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Charters Towers Regional Council
PO Box 15009
City East, QLD 4002

DATE
21 August 2026

SUBJECT
Operational Works – Douglas Creek Bridge Works

REFERENCE
0833379

Dear Sir/Madam,

Environmental Resources Management Australia Pty Ltd (ERM) writes on behalf of DavBridge Properties Pty Ltd (DavBridge) to Charters Towers Regional Council in support of a Development Application for Operational Works (Civil Works) associated with the Gawara Baya Wind Farm off-site road upgrade program. This application relates specifically to the Douglas Creek Bridge upgrade works located along Mount Fox Road and Lava Plains Mount Fox Road between Douglas Creek Bridge and approaches (CH63215 - CH64715) within the Charters Towers Regional Council local government area.

1. THE PROPOSED DEVELOPMENT

The proposed development relates to the Douglas Creek Bridge works required to support the Gawara Baya Wind Farm offsite roadworks. The works involve the replacement and construction of the Douglas Creek Bridge within and adjacent to the Douglas Creek waterway to facilitate safe and suitable road access for project-related traffic, including heavy and over-size over mass vehicles associated with the broader wind farm development.

The Operational Works application has been prepared to address the relevant requirements of the *Planning Act 2016* and Planning Regulation 2017 for works within a mapped waterway.

The Douglas Creek Bridge works are expected to include the following key components:

- Bridge construction works within and adjacent to the Douglas Creek waterway;
- Associated bridge approaches and road tie-in works;
- Temporary construction access, work areas and laydown areas;
- Earthworks, drainage and scour protection measures required to support the bridge structure;
- Temporary waterway management and erosion and sediment control measures; and
- Rehabilitation of disturbed areas following completion of construction.

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The design and construction methodology for the Douglas Creek Bridge works have been developed to support road safety and constructability while avoiding and minimising impacts to the waterway, fish passage and surrounding environmental values where practicable. The proposed works will be managed through appropriate construction controls, including erosion and sediment control, waterway management and rehabilitation measures.

2. SUPPORTING DOCUMENTATION

A detailed Development Application has been prepared to support the Proposed Development. The Application primarily consists of a Planning Report (Attachment B) which is supported by technical assessments and attachments. The Planning Report, combined with the following documentation comprises the Development Application:

- DA Form 1 – Attachment A; and
- Planning Report - Attachment B.

We welcome further discussion on a payment schedule for the proposed works, as well as subsequent applications for proposed works along Mount Fox Road.

3. CONCLUSION

If you have any queries regarding the application or require any further information during the course of the assessment, please contact ERM's Michael Rookwood via email at qldapprovals@erm.com, acting on behalf of DavBridge Pty Ltd.

ERM

ATTACHMENT A DA FORM

DA Form 1 – Development application details

Approved form (version 1.6 effective 2 August 2024) 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) (*individual or company full name*)	Gawara Baya Wind Farm Pty Ltd c/- Environmental Resources Management Australia Pty Ltd
Contact name *(only applicable for companies)*	Michael Rookwood
Postal address *(P.O. Box or street address)*	Level 9, 260 Queen Street
Suburb	Brisbane
State	Queensland
Postcode	4000
Country	Australia
Contact number	+61730078478
Email address *(non-mandatory)*	qldapprovals@erm.com
Mobile number *(non-mandatory)*	n/a
Fax number *(non-mandatory)*	n/a
Applicant's reference number(s) *(if applicable)*	0833379
1.1) Home-based business	
☐ Personal details to remain private in accordance with section 264(6) of *Planning Act 2016*	

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)

Queensland Government

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
	-	-	Mount Fox Road	Valley of Lagoons
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)
	4850	6	WU16	Charters Towers Regional

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)*
		☐ WGS84 ☐ GDA94 ☐ Other:	

☐ Coordinates of premises by easting and northing

Easting(s)	Northing(s)	Zone Ref.	Datum	Local Government Area(s) *(if applicable)*
		☐ 54 ☐ 55 ☐ 56	☐ WGS84 ☐ GDA94 ☐ 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:	Douglas Creek

☐ 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:	
☐ Listed on the Environmental Management Register (EMR) under the *Environmental Protection Act 1994*	
EMR site identification:	
☐ Listed on the Contaminated Land Register (CLR) under the *Environmental Protection Act 1994*	
CLR site identification:	

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 a replacement bridge crossing over Douglas Creek, including bridge abutments, bridge piles, scour protection works and associated construction activities.

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
6.4) Is the application for State facilitated development?
☐ Yes - Has a notice of declaration been given by the Minister?
☐ No

Section 2 – Further development details

7) Does the proposed development application involve any of the following?	
Material change of use	☐ Yes – complete division 1 if assessable against a local planning instrument
Reconfiguring a lot	☐ Yes – complete division 2
Operational work	☒ Yes – complete division 3
Building work	☐ Yes – complete *DA Form 2 – Building work details*

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 *(include each definition in a new row)*	Number of dwelling units *(if applicable)*	Gross floor area (m^2) *(if applicable)*

8.2) Does the proposed use involve the use of existing buildings on the premises?
☐ Yes
☐ No

8.3) Does the proposed development relate to temporary accepted development under the Planning Regulation?	
☐ Yes – provide details below or include details in a schedule to this development application	
☐ No	
Provide a general description of the temporary accepted development	Specify the stated period dates under the Planning Regulation

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? *(tick all applicable boxes)*	
☐ Subdivision *(complete 10)*	☐ Dividing land into parts by agreement *(complete 11)*
☐ Boundary realignment *(complete 12)*	☐ Creating or changing an easement giving access to a lot from a constructed road *(complete 13)*

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?	
☐ Yes – provide additional details below ☐ 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?		
☒ Road work	☐ Stormwater	☒ Water infrastructure
☒ Drainage work	☒ Earthworks	☐ Sewage infrastructure
☐ Landscaping	☐ Signage	☐ Clearing vegetation
☐ 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:	
☒ No	

14.3) What is the monetary value of the proposed operational work? *(include GST, materials and labour)*
$11 137 655.05

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application
Charters Towers Regional 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 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 under Chapter 1 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules or* • *Part 2under Chapter 2 of the DA Rules will still apply if the application is for state facilitated development* *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)*			
☐ Yes – provide details below or include details in a schedule to this development application ☒ No			
List of approval/development application references	Reference number	Date	Assessment manager
☐ Approval ☐ Development application	2211-32271 SDA	13/11/2023	State Assessment Referral Agency
☐ Approval ☐ Development application			

21) Has the portable long service leave levy been paid? *(only applicable to development applications involving building work or operational work)*		
☒ Yes – a copy of the receipted QLeave form is attached to this development application ☐ 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 ☐ 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)
Confirming payment of 'Portable long service leave levy' is Principals responsibility. The payment hasn't been made at this stage, planned for payment post-IFC. This should not delay submission/approval of the permit.		

22) Is this development application in response to a show cause notice or required as a result of an enforcement notice?
☐ Yes – show cause or enforcement notice is attached ☒ 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 *Environmental Protection Act 1994*?

☐ 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

☒ No

***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.*

Proposed ERA number:		Proposed ERA threshold:	
Proposed ERA name:			

☐ 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**?

☐ Yes – *Form 536: Notification of a facility exceeding 10% of schedule 15 threshold* is attached to this development application

☒ No

***Note**: See www.business.qld.gov.au for further information about hazardous chemical notifications.*

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.desi.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 Resources at www.resources.qld.gov.au for further information.*

DA templates are available from planning.statedevelopment.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 Form1 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 planning.statedevelopment.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 Resources at www.resources.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, Science and Innovation at www.desi.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.resources.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.desi.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.desi.qld.gov.au for information requirements regarding development of Queensland heritage places.*

For a heritage place that has cultural heritage significance as a local heritage place and a Queensland heritage place, provisions are in place under the Planning Act 2016 that limit a local categorising instrument from including an assessment benchmark about the effect or impact of, development on the stated cultural heritage significance of that place. See guidance materials at www.planning.statedevelopment.qldgov.au for information regarding assessment of Queensland heritage places.

Name of the heritage place:		Place ID:	

Decision under section 62 of the *Transport Infrastructure Act 1994*

23.14) 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

23.15) 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.statedevelopment.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 ***Note**: See the Planning Regulation 2017 for referral requirements*	☒ Yes
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	☐ Yes ☒ Not applicable
Supporting information addressing any applicable assessment benchmarks is with the development application ***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.*	☒ Yes
Relevant plans of the development are attached to this development application ***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*	☒ Yes
The portable long service leave levy for QLeave has been paid, or will be paid before a development permit is issued *(see 21)*	☒ Yes ☐ 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 *Note: For completion by assessment manager if applicable*			
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			

ATTACHMENT B PLANNING REPORT

Planning Report

Gawara Baya Operational Works – Douglas Creek Bridge

PREPARED FOR
DavBridge Properties Pty Ltd

DATE
21 August 2026

REFERENCE
0833379

DOCUMENT DETAILS

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Planning Report

Gawara Baya Operational Works – Douglas Creek Bridge

0833379

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
ARI	Average Recurrence Interval
AHD	Above Height Datum
DA	Development Application
ERM	Environmental Resources Management Australia Pty Ltd
GBWF	Gawara Baya Wind Farm
MSES	Matters of State Environmental Significance
SPP	State Planning Policy

1. INTRODUCTION

This Planning Report has been prepared by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of DavBridge Properties Pty Ltd (DavBridge), in support of a Development Application (DA) for Operational Works – Douglas Creek Bridge Upgrade under the *Planning Act 2016* (Planning Act). This includes works to the Douglas Creek Bridge and associated bridge approaches along Mount Fox Road within the Charters Towers Regional Council local government area. The Project forms part of the broader Gawara Baya Wind Farm off-site road upgrade program and is required to facilitate the safe and efficient transport of wind turbine components, construction materials and associated infrastructure to the approved wind farm development.

The Douglas Creek Bridge is a critical component of the haulage route connecting sections of Mount Fox Road and provides an essential crossing of the Douglas Creek for local traffic, construction traffic and future Oversize Overmass (OSOM) transport movements associated with the Project. The existing bridge and approach infrastructure presents geometric, operational and transport constraints that limit the safe movement of OSOM vehicles. Accordingly, bridge upgrade works are required to improve road safety, accommodate the swept path requirements of OSOM vehicles and establish a suitable transport corridor capable of supporting the construction and operation of the Gawara Baya Wind Farm.

The Project comprises upgrades to the existing bridge crossing, associated road approaches, pavement interfaces, drainage infrastructure, safety barriers and associated civil works required to support the broader Mount Fox Road upgrade program. The works have been designed to improve transport functionality while maintaining riverine processes, flood conveyance, road safety outcomes and environmental values associated with the Douglas Creek corridor.

The Development Application has been prepared in accordance with the *Planning Act 2016* and the *Charters Towers Regional Council Planning Scheme Version 2, 2020* (the Planning Scheme) and includes an assessment of the applicable planning framework, overlay mapping, engineering requirements and development assessment benchmarks relevant to the proposed works. The report demonstrates that the Project is consistent with the intent of the Planning Scheme and can be undertaken without resulting in unacceptable impacts upon the surrounding environment, transport network or floodplain function.

A summary of the Development Application and proposed works is provided in Table 1-1 below.

TABLE 1-1 DEVELOPMENT APPLICATION SUMMARY

Aspect	Description
Project Location	Douglas Creek Bridge and approaches (CH63215 - CH64715)
Property description	• Lot 6 on WU16 • Mount Fox Road Reserve • Douglas Creek (Category 4 Waterway)
Tenure	Road Reserve
Local Government	Charters Towers Regional Council

Aspect	Description
Planning Scheme	Charters Towers Regional Town Plan Version 2, 2021
Zone	Rural
Road Hierarchy	Arterial Road
Project Length	1.5 km
Development Application Type	Operational Works
Applicant	DavBridge Properties Pty Ltd c/- Environmental Resources Management Australia Pty Ltd
Assessment Manager	Charters Towers Regional Council
Level of Assessment	Code Assessment
Referrals	Not applicable
Project Description	Development Application (Operational Works, Civil Works) for bridge replacement upgrades and improvements between Douglas Creek Bridge and approaches (CH63215 - CH64715)
Applicable Planning Scheme Overlays	• Agricultural Overlay • Flood Hazard Overlay • Natural Environmental Overlay
Applicable Planning Scheme Benchmarks	• Rural Zone Code • Development Works Code • Flood Hazard Overlay Code • Natural Environment Overlay Code • Bushfire Hazard Overlay Code

The construction of the bridge is critical to ensuring the successful construction and operation of the Gawara Baya Wind Farm (location in Figure 2-1), while also providing legacy infrastructure for the local community.

2. BACKGROUND AND CONTEXT

The Gawara Baya Wind Farm is a proposed wind energy development located at 4364 Mount Fox Road, Valley of Lagoons, also known as Kilclooney Station, formally described as Lot 3198 on SP344602. The wind farm comprises a 68-turbine renewable energy project and requires the delivery of wind turbine components, ancillary infrastructure, construction materials and heavy vehicles to and from the project site. Due to the scale and geometry of wind turbine components, construction access to the wind farm requires the movement of Oversize Overmass vehicles along the local and regional road network.

The off-site road and bridge works are required to provide a suitable haulage route for the safe and efficient transport of these components to the Gawara Baya Wind Farm site. The broader off-site road upgrade scope includes works along Mount Fox Road and Lava Plains Mount Fox Road, including pavement widening, targeted corrections to road crossfall, horizontal and vertical geometry ability so that the road network can safely accommodate OSOM haulage vehicles and improvements, upgrades to culverts and drainage infrastructure, cattle grid works, passing bays and associated civil works. These upgrades are intended to address existing constraints in carriageway width, road geometry, sight distance, drainage capacity and heavy vehicle maneuvering and traffic.

DavBridge has been engaged to deliver civil works associated with the Gawara Baya Wind Farm off-site roads program. To support construction sequencing and the approvals process, the off-site road works have been divided into discrete works packages (segments) for assessment, lodgement and delivery. This staged approach allows construction-critical components of the haulage route to be assessed and progressed in a logical sequence, while recognising that different parts of the off-site road network may involve different approval pathways, design inputs, land tenure interfaces and authority requirements.

