

Our Ref: 160-011-001L
Your Ref: RAL/23/0009



9 December 2024

Chief Executive Officer
Mareeba Shire Council
PO Box 154,
MAREEBA QLD 4880

**LOT 1 on RP747077, RAY ROAD, MAREEBA
DEVELOPMENT APPLICATION FOR OPERATIONAL WORKS
RAY ROAD ESTATE – STAGE 1 (18 LOT RURAL RESIDENTIAL SUBDIVISION)**

Please find attached the operational works submission for the above mentioned subdivision in electronic format.

The Operational Works fee payable is \$4,514.00 being for the base fee and per lot fee (18 lots). This invoice is to be provided to the applicant for payment.

If you require any further clarification or additional information, please do not hesitate to contact the undersigned.

Yours faithfully

A handwritten signature in blue ink that reads "John Martin".

John Martin
Director

Enc: DA Form 1 – Development Application Details
Design Report
Engineering Drawings
Statement of Compliance



Ray Road Subdivision Stage 1

Operational Works Design Report

File No: 160-011

December 2024

Client:



CONMAT
CONSTRUCTION MATERIALS



www.erscon.com.au



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1 SUMMARY

1.1 DEVELOPMENT APPLICATION DETAILS

Proposed development:	Stage 1 Land development at Ray Road, Mareeba and full width widening and extension to McIver Road. Works include earthworks, road works, water connections, and stormwater drainage.
Type of approval sought:	Operational Works
Site address:	Ray Road, Mareeba
Real property description:	Lot 1 on RP747077
Site area:	37,602 m ²
Assessment manager:	Mareeba Shire Council
Owner details:	Conmat Pty Ltd
Applicant details:	Conmat Pty Ltd C/-ERSCON PTY. LTD. PO BOX 7890 CAIRNS QLD 4870

1.2 PLANNING INSTRUMENT DETAILS

Planning scheme:	Mareeba Shire Council Planning Scheme 2016
Zone:	Medium Density Residential
Local plan:	Nil
Level of assessment:	Code Assessment
Applicable codes:	Nil

1.3 REFERRAL AGENCIES

Referral agency and role

Nil

2 SITE DETAILS

2.1 SITE DESCRIPTION

The site is located on Ray Road, Mareeba. This application seeks operational works approval to complete construction of a 18-lot land development as approved for re-configuration by Council.

Table 1: Site description

Site characteristic	Description
Existing land use	The existing land use has been a vacant lot.
Existing structures	There are existing intersections at Ray Road and Cater Road. Existing drainage overland drains are also present to the East of Ray Road.
Frontage and access	Access will be provided via Ray Road.
Topography and views	The elevation change is 3m from RL 431.0m to 428.0m and slopes from the South-East towards the North-West at a grade of 0.5%.
Existing vegetation	The lot is predominantly open grassed areas and other minor vegetation.
Existing waterways	Drainage pathways are located along the East of Ray Road and discharge into a drainage easement near the north boundary. These then flow from West to East towards the Kennedy Highway.

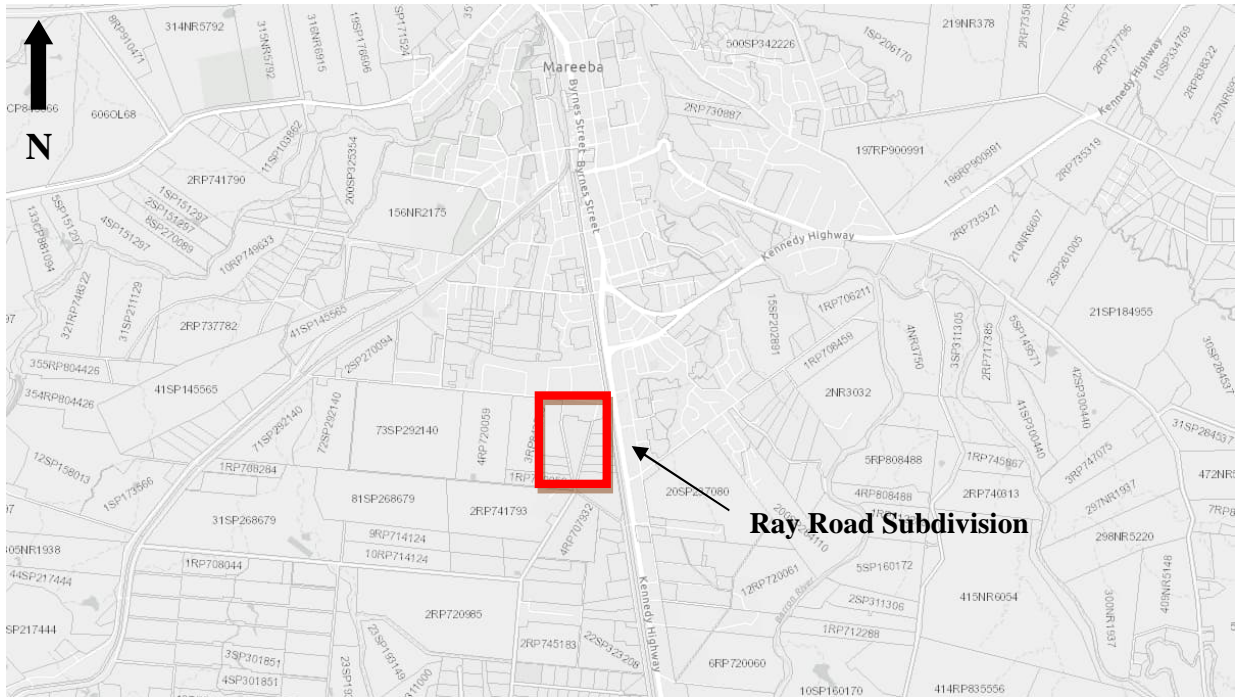


Figure 1: Aerial View of Site Identification
Source: DA Mapping System

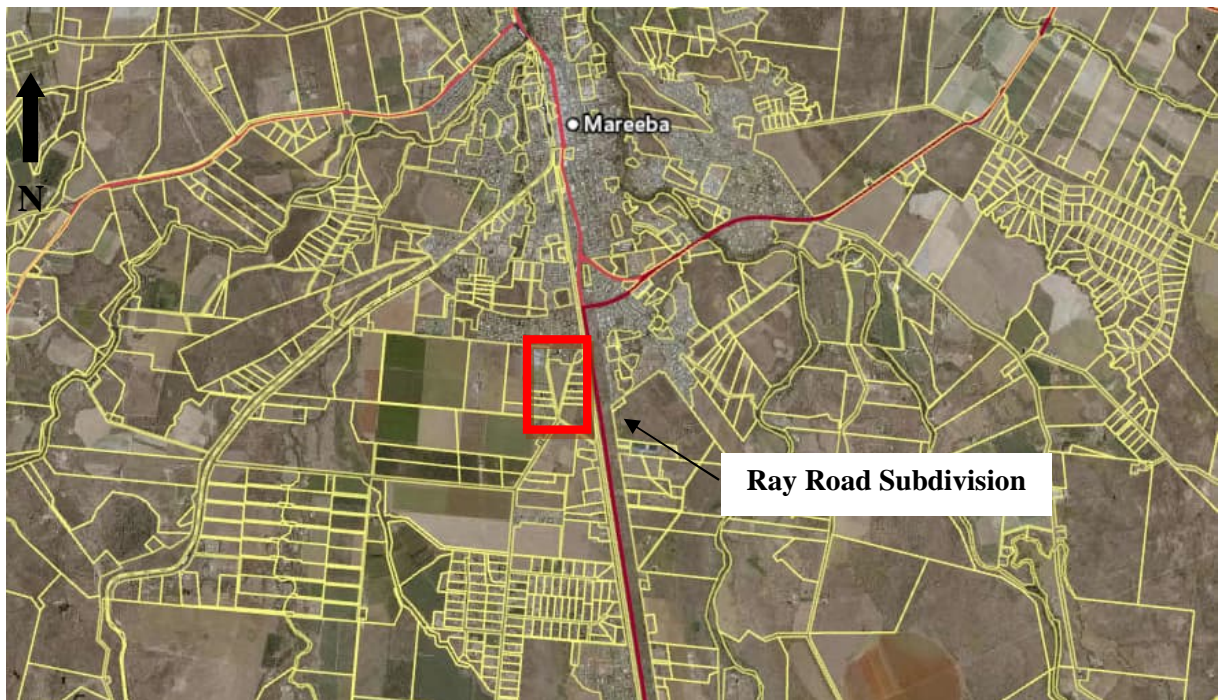


Figure 2: Satellite View of Site Identification
Source: QLD Globe

2.2 SURROUNDING LAND USES

Table 2: Surrounding land uses

Surrounding land uses	
North	Existing residential area
South	Existing residential area and farmland
East	Existing residential area and farmland
West	Existing residential area and farmland

3 PROPOSED DEVELOPMENT DETAILS

The purpose of this application is the development of 18 new allotments, including all municipal services and Ray Road upgrade. This stage is designed in accordance with Council’s conditions, and relevant specifications and standards.

Table 3: Summary of development aspects

Building or operational work	
Operational work	Stage 1 Construction of 18 new rural residential allotments including roadworks, bulk earthworks, water, sewer and stormwater connections. All works east of the new Ray Road control line and north of the Stage 1 works are to be funded by Mareeba Shire Council.
Value of proposed work by Developer	Approx \$2,983,464.98 (Incl. GST and Contingency)
Value of proposed work by Mareeba Shire Council	Approx \$1,667,442.38 (Incl. GST and Contingency)



4 DEVELOPMENT APPLICATION FORM 1

DA Form 1 – Development application details

Approved form (version 1.4 effective 15 December 2023) made under section 282 of the Planning Act 2016.

This form **must** be used to make a development application **involving code assessment or impact assessment**, except when applying for development involving only building work.

For a development application involving **building work only**, use *DA Form 2 – Building work details*.

For a development application involving **building work associated with any other type of assessable development (i.e. material change of use, operational work or reconfiguring a lot)**, use this form (*DA Form 1*) and parts 4 to 6 of *DA Form 2 – Building work details*.

Unless stated otherwise, all parts of this form **must** be completed in full and all required supporting information **must** accompany the development application.

One or more additional pages may be attached as a schedule to this development application if there is insufficient space on the form to include all the necessary information.

This form and any other form relevant to the development application must be used to make a development application relating to strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994*, and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*. For the purpose of assessing a development application relating to strategic port land and Brisbane core port land, any reference to a planning scheme is taken to mean a land use plan for the strategic port land, Brisbane port land use plan for Brisbane core port land, or a land use plan for airport land.

Note: All terms used in this form have the meaning given under the *Planning Act 2016*, the *Planning Regulation 2017*, or the *Development Assessment Rules (DA Rules)*.

PART 1 – APPLICANT DETAILS

1) Applicant details	
Applicant name(s) <i>(individual or company full name)</i>	ConMat Pty Ltd / ERSCON Consulting Engineers
Contact name <i>(only applicable for companies)</i>	Mark Freeman
Postal address <i>(P.O. Box or street address)</i>	10/320 Sheridan Street
Suburb	Cairns North
State	QLD
Postcode	4870
Country	Australia
Contact number	0410 724 331
Email address <i>(non-mandatory)</i>	markfreeman@erscon.com.au
Mobile number <i>(non-mandatory)</i>	
Fax number <i>(non-mandatory)</i>	
Applicant's reference number(s) <i>(if applicable)</i>	160-011

2) Owner's consent

2.1) Is written consent of the owner required for this development application?

- Yes – the written consent of the owner(s) is attached to this development application
- No – proceed to 3)

PART 2 – LOCATION DETAILS

3) Location of the premises (complete 3.1) or 3.2, and 3.3) as applicable)

Note: Provide details below and attach a site plan for any or all premises part of the development application. For further information, see [DA Forms Guide: Relevant plans](#).

3.1) Street address and lot on plan

- Street address **AND** lot on plan (all lots must be listed), **or**
 Street address **AND** lot on plan for an adjoining or adjacent property of the premises (appropriate for development in water but adjoining or adjacent to land e.g. jetty, pontoon. All lots must be listed).

a)	Unit No.	Street No.	Street Name and Type	Suburb
			Ray Road	Mareeba
	Postcode	Lot No.	Plan Type and Number (e.g. RP, SP)	Local Government Area(s)
	4880	1	RP747077	Mareeba Shire Council
b)	Unit No.	Street No.	Street Name and Type	Suburb
	Postcode	Lot No.	Plan Type and Number (e.g. RP, SP)	Local Government Area(s)

3.2) Coordinates of premises (appropriate for development in remote areas, over part of a lot or in water not adjoining or adjacent to land e.g. channel dredging in Moreton Bay)

Note: Place each set of coordinates in a separate row.

- Coordinates of premises by longitude and latitude

Longitude(s)	Latitude(s)	Datum	Local Government Area(s) (if applicable)
		<input type="checkbox"/> WGS84 <input type="checkbox"/> GDA94 <input type="checkbox"/> Other:	

- Coordinates of premises by easting and northing

Easting(s)	Northing(s)	Zone Ref.	Datum	Local Government Area(s) (if applicable)
		<input type="checkbox"/> 54 <input type="checkbox"/> 55 <input type="checkbox"/> 56	<input type="checkbox"/> WGS84 <input type="checkbox"/> GDA94 <input type="checkbox"/> Other:	

3.3) Additional premises

- Additional premises are relevant to this development application and the details of these premises have been attached in a schedule to this development application
 Not required

4) Identify any of the following that apply to the premises and provide any relevant details

- In or adjacent to a water body or watercourse or in or above an aquifer

Name of water body, watercourse or aquifer:

- On strategic port land under the *Transport Infrastructure Act 1994*

Lot on plan description of strategic port land:

Name of port authority for the lot:

- In a tidal area

Name of local government for the tidal area (if applicable):

Name of port authority for tidal area (if applicable):

- On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*

Name of airport:

<input type="checkbox"/> Listed on the Environmental Management Register (EMR) under the <i>Environmental Protection Act 1994</i>
EMR site identification: <input type="text"/>
<input type="checkbox"/> Listed on the Contaminated Land Register (CLR) under the <i>Environmental Protection Act 1994</i>
CLR site identification: <input type="text"/>

5) Are there any existing easements over the premises?
Note: Easement uses vary throughout Queensland and are to be identified correctly and accurately. For further information on easements and how they may affect the proposed development, see [DA Forms Guide](#).

Yes – All easement locations, types and dimensions are included in plans submitted with this development application

No

PART 3 – DEVELOPMENT DETAILS

Section 1 – Aspects of development

6.1) Provide details about the first development aspect

a) What is the type of development? *(tick only one box)*

Material change of use Reconfiguring a lot Operational work Building work

b) What is the approval type? *(tick only one box)*

Development permit Preliminary approval Preliminary approval that includes a variation approval

c) What is the level of assessment?

Code assessment Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots):*

Construction of 18 lot rural residential subdivision including roads, stormwater and water reticulation.

e) Relevant plans
Note: Relevant plans are required to be submitted for all aspects of this development application. For further information, see [DA Forms guide: Relevant plans](#).

Relevant plans of the proposed development are attached to the development application

6.2) Provide details about the second development aspect

a) What is the type of development? *(tick only one box)*

Material change of use Reconfiguring a lot Operational work Building work

b) What is the approval type? *(tick only one box)*

Development permit Preliminary approval Preliminary approval that includes a variation approval

c) What is the level of assessment?

Code assessment Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots):*

e) Relevant plans
Note: Relevant plans are required to be submitted for all aspects of this development application. For further information, see [DA Forms Guide: Relevant plans](#).

Relevant plans of the proposed development are attached to the development application

6.3) Additional aspects of development

Additional aspects of development are relevant to this development application and the details for these aspects that would be required under Part 3 Section 1 of this form have been attached to this development application

Not required

Section 2 – Further development details

7) Does the proposed development application involve any of the following?	
Material change of use	<input type="checkbox"/> Yes – complete division 1 if assessable against a local planning instrument
Reconfiguring a lot	<input type="checkbox"/> Yes – complete division 2
Operational work	<input checked="" type="checkbox"/> Yes – complete division 3
Building work	<input type="checkbox"/> Yes – complete <i>DA Form 2 – Building work details</i>

Division 1 – Material change of use

Note: This division is only required to be completed if any part of the development application involves a material change of use assessable against a local planning instrument.

8.1) Describe the proposed material change of use			
Provide a general description of the proposed use	Provide the planning scheme definition <i>(include each definition in a new row)</i>	Number of dwelling units <i>(if applicable)</i>	Gross floor area (m ²) <i>(if applicable)</i>

8.2) Does the proposed use involve the use of existing buildings on the premises?	
<input type="checkbox"/> Yes	
<input type="checkbox"/> No	

Division 2 – Reconfiguring a lot

Note: This division is only required to be completed if any part of the development application involves reconfiguring a lot.

9.1) What is the total number of existing lots making up the premises?	

9.2) What is the nature of the lot reconfiguration? <i>(tick all applicable boxes)</i>	
<input type="checkbox"/> Subdivision <i>(complete 10)</i>	<input type="checkbox"/> Dividing land into parts by agreement <i>(complete 11)</i>
<input type="checkbox"/> Boundary realignment <i>(complete 12)</i>	<input type="checkbox"/> Creating or changing an easement giving access to a lot from a constructed road <i>(complete 13)</i>

10) Subdivision				
10.1) For this development, how many lots are being created and what is the intended use of those lots:				
Intended use of lots created	Residential	Commercial	Industrial	Other, please specify:
Number of lots created				

10.2) Will the subdivision be staged?	
<input type="checkbox"/> Yes – provide additional details below	
<input type="checkbox"/> No	
How many stages will the works include?	
What stage(s) will this development application apply to?	

11) Dividing land into parts by agreement – how many parts are being created and what is the intended use of the parts?

Intended use of parts created	Residential	Commercial	Industrial	Other, please specify:
Number of parts created				

12) Boundary realignment

12.1) What are the current and proposed areas for each lot comprising the premises?

Current lot		Proposed lot	
Lot on plan description	Area (m ²)	Lot on plan description	Area (m ²)

12.2) What is the reason for the boundary realignment?

13) What are the dimensions and nature of any existing easements being changed and/or any proposed easement? (attach schedule if there are more than two easements)

Existing or proposed?	Width (m)	Length (m)	Purpose of the easement? (e.g. pedestrian access)	Identify the land/lot(s) benefitted by the easement

Division 3 – Operational work

Note: This division is only required to be completed if any part of the development application involves operational work.

14.1) What is the nature of the operational work?

<input checked="" type="checkbox"/> Road work	<input checked="" type="checkbox"/> Stormwater	<input checked="" type="checkbox"/> Water infrastructure
<input checked="" type="checkbox"/> Drainage work	<input checked="" type="checkbox"/> Earthworks	<input checked="" type="checkbox"/> Sewage infrastructure
<input type="checkbox"/> Landscaping	<input checked="" type="checkbox"/> Signage	<input type="checkbox"/> Clearing vegetation
<input type="checkbox"/> Other – please specify: _____		

14.2) Is the operational work necessary to facilitate the creation of new lots? (e.g. subdivision)

Yes – specify number of new lots: 18

No

14.3) What is the monetary value of the proposed operational work? (include GST, materials and labour)

Total \$3,351,146.69 (includes GST) (Council Contribution \$1,034,958.78 – Developer Contribution \$2,316,187.91)

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application

Mareeba Shire Council

16) Has the local government agreed to apply a superseded planning scheme for this development application?

Yes – a copy of the decision notice is attached to this development application

The local government is taken to have agreed to the superseded planning scheme request – relevant documents attached

No

PART 5 – REFERRAL DETAILS

17) Does this development application include any aspects that have any referral requirements?

Note: A development application will require referral if prescribed by the Planning Regulation 2017.

No, there are no referral requirements relevant to any development aspects identified in this development application – proceed to Part 6

Matters requiring referral to the **Chief Executive of the Planning Act 2016:**

- Clearing native vegetation
- Contaminated land (*unexploded ordnance*)
- Environmentally relevant activities (ERA) (*only if the ERA has not been devolved to a local government*)
- Fisheries – aquaculture
- Fisheries – declared fish habitat area
- Fisheries – marine plants
- Fisheries – waterway barrier works
- Hazardous chemical facilities
- Heritage places – Queensland heritage place (*on or near a Queensland heritage place*)
- Infrastructure-related referrals – designated premises
- Infrastructure-related referrals – state transport infrastructure
- Infrastructure-related referrals – State transport corridor and future State transport corridor
- Infrastructure-related referrals – State-controlled transport tunnels and future state-controlled transport tunnels
- Infrastructure-related referrals – near a state-controlled road intersection
- Koala habitat in SEQ region – interfering with koala habitat in koala habitat areas outside koala priority areas
- Koala habitat in SEQ region – key resource areas
- Ports – Brisbane core port land – near a State transport corridor or future State transport corridor
- Ports – Brisbane core port land – environmentally relevant activity (ERA)
- Ports – Brisbane core port land – tidal works or work in a coastal management district
- Ports – Brisbane core port land – hazardous chemical facility
- Ports – Brisbane core port land – taking or interfering with water
- Ports – Brisbane core port land – referable dams
- Ports – Brisbane core port land – fisheries
- Ports – Land within Port of Brisbane's port limits (*below high-water mark*)
- SEQ development area
- SEQ regional landscape and rural production area or SEQ rural living area – tourist activity or sport and recreation activity
- SEQ regional landscape and rural production area or SEQ rural living area – community activity
- SEQ regional landscape and rural production area or SEQ rural living area – indoor recreation
- SEQ regional landscape and rural production area or SEQ rural living area – urban activity
- SEQ regional landscape and rural production area or SEQ rural living area – combined use
- SEQ northern inter-urban break – tourist activity or sport and recreation activity
- SEQ northern inter-urban break – community activity
- SEQ northern inter-urban break – indoor recreation
- SEQ northern inter-urban break – urban activity
- SEQ northern inter-urban break – combined use
- Tidal works or works in a coastal management district
- Reconfiguring a lot in a coastal management district or for a canal
- Erosion prone area in a coastal management district
- Urban design
- Water-related development – taking or interfering with water
- Water-related development – removing quarry material (*from a watercourse or lake*)
- Water-related development – referable dams
- Water-related development – levees (*category 3 levees only*)
- Wetland protection area

Matters requiring referral to the local government:

Airport land

Environmentally relevant activities (ERA) *(only if the ERA has been devolved to local government)*

Heritage places – Local heritage places

Matters requiring referral to the Chief Executive of the distribution entity or transmission entity:

Infrastructure-related referrals – Electricity infrastructure

Matters requiring referral to:

- The **Chief Executive of the holder of the licence**, if not an individual
- The **holder of the licence**, if the holder of the licence is an individual

Infrastructure-related referrals – Oil and gas infrastructure

Matters requiring referral to the Brisbane City Council:

Ports – Brisbane core port land

Matters requiring referral to the Minister responsible for administering the Transport Infrastructure Act 1994:

Ports – Brisbane core port land *(where inconsistent with the Brisbane port LUP for transport reasons)*

Ports – Strategic port land

Matters requiring referral to the relevant port operator, if applicant is not port operator:

Ports – Land within Port of Brisbane’s port limits *(below high-water mark)*

Matters requiring referral to the Chief Executive of the relevant port authority:

Ports – Land within limits of another port *(below high-water mark)*

Matters requiring referral to the Gold Coast Waterways Authority:

Tidal works or work in a coastal management district *(in Gold Coast waters)*

Matters requiring referral to the Queensland Fire and Emergency Service:

Tidal works or work in a coastal management district *(involving a marina (more than six vessel berths))*

18) Has any referral agency provided a referral response for this development application?

Yes – referral response(s) received and listed below are attached to this development application

No

Referral requirement	Referral agency	Date of referral response

Identify and describe any changes made to the proposed development application that was the subject of the referral response and this development application, or include details in a schedule to this development application *(if applicable)*.

PART 6 – INFORMATION REQUEST

19) Information request under Part 3 of the DA Rules

I agree to receive an information request if determined necessary for this development application

I do not agree to accept an information request for this development application

Note: *By not agreeing to accept an information request I, the applicant, acknowledge:*

- *that this development application will be assessed and decided based on the information provided when making this development application and the assessment manager and any referral agencies relevant to the development application are not obligated under the DA Rules to accept any additional information provided by the applicant for the development application unless agreed to by the relevant parties*
- *Part 3 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules.*

Further advice about information requests is contained in the [DA Forms Guide](#).

PART 7 – FURTHER DETAILS

20) Are there any associated development applications or current approvals? (e.g. a preliminary approval)			
<input checked="" type="checkbox"/> Yes – provide details below or include details in a schedule to this development application <input type="checkbox"/> No			
List of approval/development application references	Reference number	Date	Assessment manager
<input checked="" type="checkbox"/> Approval <input type="checkbox"/> Development application	RAL/23/0009	21/12/23	Carl Ewin
<input type="checkbox"/> Approval <input type="checkbox"/> Development application			

21) Has the portable long service leave levy been paid? (only applicable to development applications involving building work or operational work)		
<input type="checkbox"/> Yes – a copy of the receipted QLeave form is attached to this development application <input checked="" type="checkbox"/> No – I, the applicant will provide evidence that the portable long service leave levy has been paid before the assessment manager decides the development application. I acknowledge that the assessment manager may give a development approval only if I provide evidence that the portable long service leave levy has been paid <input type="checkbox"/> Not applicable (e.g. building and construction work is less than \$150,000 excluding GST)		
Amount paid	Date paid (dd/mm/yy)	QLeave levy number (A, B or E)
\$		

22) Is this development application in response to a show cause notice or required as a result of an enforcement notice?
<input type="checkbox"/> Yes – show cause or enforcement notice is attached <input checked="" type="checkbox"/> No

23) Further legislative requirements	
Environmentally relevant activities	
23.1) Is this development application also taken to be an application for an environmental authority for an Environmentally Relevant Activity (ERA) under section 115 of the <i>Environmental Protection Act 1994</i> ?	
<input type="checkbox"/> Yes – the required attachment (form ESR/2015/1791) for an application for an environmental authority accompanies this development application, and details are provided in the table below <input checked="" type="checkbox"/> No <i>Note: Application for an environmental authority can be found by searching "ESR/2015/1791" as a search term at www.qld.gov.au. An ERA requires an environmental authority to operate. See www.business.qld.gov.au for further information.</i>	
Proposed ERA number:	Proposed ERA threshold:
Proposed ERA name:	
<input type="checkbox"/> Multiple ERAs are applicable to this development application and the details have been attached in a schedule to this development application.	
Hazardous chemical facilities	
23.2) Is this development application for a hazardous chemical facility ?	
<input type="checkbox"/> Yes – Form 69: Notification of a facility exceeding 10% of schedule 15 threshold is attached to this development application <input checked="" type="checkbox"/> No <i>Note: See www.business.qld.gov.au for further information about hazardous chemical notifications.</i>	

Clearing native vegetation

23.3) Does this development application involve **clearing native vegetation** that requires written confirmation that the chief executive of the *Vegetation Management Act 1999* is satisfied the clearing is for a relevant purpose under section 22A of the *Vegetation Management Act 1999*?

- Yes – this development application includes written confirmation from the chief executive of the *Vegetation Management Act 1999* (s22A determination)
- No

Note: 1. Where a development application for operational work or material change of use requires a s22A determination and this is not included, the development application is prohibited development.
2. See <https://www.qld.gov.au/environment/land/vegetation/applying> for further information on how to obtain a s22A determination.

Environmental offsets

23.4) Is this development application taken to be a prescribed activity that may have a significant residual impact on a **prescribed environmental matter** under the *Environmental Offsets Act 2014*?

- Yes – I acknowledge that an environmental offset must be provided for any prescribed activity assessed as having a significant residual impact on a prescribed environmental matter
- No

Note: The environmental offset section of the Queensland Government's website can be accessed at www.qld.gov.au for further information on environmental offsets.

Koala habitat in SEQ Region

23.5) Does this development application involve a material change of use, reconfiguring a lot or operational work which is assessable development under Schedule 10, Part 10 of the Planning Regulation 2017?

- Yes – the development application involves premises in the koala habitat area in the koala priority area
- Yes – the development application involves premises in the koala habitat area outside the koala priority area
- No

Note: If a koala habitat area determination has been obtained for this premises and is current over the land, it should be provided as part of this development application. See koala habitat area guidance materials at www.des.qld.gov.au for further information.

Water resources

23.6) Does this development application involve **taking or interfering with underground water through an artesian or subartesian bore, taking or interfering with water in a watercourse, lake or spring, or taking overland flow water under the Water Act 2000**?

- Yes – the relevant template is completed and attached to this development application and I acknowledge that a relevant authorisation or licence under the *Water Act 2000* may be required prior to commencing development
- No

Note: Contact the Department of Natural Resources, Mines and Energy at www.dnrme.qld.gov.au for further information.

DA templates are available from <https://planning.dsdmip.qld.gov.au/>. If the development application involves:

- Taking or interfering with underground water through an artesian or subartesian bore: complete DA Form 1 Template 1
- Taking or interfering with water in a watercourse, lake or spring: complete DA Form 1 Template 2
- Taking overland flow water: complete DA Form 1 Template 3.

Waterway barrier works

23.7) Does this application involve **waterway barrier works**?

- Yes – the relevant template is completed and attached to this development application
- No

DA templates are available from <https://planning.dsdmip.qld.gov.au/>. For a development application involving waterway barrier works, complete DA Form 1 Template 4.

Marine activities

23.8) Does this development application involve **aquaculture, works within a declared fish habitat area or removal, disturbance or destruction of marine plants**?

- Yes – an associated *resource* allocation authority is attached to this development application, if required under the *Fisheries Act 1994*
- No

Note: See guidance materials at www.daf.qld.gov.au for further information.

Quarry materials from a watercourse or lake

23.9) Does this development application involve the **removal of quarry materials from a watercourse or lake** under the *Water Act 2000*?

- Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development
 No

Note: Contact the Department of Natural Resources, Mines and Energy at www.dnrme.qld.gov.au and www.business.qld.gov.au for further information.

Quarry materials from land under tidal waters

23.10) Does this development application involve the **removal of quarry materials from land under tidal water** under the *Coastal Protection and Management Act 1995*?

- Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development
 No

Note: Contact the Department of Environment and Science at www.des.qld.gov.au for further information.

Referable dams

23.11) Does this development application involve a **referable dam** required to be failure impact assessed under section 343 of the *Water Supply (Safety and Reliability) Act 2008* (the *Water Supply Act*)?

- Yes – the 'Notice Accepting a Failure Impact Assessment' from the chief executive administering the *Water Supply Act* is attached to this development application
 No

Note: See guidance materials at www.dnrme.qld.gov.au for further information.

Tidal work or development within a coastal management district

23.12) Does this development application involve **tidal work or development in a coastal management district**?

- Yes – the following is included with this development application:
- Evidence the proposal meets the code for assessable development that is prescribed tidal work (*only required if application involves prescribed tidal work*)
 - A certificate of title
- No

Note: See guidance materials at www.des.qld.gov.au for further information.

Queensland and local heritage places

23.13) Does this development application propose development on or adjoining a place entered in the **Queensland heritage register** or on a place entered in a local government's **Local Heritage Register**?

- Yes – details of the heritage place are provided in the table below
 No

Note: See guidance materials at www.des.qld.gov.au for information requirements regarding development of Queensland heritage places.

Name of the heritage place:		Place ID:	
-----------------------------	--	-----------	--

Brothels

23.14) Does this development application involve a **material change of use for a brothel**?

- Yes – this development application demonstrates how the proposal meets the code for a development application for a brothel under Schedule 3 of the *Prostitution Regulation 2014*
 No

Decision under section 62 of the Transport Infrastructure Act 1994

23.15) Does this development application involve new or changed access to a state-controlled road?

- Yes – this application will be taken to be an application for a decision under section 62 of the *Transport Infrastructure Act 1994* (subject to the conditions in section 75 of the *Transport Infrastructure Act 1994* being satisfied)
 No

Walkable neighbourhoods assessment benchmarks under Schedule 12A of the Planning Regulation

23.16) Does this development application involve reconfiguring a lot into 2 or more lots in certain residential zones (except rural residential zones), where at least one road is created or extended?

- Yes – Schedule 12A is applicable to the development application and the assessment benchmarks contained in schedule 12A have been considered
- No

Note: See guidance materials at www.planning.dsdmip.qld.gov.au for further information.

PART 8 – CHECKLIST AND APPLICANT DECLARATION

24) Development application checklist

I have identified the assessment manager in question 15 and all relevant referral requirement(s) in question 17	<input checked="" type="checkbox"/> Yes
Note: See the <i>Planning Regulation 2017</i> for referral requirements	
If building work is associated with the proposed development, Parts 4 to 6 of DA Form 2 – Building work details have been completed and attached to this development application	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
Supporting information addressing any applicable assessment benchmarks is with the development application	<input checked="" type="checkbox"/> Yes
Note: This is a mandatory requirement and includes any relevant templates under question 23, a planning report and any technical reports required by the relevant categorising instruments (e.g. local government planning schemes, State Planning Policy, State Development Assessment Provisions). For further information, see DA Forms Guide: Planning Report Template .	
Relevant plans of the development are attached to this development application	<input checked="" type="checkbox"/> Yes
Note: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans .	
The portable long service leave levy for QLeave has been paid, or will be paid before a development permit is issued (see 21)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable

25) Applicant declaration

- By making this development application, I declare that all information in this development application is true and correct
- Where an email address is provided in Part 1 of this form, I consent to receive future electronic communications from the assessment manager and any referral agency for the development application where written information is required or permitted pursuant to sections 11 and 12 of the *Electronic Transactions Act 2001*

Note: It is unlawful to intentionally provide false or misleading information.

Privacy – Personal information collected in this form will be used by the assessment manager and/or chosen assessment manager, any relevant referral agency and/or building certifier (including any professional advisers which may be engaged by those entities) while processing, assessing and deciding the development application. All information relating to this development application may be available for inspection and purchase, and/or published on the assessment manager's and/or referral agency's website.

Personal information will not be disclosed for a purpose unrelated to the *Planning Act 2016*, *Planning Regulation 2017* and the DA Rules except where:

- such disclosure is in accordance with the provisions about public access to documents contained in the *Planning Act 2016* and the *Planning Regulation 2017*, and the access rules made under the *Planning Act 2016* and *Planning Regulation 2017*; or
- required by other legislation (including the *Right to Information Act 2009*); or
- otherwise required by law.

This information may be stored in relevant databases. The information collected will be retained as required by the *Public Records Act 2002*.

PART 9 – FOR COMPLETION OF THE ASSESSMENT MANAGER – FOR OFFICE USE ONLY

Date received: Reference number(s):

Notification of engagement of alternative assessment manager	
Prescribed assessment manager	
Name of chosen assessment manager	
Date chosen assessment manager engaged	
Contact number of chosen assessment manager	
Relevant licence number(s) of chosen assessment manager	

QLeave notification and payment			
<i>Note: For completion by assessment manager if applicable</i>			
Description of the work			
QLeave project number			
Amount paid (\$)		Date paid (dd/mm/yy)	
Date receipted form sighted by assessment manager			
Name of officer who sighted the form			



5 SUBDIVISION CONDITIONS



21 December 2023

Senior Planner: Carl Ewin
Direct Phone: 07 4086 4656
Our Reference: RAL/23/0009
Your Reference: F23/20

Conmat No 2 Pty Ltd TTE
C/- Freshwater Planning Pty Ltd
17 Barronview Drive
FRESHWATER QLD 4870

Dear Applicants,

Decision Notice

Planning Act 2016

I refer to your application and advise that on 20 December 2023, Council decided to approve the application in full subject to conditions.

Details of the decision are as follows:

APPLICATION DETAILS

Application No:	RAL/23/0009
Street Address:	Ray Road, Mareeba
Real Property Description:	Lot 1 on RP747077
Planning Scheme:	Mareeba Shire Council Planning Scheme 2016

DECISION DETAILS

Type of Decision:	Approval
Type of Approval:	Development Permit for Reconfiguration of a Lot Subdivision (1 Lot into 41 Lots in 4 Stages)
Date of Decision:	20 December 2023

CURRENCY PERIOD OF APPROVAL

The currency period for this development approval is four (4) years starting the day that this development approval takes effect. (Refer to Section 85 "Lapsing of approval at end of currency period" of the *Planning Act 2016*.)

INFRASTRUCTURE

Where conditions relate to the provision of infrastructure, these are non-trunk infrastructure conditions unless specifically nominated as a "*necessary infrastructure condition*" for the provision of trunk infrastructure as defined under Chapter 4 of the *Planning Act 2016*.

ASSESSMENT MANAGER CONDITIONS

(C) ASSESSMENT MANAGER'S CONDITIONS (COUNCIL)

(a) Development assessable against the Planning Scheme

1. Development must be carried out generally in accordance with the approved plans and the facts and circumstances of the use as submitted with the application, and subject to any alterations:
 - found necessary by the Council's delegated officer at the time of examination of the engineering plans or during construction of the development because of particular engineering requirements; and
 - to ensure compliance with the following conditions of approval.
2. Timing of Effect
 - 2.1 The conditions of the development permit must be complied with to the satisfaction of Council's delegated officer prior to the endorsement of the plan of survey for each stage of the development, or alternative documentation as approved by the Land Title Act, except where specified otherwise in these conditions of approval.
3. General
 - 3.1 The applicant/developer is responsible for the cost of necessary alterations to existing public utility mains, services or installations required by works in relation to the proposed development or any works required by condition(s) of this approval.
 - 3.2 All payments or bonds required to be made to the Council pursuant to any condition of this approval or the Adopted Infrastructure Charges Notice must be made prior to the endorsement of the plan of survey, or alternative documentation as approved by the Land Title Act and at the rate applicable at the time of payment.

-
- 3.3 The developer must relocate (in accordance with FNQROC standards) any services such as water, sewer, drainage, telecommunications and electricity that are not wholly located within the lots that are being created/serviced where required by the relevant authority, unless approved by Council's delegated officer.
- 3.4 Where utilities (such as sewers on non-standard alignments) traverse lots to service another lot, easements must be created in favour of Council for access and maintenance purposes. The developer is to pay all costs (including Council's legal expenses) to prepare and register the easement documents.
- 3.5 All works must be designed, constructed and carried out in accordance with FNQROC Development Manual requirements (as amended) and to the satisfaction of Council's delegated officer.

3.6 Charges

All outstanding rates, charges, and expenses pertaining to the land are to be paid in full.

3.7 Local Heritage Place – Heavy Anti Aircraft Gun Station 448

No aspect of this development shall interfere with or damage the heritage significance of Heavy Anti Aircraft Gun Station 448.

4. Infrastructure Services and Standards

4.1 Stormwater Drainage

- (a) The applicant/developer must take all necessary steps to ensure a non-worsening effect on surrounding land as a consequence of the development.
- (b) Prior to works commencing the applicant must submit a Stormwater Management Plan and Report prepared and certified by a suitably qualified design engineer (RPEQ) that meets or exceeds the standards of design and construction set out in the Queensland Urban Drainage Manual (QUDM) and the FNQROC Development Manual to the satisfaction of Council's delegated officer.

The Stormwater Management Plan and Report must also consider the existing condition of the downstream Easement A on RP733064 and make all necessary recommendations to ensure the long term stability and functioning of this drainage easement.

-
- (c) Prior to works commencing the applicant must submit a Stormwater Quality Management Plan and Report prepared and certified by a suitably qualified design engineer (RPEQ) that meets or exceeds the standards of design and construction set out in the Urban Stormwater Quality Planning Guideline and the Queensland Water Quality Guideline to the satisfaction of Council's delegated officer.
 - (d) The Stormwater Quality Management Plan must include an Erosion and Sediment Control Plan that meets or exceeds the Soil Erosion and Sedimentation Control Guidelines (Institute of Engineers Australia) to the satisfaction of Council's delegated officer.
 - (e) The applicant/developer must construct the stormwater drainage infrastructure in accordance with the approved Stormwater Management Plan and/or Stormwater Quality Management Plan and Report.
 - (f) Temporary drainage is to be provided and maintained during the construction phase of the development, discharged to a lawful point and not onto the construction site.
 - (g) All stormwater channels through private property must be registered, with the easement for drainage purposes in favour of Council. All documentation leading to the registration of the easement must be completed at no cost to Council.
 - (h) All stormwater drainage collected from the site must be discharged to an approved legal point of discharge.
 - (i) The applicant (at their cost) must video all stormwater lines and submit the video for inspection by Council's delegated officer prior to the development being taken "off maintenance" to ensure that no defects have occurred during the 12 month maintenance period.
 - (j) All drainage easements must be constructed to prevent erosion. Construction may be in the form of a concrete invert, with outlet protection.

4.2 Earthworks

All earthworks must be carried out in accordance with the requirements of the FNQROC Development Manual (as amended) to the satisfaction of Council's delegated officer.

4.3 Roadworks/footpaths – Internal

- (a) The subdivision internal roads must be designed and constructed to Access Street standard in accordance with Council's FNQROC Development Manual, as detailed in Table D.1.1
- (b) Individual property access must be designed in accordance with the requirements of FNQROC Development Manual. Appropriate distances are required from intersections and tangent points in accordance with AS2890.1.

The provision of layback/roll-over kerbing along the frontage of each allotment will satisfy this condition.

- (c) The diameter of the cul-de-sacs must be suitable for the largest refuse collection vehicle used throughout the shire to be able to turn around in a forward direction. Swept path diagrams must be submitted as part of the development application for Operational Works to demonstrate this requirement.
- (d) A temporary gravel vehicle turnaround at the end of all partially constructed roads must be provided of a sufficient size to turnaround a refuse collection vehicle, either in a continuous forward movement or by a three-point turn.
- (e) A second 4 metre wide road reserve connection must be provided along the common boundary of proposed Lots 11 & 12 (and ultimately proposed Lots 22 & 23) to allow for future pedestrian only connectivity between Ray Road and the proposed internal road.
- (f) Two (2) metre wide concrete pedestrian footpaths must be installed in the locations marked on the approved Footpath Plan, applicable to the relevant stage. The horizontal alignment of all footpaths must comply with the FNQROC development Manual (specifically Standard Drawing S1004A).

4.4 Roadworks - External (Ray Road and Cater Road)

- (a) Prepare a design for Ray Road (between McIver Road and Cater Road) to a Major Collector Road standard as defined in Council's FNQROC Development Manual. The design must detail the alignment of all associated infrastructure including:
 - pavement
 - kerb and channel

- footpath (western side)
- street lighting
- underground stormwater infrastructure

The design should also identify the extent of any land requirements on the subject lots to facilitate the road network, giving consideration to any localised widenings necessary to facilitate the construction/ upgrade of the intersections.

- (b) Undertake road widening along the full Ray Road frontage of the site equivalent to half of a Major Collector Road, inclusive of pavement, kerb and channel, drainage infrastructure, footpath, landscaping, and street lighting. The arrangement must be compatible with the eventual full upgrade of Ray Road to Major Collector Road standard. Services are required to be installed in the location suitable for the future road upgrade of the eastern half of Ray Road.
- (c) Design Cater Road to a 10 metre wide bus route Access Street standard as defined in Council's FNQROC Development Manual, for the full frontage of proposed Lots 17 and 18.
- (d) Undertake road widening along Cater Road for the full frontage of proposed Lots 17 and 18 equivalent to half of a 10 metre wide bus route Access Street standard, inclusive of pavement, kerb and channel, drainage infrastructure, footpath, landscaping, and street lighting. Services are required to be installed in the location suitable for the future road upgrade of the western half of Cater Road.
- (e) Design and construct the new internal road intersection with Ray Road and upgrade of Ray Road/Cater Road intersection in accordance with Council's FNQROC Development Manual.
- (f) The design and construction of the interim arrangements must allow for all necessary work and adjustments to smoothly join the new works to the existing formation. Minor adjustment to levels may be necessary to achieve this.
- (g) Individual property access must be designed in accordance with the requirements of FNQROC Development Manual. Appropriate distances are required from intersections and tangent points in accordance with AS2890.1.

The access to all properties with two (2) road frontages (Lot 17 & Lot 18) must be from the lower order road being Cater Road.

The provision of layback/roll-over kerbing along the frontage of each allotment will satisfy this condition.

4.5 Water Supply

- (b) A water service connection must be provided to each proposed lot in accordance with FNQROC Development Manual standards (as amended) to the satisfaction of Council's delegated officer
- (b) Where the existing reticulated water supply does not currently service the site or is not at an adequate capacity, the developer is required to extend or upgrade the reticulated water supply infrastructure to connect the site to Council's existing infrastructure at a point that has sufficient capacity to service the development in accordance with FNQROC Development Manual standards (as amended).

4.6 Sewerage Connection

- (a) The developer must connect the proposed development to Council's reticulated sewerage system in accordance with FNQROC Development Manual standards (as amended) to the satisfaction of Council's delegated officer.
- (b) Where sewerage connections are not available to the site, or where existing connections are not satisfactory for the proposed development, the developer is required to extend or upgrade the reticulated sewerage infrastructure to connect the site to Council's existing infrastructure at a point that has sufficient capacity to service the development in accordance with FNQROC Development Manual standards (as amended).

4.7 Electricity provision/supply

The applicant/developer must ensure that an appropriate level of electricity supply is provided to each allotment in accordance with FNQROC Development Manual standards (as amended) to the satisfaction of Council's delegated officer.

Written advice from an Electricity Service Provider is to be provided to Council indicating that an agreement has been made for the provision of power reticulation.

4.8 Telecommunications

The applicant/developer must enter into an agreement with a telecommunication carrier to provide telecommunication services to each allotment and arrange provision of necessary conduits and enveloping pipes.

4.9 Lighting

- (a) The new intersection formed on Ray Road for the purpose of accessing the development and the intersection of Ray Road/ Cater Road must be provided with street lighting for a distance equivalent to at least two (2) spans either side of the intersection to the relevant Lighting Category.
- (b) Prior to the issue of a development permit for Operational Works a Rate 2 lighting scheme is to be prepared by an Ergon Energy approved consultant and submitted to Council for approval. The Rate 2 lighting scheme is to be designed in accordance with the relevant Road Lighting Standard AS/NZS 1158 and the FNQROC Development Manual. The applicable lighting category is to be determined from the Road Hierarchy Table D1.1.

4.10 Street Trees

One (1) street tree must be at the planted at centre of each lot's road frontage. Corner allotments must have a street tree planted on each frontage.

All street trees must be provided in accordance with the FNQROC Development Manual - Design Manual D9 Landscaping.

Plans for the development works required under Conditions 4.1 - 4.10 must be submitted to Council for approval as part of a subsequent application for operational works.

REFERRAL AGENCIES

Not Applicable.

APPROVED PLANS

The following plans are Approved plans for the development:

Plan/Document Number	Plan/Document Title	Prepared by	Dated
9348-ROL1 Rev B	Sheet 1 of 3	Twine Surveys Pty Ltd	25.07.2023
9348-ROL1 Rev B	Sheet 2 of 3	Twine Surveys Pty Ltd	25.07.2023
9348-ROL1 Rev B	Sheet 3 of 3	Twine Surveys Pty Ltd	25.07.2023

ADVISORY NOTES

The following notes are included for guidance and information purposes only and do not form part of the assessment manager conditions:

(D) ASSESSMENT MANAGER'S ADVICE

(a) An Adopted Infrastructure Charges Notice has been issued with respect to the approved development. The Adopted Infrastructure Charges Notice details the type of infrastructure charge/s, the amount of the charge/s and when the charge/s are payable.

(b) The Adopted Infrastructure Charges Notice does not include all charges or payments that are payable with respect to the approved development. A number of other charges or payments may be payable as conditions of approval. The applicable fee is set out in Council's Fees & Charges Schedule for each respective financial year.

(c) Easement Documents

Council has developed standard easement documentation to assist in the drafting of formal easement documents for Council easements. Please contact the Planning Section for more information regarding the drafting of easement documents for Council easements.

(d) Endorsement Fees

Council charges a fee for the endorsement of a Survey Plan, Community Management Statements, easement documents, and covenants. The fee is set out in Council's Fees & Charges Schedule applicable for each respective financial year.

(e) Compliance with applicable codes/policies

The development must be carried out to ensure compliance with the provisions of Council's Local Laws, Planning Scheme Policies, Planning Scheme and Planning Scheme Codes to the extent they have not been varied by a condition of this approval.

(f) Environmental Protection and Biodiversity Conservation Act 1999

The applicant is advised that referral may be required under the *Environmental Protection and Biodiversity Conservation Act 1999* if the proposed activities are likely to have a significant impact on a matter of national environmental significance. Further information on these matters can be obtained from www.dcceew.gov.au.

(g) Cultural Heritage

In carrying out the activity the applicant must take all reasonable and practicable measures to ensure that no harm is done to Aboriginal cultural heritage (the

“cultural heritage duty of care”). The applicant will comply with the cultural heritage duty of care if the applicant acts in accordance with gazetted cultural heritage duty of care guidelines. An assessment of the proposed activity against the duty of care guidelines will determine whether or to what extent Aboriginal cultural heritage may be harmed by the activity. Further information on cultural heritage, together with a copy of the duty of care guidelines and cultural heritage search forms, may be obtained from www.dsdsatsip.qld.gov.au.

(h) Electric Ants

Electric ants are designated as restricted biosecurity matter under the *Biosecurity Act 2014*.

Certain restrictions and obligations are placed on persons dealing with electric ant carriers within the electric ant restricted zone. Movement restrictions apply in accordance with Sections 74–77 of the *Biosecurity Regulation 2016*. Penalties may be imposed on movement of electric ant carriers and electric ants in contravention of the legislated restrictions. It is the responsibility of the applicant to check if the nominated property lies within a restricted zone.

All persons within and outside the electric ant biosecurity zone have an obligation (a **general biosecurity obligation**) to manage biosecurity risks and threats that are under their control, they know about, or they are expected to know about. Penalties may apply for failure to comply with a general biosecurity obligation. For more information please visit the electric ant website at [Electric ants in Queensland | Business Queensland](#) or contact Biosecurity Queensland 13 25 23.

PROPERTY NOTES

Not Applicable.

FURTHER DEVELOPMENT PERMITS REQUIRED

- Development Permit for Operational Work

SUBMISSIONS

Not Applicable.

RIGHTS OF APPEAL

You are entitled to appeal against this decision. A copy of the relevant appeal provisions from the *Planning Act 2016* is attached.

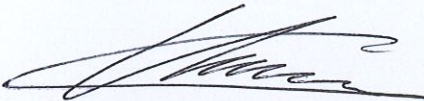
During the appeal period, you as the applicant may suspend your appeal period and make written representations to council about the conditions contained within the development approval. If council agrees or agrees in part with the representations, a “negotiated decision notice” will be issued. Only one “negotiated decision notice” may be given. Taking this step will

defer your appeal period, which will commence again from the start the day after you receive a "negotiated decision notice".

OTHER DETAILS

If you wish to obtain more information about Council's decision, electronic copies are available on line at www.msc.qld.gov.au, or at Council Offices.

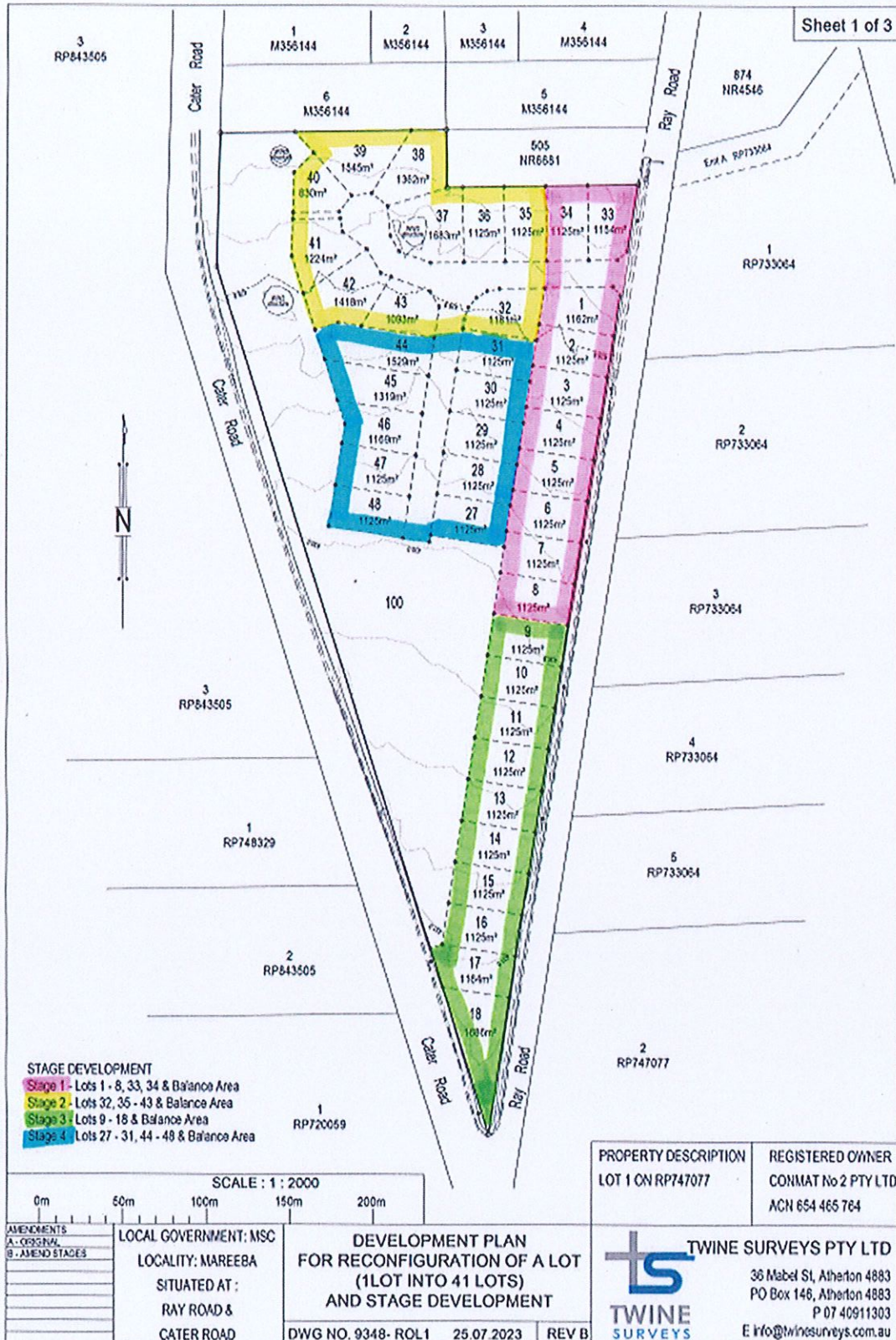
Yours faithfully



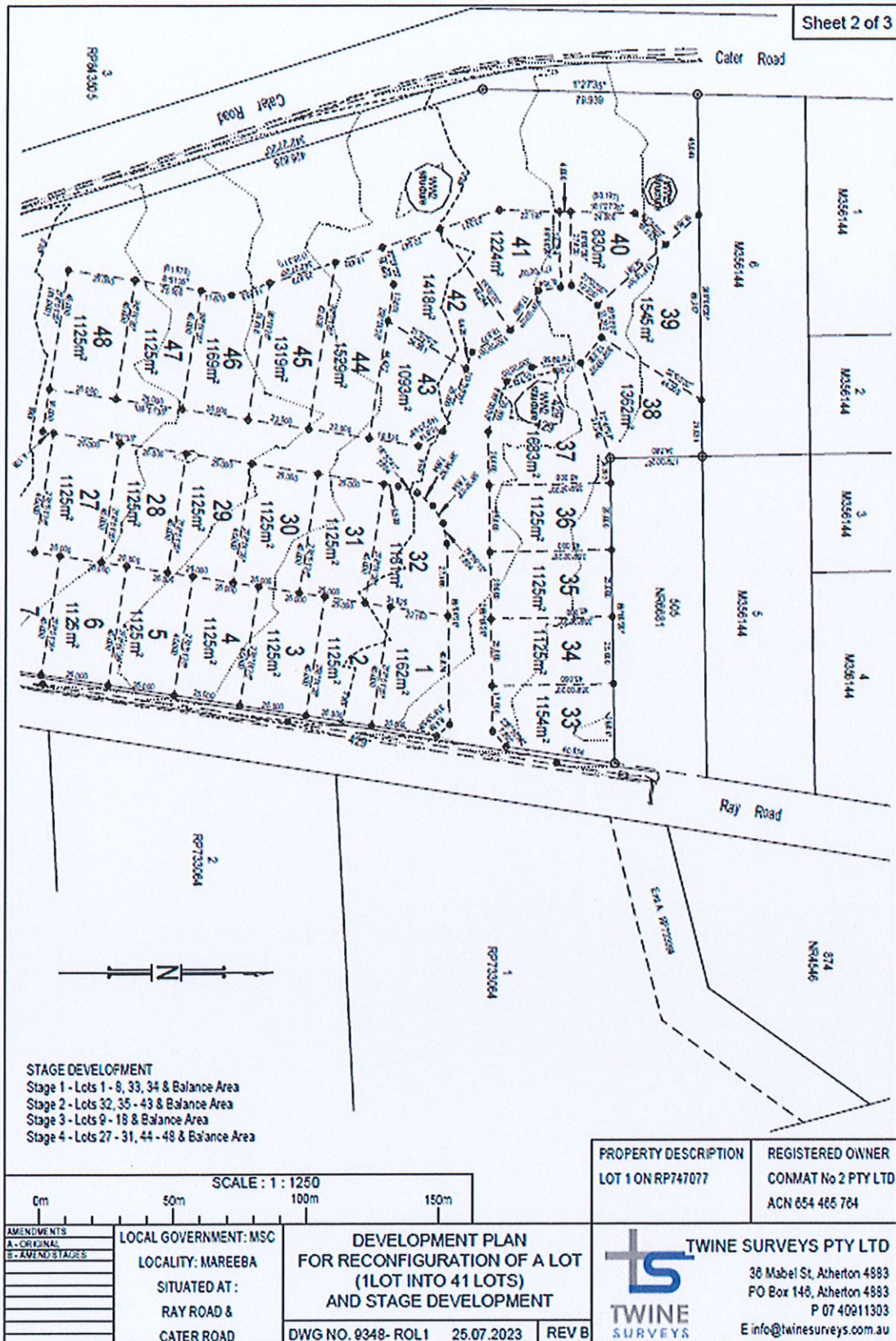
for **BRIAN MILLARD**
COORDINATOR PLANNING SERVICES

Enc: Approved Plans/Documents
Appeal Rights
Adopted Infrastructure Charge Notice

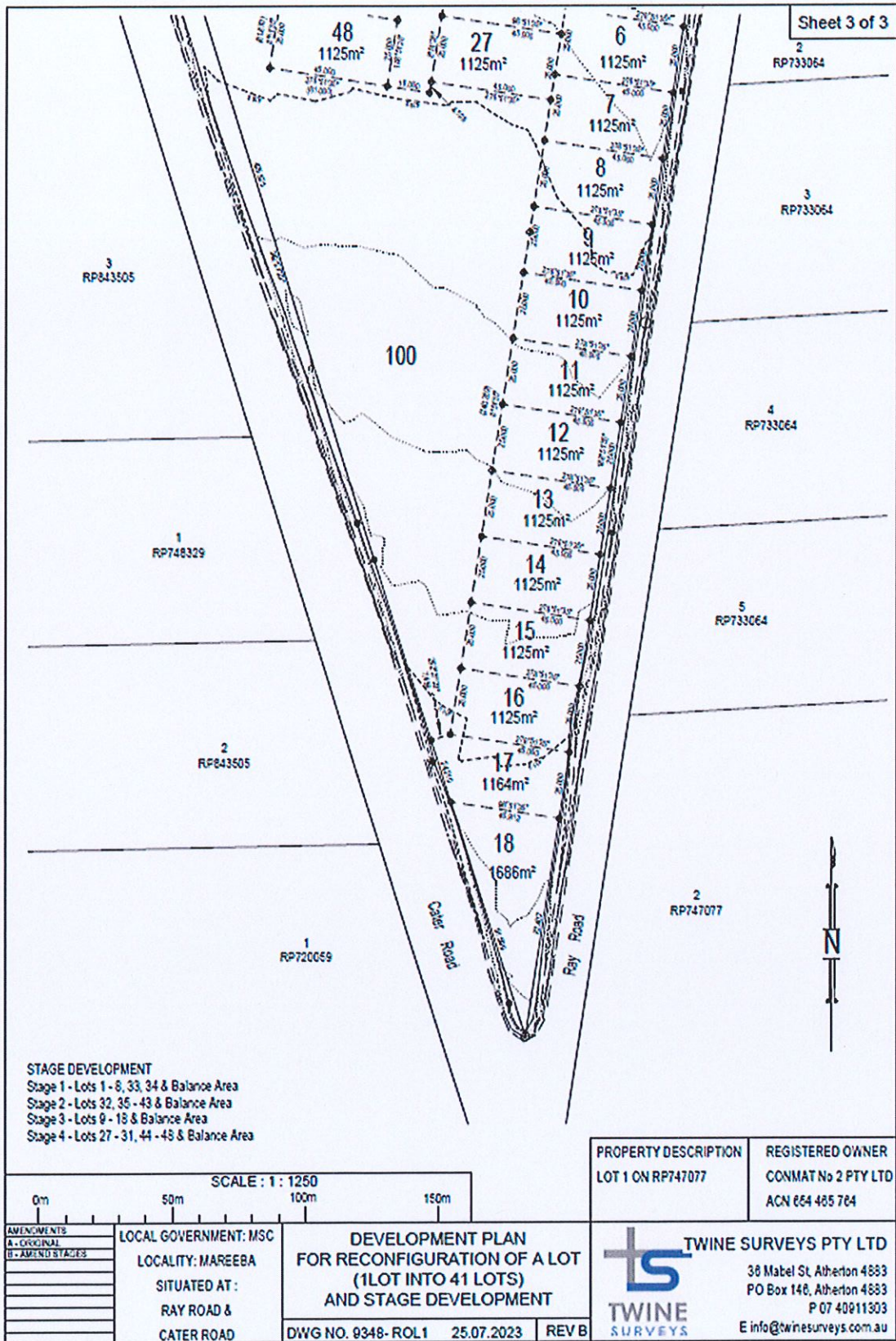
Approved Plans/Documents



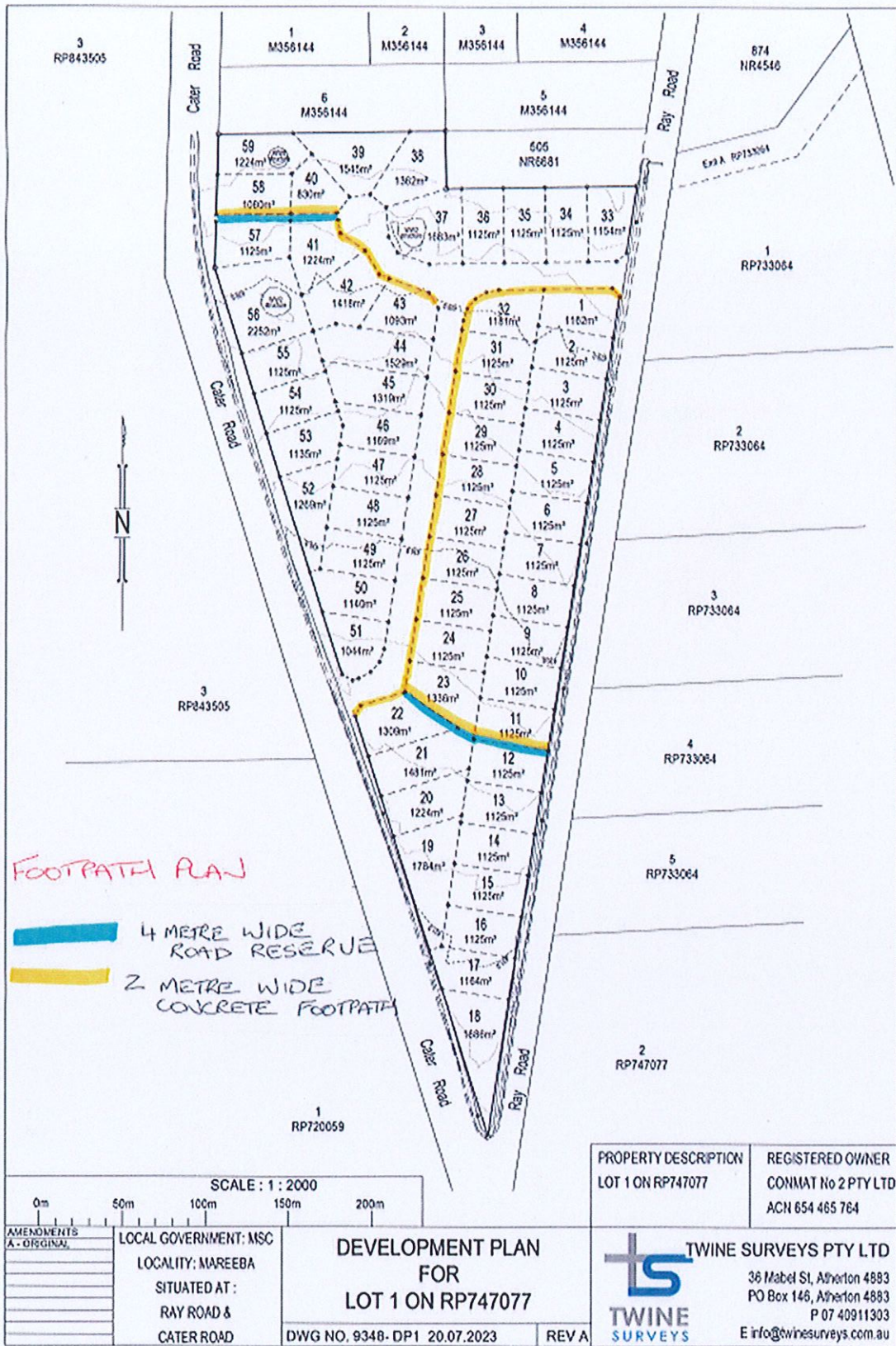
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Appeal Rights

PLANNING ACT 2016 & THE PLANNING REGULATION 2017

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

- (1) Schedule 1 of the *Planning Act 2016* states –
- (a) Matters that may be appealed to –
 - (i) either a tribunal or the P&E Court; or
 - (ii) only a tribunal; or
 - (iii) only the P&E Court; and
 - (b) The person-
 - (i) who may appeal a matter (**the appellant**); and
 - (ii) who is a respondent in an appeal of the matter; and
 - (iii) who is a co-respondent in an appeal of the matter; and
 - (iv) who may elect to be a co-respondent in an appeal of the matter.

