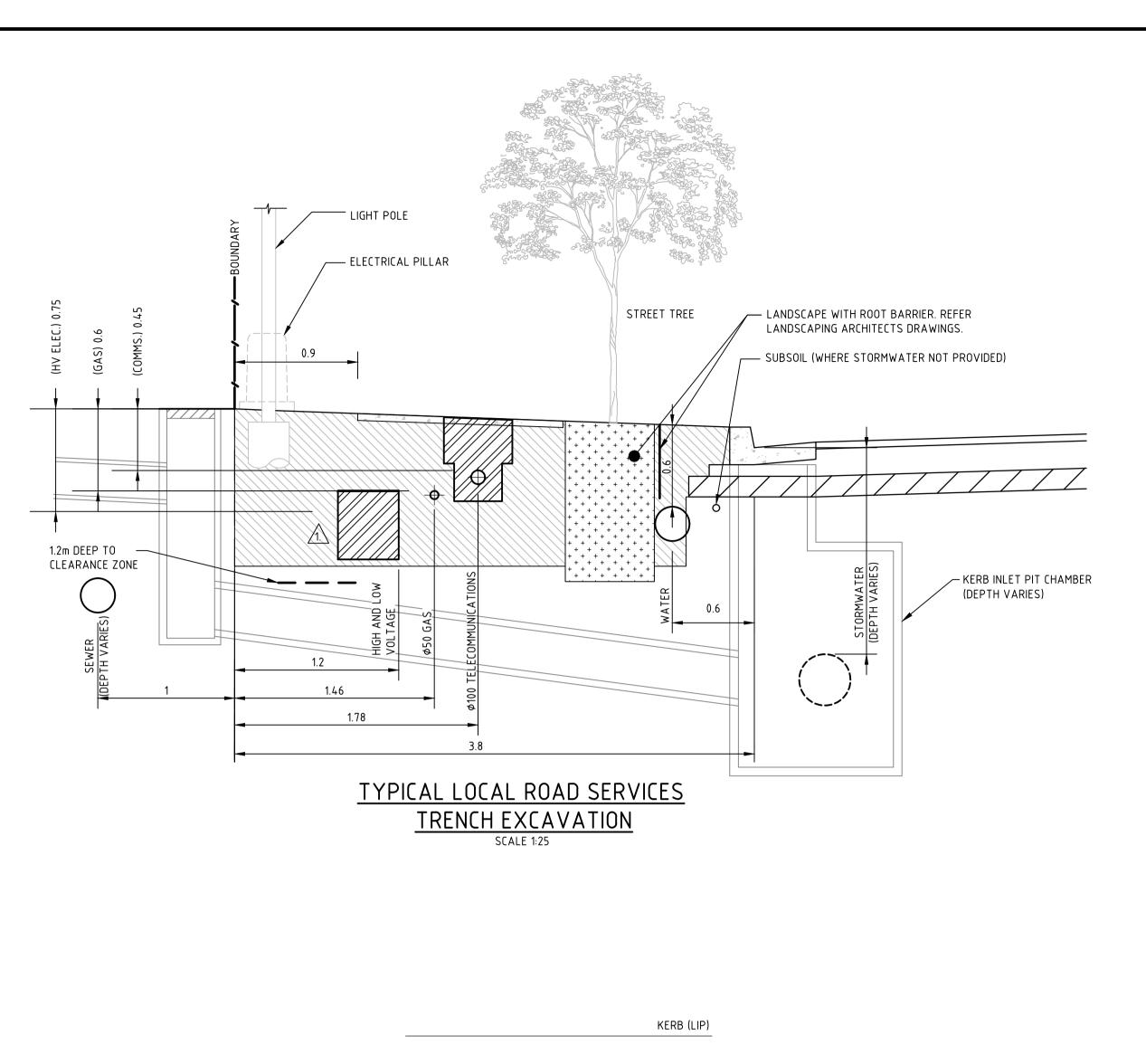
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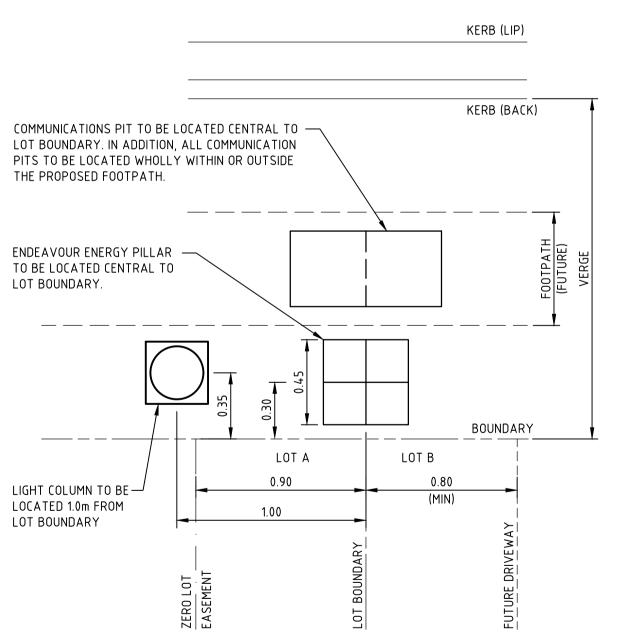
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AHD