The upgrade works include approximately 80 km section of Mt Fox and Lava Plains Road, and includes two bridge upgrades across the Burdekin River Bridge and Douglas Creek Bridge as shown on Figure 2-1 below.

For the purposes of supporting the timely assessment of works and align with the delivery schedule, the works have been split into six (6) Development Application packages:

1. Part of Segment 1 to the north-east of Burdekin River (CH7500 – CH19230) and Segment 2, being a 19.23km section of Mt Fox Road (Chainage CH19230 to Chainage CH38460);
2. Burdekin River Bridge and approaches (CH6670 - CH7500);
3. **Douglas Creek Bridge and approaches (CH63215 - CH64715)**;
4. Part of Segment 1 southwest of Burdekin River, being an approximately 6 km section of Mt Fox Road (Ch150 where Section 4.1 ends) to Burdekin River Bridge approach CH6670);
5. Segment 3, being an approximately 20 km section of Mt Fox Road (Chainage CH38460 – CH57640); and
6. Segment 4, being an approximately 20 km section of Lava Plains Road (Chainage CH57640 – CH76780).

This Planning Report supports the Development Application Item 3, with subsequent Development Applications to be sought for future stages.

2.1 DOUGLAS CREEK BRIDGE

This Planning Report relates specifically to the Douglas Creek Bridge and associated bridge approaches along Mount Fox Road.

The Douglas Creek crossing forms one of the most significant infrastructure constraints within the haulage route due to its location within a major river corridor, exposure to flooding and the geometric requirements associated with OSOM transport movements. The existing bridge infrastructure was not designed to accommodate modern wind turbine transport vehicles including A-Double and B-Double Road trains, and therefore requires upgrade works to ensure the route can operate safely and efficiently throughout the construction period.

The proposed bridge package comprises upgrades to the existing bridge crossing and associated approach infrastructure located between Chainage CH63215 – CH64715 along Mount Fox Road. The package includes bridge works, approach works, pavement tie-ins, drainage infrastructure, floodplain interface works, safety barrier installations and associated ancillary activities required to facilitate construction.

The works have been designed having regard to transport requirements, constructability, flood behaviour, environmental constraints and long-term operational performance. Consideration has been given to maintaining floodplain function and minimising impacts to surrounding environmental values while providing a bridge crossing capable of supporting OSOM vehicle movements.

Unlike other road segments forming part of the broader haulage route, the Douglas Creek Bridge package is subject to additional technical and planning considerations associated with flood hazards, riverine environments, bridge engineering requirements and the interface between transport infrastructure and the natural waterway corridor. As a result, the bridge package has been progressed as a standalone Development Application to allow detailed consideration of these matters

0833379 - GBWF OSR Bridge Approvals.aprx

3. PROJECT DESCRIPTION

3.1 PROJECT LOCATION AND DESCRIPTION

The Project Area is located on Mount Fox Road, near Greenvale, Queensland. The Douglas Creek crossing forms part of the broader haulage route identified for the transport of turbine components, construction materials and associated infrastructure required for construction of the approved Gawara Baya Wind Farm. The bridge is located within the Mount Fox Road transport corridor and provides a critical connection between the northern and southern sections of the off-site road upgrade network. The location of the bridge within the broader Gawara Baya Wind Farm Road upgrade program is shown in the design package (Appendix B).

The Project Area is displayed in Figure 3-1 below.

3.2 RELATIONSHIP TO WIND FARM

The Gawara Baya Wind Farm received State Assessment Referral Agency (SARA) approval by negotiated decision notice on 13 November 2023 (SARA ref. 2211-32271 SDA). Specifically, the Project activities associated with this process include:

- The upgrade works will ensure a minimum pavement width of 6m and will include targeted crossfall and horizontal and vertical geometry corrections to ensure the OSOM vehicles can traverse the bridge; and
- Douglas Creek Bridge and approaches upgrades to accommodate OSOM vehicles, including the provision of passing bays, upgrades to existing culverts, and construction of batters and drainage infrastructure.

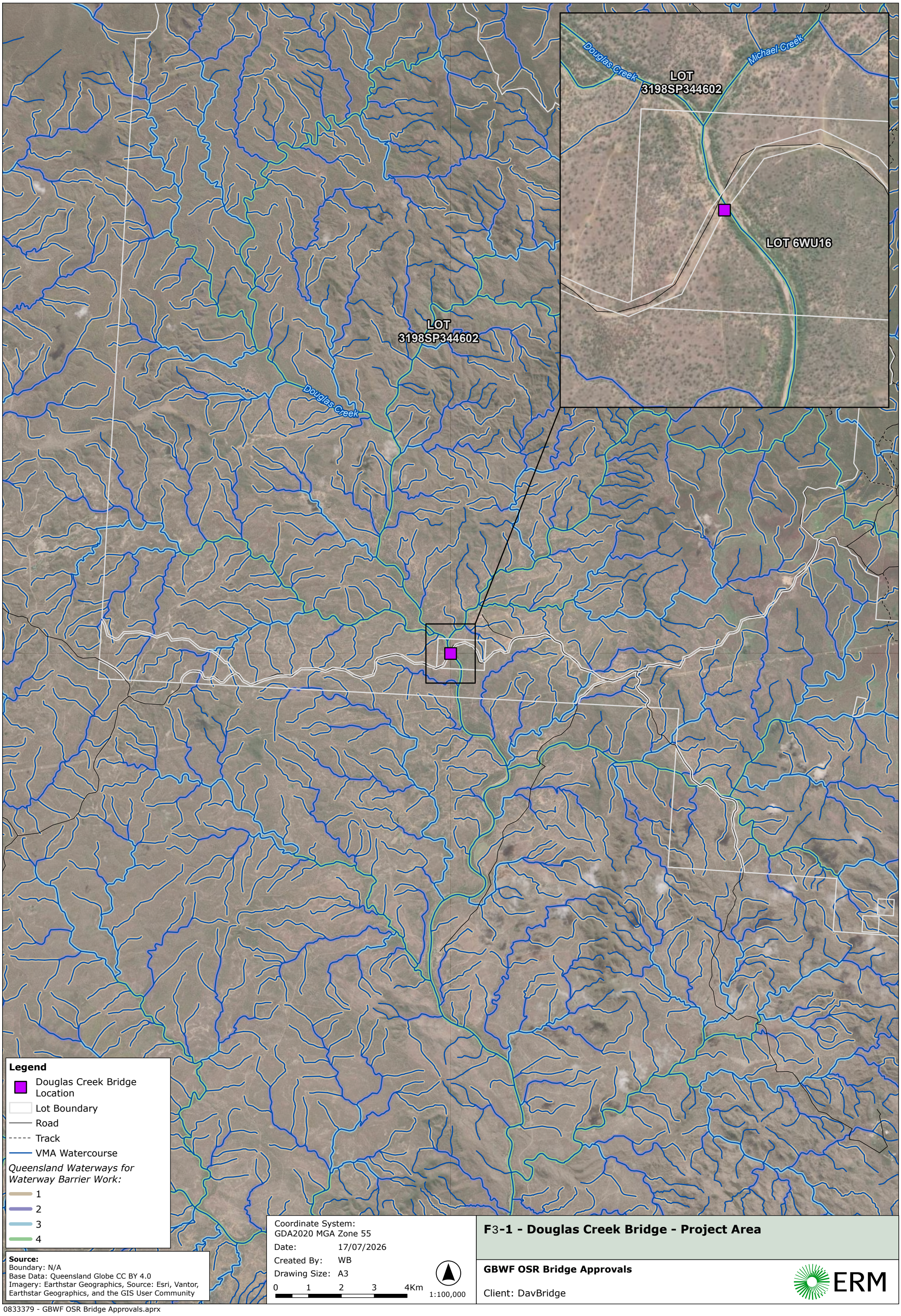
3.3 PROPOSED WORKS

The proposed works comprise the upgrade and/or replacement of the existing Douglas Creek crossing located on Mount Fox Road, forming part of the Gawara Baya Wind Farm off-site road network. The existing crossing is identified as a multi-span bridge structure across Douglas Creek, which is a major waterway within the project area.

The scope of works includes:

- Removal of the existing bridge structure;
- Construction of the replacement bridge crossing in accordance with the engineering drawings and supporting technical documentation provided with the application;
- Works within the defined waterway, including bed and bank disturbance associated with installation of the new structure;
- Localised formation and tie-in works on Mount Fox Road to integrate the upgraded crossing; and
- Ancillary works required to support the development, including erosion and sediment control measures and bank stabilisation.

The works form part of the broader upgrades to the Mount Fox Road corridor to facilitate construction and operational access for the GBWF Project.



F3-1 - Douglas Creek Bridge - Project Area

GBWF OSR Bridge Approvals

Client: DavBridge

ERM

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3.4 CONSTRUCTION WORKS

Construction activities associated with the Project are expected to occur as part of the broader Gawara Baya Wind Farm off-site infrastructure program. Works will be undertaken in accordance with the approved engineering design package, environmental management requirements and any approval conditions imposed by Council and other relevant authorities. Prior to construction, appropriate environmental and traffic management documentation will be prepared and implemented, including a Construction Environmental Management Plan, Traffic Management Plan and Erosion and Sediment Control Plan.

The proposed construction works are anticipated to include:

- Establishment of temporary site compounds and construction work areas;
- Traffic management implementation and temporary traffic control measures;
- Demolition and removal of the existing crossing infrastructure where required;
- Construction of bridge foundations, piles, abutments and pier structures;
- Installation of precast bridge elements and deck units;
- Construction of reinforced concrete deck and bridge barriers;
- Approach road upgrades and pavement tie-ins;
- Scour protection and riverbank stabilisation works;
- Installation of bridge furniture, signage and safety infrastructure;
- Rehabilitation and stabilisation of disturbed areas; and
- Demobilisation and final reinstatement works.

Construction activities will be staged to maintain a safe work environment and minimise disruption to landholders and road users. The bridge replacement has been designed to facilitate OSOM vehicle movements associated with the wind farm development while maintaining the operational function of Mount Fox Road. The Project has also been designed to improve safety and resilience of the crossing during flood events.

TABLE 3-1 CONSTRUCTION DETAILS

Construction Details	Summary
Site Access	Primary access will be via Mount Fox Road, via Gregory Developmental Road.
Construction Duration	11 months
Staging	The project will be constructed in 2 stages from the 2 sides with rock groan platforms in the riverbed that provide crane platforms from piling into the lifting the superstructure precast elements.
Value of Works	$11.137 million
Blasting	No blasting required
Fill Material Source	• Fill material to comply with DTMR MRTS04. • Fill shall comprise only natural earth and rock. • Fill must be free of contaminants, hazardous materials, deleterious matter and organics. • Unsuitable material to be removed and replaced with compacted select fill. Culvert foundation improvements use

Construction Details	Summary
	compacted Type 2.3 road base material where geotechnical requirements are not achieved.
Vehicles for Material Importation	A variety of vehicles will be used as dictated by the load requirements from rigid trucks for smaller loads to Semi-trailer as well as B-double trailers.
Vehicle Movements for Material	Vehicle movements will be random as required to import plant required like cranes and excavators, and move temporary and well as permanent materials such as pile casings, ready mix concrete and precast bridge superstructure elements
Waste Storage and Disposal Management Processes	All waste generated during the construction of the Gawara Baya OSR Works project will be managed in a manner that prevents pollution and promotes resource recovery. Waste handling will ensure materials are correctly identified, segregated, and stored to facilitate reuse where the specifications allow and/or recycling wherever possible. The disposal/management facilities to be utilised must have relevant procedures, insurances, and Environmental Authorities, which are to be provided for review and verification for suitability, prior to engagement.
Traffic and onsite parking	Construction phase activities are of the most relevance in terms of traffic generation, due to the traffic associated with the following activities: Onsite construction workforce commute to and from the site; and materials and equipment being transported to the Project area.
Construction Workforce	At peak, the construction workforce is anticipated to be 6 full-time-equivalent personnel.
Waste and Utilities	A comprehensive Construction Environmental Management Plan will be developed and implemented prior to the commencement of construction activities. This plan will outline the utility services that will be required during these stages of the Project. It is anticipated that the Project will not be connected to reticulated water or sewerage infrastructure. Alternative sources of water collection and storage mechanisms will be outlined in the plan.
Construction Hours	Work hours are expected to be between 6:00am to 6:00pm.

3.4.1 VEGETATION CLEARING

Vegetation clearing associated with the broader Gawara Baya Wind Farm off-site road upgrade program has been separately assessed and approved under a Development Permit for Operational Work (Native Vegetation Clearing) granted by the State Assessment and Referral Agency (SARA Reference 2604-51908 SDA) (Figure 6-4). The approval applies to the broader off-site road network, including Mount Fox Road and land parcels relevant to the proposed works corridor. The approved vegetation clearing package was supported by a dedicated Planning Report, Ecological Assessment Report and Relevant Purpose Determination prepared to demonstrate compliance with the requirements of the *Vegetation Management Act 1999* and State Code 16: Native Vegetation Clearing.

Accordingly, this Development Application does not seek approval for native vegetation clearing. Any vegetation disturbance required to facilitate the proposed road upgrade works between Chainage CH63215 - CH64715 will be undertaken in accordance with the approved disturbance footprint, endorsed plans and applicable conditions of the existing vegetation clearing approval. The proposed works have been designed to utilise the existing road reserve and approved clearing extent wherever practicable, thereby minimising impacts on remnant vegetation, Matters of State Environmental Significance and associated ecological values.

3.4.2 BRIDGE PAVEMENT

The Project comprises replacement of the existing Douglas Creek crossing with a new multi-span bridge structure designed to accommodate construction traffic, heavy vehicles and OSOM transport associated with the Gawara Baya Wind Farm development. The replacement bridge has been designed in accordance with relevant Queensland Department of Transport and Main Roads bridge design requirements and applicable Australian Standards.