(Refer to Schedule 1 of the Planning Act 2016)

- (2) An appellant may start an appeal within the appeal period.
- (3) The **appeal period** is –
- (a) for an appeal by a building advisory agency – 10 business days after a decision notice for the decision is given to the agency; or
 - (b) for an appeal against a deemed refusal – at any time after the deemed refusal happens; or
 - (c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises – 20 business days after a notice is published under section 269(3)(a) or (4); or
 - (d) for an appeal against an infrastructure charges notice – 20 business days after the infrastructure charges notice is given to the person; or
 - (e) for an appeal about a deemed approval of a development application for which a decision notice has not been given – 30 business days after the applicant gives the deemed approval notice to the assessment manager; or
 - (f) for any other appeal – 20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note –

See the P&E Court Act for the court's power to extend the appeal period.

- (4) Each respondent and co-respondent for an appeal may be heard in the appeal.
- (5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.

-
- (6) To remove any doubt. It is declared that an appeal against an infrastructure charges notice must not be about-
- (a) the adopted charge itself; or
 - (b) for a decision about an offset or refund-
 - (i) the establishment cost of trunk infrastructure identified in a LGIP; or
 - (ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

- (1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that-
 - (a) is in the approved form; and
 - (b) succinctly states the grounds of the appeal.
- (2) The notice of appeal must be accompanied by the required fee.
- (3) The appellant or, for an appeal to a tribunal, the registrar must, within the service period, give a copy of the notice of appeal to –
 - (a) the respondent for the appeal ; and
 - (b) each co-respondent for the appeal; and
 - (c) for an appeal about a development application under schedule 1, table 1, item 1 – each principal submitter for the development application; and
 - (d) for an appeal about a change application under schedule 1, table 1, item 2 – each principal submitter for the change application; and
 - (e) each person who may elect to become a co-respondent for the appeal, other than an eligible submitter who is not a principal submitter in an appeal under paragraph (c) or (d); and
 - (f) for an appeal to the P&E Court – the chief executive; and
 - (g) for an appeal to a tribunal under another Act – any other person who the registrar considers appropriate.
- (4) The *service period* is –
 - (a) if a submitter or advice agency started the appeal in the P&E Court – 2 business days after the appeal has started; or
 - (b) otherwise – 10 business days after the appeal is started.
- (5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).
- (6) A person elects to be a co-respondent by filing a notice of election, in the approved form, within 10 business days after the notice of appeal is given to the person.

231 Other appeals

- (1) Subject to this chapter, schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.
- (2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.
- (3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.
- (4) In this section –

decision includes-

- (a) conduct engaged in for the purpose of making a decision; and
- (b) other conduct that relates to the making of a decision; and
- (c) the making of a decision or failure to make a decision; and
- (d) a purported decision ; and
- (e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter-

- (a) is final and conclusive; and
- (b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the Judicial Review Act 1991 or otherwise, whether by the Supreme Court, another court, a tribunal or another entity; and
- (c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, a tribunal or another entity on any ground.

232 Rules of the P&E Court

- (1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.
- (2) However, the P&E Court may hear and decide an appeal even if the person has not complied with the rules of the P&E Court.

6 STORMWATER DRAINAGE

6.1 DESIGN METHOD

The stormwater design has been carried out using the Rational Method, in accordance with the Queensland Urban Drainage Manual (QUDM). Rainfall values from FNQROC Development Manual D4 (05/23) have been utilised. The majority of the hydrological and hydraulic computations undertaken during the development of the stormwater drainage system have been performed utilising the stormwater design module of Version 14 of 12d Model.

In accordance with the QUDM recommendations, the major system design has been calculated based on a 100-year recurrence interval, using a combination of underground and overland flow. Minor flows in rural residential streets are carried entirely by the underground pipe system, which is designed based on a 5-year recurrence interval, in accordance with the requirements of QUDM and FNQROC. Road crossings have been designed to a 10-year recurrence interval for rural areas in accordance with QUDM and FNQROC.

Runoff has been calculated using Rainfall intensities that have been obtained from FNQROC Development Manual - D4 **Stormwater Drainage** - Chart 18 and checked against the Australian Government's - Bureau of Meteorology - Design Rainfall Data System (2016) for the area.

Gully pit capacities have been estimated using FNQROC Section D4 Appendix B "Kerb Inlet Capacity Charts". Roadway flow widths have been calculated using Manning's equation for both major and minor flows.

As a rural residential subdivision, pits have been spaced at intervals to ensure road flows do not exceed the reserve, typical of the adjacent development.

6.2 MINOR DRAINAGE

6.2.1 Hydrological Design Philosophy

The minor drainage system consists of a combination of kerb and field inlet pits interconnected with an underground drainage infrastructure consisting of pits and pipes.

The major drainage system involves overland flow on both the street surfaces, open drains and underground system. The major drainage system has a capacity of Q100 plus 300mm freeboard, as required by QUDM.

6.2.2 Hydrological Analysis

12d Model requires various data to be input by the operator for it to perform hydrological computations as detailed below.

Coefficients of Runoff have been determined in accordance with Section 5.04 of QUDM assuming an Urban Residential Development Category. Rainfall intensities have been obtained from the Australian Government's - Bureau of Meteorology - Design Rainfall Data System (2016) for the area.

Times of Concentration have been determined in accordance with Section 4.6.11 of QUDM, specifically the Recommended Standard Inlet Times detailed in Table 4.6.2. Larger catchment Tc has been calculated on an average slope calculation using the Bransby- Williams' equation in accordance with QUDM.

The Hydrological Analysis for a Q5 and Q100 event have been undertaken including pit flow, catchment, bypass and flow widths for the pit layout are shown in the calculation tables contained in Appendix C. Stormwater longitudinal sections showing pipe grades and a graphical representation of the Hydraulic Grade Line are referred to in **Appendix A**.

Results of the Hydraulic Analysis of the stormwater drainage system including pit and pipe head losses and pipe discharge are detailed in the calculation tables contained in **Appendix E**.

Pipe sizes and invert levels have been determined through the utilisation of 12d Model with a minimum pipe cover of 600mm. The K values utilised by 12d Model in the determination of pit head losses are based on the QUDM K value charts from Table 7.16.5.

6.3 MAJOR DRAINAGE

6.3.1 Overland Flow

In accordance with the requirements of QUDM, the major drainage system, which incorporates overland flow from the cane fields to the south, along the street network and open drains, has been designed for a recurrence interval of 100 years. A portion of the total runoff will be carried by the minor drainage system in the underground pipes and the remainder of the runoff is conveyed by the streets and drains to the lawful point of discharge. As discussed with Council, all external flows will be redirected away from this development by council and are not included in drainage calculations associated with this project.

Depth by velocity calculations for half the road flow have been undertaken and all pits produce satisfactory results regarding pedestrian safety ($dv < 0.6\text{m}^2/\text{s}$).

6.3.2 Flood Immunity

The open drains have been designed to have the capacity to accept a 1% AEP (1 in 100 ARI) with 300mm freeboard. This ensures that a Q100 flood event is below the floor level of residences.

The minor stormwater network can contain a 18% AEP (1 in 5 ARI) with adequate freeboard to the invert. The 1% AEP (1 in 100 ARI) has acceptable flooded widths of the road network and diverts excess flows to the open drains. Refer to **Appendix B** for flooded width plans for Q100 event.

6.4 STORMWATER OUTLETS

Stormwater outlets have been designed to be in council owned land (drainage easements). Outlets have been designed to have outlet scour protection and energy dissipation through rock outlet pads. The outflow from the drains will be directed towards the north-east and conveyed under Ray Rd with a culvert to headwall 1/1.

Upstream flows have been calculated for the existing channels and crossroad drainage culverts to ensure the existing drains have capacity for these flows and minimise the risk of disturbance to property.

Rear of allotment cut off drains have been designed to direct existing overland flows adjacent Stage 1 into the existing open drain system.

6.5 WATER QUALITY

The design addresses the “State Planning Policy 4/10 Healthy Waterways” as below:

Part A – Urban Stormwater Management

Protecting Water Quality	
<p>Performance Outcome P01</p> <p>The development is compatible with the land use constraints of the site for achieving stormwater design objectives.</p>	<p>Acceptable outcome A01.1</p> <p>The nature, design and stormwater management of the development is in accordance with design objectives stated in Chapter 4 (section 4.9) of the State Planning Policy Guideline for Healthy Waters (the guideline)</p> <p>And</p> <p>Prepare a site stormwater quality management plan (SQMP) that:</p> <ul style="list-style-type: none"> a. Is consistent with any local area stormwater management planning; and b. Provides for achievable stormwater quality treatment measures reflecting land use constraints, such as soil type, landscape features (including landform), nutrient hazardous areas, acid sulfate soil, and rainfall erosivity.
<p>Outcome achieved – Stormwater design has been undertaken to incorporate as much of the existing flow paths and dams as practical. All stormwater outlets are directed towards or directly into existing stormwater drainage paths/gullies. Stormwater flows exiting pipe networks have been designed with outlet scour and energy dissipation to reduce velocities to minimise impacts to existing ground. Previous development has shown that outlet drains have naturally re-vegetated to provide additional protection.</p>	

<p>Performance Outcome P02</p> <p>The entry of contaminants into, and transport of contaminants, in stormwater is avoided and minimized.</p>	<p>Acceptable outcome A02.1</p> <p>Any development application incorporates:</p> <ul style="list-style-type: none"> • Stormwater management measures to achieve relevant design objectives outlined in Chapter 4 of the guideline • Management of nutrients of concern and acid sulfate soils. <p>And</p> <p>Prepare a site stormwater quality management plan (SQMP) that:</p> <ol style="list-style-type: none"> a. Accounts for development type, construction phase, local landscape, climatic conditions and design objectives in accordance with the guideline; and b. Is consistent with the Queensland Acid Sulfate Soil Technical Manual.
<p>Outcome achieved – The site is not expected to be subject to Acid Sulfate Soils. Should Acid Sulfate Soils be encountered, appropriate measures will be undertaken in accordance with Queensland Acid Sulfate Soil Technical Manual. An appropriate Erosion and Sediment Control (ESC) plan will be implemented during and post construction as part of the SQMP.</p>	
<p>Performance Outcome P03</p> <p>Construction activities for the development avoid or minimize adverse impacts on stormwater quality.</p>	<p>Acceptable outcome A03.1</p> <p>Any development application for the development is accompanied by an erosion and sediment control plan (ESCP) prepared in accordance with the guideline that demonstrates release of sediment laden stormwater is avoided for the nominated design storm, and minimized when the nominated design storm is exceeded by addressing design objectives in the guideline, Chapter 4, for:</p> <ul style="list-style-type: none"> • Drainage control; • Erosion control; • Sediment control; and • Water quality outcomes.

	<p>Addressing the design objectives may include enhancing the achievement of some objectives if achievement of other objectives is impractical.</p> <p>And</p>
	<p>Acceptable outcome A03.2</p> <p>Erosion and sediment control practices including any proprietary erosion and sediment control products are designed, installed, constructed, operated, monitored and maintained, and any other erosion and sediment control practices are carried out, in accordance with local conditions and appropriate recommendations from a suitable qualified person.</p> <p>Or</p> <p>The ESCP demonstrates how stormwater quality will be managed in accordance with an acceptable regional or local guideline so that target contaminants are treated to a design objective at least equivalent to Acceptable Outcome A03.1</p>
<p>Outcome achieved - An appropriate Erosion and Sediment Control (ESC) plan will be implemented during and post construction as part of the SQMP. The ESC is designed for the application of best practices to erosion and sediment control during and post construction. Stormwater flows exiting pipe networks have been designed with outlet scour and energy dissipation to reduce velocities to minimize impacts to existing ground.</p>	
<p>Protection of Natural flows</p>	
<p>Performance Outcome P04</p> <p>Construction and operation activities for the development avoid or minimize changes to waterway hydrology from adverse impacts of altered stormwater quality and flow.</p>	<p>Acceptable outcome A04.1</p> <p>Development incorporates stormwater flow control measures to achieve at least the design objectives set out in Chapter 4 of the guideline. Both the construction and operational phases for the development comply with advice and the design objectives in Chapter 4 of the guideline including management of frequent flows, peak flows, and construction phase hydrological impacts.</p>
<p>Outcome achieved – Stormwater flows have been designed to be directed to existing stormwater flow paths, with post-development catchments remaining similar to pre-</p>	

development. Stormwater outlets have been designed with energy dissipation to reduce velocities of flows out letting from piped networks. The existing flow regime to existing dams is generally unchanged.

Part C – Non-tidal artificial waterways ('the waterway')

Protecting Water Quality in existing natural waterways

Performance Outcome P01

The waterway is not designed only for stormwater flow management or stormwater quality management.

Acceptable outcome A01.1

The waterway is designed and managed for any of the following end use purposes:

- Amenity including aesthetics, landscaping, and recreation;
- Flood management;
- Stormwater harvesting as part of an integrated water cycle management plan;
- Aquatic habitat.

And

The end use purpose is designed and operated in a way that protects water environmental values.

Outcome achieved – The waterway end use purposes have not changed from the pre-development case. Flows that were directed towards the existing dams in the pre-development case are still current post-development. Flows to the larger gullies also remain generally the same. No new dams are proposed as part of the development, and no flows to existing flow paths are proposed to be significantly altered.

<p>Performance Outcome P02</p> <p>The waterway is located in a way that is compatible with the land use constraints of the site for protecting water environmental values in existing natural waterways.</p>	<p>Acceptable outcome A02.1</p> <p>Where relevant:</p> <ul style="list-style-type: none"> a. Environmental values in downstream waterways are protected; b. Any groundwater recharge areas are not affected; c. The location of the waterway incorporates low lying areas of a catchment connected to an existing waterway; d. Any existing areas of ponded water are included. <p>And</p> <p>Acceptable outcome A02.2</p> <p>Waterways are located:</p>
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	<ul style="list-style-type: none"> a. Outside natural wetlands and any associated buffer areas; and b. To avoid disturbing soils or sediments and c. To avoid altering the natural hydrologic regime in acid sulfate soil and nutrient hazardous areas.
<p>Outcome achieved – The catchments and flow directions on site remain generally the same between pre and post development. No additional dams are proposed, with the existing gullies being maintained toward existing dams and piped flows out letting to these. The larger gullies are also maintained with piped networks out letting toward these.</p>	

<p>Performance Outcome P03</p> <p>The waterway is located in a way that is compatible with existing tidal waterways.</p>	<p>Acceptable outcome A03.1</p> <p>Where the waterway is located adjacent to, or connected to, a tidal waterway by means of a weir, lock, pumping system or similar:</p> <ul style="list-style-type: none"> a. There is sufficient flushing or a tidal range of >0.3m; or b. Any tidal flow alteration does not adversely impact on the tidal waterway; or c. There is no introduction of salt water into freshwater environments.
<p>Outcome achieved – Not adjacent tidal waterways.</p>	
<p>Performance Outcome P04</p> <p>The construction phase for the waterway is compatible with protecting water environmental values in existing natural waterways.</p>	<p>Acceptable outcome A04.1</p> <p>Erosion and sediment control measures are incorporated during construction to achieve design objectives set out in Chapter 4 of the guideline.</p>
<p>Outcome achieved – Erosion and sediment control has been designed in accordance with best practices. The construction contractor will also be responsible for preparing an erosion and sediment control plan in reference to the civil design ESC to ensure appropriate controls are in place during and after construction.</p>	
<p>Performance Outcome P05</p> <p>Stormwater overflows from the waterway provide for the achievement of water quality objectives in existing natural waterways</p>	<p>Acceptable outcome A05.1</p> <p>Stormwater run-off that may enter the non-tidal waterway is pre-treated in accordance with the guideline design objectives, water quality objectives of local waterways, and any relevant local area stormwater management plan.</p>
<p>Outcome achieved – Stormwater has been designed to be captured and conveyed to the existing stormwater flow paths as per previous stages of the development. Run-off quality is enhanced by large areas of natural grass and vegetation to prevent sediment runoff.</p>	
<p>Designing, managing and operating the non-tidal artificial waterway</p>	

<p>Performance Outcome P06</p> <p>The waterway is designed, managed and operated by suitably qualified persons.</p>	<p>Acceptable outcome A06.1</p> <p>To help achieve water quality objectives in and downstream of the waterway, the waterway is designed, constructed and managed under the responsibility of a suitably qualified registered professional engineer, Queensland with specific experience in establishing and managing artificial waterways.</p>
<p>Outcome achieved – No additional artificial waterways are to be constructed as part of the works. Flows to existing artificial waterways and drainage paths have been designed under the responsibility of an RPEQ.</p>	
<p>Performance Outcome P07</p> <p>The waterway is managed and operated in ways that demonstrate achievement of water quality objectives in natural waterways.</p>	<p>Acceptable outcome A07.1</p> <p>Monitoring and maintenance programs adaptively manage water quality in the waterway to achieve relevant water quality objectives downstream of the waterway.</p> <p>And</p> <p>Acceptable outcome A07.2</p> <p>Aquatic weeds are managed in ways that achieve a low percentage of coverage of the water surface area (less than 10%). Pests and vectors (such as mosquitoes) are managed such as by avoiding stagnant water areas, providing for native fish predators, and if necessary, other best practices for monitoring and treating pests.</p> <p>And</p> <p>Acceptable outcome A07.3</p> <p>The waterway is managed and operated by a responsible entity under agreement for the life of the waterway.</p> <p>The responsibility entity is to implement a deed of agreement for the management and operation of the waterway that:</p> <ol style="list-style-type: none"> a. Identifies the waterway; b. States a period of responsibility for the

	<p>entity for the management and operation of the waterway;</p> <p>c. States a process for any transfer of responsibility for the waterway;</p> <p>d. States required actions under the agreement for monitoring of the water quality of the water and receiving waters;</p> <p>e. States required actions under the agreement for maintaining the waterway to achieve the outcomes of this policy and any relevant approval conditions of the development; and</p> <p>f. Identifies funding sources for the above including bonds, headworks charges or levies.</p>
<p>Outcome achieved – No additional artificial waterways are to be constructed as part of the works. Existing flow paths remain in place post development and no significant catchment changes are proposed.</p>	

7 POTABLE WATER RETICULATION

7.1 DESIGN METHOD

All reticulation mains have been designed in accordance with the FNQROC Development Manual for 500 litres/person/day as follows:

- Single Family Dwelling (>1500 m²) = 3.7 EP/Connection
- Average Day Consumption (AD) = 1,850 L/day
- Mean Day Maximum Month (MDMM) = 1.5 x AD = 2,775 L/day
- Maximum Day = 2.25 x AD = 4,163 L/day
- Maximum Hour = 1/12 MD = 347 L/hour
= 0.0964 L/s

The following design criterion was assessed:

- Pressure in system to remain above 22m and below 60m during Maximum Hour Demand.
- Pressure in system to remain above 12m during firefighting flows of 15 L/s.

7.2 GENERAL LAYOUT

7.2.1 Alignment

Water mains have been designed on an alignment of 2.0m from the RP boundary as per the Mareeba Shire requirement in Table D6.2 of the FNQROC Development Manual.

7.2.2 Cover

The minimum cover for mains located on the footpath is 600mm and 800mm for a road crossing, whilst complying with a maximum of 1200mm.

The minimum separation between the water main and other services is as follows:

Minimum Clearance for Water Mains ≤ 300mm diameter

Service	Horizontal Clearance (mm)	Vertical Clearance (mm)
Ergon	500	225
Telstra	300	150
Stormwater	300	150
Sewer	1000	500
Water Crossing	300	150

*Based on WSA 03 Table 4.1

7.2.3 Fittings

Road crossings shall be DICL with a minimum diameter of 100mm.

Rider Mains

Properties located on the opposite side of the road to the water main are serviced by a DN63mm MDPE pipe to serve a maximum of 15 allotments.

Hydrants

Fire hydrants shall be located opposite RP boundaries at a maximum spacing of 80m and shall be located on mains 100mm dia. or greater only.

Valves

Valves are installed throughout the system to provide minimum disturbance during maintenance. The maximum number of houses inconvenienced is no greater than 15.

7.3 DESIGN

EPA Net modelling was carried out using the above design information and parameters. Two models were assessed (refer **Appendix F**), the first model simulated Maximum Hour demand "MH", and the second model simulating the system under Fire Fighting conditions "FF". Both EPA Net models used a water supply 'reservoir' with a Head of 35 metres to represent the pressure in the existing 300mm diameter trunk main, this conservative estimate reflects pressure testing conducted at 35 Mclver Street refer to (**Appendix F**).

The EPA Net simulations confirm all required pressures have been comfortably achieved in the two Stage 1 model scenarios. Preliminary assessment of future stages show there is acceptable capacity in the supply network.

The water main reticulation layout is detailed in the Operational Works drawings. Water Reticulation EPANET calculations are provided in **Appendix F**.

7.3.1 Maximum Hour Demand

The local water network has been modelled with the proposed network and demands added. The network shows that the network complies with pressures between the minimum 22m and maximum 60m pressure requirements at maximum hour demand, in both the interim & ultimate development cases.

7.3.2 Fire Fighting Demand

The assessment undertaken as part of the design works shows that the network is able to operate at the minimum required pressure head of 12m at 15L/s flow, in both the interim & ultimate development cases. With future network upgrades planned for the water reticulation network in the area, this will only further improve the serviceability beyond the minimum as these are undertaken.

8 SEWERAGE RETICULATION

The sewer reticulation design has been carried out in accordance with the FNQROC Development Manual – Design Guidelines D7 – Sewerage System.

The following criteria (derived from FNQROC Development Manual Table 7.5) have been used in the design calculations:

Diameter	Minimum Grade	Allowable EDC's
150	150	259
225	290	549
300	420	983
375	570	1530

8.1 GENERAL SEWER LAYOUT

8.1.1 Horizontal Alignment

The sewer alignment and the location of manholes were designed in accordance with FNQROC Development Manual requirements with alignments as follows:

- 1.5m from front property boundaries (where located within an allotment)
- 1.6m from front property boundaries (where located within road reserve)
- 0.8m from side and rear boundaries

Sewer mains have been located within road reserve to improve design outcome and following on from this philosophy being successful in the previous stage.

The longest length of sewer without a manhole is 30m and the longest length of sewer between manholes 100m.

Connection into the council Sewer network occurs within St Steven's College which fronts onto Mclver Street.

8.1.2 Vertical Alignment

Cover

All sewer reticulation pipes have been designed to have a minimum of 600mm cover within lots and 800mm beneath roadways.

The minimum separation between the sewer pipe and other services is as follows:

Minimum Clearance for Sewer ≤DN 300mm

Service	Horizontal Clearance (mm)	Vertical Clearance (mm)
Sewer ≤DN 300mm	300	150
Sewer >DN 300mm	600	300

Gas main	300	150
Telecommunication conduits and cables	300	150
Electricity conduits and cables	500	225
Stormwater drainage	300	150
Water Mains	1000/600	500
Kerbs	150	150 (where practicable)

*Based on Table 4.2 WSA 02-2002-2.3.

House Connections

House connections to the sewer main have been designed based on control to the lowest point of the lot. The sewer is to be deep enough to control the whole property at a minimum grade of 1 in 60 after allowing a depth to invert of 400mm at the start of the drain plus a drop of 150mm from the invert of the house connection to the sewer.

Minimum Grading

For a 150mm diameter sewer pipe the minimum grades are:

- 1:100 for the most upstream line
- 1:150 for all others

8.2 SEWERAGE SYSTEM DESIGN

The sewerage system has been designed in accordance with the FNQROC Development Manual. The sewer layout plans and longitudinal sections are contained in drawings 160-011-C111 – C113. The Sewer Master Plan is attached as drawing 160-009-C127 – C130.

9 ROAD PAVEMENT DESIGN

All roadway pavements have been designed in accordance with the FNQROC Development Manual section D3 – Road Pavements.

9.1 DESIGN METHOD

9.1.1 Design Life

A Design Life of 20 years has been adopted for all streets and roads.

9.1.2 Subgrade

California Bearing Ratio (CBR) testing has not been completed as part of the design. The CBR testing is to be evaluated prior to construction by in situ CBR, and 4-day soaked CBR by a NATA registered materials testing authority using the procedures described by the Department of Main Roads and Standards Association of Australia. A value of 7% has been adopted for design purposes.

9.1.3 Flexible Pavement Design

In accordance with Table D3.1 of the FNQROC Development Manual the minimum allowable traffic loading for each pavement type has been reviewed and, in each case, the allowable traffic exceeds the minimum allowable.

The road classification is “Low Density Rural Road” which allows for a sealed carriageway, kerb and channel, and verge. The road reserve width is nominally 20.0m. Table D3.2 of the FNQROC Development Manual requires a minimum pavement thickness of 200mm and a minimum surfacing of 30mm AC.

A copy of the pavement design standard drawings is contained within **Appendix A**.



10 ELECTRICAL, COMMUNICATIONS, AND GAS RETICULATION

Ergon Energy and Telstra have been approached to supply conditions and conduit drawings by the electrical consultant.

There is no provision for gas in this subdivision.

11 SOIL AND WATER MANAGEMENT

A Soil and Water Management Strategy (SWMS) has been produced that identifies policies and development conditions relevant to the site and recommend measures required to satisfy those requirements. In accordance with the FNQROC Section D5. The strategy consists of:

- A Concept Report that identifies the constraints of the site and recommends measures to address those constraints; and
- Soil and Water Management Plan (SWMP) providing measures that can be adopted to address those constraints.

The following documents have been referenced in preparing this SWMP:

- ERSCON Pty Ltd construction drawings;
- FNQROC Development Manual;
- IEAust Soil Erosion and Sediment Control Guidelines;
- NSW DLWC – Construction and Sediment Control (Course Notes);
- Queensland Urban Drainage Manual; and
- Australian and New Zealand Guidelines for Freshwater and Marine Water Quality.

11.1 EROSION AND SEDIMENT CONTROL STANDARDS

11.1.1 Duty of Care

In accordance with the Environmental Protection Act, 1994 (the Act), all Queenslanders have a legal duty to take all reasonable and practicable measures to minimise or prevent environmental harm.

In accordance with the Integrated Planning Act, 1997, it is a requirement to comply with Council's Planning Scheme and conditions issued in Development Permits.

This SWMP considers environmental harm caused by sediment-laden runoff from the subject site entering stormwater drains and/or waterways.

11.2 CONCEPT REPORT

11.2.1 Site Conditions

The subject site is currently generally well vegetated with medium slopes.

11.2.2 Control Measures

Erosion and sediment control measures are to be designed and constructed in accordance with the FNQROC Development Manual. Specific requirements are provided on drawing 160-001-C118 - C120.

11.2.3 Water Quality Strategy

In accordance with the requirements of the Queensland Urban Drainage Manual, management of water quality involves:

- Identifying and enhancing environmental values;
- Establishing objectives to achieve the required level of protection;
- Establishing water quality management strategies;
- Monitoring and surveillance programs;
- Research.

11.2.4 Water Quality Monitoring

The soil and water management strategy requires water sampling 50m downstream of the point where stormwater drainage discharges. Sampling is required only after significant rainfall i.e. 10mm.

11.3 EROSION AND SEDIMENT CONTROL PLAN

Erosion and sediment control measures are to be designed and constructed in accordance with the FNQROC Development Manual, as detailed in the Soil and Water Management Strategy, and 160-011-C133-134 "Erosion and Sediment Control Plan" and 160-011-C135 "Erosion and Sediment Control Notes".

The Contractor shall take all reasonable precautions to minimise erosion and prevent sediment-laden runoff from leaving the site. This goal will be monitored to ensure minimal erosion on site and no visible siltation of waterways by implementing effective erosion and sediment control.

The purpose of this SWMP is to ensure the Contractor meets the following objectives:

- Comply with all relevant legislation;
- Ensure erosion and sedimentation is controlled in an appropriate and cost-effective manner;
- Maintain and if possible, enhance the existing environment;
- Reinforce and improve environmental awareness within the workforce and the general community.

11.3.1 Environmental Responsibilities of Key Staff

Inspection Officer

The Inspection Officer is to be nominated by the Contractor.

Project Manager (PM)

The Project Manager will be responsible for:

- Coordinating the response to any major environmental incident and reporting serious or material harm to the Inspection Officer, Council, EPA and/or other agencies as appropriate;
- Monitoring, review and continuous improvement of the SWMP;
- Assess the need and if required ensure the proper completion of all internal and sub-contractor audits;
- Ensuring compliance of construction activities with the EP Act and other relevant legislation, codes and specifications;
- Liaison with all external authorities and stakeholders;
- Investigating and addressing complaints in the shortest possible time frame;
- Ensuring appropriate document control is maintained and;
- Supporting and providing advice to the project team.

Contractor Environmental Representative (CER):

The Contractors Environmental Representative will be responsible for:

- The implementation and operation of the environmental control measures as detailed in the SWMP;
- Monitoring the effectiveness of control measures;
- Recording and reporting non-conformances to the SWMP;
- Recording and reporting environmental complaints and incidents;
- Advising the PM and Inspection Officer of all environmental issues;
- Ensuring all staff on-site receive an appropriate environmental induction;
- Taking all reasonable and practical measures to prevent or minimise environmental harm occurring at jobsites under his/her supervision and;
- Seeking advice from the Project Manager if uncertain of environmental requirements.

Works Supervisor (WS):

The Works Supervisor will assist the CER in the implementation of the SWMP, and the ongoing awareness of environmental issues for the Construction Workforce. The overseer shall:

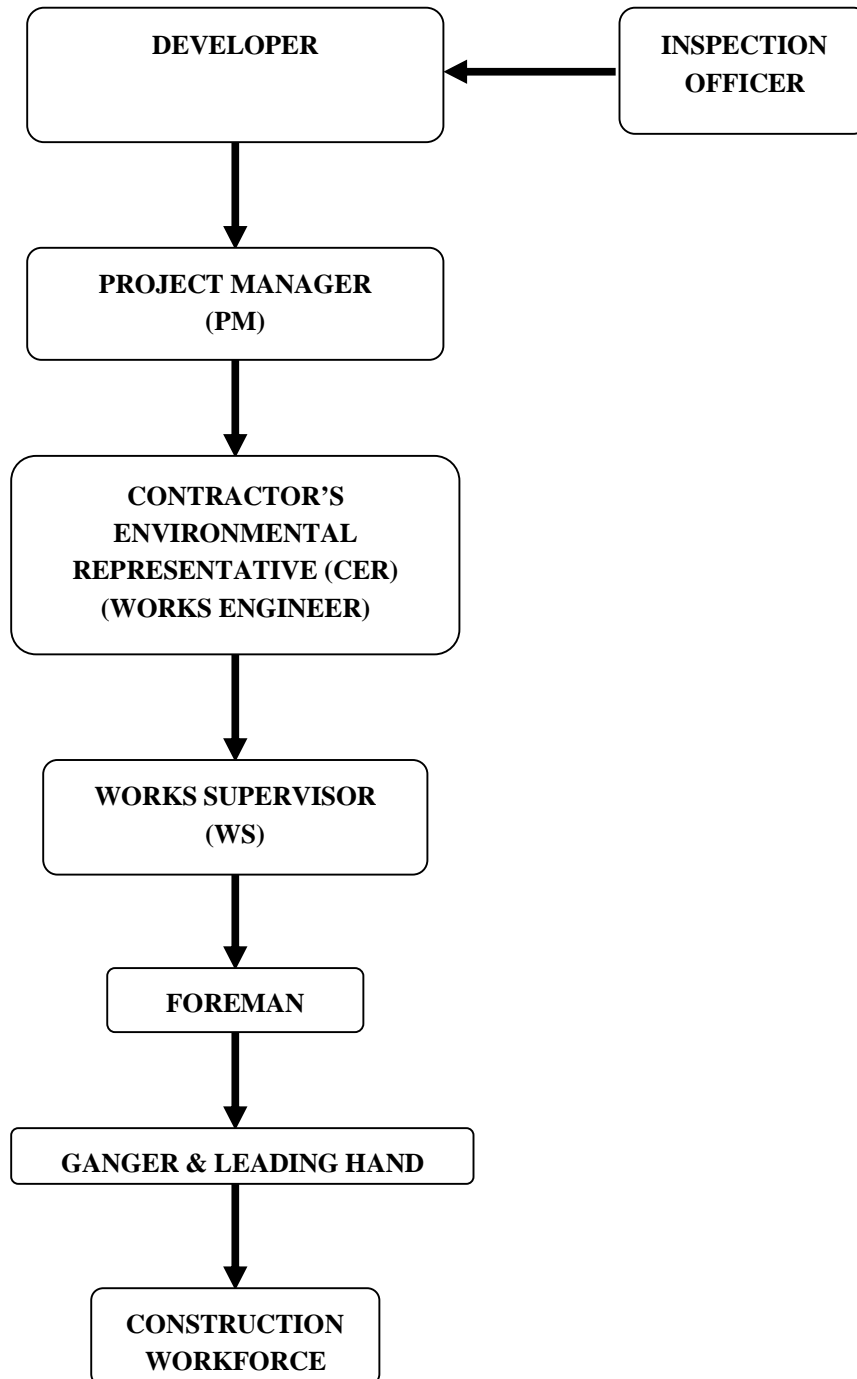
- Have a full understanding of the SWMP;
- Be fully aware of all environmental issues associated with the project; and
- Be responsible for the maintenance of control measures.

Construction Workforce:

Each member of the construction workforce will be responsible for:

- Ensuring they have a full understanding of their own environmental responsibilities;
- Assist in the implementation and maintenance of environmental protection measures in accordance with the SWMP and as directed by the CER; and
- Immediately reporting environmental complaints and incidents to the Environmental Supervisor.

Environmental Organisation Structure



11.3.2 Erosion Potential

Observations from site inspections concur that the risk of sediment laden runoff leaving site is low. The site is naturally well vegetated.

Short sharp rainfall events will create silt/sediment that can be trapped on site. In the event of catastrophic failure of sediment control structures (due to vandalism or other undefined event) clean up operations would quickly mitigate the impacts.

The risk of long-term environmental impacts due to sedimentation from the proposed works is considered very low if the SWMP is fully implemented.

11.3.3 Evaluation of the Project

Investigation into erosion and sedimentation control has been reviewed as follows:

Timing of the Works:

Construction works are will be timed to coincide with a moderate to low rainfall month. Stormwater and sewer works will be constructed first which provide a low risk in terms of erosion and sediment control. Once these works are completed, an assessment of the potential rainfall will be made in consultation with Council to determine if bulk earthworks and road construction will proceed immediately after.

Works Program:

It is expected the works will be completed as follows:

- Approval to proceed;
- Install erosion sediment control devices and site facilities;
- Strip and grub;
- Install Services;
- Commence bulk earthworks (after assessment of potential rainfall);
- Construct Roads;
- Turf batters;
- Grass footpath and other exposed areas;
- Complete works; and
- Hand over.

11.3.4 Best Management Practice

The review of this site has been made in conjunction with the Institute of Engineers Australia "Soil Erosion and Sediment Control Guidelines." All erosion and sedimentation control works are to be completed in accordance with that publication.

The selection methodology for the most appropriate control methods has due regard to cost-effectiveness, availability of materials, feasibility, durability, and compatibility. The most significant of the above is compatibility (i.e. has the system been used and proved on previous local works).

Perimeter Channel and Bunds

Diversion Channels and Cut Off Bunds are to be constructed to direct clean water away from the works and through culvert structures. The surrounding landform is steep with good vegetal

cover. Overland flow velocities will be maintained at less than 2.31 m/s, which is considered acceptable (refer IEAust Table A8.5 given full cover).

Permanent Stabilisation Measures

The proposed works do not include hard “engineered” stabilisation methods. It is not considered appropriate (cost effective) to construct “engineered” stabilisation as the existing (where undisturbed) vegetation cover provides appropriate and visually attractive stabilisation.

As part of this SWMP, rehabilitation of vegetation by seeding, drill seeding, turfing and hydro mulching, at an early stage is considered vital to the successful control of erosion (and capture of sedimentation).

Site Office

The site office and plant compound shall be fully fenced with all fuels and hazardous liquids shall be stored in a bunded area 110% the volume of stored liquid. All parking areas shall be maintained in a stable condition including surfacing as required.

Site Entry Points

There shall be only one site entry and exit point. All vehicles must enter and leave the site at these locations only. Site entry points shall also have a wash down area adjacent when stripping, and clearing and grubbing works expose plant and equipment to transportation of weeds.

The following items are proposed for incorporation into the works and details of their use and limitations have been assessed as part of the design process:

- Construction Exits (A5-C3)
- Sediment Fences (A5-C10)
- Catch Drains and Perimeter Banks (A5-A1)
- Rock Check Dams (A5-A2)

11.3.5 Erosion and Sediment Control Plan

For ESCP drawing, refer 160-001-C118 & 119

11.3.6 Implementation, Monitoring and Review

It is the responsibility of the CER to correctly implement and monitor this ESCP. It is also critical that the CER reviews and documents and provide appropriate suggestions for improvements through the project life.

11.3.7 Implementation Strategies

To ensure the objectives of the Erosion and Sediment Control Plan (ESCP) check list of responsibilities and requirements are provided below.

Actions	Locations	Timing	Responsibility
Induct all personnel as appropriate	All	Prior to Disturbance	CER

Flag the limits of disturbance and advise workforce of these limits.	Each stage of excavation.	Prior to disturbance.	CER
Divert clean water around site using lined or vegetated drains.	Perimeter of site.	Prior to disturbance.	CER
Install sediment control devices.	As per ESCP.	Prior to disturbance.	CER
Flag limits of stockpile sites clear of drainage paths and enclose with sediment fence.	As approved	Duration of works	CER
Prevent stormwater from running over exposed batters by installing catch banks/drains and directing into a stabilized batter chute or off site.	All exposed batters.	As work progresses.	WS
Install check dams in bare earth table drains if required.	Bare earth table drains	As soon as practicable.	WS
Topsoil shall be stockpiled and respread over bare areas prior to grassing to assist re-vegetation.	Bare batters and footpaths	After earthworks are completed	WS
As far as possible, the surface of batters and drains should be left in a roughened state to reduce runoff velocity and promote re-vegetation.	Earth batters and drains	As earthworks proceed.	WS
Bare earth batters to be hydro mulched to protect the surfaces using suitable species mix and application rates.	Earth Batters	As works progress or immediately following final trim of an area.	WS
Footpaths and disturbed areas to be seeded within 1 week of final trim	All exposed areas	As works progress	WS
All ESC devices to remain in place until at least 70% vegetation cover	All exposed areas	At completion of project	WS

11.3.8 Monitoring Requirements

Parameter / Item	Locations	Timing	Responsibility
Visually assess condition of erosion and sediment control devices, clean out sediment (if required), and repair any damage.	All job sites	Daily	WS
Visually inspect the turbidity of runoff leaving the site to determine effectiveness of erosion and sediment controls devices.	All job sites.	During and following any significant rainfall/runoff event.	WS
Record turbidity (photo of turbidity tube) of water over topping sediment control devices.	Downstream of structure.	During and following any significant rainfall/runoff event.	CER
Measure turbidity 50m upstream and 50m downstream.	Downstream of site.	Following rainfall event >10mm	CER
Obtain regular weather forecasts from the Bureau of Meteorology to assess risk.	Forecasts for Cairns district.	Daily.	WS

11.3.9 Reporting

The CER shall maintain appropriate records of each inspection and/or action and shall report any non-conformance incidents to the PM and Inspection Officer for action.

11.3.10 Audit

Auditing shall be completed by the PM following a major non-conformance and during random inspections if deemed necessary.

The PM shall report audit findings to the CER for action.

11.3.11 Emergency Procedures

In the event that a significant failure occurs, and that sediment-laden runoff is leaving the site the CER shall immediately protect the erosion source by:

- Covering the affected area with plastic or geofabric if localised;
- Reducing the flow velocities by installing check dams;
- Rock armour channels where velocities and turbulence are excessive;
- Other methods as deemed appropriate;

The PM shall be notified to jointly assess clean up requirements and if further action is required.

11.3.12 Corrective Action

The CER shall record any non-conformance with the EMP(C) on the Non-Conformance Report (NCR) located within Council's Quality System and notify the Inspection Officer.

11.3.13 Environmental Site Induction

All personnel (staff, workforce, sub-contractors, and plant operators) working on site are to receive appropriate induction as to the requirements of this SWMP.



It is the responsibility of the CER to ensure all site personnel receive appropriate awareness training and induction prior to or as soon as practicable after, commencement on site. The induction shall include instruction regarding the following:

- Environmental objectives and policies;
- Due diligence;
- Environmental duty of care;
- Duties and responsibilities of environmental officers;
- Key environmental issues relating to this project;
- Project specific requirements contained in the Management Plans;

Where deemed appropriate for short-term personnel (including visitors), the CER may elect to provide a brief environmental explanation/induction and control access to the site.

The CER shall maintain a register, signed by all inductees. The CER shall also monitor the existing workforce to ascertain if additional training is required.

11.3.14 Environmental Reporting

The Inspection Officer shall submit an Environmental Report on a monthly basis that will cover the following items:

- Results of all monitoring;
- NCR's against the EMP(C) in accordance with the Quality procedures;
- Monthly EMP(C) review and revisions;
- Results of internal and external audits.

Where an event of potential or actual serious environmental harm is identified, the CER shall immediately inform the PM. The PM shall inform the Inspection Officer (or his representative), Council and the EPA as soon as practicable (but no later than 24 hours).

The PM shall monitor environmental performance throughout the project to determine if and when additional Environmental Audits are required.

11.3.15 Environmental Audits

Environmental Audits of the EMP(C) shall be completed by the PM at the following times:

- Following and event of potential or actual serious environmental harm;
- Prior to submission of "Practical Completion";
- As deemed necessary.

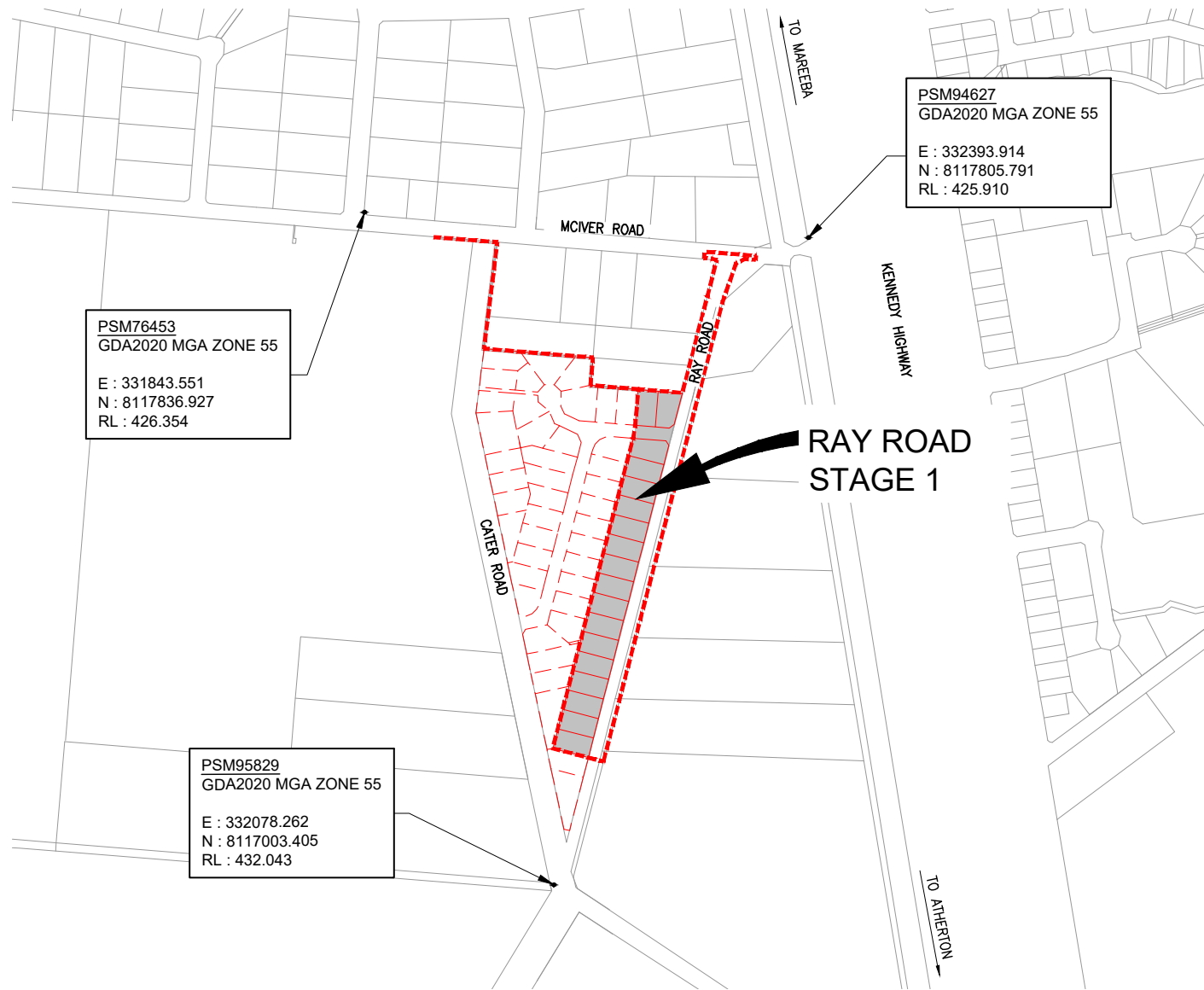


APPENDIX A

Design Drawings

CONMAT PTY. LTD.

RAY ROAD SUBDIVISION STAGE 1



PROJECT DRAWINGS LIST

- 160-011-C101 COVER SHEET, LOCALITY PLAN AND DRAWINGS LIST
- 160-011-C102 GENERAL NOTES
- 160-011-C103 EXISTING LAYOUT
- 160-011-C104 GENERAL LAYOUT (SHEET 1 OF 2)
- 160-011-C105 GENERAL LAYOUT (SHEET 2 OF 2)
- 160-011-C106 GRADING PLAN (SHEET 1 OF 2)
- 160-011-C107 GRADING PLAN (SHEET 2 OF 2)
- 160-011-C108 RAY ROAD LONGITUDINAL SECTION (SHEET 1 OF 2)
- 160-011-C109 RAY ROAD LONGITUDINAL SECTION (SHEET 2 OF 2)
- 160-011-C110 ROAD B LONGITUDINAL SECTION
- 160-011-C111 RAY ROAD AND ROAD B INTERSECTIONS
- 160-011-C112 RAY ROAD CROSS SECTIONS (SHEET 1 OF 2)
- 160-011-C113 RAY ROAD CROSS SECTIONS (SHEET 2 OF 2)
- 160-011-C114 ROAD B CROSS SECTIONS
- 160-011-C115 DRAINAGE PLAN (SHEET 1 OF 2)
- 160-011-C116 DRAINAGE PLAN (SHEET 2 OF 2)
- 160-011-C117 DRAINAGE LONGITUDINAL SECTION (SHEET 1 OF 5)
- 160-011-C118 DRAINAGE LONGITUDINAL SECTION (SHEET 2 OF 5)
- 160-011-C119 DRAINAGE LONGITUDINAL SECTION (SHEET 3 OF 5)
- 160-011-C120 DRAINAGE LONGITUDINAL SECTION (SHEET 4 OF 5)
- 160-011-C121 DRAINAGE LONGITUDINAL SECTION (SHEET 5 OF 5)
- 160-011-C122 REAR DRAIN LONGITUDINAL SECTION
- 160-011-C123 STORMWATER PIT DESIGN (SHEET 1 OF 2)
- 160-011-C124 STORMWATER PIT DESIGN (SHEET 2 OF 2)
- 160-011-C125 SEWER PLAN (SHEET 1 OF 3)
- 160-011-C126 SEWER PLAN (SHEET 2 OF 3)
- 160-011-C127 SEWER PLAN (SHEET 3 OF 3)
- 160-011-C128 SEWER LONGITUDINAL SECTION (SHEET 1 OF 3)
- 160-011-C129 SEWER LONGITUDINAL SECTION (SHEET 2 OF 3)
- 160-011-C130 SEWER LONGITUDINAL SECTION (SHEET 3 OF 3)
- 160-011-C131 WATER PLAN (SHEET 1 OF 2)
- 160-011-C132 WATER PLAN (SHEET 2 OF 2)
- 160-011-C133 EROSION AND SEDIMENT CONTROL PLAN (SHEET 1 OF 2)
- 160-011-C134 EROSION AND SEDIMENT CONTROL PLAN (SHEET 2 OF 2)
- 160-011-C135 EROSION AND SEDIMENT CONTROL NOTES AND DETAILS
- 160-011-C136 STORMWATER PIT DETAILS
- 160-011-C137 RCBC BASE SLAB
- 160-011-C138 STRUCTURAL ENGINEERING NOTES
- 160-011-C139 WH&S NOTES
- 160-011-C140 INTERSECTION TURN PATHS

Client:

Prepared by:



FOR COUNCIL APPROVAL

GENERAL NOTES:

- 1. LEVEL DATUM : AHD, GDA2020 ZONE 55
2. ORIGIN OF LEVELS:

Table with 5 columns: PSM NUMBER, EASTING, NORTHING, RL, LOCATION. Rows include PSM76453, PSM94627, PSM95829.

- 3. EXISTING CONDITIONS HAVE BEEN BASED ON SURVEY DATA COLLECTED BY TWINE SURVEYS PTY LTD. NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY OF THE INFORMATION SHOWN.
4. DETAILS OF SERVICES ARE PROVIDED FOR INFORMATION ONLY, AND NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY AND COMPLETENESS OF THE INFORMATION. POSITIONS OF SERVICE CROSSINGS SHALL BE RECORDED AND CHECKED BY THE CONTRACTOR. NOT ALL CROSSINGS HAVE NECESSARILY BEEN SHOWN ON THE DRAWINGS. THE CONTRACTOR IS TO CHECK SERVICES ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
5. FOR ALL SPECIFICATIONS REFER TO FNQROC STANDARD SPECIFICATIONS.
6. SERVICE TRENCH REQUIRED ADJACENT TO ALL BATTLE AXE DRIVEWAYS IN ACCORDANCE WITH FNQROC DEVELOPMENT MANUAL AND AS DIRECTED ON SITE BY SUPERINTENDENT. SERVICE TRENCH TO FINISH 1m PAST END OF DRIVEWAY. STORMWATER CONDUIT NOT REQUIRED.
7. INSPECTION AND TEST PLANS ARE TO BE UNDERTAKEN BY CONTRACTOR IN ACCORDANCE WITH FNQROC DEVELOPMENT MANUAL.
8. AS CONSTRUCTED DATA TO BE PREPARED AND SUBMITTED BY THE CONTRACTOR IN ACCORDANCE WITH FNQROC DEVELOPMENT MANUAL.

EARTHWORKS NOTES:

- 1. STRIP TOPSOIL AND GRUB VEGETATIVE MATTER TO A MINIMUM OF 100mm IN ACCORDANCE WITH THE FNQROC DEVELOPMENT MANUAL.
2. ALL EARTHWORKS SHALL BE IN ACCORDANCE WITH AS3798 "GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS" AND FNQROC STANDARD SPECIFICATIONS.
3. EARTHWORKS TO BE LEVEL '1' CONTROLLED FILL. COMPACTION TESTING IS TO COMPLY WITH SECTION 5 OF "GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS" UNLESS NOTED OTHERWISE.
4. ALL DISTURBED AREAS ARE TO BE GRASSSED IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN AND FNQROC STANDARD SPECIFICATIONS.
5. ALL FILL PLACED ON RESIDENTIAL ALLOTMENTS MUST BE PLACED IN LAYERS NOT EXCEEDING 200mm DEPTH AND COMPACTED TO MINIMUM 98% STANDARD COMPACTION. TESTING IS ALL TO BE COMPLETED IN ACCORDANCE WITH THE FNQROC DEVELOPMENT MANUAL.
6. ALL TURF, GRASS & HYDROMULCH SHALL BE MAINTAINED UNTIL FULL ESTABLISHMENT. ALL EARTHWORKS AND AREAS THAT HAVE BEEN DISTURBED ARE TO BE REVEGETATED IMMEDIATELY WITH AN APPROVED FAST GROWING GROUND COVER ON COMPLETION OF EARTHWORKS.
7. DUST SUPPRESSION MEASURES MUST BE UNDERTAKEN TO ENSURE THAT DUST DOES NOT CAUSE A NUISANCE TO SURROUNDING AREAS AND RESIDENTS. SUCH MEASURES MUST BE SUBMITTED TO THE SUPERINTENDENT IN THE ENVIRONMENTAL MANAGEMENT PLAN (CONSTRUCTION) PRIOR TO THE COMMENCEMENT OF WORK.
8. ALL MATERIAL TRANSPORTED TO AND FROM THE SITE MUST BE COVERED TO PREVENT DUST OR SPILLAGE DURING TRANSPORT. IF SOIL IS TRACKED OR SPILT ONTO THE ROAD PAVEMENT, IT MUST BE REMOVED BY NO LATER THAN THE END OF EACH WORKING DAY.
9. EARTHWORKS STOCKPILE LOCATIONS TO BE CONFIRMED WITH SUPERINTENDENT PRIOR TO COMMENCEMENT OF WORKS.

STORMWATER NOTES:

- 1. FOR STANDARD STORMWATER DRAINAGE DETAILS REFER FNQROC STD. DRGS. S1045 - S1100.
2. SUBSURFACE DRAINAGE TO BE CONSTRUCTED IN ACCORDANCE WITH FNQROC STD SPECIFICATION, FLUSHING POINTS IN ACCORDANCE WITH FNQROC STD. DRG. 1095
3. STORMWATER PIPES TO BE REINFORCED CONCRETE WITH FLUSH (REBATED) TYPE JOINTS OR SIMILAR (AS APPROVED BY COUNCIL)
4. ALL WORKS TO BE COMPLETED IN ACCORDANCE WITH FNQROC AND COUNCIL STANDARDS.
5. CCTV INSPECTION TO BE UNDERTAKEN IMMEDIATELY FOLLOWING THE CONSTRUCTION OF ALL STORMWATER PIPELINE.

WATER NOTES:

- 1. THE CONTRACTOR IS TO CONFIRM THE LOCATIONS AND LEVELS OF EXISTING SERVICES PRIOR TO CONSTRUCTION COMMENCING.
2. CONNECTIONS TO EXISTING WATER MAINS TO BE UNDERTAKEN OR SUPERVISED BY COUNCIL.
3. WATERMAINS SHALL BE ON A COUNCIL STANDARD 2.0m ALIGNMENT FROM PROPERTY BOUNDARY U.N.O REFER DETAIL.
4. ERGON ELECTRICAL PILLAR BOX SERVICES TO BE ON OPPOSING PROPERTY BOUNDARIES TO WATER CONNECTIONS.
5. WHERE FIRE HYDRANTS AND LIGHT POLES OCCUR AT THE SAME PROPERTY BOUNDARY, OFFSET THE FIRE HYDRANT 1.0m FROM BOUNDARY.
6. ALL WATER MAINS TO HAVE MINIMUM 800mm COVER UNDER ROADS AND 600mm COVER ELSEWHERE. MINIMUM CLEARANCE FROM OTHER SERVICES IN ACCORDANCE WITH THE WSAW WATER SUPPLY CODE OF AUSTRALIA AND FNQROC DEVELOPMENT MANUAL.
7. TEARDROP MARKERS AND BLUE RETRO-REFLECTIVE MARKERS MUST BE PROVIDED ON ROAD PAVEMENTS TO IDENTIFY LOCATION OF HYDRANTS IN ACCORDANCE WITH FNQROC STD. DRG. S2010 IN VERSION 4 OF THE MANUAL.
8. 80mm PVC CONDUITS ARE TO BE SUPPLIED AND INSTALLED UNDER CONCRETE FOOTPATHS FOR THE PURPOSE OF FUTURE WATER SERVICE AND RECYCLED WATER CONNECTIONS. THE LOCATION SHALL BE AT THE OPPOSITE BOUNDARY TO WHERE THE ELECTRICAL PILLAR BOX IS LOCATED.
9. WHERE HYDRANTS OR VALVES ARE LOCATED WITHIN AN AREA OF CONCRETE, THE SURROUND IS TO BE SET IN THE CONCRETE WITH A COMPRESSIBLE LAYER BETWEEN IT AND THE NEW CONCRETE TO ALLOW REMOVAL FOR MAINTENANCE.
10. WHERE NON-METALLIC PIPE IS LAID, A CONTINUOUS STAINLESS STEEL WIRE 1.6mm (min) DIAMETER SHALL BE LAID IMMEDIATELY ABOVE THE FILL SAND TO ASSIST IN FUTURE LOCATION. THIS WIRE SHALL BE WRAPPED ONCE AROUND ALL HYDRANTS AND SLUICE VALVES.
11. REFER TO MAREEBA SHIRE COUNCIL SPECIFIC CLAUSES WITHIN THE FNQROC.

SEWER NOTES:

- 1. ALL SEWERS ø150 UPVC CLASS SEH U.N.O.
2. SEWER MANHOLES ARE TO BE LOCATED 1.5m FROM FRONT BOUNDARIES TO CENTRE OF MANHOLE AND 0.8m FROM SIDE AND REAR BOUNDARIES TO CENTRE OF MANHOLE WHERE LOCATED WITHIN AN ALLOTMENT U.N.O. SEWER MANHOLES ARE TO BE LOCATED 1.8m OFFSET FROM FRONT BOUNDARY WHERE LOCATED IN THE ROAD RESERVE.
3. THE CONTRACTOR IS TO CONFIRM THE LOCATIONS AND LEVELS OF EXISTING SERVICES PRIOR TO CONSTRUCTION COMMENCING.
4. CONNECTIONS TO EXISTING SEWER MAINS TO BE UNDERTAKEN OR SUPERVISED BY COUNCIL.
5. ALL SEWER STRUCTURES AND PIPES TO HAVE MINIMUM CLEARANCES FROM OTHER SERVICES IN ACCORDANCE WITH THE WSAW SEWERAGE CODE OF AUSTRALIA AND FNQROC DEVELOPMENT MANUAL.
6. SEWER TO HAVE MINIMUM 800mm COVER UNDER ROADS AND 600mm ELSEWHERE.
7. ALL MANHOLES ARE TO FINISH 50mm ABOVE FINISHED DESIGN SURFACE LEVEL.
8. ALL PCB'S TO EXTEND 1m PAST END OF DRIVEWAY ON HATCHET BLOCKS, PROPERTY AND EASEMENT BOUNDARIES & 0.5m BEYOND TOP OF BATTERS.
9. ALL TYPE E1 PCB'S TO BE FABRICATED FIBREGLOSS, HEAVY DUTY, DEEP SEWER DROPS.
10. BRING ALL PCB'S TO SURFACE WITH A VERTICAL RISER FITTED WITH A BOLTED TRAP SCREW & CONCRETE SURROUND. INSTALL A RED PAINTED STAR PICKET ADJACENT TO RISER, 1m HIGH.
11. ALL SEWER STRUCTURES SHALL HAVE EMER-PROOF 750 PROTECTIVE COATING APPLIED TO ALL EXTERNAL SURFACES. CONTACT CRC FOR DETAILS.
12. CCTV INSPECTION TO BE UNDERTAKEN IMMEDIATELY FOLLOWING THE CONSTRUCTION OF ALL SEWER PIPELINES. SEWERS FOUND TO BE SUB-STANDARD SHALL BE RECTIFIED TO THE SATISFACTION OF COUNCIL.
13. MANHOLES WITHIN AN AREA OF CONCRETE - THE SURROUND IS TO BE SET IN THE CONCRETE WITH A COMPRESSIBLE LAYER BETWEEN IT AND THE NEW CONCRETE TO ALLOW REMOVAL FOR MAINTENANCE.
14. SEWER LOCATION WIRE TO BE PLACED ON FILL SAND AND TERMINATED INSIDE THE MANHOLE AT THE JOIN OF THE LID SECTIONS.
15. REFER TO MAREEBA SHIRE COUNCIL SPECIFIC CLAUSES WITHIN THE FNQROC.

CONCRETE NOTES:

- 1. MINIMUM COVER TO BE 50mm UNLESS NOTED OTHERWISE.
2. MINIMUM OF THREE (3) CONCRETE CYLINDER TESTS TO BE PROVIDED PER POUR/BATCH. CONCRETE TESTING REQUIREMENTS SHALL GENERALLY BE IN ACCORDANCE WITH THE REQUIREMENTS OF FNQROC. A COPY OF THE TEST RESULTS SHALL BE PROVIDED TO THE SUPERINTENDENT FOLLOWING CONSTRUCTION. SAMPLE, TEST AND ASSESS CONCRETE FOR COMPLIANCE IN ACCORDANCE WITH PROJECT ASSESSMENT OF STRENGTH & GRADE. REFER SECTION 19, AS3600.
4. CURING OF ALL CONCRETE WORKS SHALL BE BY SPRAY ON CURING COMPOUND. THE CURING COMPOUND SHALL BE LIBERALLY APPLIED TO THE SURFACE OF THE CONCRETE IMMEDIATELY AFTER THE INITIAL SCREEDING HAS BEEN COMPLETED, UNLESS OTHERWISE APPROVED BY THE SUPERINTENDENT.
5. CONCRETE WORKS ARE NOT TO BE LOADED OR OPENED TO TRAFFIC WITHOUT APPROVAL BY THE SUPERINTENDENT FOLLOWING SATISFACTORY CONCRETE CYLINDER TESTS.
6. LAPS SHALL BE SUCH THAT THE TWO OUTERMOST WIRES OF ONE SHEET OF FABRIC OVERLAP WITH THE OUTERMOST WIRE OF THE SHEET BEING OVERLAPPED.
7. LAPPED PORTIONS SHALL BE TIED WITH WIRE AT A MAXIMUM SPACING OF 500mm.
8. REINFORCEMENT MESH SHALL BE SUPPORTED ON CHAIRS IN A REGULAR GRID NOT EXCEEDING SPACING OF 1.0M.
9. JOINT SEALANTS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
10. UNLESS NOTED OTHERWISE ALL CONCRETE SHALL BE ROUGH BROOMED FINISHED.
11. ALL CONCRETE SHALL BE THOROUGHLY COMPACTED WITH SURFACE AND/OR IMMERSION VIBRATORS PARTICULARLY AROUND REINFORCEMENT AND AT CORNERS OF FORMS.
12. THE WORKS SHALL COMPLY WITH AS 3600, CONCRETE STRUCTURES.
13. PROVIDE QUALITY OF FINISHES OF FORMED SURFACES (AS 3610) AS FOLLOWS:

Table with 2 columns: FORMED ELEMENT, CLASS. Rows include EXPOSED SURFACES (2), CONCEALED SURFACES (3), IN CONTACT WITH THE GROUND (4).