Drawing Number

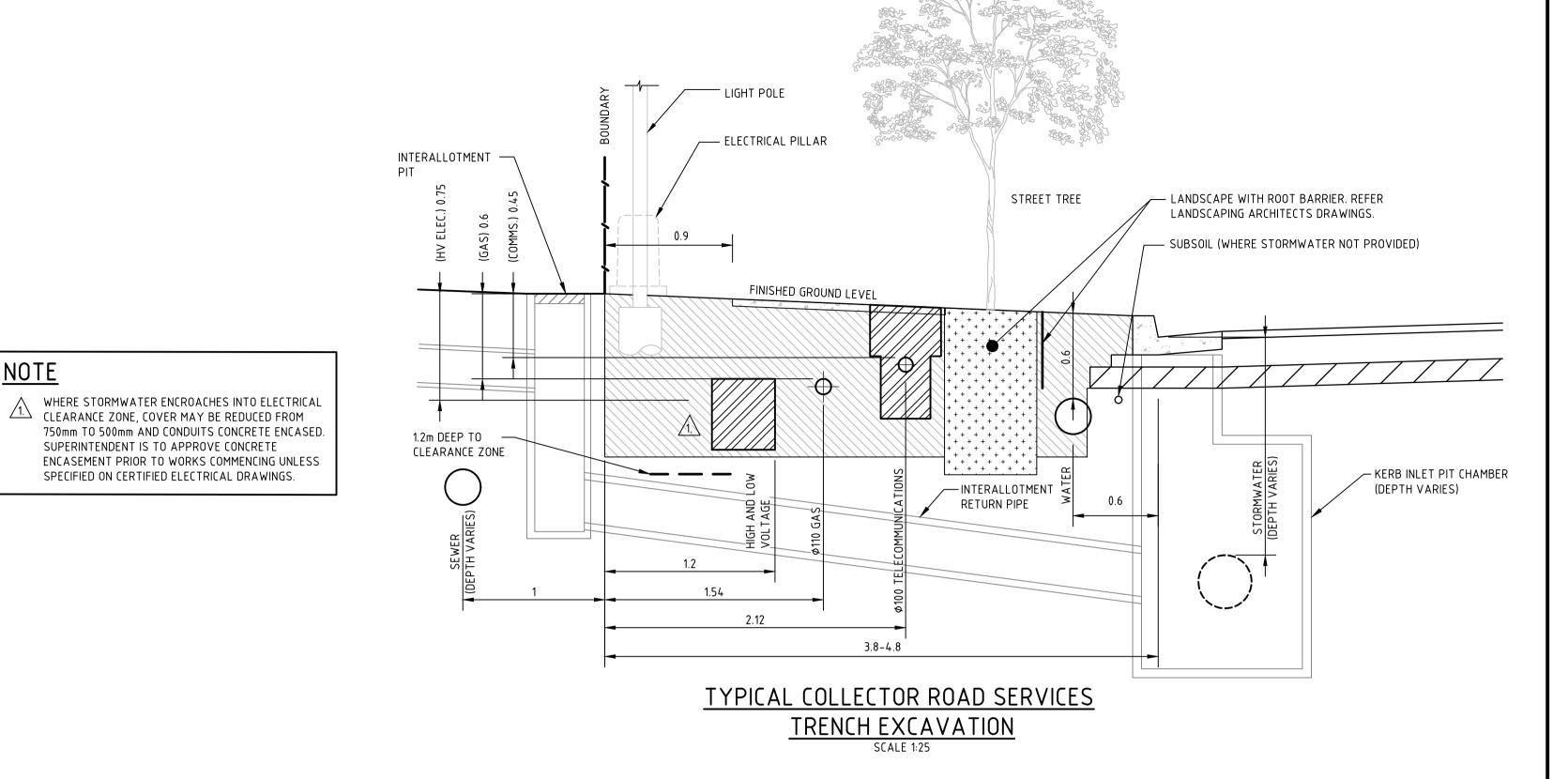
SPACE. DEBOND THIS END

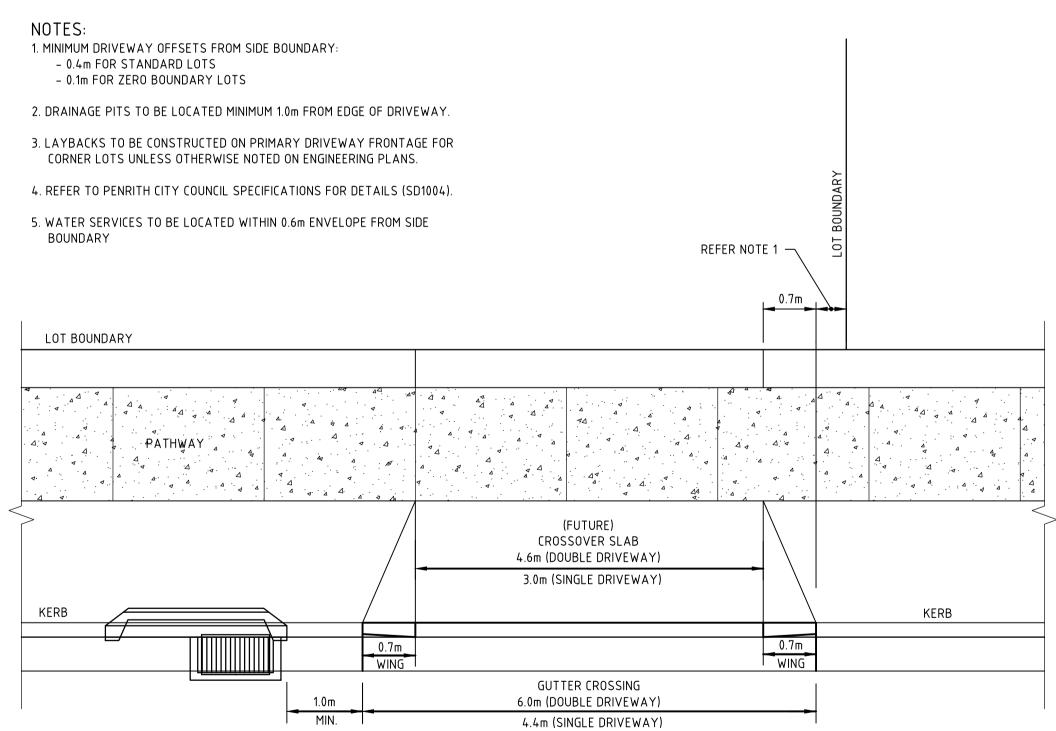




TYPICAL SURFACE UTILITY LAYOUT

(LIGHT COLUMN <u>AND</u> ELECTRICAL PILLAR)





TYPICAL VEHICULAR CROSSING LOCATION DETAIL (VC)



DRAFT - ISSUED FOR INFORMATION BJD 08.09.17 Date Description Des. Verif. Appd.