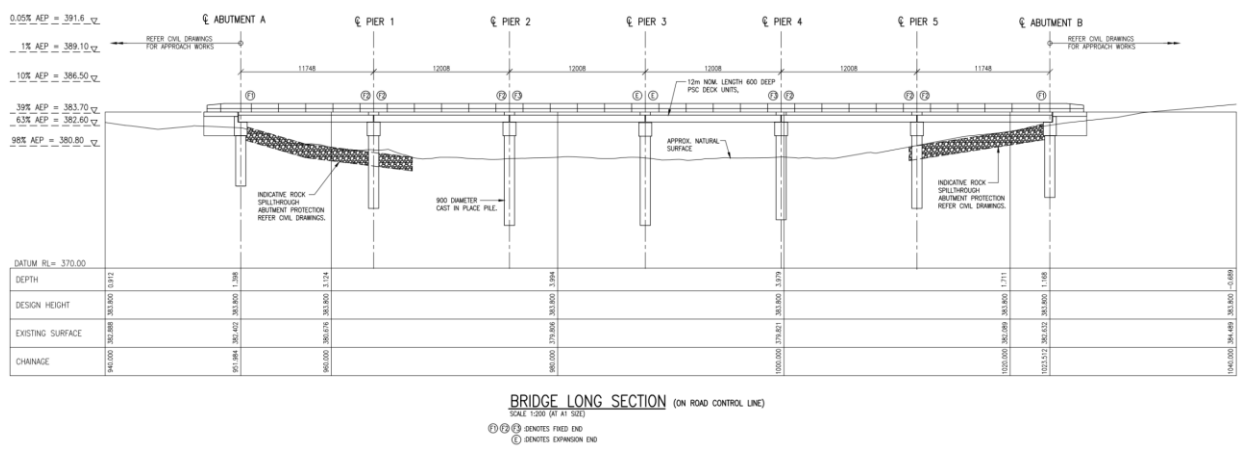
The bridge structure incorporates precast concrete deck units, reinforced concrete deck slabs, reinforced concrete abutments and pier structures supported by cast in-situ piles. The overall bridge length is approximately 156 metres between abutments, excluding approach works and relieving slabs.

The superstructure comprises prestressed concrete deck units supporting a reinforced concrete deck slab and bridge barriers. The bridge has been designed to accommodate standard road traffic loads as well as oversized and overmass transport vehicles associated with turbine component deliveries. Design loads include SM1600 traffic loading, W80 loading, A160 loading and OSOM vehicle loading in accordance with the adopted bridge design criteria.

The bridge design incorporates bridge traffic barriers, approach guardrail transitions, relieving slabs, expansion joints and associated ancillary infrastructure. Bridge piers and abutments are founded on cast in-situ piles extending into competent founding material, with geotechnical validation to be undertaken during construction.

The replacement structure has been specifically designed to improve transport efficiency and accommodate the swept path requirements of wind turbine transport vehicles while maintaining safety and structural reliability throughout the operational life of the bridge (Figure 3-2).

FIGURE 3-2 DOUGLAS BRIDGE LONG SECTION



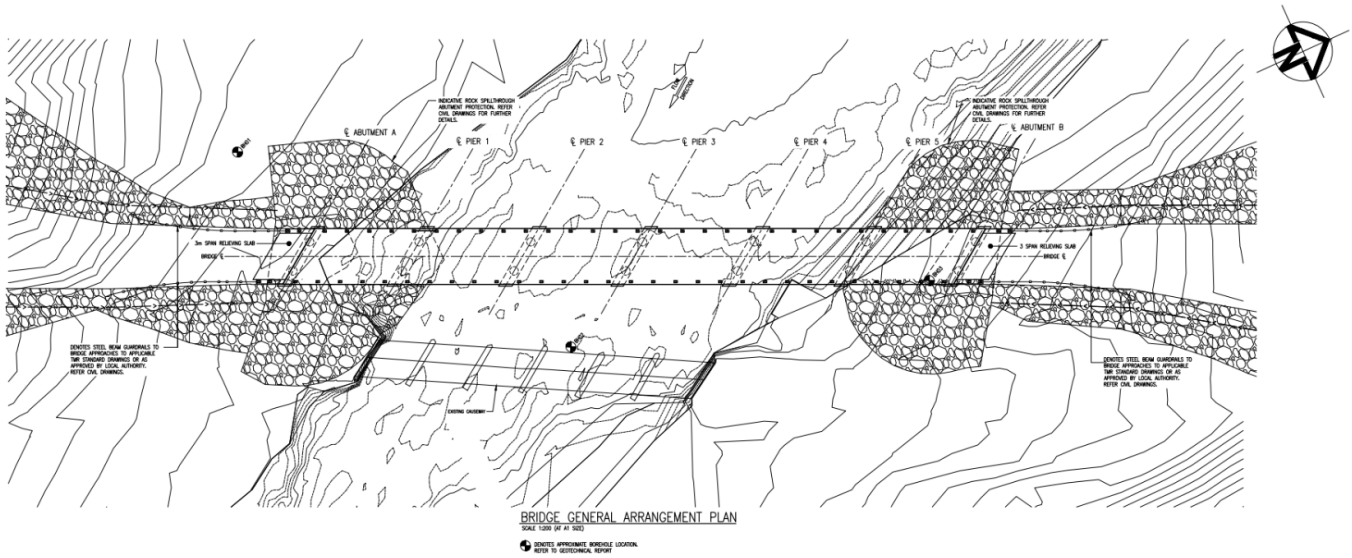
3.4.3 FLOODPLAIN WORKS AND SCOUR PROTECTION

The Douglas Creek Bridge is located within a major river system and floodplain environment. As such, careful consideration has been given to flood behaviour, hydraulic performance and scour protection during design development. The bridge has been designed using flood information developed for events ranging from the 2-year Average Recurrence Interval (ARI) through to the 2000 year ARI Interval event. Peak flood levels and flood velocities have been incorporated into the structural design criteria for the bridge and associated protection works.

The project includes scour protection measures at bridge abutments and structures to protect against erosion during flood events. Rock armouring and spill-through abutment protection are proposed adjacent to bridge abutments to improve resilience of the crossing and minimise erosion risk during high flow events. The proposed protection measures have been designed to maintain structural stability and protect critical bridge infrastructure throughout the design life of the asset.

The replacement bridge has also been designed to maintain flood conveyance through the Douglas Creek corridor while reducing risks associated with flood damage, debris loading and hydraulic impacts to bridge infrastructure. Flood immunity and hydraulic performance will be assessed in further detail within supporting engineering and hydraulic documentation accompanying the application (Figure 3-3).

FIGURE 3-3 BRIDGE DESIGN



4. WATERWAY CHARACTERISTICS

4.1 PROJECT AREA

The Project area for the hydraulic assessment (Appendix C) is centered on the Douglas Creek bridge crossing on Mount Fox Road. The assessment was undertaken to evaluate the hydrological and hydraulic performance of the crossing, quantify the impacts of the proposed bridge design on flood behaviour, afflux, scour risk and operational flood immunity, and provide a technical basis for comparing existing and proposed bridge scenarios.

The existing Douglas Creek bridge is a low-level crossing comprising reinforced concrete girders supported by bladewall piers and concrete abutments. The bridge deck includes railway beam barriers and steel girders, with an approximate span of 104.95 m and an outside rail width of 4.0 m.

4.2 DOUGLAS CREEK CATCHMENT AND HYDROLOGICAL CONTEXT

The hydrologic model developed for the Douglas Creek catchment uses the Blue Range gauge as the downstream outlet. The catchment upstream of the Blue Range gauge is approximately 10,517 km² and was subdivided into 21 sub-catchments to represent spatial rainfall variability, runoff response and flow routing.

Catchment delineation was undertaken using available digital elevation model data and was verified against topographic mapping and aerial imagery to confirm natural drainage patterns and key tributary inflows to the Douglas Creek. There are no significant storages on the Douglas Creek in the Project area, and drowned reaches were not required in the hydrologic model.

There have been three significant historical flood events at the Blue Range stream gauging station since 1982: February 1991, January 2009 and February 2025. The February 1991 flood was the largest event on record at the Blue Range gauge and was adopted as the primary calibration event, while the January 2009 flood was used as a secondary calibration event and the February 2025 flood was selected as a verification event.

The significant historical flood events recorded at the Blue Range station are summarised as follows: February 1991 recorded a peak level of 16.76 metres above height datum (AHD) and a peak flow of 9,660.037 m³/s; January 2009 recorded a peak level of 15.54 mAHD and a peak flow of 8,447.986 m³/s; and February 2025 recorded a peak level of 12.74 mAHD and a peak flow of 6,156.185 m³/s.

4.3 TOPOGRAPHICAL AND SURVEY DATA

The hydraulic assessment used multiple topographic data sources to establish the digital elevation model for hydrologic and hydraulic modelling. 1-second SRTM data from Geoscience Australia was used for broader catchment delineation, while 0.5 m DEM data from ELVIS was used as the base topography for the Douglas Creek crossing. Higher resolution LiDAR data was overlaid in the immediate bridge vicinity to improve accuracy.

LiDAR does not penetrate water bodies and therefore does not reflect the actual bed level of the Douglas Creek channel. No bathymetric survey data was available for the Project, and the riverbed elevation was assumed to be based on available topographic data.

Absence of bathymetric data is a source of uncertainty for hydraulic modelling, particularly for in-channel flow conditions, water depths and velocities.

A field survey was undertaken in April 2024 by Brazier Motti to supplement the LiDAR information and capture local details where required. The survey covered approximately 400 m on either side of Mount Fox Road and Mount Fox–Lava Plains Road, including both major and minor waterway crossings. A detailed survey of the existing Douglas Creek bridge was also undertaken by GMC Surveying in September 2025.

4.4 EXISTING BRIDGE CHARACTERISTICS

The proposed Douglas Creek Bridge comprises a replacement bridge structure designed to improve hydraulic performance, flood resilience and transport functionality along the approved haulage route. The proposed structure incorporates a substantially larger waterway opening than the existing crossing and has been designed to accommodate both conventional traffic and Oversize Overmass transport associated with the construction of the Gawara Baya Wind Farm.

The replacement bridge comprises approximately 156 m of bridge structure supported by five intermediate piers and two abutments. The bridge design incorporates reinforced concrete substructure elements, piled foundations, bridge barriers and associated scour protection works. Flood levels ranging from the 63% AEP event to the 0.05% AEP event were considered during design development to ensure the structure maintains appropriate hydraulic performance and structural integrity during flood events. Indicative rock spill-through abutment protection is also proposed to minimise erosion and scour adjacent to the bridge approaches.

For hydraulic modelling purposes, the proposed bridge was assessed as a separate development scenario. The existing crossing infrastructure was removed from the model and replaced with the proposed bridge structure, including the new piers, abutments, bridge deck and associated approach works. This enabled direct comparison between existing and proposed flood behaviour and assessment of the potential hydraulic impacts associated with the replacement bridge.

FIGURE 4-1 EXISTING BRIDGE

5. HYDRAULIC ASSESSMENT

5.1 ASSESSMENT OVERVIEW

A Hydraulic Assessment was undertaken by JJ Ryan Consulting to evaluate the effect of the proposed Douglas Creek bridge replacement on flood behaviour, hydraulic performance, flood immunity, velocity changes and scour potential. The assessment compared existing and proposed bridge configurations using hydraulic modelling across a range of flood events. The detailed Hydraulic Assessment is provided in C.

5.2 EXISTING AND PROPOSED CROSSING

The proposed bridge increases the waterway span and bridge deck elevation compared with the existing crossing. Hydraulic modelling indicates that the proposed bridge substantially improves flood immunity and reduces the frequency and duration of crossing closure during flood events.

Table 5-1 provides a summary comparison of the existing and proposed bridge configurations.

TABLE 5-1 EXISTING AND PROPOSED CROSSING

Parameter	Existing Crossing	Proposed Crossing
Structure type	Low-level bridge	Multi-span bridge
Bridge span	36.28 m	72 m
Deck elevation (top)	381.72 m AHD	383.80 m AHD
Waterway blockage/channel occupancy	9.6%	~10%
Average Annual Time of Submergence	3.68 hrs/year	1.89 hrs/year
Average Annual Time of Closure	3.82 hrs/year	2.06 hrs/year

5.3 HYDRAULIC PERFORMANCE

The hydraulic assessment indicates that the proposed bridge has negligible impact on flood behaviour during frequent flood events. For the 63% AEP and 39% AEP events, changes in flood levels are generally within ±0.01 m across the majority of the Project area. During larger flood events, localised increases in flood levels occur adjacent to the bridge and retained embankment sections; however, these impacts remain confined to the immediate vicinity of the crossing and do not materially alter broader floodplain behaviour. Downstream impacts remain negligible across all modelled events.

The assessment also identified localised changes in velocity around bridge piers and retained embankment sections. Predicted velocity increases are generally negligible during frequent flood events and become more pronounced during larger flood events, although impacts remain localised around the bridge footprint. The hydraulic assessment characterises this response as a result of localised flow concentration and concludes that broader waterway function is maintained.

Localised scour has been identified as a potential consideration around bridge abutments and retained embankment sections during larger flood events. Appropriate scour protection and erosion control measures will be incorporated into the detailed bridge design to manage these risks and maintain long-term structural stability.

5.4 KEY FINDINGS

The Hydraulic Assessment concludes that the proposed bridge provides a substantial improvement in operational performance compared with the existing crossing. The proposed bridge significantly reduces the Average Annual Time of Submergence and Average Annual Time of Closure while maintaining waterway connectivity and flood conveyance. Predicted changes in flood levels and velocities are generally localised to the bridge footprint and are not expected to materially alter broader floodplain behaviour. Identified scour risks can be appropriately managed through bridge design and targeted scour protection measures.

6. PLANNING ASSESSMENT

6.1 PLANNING ACT 2016

The Planning Act provides the overall statutory planning framework and development system for Queensland. The purpose of the Planning Act is to establish an efficient, effective, transparent, integrated, coordinated, and accountable system of land use planning, development assessment and related matters that facilitates the achievement of ecological sustainability.

This DA will assist Council to assess the proposed works against the applicable codes provided in Appendix E.

6.2 CHARTERS TOWERS REGIONAL COUNCIL PLANNING SCHEME

Recent correspondence with Council (Appendix F) has concluded that the DA is to be submitted under Operational Works application. Sections 44 and 45 of the *Planning Act 2016* establish the framework for categorising development and determining the applicable level of assessment.