- 14. DO NOT MAKE ANY PENETRATIONS OR CHASES NOR EMBED ANY ITEMS OTHER THAN THOSE SHOWN IN THE STRUCTURAL DRAWINGS WITHOUT PRIOR APPROVAL OF THE SUPERINTENDENT.
15. DO NOT WELD OR SITE BEND REINFORCEMENT UNLESS SHOWN IN THE DRAWINGS OR OTHERWISE APPROVED BY THE SUPERINTENDENT.
16. PROVIDE PREMIX CONCRETE FOR EACH ELEMENT AS FOLLOWS:

Table with 4 columns: ELEMENT, GRADE, MAX AGG. SIZE (mm), SLUMP (mm). Row: ALL, N32, 20, 80+/-15.

- 17. FOR CONCRETE PIT WALLS THAT ARE TO BE CONSTRUCTED IN STAGES, THE CONNECTION SURFACE SHALL BE PREPARED AS FOLLOWS:
A. THE LEVEL OF EACH CONCRETE POUR RISE SHALL BE EVEN.
B. THE CONCRETE IS TO BE VIBRATED TO ENSURE MAXIMUM DENSITY IS ACHIEVED AND AIR VOIDS ARE REMOVED.
C. THE SURFACE IS TO BE SCABBLED AND CLEANED USING A HIGH PRESSURE WATER BLASTER.
D. REBAR EXTENSIONS SHOULD BE CLEAN OF CONCRETE TO ENSURE BOND TO THE NEXT RISE.
E. CLEAN OUT HOLES IN THE FORMWORK SHOULD BE REQUIRED TO ALLOW THE RELEASE OF WASTE WATER AND DEBRIS.
F. TWO LAYERS OF BONDCRETE ARE TO BE APPLIED TO THE TOP CONNECTION SURFACE USING THE FOLLOWING PROCESSES:
a. A SEALANT LAYER SHALL BE APPLIED USING A 1:4 RATIO OF 1 PART BONDCRETE TO 4 PARTS WATER AND ALLOWED TO DRY FOR A MINIMUM OF 24 HOURS.
b. THE SEALANT LAYER IS TO BE PROTECTED FROM RAIN AND WATER.
c. A FINAL BONDCOAT LAYER COMPRISING OF A 4:1 RATIO OF 4 PARTS BONDCRETE TO 1 PART WATER, IS TO BE APPLIED 45-30 MINUTES (STILL TACKY) PRIOR TO THE CONCRETE POUR.

RAY ROAD

Table with 8 columns: CHAINAGE, EASTING, NORTHING, BRG. IN, BRG. OUT, RADII IN, RADII OUT, NOTES. Rows show stationing from 0.000 to 918.303.

ROAD B

Table with 8 columns: CHAINAGE, EASTING, NORTHING, BRG. IN, BRG. OUT, RADII IN, RADII OUT, NOTES. Rows show stationing from 0.000 to 181.173.

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Plot Date: 11/12/2024 8:45:08 AM File Location: D:\DOP\BBOX\ERSCON Dropbox\ERSCON\160 Conmat\011 Ray Road - Stage 1\5 Drawings\160-011-C102 NOTES.dwg

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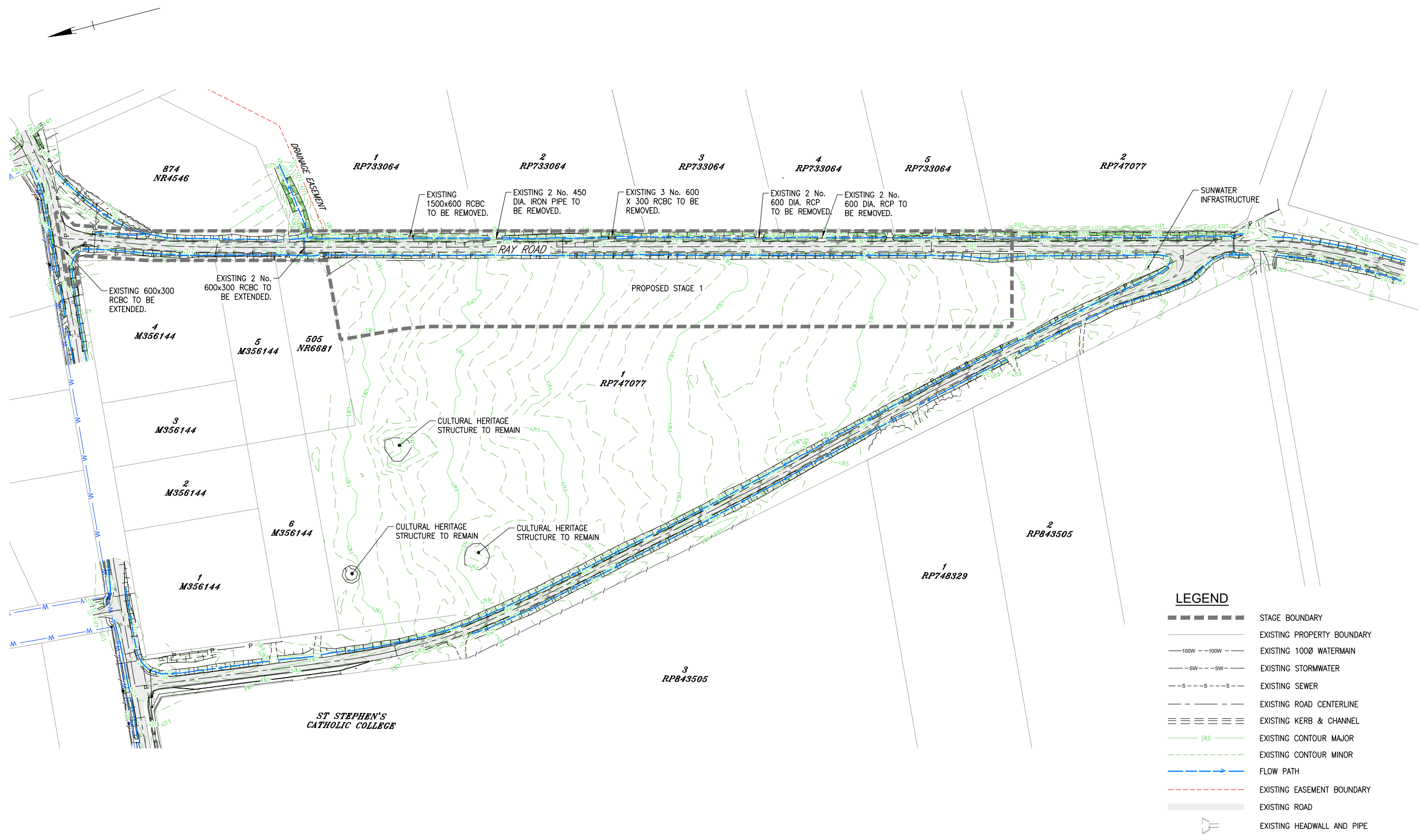


CLIENT: CLIENT SCALE: NTS ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

Table with 2 columns: DRAWN MF, DESIGNED MF; DRAWN APPROVED MF, DESIGN APPROVED JM; CIVIL SIGNOFF APPROVAL.

Table with 3 columns: PROJECT REF: CONMAT PTY LTD, RAY ROAD SUBDIVISION STAGE 1; DRAWING REF: GENERAL NOTES; DRAWING NO: 160-011-C102; SIZE: A3; REVISION: A

PLOT DATE: 11/2024 8:55:32 AM
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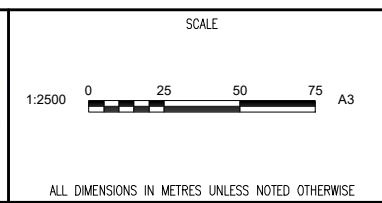


LEGEND

	STAGE BOUNDARY
	EXISTING PROPERTY BOUNDARY
	EXISTING 100Ø WATERMAIN
	EXISTING STORMWATER
	EXISTING SEWER
	EXISTING ROAD CENTERLINE
	EXISTING KERB & CHANNEL
	EXISTING CONTOUR MAJOR
	EXISTING CONTOUR MINOR
	FLOW PATH
	EXISTING EASEMENT BOUNDARY
	EXISTING ROAD
	EXISTING HEADWALL AND PIPE

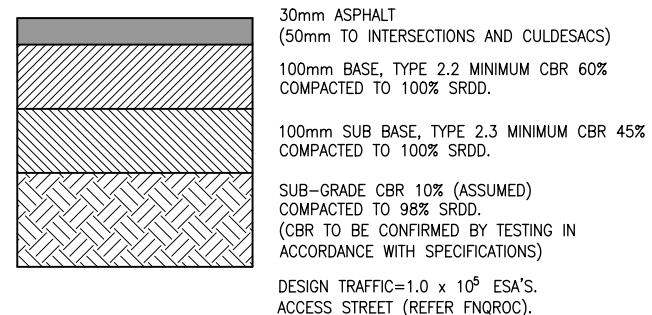
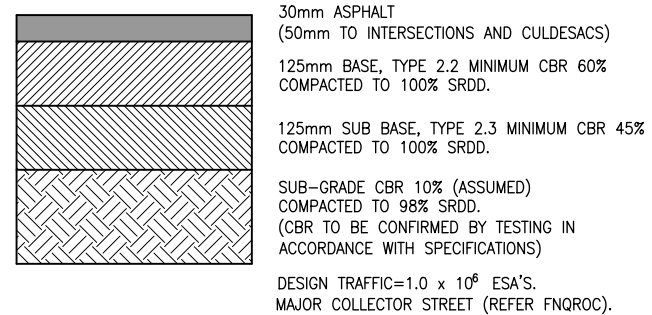
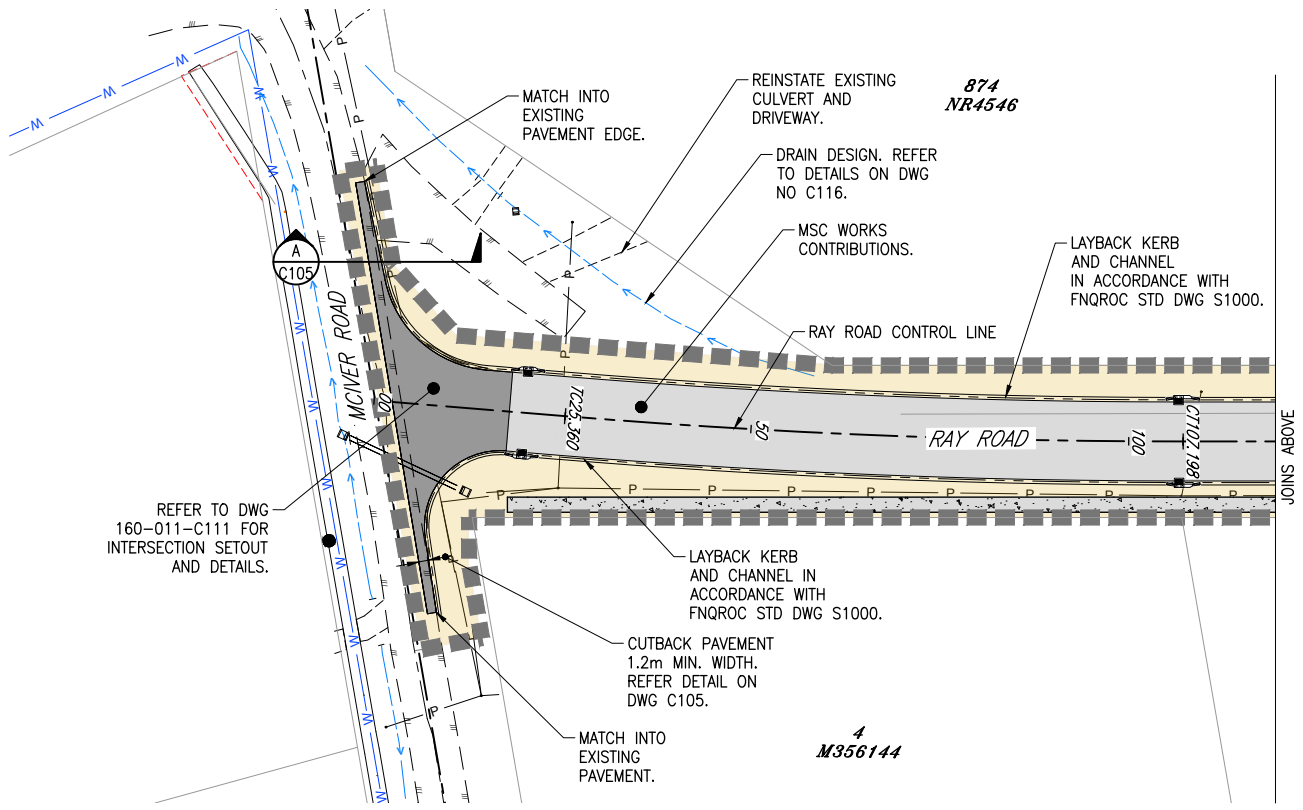
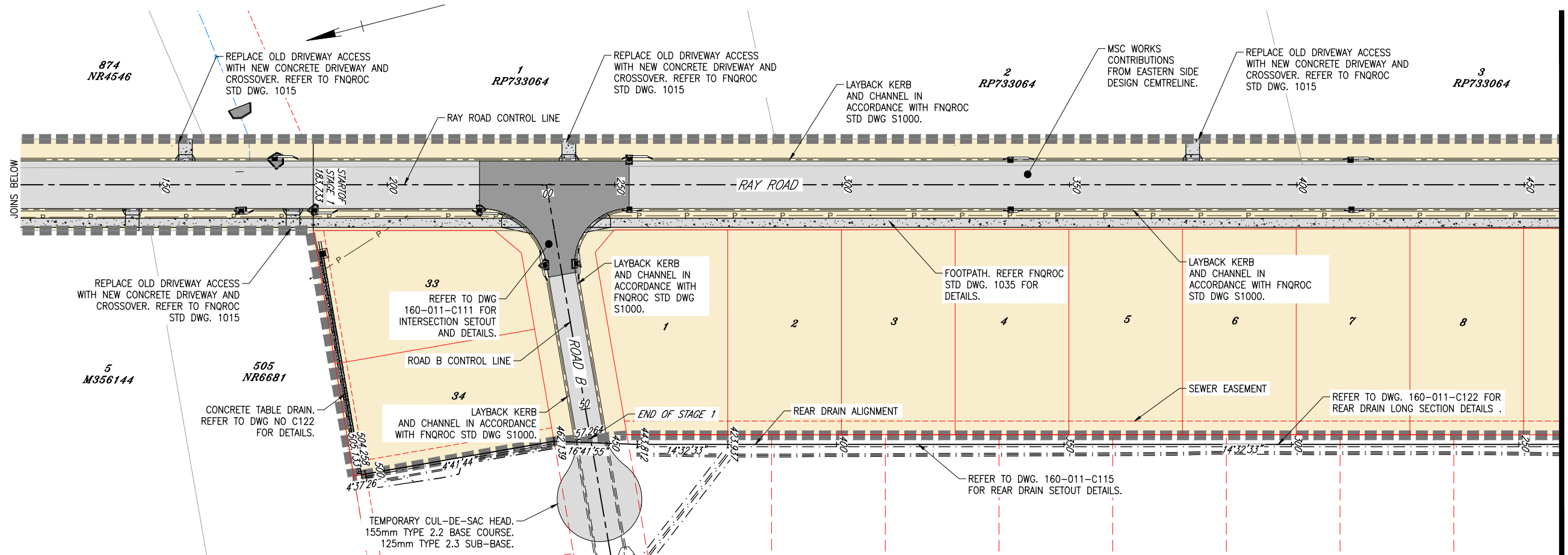
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NO.	DATE	DESCRIPTION	DESIGN	APPROVED
1	27/09/24	FOR COUNCIL APPROVAL		



DRAWN	MF	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	EXISTING LAYOUT		
DRAWING NO	160-011-C103	SIZE	A3
		REVISION	A



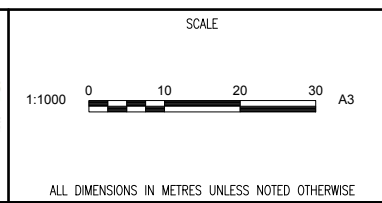
LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- PROPOSED BATTER
- ROAD CENTERLINE
- SECURITY FENCE
- FUTURE KERB & CHANNEL
- STAGE 1 WORKS AREA
- 30mm DG14 ASPHALT
- 50mm DG14 ASPHALT
- CONCRETE FOOTPATH
- EXISTING 1000 WATERMAIN
- EXISTING POWERLINE OVERHEAD
- EXISTING SEWER
- EXISTING ROAD CENTERLINE
- EXISTING KERB & CHANNEL
- FLOW PATH

PRINT IN COLOUR **FOR COUNCIL APPROVAL**

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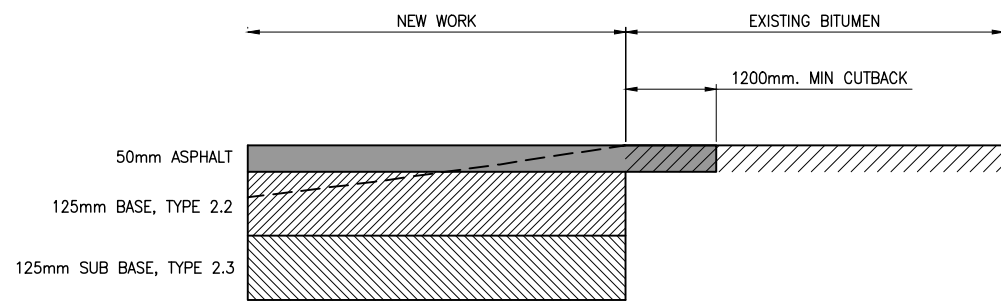
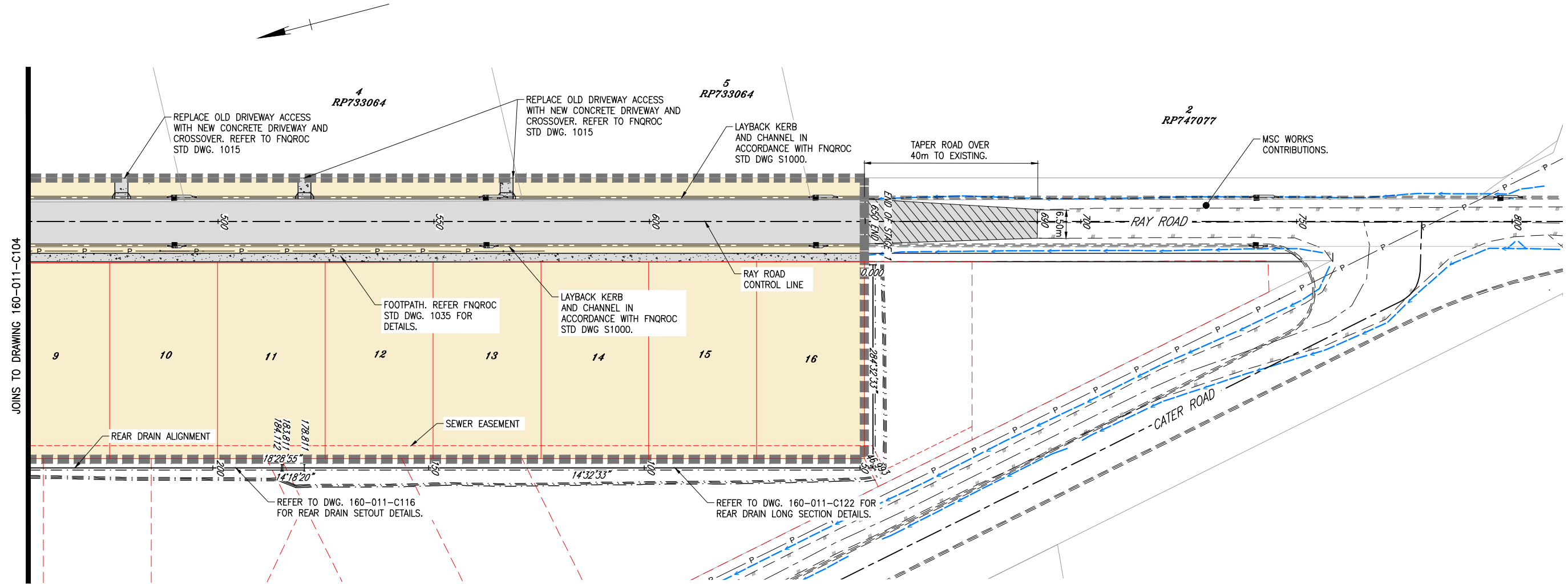
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A	27/09/24	FOR COUNCIL APPROVAL		



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DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEC:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	GENERAL LAYOUT (SHEET 1 OF 2)		
DRAWING NO	160-011-C104	SIZE	A3
		REVISION	A

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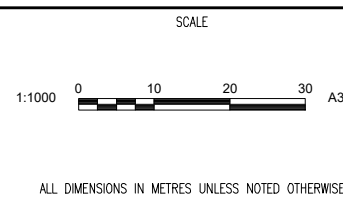
SECTION A
 NOT TO SCALE C104
 PAVEMENT CUT DETAIL

LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- FUTURE PROPERTY BOUNDARY
- PROPOSED BATTER
- FUTURE ROAD CENTERLINE
- SECURITY FENCE
- FUTURE KERB & CHANNEL
- STAGE 1 WORKS AREA
- 30mm DG14 ASPHALT
- CONCRETE FOOTPATH
- 100W---100W--- EXISTING 1000 WATERMAIN
- P --- EXISTING POWERLINE OVERHEAD
- S --- S --- EXISTING SEWER
- EXISTING ROAD CENTERLINE
- EXISTING KERB & CHANNEL
- FLOW PATH

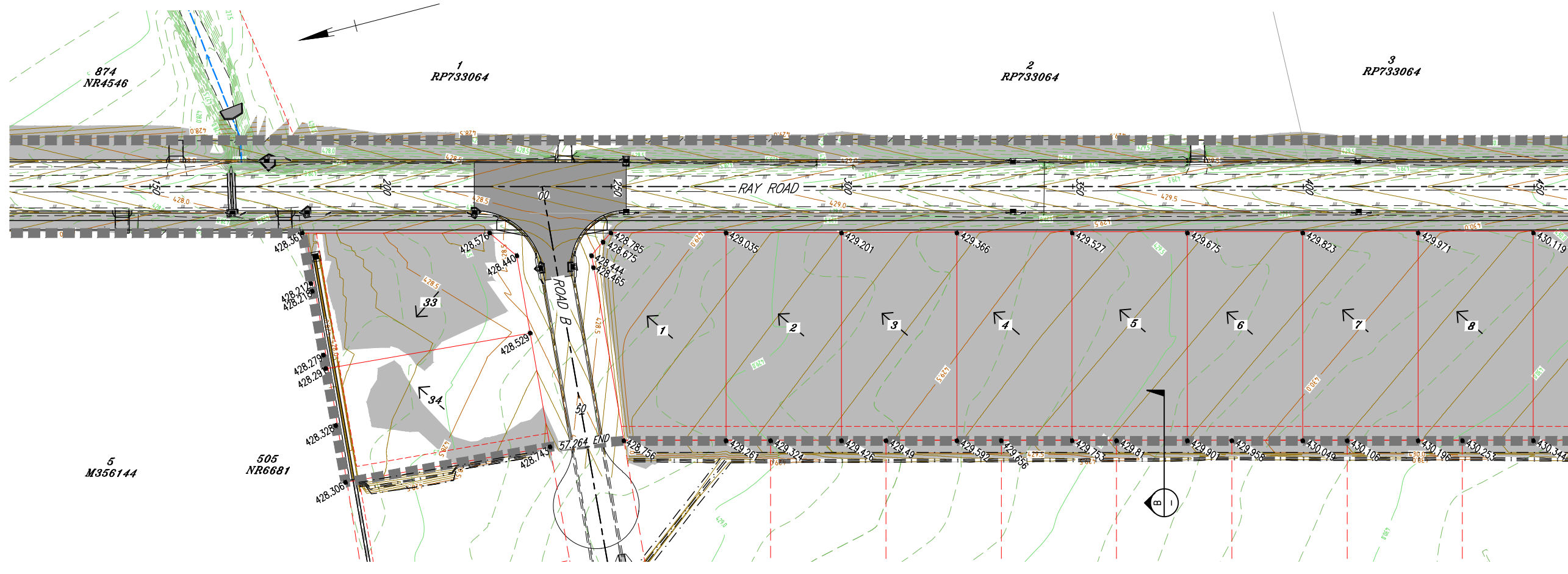
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A	27/09/24	FOR COUNCIL APPROVAL		



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CIVIL SIGNOFF APPROVAL			
DATE:	RPEG:		

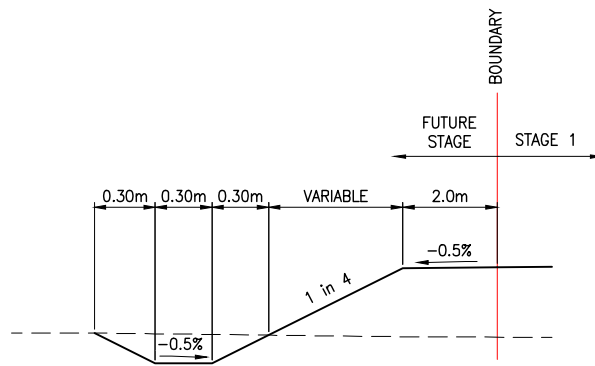
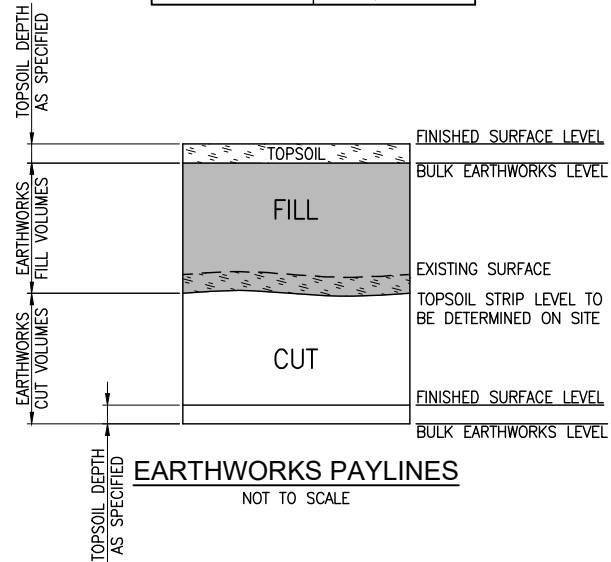
PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	GENERAL LAYOUT (SHEET 2 OF 2)		
DRAWING NO	160-011-C105	SIZE	A3
		REVISION	A



JOINS TO DRAWING 160-011-C107

QUANTITIES

CUT	3,751m ²
FILL	7,343m ²
BALANCE	3,592m ²



SECTION B
NOT TO SCALE
REAR BLOCK BATTER AND TABLE DRAIN

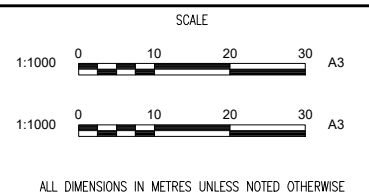
LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- PROPOSED DESIGN CONTOUR MAJOR
- PROPOSED DESIGN CONTOUR MINOR
- PROPOSED BATTER
- FUTURE ROAD CENTERLINE
- PROPOSED DESIGN LEVEL
- LOT NO. AND SURFACE FLOW DIRECTION
- PROPOSED EARTHWORKS FILL AREAS
- EXISTING PROPERTY BOUNDARIES
- EXISTING KERB & CHANNEL
- FLOW PATH
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR

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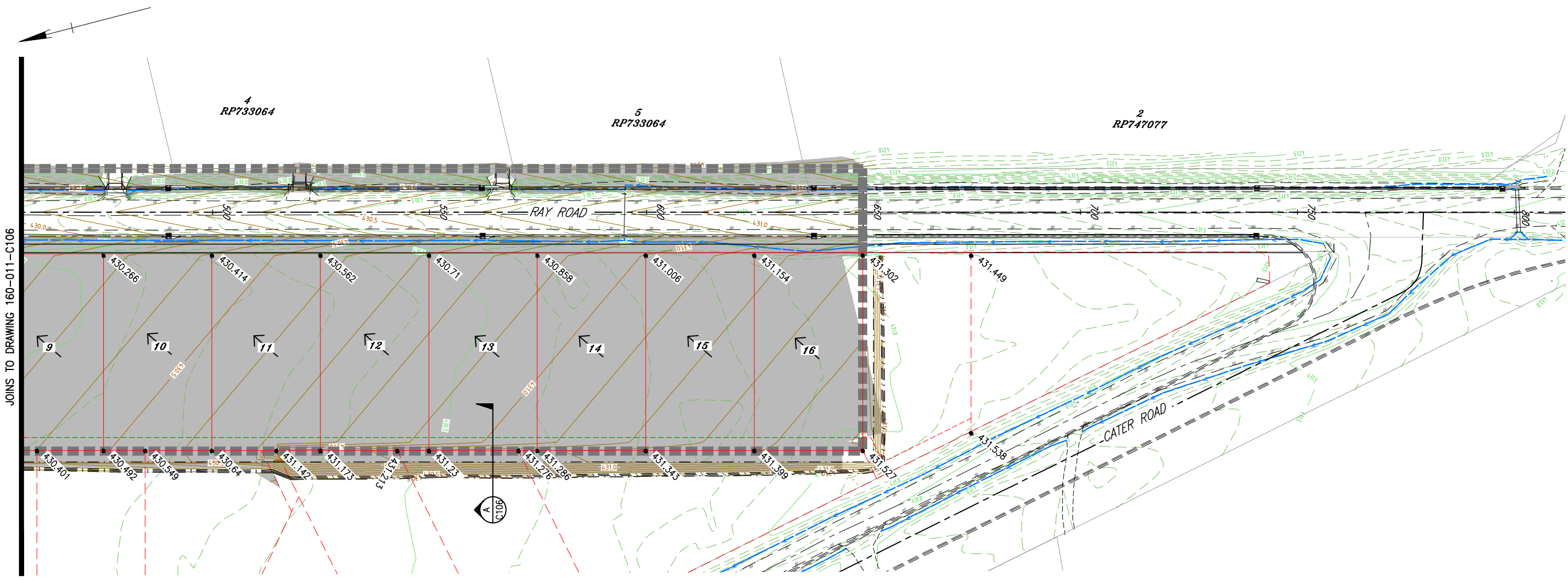
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DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	GRADING PLAN (SHEET 1 OF 2)		
DRAWING NO	160-011-C106	SIZE	A3
		REVISION	A



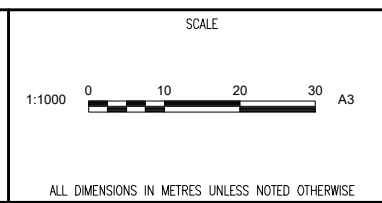
LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- PROPOSED DESIGN CONTOUR MAJOR
- PROPOSED DESIGN CONTOUR MINOR
- PROPOSED BATTER
- FUTURE ROAD CENTERLINE
- PROPOSED DESIGN LEVEL
- LOT NO. AND SURFACE FLOW DIRECTION
- PROPOSED EARTHWORKS FILL AREAS
- EXISTING PROPERTY BOUNDARIES
- EXISTING KERB & CHANNEL
- FLOW PATH
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR

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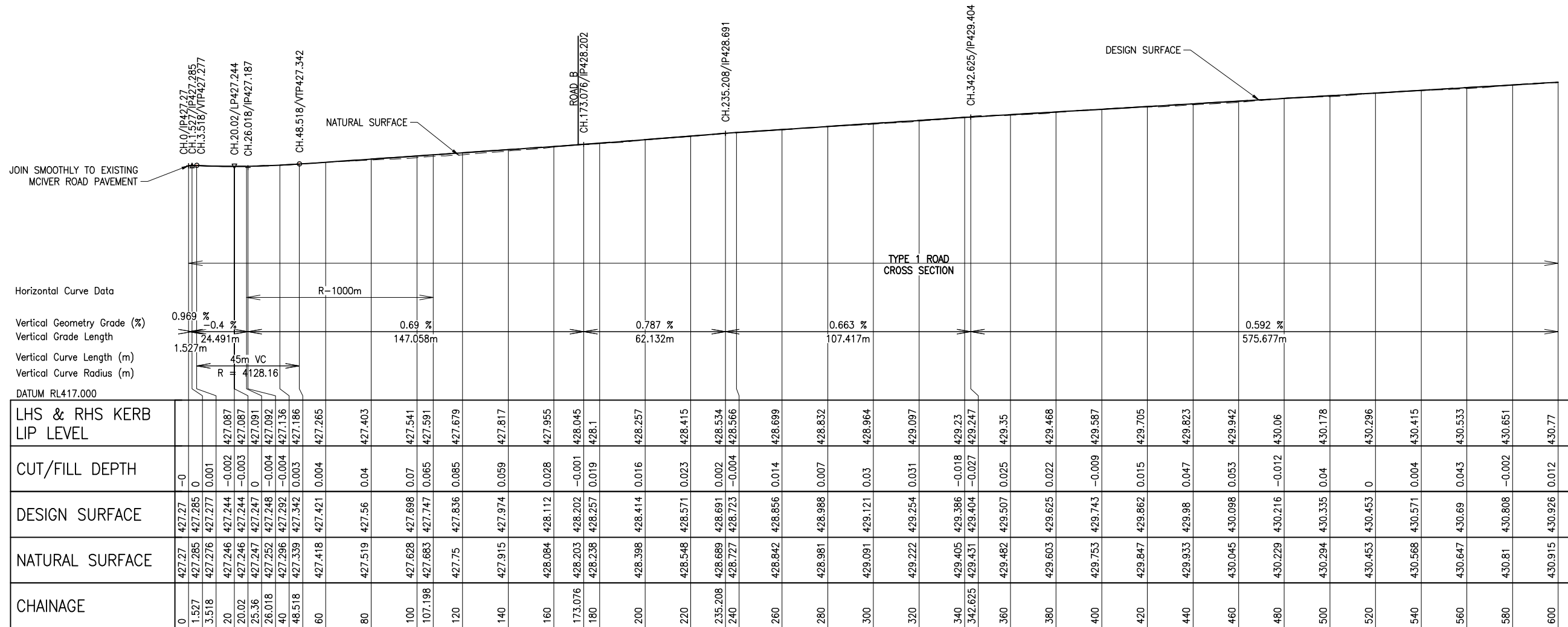
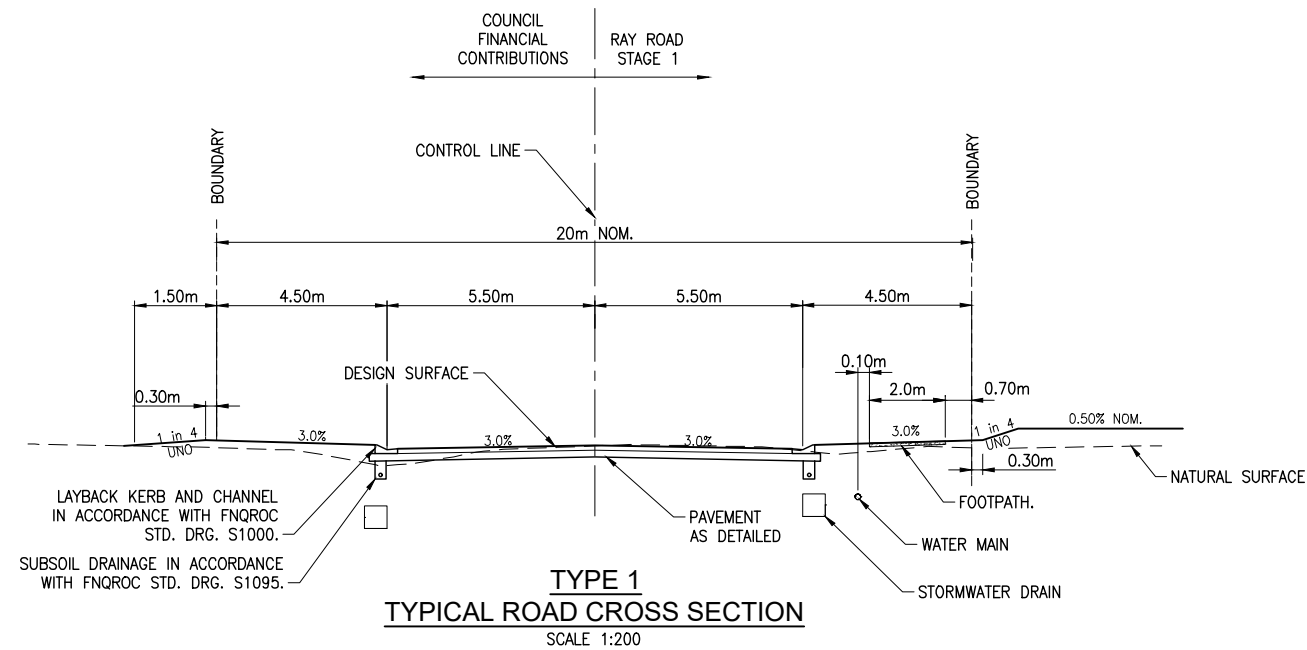
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REVISIONS				
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DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF		CONMAT PTY LTD	
		RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF		GRADING PLAN (SHEET 2 OF 2)	
DRAWING NO	160-011-C107	SIZE	A3
		REVISION	A

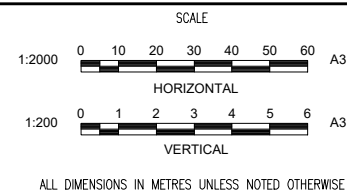


LONGITUDINAL SECTION - RAY ROAD
SCALE 1:2000H 200V

PRINT IN COLOUR FOR COUNCIL APPROVAL

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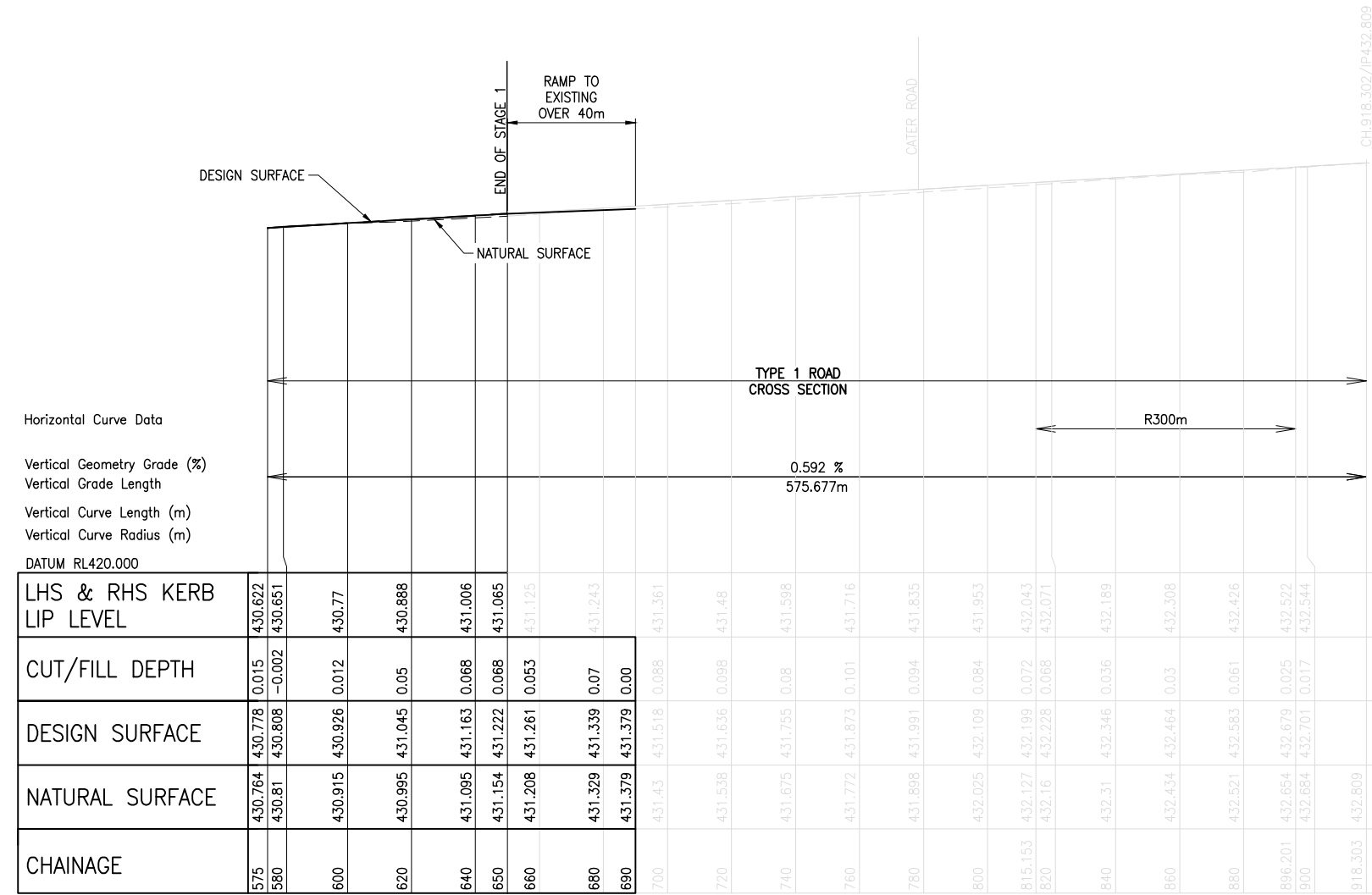
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A	27/09/24	FOR COUNCIL APPROVAL		



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DATE:		RPEG:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	RAY ROAD LONGITUDINAL SECTION (SHEET 1 OF 2)		
DRAWING NO	160-011-C108	SIZE	A3
		REVISION	A

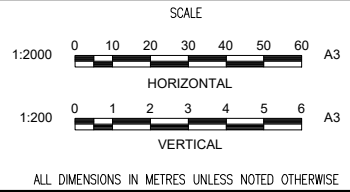
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LONGITUDINAL SECTION - RAY ROAD
SCALE 1:2000H 200V

PRINT IN COLOUR FOR COUNCIL APPROVAL

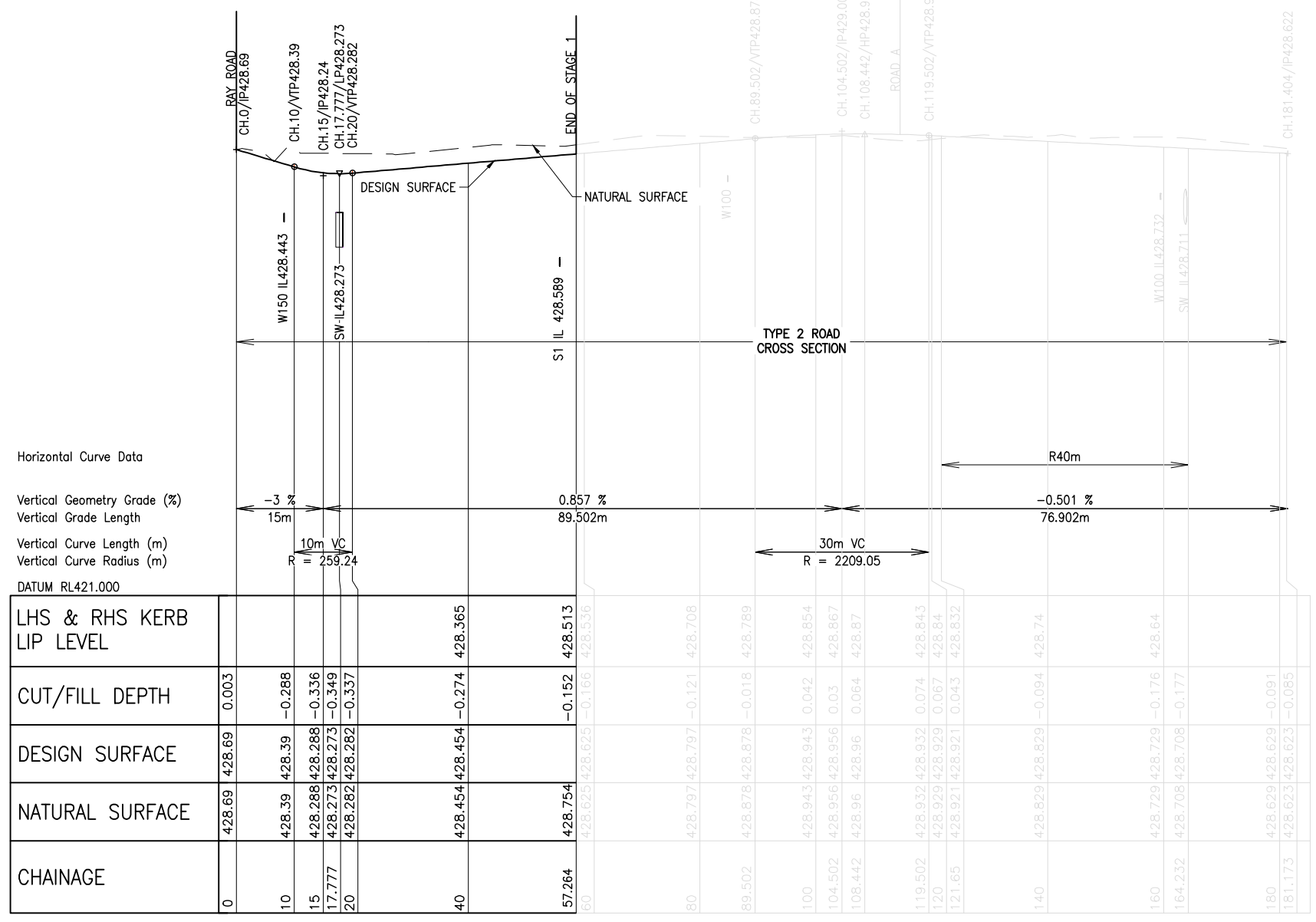
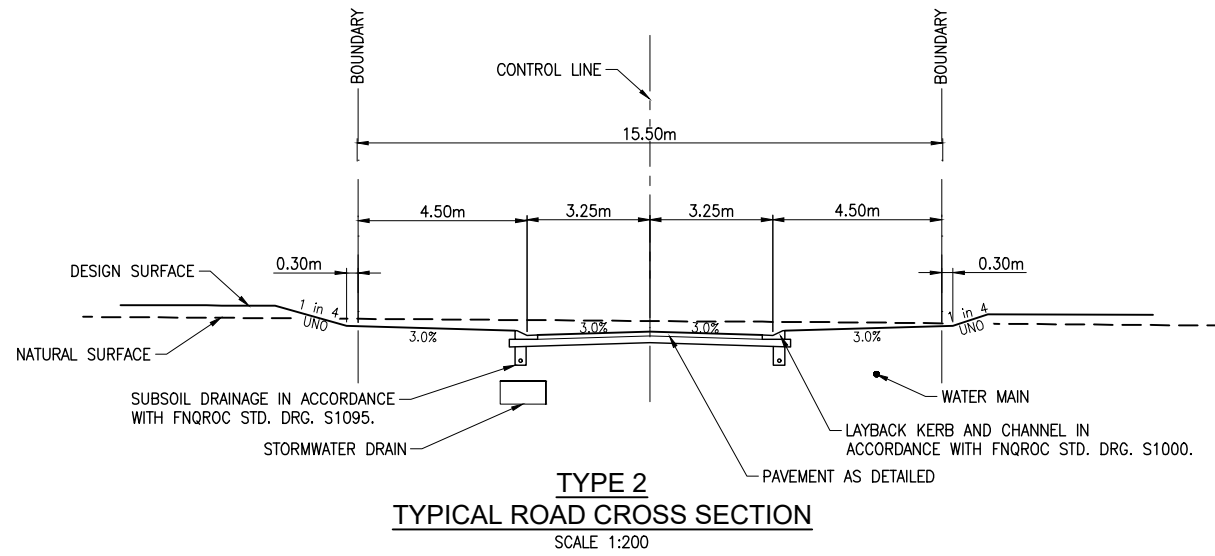
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A	27/09/24	FOR COUNCIL APPROVAL		



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CIVIL SIGNOFF APPROVAL			
DATE:		RPEQ:	

PROJECT REF		CONMAT PTY LTD	
DRAWING REF		RAY ROAD SUBDIVISION STAGE 1	
DRAWING NO		RAY ROAD LONGITUDINAL SECTION (SHEET 2 OF 2)	
SIZE	REVISION	160-011-C109	A3 A

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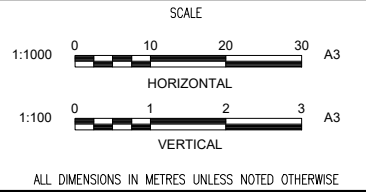
Horizontal Curve Data
 Vertical Geometry Grade (%)
 Vertical Grade Length
 Vertical Curve Length (m)
 Vertical Curve Radius (m)
 DATUM RL421.000

CHAINAGE	DESIGN SURFACE	NATURAL SURFACE	CUT/FILL DEPTH	LHS & RHS KERB LIP LEVEL
0	428.69	428.69	0.003	
10	428.39	428.39	-0.288	
15	428.288	428.288	-0.336	
17.777	428.273	428.273	-0.349	
20	428.282	428.282	-0.337	
40	428.454	428.454	-0.274	428.365
57.264		428.754	-0.152	428.513
60		428.625	-0.166	428.336
80		428.797	-0.121	428.706
89.502		428.878	-0.018	428.789
100		428.943	0.042	428.854
104.502		428.956	0.03	428.867
108.442		428.96	0.064	428.87
119.502		428.932	0.074	428.843
120		428.929	0.067	428.84
121.65		428.921	0.043	428.832
140		428.829	-0.094	428.74
160		428.729	-0.176	428.64
164.232		428.708	-0.177	
181.173		428.623	-0.085	

LONGITUDINAL SECTION - ROAD B
SCALE 1:100H 100V

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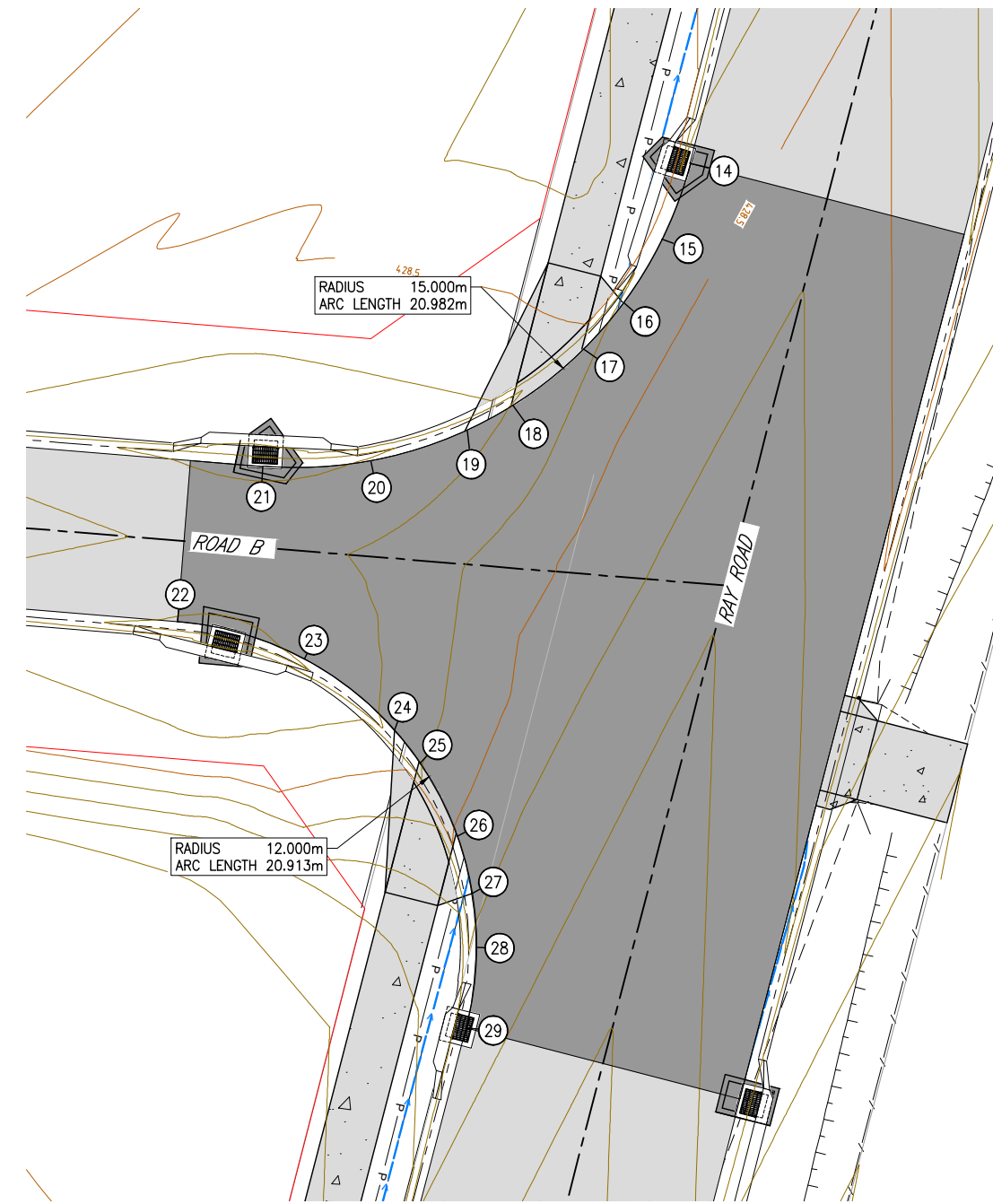
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CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF		CONMAT PTY LTD	
		RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF		ROAD B LONGITUDINAL SECTION	
DRAWING NO	160-011-C110	SIZE	A3
REVISION		REVISION	A

PLOT DATE: 11/11/2024 9:10:07 AM
FILE LOCATION: D:\PROJ\ERSCON\Dropbox\ERSCON\160-011-C111 RAY ROAD AND B ROAD INTERSECTION DESIGN.dwg





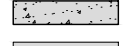

RAY ROAD - ROAD B INTERSECTION

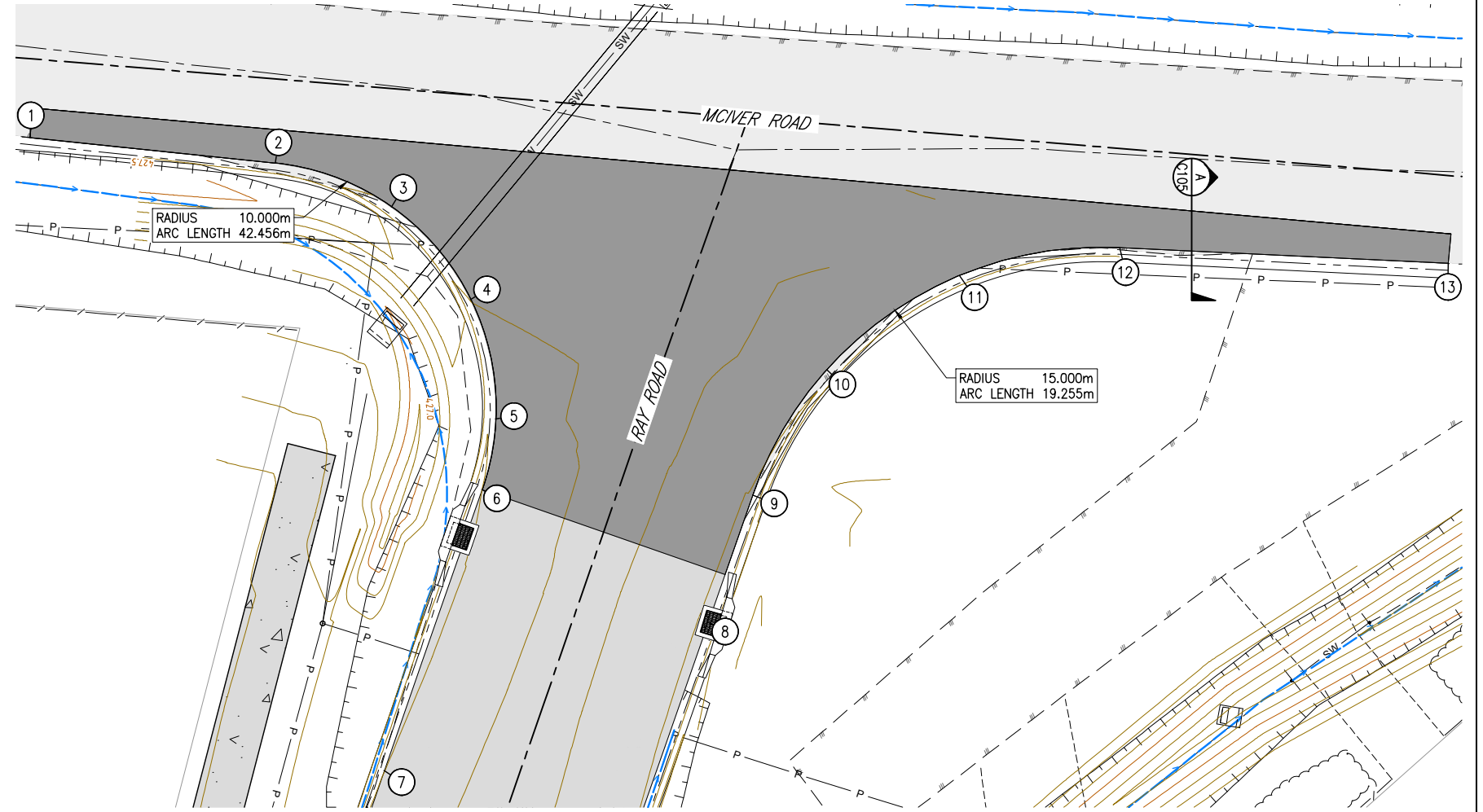
SCALE 1:250

RAY ROAD - ROAD B INTERSECTION

POINT NO.	EASTING	NORTHING	HEIGHT
14	332232.941	8117576.032	428.417
15	332231.911	8117573.238	428.426
16	332230.495	8117570.898	428.379
17	332229.022	8117569.186	428.407
18	332226.409	8117567.102	428.305
19	332224.722	8117566.186	428.264
20	332221.178	8117565.054	428.208
21	332217.195	8117564.848	428.184
22	332214.042	8117559.147	428.194
23	332218.722	8117557.768	428.214
24	332222.046	8117555.142	428.321
25	332222.991	8117553.925	428.384
26	332224.358	8117551.232	428.518
27	332224.902	8117549.133	428.575
28	332225.061	8117547.141	428.618
29	332224.676	8117544.174	428.654

LEGEND

- PROPOSED PROPERTY BOUNDARY
- - - EXISTING PROPERTY BOUNDARY
- - - - - FUTURE PROPERTY BOUNDARY
- 1.0 PROPOSED MAJOR CONTOURS (0.5m INTERVAL)
- PROPOSED MINOR CONTOURS (0.1m INTERVAL)
- - - - - PROPOSED BATTER
- PROPOSED ROAD CENTRELINE
- - - - - EXISTING 100Ø WATERMAIN
- - - - - EXISTING STORMWATER
- - - - - EXISTING SEWER
- - - - - P EXISTING POWERLINE
- - - - - EXISTING ROAD CENTERLINE
- ≡≡≡≡≡ EXISTING KERB & CHANNEL
- FLOW PATH
- EXISTING ROAD
-  EXISTING HEADWALL AND PIPE
-  CONCRETE DRAIN
-  CONCRETE FOOTPATH
-  ROAD PAVEMENT



RAY ROAD - MCIVER ROAD INTERSECTION

SCALE 1:250

RAY ROAD - MCIVER ROAD INTERSECTION SETOUT

POINT NO.	EASTING	NORTHING	HEIGHT
1	332268.961	8117785.510	427.417
2	332279.272	8117784.428	427.355
3	332283.986	8117782.658	427.286
4	332287.200	8117778.896	427.203
5	332288.217	8117774.053	427.126
6	332287.668	8117771.189	427.100
7	332283.691	8117759.789	427.103
8	332296.850	8117765.815	427.087
9	332298.649	8117770.972	427.095
10	332301.650	8117776.052	427.126
11	332307.043	8117779.878	427.174
12	332313.540	8117781.014	427.178
13	332326.874	8117780.366	427.094

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NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