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<u>NOTE</u>

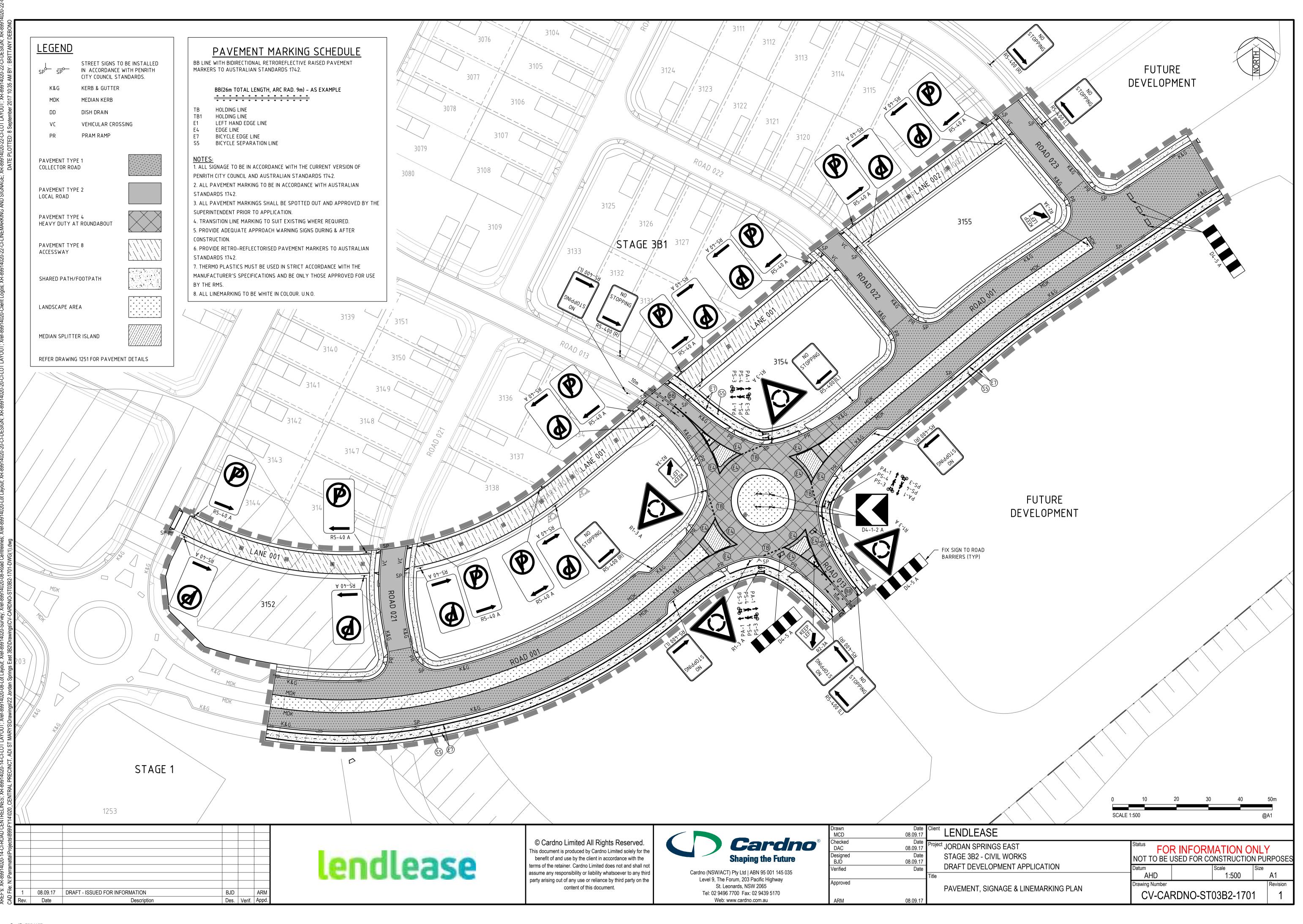
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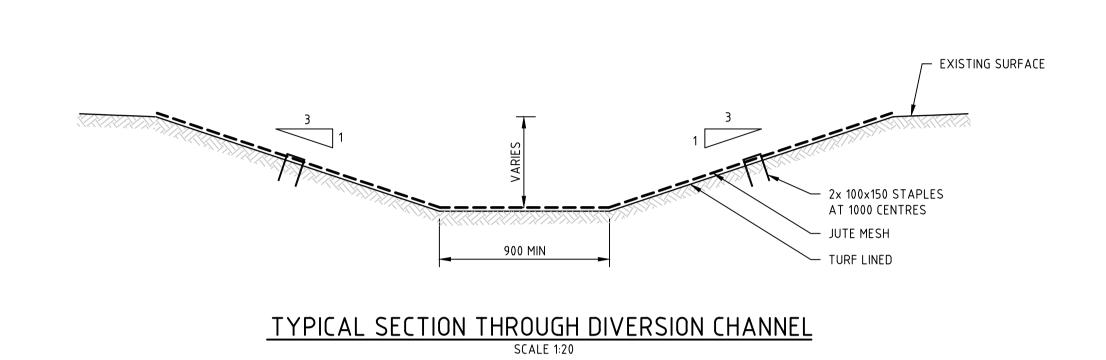
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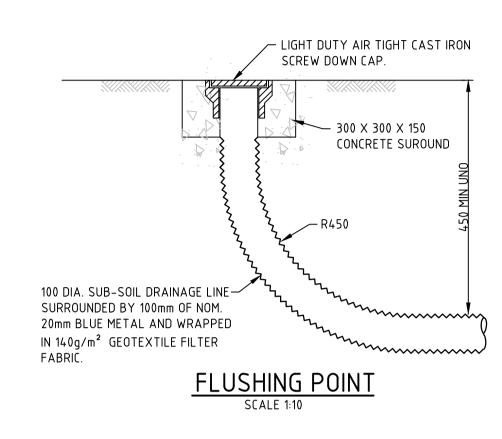