The project comprises operational work associated with upgrades to an existing local government road and is assessable development under the Charters Towers Regional Council Planning Scheme. Accordingly, this DA has been prepared to address the applicable assessment benchmarks, with a summary provided in Table 6-1 below. This demonstrates that the proposed works are consistent with the planning intentions of the Planning Scheme and can be undertaken without resulting in unacceptable impacts on the function, safety or operation of Mount Fox Road.

TABLE 6-1 APPLICABLE OVERLAYS

Planning Scheme Mapping	Project Relevance
Bushfire Hazard Mapping	The Project Area consists of medium to high potential bushfire intensity areas. Given the Project's location within the road reserve, bushfire risk is anticipated to be low. The proposed road works and upgrading of the existing road corridor improves access for emergency and firefighting vehicles and does not reduce network accessibility.
Agriculture Overlay	The Project Area consists of Category B and C (medium to low) Agricultural Land Classifications. Given the Project will preside within the road reserve, minimal disturbance to existing agricultural land values is expected.
Flood Hazard Overlay	The Project Area consists of Queensland Reconstruction Authority Level 1 flood hazard areas. Given the broadscale applicability of this overlay, further assessment of flood hazards will be required to determine the severity of flood impacts within the Project Area.

Planning Scheme Mapping	Project Relevance
Natural Environmental Overlay	The Project Area consists of mapped Matters of State Environmental Significance (MSES) including: MSES Regulated Vegetation (defined watercourse); and MSES Regulated Vegetation (Category R). While these mapped MSES values are present within the Project Area, it is important to note that as works are to be within the Council Road reserve. Proposed impacts have been approved through the recent Operational Works – Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA).

6.2.1 STRATEGIC FRAMEWORK

The Strategic Framework seeks to provide a safe, efficient and resilient transport network which supports economic development while protecting environmental values and minimising exposure to natural hazards. The Project is consistent with these outcomes.

6.2.2 RURAL ZONE CODE

The Project is located within the Rural Zone under the Charters Towers Regional Council Planning Scheme and comprises operational works associated with the upgrade and replacement of the existing Douglas Creek Bridge and associated road approaches within the existing Mount Fox Road reserve (Appendix E). The proposal does not facilitate a new land use, subdivision or intensification of development within the Rural Zone. Rather, it represents an upgrade to existing transport infrastructure required to support the safe operation of the local road network and facilitate construction access to the approved Gawara Baya Wind Farm. The Project remains wholly within an established transport corridor and does not result in the fragmentation of rural land, loss of agricultural production capacity or the introduction of land uses inconsistent with the rural character and function of the locality.

6.2.3 DEVELOPMENT WORKS CODE

The Development Works Code is the primary assessment benchmark for the proposed operational works. The purpose of the code is to ensure development works are appropriately designed, constructed and maintained to protect public safety, maintain infrastructure functionality, avoid adverse impacts on surrounding land and environmental values, and provide for the orderly delivery of infrastructure. The Project has been designed by suitably qualified engineers and is supported by detailed bridge, civil, hydraulic and environmental assessments accompanying the application.

The proposed works will improve the operational performance of the existing crossing through replacement of the ageing bridge structure with a purpose-designed multi-span bridge capable of accommodating conventional traffic, heavy vehicles and OSOM transport movements. The design incorporates upgraded pavement interfaces, drainage infrastructure, bridge barriers, scour protection measures and associated road safety improvements. The development has been designed having regard to site-specific flooding, hydraulic conditions, geotechnical constraints and long-term asset performance requirements (Appendix E).

6.2.4 FLOOD HAZARD

The Douglas Creek Bridge is located within a mapped flood-prone environment and is therefore subject to flood-related planning considerations (Figure 6-3).

The proposal comprises replacement of an existing bridge crossing with a new structure designed to withstand flood conditions and maintain long-term transport connectivity. The bridge design incorporates flood levels and flood velocities for a range of design events, including the 2 year, 5 year, 20 year, 100 year and 2000 year ARI flood events. These parameters have been considered in the design of the bridge structure, foundations and scour protection measures.

Importantly, the project does not establish a new obstacle within the floodplain. Rather, it replaces existing crossing infrastructure with a structure specifically designed for the hydraulic and geotechnical characteristics of the site. The bridge alignment follows the established road corridor and maintains floodplain functionality through an elevated bridge structure supported on pier elements rather than a broad embankment crossing.

6.2.5 BUSHFIRE HAZARD OVERLAY

The Project Area is within the Bushfire Hazard Overlay. However, the Project comprises replacement of an existing bridge crossing and associated approach works within an established transport corridor and does not involve the creation of a new sensitive land use, habitable building or increase in permanent occupancy. The proposal therefore does not increase the exposure of people or property to bushfire hazards and maintains the existing transport function of the Mount Fox Road corridor.

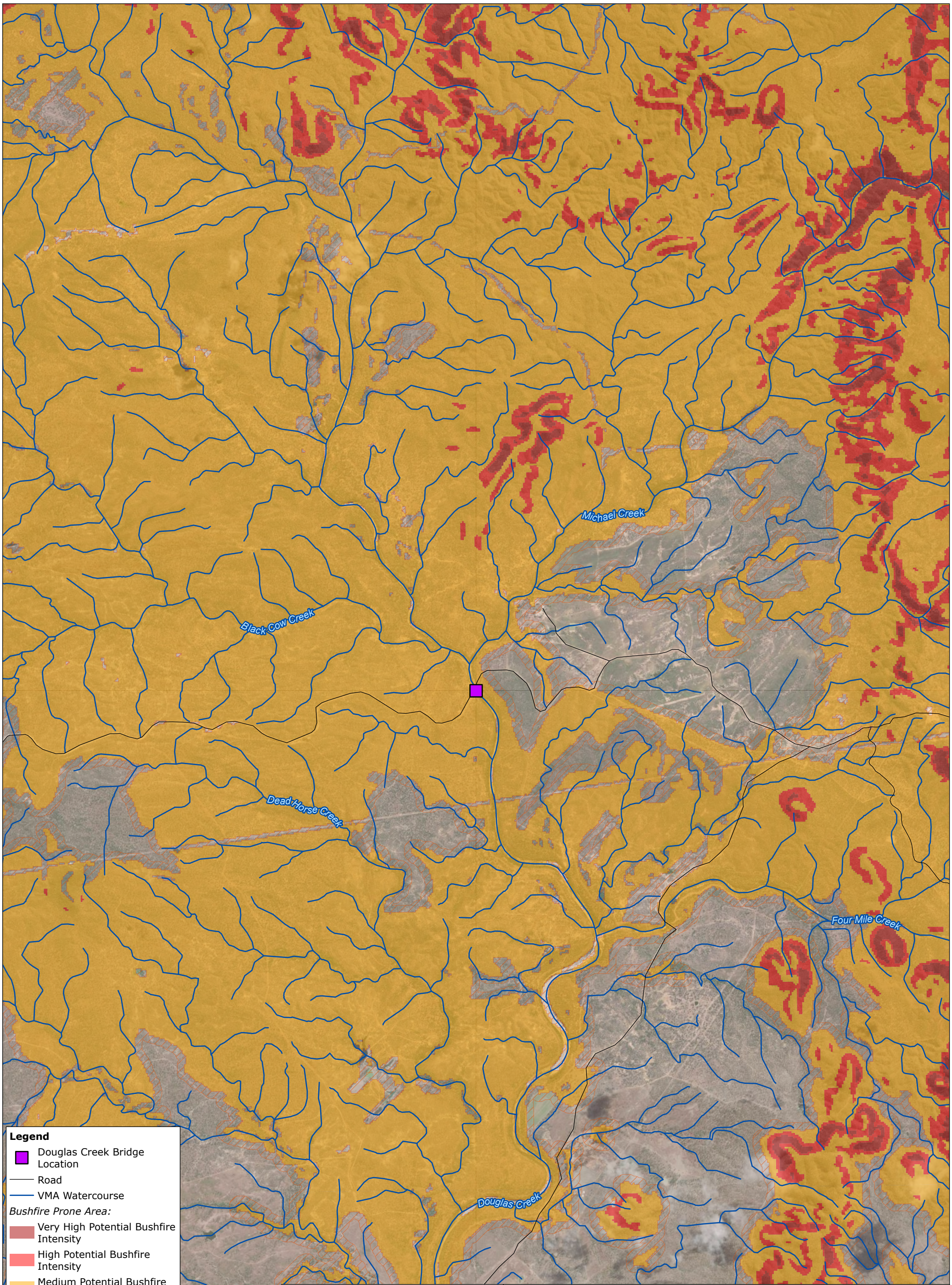
The proposed bridge structure is predominantly constructed from reinforced concrete, prestressed concrete and structural steel components, which are inherently resistant to ignition and bushfire attack. The development will also improve the reliability and resilience of the transport network by replacing the existing crossing with a purpose-designed bridge structure capable of providing safer access for emergency services, maintenance vehicles and road users during bushfire response and recovery activities. Accordingly, the Project is considered consistent with the intent and outcomes of the Bushfire Hazard Overlay Code (Figure 6-1).

6.2.6 NATURAL ENVIRONMENT OVERLAY

The Project Area is subject to the Natural Environment Overlay, with mapped Matters of State Environmental Significance (MSES) identified in Table 6-1 and shown on Figure 6-4. These values include MSES Regulated Vegetation associated with the defined watercourse of Douglas Creek and areas of MSES Regulated Vegetation (Category R) within the broader Project Area. The presence of these mapped values reflects the environmental sensitivity of the Douglas Creek corridor and the need for the proposed works to avoid, minimise and manage potential impacts to riparian, waterway and associated ecological values.

The proposed works comprise the replacement of an existing bridge crossing and associated approach works within the established Mount Fox Road reserve. The Project does not introduce a new transport corridor or expand development into previously unaffected rural land. Rather, the works are confined to the existing road corridor and approved disturbance extent as far as practicable, with construction and operational impacts to be managed through the supporting design, hydraulic assessment, erosion and sediment control measures, and rehabilitation of disturbed areas.

As outlined in Table 6-1, vegetation disturbance associated with the broader Gawara Baya Wind Farm off-site road upgrade program has been addressed through the existing Operational Works – Native Vegetation Clearing approval and Relevant Purpose Determination. Accordingly, this Development Application does not seek a separate approval for native vegetation clearing. Any clearing required to facilitate the Douglas Creek Bridge and approach works will be undertaken in accordance with the approved clearing footprint, endorsed plans and applicable approval conditions. On this basis, and having regard to Figure 6-4, the Project is considered to appropriately respond to the Natural Environment Overlay by limiting works to the established road reserve, relying on the existing approved clearing pathway, and incorporating mitigation measures to protect waterway function, bed and bank stability, water quality and surrounding environmental values.



Source:
Boundary: N/A
Base Data: Queensland Globe CC BY 4.0
Imagery: Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community

Coordinate System:
GDA2020 MGA Zone 55

Date: 17/07/2026
Created By: WB
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F4-1 - Douglas Creek Bridge - Bushfire Prone Areas

GBWF OSR Bridge Approvals

Client: DavBridge

ERM

0833379 - GBWF OSR Bridge Approvals.aprx

Legend

- Douglas Creek Bridge Location
- Road
- VMA Watercourse
- Flood Hazard Area

Source:
Boundary: N/A
Base Data: Queensland Globe CC BY 4.0
Imagery: Earthstar Geographics

Coordinate System:
GDA2020 MGA Zone 55

Date: 17/07/2026
Created By: WB
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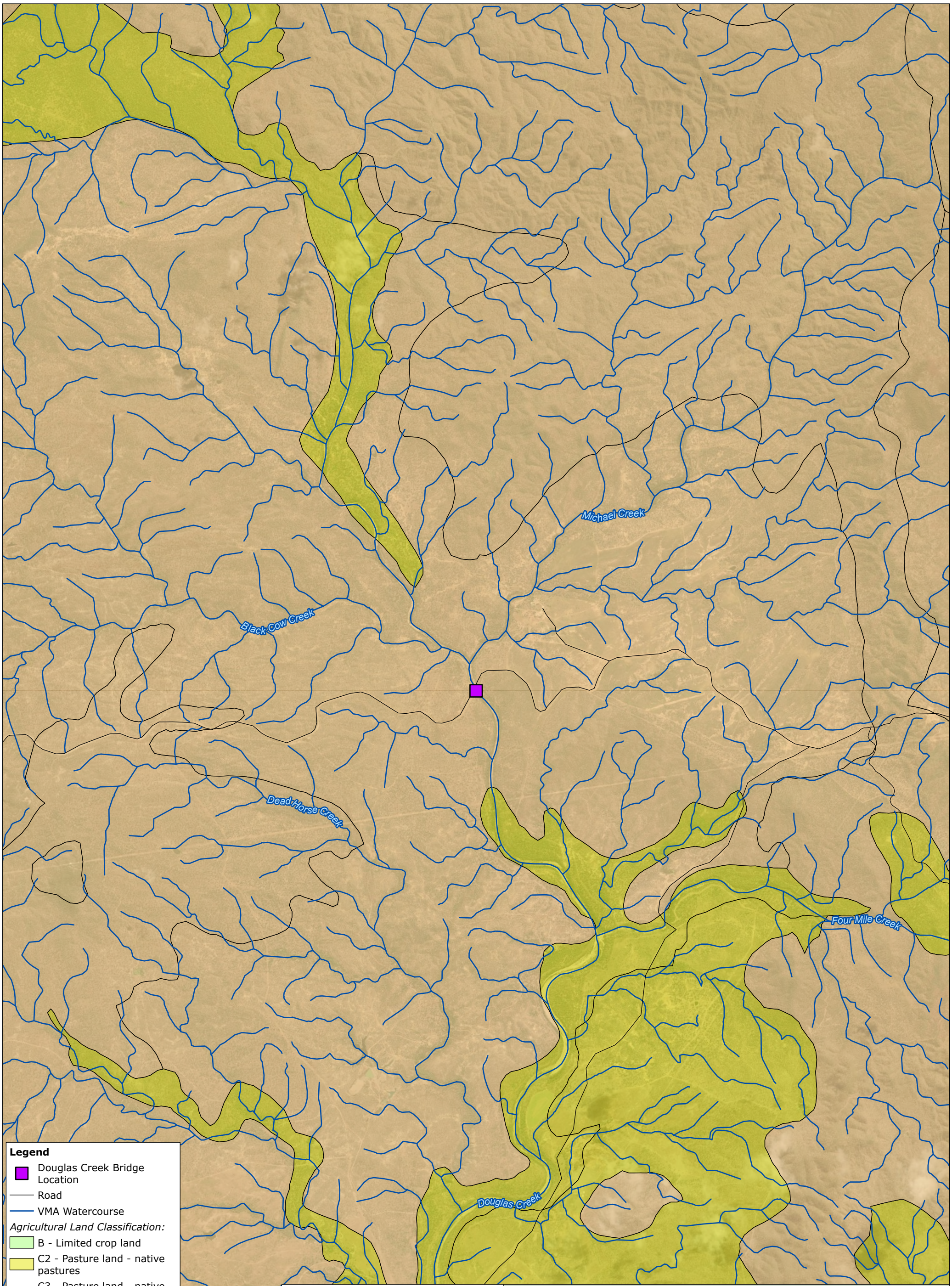
F4-2 - Douglas Creek Bridge - Agricultural Land Classification