CLIENT

SCALE

1:250

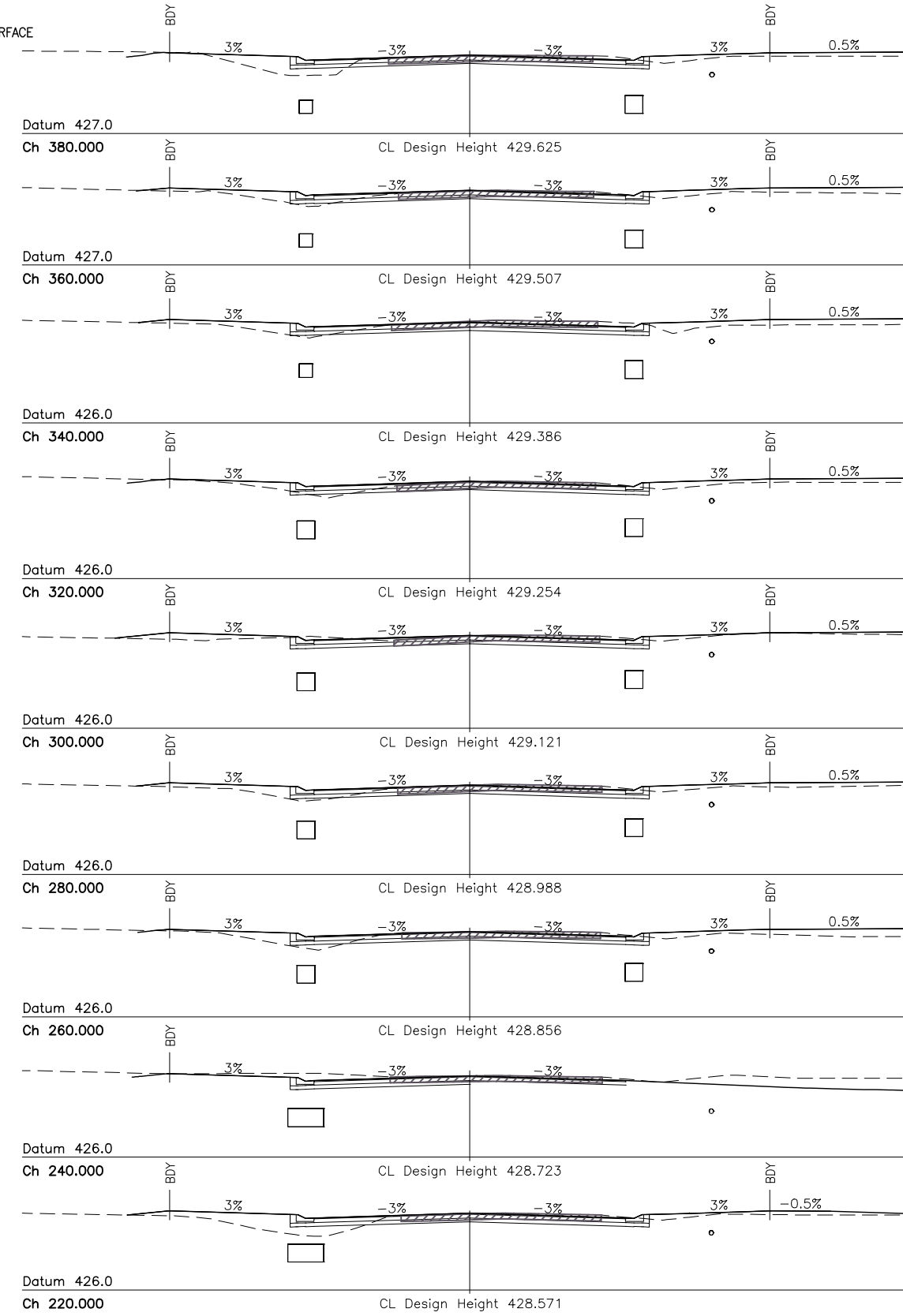
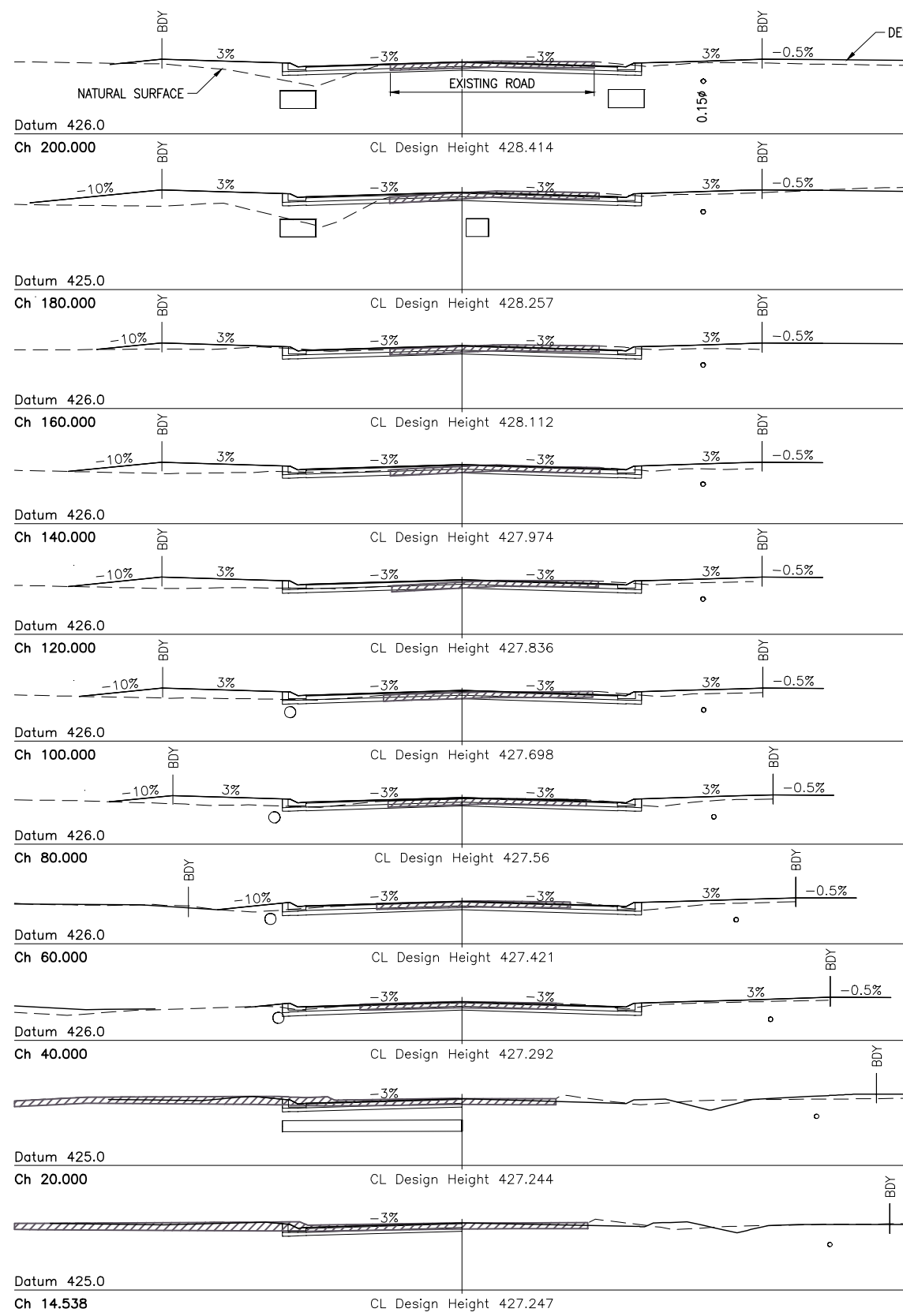


ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

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DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL		DATE:	RPEQ:

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	RAY ROAD AND ROAD B INTERSECTION		
DRAWING NO	160-011-C111	SIZE	A3
		REVISION	A

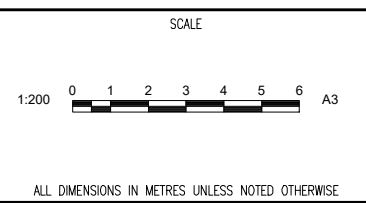
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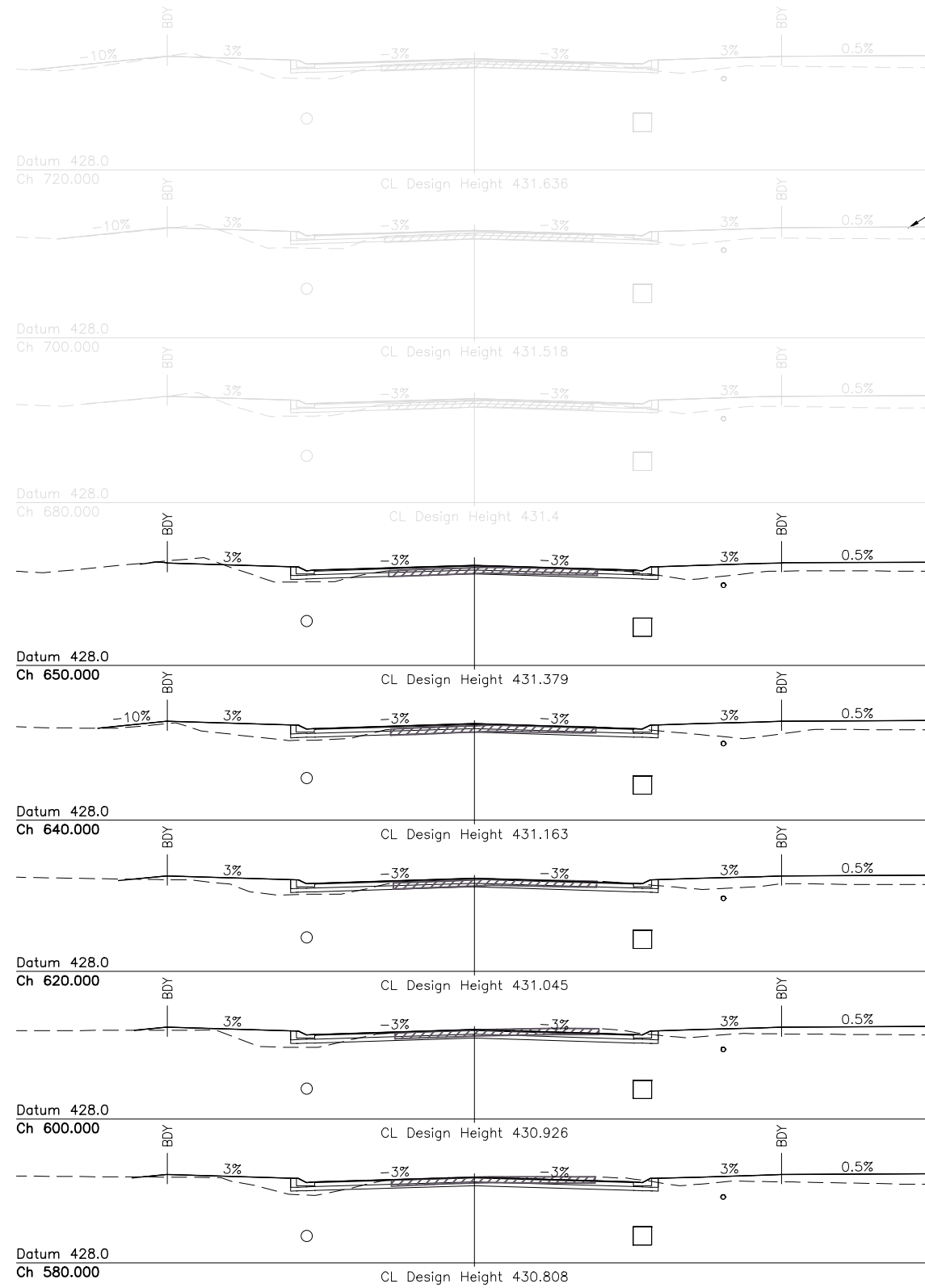
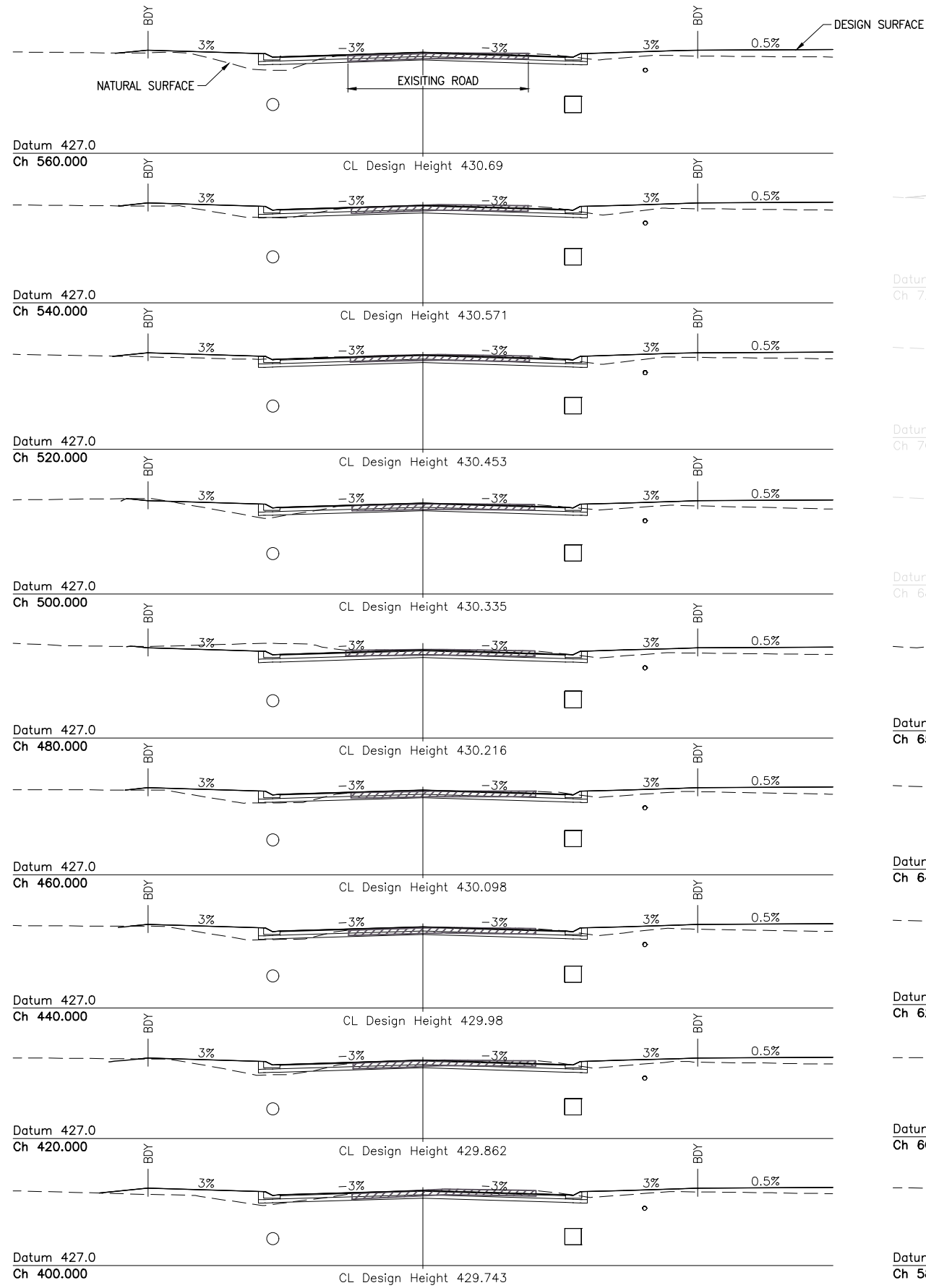
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1	27/09/24	FOR COUNCIL APPROVAL		



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CIVIL SIGNOFF APPROVAL		DATE: RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	RAY ROAD CROSS SECTIONS (SHEET 1 OF 2)		
DRAWING NO	160-011-C112	SIZE	A3
		REVISION	A

PLOT DATE: 11/12/2024 9:12:48 AM
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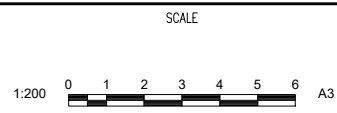
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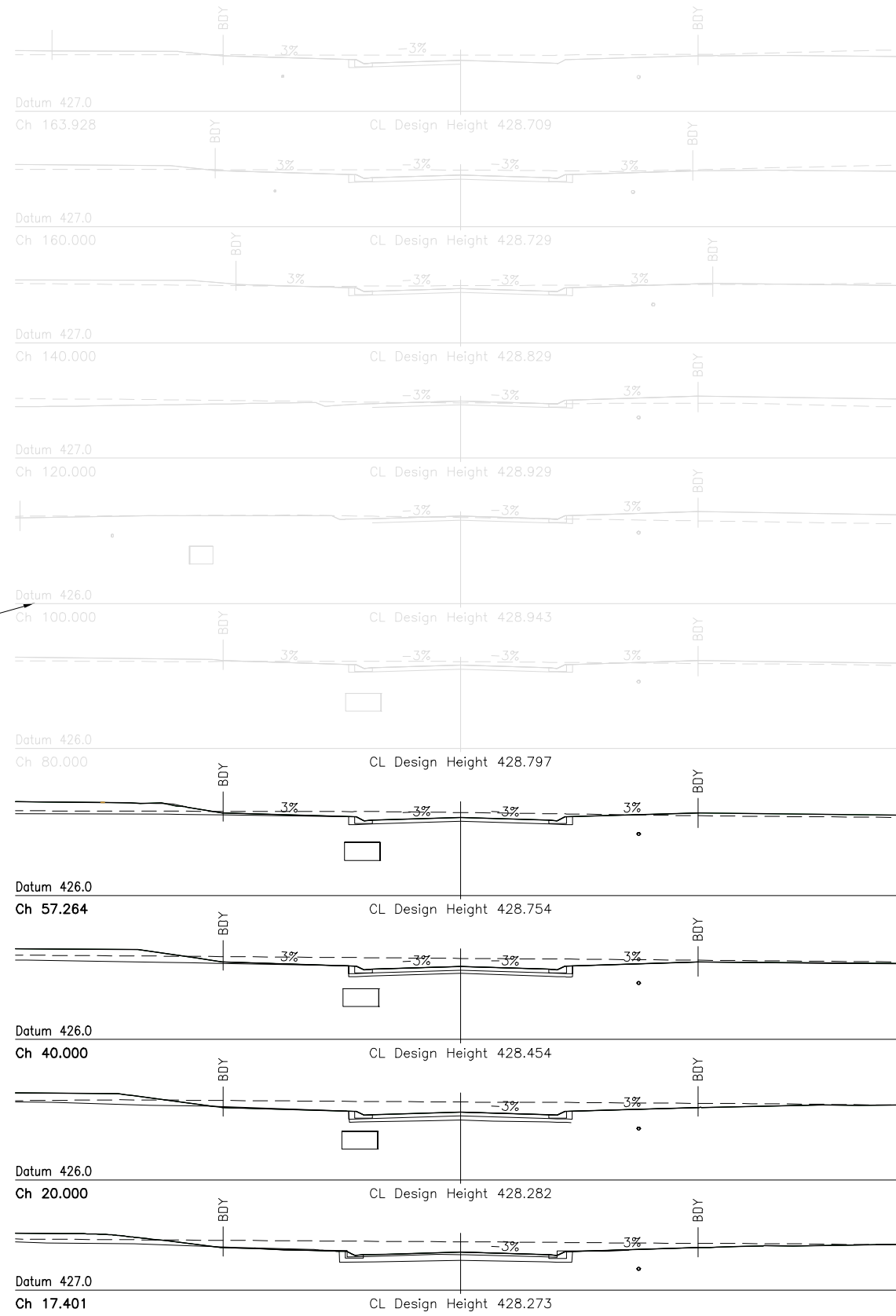
ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

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DATE:		RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	RAY ROAD CROSS SECTIONS (SHEET 2 OF 2)		
DRAWING NO	160-011-C113	SIZE	A3
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PLOT DATE: 11/11/2024 9:13:32 AM
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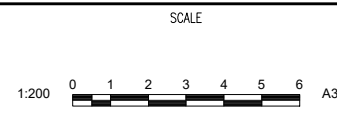
WORKS TO BE COMPLETED
IN A FUTURE STAGE



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FOR COUNCIL APPROVAL

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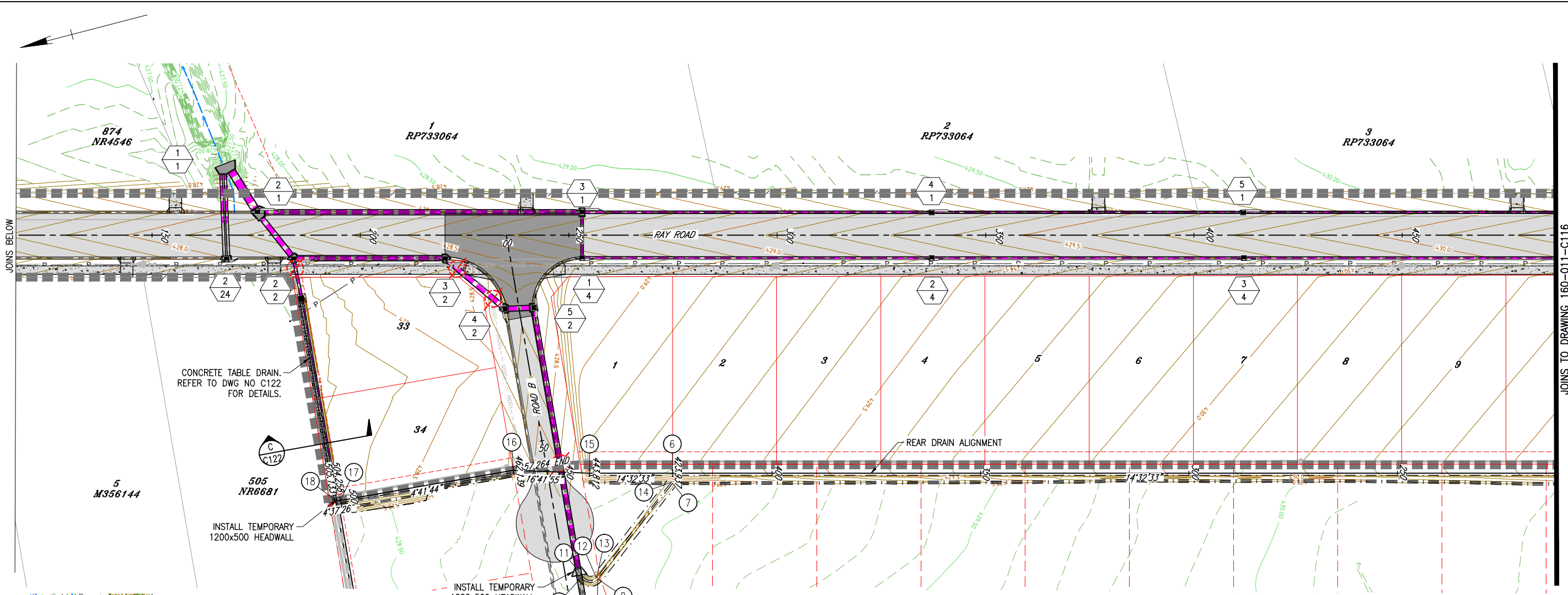


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DRAWN APPROVED	JM	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEC:		

PROJECT REF		CONMAT PTY LTD	
		RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF		ROAD B CROSS SECTIONS	
DRAWING NO	160-011-C114	SIZE	A3
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PLOT DATE: 11/11/2024 3:49:56 PM
 FILE LOCATION: D:\PROJ\ERSCON\160-011-Ray Road - Stage 1\5 Drawings\160-011-C115 DRAINAGE PLAN (SHEET 1 OF 2).dwg



REAR LOT INTERFACE DRAIN

SETOUT POINT	CHAINAGE	EASTING	NORTHING	BEARING
6	423.937	332169.064	8117536.207	14°32'33.34"
15	443.812	332174.054	8117555.445	14°32'33.33"
16	462.139	332179.321	8117573.000	16°41'54.96"
17	504.258	332182.769	8117614.977	4°41'43.83"
18	505.133	332182.839	8117615.850	4°37'26.43"

OFFSET DRAIN TO HEADWALL

SETOUT POINT	EASTING	NORTHING	HEIGHT
7	332166.722	8117536.815	428.848
8	332148.973	8117559.900	428.690
9	332148.970	8117559.965	428.696
10	332150.373	8117563.589	428.528
11	332167.039	8117537.058	428.848
12	332149.316	8117560.177	428.690
13	332149.311	8117560.174	428.696
14	332150.489	8117563.206	428.528

STORMWATER STRUCTURE SETOUT

PIT NO.	EASTING	NORTHING
1-22	332317.918	8117761.975
1-25	332286.722	8117769.328
1-26	332294.758	8117790.983
2-22	332297.110	8117765.711
2-24	332245.832	8117626.838
3-22	332271.876	8117683.432
4-22	332261.209	8117686.117
1-1	332265.583	8117621.723
2-1	332254.628	8117616.943
2-2	332241.812	8117611.278
3-2	332232.669	8117576.102
4-2	332217.265	8117565.123
5-2	332215.861	8117558.568
1-4	332224.405	8117544.244
3-1	332235.053	8117541.482
4-1	332213.707	8117460.392
1-5	332203.457	8117462.973
5-1	332194.948	8117388.071
1-6	332184.860	8117390.688

LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- ROAD CENTRELINE
- 51.0 PROPOSED DESIGN CONTOUR MAJOR
- 51.0 PROPOSED DESIGN CONTOUR MINOR
- 51.0 EXISTING CONTOUR MAJOR
- 51.0 EXISTING CONTOUR MINOR
- PROPOSED BATTER
- PROPOSED STORMWATER PIPE
- FUTURE STORMWATER PIPE
- SERVICE CROSSINGS
- SW EXISTING STORMWATER
- EXISTING HEADWALL AND PIPE
- NEW HEADWALL WITH GRATED INLET
- NEW MANHOLE
- STRUCTURE NAME

PRINT IN COLOUR FOR COUNCIL APPROVAL

NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



CLIENT: CONMAT PTY LTD

SCALE: 1:1000

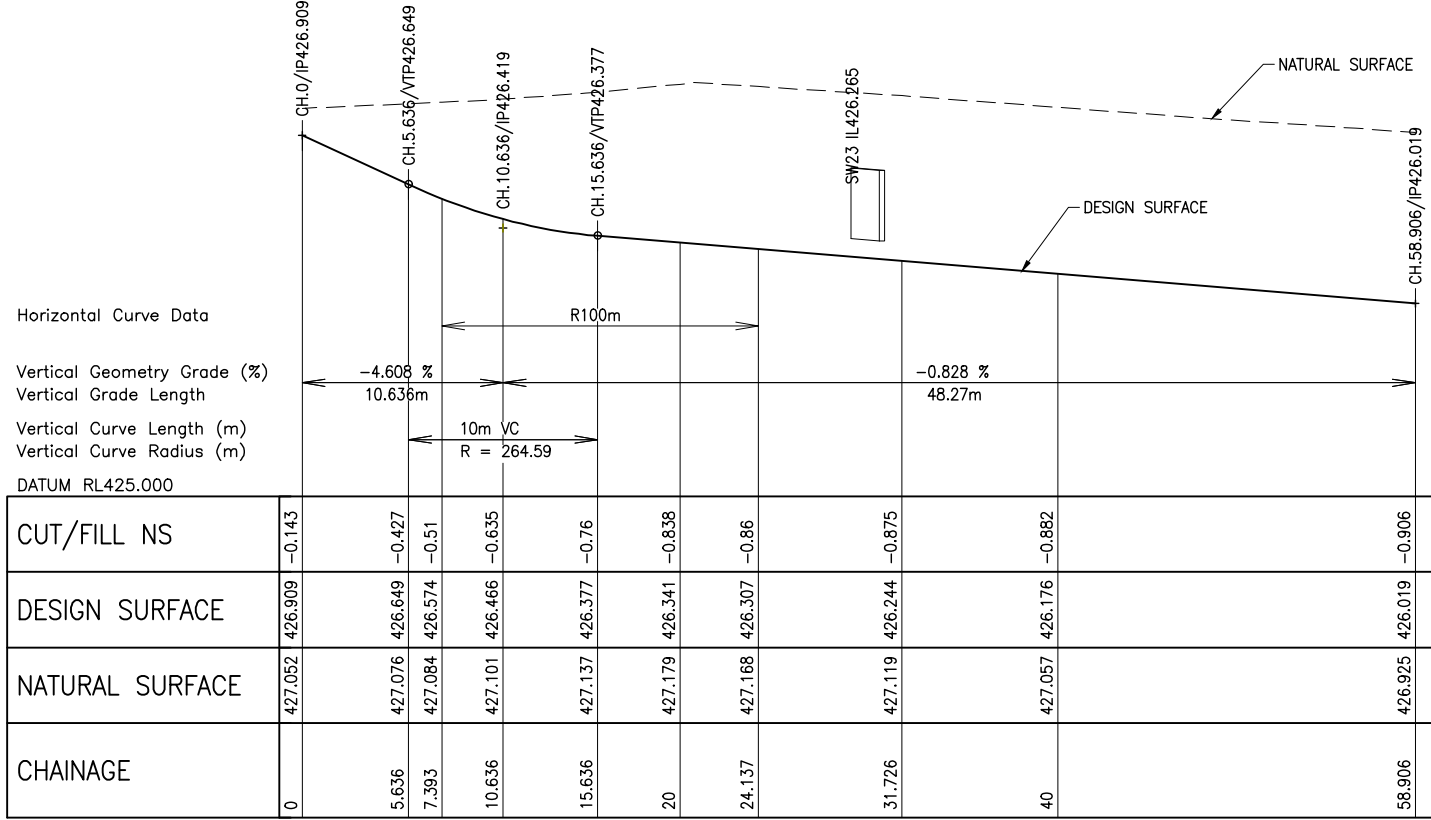
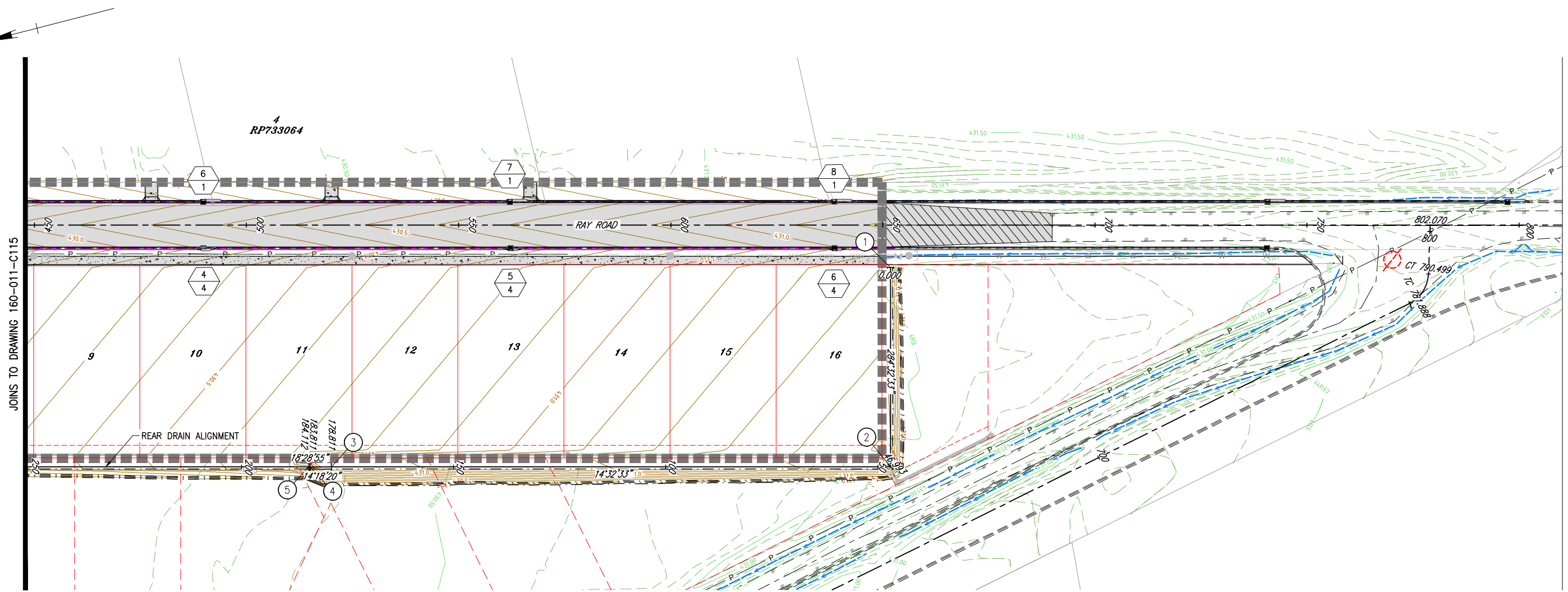
0 10 20 30 A3

ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

DRAWN: MG	DESIGNED: MF
DRAWN APPROVED: MF	DESIGN APPROVED: JM
CIVIL SIGNOFF APPROVAL	
DATE:	RPE:

PROJECT REF: CONMAT PTY LTD	
RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF: DRAINAGE PLAN (SHEET 1 OF 2)	
DRAWING NO: 160-011-C115	SIZE: A3
REVISION: A	

PLOT DATE: 11/2024 3:47:28 PM
 FILE LOCATION: D:\PROJ\ERSCON\Dropbox\ERSCON\160\011-Ray Road - Stage 1\5 Drawings\160-011-C116 DRAINAGE PLAN (SHEET 2 OF 2).dwg



LONGITUDINAL SECTION - V DRAIN

REAR LOT INTERFACE DRAIN

SETOUT POINT	CHAINAGE	EASTING	NORTHING	BEARING
1	0.000	332119.901	8117159.541	284°32'33.33"
2	46.993	332074.414	8117171.341	284°32'33.33"
3	178.811	332107.513	8117298.936	14°32'33.33"
4	183.811	332108.749	8117303.781	18°28'55.22"
5	184.112	332108.844	8117304.066	18°28'55.22"

V DRAIN SETOUT

CHAINAGE	EASTING	NORTHING	BEARING
0.000	332295.105	8117741.084	42°48'13.40"
24.137	332312.479	8117757.786	42°48'13.40"
31.726	332318.491	8117762.416	52°23'51.76"
58.906	332341.797	8117776.400	59°02'06.06"

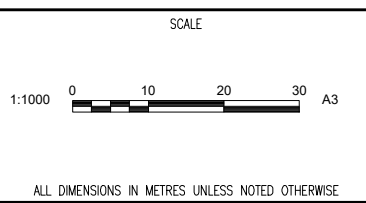
STORMWATER STRUCTURE SETOUT

PIT NO.	EASTING	NORTHING
6-1	332175.618	8117312.499
4-4	332165.011	8117315.178
7-1	332157.507	8117242.552
5-4	332146.814	8117245.137
8-1	332138.303	8117168.517
6-4	332127.665	8117171.204

- LEGEND**
- STAGE BOUNDARY
 - EXISTING PROPERTY BOUNDARY
 - PROPOSED PROPERTY BOUNDARY
 - FUTURE PROPERTY BOUNDARY
 - EASEMENT BOUNDARY
 - ROAD CENTRELINE
 - 51.0 PROPOSED DESIGN CONTOUR MAJOR
 - 51.0 PROPOSED DESIGN CONTOUR MINOR
 - 51.0 EXISTING CONTOUR MAJOR
 - 51.0 EXISTING CONTOUR MINOR
 - PROPOSED BATTER
 - PROPOSED STORMWATER PIPE
 - FUTURE STORMWATER PIPE
 - SERVICE CROSSINGS
 - SW --- EXISTING STORMWATER
 - EXISTING HEADWALL AND PIPE
 - NEW HEADWALL WITH GRATED INLET
 - NEW MANHOLE
 - STRUCTURE NAME

PRINT IN COLOUR FOR COUNCIL APPROVAL

NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		

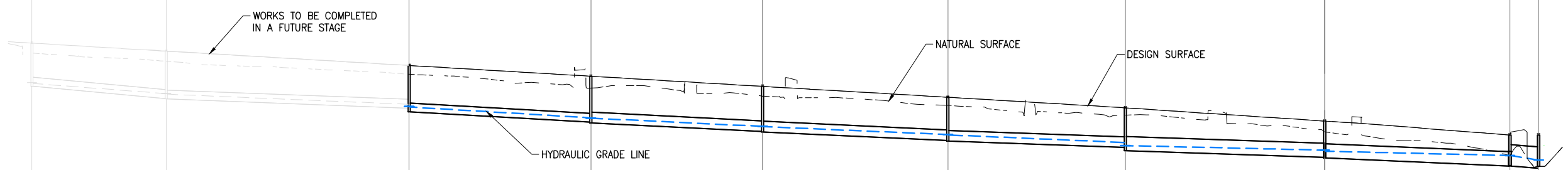


DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL		DATE: RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE PLAN (SHEET 2 OF 2)		
DRAWING NO	160-011-C116	SIZE	A3
		REVISION	A

PLOT DATE: 11/11/2024 11:15:08 AM
 FILE LOCATION: D:\DROPOBOX\ERSCON\Dropbox\ERSCON\160-011-Ray Road - Stage 1\Drawings\160-011-C117-DRAINAGE LONG SECTION (SHEET 1 OF 5).dwg

STRUCTURE NAME	10-1	9-1	8-1	7-1	6-1	5-1	4-1	3-1	2-1	1-1	
STRUCTURE DESCRIPTION	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	HEADWALL

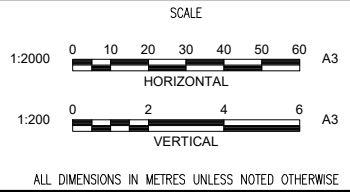


PIPE SIZE (mm)		375	375	375	450	450	450	600x600	1200x600	1800x900
PIPE CLASS		2	2	2	2	2	2	BC	BC	BC
PIPE GRADE (%)		0.92%	0.38%	0.57%	0.50%	0.46%	0.35%	0.34%	0.43%	0.76%
PIPE SLOPE (1 in X)		108.9	266.2	176.9	199.9	215.9	285.2	297.3	230.0	131.9
PIPE FLOW (cumecs)		0.046	0.076	0.094	0.108	0.120	0.133	0.144	0.559	1.615
CAPACITY FLOW (cumecs)		0.214	0.137	0.168	0.257	0.247	0.215	0.453	1.249	4.863
FULL PIPE VELOCITY (m/s)		0.33	0.54	0.67	0.53	0.59	0.66	0.40	0.78	1.00
NORMAL DEPTH VELOCITY (m/s)		1.20	1.00	1.23	1.21	1.21	1.12	1.12	1.68	2.64
DATUM RL		413.000							411.000	
HGL ELEVATION		430.255 430.218	429.792 429.766	429.341 429.254	428.774 428.76	428.412 428.397	428.067 428.049	427.730 427.598	427.408 427.412	427.183 427.177
DEPTH TO INVERT		1.818 1.818	1.998 2.018	1.797 1.957	1.937 1.967	1.902 1.922	1.822 1.852	1.667 1.807	1.533 1.553	1.300 1.300
INVERT LEVEL OF DRAIN		431.921 431.499	429.584 429.564	429.180 429.020	428.588 428.558	428.196 428.176	427.815 427.785	427.523 427.383	427.101 427.081	426.742 426.742
DESIGN (& EXISTING) SURFACE LEVEL		431.921 431.499	431.582 431.158	430.978 430.608	430.525 430.023	430.098 429.688	429.637 429.297	429.190 428.881	428.634 428.187	428.042 427.168
CHAINAGE		56.559	102.182	158.741	235.226	307.480	385.484	460.199	544.051	622.015

LINE 1

PRINT IN COLOUR FOR COUNCIL APPROVAL

NO.	DATE	DESCRIPTION	DESIGN	APPROVED
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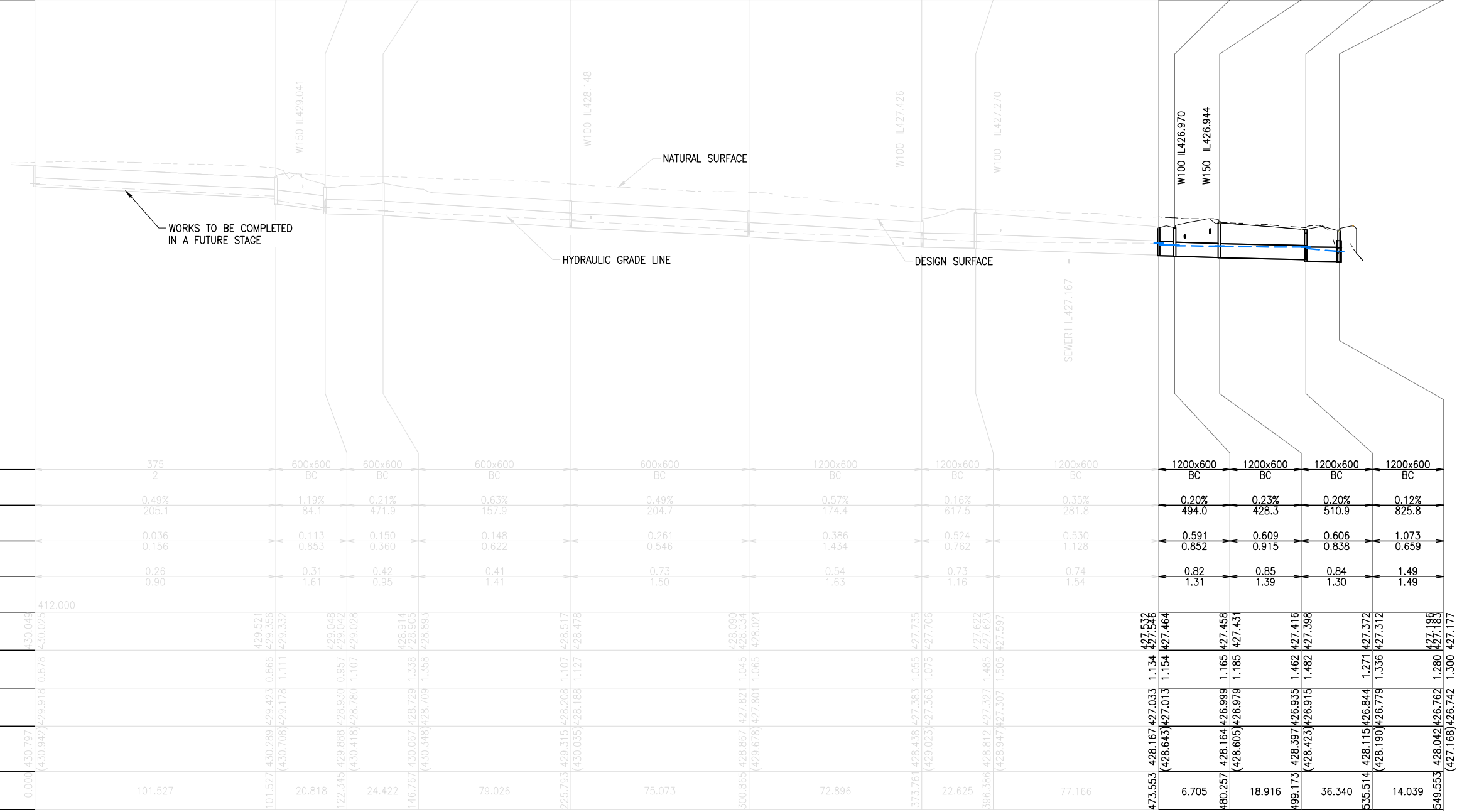


DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEC:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 1 OF 5)		
DRAWING NO	160-011-C117	SIZE	A3
		REVISION	A

PLOT DATE 27/09/24 PROJECT ERSCON 160-011-C118 DRAINAGE LONG SECTION (SHEET 2 OF 5).DWG

STRUCTURE NAME	13-2
STRUCTURE DESCRIPTION	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	12-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	11-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	10-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	9-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	8-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	7-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	6-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	5-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - SAG
	4-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - SAG
	3-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - ON GRADE
	2-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - ON GRADE
	2-1
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - ON GRADE

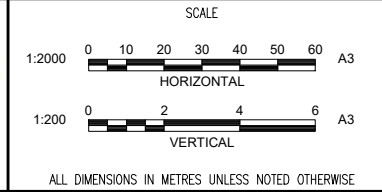


PIPE SIZE (mm)	375	600x600	600x600	600x600	600x600	1200x600	1200x600	1200x600	1200x600	1200x600	1200x600	1200x600	1200x600						
PIPE CLASS	2	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC						
PIPE GRADE (%)	0.49%	1.19%	0.21%	0.63%	0.49%	0.57%	0.16%	0.35%	0.20%	0.23%	0.20%	0.12%							
PIPE SLOPE (1 in X)	205.1	84.1	471.9	157.9	204.7	174.4	617.5	281.8	494.0	428.3	510.9	825.8							
PIPE FLOW (cumecs)	0.036	0.113	0.150	0.148	0.261	0.386	0.524	0.530	0.591	0.609	0.606	1.073							
CAPACITY FLOW (cumecs)	0.156	0.853	0.360	0.622	0.546	1.434	0.762	1.128	0.852	0.915	0.838	0.659							
FULL PIPE VELOCITY (m/s)	0.26	0.31	0.42	0.41	0.73	0.54	0.73	0.74	0.82	0.85	0.84	1.49							
NORMAL DEPTH VELOCITY (m/s)	0.90	1.61	0.95	1.41	1.50	1.63	1.16	1.54	1.31	1.39	1.30	1.49							
DATUM RL	412.000																		
HGL ELEVATION	430.045	430.025	429.521	429.356	429.048	428.914	428.090	427.735	427.532	427.536	427.464	427.458	427.431	427.416	427.398	427.372	427.312	427.186	427.186
DEPTH TO INVERT	0.000	0.878	0.866	1.111	0.957	1.338	1.045	1.065	1.134	1.154	1.165	1.185	1.462	1.482	1.271	1.336	1.280	1.280	1.300
INVERT LEVEL OF DRAIN	430.797	429.918	429.423	429.042	428.930	428.729	427.821	427.363	427.033	427.013	426.999	426.979	426.915	426.915	426.844	426.779	426.762	426.762	426.742
DESIGN (& EXISTING) SURFACE LEVEL	430.000	430.942	430.289	430.708	429.888	430.067	429.678	429.023	428.643	428.643	428.605	428.397	428.423	428.115	428.190	428.042	428.042	428.042	427.186
CHAINAGE	0.000	101.527	20.818	24.422	79.026	225.793	300.865	373.761	427.532	427.536	427.464	427.458	427.431	427.416	427.398	427.372	427.312	427.186	427.186

LINE 2

PRINT IN COLOUR FOR COUNCIL APPROVAL

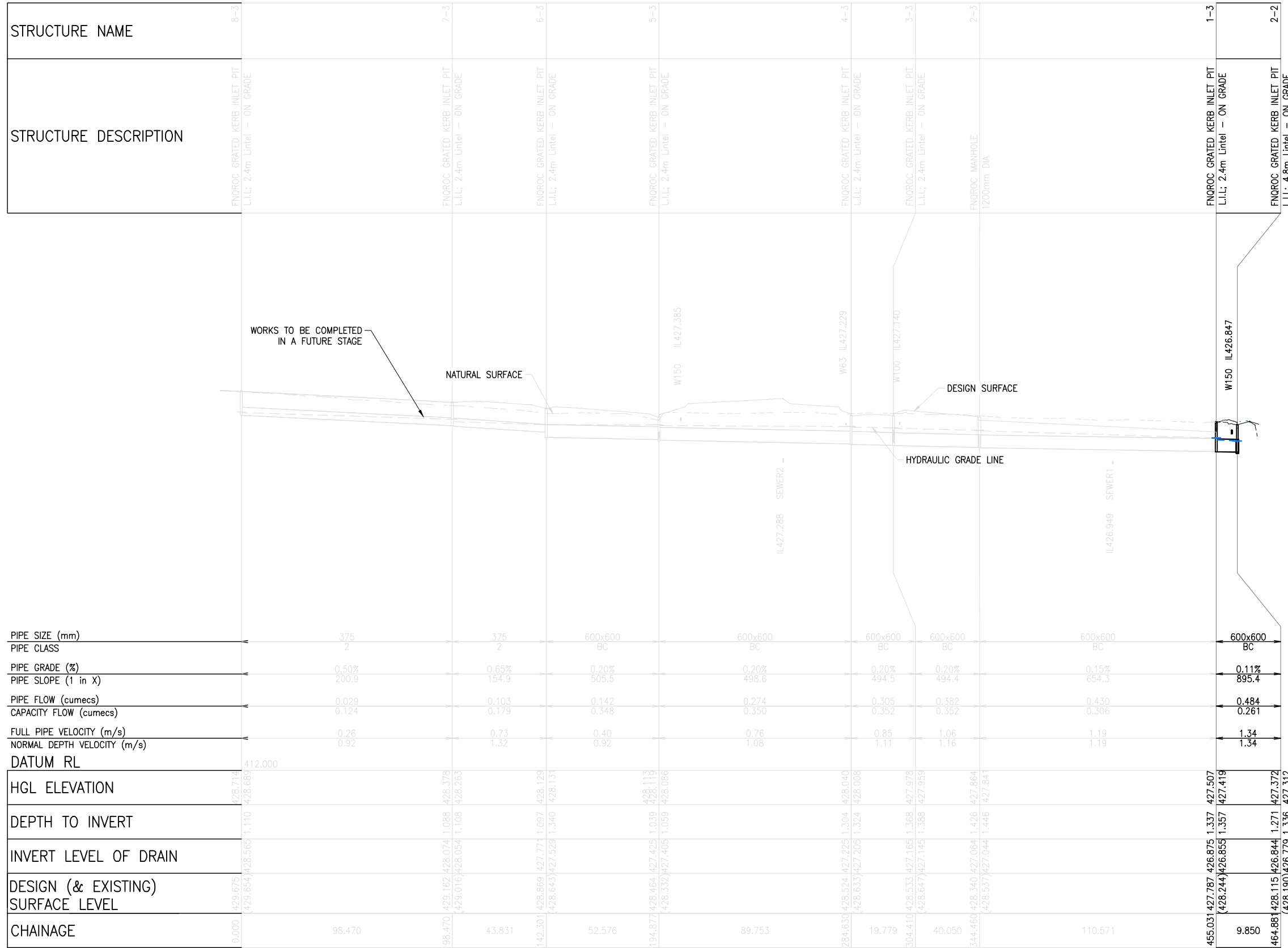
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A	27/09/24	FOR COUNCIL APPROVAL		



DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEG:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 2 OF 5)		
DRAWING NO	160-011-C118	SIZE	A3
		REVISION	A

PLOT DATE: 11/2024 11:16:28 AM
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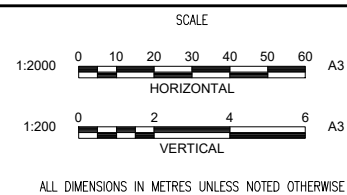


LINE 3

PRINT IN COLOUR

FOR COUNCIL APPROVAL

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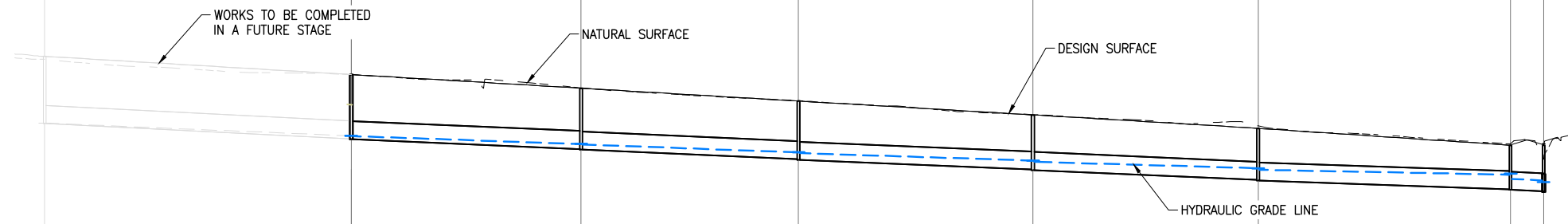


DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF		CONMAT PTY LTD	
DRAWING REF		RAY ROAD SUBDIVISION STAGE 1	
DRAWING NO		DRAINAGE LONGITUDINAL SECTION (SHEET 3 OF 5)	
160-011-C119		SIZE	A3
		REVISION	A

PLOT DATE: 11/11/2024 11:17:22 AM
 FILE LOCATION: D:\PROJ\BOX\ERSCON\Dropbox\ERSCON\160-011-C120 DRAINAGE LONG SECTION (SHEET 4 OF 5).dwg

STRUCTURE NAME	7-4
STRUCTURE DESCRIPTION	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	6-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	5-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	4-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	3-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	2-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	1-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	3-1
	FNOROC GRATED KERB INLET PIT L.I.L.; 4.8m Lintel - ON GRADE

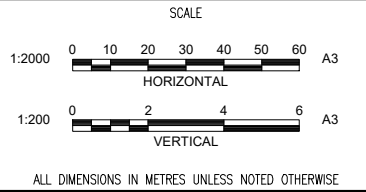


PIPE SIZE (mm)	600x600	600x600	600x600	600x600	600x600	600x600	600x600	600x600
PIPE CLASS	BC	BC	BC	BC	BC	BC	BC	BC
PIPE GRADE (%)	0.49%	0.42%	0.44%	0.41%	0.43%	0.35%	0.45%	
PIPE SLOPE (1 in X)	203.9	238.7	225.8	243.6	230.4	289.3	220.0	
PIPE FLOW (cumecs)	0.005	0.066	0.134	0.199	0.273	0.340	0.404	
CAPACITY FLOW (cumecs)	0.647	0.598	0.615	0.592	0.609	0.543	0.623	
FULL PIPE VELOCITY (m/s)	0.01	0.18	0.37	0.55	0.76	0.94	1.12	
NORMAL DEPTH VELOCITY (m/s)	0.42	1.07	1.36	1.48	1.65	1.59	1.84	
DATUM RL	414.000	413.000						
HGL ELEVATION		428.945	428.674	428.395	428.124	427.869	427.612	427.362
DEPTH TO INVERT		2.132	2.020	1.933	1.812	1.710	1.463	1.533
INVERT LEVEL OF DRAIN		428.813	428.654	428.461	428.282	427.159	427.149	427.149
DESIGN (& EXISTING) SURFACE LEVEL	431.581	430.976	430.526	430.094	429.634	429.277	428.634	428.187
CHAINAGE	0.000	101.932	178.305	250.570	328.536	403.402	487.312	498.312

LINE 4

PRINT IN COLOUR FOR COUNCIL APPROVAL

NO.	DATE	DESCRIPTION	DESIGN	APPROVED
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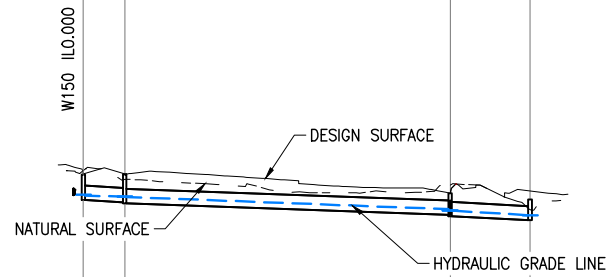


DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEG:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 4 OF 5)		
DRAWING NO	160-011-C120	SIZE	A3
		REVISION	A

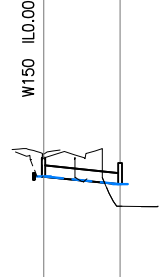
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STRUCTURE NAME	4-22	3-22	2-22	1-22
STRUCTURE DESCRIPTION	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - SAG	HEADWALL



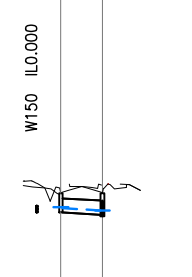
PIPE SIZE (mm)	375	375	375x375
PIPE CLASS	2	2	2
PIPE GRADE (%)	0.55%	0.35%	0.53%
PIPE SLOPE (1 in X)	183.3	282.2	190.4
PIPE FLOW (cumecs)	0.025	0.040	0.057
CAPACITY FLOW (cumecs)	0.130	0.104	0.162
FULL PIPE VELOCITY (m/s)	0.22	0.36	0.41
NORMAL DEPTH VELOCITY (m/s)	0.90	0.88	1.05
DATUM RL	411.000		
HGL ELEVATION	427.027 427.002	426.989 426.989 426.989	426.644 426.614 426.606
DEPTH TO INVERT	0.677	0.736	0.567
INVERT LEVEL OF DRAIN	426.890	426.830	426.461
DESIGN (& EXISTING) SURFACE LEVEL	427.567 (427.666)	427.566 426.830 427.436	427.067 426.500 427.286
CHAINAGE	0.000 11.000	11.000 86.074	97.074 21.138 118.213

STRUCTURE NAME	2-24	24-1
STRUCTURE DESCRIPTION	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE	HEADWALL



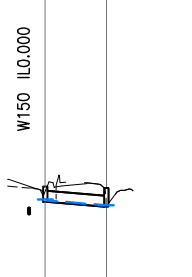
PIPE SIZE (mm)	600x300
PIPE CLASS	BC
PIPE GRADE (%)	0.99%
PIPE SLOPE (1 in X)	101.4
PIPE FLOW (cumecs)	0.003
CAPACITY FLOW (cumecs)	0.700
FULL PIPE VELOCITY (m/s)	0.01
NORMAL DEPTH VELOCITY (m/s)	0.35
DATUM RL	411.000
HGL ELEVATION	427.513
DEPTH TO INVERT	0.486
INVERT LEVEL OF DRAIN	427.504
DESIGN (& EXISTING) SURFACE LEVEL	427.990 (428.104)
CHAINAGE	20.277 20.277

STRUCTURE NAME	1-25	2-22
STRUCTURE DESCRIPTION	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - SAG	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - SAG



PIPE SIZE (mm)	375
PIPE CLASS	2
PIPE GRADE (%)	0.50%
PIPE SLOPE (1 in X)	200.0
PIPE FLOW (cumecs)	0.025
CAPACITY FLOW (cumecs)	0.124
FULL PIPE VELOCITY (m/s)	0.23
NORMAL DEPTH VELOCITY (m/s)	0.88
DATUM RL	411.000
HGL ELEVATION	426.695 426.669
DEPTH TO INVERT	0.516
INVERT LEVEL OF DRAIN	426.558
DESIGN (& EXISTING) SURFACE LEVEL	427.071 (427.092)
CHAINAGE	11.000 11.000

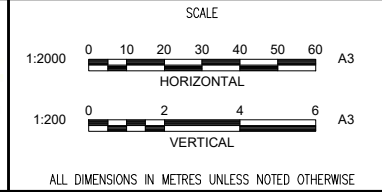
STRUCTURE NAME	2-26	1-26
STRUCTURE DESCRIPTION	HEADWALL	HEADWALL



PIPE SIZE (mm)	600x300
PIPE CLASS	BC
PIPE GRADE (%)	0.79%
PIPE SLOPE (1 in X)	127.4
PIPE FLOW (cumecs)	0.018
CAPACITY FLOW (cumecs)	0.312
FULL PIPE VELOCITY (m/s)	0.10
NORMAL DEPTH VELOCITY (m/s)	0.82
DATUM RL	411.000
HGL ELEVATION	426.903 426.880
DEPTH TO INVERT	0.414
INVERT LEVEL OF DRAIN	426.835
DESIGN (& EXISTING) SURFACE LEVEL	427.115 (427.055)
CHAINAGE	16.174 16.174

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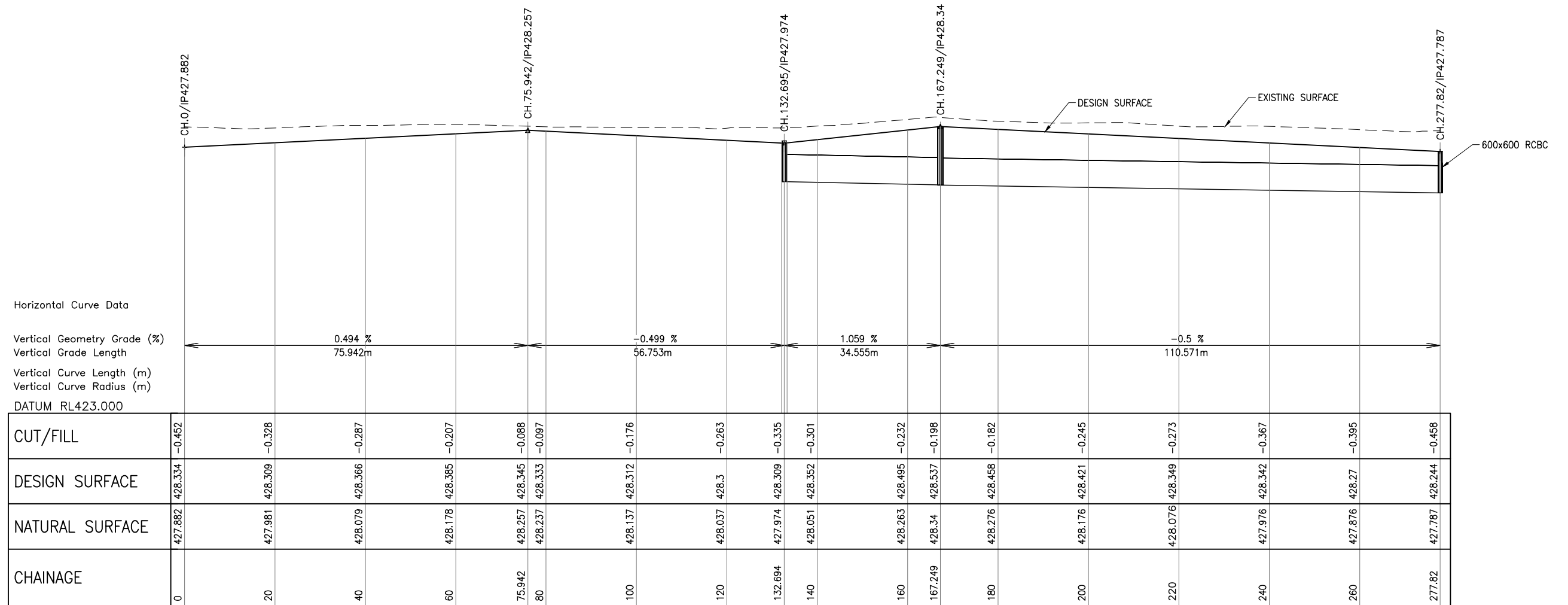
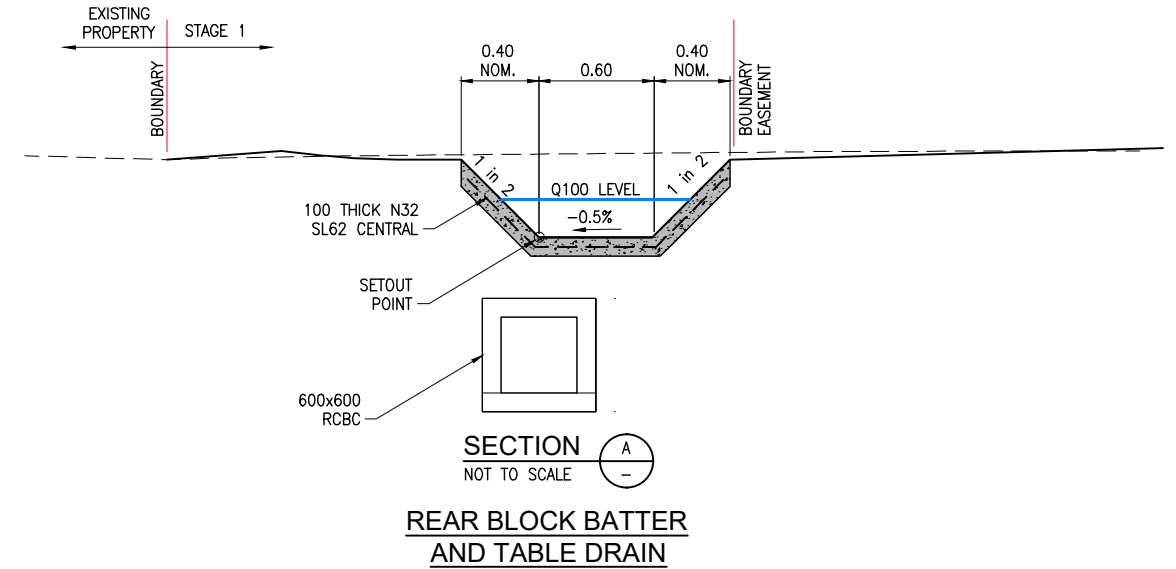
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A	30/09/24	FOR COUNCIL APPROVAL		



DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEC:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 5 OF 5)		
DRAWING NO	160-011-C121	SIZE	A3
		REVISION	A

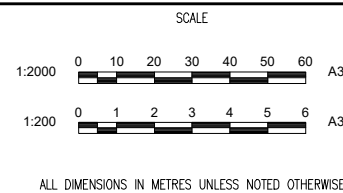
PLOT DATE: 11/2024 12:23:10 PM
 FILE LOCATION: D:\DROPOBOX\ERSCON\Dropbox\ERSCON\160 Conmat\011 Ray Road - Stage 1\5 Drawings\160-011-C122 REAR DRAIN LONG SECTION.dwg



LONGITUDINAL SECTION - REAR DRAIN
SCALE 1:2000H 200V

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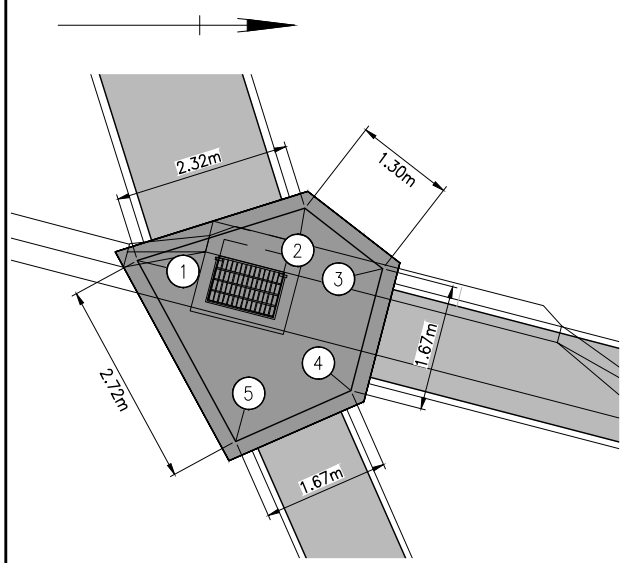
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A	27/09/24	FOR COUNCIL APPROVAL		



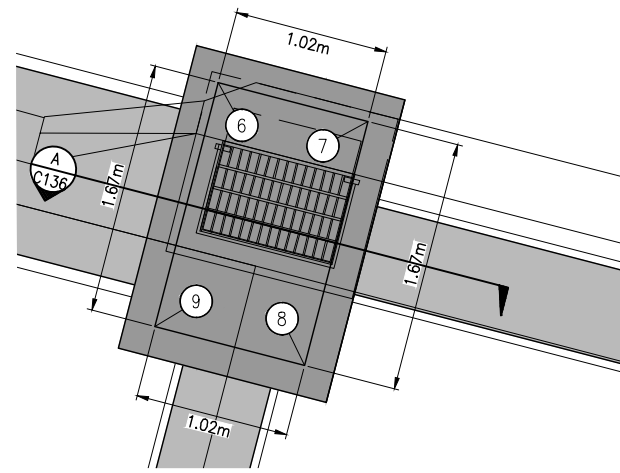
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DRAWN APPROVED JM	DESIGN APPROVED JM
CIVIL SIGNOFF APPROVAL	
DATE:	RPEC:

PROJECT REF	CONMAT PTY LTD	
	RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF	REAR DRAIN LONGITUDINAL SECTION	
DRAWING NO	160-011-C122	SIZE A3
		REVISION A