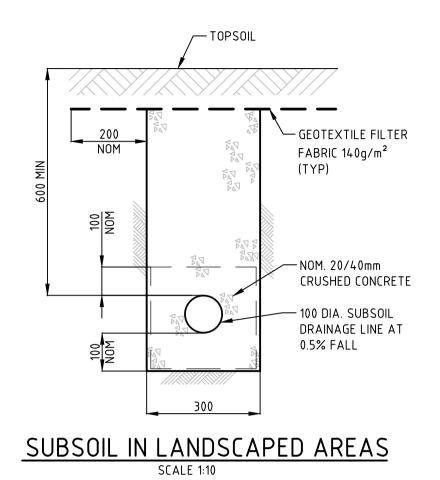
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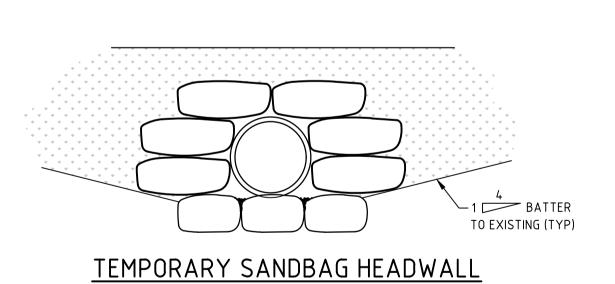
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Designed BJD	Date 08.09.17	STAGE 3B2 - CIVIL WORKS		ONSTRUCTION PURPOSES
Verified	Date	DRAFT DEVELOPMENT APPLICATION  Title	Datum AHD	Scale Size A1
Approved		SITEWORKS DETAILS	Drawing Number	Revision
ARM	08.09.17	SHEET 2	CV-CARDNO-ST	03B2-1602   1