GBWF OSR Bridge Approvals

Client: DavBridge

ERM

0833379 - GBWF OSR Bridge Approvals.aprx



Legend

- Douglas Creek Bridge Location
- Road
- VMA Watercourse

Agricultural Land Classification:

- B - Limited crop land
- C2 - Pasture land - native pastures
- C3 - Pasture land - native pastures, light grazing in accessible areas

Source:
Boundary: N/A
Base Data: Queensland Globe CC BY 4.0
Imagery: Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community

Coordinate System:
GDA2020 MGA Zone 55
Date: 17/07/2026
Created By: WB
Drawing Size: A3

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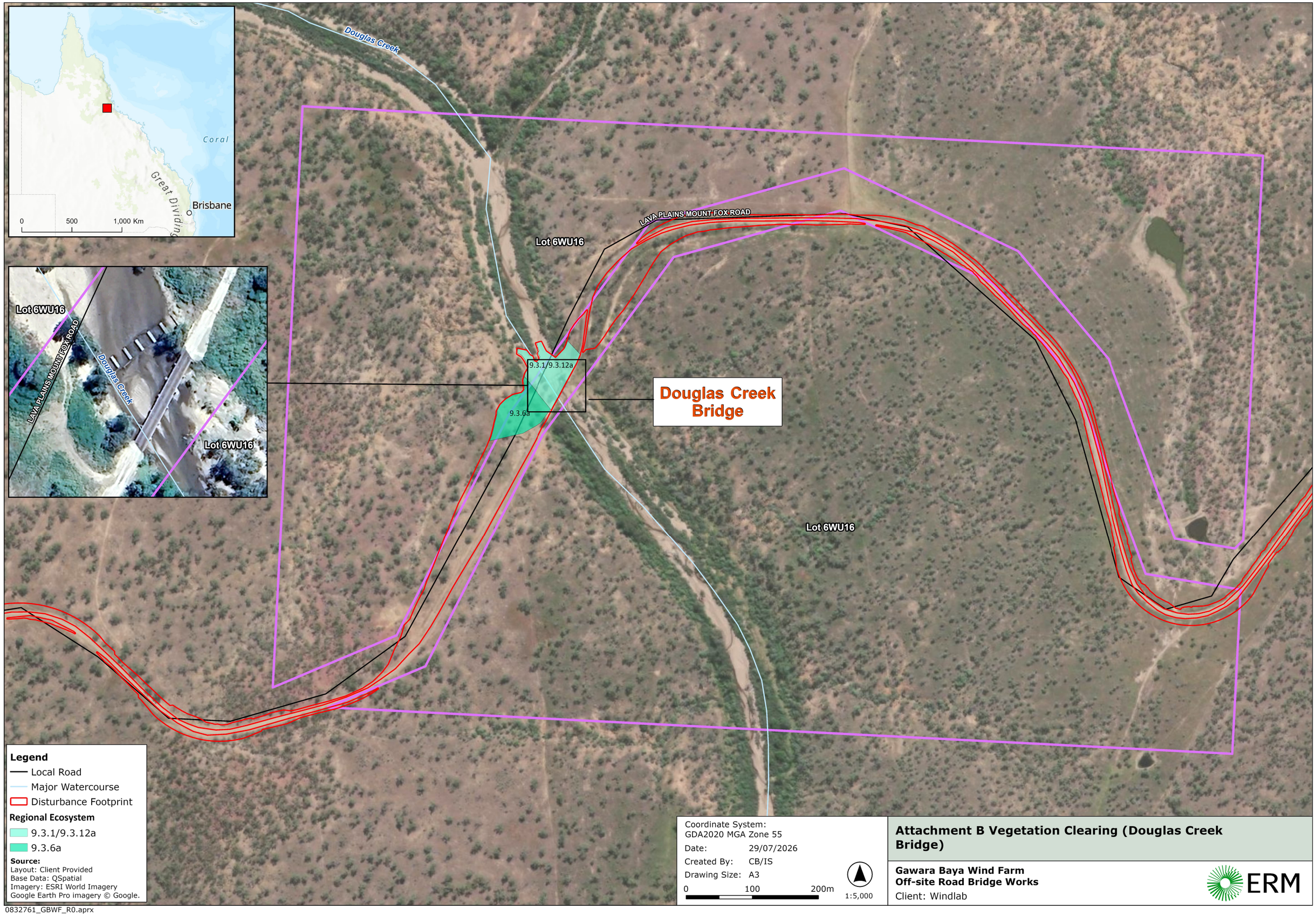
F4-3 - Douglas Creek Bridge - Flood Hazard Areas

GBWF OSR Bridge Approvals

Client: DavBridge

ERM

0833379 - GBWF OSR Bridge Approvals.aprx



Attachment B Vegetation Clearing (Douglas Creek Bridge)

Gawara Baya Wind Farm
Off-site Road Bridge Works
Client: Windlab

ERM

0832761_GBWF_R0.aprx

7. IMPACTS AND MITIGATION

7.1 GENERAL IMPACTS

The proposed development comprises replacement of the existing Douglas Creek crossing on Mount Fox Road, including removal of the existing bridge, construction of a replacement bridge crossing, works within the defined waterway, localised bed and bank disturbance, approach works and associated construction activities. Douglas Creek is mapped as a Major (purple) waterway.

Potential impacts associated with the proposed works are expected to be primarily limited to temporary disturbance of the waterway during construction, localised erosion and sediment generation, potential water quality impacts associated with construction activities, localised changes to hydraulic conditions and localised scour around bridge structures and embankments.

The hydraulic assessment indicates that changes to flood behaviour are generally localised to the immediate bridge area. Flood level changes are negligible for frequent flood events and remain localised during larger design events. The primary cause of increased upstream flood levels is identified as retention of the existing bridge embankment, which reduces floodplain conveyance and concentrates flow around the new structure.

Localised velocity increases are predicted around bridge piers and embankment areas during larger flood events. The hydraulic assessment identifies that these changes are generally confined to the immediate vicinity of the crossing and may increase scour risk at abutments and residual embankment sections if not appropriately managed.

The proposed bridge provides an improvement in flood immunity and operational reliability compared with the existing crossing, reducing both Average Annual Time of Submergence and Average Annual Time of Closure while maintaining waterway connectivity.

7.2 TRAFFIC MANAGEMENT

Construction of the Douglas Creek Bridge and associated approach works will require the movement of construction personnel, plant, equipment and construction materials to and from the Project Area via Mount Fox Road. These activities have the potential to result in temporary disruptions to traffic flow, reduced travel speeds and short-term impacts to road users during specific construction activities. The Project will therefore be undertaken in accordance with a project-specific Traffic Management Plan (Appendix G), which outlines the procedures and controls required to maintain the safe and efficient operation of the local road network during construction.

The Traffic Management Plan includes measures relating to temporary traffic control, signage, vehicle access arrangements, management of construction vehicle movements, communication with road users and implementation of safe work zones. Construction activities will be staged where practicable to minimise disruptions to traffic and maintain access along Mount Fox Road. Through implementation of these measures, traffic-related impacts are expected to be temporary, localised and effectively managed throughout the construction period.

7.3 MITIGATION MEASURES

Mitigation measures have been incorporated into the design and construction approach for the proposed Douglas Creek bridge replacement to minimise impacts on the waterway, fish passage, bed and bank stability, water quality and surrounding environmental values. The proposed works include erosion and sediment control measures and bank stabilisation as part of the project scope.

Mitigation measures focus on minimising disturbance within the waterway, controlling erosion and sediment generation during construction, managing water quality risks, stabilising disturbed areas and incorporating scour protection where required to maintain the long-term stability of the crossing.

7.3.1 CONSTRUCTION MITIGATION MEASURES

Construction activities will be confined to the minimum area necessary to undertake removal of the existing bridge, construction of the replacement bridge, associated formation works and bank stabilisation measures.

Construction works within the defined waterway will be managed to minimise disturbance to the bed and banks of Douglas Creek and reduce the duration of in-stream works where practicable.

Temporary construction works will be removed following completion of bridge construction and disturbed areas outside the permanent development footprint will be reinstated and stabilised.

7.3.2 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction to minimise sediment mobilisation and protect the water quality and ecological values of Douglas Creek. Erosion and sediment control measures form part of the proposed works and are identified as ancillary works required to support the development.

Disturbed areas will be stabilised following completion of works and erosion and sediment controls will be maintained during construction to prevent sediment entering the waterway.

The hydraulic assessment identifies that localised velocity increases near bridge piers, abutments and retained embankment sections may increase scour risk. Appropriate scour protection measures, including rock armouring or reinforced aprons where required, will be incorporated into the detailed design to maintain structural stability and reduce erosion risk.

The hydraulic assessment also identifies removal or modification of retained embankment sections as the primary mitigation measure for reducing localised afflux and improving hydraulic performance.

7.3.3 WATER QUALITY

Construction activities have the potential to affect water quality through disturbance of bed and bank material and mobilisation of sediment from exposed soils.

Water quality impacts will be minimised through implementation of erosion and sediment controls, management of disturbed areas and progressive stabilisation of exposed surfaces.

Construction activities should be undertaken in accordance with project-specific environmental management measures to minimise the release of sediment or other contaminants to Douglas Creek.

7.3.4 REHABILITATION

Disturbed areas outside the permanent development footprint will be reinstated and stabilised following completion of construction activities. Rehabilitation will include reinstatement of disturbed bed and bank areas, removal of temporary construction materials and implementation of bank stabilisation measures where required.

Where embankment removal or modification is implemented, final shaping and stabilisation should be completed in a manner that supports improved hydraulic performance and reduced scour potential.

The hydraulic assessment concludes that disturbed areas should be stabilised and that mitigation should focus on embankment treatment and targeted scour protection to ensure long-term stability of the bridge and waterway interface.

8. CONCLUSION

This Planning Report has been prepared by ERM on behalf of DavBridge in support of a Development Application for Operational Works associated with the replacement of the existing Douglas Creek Bridge and associated approach works along Mount Fox Road. The proposed development forms part of the broader Gawara Baya Wind Farm off-site road upgrade program and is required to facilitate the safe haulage of OSOM vehicles necessary for construction of the approved Gawara Baya Wind Farm. The proposed works comprise construction of a replacement bridge structure, associated bridge approaches, scour protection works, bridge barriers, drainage infrastructure and associated civil works required to achieve the necessary transport standard along the approved haulage route.

The proposed works form part of a broader strategic upgrade of the existing haulage network and have been designed to address existing constraints associated with crossing capacity, flood resilience, road safety and heavy vehicle maneuverability. The existing Douglas Creek crossing has been identified as a key constraint within the transport corridor and the replacement bridge has been specifically designed to improve network functionality while accommodating OSOM vehicle movements associated with the delivery of wind turbine components, construction materials and associated project infrastructure. The proposed bridge incorporates a substantially larger waterway opening, upgraded structural capacity and associated flood protection measures to improve the long-term safety and resilience of the project.

The assessment undertaken within this Planning Report demonstrates that the proposed development is consistent with the relevant provisions of the Charters Towers Regional Council Planning Scheme and applicable assessment benchmarks. The proposed works are located within an existing transport corridor and have been designed to minimise impacts on surrounding environmental, agricultural and waterway values while improving the safety and functionality of the local road network. Any potential construction-related impacts will be appropriately managed through the implementation of project-specific management measures, including a Construction Environmental Management Plan, Traffic Management Plan and Erosion and Sediment Control Plan.

Accordingly, the proposed Operational Works are considered to improves transport connectivity and flood resilience, and be consistent with the intent of the Planning Scheme. The project is believed to be able to be undertaken without resulting in unacceptable impacts on the surrounding environment or the operation of the local road network. ERM respectfully requests that Charters Towers Regional Council approve the application, subject to reasonable and relevant conditions.

APPENDIX A DA FORM 1

DA Form 1 – Development application details

Approved form (version 1.6 effective 2 August 2024) 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) (*individual or company full name*)	Gawara Baya Wind Farm Pty Ltd c/- Environmental Resources Management Australia Pty Ltd
Contact name *(only applicable for companies)*	Michael Rookwood
Postal address *(P.O. Box or street address)*	Level 9, 260 Queen Street
Suburb	Brisbane
State	Queensland
Postcode	4000
Country	Australia
Contact number	+61730078478
Email address *(non-mandatory)*	qldapprovals@erm.com
Mobile number *(non-mandatory)*	n/a
Fax number *(non-mandatory)*	n/a
Applicant's reference number(s) *(if applicable)*	0833379
1.1) Home-based business	
☐ Personal details to remain private in accordance with section 264(6) of *Planning Act 2016*	

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)

Queensland Government

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
	-	-	Mount Fox Road	Valley of Lagoons
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)
	4850	6	WU16	Charters Towers Regional

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)*
		☐ WGS84 ☐ GDA94 ☐ Other:	

☐ Coordinates of premises by easting and northing

Easting(s)	Northing(s)	Zone Ref.	Datum	Local Government Area(s) *(if applicable)*
		☐ 54 ☐ 55 ☐ 56	☐ WGS84 ☐ GDA94 ☐ 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:	Douglas Creek

☐ 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:	
☐ Listed on the Environmental Management Register (EMR) under the *Environmental Protection Act 1994*	
EMR site identification:	
☐ Listed on the Contaminated Land Register (CLR) under the *Environmental Protection Act 1994*	
CLR site identification:	

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 a replacement bridge crossing over Douglas Creek, including bridge abutments, bridge piles, scour protection works and associated construction activities.