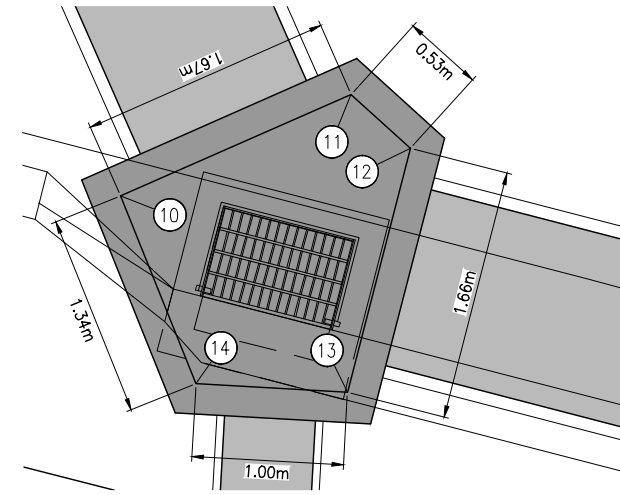
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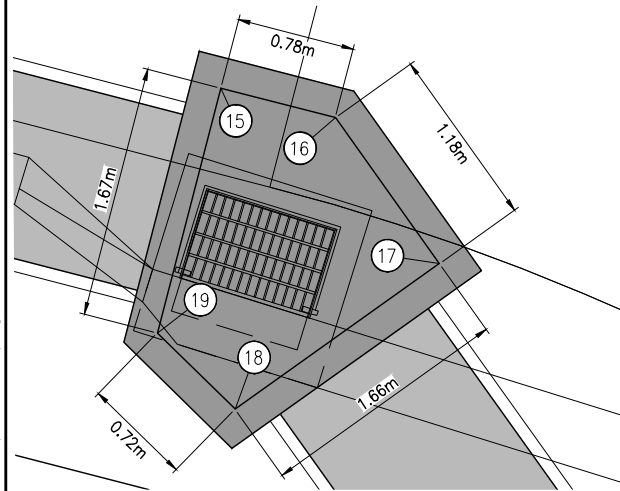
PIT 2/1
SCALE 1:100



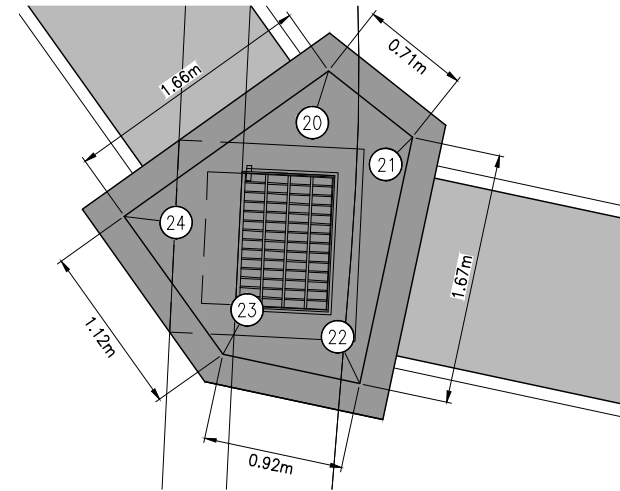
PIT 3/1
SCALE 1:50



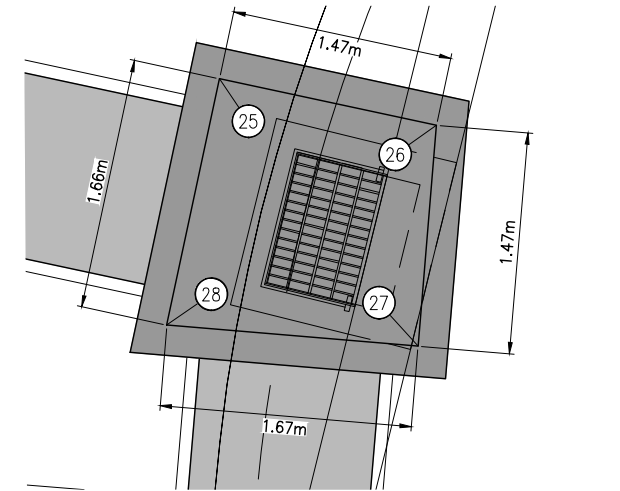
PIT 2/2
SCALE 1:50



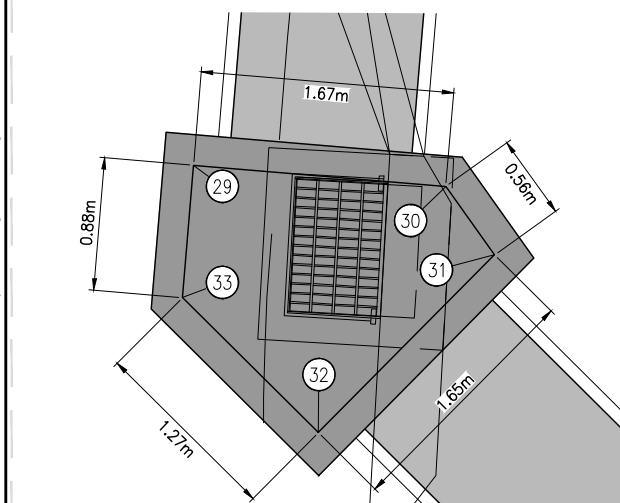
PIT 3/2
SCALE 1:50



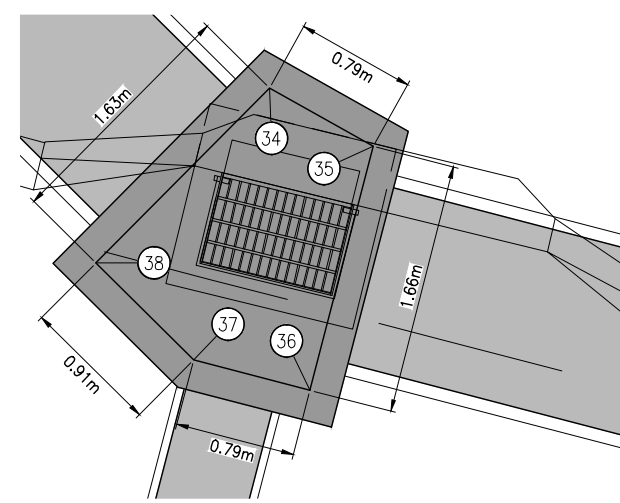
PIT 4/2
SCALE 1:50



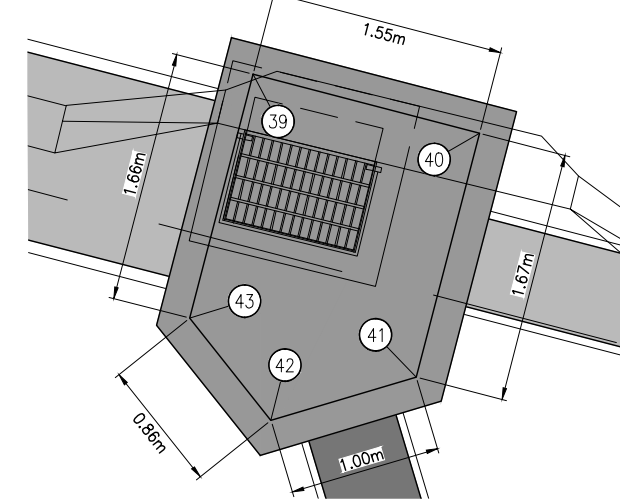
PIT 5/2
SCALE 1:50



PIT 6/2
SCALE 1:50



PIT 7/2
SCALE 1:50



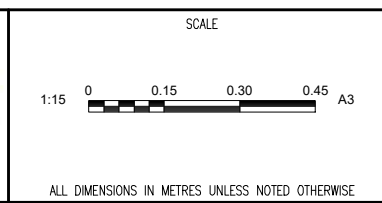
PIT 8/2
SCALE 1:50

PIT NO	UPSTREAM I.L.	UPSTAND HEIGHT	POINT NO	EASTING	NORTHING	HEIGHT	NOTES
2/1	1.090	N/A	1	332255.354	8117618.467	426.702	UPSTAND WALLS AND WALLS ABOVE RCBC NOT REQUIRED
			2	332256.190	8117616.304	426.702	
			3	332255.017	8117615.076	426.742	
			4	332253.405	8117615.494	426.762	
			5	332252.733	8117617.017	426.762	
			6	332235.995	8117541.798	427.081	
3/1	0.965	0.328	7	332235.743	8117540.828	427.101	
			8	332234.131	8117541.247	427.101	
			9	332234.383	8117542.217	427.081	
2/2	0.965	0.066	10	332242.105	8117612.331	426.779	
			11	332242.777	8117610.808	426.779	
			12	332242.421	8117610.415	426.844	
			13	332240.810	8117610.832	426.844	
			14	332240.865	8117611.833	426.844	
			15	332233.595	8117576.356	426.915	
3/2	0.965	0.257	16	332233.399	8117575.600	426.925	
			17	332232.619	8117575.044	426.935	
			18	332231.653	8117576.400	426.935	
4/2	0.765	0.160	19	332231.984	8117576.774	426.915	WALL ABOVE RCBC NOT REQUIRED
			20	332218.263	8117564.813	426.979	
			21	332217.971	8117564.444	426.999	
			22	332216.343	8117564.793	426.999	
			23	332216.514	8117565.611	426.989	
			24	332217.296	8117566.168	426.979	
5/2	0.765	0.129	25	332216.829	8117559.110	427.013	
			26	332216.522	8117557.677	427.042	
			27	332215.061	8117557.799	427.033	
6/2	0.965	0.280	28	332215.201	8117559.459	427.013	
			29	332139.522	8117565.812	427.307	
			30	332139.382	8117564.153	427.307	
			31	332139.105	8117563.982	427.327	
			32	332137.923	8117565.155	427.327	
			33	332138.648	8117565.885	427.317	
7/2	0.765	N/A	34	332124.055	8117548.816	427.363	UPSTAND WALLS AND WALLS ABOVE RCBC NOT REQUIRED
			35	332123.735	8117548.247	427.383	
			36	332122.124	8117548.668	427.383	
			37	332122.323	8117549.435	427.383	
			38	332122.873	8117549.989	427.363	
			39	332105.663	8117478.619	427.801	
8/2	0.765	N/A	40	332105.274	8117477.122	427.821	UPSTAND WALLS AND WALLS ABOVE RCBC NOT REQUIRED
			41	332103.663	8117477.540	427.821	
			42	332103.376	8117478.500	427.811	
			43	332104.051	8117479.037	427.801	



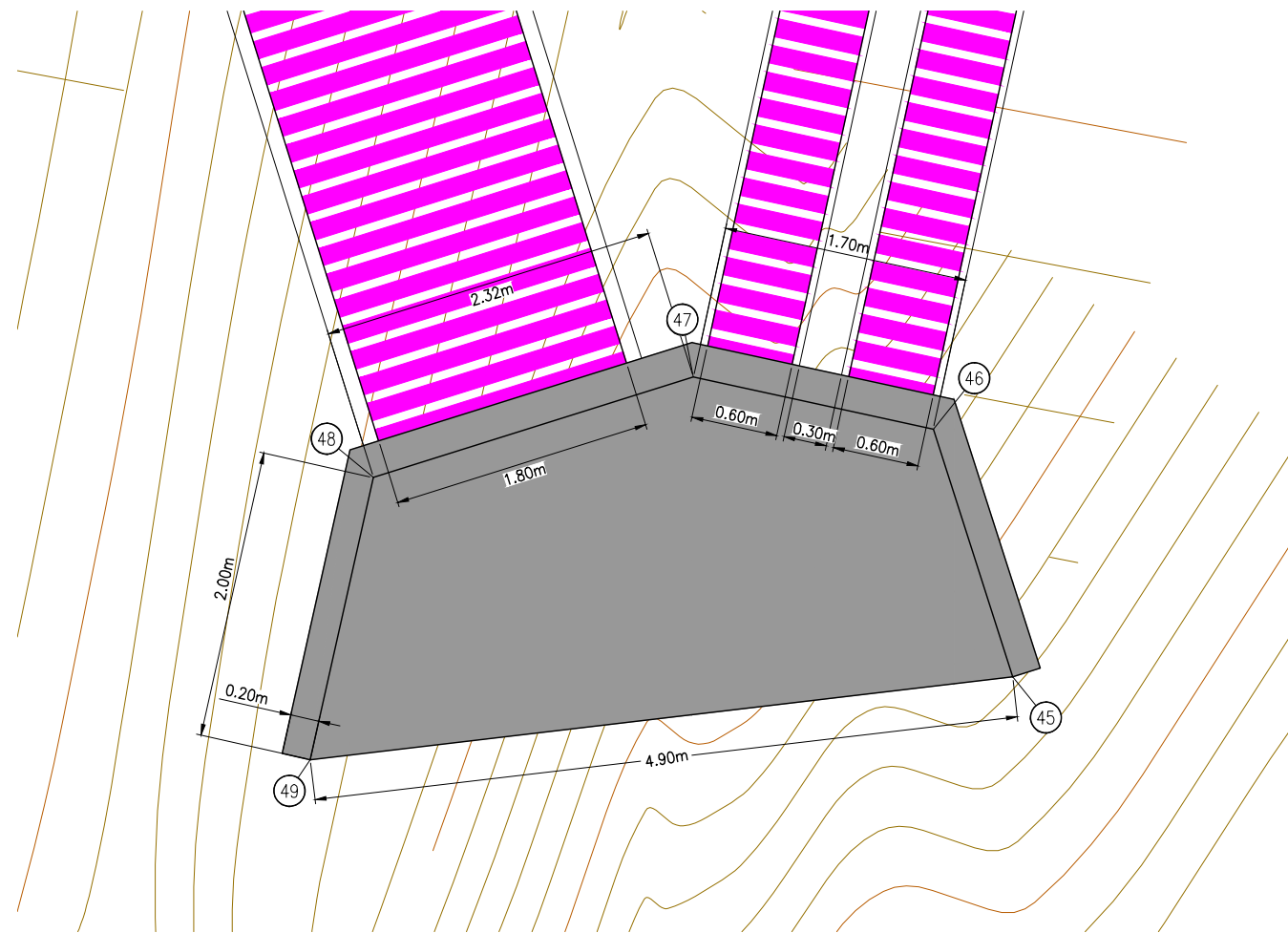
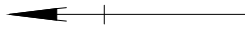
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NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	8/11/24	FOR COUNCIL APPROVAL		



DRAWN	MF	DESIGNED	MF
DRAWN APPROVED	JM	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	STORMWATER PIT DESIGN (SHEET 1 OF 2)		
DRAWING NO	160-011-C123	SIZE	A3
		REVISION	A



STORMWATER PIT SETOUT

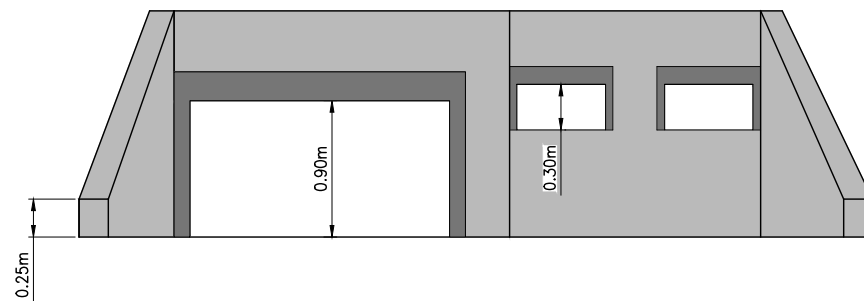
PIT NO	POINT NO	EASTING	NORTHING	HEIGHT
1/1	45	332267.539	8117623.928	426.713
	46	332265.825	8117623.378	426.723
	47	332265.465	8117621.717	426.723
	48	332266.159	8117619.500	426.723
	49	332268.111	8117619.064	426.713

NOTES:

- BOX CULVERT HEADWALL TO BE CONSTRUCTED IN ACCORDANCE WITH FNQROC STD DWG. S1090 "BOX CULVERT HEADWALL, WINGWALLS AND APRON".

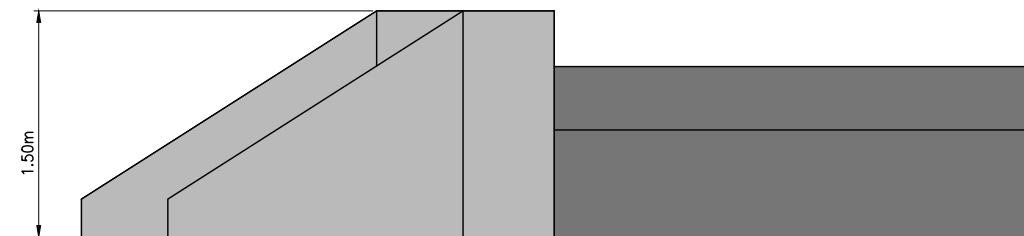
OUTLET HEADWALL 1/1

SCALE 1:50



OUTLET HEADWALL 1/1 - FRONT PROFILE

SCALE 1:50



OUTLET HEADWALL 1/1 - SIDE PROFILE

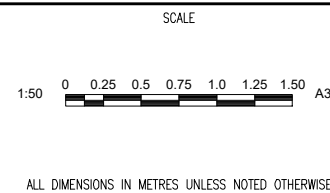
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PLOT DATE: 11/11/2024 2:46:34 PM FILE LOCATION: D:\PROJ\BO\X\ERSCON Dropbox\ERSCON\160\011-Ray Road - Stage 1\5 Drawings\160-011-C124-STORMWATER PIT DESIGN (SHEET 2 OF 2).dwg

NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	8/11/24	FOR COUNCIL APPROVAL		



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DRAWN APPROVED	JM	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

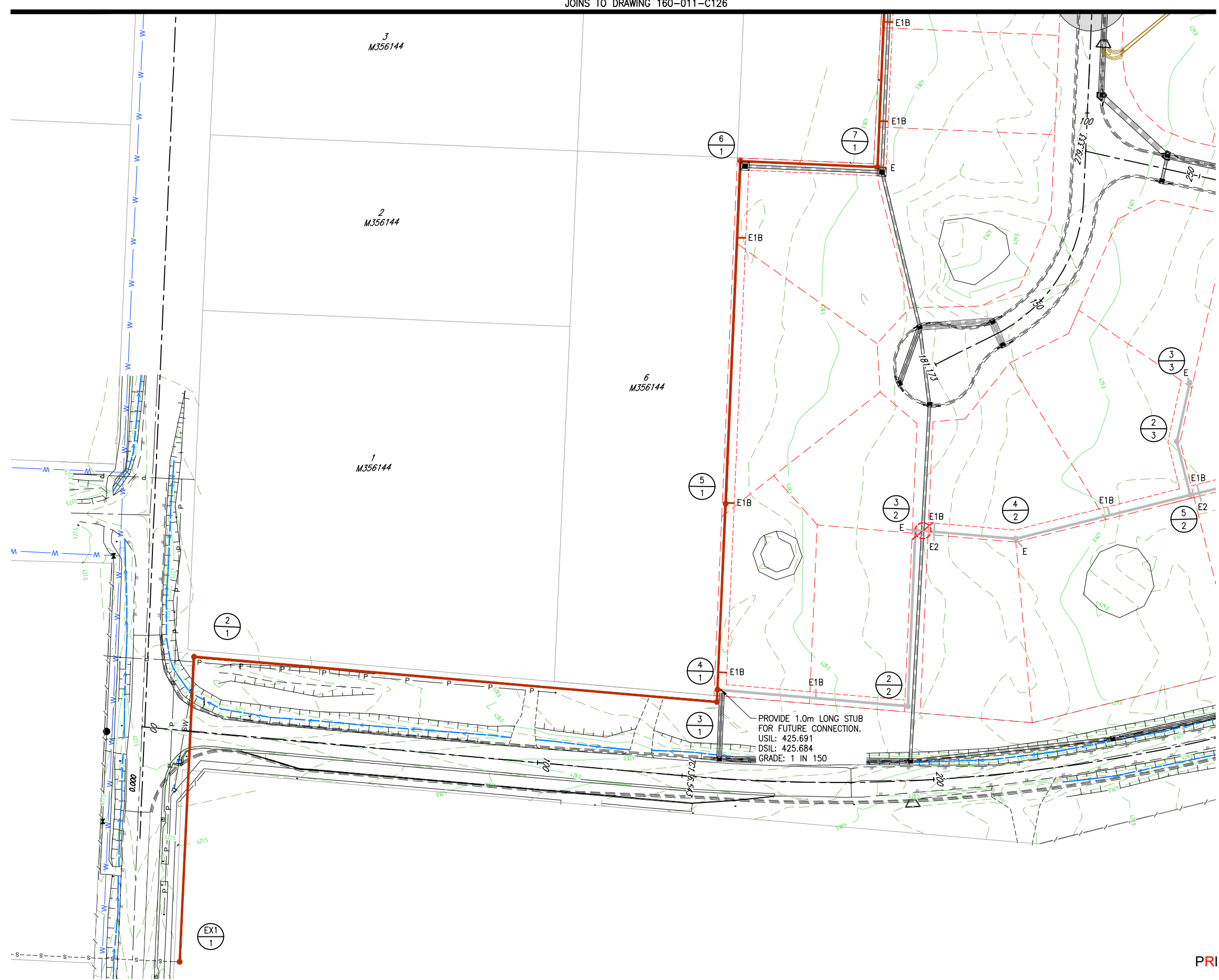
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		RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF		STORMWATER PIT DESIGN (SHEET 2 OF 2)	
DRAWING NO		160-011-C124	SIZE A3
			REVISION A

SEWER STRUCTURE SETOUT

PIT No.	EASTING	NORTHING
6/1	332125.868	8117656.396
7/1	332123.044	8117621.957
5/1	332039.849	8117663.451
2/1	332006.509	8117798.646
4/1	331993.171	8117667.279
3/1	331990.079	8117667.533
1/1	331929.924	8117805.184

LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- 3.0m WIDE EASEMENT
- ROAD CENTRELINE
- NEW KERB & CHANNEL
- NEW RETAINING WALL
- NEW BATTER
- EXISTING SEWER
- EXISTING WATER
- EXISTING STORMWATER
- FLOW PATH
- PROPOSED STORMWATER PIPE
- PROPOSED DESIGN CONTOUR MAJOR
- PROPOSED DESIGN CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- STRUCTURE NAME
- PROPOSED GRAVITY SEWER MAIN, MANHOLE & TERMINAL MAINTENANCE SHAFT (TMS)
- PROPOSED SEWER WITH PROPERTY CONNECTION SEWER TO MANHOLE
- PROPOSED SEWER WITH PROPERTY CONNECTION SEWER. REFER FNQROC STD DWG S3005.
- SERVICE CROSSING
- PROPOSED GRAVITY SEWER MAIN, MANHOLE & TERMINAL MAINTENANCE SHAFT (TMS)
- PROPOSED SEWER WITH PROPERTY CONNECTION SEWER TO MANHOLE
- PROPOSED SEWER WITH PROPERTY CONNECTION SEWER. REFER FNQROC STD DWG S3005.
- SERVICE CROSSING
- MINIMUM HOUSE PAD LEVEL
- PROPOSED Ø63 uPVC WATER MAIN
- PROPOSED Ø100 uPVC WATER MAIN
- PROPOSED Ø150 uPVC WATER MAIN
- EXISTING HEADWALL AND PIPE
- NEW IN-SITU MANHOLE
- FUTURE FIELD INLET PIT TYPE A
- NEW HEADWALL WITH GRATED INLET
- NEW MANHOLE



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PLOT DATE: 11/12/2024 10:24:24 AM
 FILE LOCATION: D:\PROJ\ERSCON\160\Conmat\011 Ray Road - Stage 1\5 Drawings\160-011-C125 SEWER PLAN (1 OF 3).dwg

NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



CLIENT

SCALE

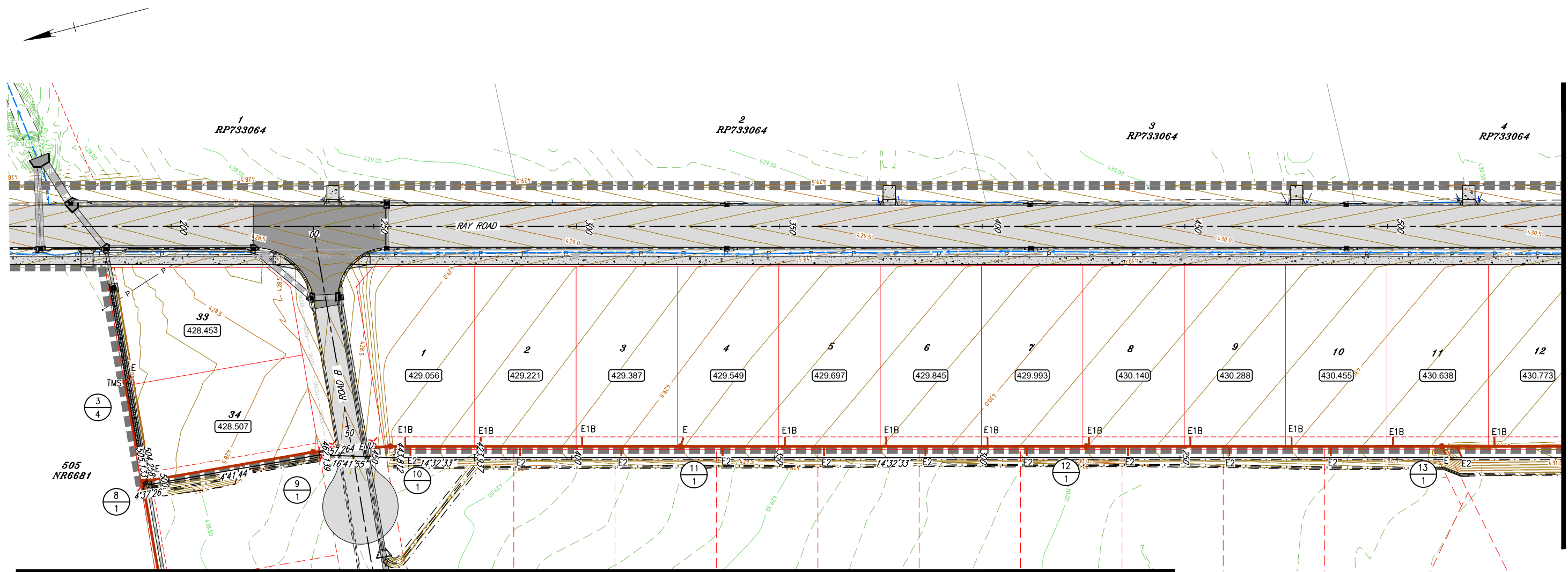
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ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

DRAWN	AB	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			

DATE: _____ RPEC: _____

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	SEWER PLAN (SHEET 1 OF 3)		
DRAWING NO	160-011-C125	SIZE	A3
		REVISION	A



JOINS TO DRAWING 160-011-C127

JOINS TO DRAWING 160-011-C125

SEWER STRUCTURE SETOUT

PIT No.	EASTING	NORTHING
3/4	332208.647	8117614.937
8/1	332183.934	8117616.963
9/1	332180.444	8117574.413
10/1	332177.002	8117555.656
11/1	332159.020	8117486.339
12/1	332133.914	8117389.558
13/1	332111.889	8117304.653

LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- 3.0m WIDE EASEMENT
- ROAD CENTRELINE
- NEW KERB & CHANNEL
- NEW RETAINING WALL
- PROPOSED BATTER
- EXISTING SEWER
- EXISTING WATER
- EXISTING STORMWATER
- FLOW PATH
- PROPOSED STORMWATER PIPE
- PROPOSED DESIGN CONTOUR MAJOR
- PROPOSED DESIGN CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- STRUCTURE NAME
- PROPOSED GRAVITY SEWER MAIN, MANHOLE & TERMINAL MAINTENANCE SHAFT (TMS)
- PROPOSED SEWER WITH PROPERTY CONNECTION SEWER TO MANHOLE
- PROPOSED SEWER WITH PROPERTY CONNECTION SEWER. REFER FNQROC STD DWG S3005.
- SERVICE CROSSING
- PROPOSED GRAVITY SEWER MAIN, MANHOLE & TERMINAL MAINTENANCE SHAFT (TMS)
- PROPOSED SEWER WITH PROPERTY CONNECTION SEWER TO MANHOLE
- PROPOSED SEWER WITH PROPERTY CONNECTION SEWER. REFER FNQROC STD DWG S3005.
- SERVICE CROSSING
- MINIMUM HOUSE PAD LEVEL
- PROPOSED #63 uPVC WATER MAIN
- PROPOSED #100 uPVC WATER MAIN
- PROPOSED #150 uPVC WATER MAIN
- EXISTING HEADWALL AND PIPE
- NEW IN-SITU MANHOLE
- FUTURE FIELD INLET PIT TYPE A
- NEW HEADWALL WITH GRATED INLET
- NEW MANHOLE

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PLOT DATE: 11/20/24 4:17:35 PM
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NO.	DATE	DESCRIPTION	DESIGN	APPROVED
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CLIENT

SCALE

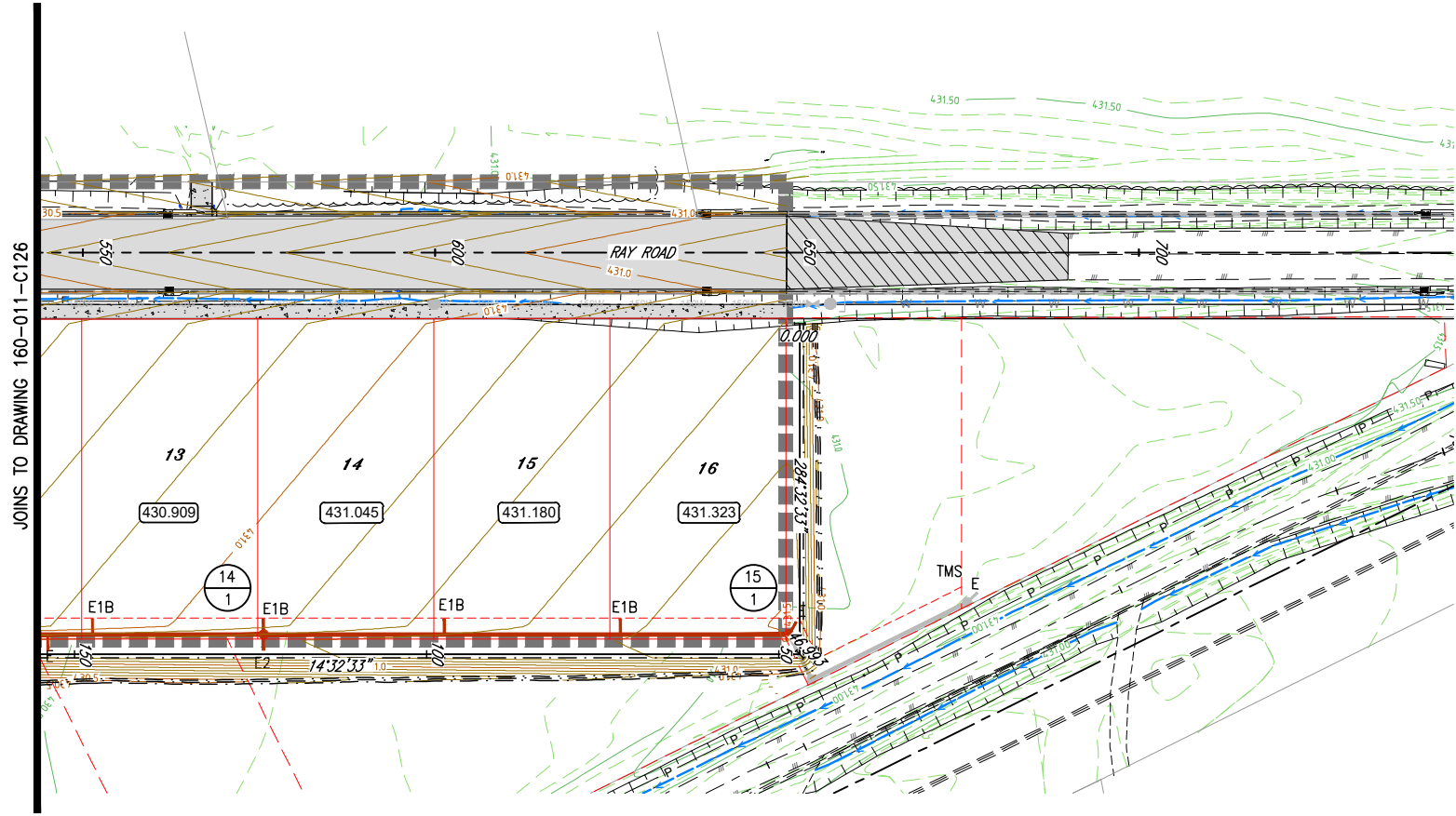
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ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

DRAWN	MF	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL		DATE: _____ RPEC: _____	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	SEWER PLAN (SHEET 2 OF 3)		
DRAWING NO	160-011-C126	SIZE	A3
		REVISION	A

PLOT DATE: 11/11/2024 10:03:54 AM
FILE LOCATION: D:\DROPOBOX\ERSCON\160 Conmat\011 Ray Road - Stage 1\5 Drawings\160-011-C127 SEWER PLAN (3 OF 3).dwg



SEWER STRUCTURE SETOUT

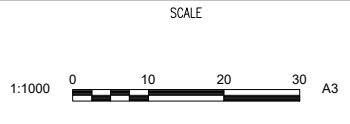
PIT No.	EASTING	NORTHING
14/1	332096.255	8117244.386
15/1	332077.502	8117172.094

LEGEND

- STAGE BOUNDARY
 - EXISTING PROPERTY BOUNDARY
 - PROPOSED PROPERTY BOUNDARY
 - FUTURE PROPERTY BOUNDARY
 - EASEMENT BOUNDARY
 - 3.0m WIDE EASEMENT
 - ROAD CENTRELINE
 - NEW KERB & CHANNEL
 - NEW RETAINING WALL
 - PROPOSED BATTER
 - EXISTING SEWER
 - EXISTING WATER
 - EXISTING STORMWATER
 - FLOW PATH
 - PROPOSED STORMWATER PIPE
 - STRUCTURE NAME
 - PROPOSED DESIGN CONTOUR MAJOR
 - PROPOSED DESIGN CONTOUR MINOR
 - EXISTING CONTOUR MAJOR
 - EXISTING CONTOUR MINOR
-
- PROPOSED GRAVITY SEWER MAIN, MANHOLE & TERMINAL MAINTENANCE SHAFT (TMS)
 - PROPOSED SEWER WITH PROPERTY CONNECTION SEWER TO MANHOLE
 - PROPOSED SEWER WITH PROPERTY CONNECTION SEWER. REFER FNQROC STD DWG S3005.
 - SERVICE CROSSING
 - PROPOSED GRAVITY SEWER MAIN, MANHOLE & TERMINAL MAINTENANCE SHAFT (TMS)
 - PROPOSED SEWER WITH PROPERTY CONNECTION SEWER TO MANHOLE
 - PROPOSED SEWER WITH PROPERTY CONNECTION SEWER. REFER FNQROC STD DWG S3005.
 - SERVICE CROSSING
 - MINIMUM HOUSE PAD LEVEL
 - PROPOSED #63 uPVC WATER MAIN
 - PROPOSED #100 uPVC WATER MAIN
 - PROPOSED #150 uPVC WATER MAIN
 - EXISTING HEADWALL AND PIPE
 - NEW IN-SITU MANHOLE
 - FUTURE FIELD INLET PIT TYPE A
 - NEW HEADWALL WITH GRATED INLET
 - NEW MANHOLE

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NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



DRAWN	AB	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	SEWER PLAN (SHEET 3 OF 3)		
DRAWING NO	160-011-C127	SIZE	A3
		REVISION	A

ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

DATE: RPEC:

PLOT DATE: 11/11/2024 4:17:58 PM
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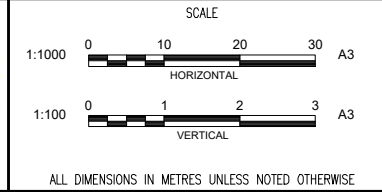
STRUCTURE NAME	EX1-1	2-1	3-1	4-1	5-1	8-1	3-4
STRUCTURE TYPE & DROP		1050mm MH	1050mm MH	1050mm MH	1050mm MH	1050mm MH	1050mm MH
STRUCTURE LID TYPE		C	C	C	C	C	C
JUNCT. DROP ANGLE		92°	-92°	2	92°		
DEPTH TO HC							
SEWER IL HEIGHT AT HC							
HC INVERT LEVEL							
HC TYPE				E1B			
HC LOT No.				59			
CH FROM DS STRUCTURE			4.474	424.628	2.550		

PIPE DIA & TYPE	225ø PVC				150ø PVC		150ø PVC		150ø PVC	
PIPE GRADE (1 in x)	1 IN 250				1 IN 150		1 IN 150		1 IN 99.985	
DATUM RL(m)	421.000									
JUNCTION INVERT LEVEL										
DEPTH TO INVERT	4.510	3.946	3.794	3.754	3.867	3.787	3.909	3.839	3.393	3.393
SEWER INVERT LEVEL	422.990	423.554	423.862	423.902	424.430	424.510	424.531	424.601	424.913	424.913
DESIGN SURFACE LEVEL	427.500	427.656	427.656	427.656	428.298	428.367	428.440	428.339	428.383	428.306
EXISTING SURFACE LEVEL	427.486	427.656	427.656	427.656	428.367	428.367	428.339	428.339	428.383	428.306
RUNNING CHAINAGE	0.000	76.864	76.864	132.139	209.003	212.106	212.106	46.834	258.940	258.940

LINE NUMBER	LINE 1	LINE 4
JUNCTION INVERT LEVEL		426.217
DEPTH TO INVERT		2.092
SEWER INVERT LEVEL		426.217
DESIGN SURFACE LEVEL		428.309
EXISTING SURFACE LEVEL		428.351
RUNNING CHAINAGE	0.000	24.796

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NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		

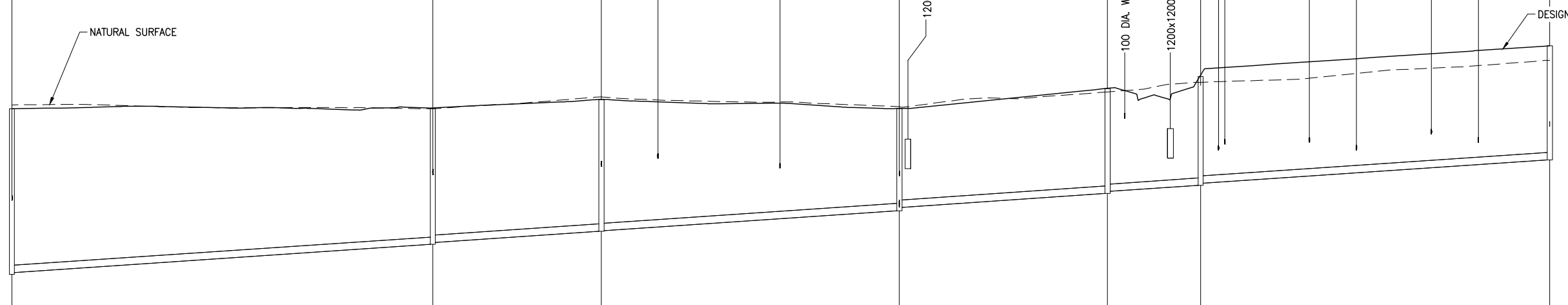


DRAWN	AB	DESIGNED	MF
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CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	SEWER LONGITUDINAL SECTION (SHEET 1 OF 3)		
DRAWING NO	160-011-C128	SIZE	A3
		REVISION	A

PLOT DATE: 11/11/2024 4:19:20 PM
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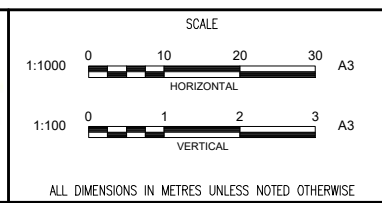
STRUCTURE NAME	5-1	6-1	7-1	8-1	9-1	10-1	11-1
STRUCTURE TYPE & DROP	1050mm MH	1050mm MH	1050mm MH	1050mm MH	1050mm MH	1050mm MH	1050mm MH
STRUCTURE LID TYPE	C	C	C	C	C	C	C
JUNCT. DROP ANGLE		90°	-90°	90°	6°	4°	
DEPTH TO HC	1.288	1.031	1.327	0.684	0.485	0.653	0.450
SEWER IL HEIGHT AT HC	425.143	425.929	425.800	426.247	426.247	426.802	427.163
HC INVERT LEVEL	426.431	426.960	427.127	426.931	426.712	427.580	427.613
HC TYPE	E	E	E	E	E	E1B	E2
HC LOT No.	39	38	37	34	33	1	30
CH FROM DS STRUCTURE	0.000	0.000	0	0.000	0.000	3.687	56.955



PIPE DIA & TYPE	150ø PVC						
PIPE GRADE (1 in x)	1 IN 150						
DATUM RL(m)	422.000						
JUNCTION INVERT LEVEL				426.869			
DEPTH TO INVERT	3.393	2.791	2.694	2.092	2.149	2.229	2.334
SEWER INVERT LEVEL	424.913	425.529	425.800	426.217	426.572	426.740	427.259
DESIGN SURFACE LEVEL	428.306	428.320	428.494	428.309	428.721	428.969	429.593
EXISTING SURFACE LEVEL	428.383	428.305	428.544	428.351	428.651	428.848	429.298
RUNNING CHAINAGE	258.940	345.248	379.803	440.897	483.590	502.660	574.272
LINE NUMBER	LINE 1						

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NO.	DATE	DESCRIPTION	DESIGN	APPROVED
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CIVIL SIGNOFF APPROVAL			
DATE:	RPEQ:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	SEWER LONGITUDINAL SECTION (SHEET 2 OF 3)		
DRAWING NO	160-011-C129	SIZE	A3
		REVISION	A

PLOT DATE: 11/2024 4:19:47 PM
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STRUCTURE NAME	11-1				12-1				13-1				14-1		15-1	16-1										
STRUCTURE TYPE & DROP	1050mm MH																									
STRUCTURE LID TYPE	C																									
JUNCT. DROP ANGLE																										
DEPTH TO HC	0.685	0.398	0.625	0.378	0.605	0.359	0.584	0.339	0.528	0.287	0.509	0.266	0.507	0.455	0.522	0.242	0.316	0.454	0.437	0.421	0.245	0.390	0.320	0.294	0.244	0.244
SEWER IL HEIGHT AT HC	427.259	427.365	427.469	427.534	427.637	427.702	427.806	427.871	428.007	428.072	428.176	428.241	428.345	428.410	428.513	428.591	428.653	428.716	428.842	428.885	429.447	429.047	429.257	429.426	429.584	429.584
HC INVERT LEVEL	427.944	427.763	428.084	427.912	428.242	428.061	428.390	428.210	428.535	428.359	428.685	428.507	428.852	428.665	429.035	428.833	428.969	429.170	429.279	429.306	429.692	429.437	429.577	429.720	429.828	429.828
HC TYPE	E	E2	E1B	E2	E1B	E2	E1B	E2	E1B	E2	E1B	E2	E1B	E2	E1B	E	E2	E1B	E2	E1B	E	E	E1B	E1B	E	E
HC LOT No.	4	29	5	28	6	27	7	26	8	25	9	24	10	23	11	22	21	12	20	13	19	14	15	16	17	
CH FROM DS STRUCTURE	0.000	10.340	25.696	35.336	50.692	60.332	75.689	85.328	0.710	10.340	25.696	35.336	50.692	60.332	75.689	0.000	3.710	12.970	31.617	37.966	0.000	0.000	25.696	50.692	74.665	

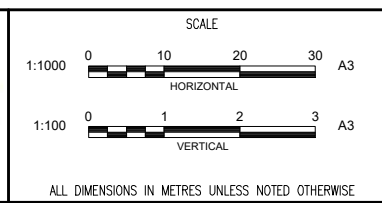
DESIGN SURFACE

NATURAL SURFACE

PIPE DIA & TYPE	150ø PVC																									
PIPE GRADE (1 in x)	1 IN 150																									
DATUM RL(m)	424.000																									
JUNCTION INVERT LEVEL																										
DEPTH TO INVERT	2.334	2.294			2.231	2.191			2.244	2.204			2.142	2.102			1.940	1.899			1.761	1.761			1.761	1.761
SEWER INVERT LEVEL	427.259	427.299			427.966	428.006			428.591	428.631			429.047	429.087			429.584	429.625			429.673	429.673			429.673	429.673
DESIGN SURFACE LEVEL	429.593				430.197				431.835				431.189				431.524				431.007				431.007	431.007
EXISTING SURFACE LEVEL	429.298				429.962				430.315				430.586				430.586				431.007				431.007	431.007
RUNNING CHAINAGE	574.272		99.985		674.256		87.715		761.972		62.262		824.234		74.685		898.918				898.918				906.089	906.089
LINE NUMBER	LINE 1																									

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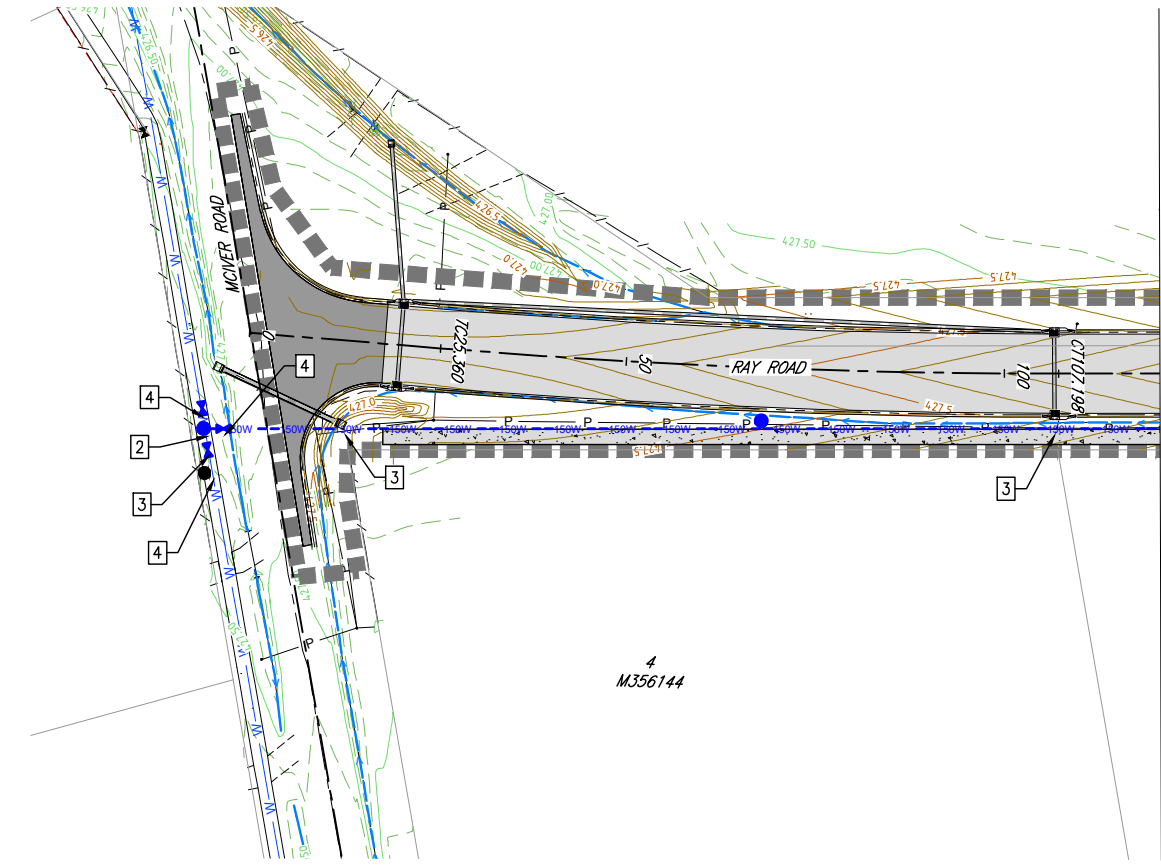
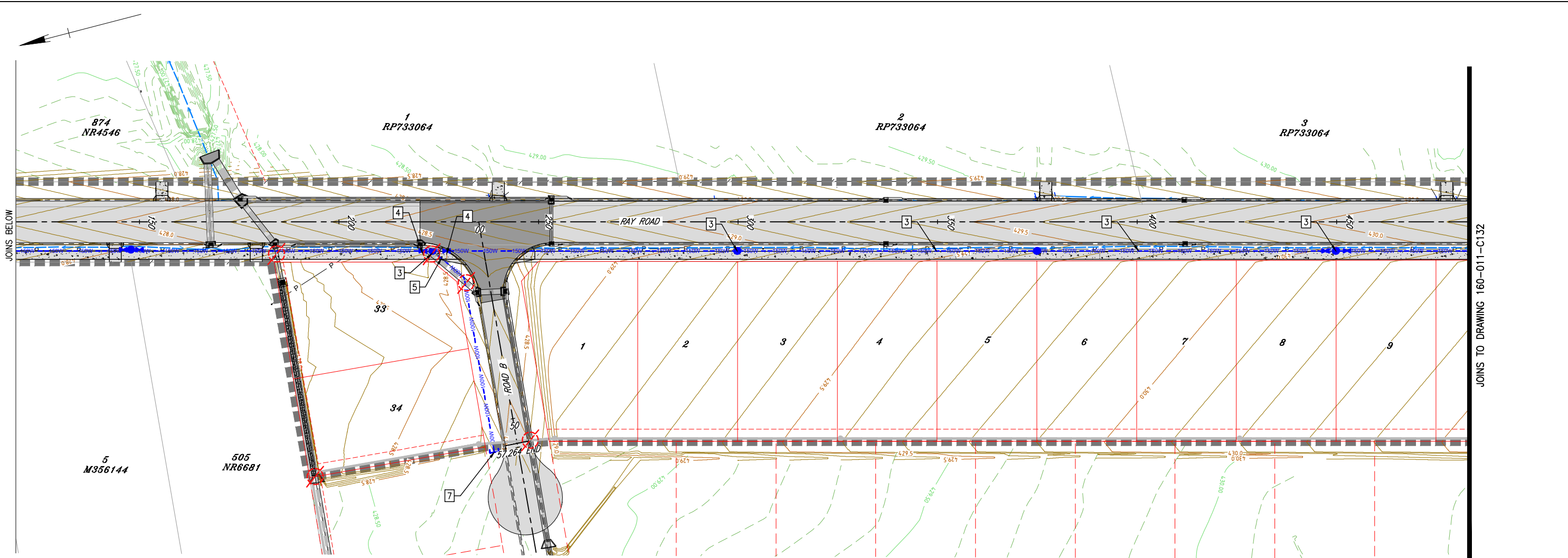
NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



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CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	SEWER LONGITUDINAL SECTION (SHEET 3 OF 3)		
DRAWING NO	160-011-C130	SIZE	A3
REVISION			A

PLOT DATE: 11/2024 4:20:16 PM
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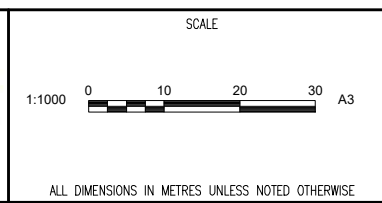


WATER CONNECTIONS		
1		100 x 100 x 150 D.I.C.L TEE WITH CONCRETE THRUST BLOCK.
2		150 x 150 x 100 D.I.C.L TEE WITH CONCRETE THRUST BLOCK.
3		80 DIA. SPRING HYDRANT "MAXI FLOW" 2000 TYPE (DNBD) COMPLETE WITH D.I.C.L TEE, RISER, C.I. COVER BOX MARGIN AND KERB MARKER. (100 MAIN)
4		150 DIA. SLUICE VALVE CLASS 600 M.E. COMPLETE WITH C.I. COVER BOX MARGIN AND KERB MARKER.
5		100 DIA. SLUICE VALVE CLASS 600 M.E. COMPLETE WITH C.I. COVER BOX MARGIN AND KERB MARKER.
6		150 DIA. D.I.C.L. DEAD END CAP WITH CONCRETE THRUST BLOCK.
7		100 DIA. D.I.C.L. DEAD END CAP WITH CONCRETE THRUST BLOCK.

LEGEND	
	STAGE BOUNDARY
	EXISTING PROPERTY BOUNDARY
	PROPOSED PROPERTY BOUNDARY
	FUTURE PROPERTY BOUNDARY
	EASEMENT BOUNDARY
	3.0m WIDE EASEMENT
	ROAD CENTRELINE
	NEW KERB & CHANNEL
	NEW RETAINING WALL
	PROPOSED #100 uPVC WATER MAIN (CLASS 16)
	PROPOSED #150 uPVC WATER MAIN (CLASS 16)
	DICL PIPE
	SERVICE CROSSING
	PROPOSED DESIGN CONTOUR MAJOR
	PROPOSED DESIGN CONTOUR MINOR
	FLOW PATH
	EXISTING CONTOUR MAJOR
	EXISTING CONTOUR MINOR
	PROPOSED GRAVITY SEWER MAIN, MANHOLE & TERMINAL MAINTENANCE SHAFT (TMS)
	PROPOSED STORMWATER PIPE
	EXISTING KERB
	EXISTING SEWER
	EXISTING WATER
	EXISTING STORMWATER
	EXISTING #100 uPVC WATER MAIN
	EXISTING #150 uPVC WATER MAIN
	EXISTING HEADWALL AND PIPE
	NEW IN-SITU MANHOLE
	FUTURE FIELD INLET PIT TYPE A
	NEW HEADWALL WITH GRATED INLET
	NEW MANHOLE

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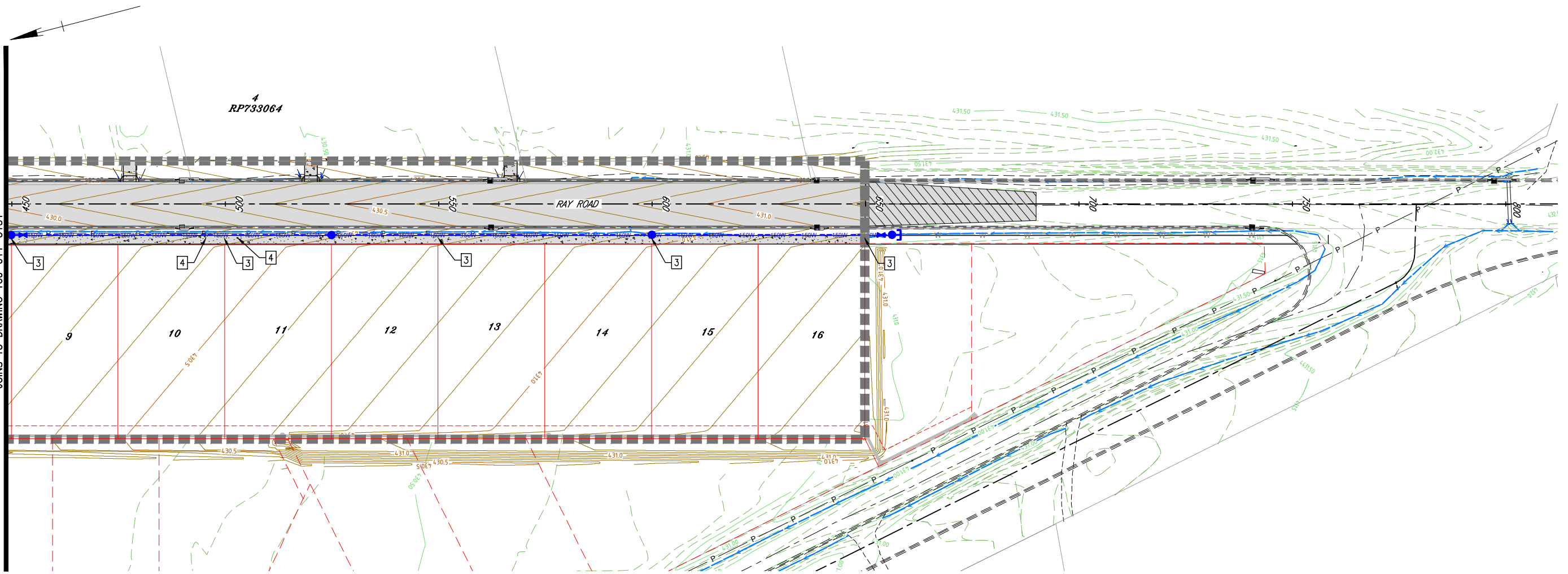
NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



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CIVIL SIGNOFF APPROVAL	
DATE:	RPEP:

PROJECT REF:	CONMAT PTY LTD	
	RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF:	WATER PLAN (SHEET 1 OF 2)	
DRAWING NO:	160-011-C131	SIZE: A3
		REVISION: A

JOINS TO DRAWING 160-011-C131



WATER CONNECTIONS		
1		100 x 100 x 150 D.I.C.L. TEE WITH CONCRETE THRUST BLOCK.
2		150 x 150 x 100 D.I.C.L. TEE WITH CONCRETE THRUST BLOCK.
3		80 DIA. SPRING HYDRANT "MAXI FLOW" 2000 TYPE (DNBD) COMPLETE WITH D.I.C.L. TEE, RISER, C.I. COVER BOX MARGIN AND KERB MARKER. (100 MAIN)
4		150 DIA. SLUICE VALVE CLASS 600 M.E. COMPLETE WITH C.I. COVER BOX MARGIN AND KERB MARKER.
5		100 DIA. SLUICE VALVE CLASS 600 M.E. COMPLETE WITH C.I. COVER BOX MARGIN AND KERB MARKER.
6		150 DIA. D.I.C.L. DEAD END CAP WITH CONCRETE THRUST BLOCK.
7		100 DIA. D.I.C.L. DEAD END CAP WITH CONCRETE THRUST BLOCK.

LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- 3.0m WIDE EASEMENT
- ROAD CENTRELINE
- NEW KERB & CHANNEL
- NEW RETAINING WALL
- PROPOSED 100W 100 uPVC WATER MAIN (CLASS 16)
- PROPOSED 150W 150 uPVC WATER MAIN (CLASS 16)
- 100W DICL PIPE
- 100W SERVICE CROSSING
- 51.0 PROPOSED DESIGN CONTOUR MAJOR
- 51.0 PROPOSED DESIGN CONTOUR MINOR
- PROPOSED GRAVITY SEWER MAIN, MANHOLE & TERMINAL MAINTENANCE SHAFT (TMS)
- PROPOSED STORMWATER PIPE
- EXISTING KERB
- EXISTING SEWER
- EXISTING WATER
- EXISTING STORMWATER
- EXISTING 100W 100 uPVC WATER MAIN
- EXISTING 150W 150 uPVC WATER MAIN
- EXISTING HEADWALL AND PIPE
- NEW IN-SITU MANHOLE
- FUTURE FIELD INLET PIT TYPE A
- NEW HEADWALL WITH GRATED INLET
- NEW MANHOLE
- 51.0 EXISTING CONTOUR MAJOR
- 51.0 EXISTING CONTOUR MINOR

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PLOT DATE: 11/11/2024 4:20:44 PM FILE LOCATION: D:\PROJ\BOS\ERSCON\Dropbox\ERSCON\160-011-Ray Road - Stage 1\5 Drawings\160-011-C132-WATER PLAN (2 OF 2).dwg

NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



CLIENT: CONMAT CONSTRUCTION MATERIALS

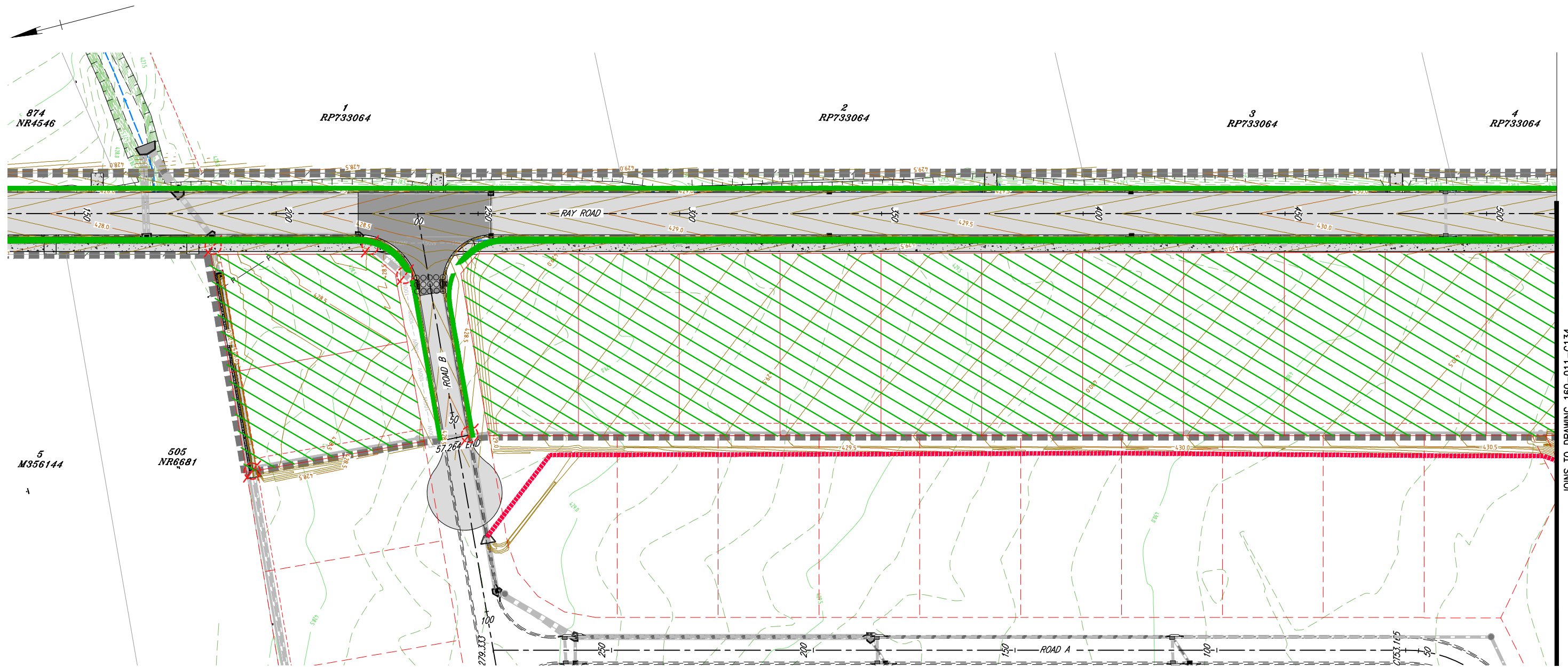
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CIVIL SIGNOFF APPROVAL	
DATE:	RPEC:

PROJECT REF:	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF:	WATER PLAN (SHEET 2 OF 2)		
DRAWING NO:	160-011-C132	SIZE: A3	REVISION: A

PLOT DATE: 11/11/2024 10:18:50 AM
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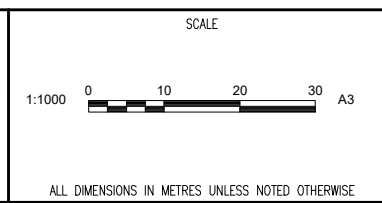


JOINS TO DRAWING 160-011-C134

LEGEND	
	GRATED KERB INLET PIT WITH SAND BAG SURROUND IN ACCORDANCE WITH FNQROC STD DWG S5000.
	PROPOSED MAJOR CONTOURS (0.5m INTERVAL)
	PROPOSED MINOR CONTOURS (0.1m INTERVAL)
	EXISTING MAJOR CONTOURS (1.0m INTERVAL)
	EXISTING MINOR CONTOURS (0.1m INTERVAL)
	TEMPORARY ROCK/SHAKER GRID
	PROPOSED TURF
	PROPOSED HYDROMULCH
	PROPOSED GRASS/DRILL SEED
	SEDIMENT FENCING
	ROCK FILTER DAM
	SAND BAG CHECK DAM.
	TURF BATTER CHUTE

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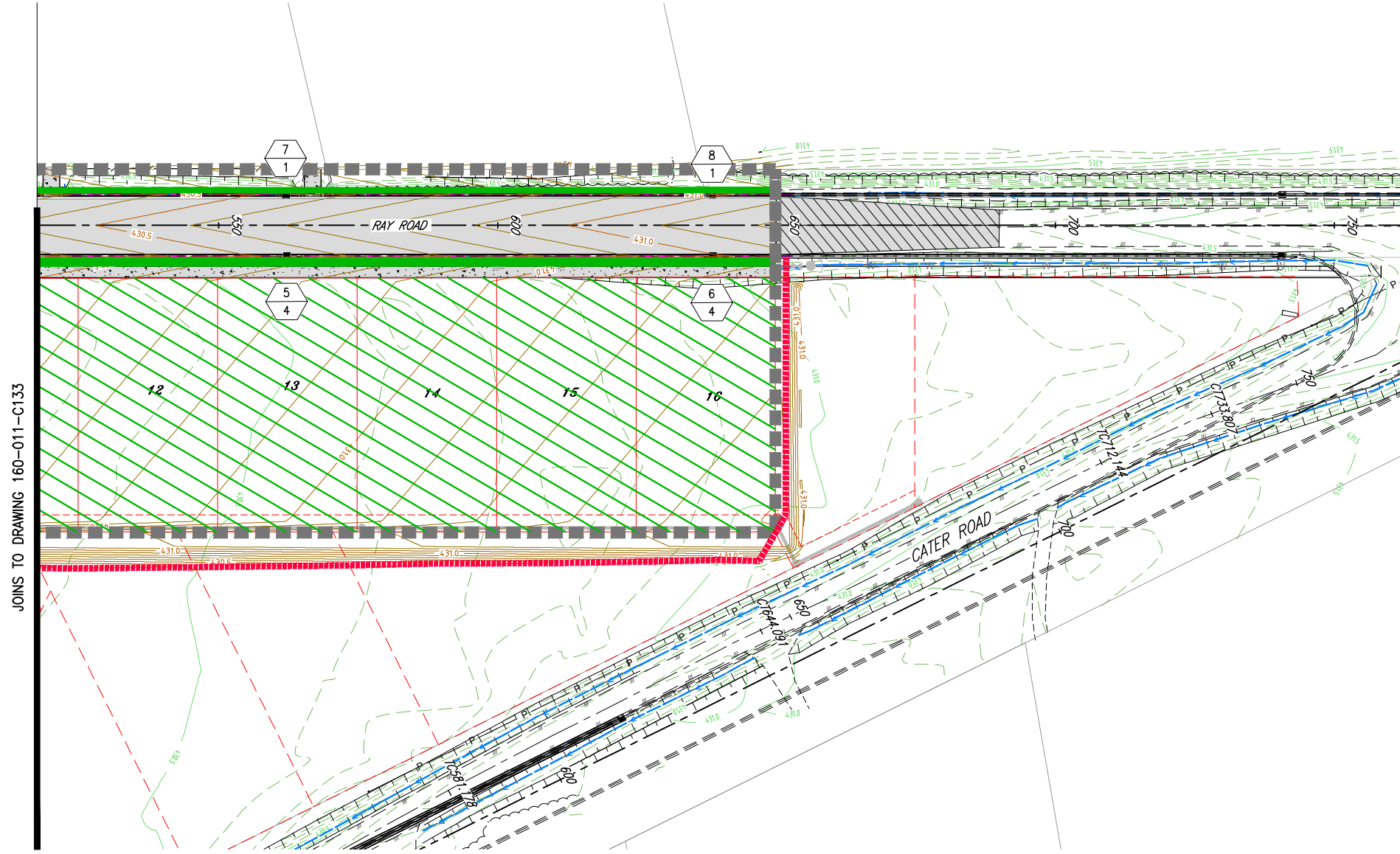
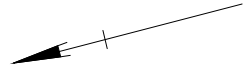
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CIVIL SIGNOFF APPROVAL			
DATE:		RPE:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	EROSION AND SEDIMENT CONTROL PLAN (SHEET 1 OF 2)		
DRAWING NO	160-011-C133	SIZE	A3
		REVISION	A

PLOT DATE: 11/11/2024 10:19:53 AM
FILE LOCATION: D:\PROJ\BOX\ERSCON\160\160-011-Ray Road - Stage 1\5 Drawings\160-011-C134 EROSION AND SEDIMENT CONTROL PLAN (2 OF 2).dwg



JOINS TO DRAWING 160-011-C133

- LEGEND**
-  GRATED KERB INLET PIT WITH SAND BAG SURROUND IN ACCORDANCE WITH FNQROC STD DWG S5000.
 -  1.0 PROPOSED MAJOR CONTOURS (0.5m INTERVAL)
 -  PROPOSED MINOR CONTOURS (0.1m INTERVAL)
 -  1.0 EXISTING MAJOR CONTOURS (1.0m INTERVAL)
 -  EXISTING MINOR CONTOURS (0.1m INTERVAL)
 -  TEMPORARY ROCK/SHAKER GRID
 -  PROPOSED TURF
 -  PROPOSED HYDROMULCH
 -  PROPOSED GRASS/DRILL SEED
 -  SEDIMENT FENCING
 -  ROCK FILTER DAM
 -  SAND BAG CHECK DAM.
 -  TURF BATTER CHUTE

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REVISIONS				
NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



SCALE

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ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

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DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF		CONMAT PTY LTD	
		RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF		EROSION AND SEDIMENT CONTROL PLAN (SHEET 2 OF 2)	
DRAWING NO	160-011-C134	SIZE	A3
		REVISION	A

SEDIMENT FENCE

MATERIAL

FABRIC:
POLYPROPYLENE, POLYAMIDE, NYLON, POLYESTER, OR POLYETHYLENE WOVEN OR NON-WOVEN FABRIC, AT LEAST 700mm IN WIDTH AND A MINIMUM UNIT WEIGHT OF 140GSM. ALL FABRICS TO CONTAIN ULTRAVIOLET INHIBITORS AND STABILISERS TO PROVIDE A MINIMUM OF 6 MONTHS OF USEABLE CONSTRUCTION LIFE (ULTRAVIOLET STABILITY EXCEEDING 70%).