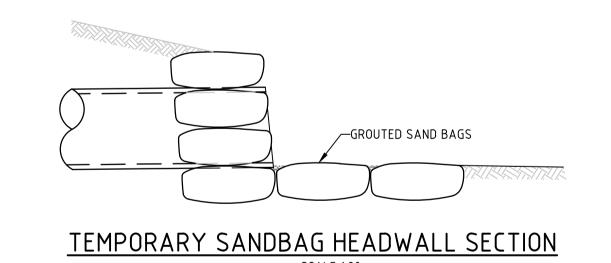


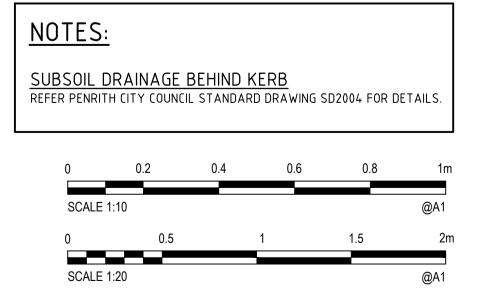












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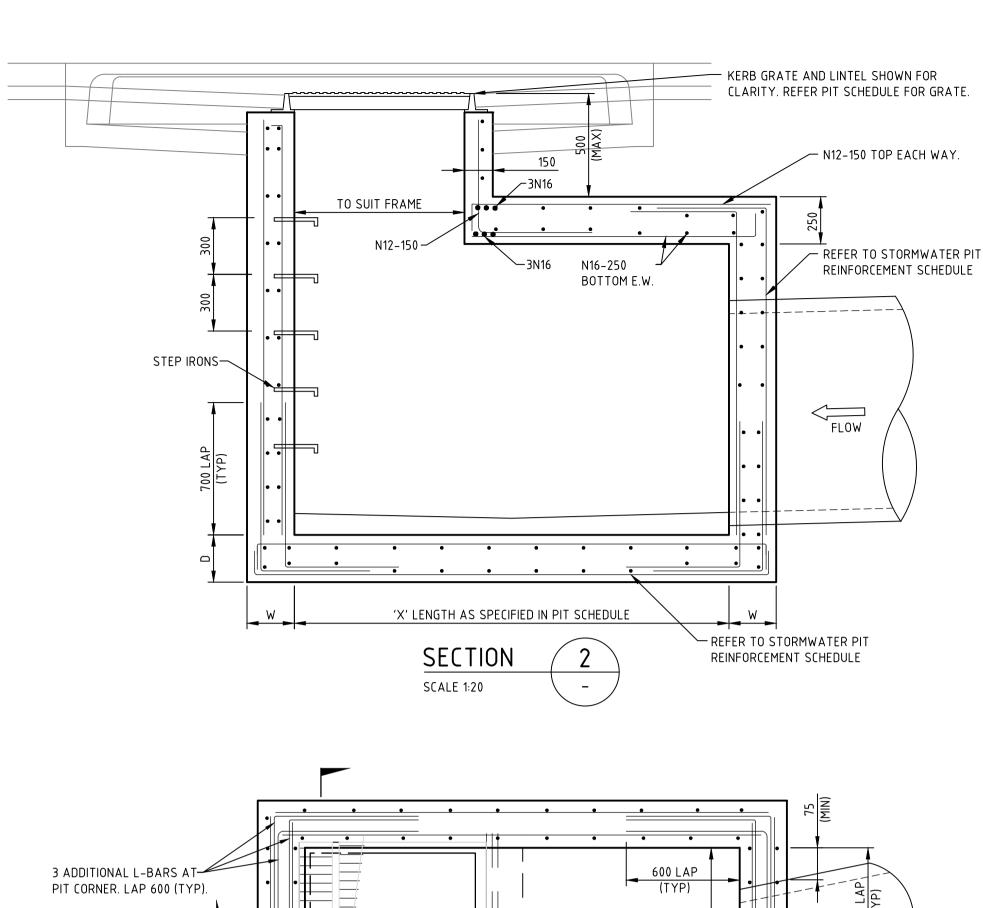
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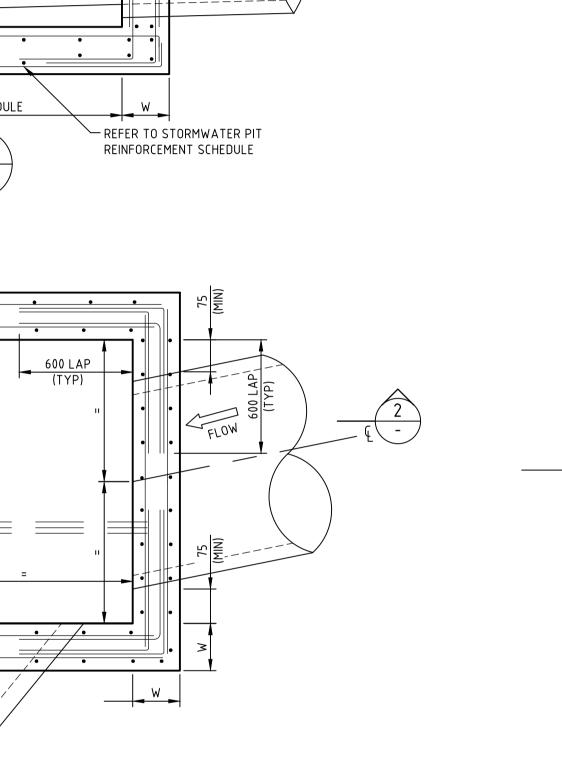
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Designed I BJD 08.0	Date 09.17				INSTRUCTION F	<del></del>
Verified I	Date Ti		Datum AHD		Scale Siz	ze A1
Approved		STORMWATER DRAINAGE DETAILS	Drawing Number			Revision
ARM 08.0	09.17	SHEET 1	CV-CAF	RDNO-ST	03B2-2201	1