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
6.4) Is the application for State facilitated development?
☐ Yes - Has a notice of declaration been given by the Minister?
☐ No

Section 2 – Further development details

7) Does the proposed development application involve any of the following?	
Material change of use	☐ Yes – complete division 1 if assessable against a local planning instrument
Reconfiguring a lot	☐ Yes – complete division 2
Operational work	☒ Yes – complete division 3
Building work	☐ Yes – complete *DA Form 2 – Building work details*

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 *(include each definition in a new row)*	Number of dwelling units *(if applicable)*	Gross floor area (m^2) *(if applicable)*

8.2) Does the proposed use involve the use of existing buildings on the premises?
☐ Yes
☐ No

8.3) Does the proposed development relate to temporary accepted development under the Planning Regulation?	
☐ Yes – provide details below or include details in a schedule to this development application	
☐ No	
Provide a general description of the temporary accepted development	Specify the stated period dates under the Planning Regulation

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? *(tick all applicable boxes)*	
☐ Subdivision *(complete 10)*	☐ Dividing land into parts by agreement *(complete 11)*
☐ Boundary realignment *(complete 12)*	☐ Creating or changing an easement giving access to a lot from a constructed road *(complete 13)*

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?	
☐ Yes – provide additional details below ☐ 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?		
☒ Road work	☐ Stormwater	☒ Water infrastructure
☒ Drainage work	☒ Earthworks	☐ Sewage infrastructure
☐ Landscaping	☐ Signage	☐ Clearing vegetation
☐ 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:	
☒ No	

14.3) What is the monetary value of the proposed operational work? *(include GST, materials and labour)*
$11 137 655.05

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application
Charters Towers Regional 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 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 under Chapter 1 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules or* • *Part 2under Chapter 2 of the DA Rules will still apply if the application is for state facilitated development* *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)*			
☐ Yes – provide details below or include details in a schedule to this development application ☒ No			
List of approval/development application references	Reference number	Date	Assessment manager
☐ Approval ☐ Development application	2211-32271 SDA	13/11/2023	State Assessment Referral Agency
☐ Approval ☐ Development application			

21) Has the portable long service leave levy been paid? *(only applicable to development applications involving building work or operational work)*		
☒ Yes – a copy of the receipted QLeave form is attached to this development application ☐ 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 ☐ 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)
Confirming payment of 'Portable long service leave levy' is Principals responsibility. The payment hasn't been made at this stage, planned for payment post-IFC. This should not delay submission/approval of the permit.		

22) Is this development application in response to a show cause notice or required as a result of an enforcement notice?
☐ Yes – show cause or enforcement notice is attached ☒ 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 *Environmental Protection Act 1994*?

☐ 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

☒ No

***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.*

Proposed ERA number:		Proposed ERA threshold:	
Proposed ERA name:			

☐ 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**?

☐ Yes – *Form 536: Notification of a facility exceeding 10% of schedule 15 threshold* is attached to this development application

☒ No

***Note**: See www.business.qld.gov.au for further information about hazardous chemical notifications.*

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.desi.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 Resources at www.resources.qld.gov.au for further information.*

DA templates are available from planning.statedevelopment.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 Form1 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 planning.statedevelopment.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 Resources at www.resources.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, Science and Innovation at www.desi.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.resources.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.desi.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.desi.qld.gov.au for information requirements regarding development of Queensland heritage places.*

For a heritage place that has cultural heritage significance as a local heritage place and a Queensland heritage place, provisions are in place under the Planning Act 2016 that limit a local categorising instrument from including an assessment benchmark about the effect or impact of, development on the stated cultural heritage significance of that place. See guidance materials at www.planning.statedevelopment.qldgov.au for information regarding assessment of Queensland heritage places.

Name of the heritage place:		Place ID:	

Decision under section 62 of the *Transport Infrastructure Act 1994*

23.14) 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

23.15) 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.statedevelopment.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 ***Note**: See the Planning Regulation 2017 for referral requirements*	☒ Yes
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	☐ Yes ☒ Not applicable
Supporting information addressing any applicable assessment benchmarks is with the development application ***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.*	☒ Yes
Relevant plans of the development are attached to this development application ***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*	☒ Yes
The portable long service leave levy for QLeave has been paid, or will be paid before a development permit is issued *(see 21)*	☒ Yes ☐ 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 *Note: For completion by assessment manager if applicable*			
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			

APPENDIX B DOUGLAS CREEK BRIDGE DRAWINGS

GENERAL NOTES

G1 WESTERA PARTNERS HAS LIMITED CONTROL OR INPUT TO LOCAL GOVERNMENT OR OTHER LEGISLATED APPROVALS UNLESS SPECIFICALLY ENGAGED BY IT'S CLIENT. ANY CHANGES TO APPROVAL REQUIREMENTS (INCLUDING ORDERS FOR SUSPENSION OF WORKS ETC) SHOULD BE COMMUNICATED TO WESTERA PARTNERS AND ALL OTHER RELEVANT DESIGNERS TO ALLOW ASSESSMENT OF POTENTIAL RISKS AND ENSURE DESIGN AND SAFETY COMPLIANCE.

G2 ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LOCAL AUTHORITIES STANDARD DRAWINGS & SPECIFICATIONS AND COMPLETED TO THE SATISFACTION OF THE SUPERINTENDENT AND LOCAL AUTHORITY.

G3 UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.

G4 PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR MUST LOCATE ALL EXISTING SERVICES AND PROMPTLY PROVIDE THE LOCATION DATA TO THE DESIGN ENGINEER TO ASSESS IMPACTS ON THE DESIGN.

G5 THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE TO BE VERIFIED FOLLOWING SUB-SOIL TESTS OF THE SUB-GRADE MATERIAL.

G6 WATER PIPES SHALL BE;
- P.V.C.-M WATER PIPES ARE TO BE SERIES 2 PN16 SN10 R.R.J.
- D.I.C.L. WATER PIPES ARE TO BE PN35 WITH ALL FITTINGS TO BE FUSION BONDED POLYMERIC COATED.
- PE WATER PIPES ARE TO BE PN16 SDR11 PE100. DN25 AND DN32 WATER SERVICES SHALL BE PE80B.

G7 ALL "AS CONSTRUCTED" INFORMATION IS TO BE RECORDED AS REQUIRED BY THE LOCAL AUTHORITY AND SUBMITTED TO THE SUPERINTENDENT IMMEDIATELY AFTER COMPLETION OF THE WORKS.

G8 ALL ALLOTMENTS ARE TO BE GRADED AT A MINIMUM GRADE OF 1 IN 200.

CONCRETE NOTES

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600 CONCRETE STRUCTURES CODE AND THE REFERENCED STANDARDS THEREIN.

C2 THE CONCRETE STRENGTH GRADE AND THE COVER TO REINFORCEMENT FOR THE VARIOUS CONCRETE ELEMENTS SHALL BE AS LISTED BELOW:
- CLIMATE ZONE: ~~TROPICAL~~ TEMPERATE ~~ARID~~
- LOCATION: ~~COASTAL~~ ~~NEAR COASTAL~~ INLAND

ELEMENT	EXPOSURE CLASSIFICATION	STRENGTH GRADE	MINIMUM COVER
MANHOLES	B1	N32	40
FIELD INLET PITS	B1	N32	40
INTERNAL ROADS	B1	N32	40
KERB/CHANNEL	B1	N32	–
FOOTPATHS	B1	N32	40
RETAINING WALL PANELS	B1	N32	30*
BORED PIERS	B1	N32	40

*RIGID FORMWORK & INTENSE COMPACTION

C3 CONCRETE TO HAVE A MAXIMUM AGGREGATE SIZE OF 20mm WITH 80mm MAXIMUM SLUMP, A WATER/CEMENT RATIO OF NOT GREATER THAN 0.65 AND A MAXIMUM FINAL BASIC DRYING SHRINKAGE STRAIN OF 800 x 10^{-6}, UNLESS APPROVED OTHERWISE.

C4 NO ADDITIVES SHALL BE ADDED OR APPLIED TO THE CONCRETE MIX WITHOUT THE APPROVAL OF THE ENGINEER.

C5 THE MAXIMUM PERMISSIBLE TRANSPORT TIME FOR CONCRETE BETWEEN BATCHING AND PLACEMENT ON SITE SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.

AMBIENT AIR TEMPERATURE	MAX. BATCHING TO PLACEMENT TIME
10° – 24°C	120 MINUTES
25° – 27°C	90 MINUTES
28° – 30°C	60 MINUTES
31° – 33°C	45 MINUTES
34° – 36°C	30 MINUTES
37°C+	NO PLACEMENT OF CONCRETE UNLESS CHILLED WATER OR ICE IN MIX

C6 ALL CONCRETE SHALL BE MECHANICALLY VIBRATED. VIBRATORS SHALL NOT BE USED TO SPREAD CONCRETE.

C7 ALL CONCRETE SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH AS1379 ADOPTING THE PROJECT ASSESSMENT METHOD FOR COMPRESSIVE STRENGTH AND SLUMP COMPLIANCE. THE RESULTS OF ALL TESTS SHALL BE PROMPTLY SUBMITTED TO THE ENGINEER FOR REVIEW.

C8 WHEN THE AIR TEMPERATURE EXCEEDS 30°C, ALIPHATIC ALCOHOL SHALL BE APPLIED TO THE CONCRETE SURFACE OF SLABS IMMEDIATELY AFTER THE INITIAL SCREED AND AGAIN AFTER BULL FLOATING.

C9 CURING OF ALL CONCRETE SURFACES SHALL COMMENCE IMMEDIATELY AFTER COMPLETING CONCRETE FINISHING AND SHALL CONTINUE FOR 7 DAYS. CONTRACTOR TO CONFIRM METHOD OF CURING WITH ENGINEER PRIOR TO USE.

C10 SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.

C11 BEAM DEPTHS ARE WRITTEN FIRST AND INCLUDE SLAB THICKNESS, IF ANY.

C12 NO HOLES, CHASES OR EMBEDDED ITEMS OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER. CONDUITS, PIPES ETC. SHALL NOT BE PLACED IN THE COVER THICKNESS OF THE CONCRETE.

C13 WHERE SERVICE PIPES PENETRATE CONCRETE ELEMENTS, PROVISION SHOULD BE MADE TO ALLOW FOR MOVEMENT OF THE ELEMENT.

C14 FORMWORK SHALL BE DESIGNED, CONSTRUCTED AND STRIPPED IN ACCORDANCE WITH AS3610 FORMWORK CODE, UNLESS NOTED OTHERWISE ON THE DRAWINGS.

C15 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION OR SCALE.

C16 ALL REINFORCEMENT SHALL BE SECURELY SUPPORTED IN ITS CORRECT POSITION ON PLASTIC BAR CHAIRS, GENERALLY AT NOT GREATER THAN 800mm CENTRES IN BOTH DIRECTIONS.

C17 WELDING AND HEATING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT APPROVAL OF THE ENGINEER.

C18 ALL STEEL REINFORCEMENT IN CONCRETE ELEMENTS SHALL BE INSPECTED BY THE ENGINEER AND PASSED PRIOR TO POURING OF ANY CONCRETE.

C19 LAP REINFORCEMENT ONLY AT LOCATIONS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER.

C20 SLAB FABRIC SHALL BE LAPPED ONE FULL PANEL OF FABRIC PLUS 50mm SO THAT THE TWO OUTERMOST TRANSVERSE WIRES OF ONE SHEET OVERLAP THE TWO OUTERMOST TRANSVERSE WIRES OF THE SHEET BEING LAPPED BY 50mm.

C21 BAR REINFORCEMENT SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING TABLE.

TYPICAL BAR REINFORCEMENT LAP LENGTHS		
BAR	LAP LENGTH UNO	HORIZONTAL BARS WITH GREATER THAN 300mm OF CONCRETE CAST BELOW THEM
N12	550	750
N16	800	1100
N20	1100	1400
N24	1250	1600
N28	1400	1800
N32	1600	2100
N36	2000	2500

WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.

C22 A VAPOUR BARRIER OF 0.2mm (200um) MINIMUM THICK POLYTHENE SHEETING SHALL BE PLACED BENEATH SLABS ON GROUND UNLESS NOTED OTHERWISE.