FABRIC REINFORCEMENT:

WIRE OR STEEL MESH MINIMUM 14-GAUGE WITH A MAXIMUM MESH SPACING OF 200mm.

SUPPORT POSTS/STAKES:

1500mm² (MIN) HARDWOOD, 2500mm² (MIN) SOFTWOOD, OR 1.5kg/m (MIN) STEEL STAR PICKETS SUITABLE FOR ATTACHING FABRIC.

INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION, EXTENT AND REQUIRED TYPE OF FABRIC (IF SPECIFIED). IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, FABRIC TYPE, OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- TO THE MAXIMUM DEGREE PRACTICAL, AND WHERE THE PLANS ALLOW, ENSURE THE FENCE IS LOCATED:
 - TOTALLY WITHIN THE PROPERTY BOUNDARIES;
 - ALONG A LINE OF CONSTANT ELEVATION WHEREVER PRACTICAL;
 - AT LEAST 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SOIL/FILL DAMAGING THE FENCE.
- INSTALL RETURNS WITHIN THE FENCE AT MAXIMUM 20m INTERVALS IF THE FENCE IS INSTALLED ALONG THE CONTOUR, OR 5 TO 10m MAXIMUM SPACING (DEPENDING ON SLOPE) IF THE FENCE IS INSTALLED AT AN ANGLE TO THE CONTOUR. THE 'RETURNS' SHALL CONSIST OF EITHER:
 - V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE; OR
 - SANDBAG OR ROCK/AGGREGATE CHECK DAM A MINIMUM 1/3 AND MAXIMUM 1/2 FENCE HEIGHT, AND EXTENDING AT LEAST 1.5m UP THE SLOPE.
- ENSURE THE EXTREME ENDS OF THE FENCE ARE TURNED UP THE SLOPE AT LEAST 1.5m, OR AS NECESSARY, TO MINIMISE WATER BYPASSING AROUND THE FENCE.
- ENSURE THE SEDIMENT FENCE IS INSTALLED IN A MANNER THAT AVOIDS THE CONCENTRATION OF FLOW ALONG THE FENCE, AND THE UNDESIRABLE DISCHARGE OF WATER AROUND THE ENDS OF THE FENCE.
- IF THE SEDIMENT FENCE IS TO BE INSTALLED ALONG THE EDGE OF EXISTING TREES, ENSURE CARE IS TAKEN TO PROTECT THE TREES AND THEIR ROOT SYSTEMS DURING INSTALLATION OF THE FENCE. DO NOT ATTACH FABRIC TO THE TREES.
- UNLESS DIRECTED BY THE SITE SUPERVISOR OR THE APPROVED PLANS, EXCAVATE A 200mm WIDE BY 200mm DEEP TRENCH ALONG THE PROPOSED FENCE LINE, PLACING THE EXCAVATED MATERIAL ON THE UP-SLOPE SIDE OF THE TRENCH.
- ALONG THE LOWER SIDE OF THE TRENCH, APPROPRIATELY SECURE THE STAKES INTO THE GROUND SPACED NO GREATER THAN 3m IF SUPPORTED BY A TOP SUPPORT WIRE OR WEIR MESH BACKING, OTHERWISE NO GREATER THAN 2m.
- IF SPECIFIED, SECURELY ATTACH THE SUPPORT WIRE OR MESH TO THE UP-SLOPE SIDE OF THE STAKES WITH THE MESH EXTENDING AT LEAST 200mm INTO THE EXCAVATED TRENCH, ENSURE THE MESH AND FABRIC IS ATTACHED TO THE UP-SLOPE SIDE OF THE STAKES EVEN WHEN DIRECTING A FENCE AROUND A CORNER OR SHARP CHANGE OF DIRECTION.
- WHEREVER POSSIBLE, CONSTRUCT THE SEDIMENT FENCE FROM A CONTINUOUS ROLL OF FABRIC. TO JOIN FABRIC EITHER:
 - ATTACH EACH END TO TWO OVERLAPPING STAKES WITH THE FABRIC FOLDING AROUND THE ASSOCIATED STAKE ONE TURN, AND WITH THE TWO STAKES TIED TOGETHER WITH WIRE; OR
 - OVERLAP THE FABRIC TO THE NEXT ADJACENT SUPPORT POST.
- SECURELY ATTACH THE FABRIC TO THE SUPPORT POSTS USING 25 X 12.5mm STAPLES, OR TIE WIRE AT MAXIMUM 150mm SPACING.
- SECURELY ATTACH THE FABRIC TO THE SUPPORT WIRE/MESH (IF ANY) AT A MAXIMUM SPACING OF 1m.
- ENSURE THE COMPLETED SEDIMENT FENCE IS AT 450mm, BUT NOT MORE THAN 700mm HIGH. IF A SPILL-THROUGH WEIR IS INSTALLED, ENSURE THE CREST OF THE WEIR IS AT LEAST 300mm ABOVE GROUND LEVEL.
- BACKFILL THE TRENCH AND TAMP THE FILL TO FIRMLY ANCHOR THE BOTTOM OF THE FABRIC AND MESH TO PREVENT WATER FROM FLOWING UNDER THE FENCE.

ADDITIONAL REQUIREMENTS FOR THE INSTALLATION OF SPILL-THROUGH WEIR

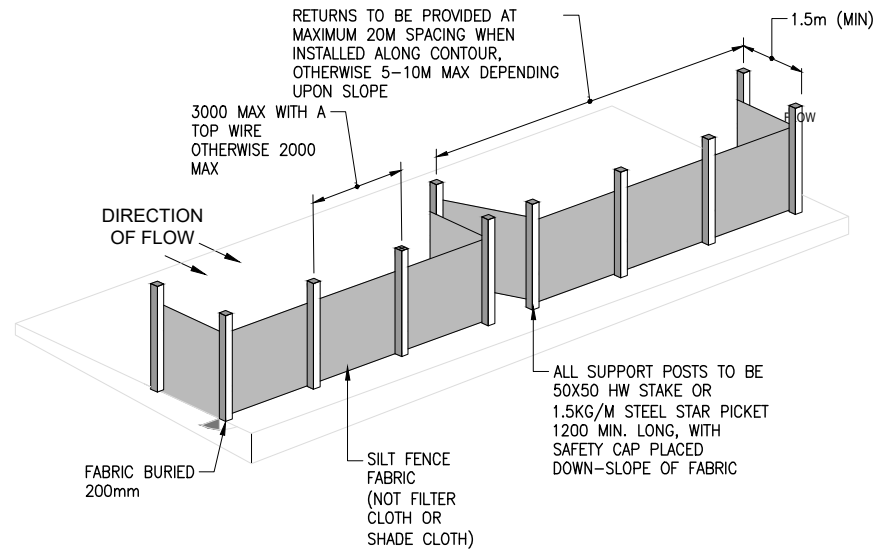
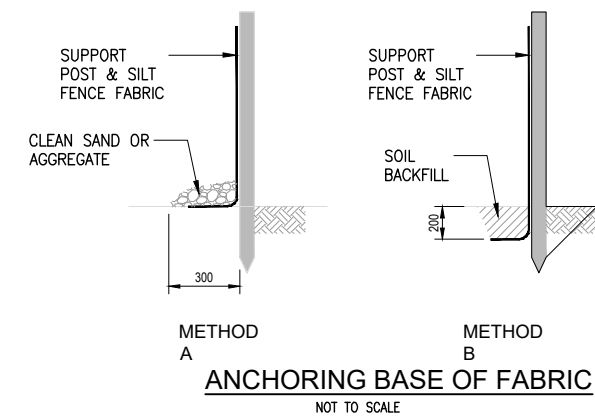
- LOCATE THE SPILL-THROUGH WEIR SUCH THAT THE WEIR CREST WILL BE LOWER THAN THE GROUND LEVEL AT EACH END OF THE FENCE.
- ENSURE THE CREST OF THE SPILL-THROUGH WEIR IS AT LEAST 300mm THE GROUND ELEVATION.
- SECURELY TIE A HORIZONTAL CROSS MEMBER (WEIR) TO THE SUPPORT POSTS/STAKES EACH SIDE OF THE WEIR. CUT THE FABRIC DOWN THE SIDE OF EACH POST AND FOLD THE FABRIC OVER THE CROSS MEMBER AND APPROPRIATELY SECURE THE FABRIC.
- INSTALL A SUITABLE SPLASH PAD AND/OR CHUTE IMMEDIATELY DOWN-SLOPE OF THE SPILL-THROUGH WEIR TO CONTROL SOIL EROSION AND APPROPRIATELY DISCHARGE THE CONCENTRATED FLOW PASSING OVER THE WEIR.

MAINTENANCE

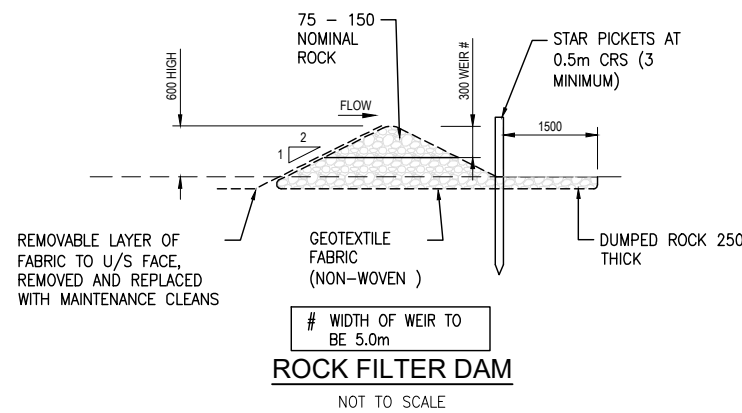
- INSPECT THE SEDIMENT FENCE AT LEAST WEEKLY AND AFTER ANY SIGNIFICANT RAIN. MAKE NECESSARY REPAIRS IMMEDIATELY.
- REPAIR ANY TORN SECTIONS WITH A CONTINUOUS PIECE OF FABRIC FROM POST TO POST.
- WHEN MAKING REPAIRS, ALWAYS RESTORE THE SYSTEM TO ITS ORIGINAL CONFIGURATION UNLESS AN AMENDED LAYOUT IS REQUIRED OR SPECIFIED.
- IF THE FENCE IS SAGGING BETWEEN STAKES, INSTALL ADDITIONAL SUPPORT POSTS.
- REMOVE ACCUMULATED SEDIMENT IF THE SEDIMENT DEPOSIT EXCEEDS A DEPTH OF 1/3 THE HEIGHT OF THE FENCE.
- DISPOSE OF SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
- REPLACE THE FABRIC IS THE SERVICE LIFE OF THE EXISTING FABRIC EXCEEDS 6 MONTHS.

REMOVAL

- WHEN DISTURBED AREAS UP-SLOPE OF THE SEDIMENT FENCE ARE SUFFICIENTLY STABILISED TO RESTRAIN EROSION, THE FENCE MUST BE REMOVED.
- REMOVE MATERIALS AND COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
- REHABILITATE/REVEGETATE THE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.



SEDIMENT FENCE
NOT TO SCALE



MATERIALS

ROCK:
75 TO 150mm NOMINAL DIAMETER, HARD, EROSION RESISTANT ROCK.

GEOTEXTILE FABRIC:

HEAVY-DUTY, NEEDLE-PUNCHES, NON-WOVEN FILTER CLOTH ('BIDIM' A24 OR EQUIVALENT).

INSTALLATION

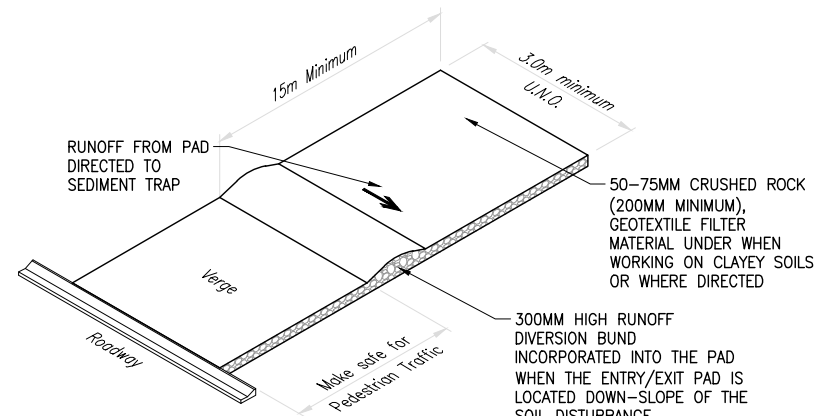
- REFER TO APPROVED PLANS FOR LOCATION AND INSTALLATION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- PRIOR TO PLACEMENT OF THE FILTER DAM, ENSURE THE TYPE AND SIZE OF EACH CHECK DAMS WILL NOT CAUSE A SAFETY HAZARD OR CAUSE WATER TO SPILL OUT OF THE DRAIN.
- CONSTRUCT THE FILTER DAM TO THE DIMENSIONS AND PROFILE SHOWN WITHIN THE APPROVED PLAN.
- WHERE SPECIFIED, THE FILTER DAM SHALL BE CONSTRUCTED ON A SHEET OF GEOTEXTILE FABRIC USED AS A DOWNSTREAM SPLASH PAD.

MAINTENANCE

- INSPECT EACH FILTER DAM AND THE DRAINAGE CHANNEL AT LEAST WEEKLY AND AFTER RUNOFF-PRODUCING RAINFALL.
- CHECK FOR DISPLACEMENT OF THE FILTER DAM.
- CHECK FOR SOIL SCOUR AROUND THE ENDS OF THE FILTER DAM. IF SUCH EROSION IS OCCURRING, CONSIDER EXTENDING THE WIDTH OF THE FILTER DAM TO AVOID SUCH PROBLEMS.
- IF SEVERE SOIL EROSION OCCURS EITHER UNDER OR AROUND THE FILTER DAM, THEN SEEK EXPERT ADVICE ON AN ALTERNATIVE TREATMENT MEASURE.
- REMOVE AND SEDIMENT ACCUMULATED BY THE FILTER DAM, UNLESS IT IS INTENDED THAT THIS SEDIMENT WILL REMAIN WITHIN THE CHANNEL.
- DISPOSE OF COLLECTED SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
- REPLACE GEOTEXTILE LAYER ON UPSTREAM FACE WITH A CLEAN LAYER AS REQUIRED.

REMOVAL

- WHEN CONSTRUCTION WORK WITHIN THE DRAINAGE AREA ABOVE THE FILTER DAM HAS BEEN COMPLETED, AND THE DISTURBED AREAS AND THE DRAINAGE CHANNEL ARE SUFFICIENTLY STABILISED TO RESTRAIN EROSION, ALL TEMPORARY CHECK DAMS MUST BE REMOVED.
- REMOVE THE FILTER DAM AND ASSOCIATED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.



TEMPORARY ROCK/SHAKER GRID
NOT TO SCALE

MATERIAL

ROCK:
WELL GRADED, HARD, ANGULAR, EROSION RESISTANT ROCK, NOMINAL DIAMETER OF 50 TO 75mm (SMALL DISTURBANCES) OR 100 TO 150mm (LARGE DISTURBANCES). ALL REASONABLE MEASURES MUST BE TAKEN TO OBTAIN ROCK OF NEAR UNIFORM SIZE.

FOOTPATH STABILISING AGGREGATE:

25 TO 50mm GRAVEL OR AGGREGATE.

GEOTEXTILE FABRIC:

HEAVY-DUTY, NEEDLE-PUNCHES, NON-WOVEN FILTER CLOTH ('BIDIM' A24 OR EQUIVALENT).

INSTALLATION

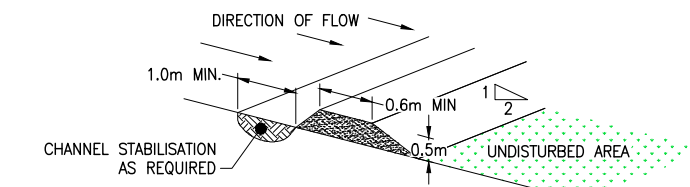
- REFER TO APPROVED PLANS FOR LOCATION AND DIMENSIONAL DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSIONS, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- CLEAR THE LOCATION OF THE ROCK PAD, REMOVING STUMPS, ROOTS AND OTHER VEGETATION TO PROVIDE A FIRM FOUNDATION SO THAT THE ROCK IS NOT PRESSED INTO SOFT GROUND. CLEAR SUFFICIENT WIDTH TO ALLOW PASSAGE OF LARGE VEHICLES, BUT CLEAR ONLY THAT NECESSARY FOR THE EXIT. DO NOT CLEAR ADJACENT AREAS UNTIL THE REQUIRED EROSION AND SEDIMENT CONTROL DEVICES ARE IN PLACE.
- IF THE EXPOSED SOIL IS SOFT, PLASTIC OR CLAYEY, PLACE A SUB-BASE OF CRUSHED ROCK OR A LAYER OF HEAVY-DUTY FILTER CLOTH TO PROVIDE A FIRM FOUNDATION.
- PLACE THE ROCK PAD FORMING A MINIMUM 200mm THICK LAYER OF CLEAN, OPEN-VOID ROCK.
- IF THE ASSOCIATED CONSTRUCTION SITE IS UP-SLOPE OF THE ROCK PAD, THIS CAUSING STORMWATER RUNOFF TO FLOW TOWARDS THE ROCK PAD, THEN FORM A MINIMUM 300mm HIGH FLOW CONTROL BERM ACROSS THE ROCK PAD TO DIVERT SUCH RUNOFF TO A SUITABLE SEDIMENT TRAP.
- THE LENGTH OF THE ROCK PAD SHOULD BE AT LEAST 15m WHERE PRACTICABLE, AND AS WISE AS THE FULL WIDTH OF THE ENTRY OR EXIT AND AT LEAST 3m. THE ROCK PAD SHOULD COMMENCE AT THE EDGE OF THE OFF-SITE SEALED ROAD OR PAVEMENT.
- FLARE THE END OF THE ROCK PAD WHERE IT MEETS THE PAVEMENT SO THAT THE WHEELS OF TURNING VEHICLES DO NOT TRAVEL OVER UNPROTECTED SOIL.
- IF THE FOOTPATH IS OPEN TO PEDESTRIAN MOVEMENT, COVER THE COARSE ROCK WITH FINE AGGREGATE OR GRAVEL, OR OTHERWISE TAKE WHATEVER MEASURES ARE NEEDED TO MAKE THE AREA SAFE.

MAINTENANCE

- INSPECT ALL SITE ENTRY AND EXIT POINTS PRIOR TO FORECAST RAIN. DAILY DURING EXTENDED PERIODS OF RAINFALL, AFTER RUNOFF-PRODUCING RAINFALL, OR OTHERWISE AT FORTNIGHTLY INTERVALS.
- IF SAND, SOIL, SEDIMENT OR MUD IS TRACKED OR WASHED ONTO THE ADJACENT SEALED ROADWAY, THEN SUCH MATERIAL MUST BE PHYSICALLY REMOVED, FIRST USING A SQUARE-EDGED SHOVEL, AND THEN A STIFF-BRISTLED BROOM, AND THEN BY A MECHANICAL VACUUM UNIT, IF AVAILABLE.
- IF NECESSARY FOR SAFETY REASONS, THE ROADWAY SHALL ONLY BE WASHED CLEAN AFTER ALL REASONABLE EFFORTS HAVE BEEN TAKEN TO SHOVEL AND SWEEP THE MATERIAL FROM THE ROADWAY.
- WHEN THE VOIDS BETWEEN THE ROCK BECOMES FILLED WITH MATERIAL AND THE EFFECTIVENESS OF THE ROCK PAD IS REDUCED TO A POINT WHERE SEDIMENT IS BEING TRACKED OFF THE SITE. A NEW 100MM LAYER OF ROCK MUST BE ADDED AND/OR THE ROCK PAD MUST BE EXTENDED.
- ENSURE ANY ASSOCIATED DRAINAGE CONTROL MEASURES (e.g. FLOW CONTROL BERM) ARE MAINTAINED IN ACCORDANCE WITH THEIR DESIRED OPERATIONAL CONDITIONS.
- DISPOSE OF SEDIMENT AND DEBRIS IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

REMOVAL

- THE ROCK PAD SHOULD BE REMOVED ONLY AFTER IT IS NO LONGER NEEDED AS A SEDIMENT TRAP.
- REMOVE MATERIALS AND COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
- RE-GRADE AND STABILISE THE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.



DIVERSION DRAINS
NOT TO SCALE

MAINTENANCE

- SHOULD BE CHECKED WEEKLY
- EXCESSIVE SEDIMENT SHOULD BE REMOVED TO AVOID PONDING
- REPAIR ANY SLUMPS OR DAMAGE

SPACING

- THE SPACING OF CATCH DRAINS DOWN EXPOSED SLOPES SHOULD NOT EXCEED THE DISTANCE DEFINED BY:
 MAXIMUM SPACING ≈ 48 [LOG(H)] - 25 METRES
 ≈ 71 - 48 [LOG(% SLOPE)] METRES
 WHERE: H IS THE HORIZONTAL SLOPE COMPONENT AS DEFINED BY H(H):1(V) AND (% SLOPE) = $\frac{100}{H}$

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PLOT DATE:11/12/2024 10:20:19 AM

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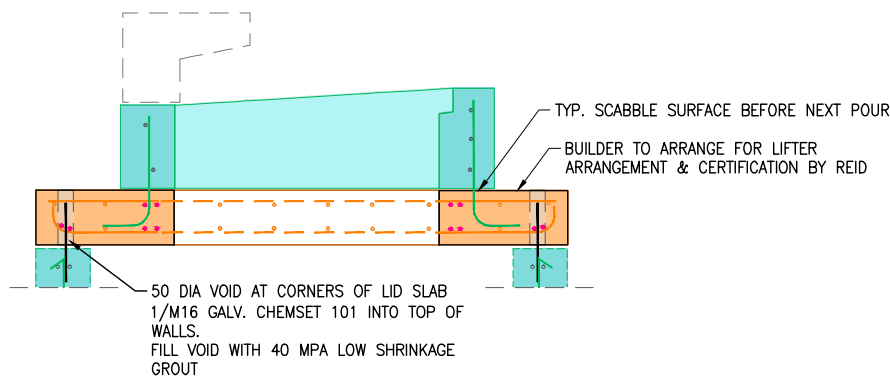
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DATE:		RPEG:	

PROJECT REF	CONMAT PTY LTD	
	RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS	
DRAWING NO	160-011-C135	SIZE: A3
		REVISION: A



STORMWATER PIT DETAILS

- TYP. S40 CONCRETE GRADE**
- SLUMP 80 +/- 15
 - MAX. 20mm AGGREGATE SIZE
 - MIN. 400 kg/m CEMENTIOUS MATERIAL
 - MAX. WATER/CEMENT RATIO
 - CURE CONTINUOUS FOR MIN. OF 7 DAYS
 - MIN. 25 MPa CONCRETE STRENGTH AT STRIPPING TIME

PRE-FABRICATED LID SLAB & UPSTAND WALLS

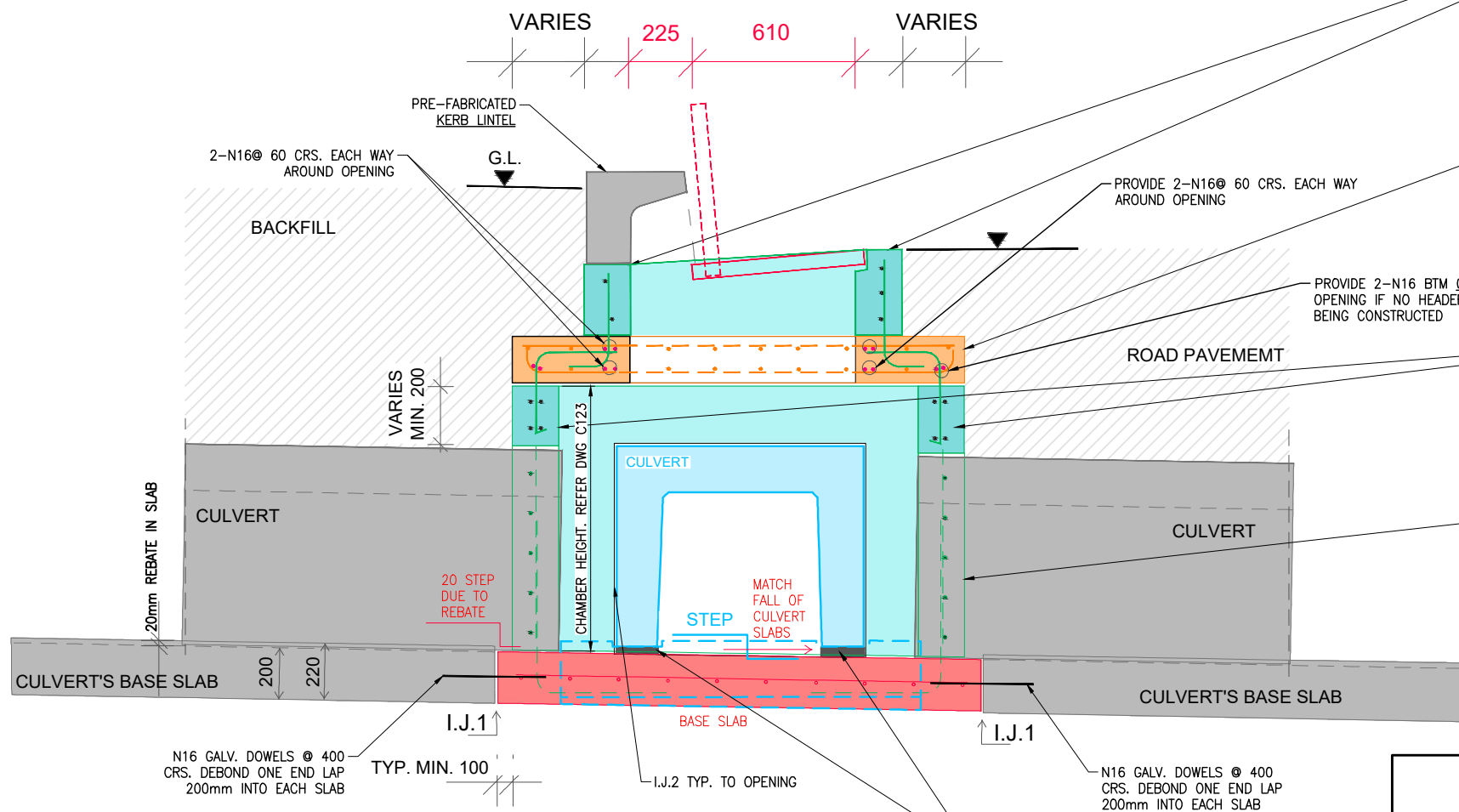
- UPSTAND WALLS - PRE-FAB ON SITE, WITH LID SLAB**
- 160mm THICK
 - N12-150 GALV. STARTER BARS WITH 200 COG
 - N12-200 HORIZONTAL, COG 300 AT CORNERS OR USE CORNER 'L' BARS WITH LEGS LAPPING MIN. 400 WITH HORIZONTAL BARS

- LID SLAB - PRE-FAB ON SITE, THEN LIFT IN PLACE**
- MIN. 240mm THICK
 - N12-200 TOP U.N.O., 60 COVER
 - N16-200 BOTTOM U.N.O. WITH COG, 60 COVER
 - TYP. FAN BARS WHERE REQUIRED
 - N12 TRIMMER BAR TOP ALL AROUND PERIMETER, LAP 450

- OPTIONAL HEADER**
- MIN. 200 HIGH, REINFORCED WITH MIN 2-N12 TOP AND BOTTOM AND N12-150 HORIZONTAL BARS INTERMEDIATE

- WALLS**
- 160mm THICK
 - N16 GALV. STARTER BARS WITH 500 COG
 - N12-150 VERTICAL, LAP 450 WITH STARTER BARS
 - COG VERTICALS 400 UNDER LID SLAB REINF. LAYER
 - N12-150 HORIZONTAL, COG 300 AT CORNERS OR USE CORNER 'L' BARS WITH LEGS LAPPING MIN. 400 WITH HORIZONTAL BARS

- BASE SLAB**
- MIN. 220mm THICK WITH 20mm REBATES FOR INCOMING CULVERTS
 - N16-200 EACH WAY, MIN. 90 BOTTOM COVER
 - TYP. FAN BARS WHERE REQUIRED
 - N16 TRIMMER BAR ALL AROUND PERIMETER, LAP 600



NOTES

1. REFER TO 'STRUCTURAL ENGINEERING NOTES' SHEET 160-011-C138 FOR FURTHER SPECIFICATIONS ON, BUT NOT LIMITED TO, FOUNDATIONS AND CONCRETE.
2. CONSTRUCTION JOINTS SHALL HAVE CONCRETE FACES FULLY SCABBLD PRIOR TO PLACING ADJACENT CONCRETE AND ARE TO BE USED ONLY WHERE SHOWN OR SPECIFICALLY APPROVED.

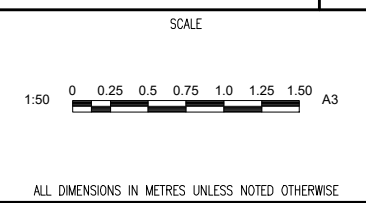
LEGEND

- I.J.1 ISOLATION JOINT
APPLY APPROVED BOND BREAKER TO VERTICAL FACE BEFORE NEXT POUR
- I.J.2 ISOLATION JOINT
PROVIDE 10mm GAP TO VERTICAL & HORIZONTAL CULVERT FACES E.G. 10mm ABLEFLEX

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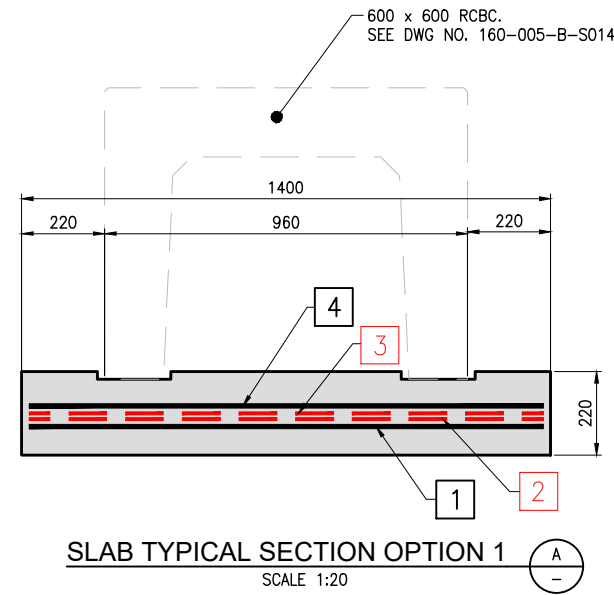
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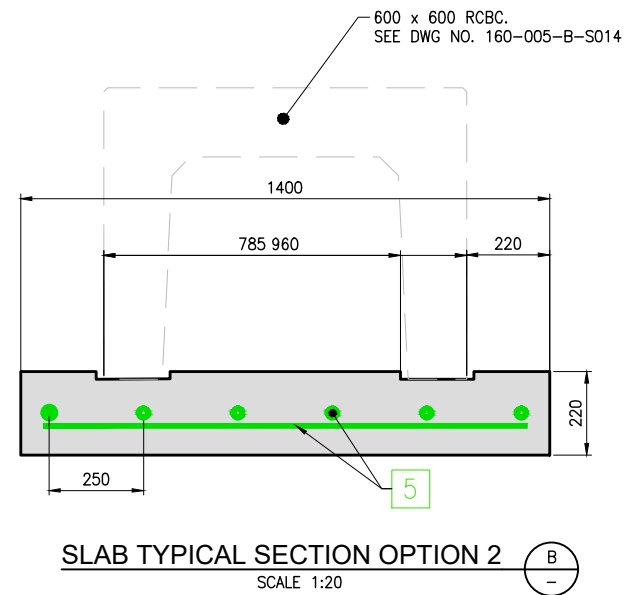
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PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	STORMWATER PIT DETAILS		
DRAWING NO	160-011-C136	SIZE	A3
		REVISION	A

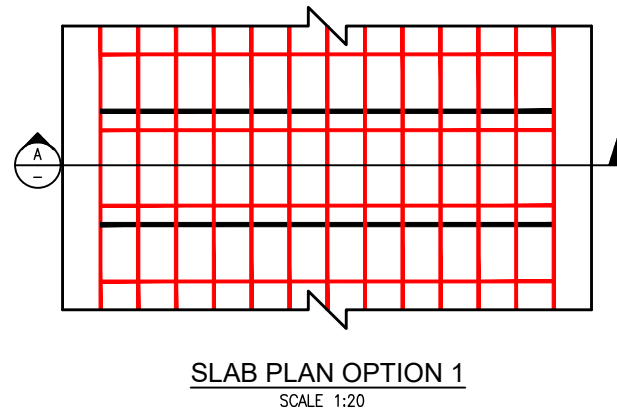
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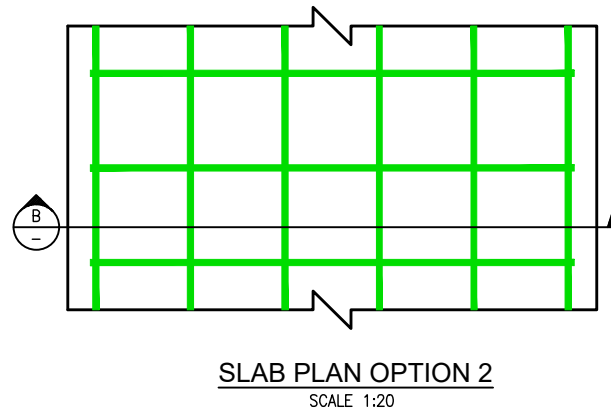
SLAB TYPICAL SECTION OPTION 1
SCALE 1:20



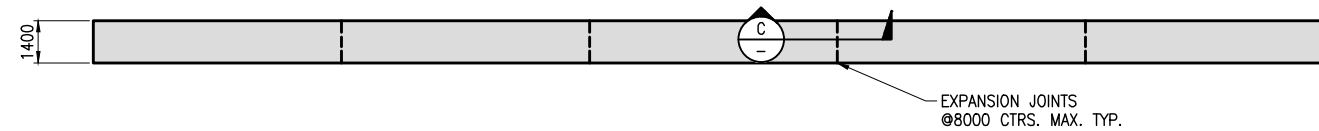
SLAB TYPICAL SECTION OPTION 2
SCALE 1:20



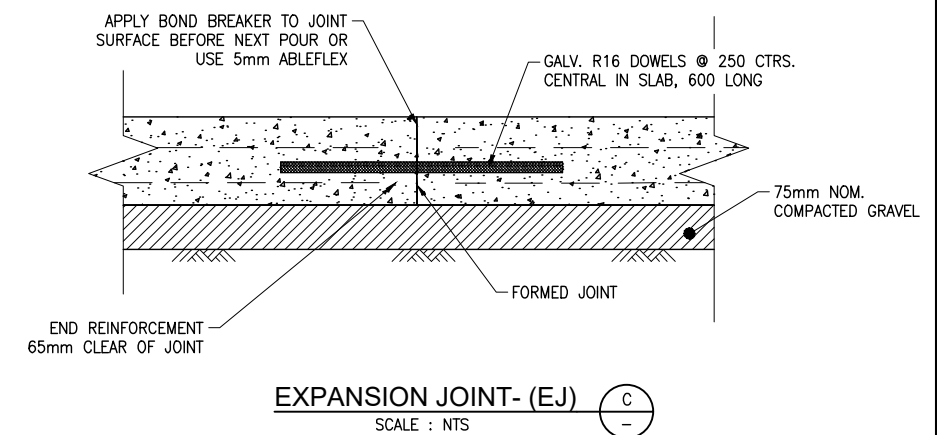
SLAB PLAN OPTION 1
SCALE 1:20



SLAB PLAN OPTION 2
SCALE 1:20



CONSTRUCTION/EXPANSION JOINTS
PLAN VIEW
SCALE 1:250



EXPANSION JOINT- (EJ) C
SCALE : NTS

BASE SLAB - SCHEDULE

BASE SLAB THICKNESS 'D' (mm)	200
BASE SLAB WIDTH 'W3' (mm)	1400

CONCRETE GRADE	N40
MIN CONCRETE COVER TO REINF. AT SIDES (mm)	65

MARK	REINFORCEMENT
1	N12 @ 300 CRS. B/U. CENTRAL IN SLAB
2	RL918 MAIN BARS LONGITUDINAL AND B/O. CENTRAL IN SLAB
3	RL918 MAIN BARS LONGITUDINAL AND T/U. CENTRAL IN SLAB
4	N12 @ 300 CRS. T/O. CENTRAL IN SLAB
5	N16 @ 250 CRS./CENTRAL

LEGEND

T2 TOTAL CROWN UNIT WIDTH = 960mm
W2 CROWN UNIT LEG THICKNESS = 180mm

ABBREVIATIONS

REINF. REINFORCEMENT
T/O REINFORCEMENT TO BE TOP OVER
T/U REINFORCEMENT TO BE TOP UNDER
B/O REINFORCEMENT TO BE BTM OVER
B/U REINFORCEMENT TO BE BTM UNDER

NOTES

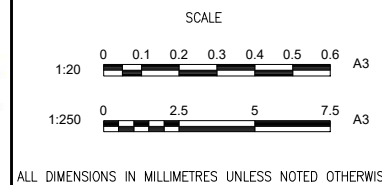
- THIS DRAWING DETAILS THE CAST INSITU BASE SLAB FOR PRECAST RC BOX CULVERTS OF 600mm NOMINAL SPAN x 600mm NOMINAL HEIGHT.
- CONCRETE SHALL BE S40.
- REFER TO 160-011-C138 'STRUCTURAL ENG. NOTES' FOR FURTHER APPLICABLE SPECIFICATIONS.
- REFER TO 160-011-C139 FOR WH&S NOTES.
- THE DESIGN OF THE BASE SLAB HAS BEEN BASED ON THE FOUNDATION HAVING A MINIMUM ALLOWABLE BEARING CAPACITY OF 150 kPa. BUILDER TO VERIFY BEARING CAPACITY BEFORE CONSTRUCTING THE BASE SLAB VIA DYNAMIC CONE PENETROMETER TESTS UNDERTAKEN BY A QUALIFIED GEOTECHNICAL SERVICE PROVIDER. IF BEFORE-MENTIONED BEARING CAPACITY IS NOT BEING ACHIEVED, CONSULT THE STRUCTURAL OR GEOTECHNICAL ENGINEER TO ADVISE SITE PREPARATION WORKS / FOUNDATION IMPROVEMENT WORKS.
- E9. DESIGN TO BE MODIFIED IF GROUND WATER IS ENCOUNTERED DURING EXCAVATION; CONTACT THE CERTIFYING ENGINEER AND SEEK ADVICE.

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CLIENT



DRAWN	MF	APPROVED	RQ
DESIGN	RQ	APPROVED	RQ
STRUCTURAL SIGNOFF APPROVAL			
DATE:	20/06/24	RPED:	15306

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	BASE SLAB FOR 600x600/5-A RCBC		
DRAWING NO	160-011-C137	SIZE	A3
		REVISION	A

A. GENERAL NOTES:

- A1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER PROJECT DRAWINGS, SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE WORK. ALL DISCREPANCIES SHALL BE REFERRED FOR 'APPROVAL OF THE ENGINEER' BEFORE PROCEEDING WITH THE WORK.
- A2. WORKMANSHIP AND MATERIALS ARE TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING CODE OF AUSTRALIA, STANDARDS AUSTRALIA CODES AND THE WORKPLACE HEALTH AND SAFETY ACT/S (INCLUDING ALL AMENDMENTS) APPLICABLE FOR THAT STATE/TERRITORY. ALL LOCAL AND STATUTORY AUTHORITY'S REQUIREMENTS AND BYLAWS ARE TO BE ADHERED TO.
- A3. THE MANUFACTURER SHALL PROVIDE (TO THE MANUFACTURER'S COSTS AND CERTIFICATION) AND LEAVE IN PLACE, UNTIL PERMANENT BRACING ELEMENTS ARE CONSTRUCTED, SUCH TEMPORARY BRACING ELEMENTS AS IS NECESSARY TO STABILIZE THE STRUCTURE AND ANY ADJACENT STRUCTURES DURING CONSTRUCTION, TRANSPORTATION, EXCAVATIONS AND ERECTION, ENSURING NO PART SHALL BE OVERSTRESSED DURING THESE ACTIVITIES.
- A4. DO NOT OBTAIN DIMENSIONS BY SCALING FROM THESE DRAWINGS.
- A5. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL EXISTING SERVICES ON THE SITE, SERVICES WHERE SHOWN ON THESE DRAWINGS ARE INDICATIVE LOCATIONS ONLY. THE CONTRACTOR IS TO RECTIFY IMMEDIATELY ANY OBSTRUCTION OR DAMAGE TO SUCH SERVICES AND PROVIDE TEMPORARY AND ADEQUATE SERVICES WHILST REPAIRS ARE CARRIED OUT.
- A6. ANY DRAINAGE WORKS SHOWN ON THE DRAWINGS ARE INDICATIVE ONLY AND DO NOT FORM PART OF ERSCON'S STRUCTURAL CERTIFICATION. DRAINAGE WORKS ARE TO BE BY THE BUILDER.
- A7. PERMISSION IS GIVEN TO COPY THESE PLANS FOR USE ON THIS SPECIFIC PROJECT ONLY. PLANS MAY ONLY BE REPRODUCED AS A COMPLETE SET AND MUST INCLUDE THE STRUCTURAL DESIGN CERTIFICATE.
- A8. IF ANY PART OF THIS DOCUMENTATION IS UNCLEAR OR ILLEGIBLE, PLEASE CONTACT THIS OFFICE.
- A9. ABBREVIATIONS:

ABBRE	DESCRIPTION
CBR	CALIFORNIA BEARING RATIO
CL	CENTRE LINE
C.J	CONSTRUCTION JOINT
CRS	CENTRES
DCP	DYNAMIC CONE PENETROMETER
HORIZ	HORIZONTAL
MAX	MAXIMUM
MIN	MINIMUM
NCC	AUSTRALIAN NATIONAL CONSTRUCTION CODE
O/H	OVERHANG
RC	REINFORCED CONCRETE
RCBC	REINFORCED CONCRETE BOXED CULVERT
REINF	REINFORCEMENT
S.C.	SAW CUT
SRDD	STANDARD RELATIVE DRY DENSITY
T.B.A.	TO BE ADVISED
T/O	TOP OVER (REINFORCING LAYER)
T/U	TOP UNDER (REINFORCING LAYER)
TYP	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
VERT	VERTICAL

B. ELECTRONICALLY TRANSFERRED DRAWINGS

- B1. ERSCON ACCEPTS NO RESPONSIBILITY FOR A DRAWING THAT HAS BEEN AMENDED IN ANY WAY BY OTHER PARTIES.
- B2. ANY PART OF ERSCON'S DRAWINGS COPIED FROM ELECTRONICALLY TRANSFERRED DRAWINGS BECOMES THE RESPONSIBILITY OF THE RECIPIENT TO DISTRIBUTE ONLY TO THE PARTICIPATING PARTIES AS COMPLETE SET OF DRAWINGS.

C. HEALTH & SAFETY

- C1. THE CONTRACTOR SHALL DEVELOP, IMPLEMENT AND ADMINISTER A WORKPLACE HEALTH AND SAFETY PROGRAM THAT WILL ENSURE THAT ALL CONSTRUCTION ACTIVITIES ARE PERFORMED TO THE RELEVANT WORKPLACE HEALTH AND SAFETY REQUIREMENTS AND ANY OTHER RELEVANT STATUTORY REQUIREMENTS.
- C2. THE WORKPLACE HEALTH AND SAFETY PROGRAM MUST BE COORDINATED WITH ADJOINING PROPERTY OWNERS AND ALL RELEVANT PARTIES AS NECESSARY TO ENSURE A SAFE BUILDING ENVIRONMENT AT ALL TIMES.

D. REINFORCED CONCRETE BOX CULVERTS - SPECIFIC NOTES

- D1. THE PRECAST CULVERT MANUFACTURING DRAWINGS COVER CULVERTS AS PER THE SIZE CLASS AND ROADWAY LOAD CLASS A AS STATED AND FOR A MAX. FILL HEIGHT OF 5 METRES.
- D2. DESIGN PARAMETERS AND SERVICE LOADS
 - D2.1. REINFORCED CONCRETE BOXED CULVERTS – RCBC HAVE BEEN DESIGNED IN ACCORDANCE WITH THE 'CURRENT ISSUES OF AS 5100.2-2017 BRIDGE DESIGN – DESIGN LOADS, AS 5100.5-2017 BRIDGE DESIGN – CONCRETE, AS/NZS 1170.0.1 & .4 – STRUCTURAL DESIGN ACTIONS, AS3600: 2018 CONCRETE STRUCTURES, AS1597.1-2010 AND AS1597.2-2013 PRECAST REINFORCED BOXED CULVERTS, AND THE TRANSPORT AND MAIN ROADS TECHNICAL SPECIFICATION MRS24 – MANUFACTURE OF PRECAST CONCRETE CULVERTS (JULY 2017); AS APPLICABLE.
 - D2.2. DESIGN CRITERIA AND ASSUMPTIONS USED IN THE DESIGN AMONGST OTHERS:
 - i. PERMANENT, IMPOSED AND OTHER ACTIONS TO AS/NZS 1170.0: 2002 AND AS/NZS 1170.1: 2002; EARTH PRESSURE TO AS 1597.1-2010
 - ii. VEHICLE LOADING TO AS 5100.2-2017
 - iii. EARTHQUAKE LOADS TO AS 1170.4: 2007
 - iv. EXPOSURE CLASSIFICATION, CONCRETE PROPERTIES & CURING, CONCRETE STRENGTH AND REINFORCEMENT COVER FOR MOST STRINGENT REQUIREMENT OF AS 3600-2018, AS 5100.5 AND AS 1597.1
 - D2.3. THE STANDARD ROAD TRAFFIC LOADS ARE THE W80 WHEEL, THE A160 AXLE, AND THE M1600 TRI-AXLE GROUP, AS DEFINED IN AS5100.2, BUT EXCLUDING THE UDL COMPONENT FROM M1600 TRI-AXLE GROUP.
 - D2.4. FURTHER DESIGN LOADS APPLIED ARE AS PER AS1597.2-2013 CLAUSE 3.3 DESIGN LOADS, AS APPLICABLE.
 - D2.5. THE RCBC HAVE BEEN DESIGNED FOR AN EXPOSURE CLASSIFICATION B2 AND MIN. 50mm CONCRETE COVER AS PER AS5100.5.
- D3. REINFORCEMENT TO COMPLY WITH AS 1597.1 CLAUSE 2.3
- D3.1. DO NOT USE METAL INSERTS WITHIN CONCRETE COVER INCLUDING METAL BAR CHAIRS
- D4. CONCRETE TO COMPLY WITH AS 1597 CLAUSE 2.4, AND REQUIRED TO MEET FOLLOWING SPECIFICATIONS:
 - D4.1. CONCRETE GRADE TO BE S50
 - D4.2. THE RCBC HAVE BEEN DESIGNED FOR AN EXPOSURE CLASSIFICATION B2 AND MIN. 50mm CONCRETE COVER AS PER AS5100.5.
 - D4.3. CEMENTITIOUS MATERIAL CONTENT OF MINIMUM 450 kg/cbm
 - D4.4. USE BLENDED CEMENTS COMPRISING A MIN. OF 65% SLAG (AND SLAG TO COMPLY WITH AS 3582.2), OR 25% FLY ASH (AND FLY ASH TO COMPLY WITH AS 3582.1)
 - D4.5. SUPPLEMENTARY CEMENTITIOUS MATERIALS SHALL COMPLY WITH AS 3582.1, AS 3582.2 AND AS/NZS 3582.3 AGGREGATES SHALL GENERALLY COMPLY WITH AS 2758.1 WITH THE FOLLOWING VARIATIONS: WATER ABSORPTION OFF AGGREGATE SHALL BE LIMITED TO MAX 2.5%, EXCEPT FOR SLAG AGGREGATES WHERE THE MAX.
 - D4.6. AGGREGATES SHALL GENERALLY COMPLY WITH AS 2758.1 WITH THE FOLLOWING VARIATIONS: WATER ABSORPTION OFF AGGREGATE SHALL BE LIMITED TO MAX 2.5%, EXCEPT FOR SLAG AGGREGATES WHERE THE MAX LIMIT SHALL BE 6%. AGGREGATE DURABILITY: MIN. WET STRENGTH 100kN AND MAX. WET/DRY STRENGTH VARIATION 25%.
 - D4.7. WATER SHALL COMPLY WITH THE REQUIREMENTS OF AS 1379. THE WATER CEMENT RATIO TO BE SMALLER THAN 0.4.
 - D4.8. CHEMICAL ADMIXTURES SHALL COMPLY WITH AS 1478.1 AND SHALL NOT CONTAIN NITRATES, CALCIUM CHLORIDE, SIGNIFICANT CHLORIDES OR OTHER STRONG IONIZED SALTS UNLESS IT CAN BE SHOWN THAT THE ADMIXTURES DO NOT ADVERSELY AFFECT DURABILITY.
 - D4.9. RESTRICTIONS ON CHEMICAL CONTENT: THE MATERIALS SHALL NOT CONTAIN ACID-SOLUBLE CHLORIDE OR SULFATE SALTS IN EXCESS OF THE VALUES IN TABLE 2.2 OF AS1597.2-2013.
- D5. CONCRETE PRODUCTION, PLACEMENT AND CURING
 - D5.1. REFER AS 1597.1 CLAUSE 2.6 AND FOLLOW STRICTLY
 - D5.2. CONCRETE SHALL BE CONTROL BATCHED AND MECHANICALLY MIXED TO COMPLY WITH AS 1379.
 - D5.3. FRESH CONCRETE SHALL BE PLACED USING INTENSE COMPACTION SUCH AS OBTAINED WITH VIBRATING TABLES OR EXTERNAL FORM VIBRATION, IN RIGID FORMS, TO PRODUCE A DENSE MASS FREE FROM DEFECTS THAT WOULD IMPAIR THE STRENGTH, SERVICEABILITY AND DURABILITY OF THE UNIT.
 - D5.4. CONCRETE CURING METHODS SHALL BE EITHER 'MOIST CURING', 'MEMBRANE CURING' OR 'ACCELERATED CURING' TO AS1597.1 CLAUSES 2.6.3.2, 2.6.3.3 OR 2.6.3.4
 - D5.5. CURE CONTINUOUSLY FOR AT LEAST 7 DAYS
 - D5.6. THE MIN. AVERAGE COMPRESSIVE STRENGTH AT COMPLETION OF CURING AND STRIPPING OF FORMWORK SHALL NOT BE LESS THAN 32 MPa (AS1597.1-2010 TABLE 2.4).
- D6. STORAGE AND HANDLING: REFER TO AS1597.1 CLAUSE 2.11.
 - D6.1. PRECAST UNITS SHALL NOT BE HANDLED BEFORE THE CONCRETE HAS REACHED A MIN. COMPRESSIVE STRENGTH OF 15MPa.
 - D6.2. PROVISION SHALL BE MADE BY THE MANUFACTURER FOR LIFTING AND HANDLING THE PRECAST UNITS. REFER TO AS1597 CLAUSE 2.11.2
 - D6.3. PRECAST UNITS SHALL BE TRANSPORTED IN ACCORDANCE WITH APPROPRIATE TRANSPORT PROCEDURES. UNITS SHALL NOT BE TRANSPORTED BEFORE HAVING REACHED A MIN. COMPRESSIVE STRENGTH OF 32 MPa.
- D7. DIMENSION TOLERANCES MANUFACTURED SHALL BE AS PER AS1597.1 CLAUSE 2.10
- D8. DEFECTS REFER TO AS1597.1 CLAUSE 2.13
- D9. FINISHING AND REPAIRS REFER TO AS1597.1 CLAUSE 2.14. FINISHING AND REPAIRS OF THE PRECAST UNITS SHALL BE CARRIED OUT IN A MANNER ACCEPTABLE TO THE PURCHASER.
- D10. MARKING REFER TO AS1597.1 CLAUSE 2.15. THE FOLLOWING MARKINGS SHALL BE CLEARLY STENCILLED WITH INDELIBLE INK OR EMBOSSED INTO THE CONCRETE OF EACH CULVERT UNIT NEAR THE INSIDE TOP OF THE LEG:
 - D10.1. DATE AND PLACE OF MANUFACTURE
 - D10.2. MANUFACTURER'S NAME OR REGISTERD TRADEMARK
 - D10.3. THE SIZE CLASS AND LOAD CLASS OF THE UNIT
 - D10.4. THE MAX. MASS OF THE UNIT IN kg
 - D10.5. THE NUMBER OF THE APPLICABLE STANDARD AS 5100
- D11. SAMPLING AND TESTING: CONMAT, THE MANUFACTURER WILL UNDERTAKE TESTING AS PER AS3600 APPENDIX B 'TESTING OF MEMBERS AND STRUCTURES'. LOAD TESTING IS NOT REQUIRED DUE TO THE STRUCTURE BEING DESIGNED BY ENGINEERING CALCULATIONS. CONMAT WILL VALIDATE THE REQUIREMENTS FOR CONCRETE COMPRESSIVE STRENGTH, REINFORCING YIELD & COVER, DIMENSIONS, CONCRETE MIX AND CURING THROUGH THE ESTABLISHED QUALITY MANAGEMENT SYSTEM.
- D12. PURCHASING GUIDELINES: FOR INFORMATION, MANUFACTURER TO REFER TO APPENDIX A.
- D13. MEANS OF DEMONSTRATING COMPLIANCE WITH AS 1597.1: FOR INFORMATION, MANUFACTURER TO REFER TO APPENDIX B.

E. SITE PREPARATIONS, EARTHWORKS AND FOUNDATION NOTES

- E1. EARTHWORKS SHALL BE IN ACCORDANCE WITH AS3798 AND AS FOLLOWS.
- E2. THE CONTRACTOR SHALL CHECK ALL EXCAVATIONS FOR ORGANIC MATERIAL AND RUBBISH. IF ANY OF THIS MATERIAL IS FOUND, IT SHALL BE REMOVED FROM THE WORKS TO A PLACE DESIGNATED BY THE SUPERINTENDENT.
- E3. ALL VEGETATION AND TOPSOIL SHALL BE REMOVED TO STOCKPILE.
- E4. EXPOSURE OF EXCAVATED FOUNDATIONS SHALL BE MINIMISED TO PREVENT LOCALISED MOISTURE CHANGES DURING THE CONSTRUCTION PERIOD.
- E5. ENGINEERED FILL & BACKFILLING: REFER TO 1597.1-2010 CLAUSES 4.5 COMPACTION AND 4.6 BACKFILLING
- E6. BACKFILLING SHALL NOT TAKE PLACE UNTIL THE BASE SLAB HAS REACHED ITS SPECIFIC 28 DAY STRENGTH.
- E7. UNLESS NOTED OTHERWISE IN SPECIFICATION, SLABS SHALL BE FOUNDED ON NATURAL GROUND, COMPACTED MATERIAL OR CONTROLLED FILL COMPACTED IN ACCORDANCE WITH THE FOLLOWING AS APPROPRIATE FOR MATERIAL TYPE:
 - E7.1. SANDS WITH 5% FINES OR LESS. FIELD DENSITY INDEX NOT LESS THAN 65% OF LABORATORY REFERENCE DENSITY DETERMINED IN ACCORDANCE WITH AS1289.5.6.1.
 - E7.2. SILTS AND SANDS WITH MORE THAN 5% FINES, DRY DENSITY RATIO OF NOT LESS THAN 98% OF LABORATORY REFERENCE DENSITY DETERMINED IN ACCORDANCE WITH AS 1289.5.1.1.
 - E7.3. CLASS S CLAYS, DRY DENSITY RATIO OF NOT LESS THAN 95% OF LABORATORY REFERENCE DENSITY DETERMINED IN ACCORDANCE WITH AS 1289 CLAUSE 5.1.1 OR 90% IN ACCORDANCE WITH AS 1 289.5.2.1-1. CLAY FILL SHOULD BE MOIST TO ALLOW COMPACTION AND REDUCE SUBSEQUENT MOVEMENT. REACTIVE CLAY FILL SHOULD BE AVOIDED.
- E8. THE DESIGN OF THE BASE SLAB HAS BEEN BASED ON THE FOUNDATION HAVING A MINIMUM ALLOWABLE BEARING CAPACITY OF 150 kPa. BUILDER TO VERIFY BEARING CAPACITY BEFORE CONSTRUCTING THE BASE SLAB VIA DYNAMIC CONE PENETROMETER TESTS UNDERTAKEN BY A QUALIFIED GEOTECHNICAL SERVICE PROVIDER. IF BEFORE-MENTIONED BEARING CAPACITY IS NOT BEING ACHIEVED, CONSULT THE STRUCTURAL OR GEOTECHNICAL ENGINEER TO ADVISE SITE PREPARATION WORKS / FOUNDATION IMPROVEMENT WORKS.
- E9. DESIGN TO BE MODIFIED IF GROUND WATER IS ENCOUNTERED DURING EXCAVATION; CONTACT THE CERTIFYING ENGINEER AND SEEK ADVICE.
- E10. DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EXCAVATIONS IN A STABLE CONDITION AND NOT TO UNDERMINE ANY EXISTING FOOTINGS CLOSE BY.
- E11. IF ANY DOUBTS, CONSULT THE CERTIFYING ENGINEER AND SEEK ADVICE.

F. SITE DRAINAGE

- F1. THE CIVIL CONTRACTOR / CIVIL ENGINEER HAS THE RESPONSIBILITY TO CONSTRUCT / DESIGN ADEQUATE SURFACE WATER DRAINAGE AND IF REQUIRED UNDERGROUND WATER DRAINAGE.
- F2. THE OWNER OF THE STRUCTURE IS THE PERSON OR ORGANIZATION RESPONSIBLE FOR THE MAINTENANCE OF THE BUILDING AND THE SITE. THIS INCLUDES:
 - MAINTAINING THE STATE OF 'NORMAL' SOIL MOISTURE CONDITIONS SO THAT NO 'ABNORMAL' (EXTREMELY WET) MOISTURE CONDITIONS DEVELOP BY PROVIDING/MAINTAINING ADEQUATE SURFACE WATER AND UNDERGROUND DRAINAGE.
 - PREVENTING UNUSUAL SOIL MOISTURE CONDITIONS BY MAINTAINING POOLS, PIPES, WATERTANKS, DRAINS AND THE LIKE AND REPAIRING LEAKS IMMEDIATELY.
 - CONSIDER THE EFFECT THAT VEGETATION AND IRRIGATION IN THE VICINITY OF FOOTINGS CAN HAVE ON THE SOIL MOISTURE CONDITIONS AND PREVENT EXTREMELY WET SOIL CONDITIONS OR GREATLY CHANGING SOIL MOISTURE CONDITIONS.