NON PENRITH CITY COUNCIL STANDARD STORMWATER PIT

# SCALE 1:20 REAR BOUNDARY FALL ►PROVIDE Ø100 uPVC HOUSE CONNECTION FOR

MORTAR BED -

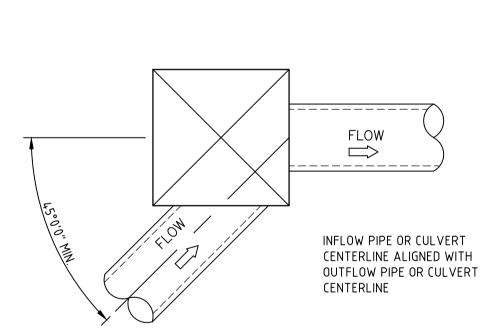
REFER TO STORMWATER PIT

REINFORCEMENT SCHEDULE —

MASS CONCRETE BENCHING (TYP.) CENTRAL 650

'Y' LENGTH AS SPECIFIED IN PIT SCHEDULE

PENRITH CITY COUNCIL STANDARD INTERALLOTMENT DRAINAGE PIT SCALE 1:20





INFLOW PIPE OR CULVERT CENTERLINE ALIGNED WITH OUTFLOW PIPE OR CULVERT CENTERLINE

# DEFLECTION ANGLE GREATER THAN 45° (SIDE OF PIT)

WELDLOK GG51D —

 $\Pi\Pi\Pi\Pi\Pi\Pi\Pi\Pi\Pi$ 

DETAIL

OR APPROVED

EQUIVALENT

ROAD PAVEMENT TO

ABUT GRATE FRAME

PIT ALIGNMENT REQUIREMENTS

TYPICAL DETAILS OF STORMWATER PIPE OR CULVERT ALIGNMENTS THROUGH STORMWATER PITS. STORMWATER PIPE OR CULVERT ALIGNMENTS NOT SHOWN SHOULD BE CONSTRUCTED SIMILARLY IN ORDER TO STREAMLINE FLOWS FROM UPSTREAM TO DOWNSTREAM AND MINIMISE HEADLOSS.