LEGEND

GENERAL

GRAVEL PAVEMENT
REINFORCED CONCRETE PAVEMENT BROOM FINISH
REINFORCED CONCRETE PATHWAY/CROSSOVER
TURF
ROCK ARMOUR
CEMENT GROUTED STONE PITCHING
TELECOMMUNICATION — T —
GAS MAIN — G —
ELECTRICITY OVERHEAD — V —
ELECTRICITY UNDERGROUND — E —
LIGHT POLE — V LP V —
POWER POLE — V PP V —
PIT (TELSTRA/ELEC) — T — T —
EDGE OF BITUMEN
FENCE
EXISTING SURFACE LEVEL × 2.53
EXISTING CONTOUR MINOR — 33.75 —
EXISTING CONTOUR MAJOR — 34.00 —
DESIGN SURFACE LEVEL × 2.53
DESIGN CONTOUR MINOR — 33.75 —
DESIGN CONTOUR MAJOR — 34.00 —
RETAINING WALL
STAGE BOUNDARY

STORMWATER DRAINAGE

	NEW	EXISTING
STORMWATER PIPE		
SAG GULLY PIT		
ON GRADE GULLY PIT		
MANHOLE		
600 x 600 FIELD INLET		
900 x 600 FIELD INLET		
1050 DIA FIELD INLET		
HEADWALL		
KERB ADAPTER WITH ROOFWATER PIPE	— SWO —	
STORMWATER STRUCTURE LABEL	2A	

WATER

	NEW	EXISTING	DISUSED
WATER MAIN	W — W	W — W	W — W
FIRE HYDRANT	W FH W	W FH W	W FH W
DUAL OUTLET FIRE HYDRANT	W DFH W	W DFH W	W DFH W
SWABBING DUAL OUTLET FIRE HYDRANT	W SDFH W		
SWABBING FIRE HYDRANT	W SFH W	W SFH W	W SFH W
ISOLATION VALVE	W V W	W V W	W V W
SCOUR VALVE	W W	W W	W W
AIR VALVE	W AV W	W AV W	W AV W
DEAD END	W W	W W	W W
TEST/CHLORINATION POINT	W W		
REDUCER	150 W 100 W	150 W 100 W	150 W 100 W
PIPE MATERIAL CHANGE	PVC W DICL W	PVC W DICL W	PVC W DICL W
WATER SERVICE PRE-TAPPED TEE	W W		
WATER SERVICE PIPE & CONDUIT	DN25ø		
FLOW METER	W WM W		
FLUSHING POINT	W F W		
WATER IRRIGATION	I I		
REDUCE PRESSURE ZONE (RPZ)	RPZ I I RPZ		

SEWERAGE

	NEW	EXISTING	DISUSED
GRAVITY SEWER MAIN	S S	S S	S S
SEWER RISING MAIN	RM	RM RM	
SEWER VACUUM MAIN	VM	VM VM	
MAINTENANCE HOLE & END OF LINE	S 1/1 S	S 1/1 S	S 1/1 S
END OF LINE	S 1/1 E S	S 1/1 E S	S 1/1 E S
MAINTENANCE SHAFT	S 1/1 S	S 1/1 S	S 1/1 S
HORIZONTAL/VERTICAL BEND	S VB1 1 HB1 1 S	S VB1 1 HB1 1 S	S VB1 1 HB1 1 S
COMPOUND BEND	S CB1 1 S	S CB1 1 S	S CB1 1 S
STUB / TEMPORARY END	S		
RODDING END	S RE 1		
PROPERTY CONNECTION	S S		
OVERFLOW MAINTENANCE HOLE	S OFMH S		
ISOLATION VALVE	RM RM		
SCOUR VALVE AND CHAMBER	RM RM		
GAS RELEASE VALVE	RM GRV RM		
FLUSHING POINT	RM FP RM		
DISCHARGE MAINTENANCE HOLE	RM DMH S		
NON-RETURN/REFLUX VALVE	RM RM		
VENT POLE / ODOUR CONTROL UNIT			

30% DESIGN ISSUE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED
DATE APRIL 2026
DOCUMENT CONTROL

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR BRAZIER MOTTI PHONE 07 4772 1144
DATUM A.H.D. PSM30343 RL.491.533

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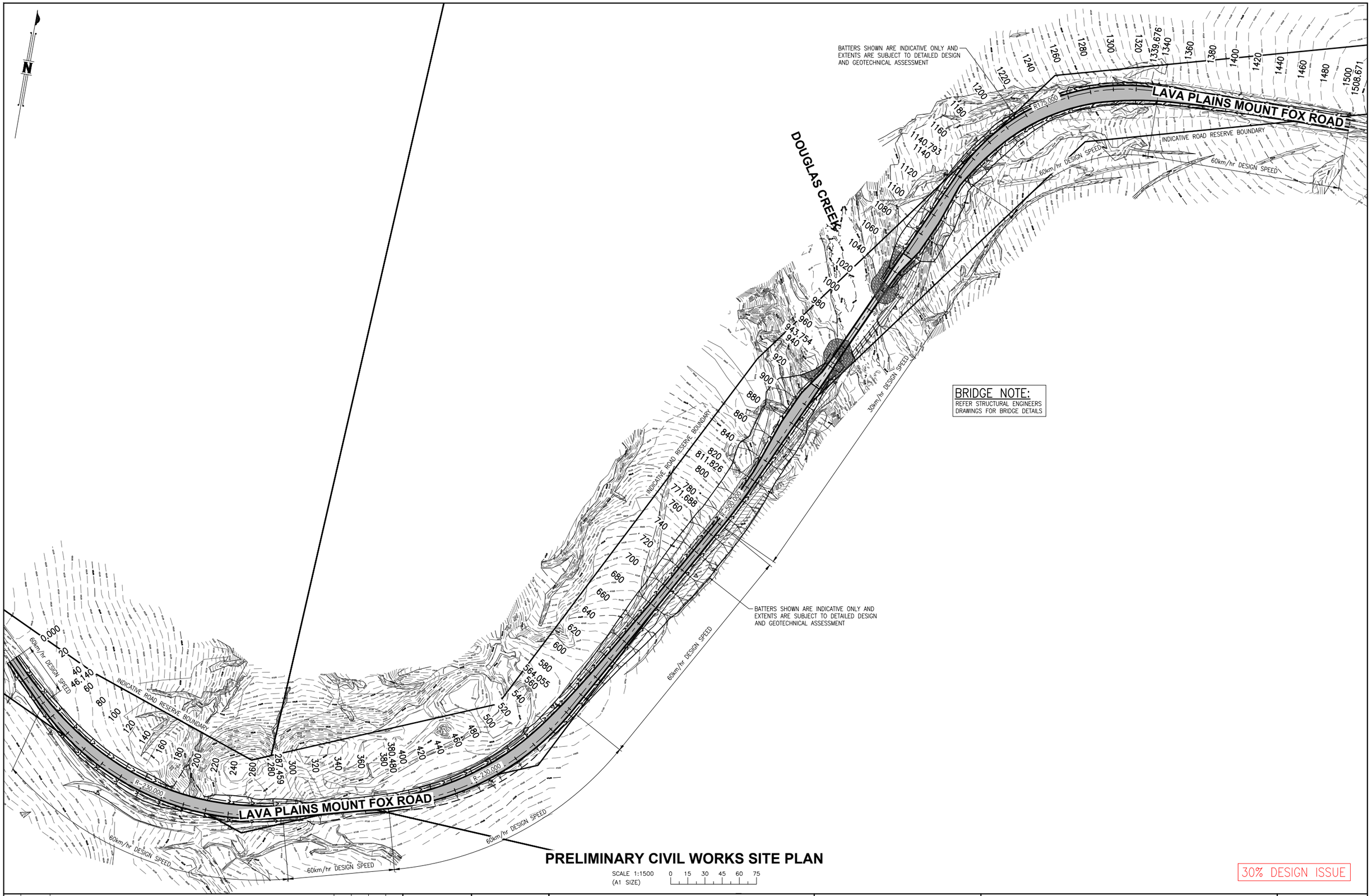
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL NOTES AND LEGEND
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC01
SHEET NUMBER 01 OF 14
REVISION A

G26-017-D-PC_Pre_Civil_Notes.dwg



PRELIMINARY CIVIL WORKS SITE PLAN

SCALE 1:1500 (A1 SIZE) 0 15 30 45 60 75

30% DESIGN ISSUE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	
DATE	APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
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RL.491.533

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PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY CIVIL WORKS SITE PLAN
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26-017-D-PC02
SHEET NUMBER: 02 OF 14
REVISION: A

G26-017-D-PC_Pre_Civil_Site.dwg

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	
DATE	APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.

APPROVED

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PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT

LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX

TITLE: PRELIMINARY CIVIL WORKS PLAN 1 of 5

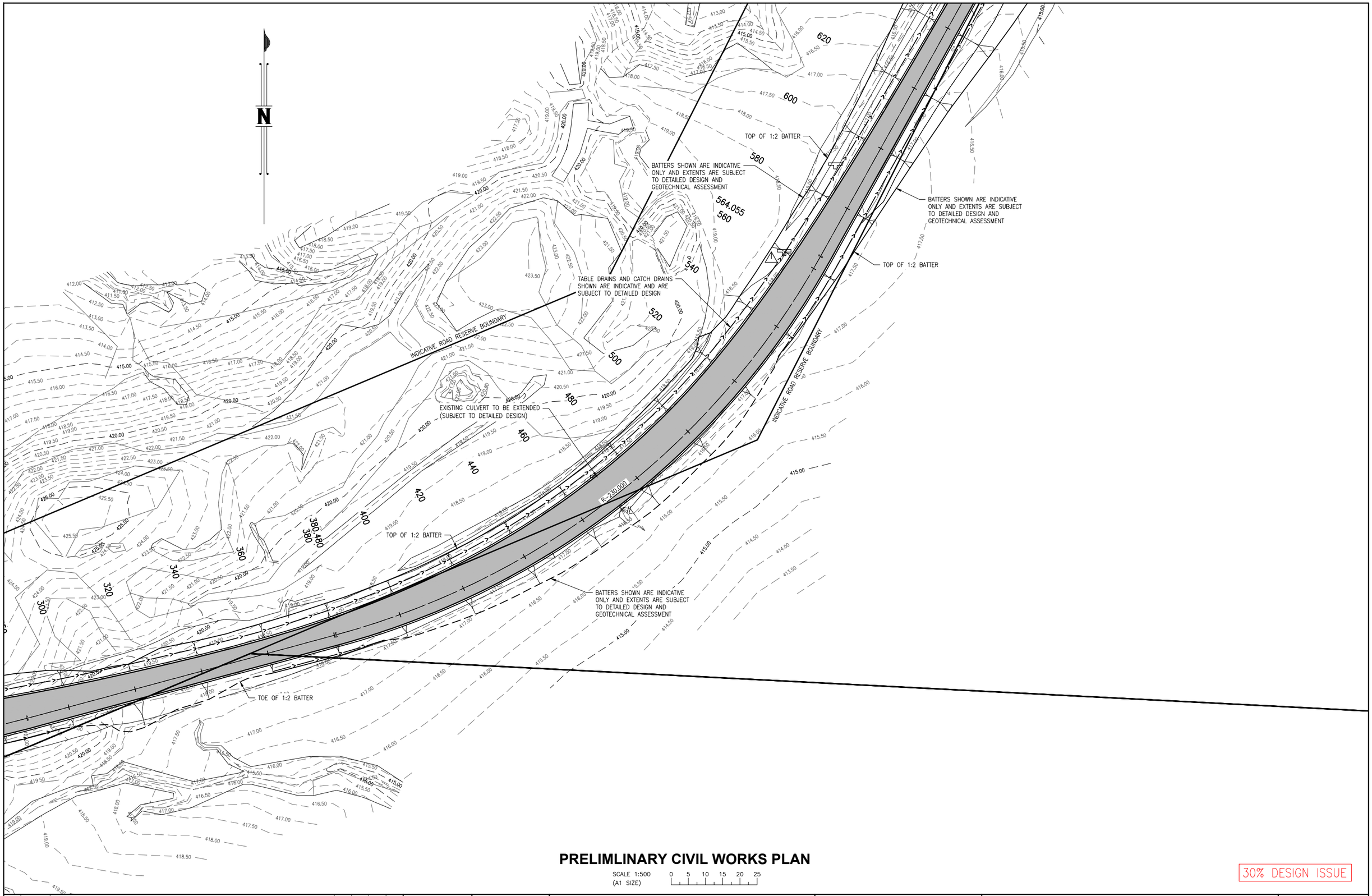
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.

DRAWING NUMBER: G26-017-D-PC03

SHEET NUMBER: 03 OF 14

REVISION: A



PRELIMLINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

30% DESIGN ISSUE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED
DATE APRIL 2026

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS PLAN 2 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC04
SHEET NUMBER 04 OF 14
REVISION A

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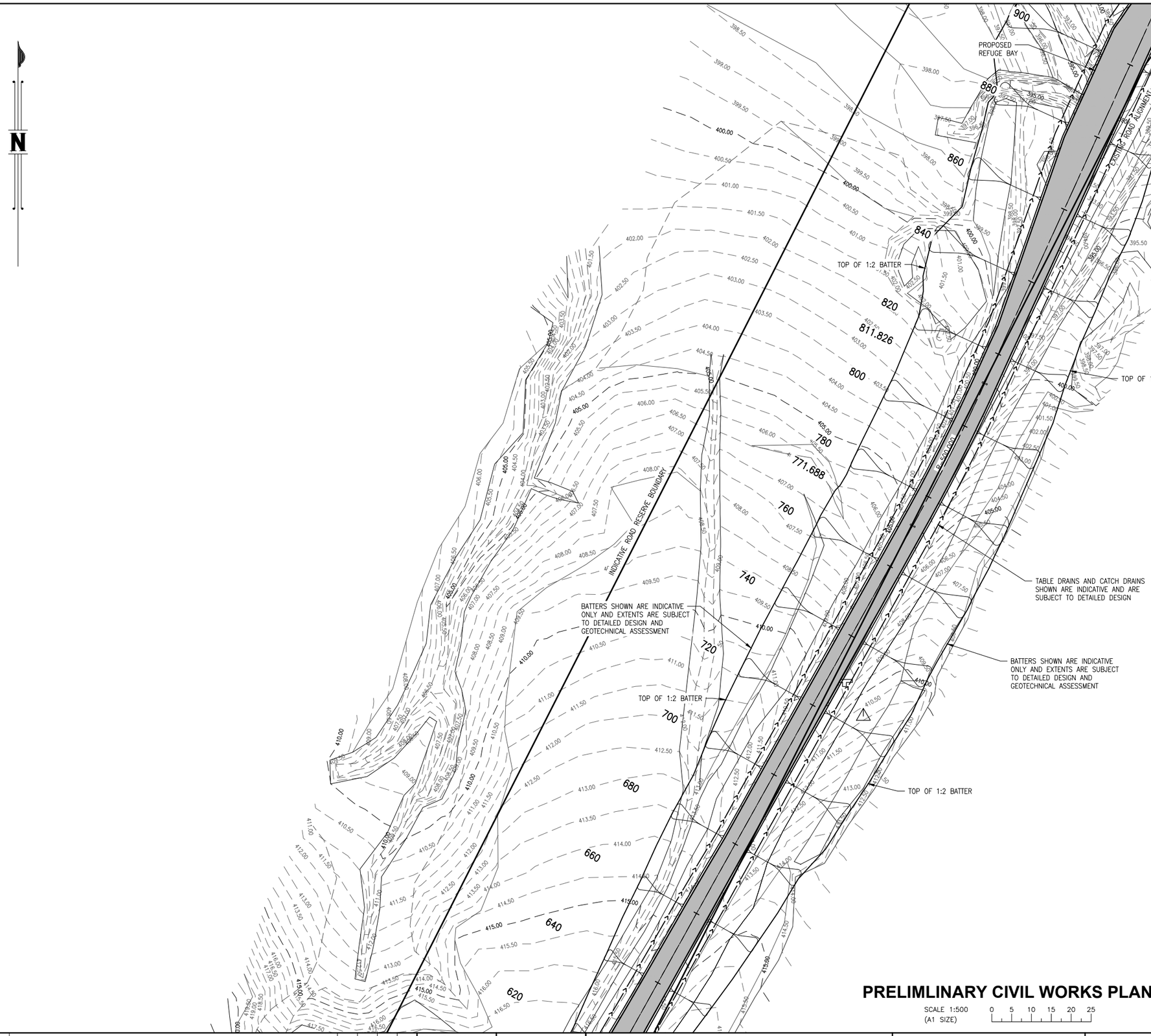

PRELIMLINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

30% DESIGN ISSUE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	
DATE	APRIL 2026

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PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT

LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX

TITLE: PRELIMINARY CIVIL WORKS PLAN 3 of 5

CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.