G. CONCRETE AND REINFORCEMENT NOTES

- G1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600.
- G2. SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES OR REBATES FOR MARKINGS.
- G3. NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ISSUER OF THESE DRAWINGS.
- G4. CONSTRUCTION JOINTS SHALL HAVE CONCRETE FACES FULLY SCABBLED PRIOR TO PLACING ADJACENT CONCRETE AND ARE TO BE USED ONLY WHERE SHOWN OR SPECIFICALLY APPROVED.
- G5. STEEL REINFORCEMENT IS TO COMPLY WITH AS4671, AND IS REPRESENTED DIAGRAMATICALLY, F_{yk} = 500MPa.
- G6. SPLICING OF REINFORCEMENT IS TO BE A MINIMUM OF:

N12	450mm
N16	600mm
MESH	TWO CROSS WIRES PLUS 25mm
TRENCH MESH	500mm
- G7. WELDING OR SITE BENDING OF REINFORCEMENT IS NOT PERMITTED WITHOUT APPROVAL OF THE ENGINEER.
- G8. ALL REINFORCEMENT SHALL BE SUPPORTED IN ITS CORRECT POSITION DURING CONCRETING, BAR CHAIRS AT 800mm MAX. CENTRES BOTH DIRECTIONS. SUPPORTS OVER MEMBRANES ARE TO BE PLACED SO AS TO PREVENT PUNCTURING OF THE MEMBRANE.
- G9. FORMWORK SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH AS3610.
- G10. CONCRETE SHALL HAVE THE FOLLOWING PROPERTIES:

ELEMENT	GRADE	SLUMP	MAX AGGREGATE SIZE	EXPOSURE CLASSIFICATION	MIN CONCRETE COVER TO REINFORCEMENT
BASE SLAB (SUPPORTING RC BOXED CULVERT)	S40	80 +/- 15	20mm	B2	65mm FOR SURFACES CAST AGAINST GROUND; 60mm EXTERNAL TOP SURFACES
RC BOXED CULVERT (REFER CLAUSE D FOR FURTHER SPECIFICATION)	S50	80 +/- 15	20mm	B2	50mm

- G11. METHOD OF PLACEMENT BY PUMP.
- G12. PROJECT ASSESSMENT IS NOT REQUIRED.
- G13. PROVIDE A 10mm x 10mm CHAMFER TO EXPOSED EDGES ON CONCRETE UNO.
- G14. CURE CONCRETE IN ACCORDANCE WITH AS3600 FOR 7 DAYS AND PRIOR TO THE REMOVAL OF FORMWORK U.N.O
- G15. CONTROL JOINTS SHALL BE CONSTRUCTED AS SPECIFIED.
- G16. SAW CUTTING SHALL BE CARRIED OUT WITHIN 6 HOURS OF CONCRETE HARDENING.

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11/11/2024 10:22:54 AM D:\DROPOBOX\ERSCON\Dropbox\ERSCON\160 Conmat\011 Ray Road - Stage 1\5 Drawings\160-011-C138 STRUCTURAL ENGINEERING NOTES.dwg

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DESIGN	RQ	APPROVED	RQ
STRUCTURAL SIGNOFF APPROVAL			
DATE:	RPEQ: 15306		

PROJECT REF	CONMAT PTY LTD		
RAY ROAD SUBDIVISION STAGE 1			
DRAWING REF	STRUCTURAL ENGINEERING NOTES		
DRAWING NO	160-011-C138	SIZE	A3
		REVISION	A

WORKPLACE HEALTH AND SAFETY DESIGN REPORT

THESE NOTES SHOULD BE READ AND UNDERSTOOD BY ALL INVOLVED IN THIS PROJECT. THIS INCLUDES (BUT IS NOT LIMITED TO): DESIGNERS, CLIENT, OWNER, OWNER BUILDER, PRINCIPAL CONTRACTOR, SUB-CONTRACTORS, TRADE CONTRACTORS, CONSULTANTS, MAINTENANCE WORKERS, DEMOLISHERS, GENERAL WORKERS AND ANY PERSON CONDUCTING A BUSINESS OR UNDERTAKING (PCBU) ON THIS PROJECT.

GENERAL

- ANY CHANGES TO THE SPECIFICATIONS OF THE STRUCTURAL DESIGN OR LOADING OF THE STRUCTURE BEFORE, DURING OR AFTER CONSTRUCTION MUST BE APPROVED BY THE STRUCTURAL ENGINEER OR AN APPROPRIATELY QUALIFIED ENGINEER BEFORE PROCEEDING WITH ANY CONSTRUCTION OR ALTERATION WORKS.
- PROPER PERSONAL PROTECTIVE EQUIPMENT (PPE) SHOULD BE PROVIDED, USED, WORN AND CURRENT AT ALL TIMES.
- AN ADEQUATE FIRST AID KIT SHOULD BE PRESENT AND MAINTAINED ON SITE AT ALL TIMES.
- NO UNIQUE/NON-TYPICAL BUILDING TECHNIQUES OR METHODS ARE REQUIRED FOR CONSTRUCTION, MAINTENANCE OR DEMOLITION OF THIS PROJECT. AS SUCH, A SAFETY-IN-DESIGN REVIEW BY THE ENGINEER HAS IDENTIFIED NO RISKS REQUIRING UNIQUE CONSIDERATION OR ACTION BEYOND THE REQUIREMENTS OF THE NATIONAL WORKPLACE HEALTH AND SAFETY ACT, THE WORKPLACE HEALTH AND SAFETY REGULATIONS AND INDUSTRY CODES OF PRACTICE.

SLIPS, TRIPS AND FALLS

- CONSTRUCTION, CLEANING AND MAINTENANCE OF THIS BUILDING MAY REQUIRE PERSONS TO BE SITUATED WHERE A FALL IN EXCESS OF 1.4m IS POSSIBLE WHERE THIS ACTIVITY CANNOT BE AVOIDED, SCAFFOLDING, LADDERS, FALL BARRIERS AND/OR PPE SHOULD BE USED IN ACCORDANCE WITH THE RELEVANT GUIDELINES, REGULATIONS OR LEGISLATION. CARE SHOULD BE TAKEN TO PREVENT A FALL FROM ANY HEIGHT.
- THE SITE SHOULD BE KEPT TIDY AND FREE OF TRIP HAZARDS AT ALL TIMES, INCLUDING DURING CONSTRUCTION, MAINTENANCE AND EVERYDAY USE.
- ADEQUATE LIGHTING SHOULD BE PROVIDED AT ALL TIMES DURING CONSTRUCTION AND MAINTENANCE AND WHEN THE BUILDING IS BEING USED TO ENSURE SAFE WORKING CONDITIONS.
- ACCESSWAYS AND PATHS SHOULD BE MONITORED AT ALL TIMES TO ENSURE SURFACES ARE KEPT FREE OF ANY OBJECTS THAT MAY CAUSE A SLIP OR TRIP HAZARD.

MANUAL TASKS

- ANY ITEMS WITH A MASS GREATER THAN 25kg SHOULD BE LIFTED BY TWO OR MORE WORKERS, OR WITH THE AID OF A MECHANICAL LIFTING DEVICE. WHERE POSSIBLE, COMPONENTS SHOULD BE STORED IN A WAY WHICH MINIMISES THE NEED FOR BENDING BEFORE LIFTING.
- ALL PORTABLE TOOLS USED DURING CONSTRUCTION, MAINTENANCE AND DEMOLITION OF THIS BUILDING SHOULD BE PROPERLY MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

FALLING OBJECTS

- CONSTRUCTION, MAINTENANCE OR DEMOLITION WORK ON OR AROUND THIS BUILDING IS LIKELY TO INVOLVE PERSONS WORKING ABOVE GROUND LEVEL. WHERE THIS OCCURS, ONE OR MORE OF THE FOLLOWING MEASURES SHOULD BE TAKEN TO PREVENT INJURY FROM FALLING OBJECTS.
 - PREVENT OR RESTRICT ACCESS TO AREAS BELOW WHERE THE WORK IS BEING CARRIED OUT BY THE USE OF APPROPRIATE BARRICADES.
 - PROVIDE TOE-BOARDS TO SCAFFOLDING OR WORK PLATFORMS.
 - PROVIDE MESH BARRICADES TO THE SIDE OF SCAFFOLDING OR WORK PLATFORMS.
 - PROVIDE PROTECTIVE STRUCTURES, HOARDING AND GANTRIES BELOW THE WORK AREA.
 - ENSURE ALL PERSONS BELOW THE WORK AREA HAVE SUITABLE PPE (HARD HATS, SAFETY FOOTWEAR, EYE PROTECTION ETC.) AND THAT IT IS USED CORRECTLY.
- DURING CONSTRUCTION, RENOVATION OR DEMOLITION OF THIS BUILDING, PARTS OF THE STRUCTURE WILL REMAIN STANDING PRIOR TO OR AFTER SUPPORTING ELEMENTS ARE IN PLACE, CONTRACTORS SHOULD ENSURE THAT TEMPORARY BRACING OR OTHER REQUIRED SUPPORTS ARE IN PLACE AT ALL TIMES TO PREVENT COLLAPSE.
- DURING CONSTRUCTION, RENOVATION, MAINTENANCE OR DEMOLITION MECHANICAL LIFTING OF MATERIALS MAY BE REQUIRED. WHERE SUCH LIFTING IS NECESSARY, ENSURE THAT APPROPRIATE LIFTING DEVICES ARE USED, THAT LOADS ARE APPROPRIATE AND ARE PROPERLY SECURED AND THAT ACCESS TO AREAS BELOW THE LOAD IS PREVENTED OR RESTRICTED.

PUBLIC ACCESS

- PUBLIC ACCESS TO CONSTRUCTION AND DEMOLITION SITES AND AREAS UNDER MAINTENANCE CAN CAUSE RISK TO WORKERS AND THE PUBLIC. WARNING SIGNS AND BARRIERS SHOULD BE PROVIDED TO PREVENT UNAUTHORISED ACCESS. ELECTRICAL INSTALLATIONS, EXCAVATIONS, PLANT AND LOOSE MATERIAL SHOULD BE SECURED WHEN NOT FULLY SUPERVISED.

TRAFFIC MANAGEMENT

- PARKING OF VEHICLES OR LOADING/UNLOADING OF VEHICLES ON THIS SITE/ROADWAY MAY CAUSE A TRAFFIC HAZARD. PARKING FOR WORKERS AND LOADING AREAS SHOULD BE PROVIDED AND SUPERVISED BY TRAINED TRAFFIC MANAGEMENT PERSONNEL.
- CONSTRUCTION OF THIS BUILDING MAY REQUIRE LOADING AND UNLOADING OF MATERIALS ON THE ROADWAY. DELIVERIES SHOULD BE WELL PLANNED TO AVOID CONGESTION OF LOADING AREAS. LOADING AND UNLOADING SHOULD BE SUPERVISED BY TRAINED TRAFFIC MANAGEMENT PERSONNEL.
- PLANT OPERATING ON THIS SITE MAY CAUSE A RISK OF COLLISION. A TRAFFIC MANAGEMENT PLAN SHOULD BE ADOPTED AND SUPERVISED BY TRAINED TRAFFIC MANAGEMENT PERSONNEL.
- ANY TEMPORARY ROAD CLOSURES ARE TO COMPLY WITH ALL LOCAL GOVERNMENT REQUIREMENTS. THE PRINCIPAL CONTRACTOR IS TO COMPLETE ALL NECESSARY DOCUMENTATION FOR TRAFFIC MANAGEMENT, SIGNAGE, BARRICADES, TRAFFIC CONTROLLERS ETC.

HAZARDOUS SUBSTANCES

- MANY MATERIALS USED IN THE CONSTRUCTION OF THIS BUILDING CAN CAUSE HARM IF INHALED OR HANDLED. PERSONS WORKING ON OR IN THE BUILDING DURING CONSTRUCTION, MAINTENANCE OR DEMOLITION SHOULD ENSURE GOOD VENTILATION AND WEAR PERSONAL PROTECTIVE EQUIPMENT INCLUDING PROTECTION AGAINST INHALATION WHILE USING POWDERED MATERIALS OR WHEN SANDING, DRILLING, CUTTING OR OTHERWISE DISTURBING OR CREATING POWDERED MATERIAL.
- TREATED TIMBER MAY BE USED IN THIS BUILDING. DUST OR FUMES FROM THIS MATERIAL CAN BE HARMFUL. PERSONS WORKING ON OR IN THIS BUILDING DURING CONSTRUCTION, MAINTENANCE OR DEMOLITION SHOULD ENSURE GOOD VENTILATION AND WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT. DO NOT BURN TREATED TIMBER.
- MANY TYPES OF GLUE, SOLVENTS, SPRAY PACKS, PAINTS, VARNISHES AND SOME CLEANING MATERIALS AND DISINFECTANTS HAVE DANGEROUS EMISSIONS. AREAS WHERE THESE ARE USED SHOULD BE KEPT WELL VENTILATED. PERSONAL PROTECTIVE EQUIPMENT MAY BE REQUIRED. THE MANUFACTURER'S RECOMMENDATIONS FOR USE MUST BE CAREFULLY CONSIDERED AT ALL TIMES.
- FIBREGLASS, ROCKWOOL, CERAMIC AND OTHER MATERIAL USED FOR THERMAL OR SOUND INSULATION MAY CONTAIN SYNTHETIC MINERAL FIBRE WHICH MAY BE HARMFUL IF INHALED OR IF IT COMES INTO CONTACT WITH THE SKIN, EYES OR OTHER SENSITIVE PARTS OF THE BODY. APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT SHOULD BE WORN AT ALL TIMES WHEN INSTALLING, REMOVING OR WORKING WITH SUCH MATERIALS.
- AREAS WHERE TIMBER FINISHES ARE APPLIED SHOULD BE KEPT WELL VENTILATED DURING SANDING AND APPLICATION AND FOR A PERIOD AFTER INSTALLATION. PERSONAL PROTECTIVE EQUIPMENT MAY BE REQUIRED. THE MANUFACTURER'S RECOMMENDATIONS FOR USE MUST BE CAREFULLY CONSIDERED AT ALL TIMES.
- WORKS INVOLVING EXPOSURE TO ASBESTOS SHALL ONLY BE CARRIED OUT BY LICENCED SPECIALISTS AND STRICTLY IN ACCORDANCE WITH THE WHS REGULATIONS.

OTHER HIGH-RISK ACTIVITY

- ALL ELECTRICAL WORK SHOULD BE CARRIED OUT IN ACCORDANCE WITH THE 'CODE OF PRACTICE MANAGING ELECTRICAL RISKS AT THE WORKPLACE, AS/NZ 3012' AND ALL LICENSING REQUIREMENTS. NEW ELECTRICAL INSTALLATION ON CONSTRUCTION AND DEMOLITION SITES MUST BE IN ACCORDANCE WITH THE WIRING RULES OF AS/NZS 3000 AND APPROPRIATE REQUIREMENTS OF AS/NZA 3012.
- ALL WORK USING PLANT SHOULD BE CARRIED OUT IN ACCORDANCE WITH THE 'CODE OF PRACTICE MANAGING RISKS OF PLANT AT THE WORKPLACE'.
- ALL WORK SHOULD BE CARRIED OUT IN ACCORDANCE WITH THE 'CODE OF PRACTICE MANAGING NOISE AND PREVENTING HEARING LOSS AT WORK'.
- DUE TO THE HISTORY OF SERIOUS INCIDENTS, IT IS RECOMMENDED THAT PARTICULAR CARE BE EXERCISED WHEN UNDERTAKING ANY WORK INVOLVING STEEL CONSTRUCTION AND CONCRETE PLACEMENT.

FIRE FIGHTING

- THE CLIENT/OWNER IS TO ENSURE THAT APPROPRIATE FIRE FIGHTING EQUIPMENT IS PROVIDED ON SITE DURING CONSTRUCTION AND MAINTAINED FOR THE LIFE OF THE BUILDING.
- ALL FIRE FIGHTING EQUIPMENT IS TO BE PROVIDED AND MAINTAINED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS.

GENERAL WORKPLACE HEALTH AND SAFETY REQUIREMENTS

- THE CLIENT/OWNER IS TO ENSURE THAT THE PRINCIPAL CONTRACTOR COMPLIES WITH ALL REQUIREMENTS OF THE NATIONAL WH&S ACT 2011, WORKPLACE HEALTH AND SAFETY REGULATIONS 2011 AND CODES OF PRACTICE DURING THE CONSTRUCTION OF THE BUILDING.
- THE PRINCIPAL CONTRACTOR MEANS THE BUILDER WHO HAS OBTAINED THE BUILDING PERMIT AND WHOSE LICENCE NUMBER IS BEING USED FOR THE CONTRACT.
- THE CLIENT/OWNER MUST ENSURE THAT THE PRINCIPAL CONTRACTOR COMPLETES A CONSTRUCTION WORKPLACE PLAN AS APPLICABLE UNDER THE WH&S LEGISLATION.
- THE CLIENT/OWNER MUST ENSURE THAT THE PRINCIPAL CONTRACTOR AND ALL TRADE CONTRACTORS COMPLETE WORK METHOD STATEMENTS (WMS) AS APPLICABLE UNDER THE WH&S LEGISLATION BEFORE ANY WORK COMMENCES.
- THE CLIENT/OWNER MUST ENSURE THAT WORKERS HAVE A CURRENT GENERAL SAFETY INDUCTION (WHITE OR BLUE) CARD.
- THE CLIENT/OWNER MUST ENSURE THAT THE PRINCIPAL CONTRACTOR CONDUCTS THE NECESSARY SITE-SPECIFIC INDUCTION AS REQUIRED BY WH&S LEGISLATION.
- THE CLIENT/OWNER MUST ENSURE THAT THE PRINCIPAL CONTRACTOR HAS THE APPROPRIATE FIRST AID KITS AND THAT THEY ARE MAINTAINED AND KEPT ON SITE FOR THE DURATION OF THE CONSTRUCTION.
- THE CLIENT/OWNER MUST ENSURE THAT THE PRINCIPAL CONTRACTOR, TRADE CONTRACTORS AND WORKERS MEET ALL OF THEIR WH&S OBLIGATIONS DURING CONSTRUCTION.
- THE CLIENT/OWNER MUST ENSURE THAT THE PRINCIPAL CONTRACTOR AND TRADE CONTRACTORS ENSURE THAT ONLY EXPERIENCED, QUALIFIED, LICENSED PERSONS ARE EMPLOYED TO CARRY OUT THE WORK.
- THE CLIENT/OWNER MUST ENSURE THAT THE PRINCIPAL CONTRACTOR HAS PUT IN PLACE THE WORKPLACE HEALTH AND SAFETY CONTROL MEASURES IN ACCORDANCE WITH WH&S REGULATION FOR ALL HIGH RISK CONSTRUCTION WORK INCLUDING BUT NOT LIMITED TO: CONSTRUCTION SAFETY PLAN, WORK METHOD STATEMENTS, ROOF EDGE PROTECTION, SCAFFOLDS AND WORK PLATFORMS, WORK PLATFORMS ON TRESTLE LADDERS, FALL ARREST PLATFORMS, TRAVEL RESTRAINT SYSTEMS, FALL ARREST HARNESS SYSTEMS, STAIR VOID PROTECTION, BALCONY EDGE PROTECTION, INDUSTRIAL SAFETY NETS AND EXCAVATION FALLS PROTECTION.

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SCALE

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DESIGN	RQ	APPROVED	RQ
STRUCTURAL SIGNOFF APPROVAL			
DATE:	20/03/24	RPEQ:	15306

PROJECT REF	CONMAT PTY LTD PRECAST BOX CULVERT		
DRAWING REF	WORKPLACE HEALTH AND SAFETY DESIGN REPORT		
DRAWING NO	160-011-C139	SIZE	A3
REVISION			A

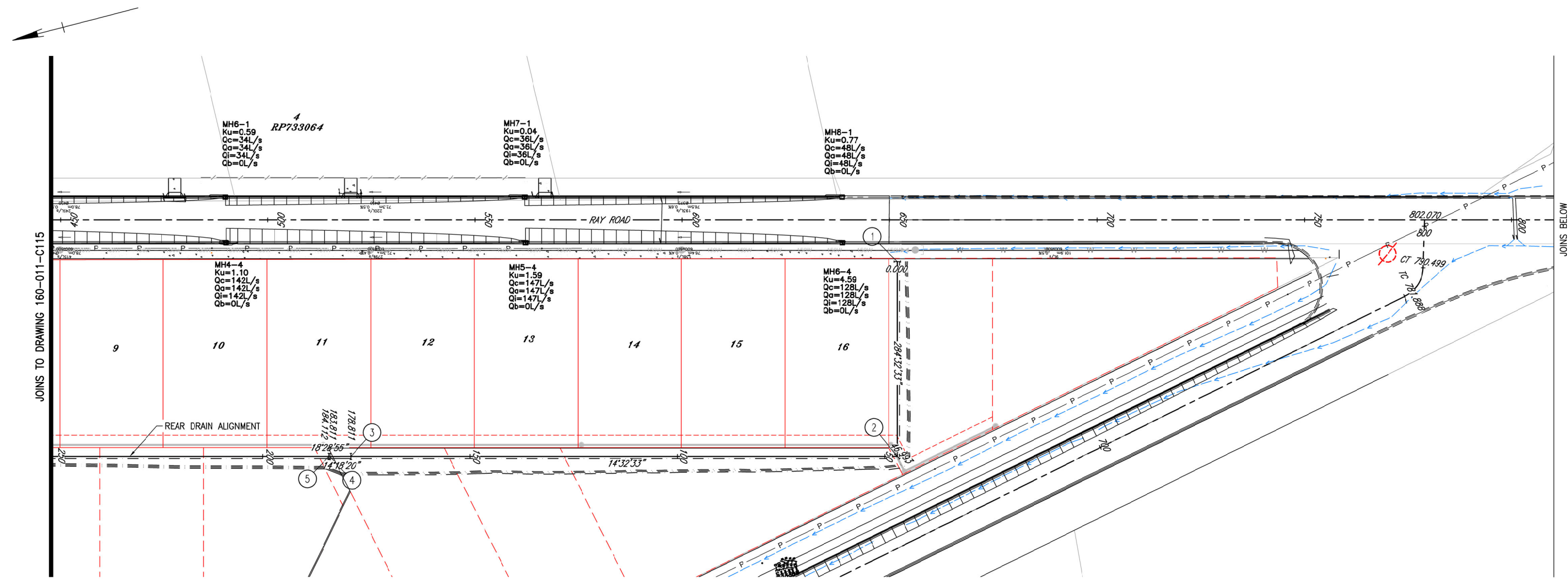
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APPENDIX B

Q100 Design Sketches

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LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- ROAD CENTRELINE
- 51.0 PROPOSED DESIGN CONTOUR MAJOR
- PROPOSED DESIGN CONTOUR MINOR
- 51.0 EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- PROPOSED BATTER
- PROPOSED STORMWATER PIPE
- FUTURE STORMWATER PIPE
- SERVICE CROSSINGS
- SW EXISTING STORMWATER
- EXISTING HEADWALL AND PIPE
- NEW HEADWALL WITH GRATED INLET
- NEW MANHOLE
- STRUCTURE NAME

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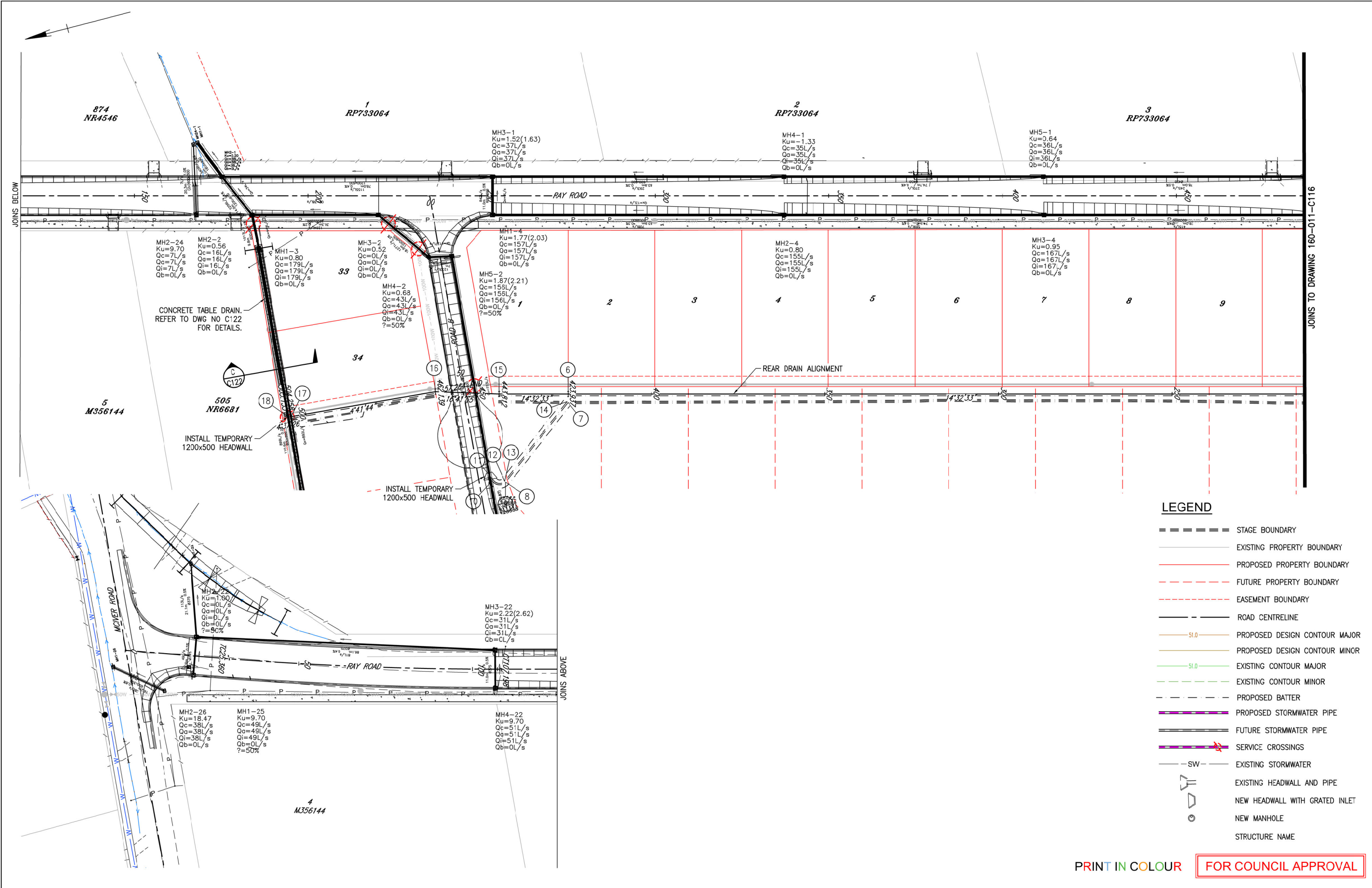
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PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	Q100 DRAINAGE PLAN (SHEET 2 OF 2)		
DRAWING NO	160-011-SK105	SIZE	A3
		REVISION	A

PLOT DATE: 11/11/2024 6:31:21 PM
 FILE LOCATION: X:\160 Conmat\011 Ray Road - Stage 1\Drawings\Sketch\160-011-SK104 SW PLAN Q100 (SHEET 1 OF 2).dwg



LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- ROAD CENTRELINE
- 51.0 PROPOSED DESIGN CONTOUR MAJOR
- 51.0 PROPOSED DESIGN CONTOUR MINOR
- 51.0 EXISTING CONTOUR MAJOR
- 51.0 EXISTING CONTOUR MINOR
- PROPOSED BATTER
- PROPOSED STORMWATER PIPE
- FUTURE STORMWATER PIPE
- SERVICE CROSSINGS
- SW --- EXISTING STORMWATER
- EXISTING HEADWALL AND PIPE
- NEW HEADWALL WITH GRATED INLET
- NEW MANHOLE
- STRUCTURE NAME

PRINT IN COLOUR FOR COUNCIL APPROVAL

NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



CLIENT

SCALE

1:1000

0 10 20 30 A3

ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	Q100 DRAINAGE PLAN (SHEET 1 OF 2)		
DRAWING NO	160-011-SK104	SIZE	A3
		REVISION	A



APPENDIX C

Statement of Compliance

FNQROC DEVELOPMENT MANUAL

CouncilMareeba Shire Council.....
(INSERT COUNCIL NAME)

**STATEMENT OF COMPLIANCE
OPERATIONAL WORKS DESIGN**

This form duly completed and signed by an authorised agent of the Designer shall be submitted with the Operational Works Application for Council Approval.

Name of Development Ray Road Stage 1

Location of Development Ray Road, Mareeba

Applicant Tyrone Corporation

Designer ERSCON Consulting Engineers

It is hereby certified that the Calculations, Drawings, Specifications and related documents submitted herewith have been prepared, checked and amended in accordance with the requirements of the FNQROC Development Manual and that the completed works comply with the requirements therein, **except** as noted below.

Compliance with the requirements of the Operational Works Design Guidelines	Non-Compliance refer to non-compliance report / drawing number
Plan Presentation	
Geotechnical requirements	
Geometric Road Design	
Pavements	
Structures / Bridges	
Subsurface Drainage	
Stormwater Drainage	
Site Re-grading	
Erosion Control and Stormwater Management	
Pest Plant Management	
Cycleway / Pathways	

Landscaping	
Water Source and Disinfection/Treatment Infrastructure (if applicable)	
Water Reticulation, Pump Stations and water storages	
Sewer Reticulation and Pump Stations	
Electrical Reticulation and Street Lighting	
Public Transport	
Associated Documentation/ Specification	
Priced Schedule of Quantities	
Referral Agency Conditions	
Supporting Information (AP1.08)	
Other	

Conscientiously believing the above statements to be true and correct, signed on behalf of:

Designer ...ERSCON Consulting Engineers..... **RPEQ No** ...05085...

Name in Full .John Dale Martin.

Signature **Date** .11/11/2024.



APPENDIX D

Hydrological Analysis

Q100 STORMWATER CALCULATIONS

STRUCTURE NO.	DRAIN SECTION	tc	I	C	A	(Cx)	Q	Qa	ROAD GRADE AT INLET	Wf	dg	Vg	dg.Vg	STRUCTURE TYPE	INLET CAPACITY CURVE	Qg	Qb	tc	I	(Cx)	Qrat	Qrc	Qb(net)	Qo	L	S	V	Vt	S/Do	Qg/Go	Do/Do	V2/2g	Ku	hu	Kw	hw	Sf	hf	dn	Vn	PIPE U/S INVERT LEVEL	PIPE D/S INVERT LEVEL	PIPE U/S H.G.L.	PIPE D/S H.G.L.	W.S.E.	SURFACE OR K & C INVERT LEVEL	FREEBOARD	STRUCTURE NO.				
		m/s														m/s	m													m	m	m	m	m	m	m	m	m	m	m									m	m	m	m
MH8-2	MH8-2 to MH9-2	15	182	0.727	0.389	0.283	0.143	0.143	1	3	3.477	0.115	0.744	0.085	AL2D		0.143		15.97	178	1.629	0.806	0.119		0.806	72.896	0.57	1200x600	1.12	1.99	T1/T2	1.38	0.17	1	0.064	1.03	0.066		0.066	0.18	0.132	0.325	2.06	427.8	427.4	428.6	428.4	428.9	0.267	MH8-2		
MH7-2	MH7-2 to MH6-2	15	182	0.708	0.424	0.3	0.152	0.152	1	3	3.477	0.141	0.538	0.076	AL2D		0.152		16.43	176	2.24	1.097	0.068		1.097	22.625	0.16	1200x600	1.52	1.06	T2/T4	1.78	0.14	1	0.001	1.01	0.001		0.001		0.001	0.6	1.52	427.4	427.3	428.4	428.4	428.5	0.035	MH7-2		
MH6-2	MH6-2 to MH5-2	5	246	1	0.04	0.04	0.028	0.028	1	3	2.005	0.068	0.471	0.032	AL2D		0.028		16.79	175	2.28	1.107	0.116		1.107	77.166	0.35	1200x600	1.54	1.57	T4/T8	1.88	0.02	1	0.077	0.86	0.066	0.87	0.067	0.22	0.168	0.484	1.9	427.3	427	428.4	428.2	428.4	0.41	MH6-2		
MH5-2	MH5-2 to MH4-2	15	182	0.744	0.413	0.308	0.156	0.156	1	3					SAL4D		0.156		17.61	172	2.588	1.233			1.233	6.705	0.2	1200x600	1.71	1.18	T8/T10	1.97	0.12	1	0.001	1.87	0.002	2.21	0.002			0.6	1.71	427	427	428.2	428.2	428.2		MH5-2		
MH4-2	MH4-2 to MH3-2	15	182	0.852	0.099	0.085	0.043	0.043	1	3					SAL4D		0.043		17.02	174	2.631	1.271			1.271	18.916	0.23	1200x600	1.77	1.27	T2/T4	2.03	0.03	1	0.68				0.68			0.6	1.77	427	426.9	428.2	428.2	428.2		MH4-2		
MH3-2	MH3-2 to MH2-2								1	3					AL4D				17.27	173	2.631	1.264			1.264	36.34	0.2	1200x600	1.75	1.16	T2/T4	2.13		1	0.148	0.52	0.077		0.077	0.42	0.152	0.6	1.75	426.9	426.8	428.1	428	428.2	0.233	MH3-2		
MH2-2	MH2-2 to MH1-2	5	246	0.943	0.026	0.024	0.016	0.016	1	3	1.53	0.054	0.472	0.026	AL4D		0.016		18.47	168	4.832	2.256	0.53		2.256	14.039	0.12	1200x600	3.13	0.92	T2/T4	1.98	0.01	1	0.486	0.56	0.271		0.271	1.38	0.193	0.6	3.13	426.8	426.8	427.7	427.5	428	428		MH2-2	
MH2-1		5	246	0.943	0.058	0.055	0.038	0.038	1	3	2.119	0.071	0.577	0.041	AL4D		0.038						0.53							T1/T2	1.05	0.01	0.94		0.2	0.044	0.044						427.5	428.1	0.591	MH2-1						
MH8-3	MH8-3 to MH7-3	15	182	0.784	0.152	0.119	0.06	0.06	1	3	2.772	0.089	0.546	0.049	AL2D		0.06		15	182	0.119	0.06	0.323		0.06	98.47	0.5	375	0.55	1.12	G1	1.52	1		0.015	6.89	0.105		0.105	0.12	0.116	0.185	1.11	428.6	428.1	429	428.9	429.1	0.588	MH8-3		
MH7-3	MH7-3 to MH6-3	15	182	0.735	0.426	0.314	0.159	0.159	1	3	3.863	0.12	0.746	0.09	AL2D		0.159		15	182	0.425	0.215	0.356		0.215	43.831	0.65	375x375	1.53	1.28	G1/T1/T2	2.3	0.72	0.89	0.119	2.69	0.321		0.321	0.93	0.406	0.372	1.54	428.1	427.8	428.6	428.2	428.9	0.297	MH7-3		
MH6-3	MH6-3 to MH5-3	15	182	0.731	0.232	0.169	0.086	0.086	1	3	2.948	0.094	0.688	0.065	AL2D		0.086		15.57	180	0.595	0.297	0.391		0.297	52.576	0.42	600x600	0.82	0.97	T1/T2	1.1	0.29	0.63	0.035				0.14	0.076	0.453	1.09	427.5	427.4	428.2	428.2	428.9	0.73	MH6-3			
MH5-3	MH5-3 to MH4-3	15	182	0.726	0.356	0.258	0.13	0.13	1	3	3.422	0.108	0.781	0.084	AL2D		0.13		16.36	177	1.168	0.573	0.403		0.573	89.753	0.2	600x600	1.59	0.97	T10	1.19	0.22	1		2.18		2.64			0.6	1.59	427.4	427.2	428.1	428.1	428.1	428.5	0.395	MH5-3		
MH4-3	MH4-3 to MH3-3	15	182	0.725	0.251	0.182	0.092	0.092	1	3	9.133	0.092	0.268	0.025	AL2D		0.092		17.9	170	1.35	0.639	0.123		0.639	19.779	0.2	600x600	1.77	0.98	T1/T2	1.52	0.14	1	0.87				0.87			0.6	1.77	427.2	427.2	428.1	428.1	428.1	428.6	0.46	MH4-3	
MH3-3	MH3-3 to MH2-3	5	246	0.938	0.014	0.013	0.009	0.009	1	3	3.554	0.043	0.183	0.008	AL2D		0.009		17.89	170	1.685	0.798	0.12		0.798	40.05	0.2	600x600	2.22	0.98	T1/T2	1.62	0.01	1	0.31				0.31			0.6	2.22	427.1	427.1	428.1	428.1	428.6	0.464	MH3-3		
MH2-3	MH2-3 to MH1-3								1	3					MH1200				18.47	168	1.925	0.899			0.899	110.57	0.15	600x600	2.5	0.85	T2/T4	1.79		1	0.32				0.32			0.6	2.5	427	426.9	428.1	428.1	428.5	0.421	MH2-3		
MH1-3	MH1-3 to MH2-2	15	182	0.708	0.501	0.354	0.179	0.179	1	3	0.975	0.187	1.214	0.227	AL2D		0.179		20.64	160	2.279	1.013	0.882		1.013	9.85	0.11	600x600	2.81	0.73	T1/T2	2.11	0.17	1	0.128	0.8	0.101		0.101	0.53	0.052	0.6	2.81	426.9	426.8	428	428	428.3	0.143	MH1-3		
MH2-2		5	246	0.943	0.026	0.024	0.016	0.016	1	3	1.53	0.054	0.472	0.026	AL4D		0.016						0.53							T2/T4	1.98	0.01	1		0.56	0.271		0.271							428	428						MH2-2
MH7-4		4	15	182	0.851	0.022	0.019	0.009	0.009	1	3	1.291	0.047	0.37	0.018	AL2D		0.009		15	182	0.019	0.009	0.46		0.009	101.93	0.49	600x600	0.03	1.8	G1	1.08	1		7					0.028	0.55	429.3	428.8	430	430	430	431.6	1.587	MH7-4		
MH6-4		4	15	182	0.76	0.334	0.254	0.128	0.128	1	3	3.582	0.112	0.702	0.079	AL2D		0.128		15	182	0.272	0.138	0.46		0.138	76.373	0.42	600x600	0.38	1.66	G1/T1	1.95	0.93	1	0.007	4.59	0.034		0.034	0.02	0.017	1.34	428.8	428.5	430	429.9	430	431	0.984	MH6-4	
MH5-4		4	15	182	0.741	0.391	0.29	0.147	0.147	1	3	3.765	0.117	0.726	0.085	AL2D		0.147		15.77	179	0.562	0.279	0.46		0.279	72.265	0.44	600x600	0.78	1.71	G1/T1	2.43	0.52	1	0.031	1.59	0.049	0.049	0.09	0.066	0.372	1.54	428.5	428.2	429.8	429.8	430.5	0.584	MH5-4		
MH4-4		4	15	182	0.74	0.38	0.281	0.142	0.142	1	3	3.723	0.116	0.72	0.084	AL2D		0.142		15.71	179	0.833	0.415	0.46		0.415	77.966	0.41	600x600	1.15	1.64	T1	2.8	0.34	1	0.068	1.1	0.074	0.074	0.2	0.157	0.388	1.78	428.1	427.8	428.8	429.6	430.1	0.721	MH4-4		
MH3-4		4	15	182	0.737	0.449	0.331	0.167	0.167	1	3	3.961	0.123	0.75	0.092	AL2D		0.167		16.5	176	1.164	0.569	0.46		0.569	74.866	0.43	600x600	1.58	1.69	T1	2.98	0.29	1	0.128	0.95	0.121	0.121	0.38	0.284	0.487	1.95	427.8	427.5	429.5	429.2	429.6	0.041	MH3-4		
MH2-4		4	15	182	0.738	0.414	0.306	0.155	0.155	1	3	3.759	0.117	0.768	0.09	AL2D		0.155		16.53	176	1.449	0.708	0.487		0.708	83.91	0.35	600x600	1.97	1.51	T1	2.88	0.21	1	0.191	0.8	0.152	0.152	0.57	0.476	0.6	1.97	427.5	427.2	429	428.6	429.2		MH2-4		
MH1-4		4	15	182	0.74	0.42	0.311	0.157	0.157	1	3	3.784	0.118	0.771	0.091	AL2D		0.157		17.46	172	1.76	0.842	0.487		0.842	11	0.45	600x600	2.34	1.73	T10	2.47	0.18	1	0.273	1.77	0.482	2.03	0.554	0.81</											



APPENDIX E

Hydraulic Analysis

JOB NO: 160-009
JOB: Ray Road Stormwater
TITLE : Catchment C
DATE: 10/10/2024



Time of concentration Calculation
 (Using Bransby-Williams' Equation)

Proportionality Factor P= 58 (for Ha)

Length of Flow Path L= 0.910 km
 Top of Catchment (RL) RL = 432 m
 Area of Catchment A = 9.89 Ha

Catchment Profile 428.2 [to utilise graph area better]

Chainage	RL	RL	Area under Graph (m ²)
0	428.2	0	----
250	428.5	0.3	38
500	430	1.8	263
750	431	2.8	575
750	431	2.8	0
750	431	2.8	0
750	431	2.8	0
750	431	2.8	0
750	431	2.8	0
910	432.0	3.8	528

Average Slope Calculation	
Outlet Chainage	0
Catchment length	910
Outlet RL	0
Top RL (Av Slope)	3.1

$$T_c = \frac{P \times L}{(A \wedge 0.1) \times (S \wedge 0.2)}$$

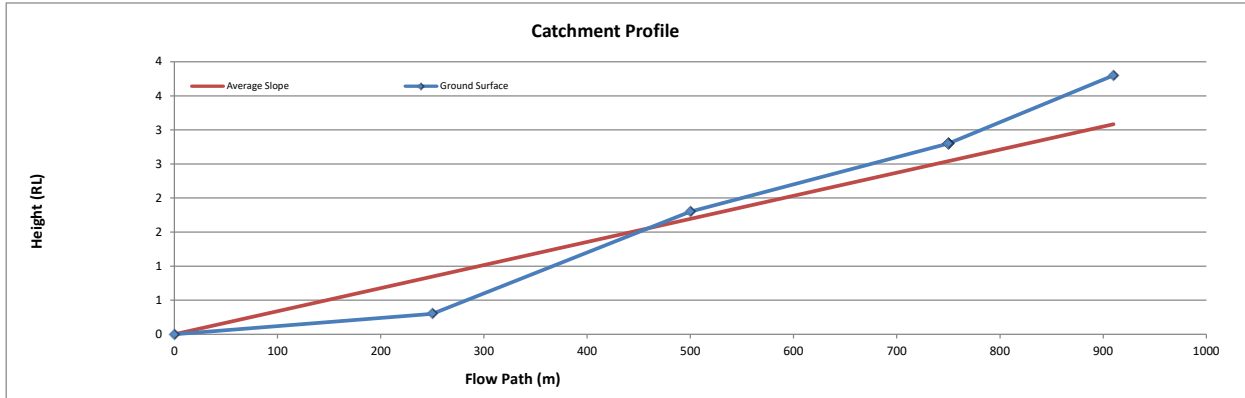
Tc = 52.1 min

Adopted Tc 52.0 min

Total area under graph 1403 m²
 Area below outlet level 0 m²
 Area above outlet 1403 m²

Height for average slope 3.08 m

Average Slope S = 0.3 %



Flow Calculation for Upstream Catchment

Catchment 3

Fraction Impervious = f_i = 0.1 Table Drain (QUDM Table 4.5.3)
 1 hour @ 10 year ARI = i₁₀ = 63.5 mm/hr (IFD CHARTS)
 C₁₀ = 0.675 (QUDM Table 4.5.3)

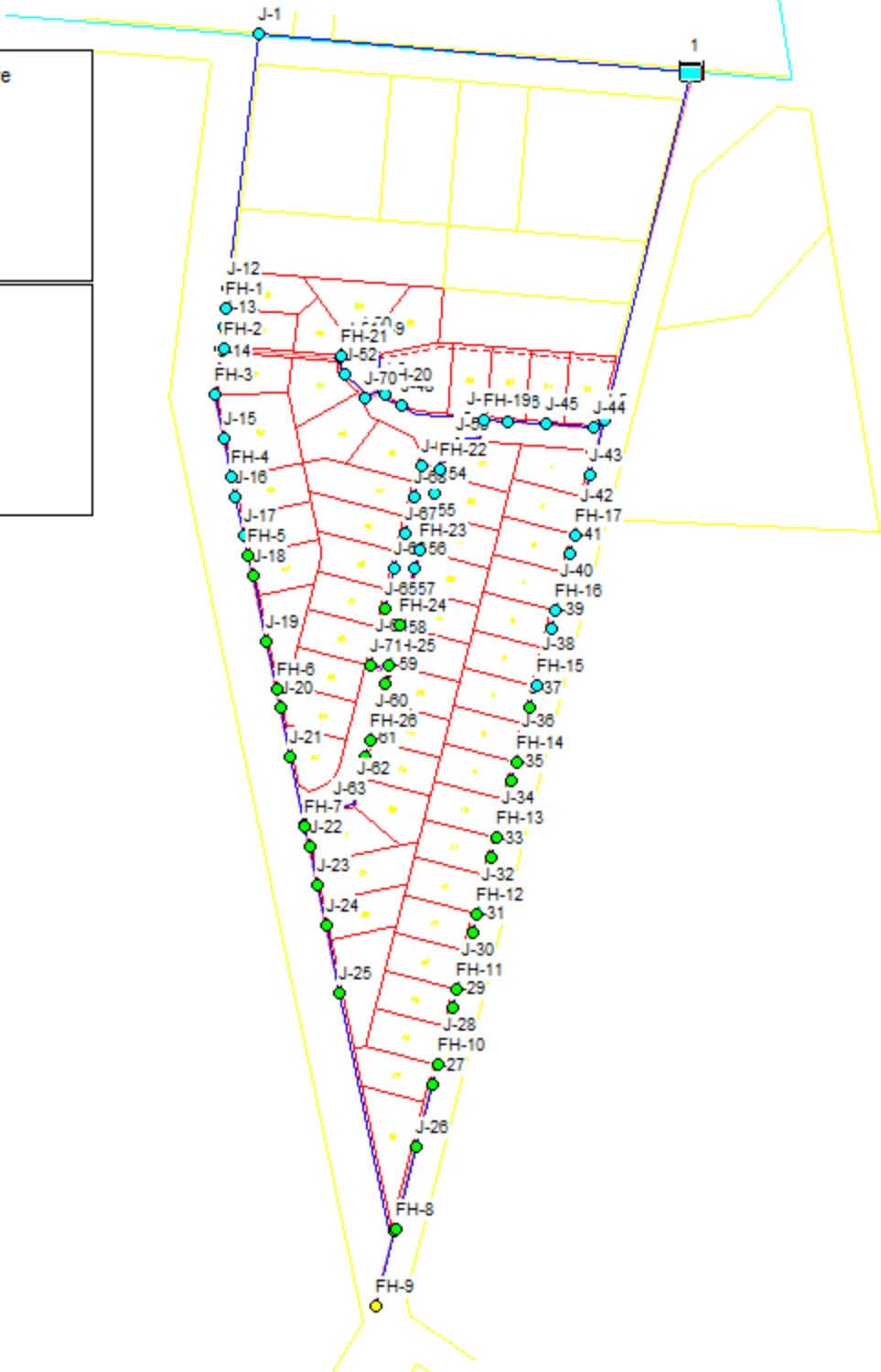
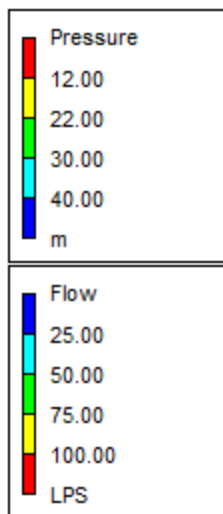
AEP		63%	39%	18%	10%	5%	2%	1%	0.5%	
Design ARI		1	2	5	10	20	50	100	200	
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2	1.2	(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.54	0.57375	0.64125	0.675	0.70875	0.77625	0.81	0.81	(QUDM Equation 4.3)
Time of Concentration	T _C	52	52	52	52	52	52	52	52	min
Rainfall Intensity	i ₁₀ ^{6min}	40	47	60	70	79	90	98	111	mm/hr (IFD CHARTS)
Area	A	9.89	9.89	9.89	9.89	9.89	9.89	9.89	9.89	Ha
Path C Flow		0.60	0.73	1.06	1.30	1.54	1.92	2.18	2.48	m³/s
Velocity		1.968	2.119	2.445	2.646	2.827	3.082	3.239	3.408	m/s
Height		0.275	0.303	0.367	0.408	0.446	0.502	0.538	0.577	m

Taken from ERSCON Super Drain Table



APPENDIX F

EPANet



Network Table - Nodes

Node ID	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J-1	1	0.09	463.39	36.39
Junc J-2	1	0.09	461.83	33.83
Junc J-3	1	0.09	457.79	27.79
Junc J-4	1	0.09	454.27	23.27
Junc J-5	1	0.09	462.23	34.23
Junc J-7	1	0.09	460.7	32.7
Junc J-8	1	0.09	460.65	32.65
Junc J-9	1	0.09	460.65	32.65
Junc J-10	1	0.09	459.8	30.8
Junc J-11	1	0.09	458.75	28.75
Junc J-12	1	0.09	462.49	34.49
Junc J-13	1	0.09	462.05	34.05
Junc J-14	1	0.09	461.6	33.6
Junc J-15	1	0.09	460.92	30.92
Junc J-16	1	0.09	460.37	30.37
Junc J-17	1	0.09	460.02	30.02
Junc J-18	1	0.09	459.67	29.67
Junc J-19	1	0.09	459.14	29.14
Junc J-20	1	0.09	458.63	28.63
Junc J-21	1	0.09	458.26	28.26
Junc J-22	1	0.09	457.37	27.37
Junc J-23	1	0.09	456.63	26.63
Junc J-24	1	0.09	455.89	24.89
Junc J-25	1	0.09	455.53	24.53
Junc J-26	1	0.09	455.29	24.29
Junc J-27	1	0.09	455.91	24.91
Junc J-28	1	0.09	456.17	25.17
Junc J-29	1	0.09	456.29	25.29
Junc J-30	1	0.09	456.56	25.56
Junc J-31	1	0.09	456.95	26.95
Junc J-32	1	0.09	457.37	27.37
Junc J-33	1	0.09	457.78	27.78
Junc J-34	1	0.09	458.23	28.23
Junc J-35	1	0.09	458.64	28.64
Junc J-36	1	0.09	459.1	29.1
Junc J-37	1	0.09	459.49	29.49
Junc J-38	1	0.09	460.02	31.02
Junc J-39	1	0.09	460.43	31.43
Junc J-40	1	0.09	460.9	31.9
Junc J-41	1	0.09	461.36	32.36

Junc J-42	1	0.09	461.5	32.5
Junc J-43	1	0.09	462.01	34.01
Junc J-44	1	0.09	462.15	34.15
Junc J-45	1	0.09	461.88	33.88
Junc J-46	1	0.09	461.16	33.16
Junc J-47	1	0.09	460.7	32.7
Junc J-48	1	0.09	460.66	32.66
Junc J-49	1	0.09	460.65	32.65
Junc J-50	1	0.09	460.65	32.65
Junc J-51	1	0.09	460.65	32.65
Junc J-52	1	0.09	460.65	32.65
Junc J-53	1	0.09	460.17	31.17
Junc J-54	1	0.09	459.66	30.66
Junc J-55	1	0.09	459.45	30.45
Junc J-56	1	0.09	459.24	30.24
Junc J-57	1	0.09	459.03	29.03
Junc J-58	1	0.09	458.86	28.86
Junc J-59	1	0.09	458.67	28.67
Junc J-60	1	0.09	458.46	28.46
Junc J-61	1	0.09	458.26	28.26
Junc J-62	1	0.09	458.11	28.11
Junc J-63	1	0.09	457.94	27.94
Junc J-64	1	0.09	458.77	28.77
Junc J-65	1	0.09	458.94	28.94
Junc J-66	1	0.09	459.16	30.16
Junc J-67	1	0.09	459.41	30.41
Junc J-68	1	0.09	459.7	30.7
Junc J-69	1	0.09	459.79	30.79
Junc FH-1	0	0	462.27	34.27
Junc FH-2	0	0	461.83	33.83
Junc FH-3	0	0	461.36	33.36
Junc FH-4	0	0	460.56	30.56
Junc FH-5	0	0	459.85	29.85
Junc FH-6	0	0	458.77	28.77
Junc FH-7	0	0	457.74	27.74
Junc FH-8	0	0	454.48	23.48
Junc FH-9	170	15.04	452.78	21.78
Junc FH-10	0	0	456.11	25.11
Junc FH-11	0	0	456.35	25.35
Junc FH-12	0	0	457.16	27.16
Junc FH-13	0	0	458	28
Junc FH-14	0	0	458.86	28.86
Junc FH-15	0	0	459.74	30.74
Junc FH-16	0	0	460.66	31.66

Junc FH-17	0	0	461.43	32.43
Junc FH-19	0	0	460.76	32.76
Junc FH-20	0	0	460.66	32.66
Junc FH-21	0	0	460.65	32.65
Junc FH-22	0	0	459.82	30.82
Junc FH-23	0	0	459.34	30.34
Junc FH-24	0	0	458.95	28.95
Junc FH-25	0	0	458.77	28.77
Junc FH-26	0	0	458.35	28.35
Junc J-70	1	0.09	460.65	32.65
Junc J-71	1	0.09	458.75	28.75
Resvr 1	#N/A	-21.24	465	0

Network Table - Links				
Link ID	Length m	Diameter mm	Flow LPS	Velocity m/s
Pipe 1	163.75	100	3.94	0.5
Pipe 2	41.31	100	3.85	0.49
Pipe 3	41.09	100	3.85	0.49
Pipe 4	44.65	100	3.76	0.48
Pipe 5	46.76	100	3.67	0.47
Pipe 6	51.88	100	3.58	0.46
Pipe 7	95.1	100	3.58	0.46
Pipe 8	82.22	100	3.49	0.44
Pipe 9	41.85	100	3.49	0.44
Pipe 10	82.74	100	3.41	0.43
Pipe 11	42.6	100	3.32	0.42
Pipe 12	44.9	100	3.32	0.42
Pipe 13	139.72	100	3.23	0.41
Pipe 14	101.78	100	3.14	0.4
Pipe 15	39.79	100	3.14	0.4
Pipe 16	106.17	100	3.05	0.39
Pipe 17	145.32	100	2.96	0.38
Pipe 18	5.01	100	5.16	0.66
Pipe 19	41.56	100	5.16	0.66
Pipe 20	83.54	100	5.07	0.65
Pipe 21	86.46	100	4.98	0.63
Pipe 22	44.36	100	4.89	0.62
Pipe 23	158.02	100	4.81	0.61
Pipe 24	161.72	150	15.04	0.85
Pipe 25	6.55	100	-10.33	1.31
Pipe 26	178	150	-10.33	0.58
Pipe 27	133.04	150	-10.42	0.59
Pipe 28	42.74	150	-10.5	0.59
Pipe 29	43.05	150	-10.68	0.6
Pipe 30	80.22	150	-10.77	0.61
Pipe 31	41.07	150	-10.86	0.61
Pipe 32	41.27	150	-10.86	0.61
Pipe 33	82.22	150	-10.95	0.62
Pipe 34	41.3	150	-11.04	0.62
Pipe 35	44.78	150	-11.04	0.62
Pipe 36	78.32	150	-11.12	0.63
Pipe 37	41.57	150	-11.21	0.63
Pipe 38	45.88	150	-11.21	0.63
Pipe 39	71.36	150	-11.3	0.64
Pipe 40	47.02	150	-11.39	0.64

Pipe 41	49.7	150	-11.39	0.64
Pipe 42	73.82	150	-11.48	0.65
Pipe 43	41.69	150	-11.57	0.65
Pipe 44	43.29	150	-11.57	0.65
Pipe 45	79.78	150	-11.65	0.66
Pipe 46	12.42	150	-11.74	0.66
Pipe 47	12.33	150	-11.74	0.66
Pipe 48	87.05	150	-11.83	0.67
Pipe 49	36.83	150	-11.92	0.67
Pipe 53	30.11	100	5.12	0.65
Pipe 54	82.48	100	5.03	0.64
Pipe 55	48.14	100	4.94	0.63
Pipe 56	6.52	100	4.94	0.63
Pipe 57	28.25	100	0.8	0.1
Pipe 58	145.46	100	0.71	0.09
Pipe 59	44.87	100	0.62	0.08
Pipe 60	9.64	100	0.62	0.08
Pipe 61	93.42	100	0.26	0.03
Pipe 62	32.38	100	0.17	0.02
Pipe 63	32.43	100	0.09	0.01
Pipe 64	20.18	100	0	0
Pipe 65	4.11	100	0	0
Pipe 66	38.94	100	-0.09	0.01
Pipe 68	92.56	100	4.06	0.52
Pipe 69	61.36	100	3.97	0.51
Pipe 70	3.93	100	3.97	0.51
Pipe 71	49.02	100	2.75	0.35
Pipe 72	81.51	100	2.66	0.34
Pipe 73	42.07	100	2.57	0.33
Pipe 74	41.63	100	2.57	0.33
Pipe 75	86.99	100	2.48	0.32
Pipe 76	36.14	100	2.39	0.3
Pipe 77	44.32	100	2.39	0.3
Pipe 78	42.58	100	2.3	0.29
Pipe 79	8.99	100	2.3	0.29
Pipe 80	27.51	100	2.73	0.35
Pipe 81	81.98	100	2.64	0.34
Pipe 82	42.21	100	2.55	0.32
Pipe 83	36.78	100	2.55	0.32
Pipe 84	66.46	100	2.46	0.31
Pipe 85	79.95	100	2.37	0.3
Pipe 86	73.36	100	2.29	0.29
Pipe 87	12.17	100	1.13	0.14
Pipe 88	20.34	63	1.04	0.34

Pipe 89	77.46	63	0.96	0.31
Pipe 90	77.91	63	0.87	0.28
Pipe 91	84.76	63	0.78	0.25
Pipe 92	79.54	63	0.69	0.22
Pipe 95	20.4	63	-0.18	0.06
Pipe 96	12.18	100	-0.27	0.03
Pipe 67	12.44	150	10.68	0.6
Pipe 94	24.12	150	10.59	0.6
Pipe 97	13.34	150	10.5	0.59
Pipe 98	2.41	12	0	0
Pipe 93	12.18	100	-0.51	0.07
Pipe 99	13.78	63	-0.6	0.19
Pipe 100	280.19	100	-4.02	0.51
Pipe 50	235.38	150	17.22	0.97
Pipe 51	9.1	100	-5.21	0.66



Ray Road Subdivision Stage 1

Stormwater Management Plan

File No: 160-011

December 2024

Client:



CONMAT
CONSTRUCTION MATERIALS



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DOCUMENT ISSUE RECORD

Revision Code	Date Revised	Revision Details	Author	Checked	Approved
A	09/12/24	Stormwater Management Plan	MG	MF	JM

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APPENDIX A – Catchment Plan

APPENDIX B – Q100 & Q5 Design Sketches

APPENDIX C – Hydrological Analysis

APPENDIX D – Hydraulic Analysis

1 SUMMARY

1.1 DEVELOPMENT APPLICATION DETAILS

Proposed development:	Land development at Ray Road, Mareeba. Works include earthworks, road works, water connections, and stormwater drainage.
Type of approval sought:	Operational Works
Site address:	Ray Road Stage 1 , Mareeba
Real property description:	Lot 1 on RP747077
Site area:	37,602 m ²
Assessment manager:	Mareeba Shire Council
Owner details:	Conmat Pty Ltd
Applicant details:	Conmat Pty Ltd C/-ERSCON PTY. LTD. PO BOX 7890 CAIRNS QLD 4870

1.2 PLANNING INSTRUMENT DETAILS

Planning scheme:	Mareeba Shire Council Planning Scheme 2016
Zone:	Medium Density Residential
Local plan:	Nil
Level of assessment:	Code Assessment
Applicable codes:	Nil

1.3 REFERRAL AGENCIES

Referral agency and role

Nil

2 SITE DETAILS

2.1 SITE DESCRIPTION

The site is located off Wylandra Drive, Mareeba. This application seeks operational works approval to complete construction of a 18-lot land development as approved for re-configuration by Council.

Table 1: Site description

Site characteristic	Description
Existing land use	The existing land use has been a vacant lot.
Existing structures	There are existing intersections at Ray Road and Cater Road. Existing drainage overland drains are also present to the East of Ray Road.
Frontage and access	Access will be provided via Ray Road.
Topography and views	The elevation change is 3m from RL 431.0m to 428.0m and slopes from the South-East towards the North-West at a grade of 0.5%.
Existing vegetation	The lot is predominantly trees with open grassed areas and other vegetation.
Existing waterways	Drainage pathways are located along the East of Ray Road and discharge into a drainage easement near the north boundary. These then flow from West to East towards the Kennedy Highway.

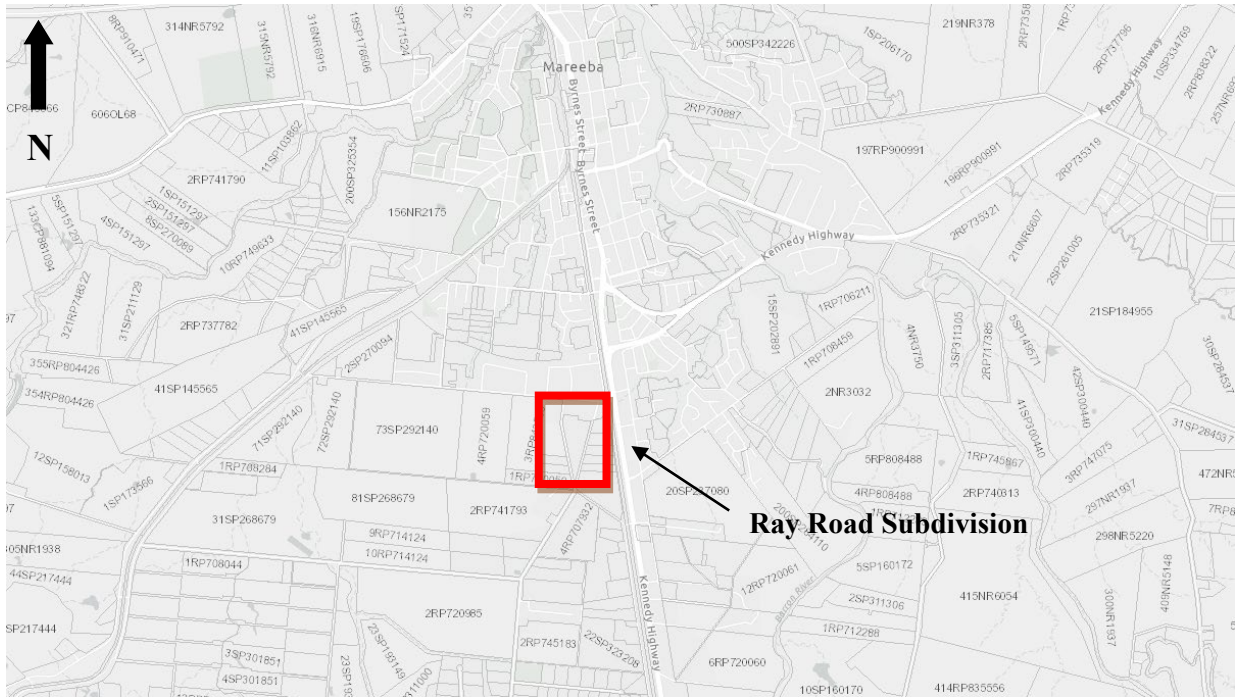


Figure 1: Aerial View of Site Identification
Source: DA Mapping System



Figure 2: Satellite View of Site Identification
Source: QLD Globe

2.2 SURROUNDING LAND USES

Table 2: Surrounding land uses

Surrounding land uses	
North	Existing residential area
South	Existing residential area and farmland
East	Existing residential area and farmland
West	Existing residential area and farmland

3 STORMWATER MANAGEMENT PLAN

3.1 DESIGN METHOD

The stormwater design has been carried out using the Rational Method, in accordance with the Queensland Urban Drainage Manual (QUDM).

In accordance with the QUDM recommendations, the major system design has been calculated based on a 100-year recurrence interval (1 in 100 ARI / 1% AEP), using overland flow and the minor system design has been calculated based on a 18-year recurrence interval (1 in 18 year / 5% AEP), using an underground network system.