# IMPORTANT NOTE: PIT STANDARD DETAILS

GRATE AND FRAME AS-SPECIFIED IN PIT SCHEDULE

PROVIDE EXTRA VERTICAL WALL CORNER BAR (TYP).

PENRITH COUNCIL STANDARD GRATED GULLY PITS DETAIL, SD2001 TO BE USED FOR PIT DETAILS WHERE:

A. PIT INTERNAL WIDTH IN ANY DIRECTION IS LESS THAN OR EQUAL TO 1200mm, AND B. PIT DEPTH FROM SETOUT POINT TO INVERT IS LESS THAN OR EQUAL TO 2000mm.

FOR PITS WIDER THAN 1200mm AND/OR DEEPER THAN 2000mm REFER TO THE BELOW TABLE AND DETAILS.

NON PCC STORMWATER PIT REINFORCEMENT SCHEDULE											
PIT DIMENSIONS(mm)		WALL DIMENSIONS(mm)		VERTICAL	HORIZONTAL	BASE					
LENGTH 'X','Y'	DEPTH 'H'	BASE THICKNESS 'D'	WALL THICKNESS 'W'	1	REINFORCEMENT						
1200 <x,y<3300< td=""><td>2000<h<3900< td=""><td>230</td><td>230</td><td>N12-200 E.F.</td><td>N12-200 E.F.</td><td>N12-200 E.F.</td></h<3900<></td></x,y<3300<>	2000 <h<3900< td=""><td>230</td><td>230</td><td>N12-200 E.F.</td><td>N12-200 E.F.</td><td>N12-200 E.F.</td></h<3900<>	230	230	N12-200 E.F.	N12-200 E.F.	N12-200 E.F.					
X,Y<1200	H<6000	230	230	N16-250 E.F.	N16-250 E.F.	N16-250 E.F.					

Des. Verif. Appd.

NOTE: PIT REINFORCEMENT TO BE SELECTED USING MAXIMUM PIT DIMENSION

Description

08.09.17 DRAFT - ISSUED FOR INFORMATION

1. PIT REINFORCEMENT TO BE SELECTED USING MAXIMUM PIT DIMENSION. MINIMUM COVER TO REINFORCING AND CONCRETE STRENGTH AS SPECIFIED ON SHEET 1011.

NOTES:

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KERB GRATE AND LINTEL SHOWN FOR CLARITY. REFER PIT SCHEDULE FOR GRATE.

- 2N16 EACH FACE TRIMMERS. TYP.

- REFER TO STORMWATER PIT

REINFORCEMENT SCHEDULE

FLOW

HOUSE CONNECTION.

<u>SECTION</u>

FUTURE USE. ENSURE LOCATION OF CONNECTION IS PARALLEL TO SIDE BOUNDARY ON THE UPSTREAM SIDE OF PIT. CAP AND SEAL.

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		SCALE 1:10	@A1	SCALE 1:20		@A1
Drawn MCD	08.09.17	Client LENDLEASE				
Checked DAC Designed BJD	Date 08.09.17 Date 08.09.17	Project JORDAN SPRINGS EAST STAGE 3B2 - CIVIL WORKS			R INFORMATION ONL	
Verified	Date	DRAFT DEVELOPMENT APPLICATION  Title		Datum AHD	Scale Size AS SHOWN	A1
Approved	22.22.47	STORMWATER DRAINAGE DETAILS SHEET 2		Drawing Number	RDNO-ST03B2-2202	Revision 1
ARM	08.09.17	OTILL I Z				

Date Document Set ID: 7854157

Version: 1, Version Date: 26/09/2017