Runoff has been calculated using IFD Chart 18 of the FNQROC Development Manual. Runoff Coefficients have been determined in accordance with QUDM.

3.2 CATCHMENT AREAS

The catchment areas contributing to the drainage system are directed from the overland flow of the lots within Stage 1 and the existing lots located to the western side of Ray Road. Also contributing to the drainage are the minor catchments located within the drainage reserve of Ray Road and Road B.

The system has not been designed to accept any external drainage from the southern catchments which flow towards the intersection of Ray and Cater Road. This was discussed and agreed between council Sam Wakeford, Paul Steele (engineering drainage representative for MSC) and ERSCON at the Drainage meeting held at the Kowa Deport on the 24 October, 2024. (Refer Appendix A – Figure 1 – Catchment Plan).

As mentioned at the meeting, these external flows will be directed towards the TMR drainage reserve near the rail tracks and McIver Road.

- Catchment A will be directed off site and will not be contributing to any flows within the Stage 1 system.
- Catchment B contributes to Cater Road and is directed to the north and will not be contributing to any flows within the Stage 1 system.
- Catchment C flows are directed to the eastern side of Stage 1 and at the northern end of Ray Road. Culverts under Ray Road direct flows to an intersecting chamber on the eastern side and directed to the Headwall 1/1 to the drainage reserve.

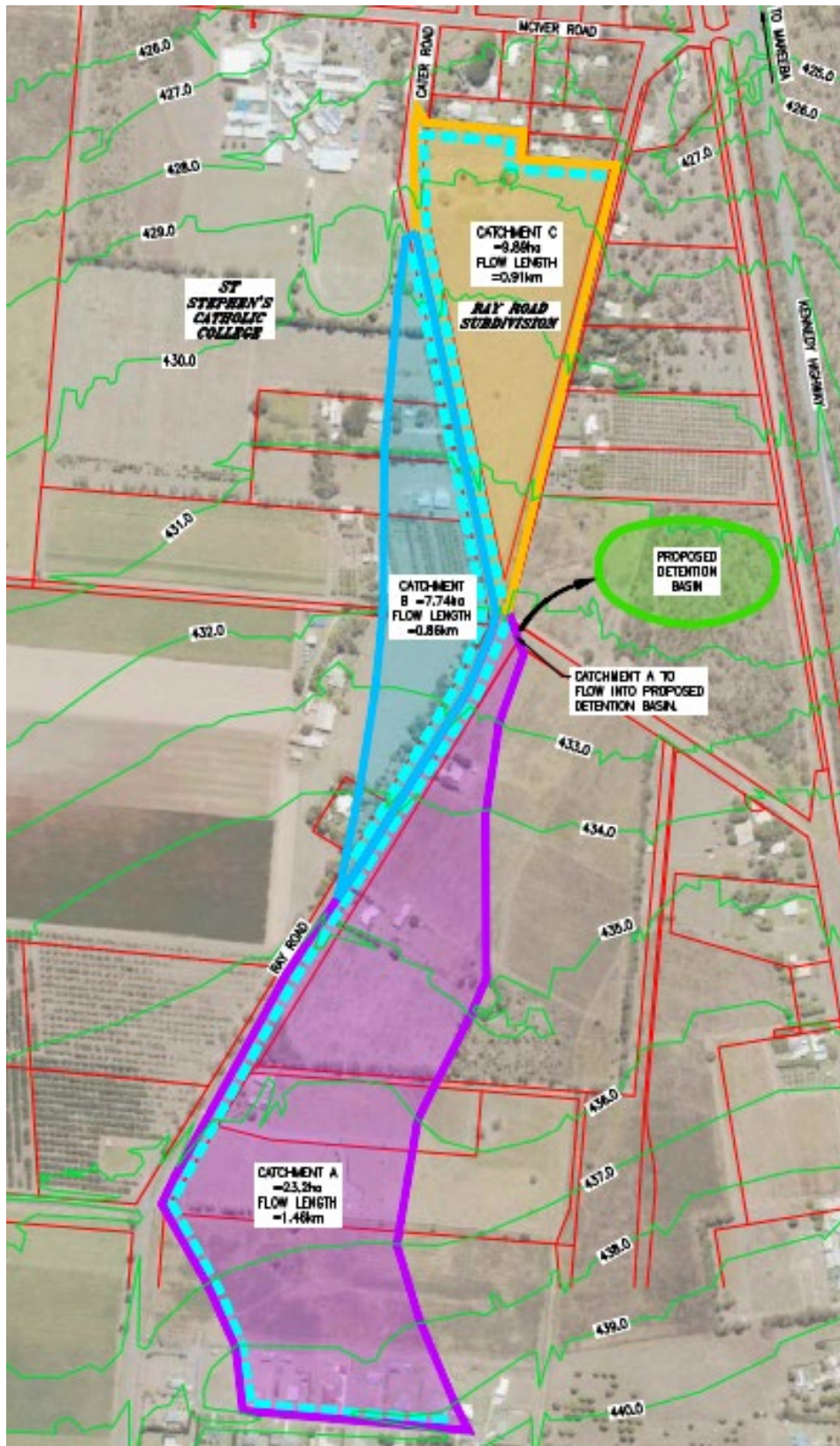


Figure 1 - Catchment Areas for Ray Road Subdivision

3.3 HYDROLOGICAL DESIGN PHILOSOPHY

The major drainage system consists of an underground stormwater network which outflows into an existing drainage easement located on the eastern side of Ray Road. The contributions for inter lot drainage and the road network, will be diverted towards the underground system and outflow into the open drainage easement.

Coefficients of Discharge have been determined in accordance with Section 4.5 of QUDM assuming an Urban Residential – Low Density (Including roads) Development Category. Rainfall intensities have been obtained from BOM IFD rainfall charts and IFD Chart 18 from FNQROC Section D4 Appendix A.

Times of Concentration have been determined in accordance with Section 4.6 of QUDM.

The Hydrological Analysis undertaken including the catchment areas are shown in the calculation tables contained in Appendix D.

3.3.1 Hydrological Analysis

Stream velocities and volumes were calculated for the catchment for AEP values of 63%, 39%, 18%, 10%, 5%, 2%, 1% and 0.5%. Accumulated values were then determined when flow paths converged as they descended through the catchment.

Catchment C flow volumes were determined as 1.54m³/s and a velocity of 2.83m/s for the 5% AEP and 2.18m³/s and 3.24m/s for the 1% AEP. (Refer Appendix D - Hydrological Analysis).

3.4 MAJOR DRAINAGE

The site uses an underground network to channel the flow to the legal point of discharge located at the North-West boundary. The major drainage system has a capacity of Q100.

3.5 MINOR DRAINAGE

The minor drainage system involves an underground stormwater system. The minor drainage system has a capacity of Q5.

3.5.1 Stormwater Network

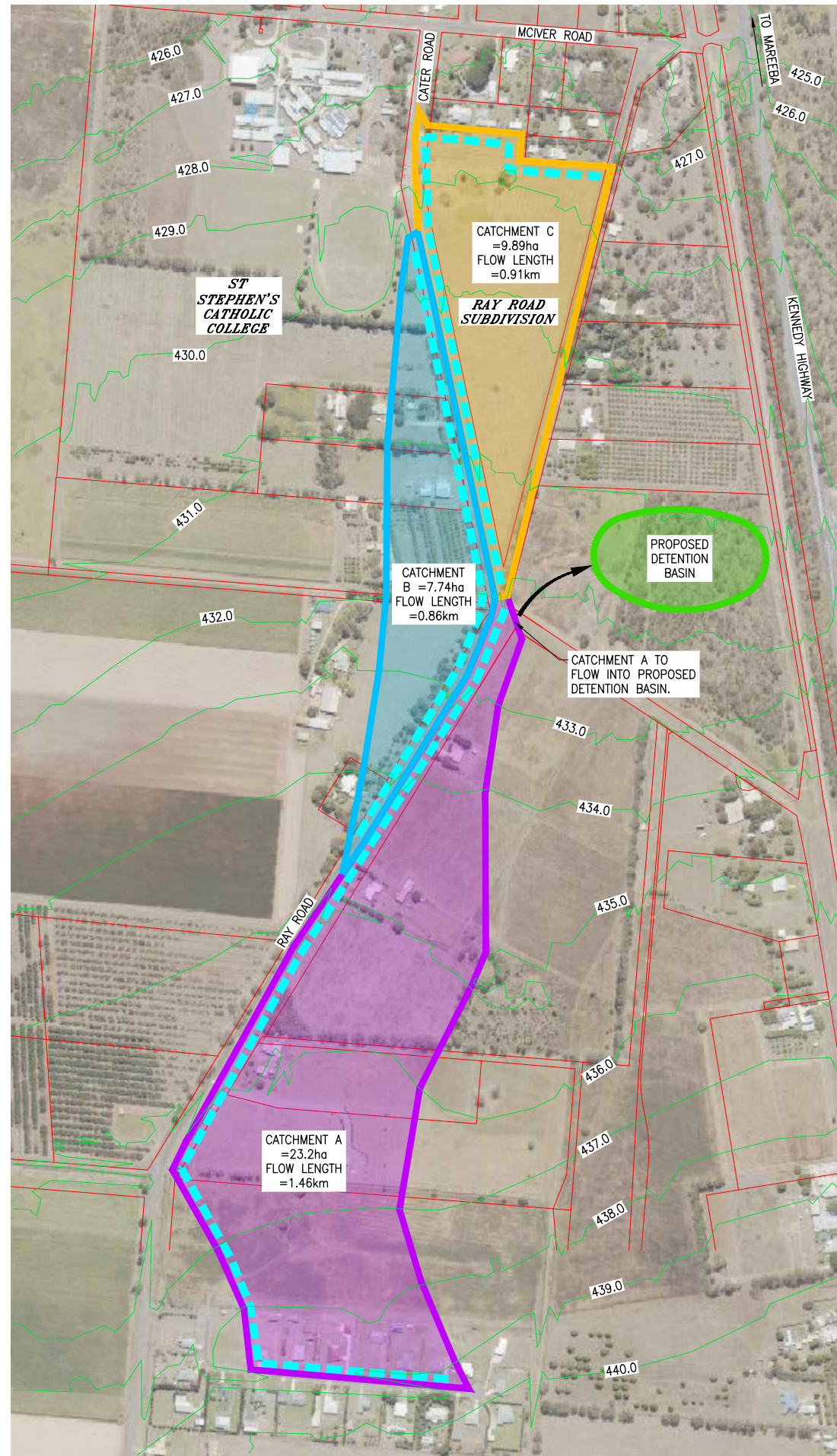
In accordance with the requirements of FNQROC, the minor drainage system has been designed for a maximum recurrence interval of 5 years (18% AEP). The runoff will be carried by the network system and discharged into the existing drainage easement.

Depth by velocity calculations for half the road flow have been undertaken and all drains produce satisfactory results regarding pedestrian safety.



APPENDIX A

Catchment Area



LEGEND

- EXISTING PROPERTY BOUNDARY
- 1.0 EXISTING MAJOR CONTOURS (1.0m INTERVAL)
- - - FLOW PATH

EXTERNAL CATCHMENT CALCULATIONS

CATCHMENT	A (ha)	Tc (min)	Fi	C10	INT10 (mm/h)	INT100 (mm/h)	Q10 (m³/s)	Q100 (m³/s)
A	23.3	70	0.1	0.675	58.43	82.02	2.54	4.28
B	7.74	51	0.1	0.675	70.76	99.24	1.03	1.73
C	9.89	52	0.1	0.675	69.95	98.11	1.30	2.18

NOTES:

1. CATCHMENT CALCULATIONS ARE ALL "PRE-DEVELOPMENT".

**PRELIMINARY
NOT FOR CONSTRUCTION**

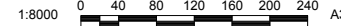
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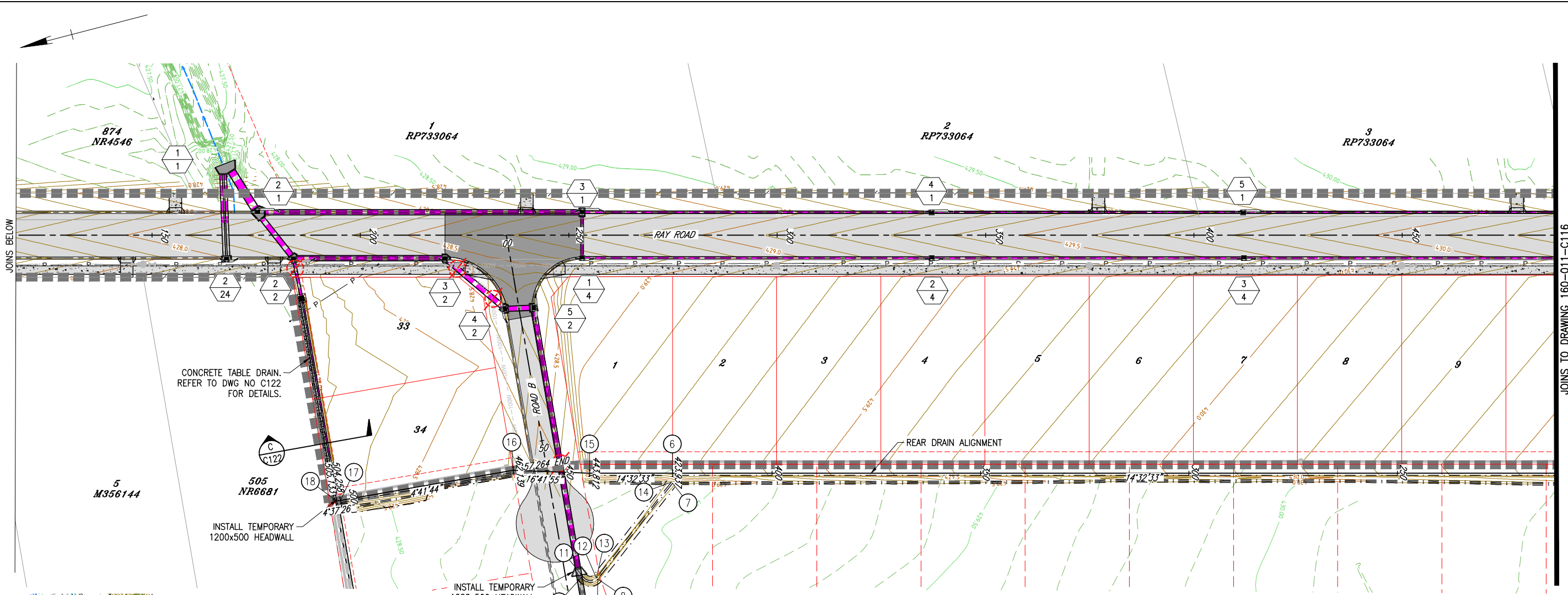
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DRAWING REF	CATCHMENT PLAN		
DRAWING NO	160-009-SK002	SIZE	A3
REVISION			1



APPENDIX B

Q100 & Q5 Design Sketches

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REAR LOT INTERFACE DRAIN

SETOUT POINT	CHAINAGE	EASTING	NORTHING	BEARING
6	423.937	332169.064	8117536.207	14°32'33.34"
15	443.812	332174.054	8117555.445	14°32'33.33"
16	462.139	332179.321	8117573.000	16°41'54.96"
17	504.258	332182.769	8117614.977	4°41'43.83"
18	505.133	332182.839	8117615.850	4°37'26.43"

OFFSET DRAIN TO HEADWALL

SETOUT POINT	EASTING	NORTHING	HEIGHT
7	332166.722	8117536.815	428.848
8	332148.973	8117559.900	428.690
9	332148.970	8117559.965	428.696
10	332150.373	8117563.589	428.528
11	332167.039	8117537.058	428.848
12	332149.316	8117560.177	428.690
13	332149.311	8117560.174	428.696
14	332150.489	8117563.206	428.528

STORMWATER STRUCTURE SETOUT

PIT NO.	EASTING	NORTHING
1-22	332317.918	8117761.975
1-25	332286.722	8117769.328
1-26	332294.758	8117790.983
2-22	332297.110	8117765.711
2-24	332245.832	8117626.838
3-22	332271.876	8117683.432
4-22	332261.209	8117686.117
1-1	332265.583	8117621.723
2-1	332254.628	8117616.943
2-2	332241.812	8117611.278
3-2	332232.669	8117576.102
4-2	332217.265	8117565.123
5-2	332215.861	8117558.568
1-4	332224.405	8117544.244
3-1	332235.053	8117541.482
4-1	332213.707	8117460.392
1-5	332203.457	8117462.973
5-1	332194.948	8117388.071
1-6	332184.860	8117390.688

LEGEND

- STAGE BOUNDARY
- EXISTING PROPERTY BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- FUTURE PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- ROAD CENTRELINE
- 51.0 PROPOSED DESIGN CONTOUR MAJOR
- 51.0 PROPOSED DESIGN CONTOUR MINOR
- 51.0 EXISTING CONTOUR MAJOR
- 51.0 EXISTING CONTOUR MINOR
- PROPOSED BATTER
- PROPOSED STORMWATER PIPE
- FUTURE STORMWATER PIPE
- SERVICE CROSSINGS
- SW EXISTING STORMWATER
- EXISTING HEADWALL AND PIPE
- NEW HEADWALL WITH GRATED INLET
- NEW MANHOLE
- STRUCTURE NAME

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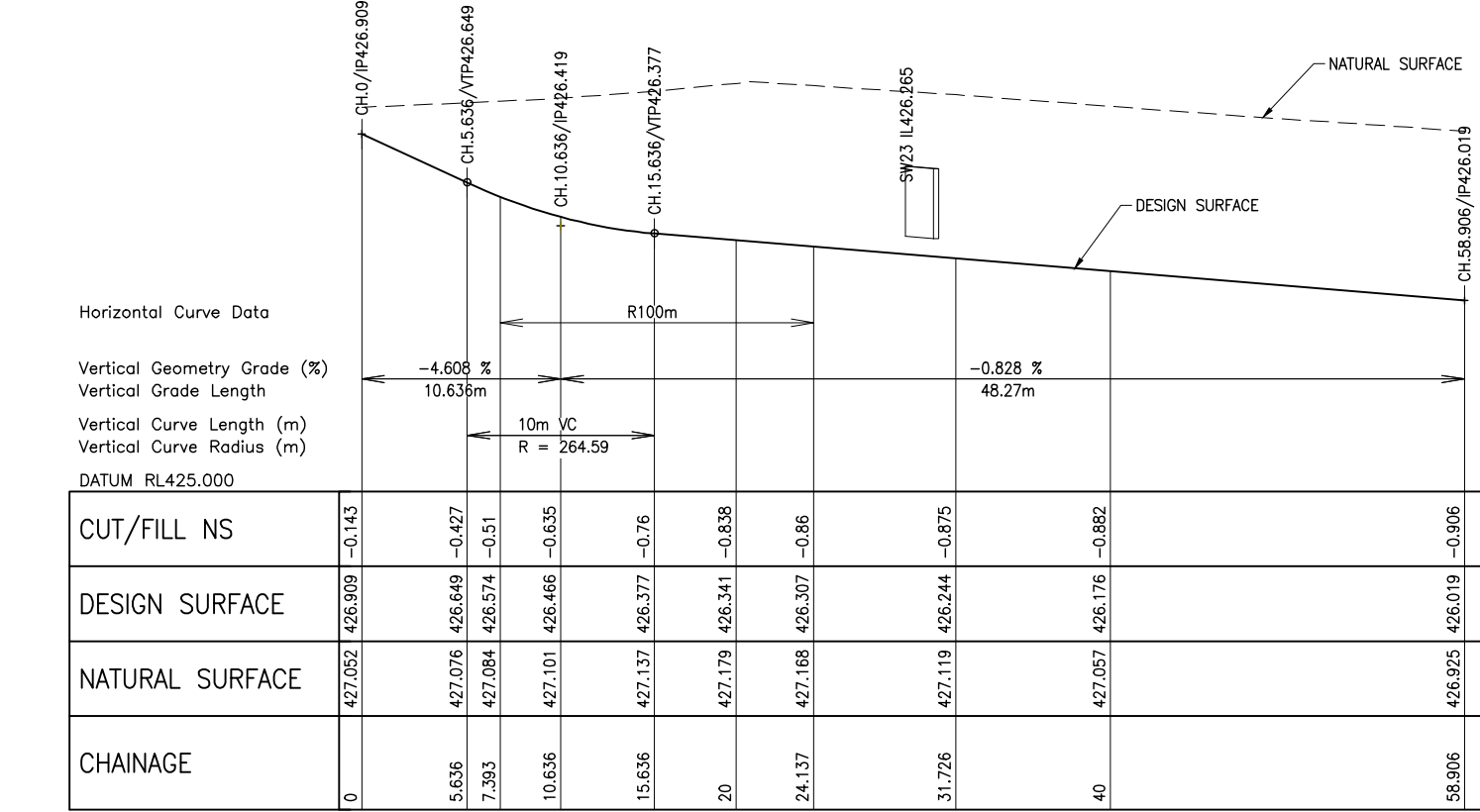
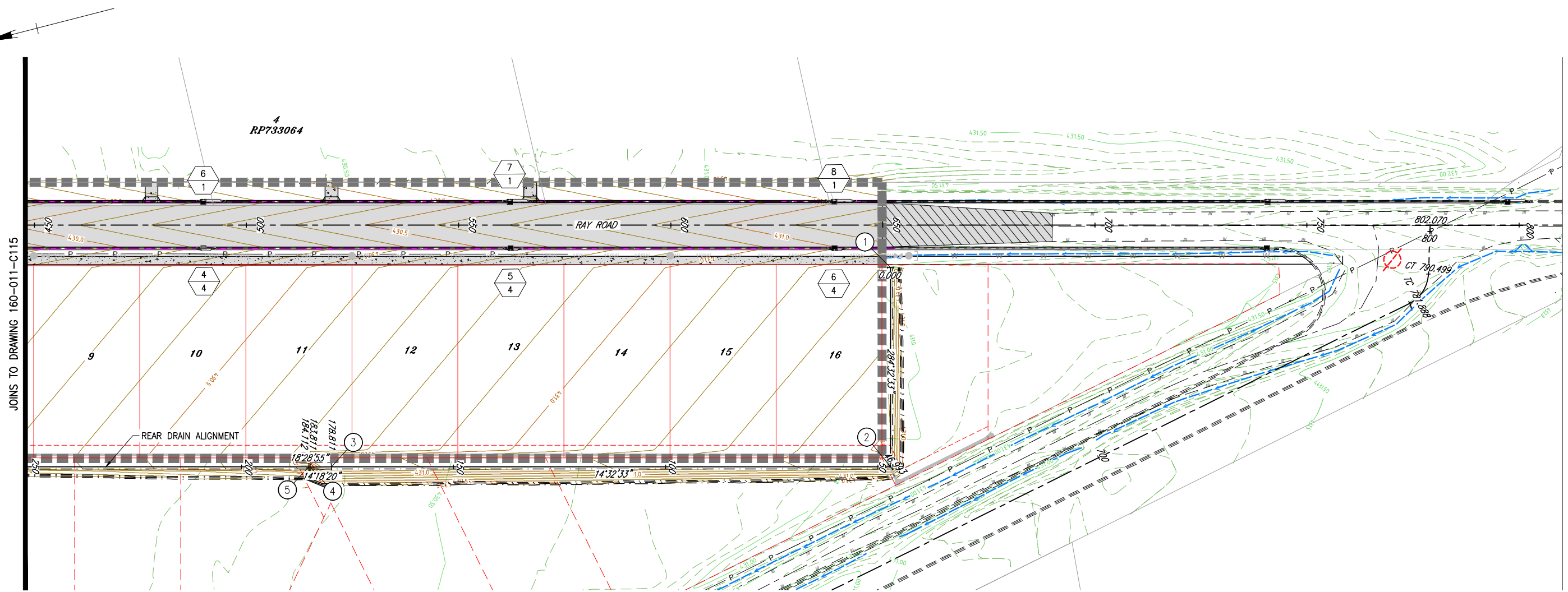
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Horizontal Curve Data
 Vertical Geometry Grade (%)
 Vertical Grade Length
 Vertical Curve Length (m)
 Vertical Curve Radius (m)
 DATUM RL425.000

CUT/FILL NS	0	5.636	7.393	10.636	15.636	20	24.137	31.726	40	58.906
DESIGN SURFACE	426.909	426.649	426.574	426.466	426.377	426.341	426.307	426.244	426.176	426.019
NATURAL SURFACE	427.052	427.076	427.084	427.101	427.137	427.179	427.168	427.119	427.057	426.925
CHAINAGE	0	5.636	7.393	10.636	15.636	20	24.137	31.726	40	58.906

LONGITUDINAL SECTION - V DRAIN

REAR LOT INTERFACE DRAIN

SETOUT POINT	CHAINAGE	EASTING	NORTHING	BEARING
1	0.000	332119.901	8117159.541	284°32'33.33"
2	46.993	332074.414	8117171.341	284°32'33.33"
3	178.811	332107.513	8117298.936	14°32'33.33"
4	183.811	332108.749	8117303.781	18°28'55.22"
5	184.112	332108.844	8117304.066	18°28'55.22"

V DRAIN SETOUT

CHAINAGE	EASTING	NORTHING	BEARING
0.000	332295.105	8117741.084	42°48'13.40"
24.137	332312.479	8117757.786	42°48'13.40"
31.726	332318.491	8117762.416	52°23'51.76"
58.906	332341.797	8117776.400	59°02'06.06"

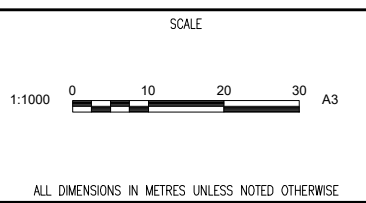
STORMWATER STRUCTURE SETOUT

PIT NO.	EASTING	NORTHING
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4-4	332165.011	8117315.178
7-1	332157.507	8117242.552
5-4	332146.814	8117245.137
8-1	332138.303	8117168.517
6-4	332127.665	8117171.204

- LEGEND**
- STAGE BOUNDARY
 - EXISTING PROPERTY BOUNDARY
 - PROPOSED PROPERTY BOUNDARY
 - FUTURE PROPERTY BOUNDARY
 - EASEMENT BOUNDARY
 - ROAD CENTRELINE
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 - 51.0 EXISTING CONTOUR MINOR
 - PROPOSED BATTER
 - PROPOSED STORMWATER PIPE
 - FUTURE STORMWATER PIPE
 - SERVICE CROSSINGS
 - SW --- EXISTING STORMWATER
 - EXISTING HEADWALL AND PIPE
 - NEW HEADWALL WITH GRATED INLET
 - NEW MANHOLE
 - STRUCTURE NAME

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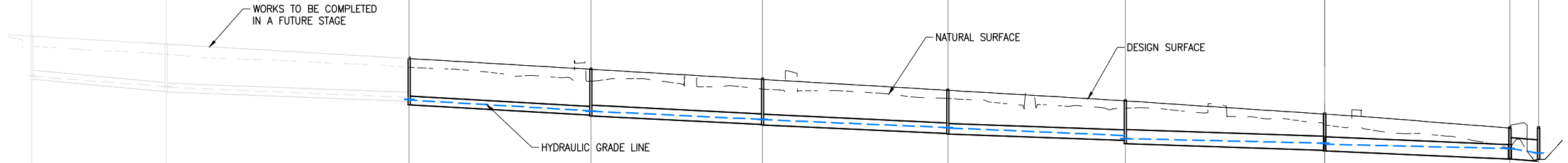


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STRUCTURE NAME	10-1	9-1	8-1	7-1	6-1	5-1	4-1	3-1	2-1	1-1	
STRUCTURE DESCRIPTION	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	FNOROC GRATED KERB INLET PIT L.L.L: 4.8m Lintel - ON GRADE	HEADWALL

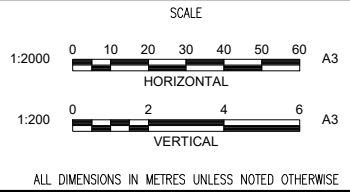


PIPE SIZE (mm)		375	375	375	450	450	450	600x600	1200x600	1800x900	
PIPE CLASS		2	2	2	2	2	2	BC	BC	BC	
PIPE GRADE (%)		0.92%	0.38%	0.57%	0.50%	0.46%	0.35%	0.34%	0.43%	0.76%	
PIPE SLOPE (1 in X)		108.9	266.2	176.9	199.9	215.9	285.2	297.3	230.0	131.9	
PIPE FLOW (cumecs)		0.046	0.076	0.094	0.108	0.120	0.133	0.144	0.559	1.615	
CAPACITY FLOW (cumecs)		0.214	0.137	0.168	0.257	0.247	0.215	0.453	1.249	4.863	
FULL PIPE VELOCITY (m/s)		0.33	0.54	0.67	0.53	0.59	0.66	0.40	0.78	1.00	
NORMAL DEPTH VELOCITY (m/s)		1.20	1.00	1.23	1.21	1.21	1.12	1.12	1.68	2.64	
DATUM RL		413.000							411.000		
HGL ELEVATION		430.255 (431.499)	430.218 (430.103)	429.341 (430.608)	429.254 (429.020)	428.774 (430.023)	428.761 (428.558)	428.730 (428.881)	427.408 (427.101)	427.412 (427.081)	427.362 (426.742)
DEPTH TO INVERT				1.797 (1.957)	1.902 (1.922)	1.822 (1.852)	1.822 (1.852)	1.667 (1.807)	1.533 (1.553)	1.300 (1.300)	0.065 (-0.008)
INVERT LEVEL OF DRAIN				429.180 (429.020)	428.196 (428.176)	428.115 (427.785)	428.067 (427.785)	427.730 (427.383)	427.412 (427.101)	427.117 (426.742)	426.650 (426.721)
DESIGN (& EXISTING) SURFACE LEVEL		431.921 (431.499)		429.978 (430.608)	428.588 (430.023)	428.761 (429.297)	428.049 (427.785)	427.598 (427.383)	427.412 (427.081)	427.177 (426.742)	426.990 (426.721)
CHAINAGE		56.559	102.182	158.741	235.226	307.480	385.484	460.199	544.051	622.015	634.150

LINE 1

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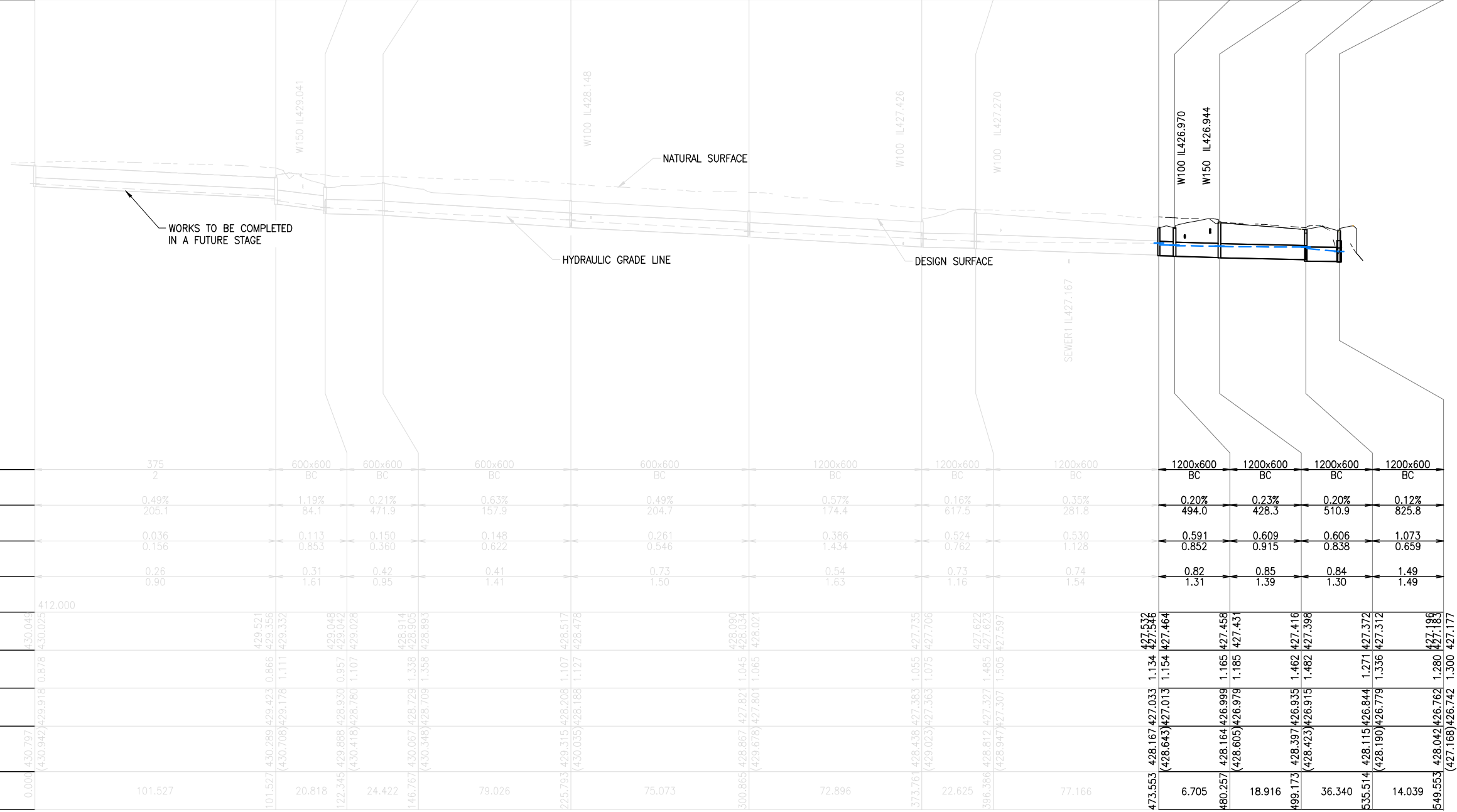
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A	27/09/24	FOR COUNCIL APPROVAL		



DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL		DATE: RPEC:	

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 1 OF 5)		
DRAWING NO	160-011-C117	SIZE	A3
		REVISION	A

STRUCTURE NAME	13-2
STRUCTURE DESCRIPTION	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	12-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	11-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	10-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	9-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	8-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	7-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	6-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 2.4m Lintel - ON GRADE
	5-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - SAG
	4-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - SAG
	3-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - ON GRADE
	2-2
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - ON GRADE
	2-1
	FNOROC GRATED KERB INLET PIT L.L.I.; 4.8m Lintel - ON GRADE

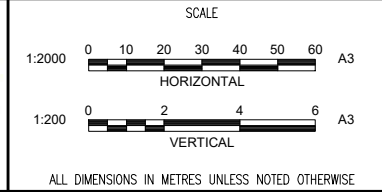


PIPE SIZE (mm)	375	600x600	600x600	600x600	600x600	1200x600	1200x600	1200x600	1200x600	1200x600	1200x600	1200x600	1200x600																																																					
PIPE CLASS	2	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC	BC																																																					
PIPE GRADE (%)	0.49%	1.19%	0.21%	0.63%	0.49%	0.57%	0.16%	0.35%	0.20%	0.23%	0.20%	0.12%																																																						
PIPE SLOPE (1 in X)	205.1	84.1	471.9	157.9	204.7	174.4	617.5	281.8	494.0	428.3	510.9	825.8																																																						
PIPE FLOW (cumecs)	0.036	0.113	0.150	0.148	0.261	0.386	0.524	0.530	0.591	0.609	0.606	1.073																																																						
CAPACITY FLOW (cumecs)	0.156	0.853	0.360	0.622	0.546	1.434	0.762	1.128	0.852	0.915	0.838	0.659																																																						
FULL PIPE VELOCITY (m/s)	0.26	0.31	0.42	0.41	0.73	0.54	0.73	0.74	0.82	0.85	0.84	1.49																																																						
NORMAL DEPTH VELOCITY (m/s)	0.90	1.61	0.95	1.41	1.50	1.63	1.16	1.54	1.31	1.39	1.30	1.49																																																						
DATUM RL	412.000																																																																	
HGL ELEVATION	430.045	430.025	429.521	429.356	429.048	428.914	428.090	427.735	427.532	427.536	427.464	427.458	427.431	427.416	427.398	427.372	427.312	427.186	427.186																																															
DEPTH TO INVERT	0.000	0.878	0.866	1.111	0.957	1.338	1.045	1.065	1.134	1.154	1.165	1.185	1.462	1.482	1.271	1.336	1.280	1.300	1.300																																															
INVERT LEVEL OF DRAIN	430.797	429.918	428.423	428.178	428.780	428.729	427.821	427.363	427.033	427.013	426.999	426.979	426.915	426.915	426.844	426.779	426.762	426.742	426.742																																															
DESIGN (& EXISTING) SURFACE LEVEL	430.000	430.942	430.289	429.178	429.042	430.067	428.667	428.023	428.643	427.643	428.164	428.605	428.423	428.115	428.190	428.042	428.042	427.186	427.186																																															
CHAINAGE	0.000	101.527	20.818	24.422	79.026	225.793	429.315	428.208	1.107	428.517	428.478	300.865	428.867	427.821	1.045	428.034	428.021	72.896	373.761	428.438	427.383	1.055	427.735	427.706	22.625	396.386	428.812	427.327	1.485	427.623	427.622	427.597	473.553	428.167	427.033	1.134	427.532	427.536	6.705	480.257	428.164	426.999	1.165	427.458	427.458	18.916	499.173	428.397	426.915	1.462	427.416	427.416	36.340	535.514	428.115	426.844	1.271	427.372	427.372	14.039	549.553	428.042	426.762	1.280	427.186	427.186

LINE 2

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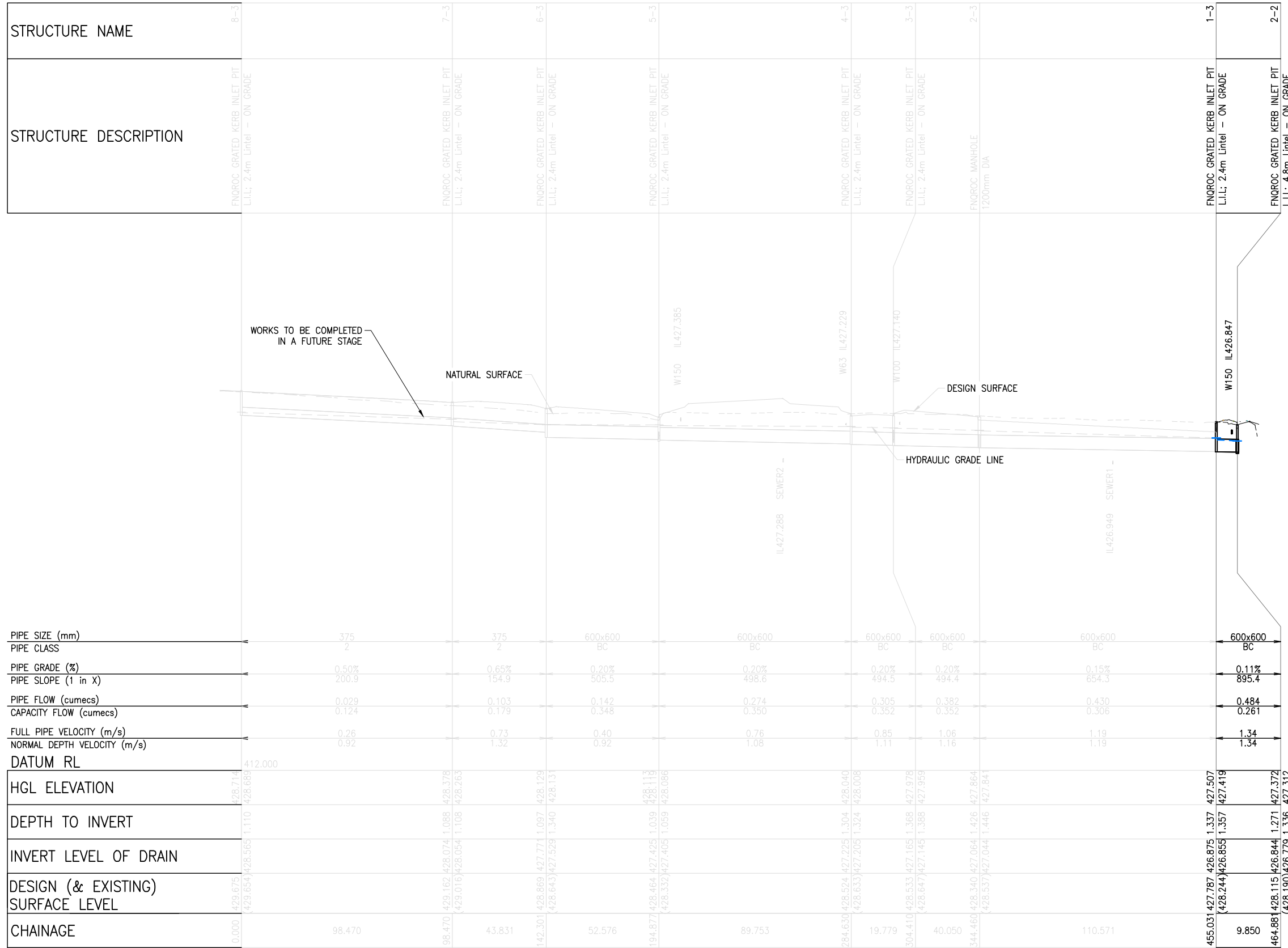
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CIVIL SIGNOFF APPROVAL			
DATE:	RPEG:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 2 OF 5)		
DRAWING NO	160-011-C118	SIZE	A3
		REVISION	A

PLOT DATE: 11/2024 11:16:28 AM
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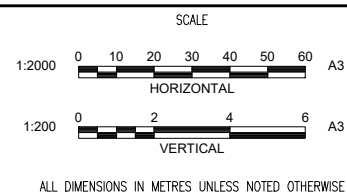


LINE 3

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FOR COUNCIL APPROVAL

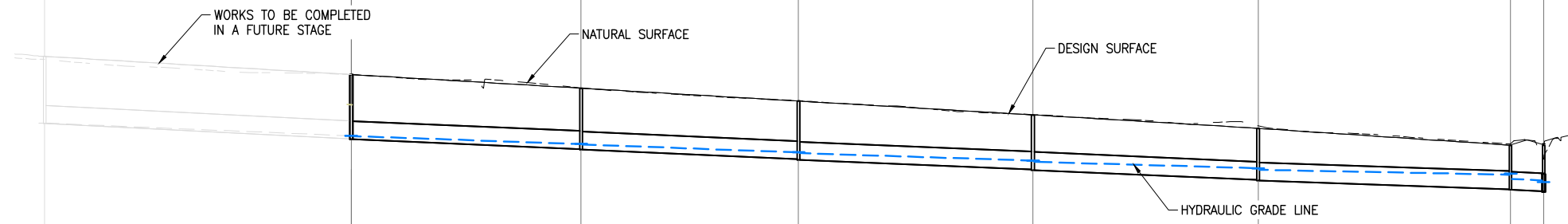
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DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:		RPEC:	

PROJECT REF	CONMAT PTY LTD	
	RAY ROAD SUBDIVISION STAGE 1	
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 3 OF 5)	
DRAWING NO	160-011-C119	SIZE A3
		REVISION A

STRUCTURE NAME	7-4
STRUCTURE DESCRIPTION	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	6-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	5-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	4-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	3-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	2-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	1-4
	FNOROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE
	3-1
	FNOROC GRATED KERB INLET PIT L.I.L.; 4.8m Lintel - ON GRADE

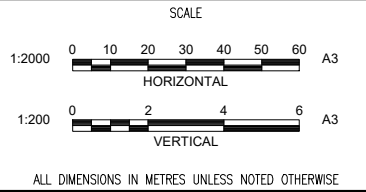


PIPE SIZE (mm)	600x600	600x600	600x600	600x600	600x600	600x600	600x600	600x600
PIPE CLASS	BC	BC	BC	BC	BC	BC	BC	BC
PIPE GRADE (%)	0.49%	0.42%	0.44%	0.41%	0.43%	0.35%	0.45%	
PIPE SLOPE (1 in X)	203.9	238.7	225.8	243.6	230.4	289.3	220.0	
PIPE FLOW (cumecs)	0.005	0.066	0.134	0.199	0.273	0.340	0.404	
CAPACITY FLOW (cumecs)	0.647	0.598	0.615	0.592	0.609	0.543	0.623	
FULL PIPE VELOCITY (m/s)	0.01	0.18	0.37	0.55	0.76	0.94	1.12	
NORMAL DEPTH VELOCITY (m/s)	0.42	1.07	1.36	1.48	1.65	1.59	1.84	
DATUM RL	414.000	413.000						
HGL ELEVATION		428.945	428.674	428.395	428.124	427.869	427.612	427.362
DEPTH TO INVERT		2.132	2.020	1.933	1.812	1.710	1.463	1.533
INVERT LEVEL OF DRAIN		428.828	428.486	428.146	427.806	427.461	427.151	427.081
DESIGN (& EXISTING) SURFACE LEVEL	431.581	428.846	428.506	428.166	427.826	427.481	427.171	427.101
CHAINAGE	0.000	101.932	178.305	250.570	328.536	403.402	487.312	498.312

LINE 4

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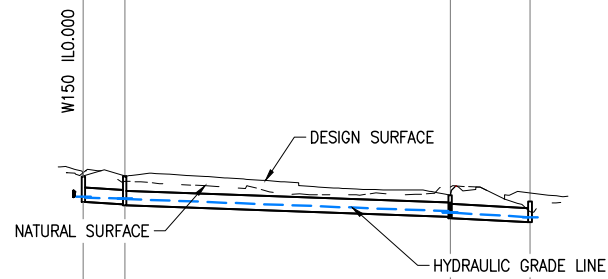


DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEG:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 4 OF 5)		
DRAWING NO	160-011-C120	SIZE	A3
		REVISION	A

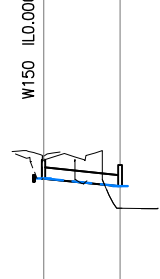
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STRUCTURE NAME	4-22	3-22	2-22	1-22
STRUCTURE DESCRIPTION	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - SAG	HEADWALL



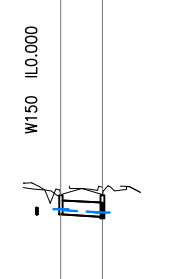
PIPE SIZE (mm)	375	375	375x375
PIPE CLASS	2	2	2
PIPE GRADE (%)	0.55%	0.35%	0.53%
PIPE SLOPE (1 in X)	183.3	282.2	190.4
PIPE FLOW (cumecs)	0.025	0.040	0.057
CAPACITY FLOW (cumecs)	0.130	0.104	0.162
FULL PIPE VELOCITY (m/s)	0.22	0.36	0.41
NORMAL DEPTH VELOCITY (m/s)	0.90	0.88	1.05
DATUM RL	411.000		
HGL ELEVATION	427.027 427.002	426.989 426.989 426.989	426.644 426.614 426.606
DEPTH TO INVERT	0.677	0.736	0.567
INVERT LEVEL OF DRAIN	426.890	426.830	426.461
DESIGN (& EXISTING) SURFACE LEVEL	427.567 (427.666)	427.566 426.830 427.436	427.067 426.500 427.286
CHAINAGE	0.000 11.000	11.000 86.074	97.074 21.138 118.213

STRUCTURE NAME	2-24	24-1
STRUCTURE DESCRIPTION	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - ON GRADE	HEADWALL



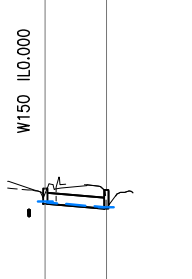
PIPE SIZE (mm)	600x300
PIPE CLASS	BC
PIPE GRADE (%)	0.99%
PIPE SLOPE (1 in X)	101.4
PIPE FLOW (cumecs)	0.003
CAPACITY FLOW (cumecs)	0.700
FULL PIPE VELOCITY (m/s)	0.01
NORMAL DEPTH VELOCITY (m/s)	0.35
DATUM RL	411.000
HGL ELEVATION	427.513
DEPTH TO INVERT	0.486
INVERT LEVEL OF DRAIN	427.504
DESIGN (& EXISTING) SURFACE LEVEL	427.990 (428.104)
CHAINAGE	20.277 20.277

STRUCTURE NAME	1-25	2-22
STRUCTURE DESCRIPTION	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - SAG	FNQROC GRATED KERB INLET PIT L.I.L.; 2.4m Lintel - SAG



PIPE SIZE (mm)	375
PIPE CLASS	2
PIPE GRADE (%)	0.50%
PIPE SLOPE (1 in X)	200.0
PIPE FLOW (cumecs)	0.025
CAPACITY FLOW (cumecs)	0.124
FULL PIPE VELOCITY (m/s)	0.23
NORMAL DEPTH VELOCITY (m/s)	0.88
DATUM RL	411.000
HGL ELEVATION	426.695 426.669
DEPTH TO INVERT	0.516
INVERT LEVEL OF DRAIN	426.558
DESIGN (& EXISTING) SURFACE LEVEL	427.071 (427.092)
CHAINAGE	11.000 11.000

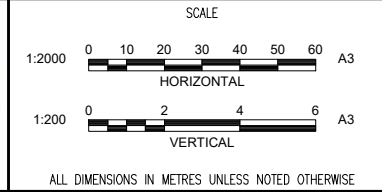
STRUCTURE NAME	2-26	1-26
STRUCTURE DESCRIPTION	HEADWALL	HEADWALL



PIPE SIZE (mm)	600x300
PIPE CLASS	BC
PIPE GRADE (%)	0.79%
PIPE SLOPE (1 in X)	127.4
PIPE FLOW (cumecs)	0.018
CAPACITY FLOW (cumecs)	0.312
FULL PIPE VELOCITY (m/s)	0.10
NORMAL DEPTH VELOCITY (m/s)	0.82
DATUM RL	411.000
HGL ELEVATION	426.903 426.880
DEPTH TO INVERT	0.414
INVERT LEVEL OF DRAIN	426.835
DESIGN (& EXISTING) SURFACE LEVEL	427.115 (427.055)
CHAINAGE	16.174 16.174

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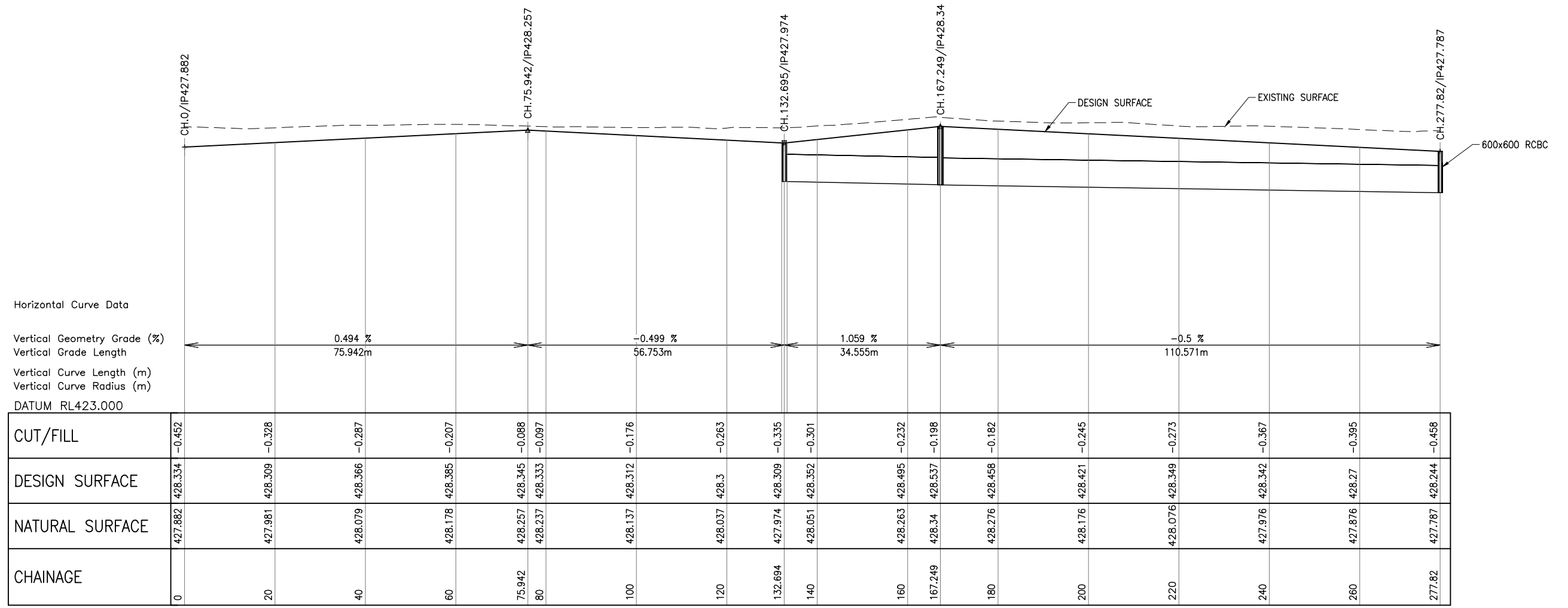
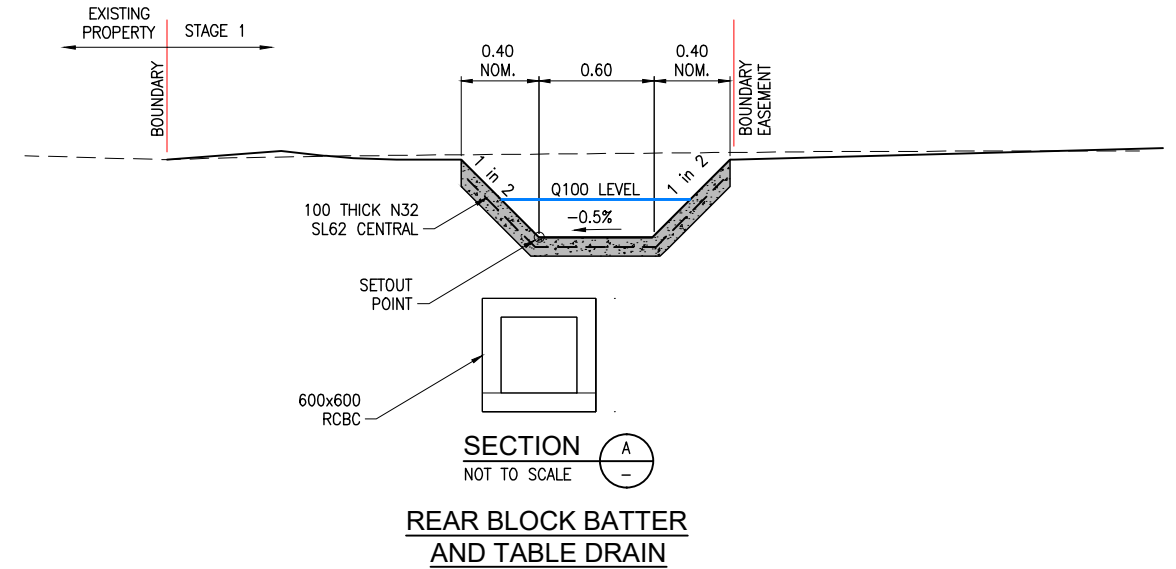
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A	30/09/24	FOR COUNCIL APPROVAL		



DRAWN	MG	DESIGNED	MF
DRAWN APPROVED	MF	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEC:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	DRAINAGE LONGITUDINAL SECTION (SHEET 5 OF 5)		
DRAWING NO	160-011-C121	SIZE	A3
		REVISION	A

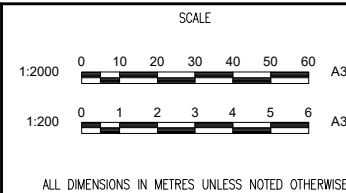
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LONGITUDINAL SECTION - REAR DRAIN
SCALE 1:2000H 200V

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NO.	DATE	DESCRIPTION	DESIGN	APPROVED
A	27/09/24	FOR COUNCIL APPROVAL		



DRAWN	MF	DESIGNED	MF
DRAWN APPROVED	JM	DESIGN APPROVED	JM
CIVIL SIGNOFF APPROVAL			
DATE:	RPEC:		

PROJECT REF	CONMAT PTY LTD		
	RAY ROAD SUBDIVISION STAGE 1		
DRAWING REF	REAR DRAIN LONGITUDINAL SECTION		
DRAWING NO	160-011-C122	SIZE	A3
		REVISION	A



APPENDIX C

Hydrological Analysis



APPENDIX D

Hydraulic Analysis

JOB NO: 160-009
JOB: Ray Road Stormwater
TITLE : Catchment C
DATE: 10/10/2024



Time of concentration Calculation
 (Using Bransby-Williams' Equation)

Proportionality Factor P= 58 (for Ha)

Length of Flow Path L= 0.910 km
 Top of Catchment (RL) RL = 432 m
 Area of Catchment A = 9.89 Ha

Catchment Profile 428.2 [to utilise graph area better]

Chainage	RL	RL	Area under Graph (m ²)
0	428.2	0	----
250	428.5	0.3	38
500	430	1.8	263
750	431	2.8	575
750	431	2.8	0
750	431	2.8	0
750	431	2.8	0
750	431	2.8	0
750	431	2.8	0
910	432.0	3.8	528

Average Slope Calculation	
Outlet Chainage	0
Catchment length	910
Outlet RL	0
Top RL (Av Slope)	3.1

$$T_c = \frac{P \times L}{(A \wedge 0.1) \times (S \wedge 0.2)}$$

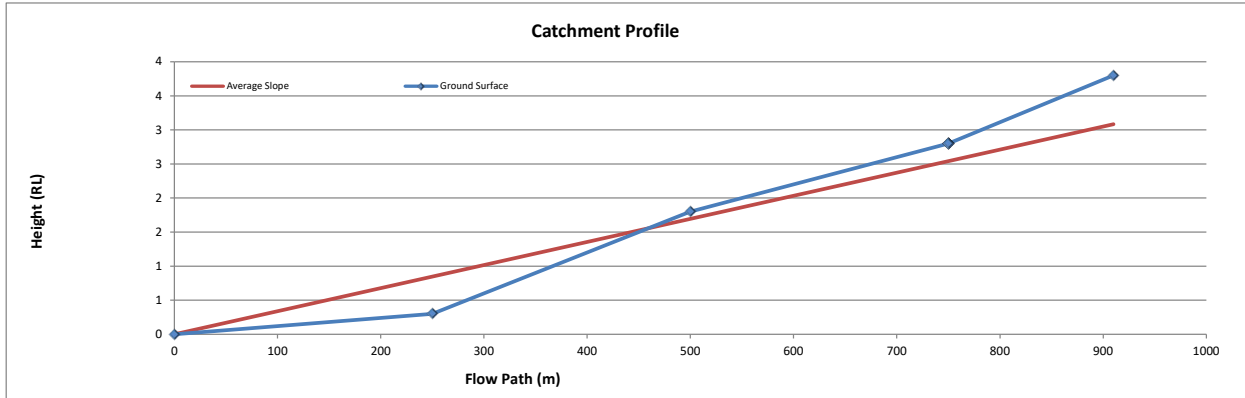
Tc = 52.1 min

Adopted Tc 52.0 min

Total area under graph 1403 m²
 Area below outlet level 0 m²
 Area above outlet 1403 m²

Height for average slope 3.08 m

Average Slope S = 0.3 %



Flow Calculation for Upstream Catchment

Catchment 3

Fraction Impervious = f_i = 0.1 Table Drain (QUDM Table 4.5.3)
 1 hour @ 10 year ARI = i₁₀ = 63.5 mm/hr (IFD CHARTS)
 C₁₀ = 0.675 (QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%	0.5%	
Design ARI		1	2	5	10	20	50	100	200	
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2	1.2	(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.54	0.57375	0.64125	0.675	0.70875	0.77625	0.81	0.81	(QUDM Equation 4.3)
Time of Concentration	T _C	52	52	52	52	52	52	52	52	min
Rainfall Intensity	i ₁₀ ^{6min}	40	47	60	70	79	90	98	111	mm/hr (IFD CHARTS)
Area	A	9.89	9.89	9.89	9.89	9.89	9.89	9.89	9.89	Ha
Path C Flow		0.60	0.73	1.06	1.30	1.54	1.92	2.18	2.48	m³/s
Velocity		1.968	2.119	2.445	2.646	2.827	3.082	3.239	3.408	m/s
Height		0.275	0.303	0.367	0.408	0.446	0.502	0.538	0.577	m

Taken from ERSCON Super Drain Table

P05-F-DD01 Document Transmittal

Project: **Ray Road Subdivision Stage 1**

Attention: **Patrick McNamee**

Company: **Tyrone Corporation Pty Ltd**



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From: **Mark Freeman**

		Date of Issue									
Day	Month	Year	30	1	11	12	9				
	8	24	10	24	11	24	11	24	12	24	24

Dwg/Doc Number	Dwg/Doc Title	Revision									
160-011-C101	Cover Sheet, Locality Plan and Drawing List	2	A	A	A						
160-011-C102	General Notes	2	A	A	A						
160-011-C103	Existing Layout	2	A	A	A						
160-011-C104	General Layout (Sheet 1 of 2)	2	A	A	A						
160-011-C105	General Layout (Sheet 2 of 2)	2	A	A	A						
160-011-C106	Grading Plan (Sheet 1 of 2)	2	A	A	A						
160-011-C107	Grading Plan (Sheet 2 of 2)	2	A	A	A						
160-011-C108	Ray Road Longitudinal Section (Sheet 1 of 2)	2	A	A	A						
160-011-C109	Ray Road Longitudinal Section (Sheet 2 of 2)	2	A	A	A						
160-011-C110	Road B Longitudinal Section	2	A	A	A						
160-011-C111	Ray Road and Road B Intersection Designs	2	A	A	A						
160-011-C112	Ray Road Cross Sections (Page 1 of 2)	2	A	A	A						
160-011-C113	Ray Road Cross Sections (Page 2 of 2)	2	A	A	A						
160-011-C114	B Road Cross Sections	2	A	A	A						
160-011-C115	Drainage Plan (Sheet 1 of 2)	2	A	A	A						
160-011-C116	Drainage Plan (Sheet 2 of 2)	2	A	A	A						
160-011-C117	Drainage Longitudinal Section (Sheet 1 of 5)	2	A	A	A						
160-011-C118	Drainage Longitudinal Section (Sheet 2 of 5)	2	A	A	A						
160-011-C119	Drainage Longitudinal Section (Sheet 3 of 5)	2	A	A	A						
160-011-C120	Drainage Longitudinal Section (Sheet 4 of 5)	2	A	A	A						
160-011-C121	Drainage Longitudinal Section (Sheet 5 of 5)	2	A	A	A						
160-011-C122	Rear Drain Longitudinal Section	2	A	A	A						
160-011-C123	Stormwater Pit Design (Sheet 1 of 2)	2	A	A	A						
160-011-C124	Stormwater Pit Design (Sheet 2 of 2)	2	A	A	A						
160-011-C125	Sewer Plan (Sheet 1 of 3)	2	A	A	A						
160-011-C126	Sewer Plan (Sheet 2 of 3)	2	A	A	A						
160-011-C127	Sewer Plan (Sheet 3 of 3)	2	A	A	A						
160-011-C128	Sewer Longitudinal Section (Sheet 1 of 3)	2	A	A	A						
160-011-C129	Sewer Longitudinal Section (Sheet 2 of 3)	2	A	A	A						
160-011-C130	Sewer Longitudinal Section Sheet (3 of 3)	2	A	A	A						
160-011-C131	Water Plan (Sheet 1 of 2)	2	A	A	A						
160-011-C132	Water Plan (Sheet 2 of 2)	2	A	A	A						
160-011-C133	Erosion and Sediment Control Plan (Sheet 1 of 2)	2	A	A	A						
160-011-C134	Erosion and Sediment Control Plan (Sheet 2 of 2)	2	A	A	A						
160-011-C135	Erosion and Sediment Control Notes and Details	2	A	A	A						
160-011-C136	Stormwater Pit Details	2	A	A	A						
160-011-C137	Base Slab			A	A						
160-011-C138	Structural Engineering Notes			A	A						
160-011-C139	WHS Notes			A	A						
160-011-C140	Turn Path Intersections	2	A	A	A						
160-011-R001 OPW	Operational Works Report	2	A	A	A	A					
160-011-R002 SWMP	Stormwater Management Plan Report	2	A	A	A	A					
160-011-L001 OPW	Cover Letter Submission				A						

Company Name	Attention	Number of Copies									
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