DRAWING NUMBER: G26-017-D-PC05

SHEET NUMBER: 05 OF 14

REVISION: A

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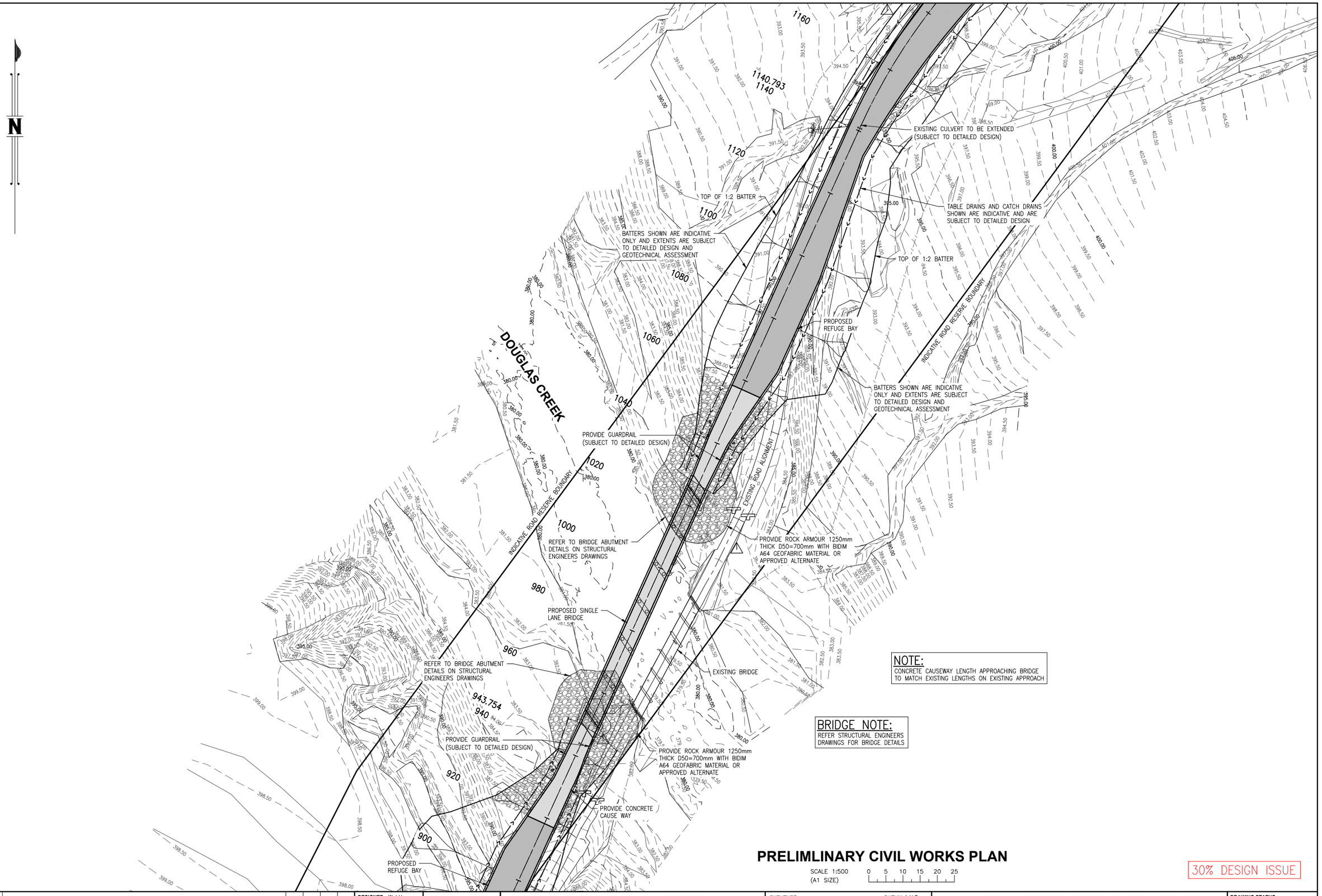

NOTE:
CONCRETE CAUSEWAY LENGTH APPROACHING BRIDGE TO MATCH EXISTING LENGTHS ON EXISTING APPROACH

BRIDGE NOTE:
REFER STRUCTURAL ENGINEERS DRAWINGS FOR BRIDGE DETAILS

PRELIMLINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

30% DESIGN ISSUE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED
DATE APRIL 2026
DOCUMENT CONTROL

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS PLAN 4 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC06
SHEET NUMBER 06 OF 14
REVISION A

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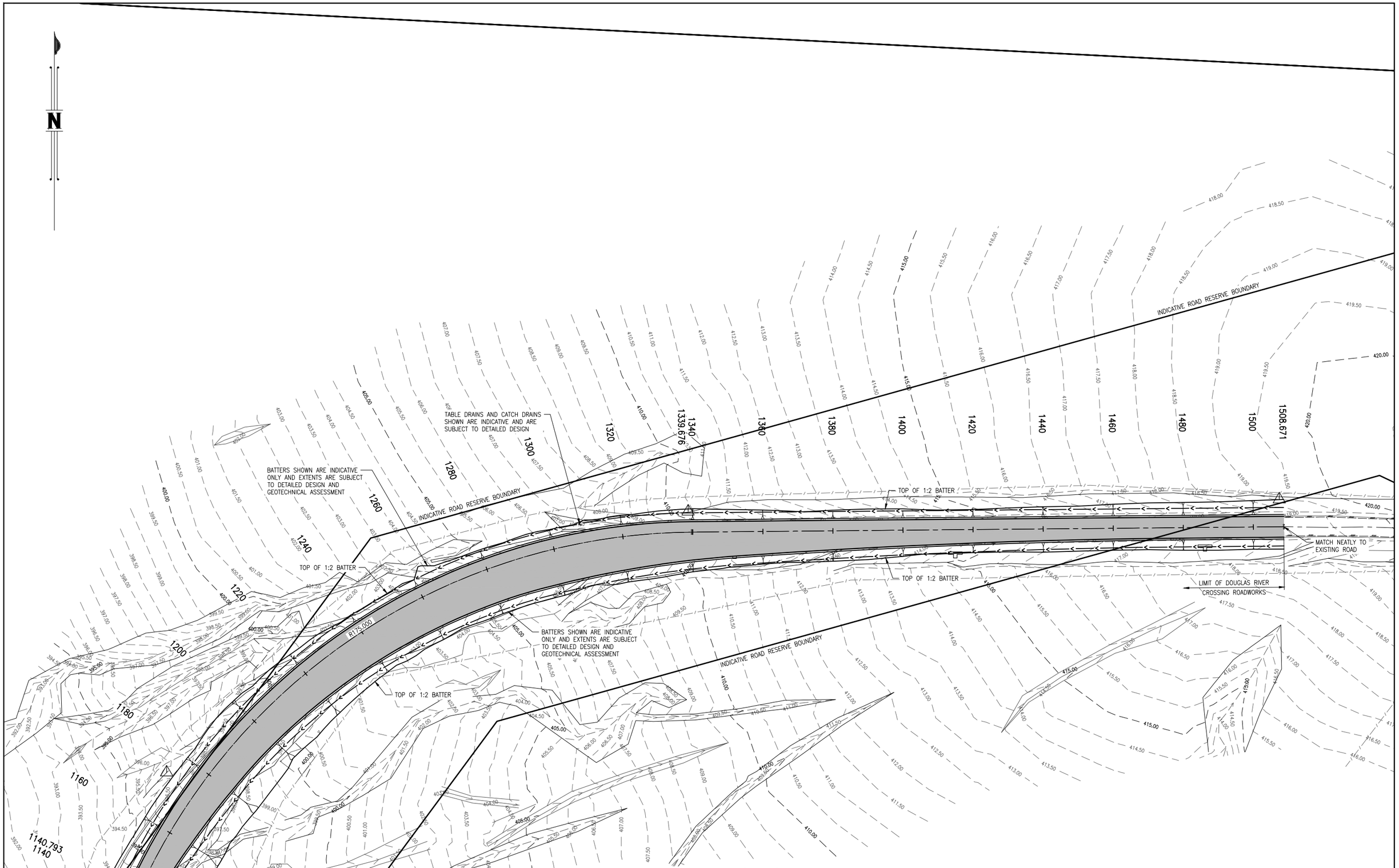

PRELIMLINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

30% DESIGN ISSUE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED
DATE APRIL 2026
DOCUMENT CONTROL

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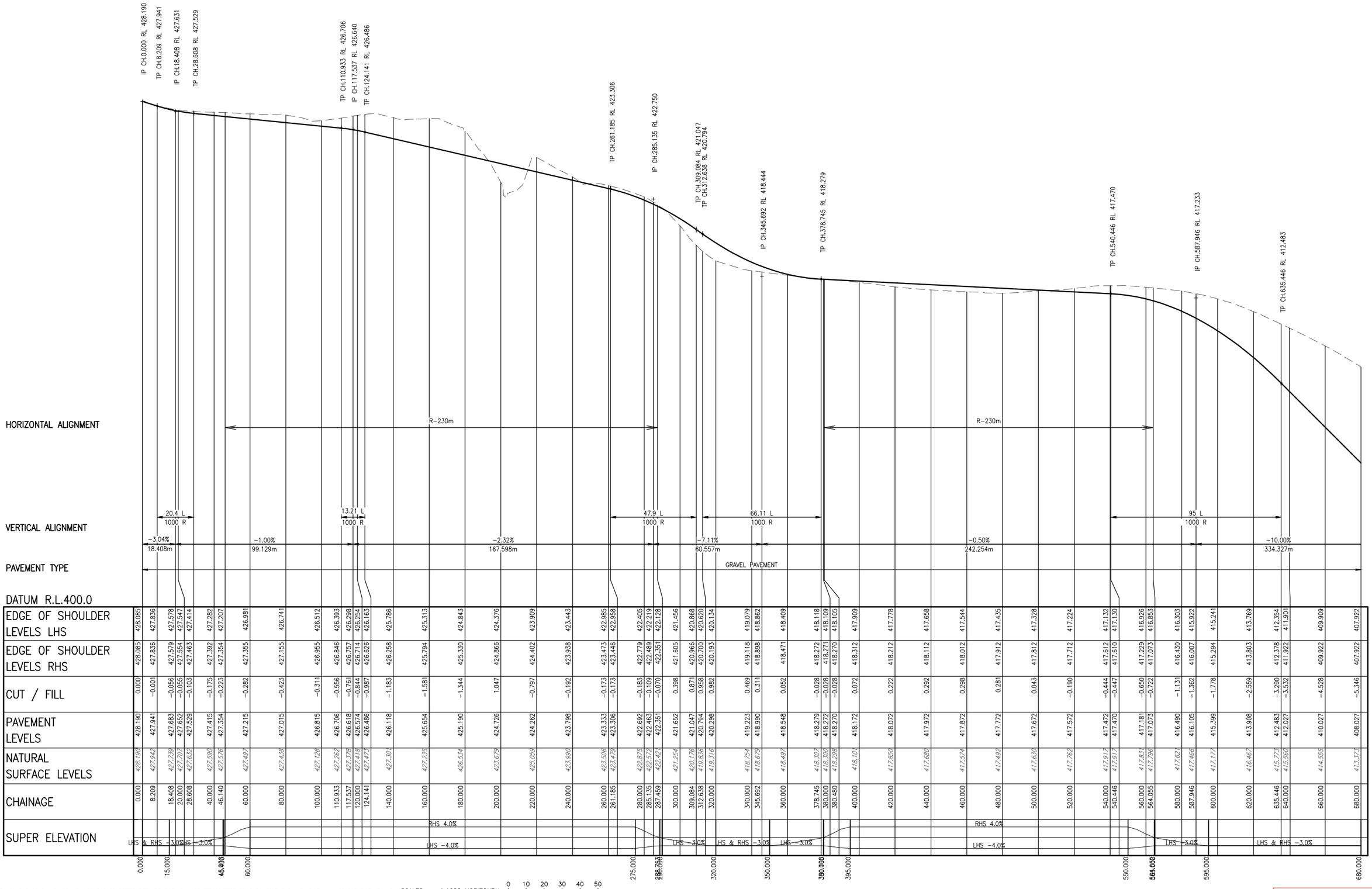
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS PLAN 5 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC07
SHEET NUMBER 07 OF 14
REVISION A

G26-017-D-PC_Pre_Civilwks.dwg



DOUGLAS LONGITUDINAL SECTION CH0.000 - CH680.0

SCALES (A1 SIZE) 1:1000 HORIZONTAL 1:100 VERTICAL

30% DESIGN ISSUE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED
DATE APRIL 2026
DOCUMENT CONTROL
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DATUM A.H.D.
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RL.491.533

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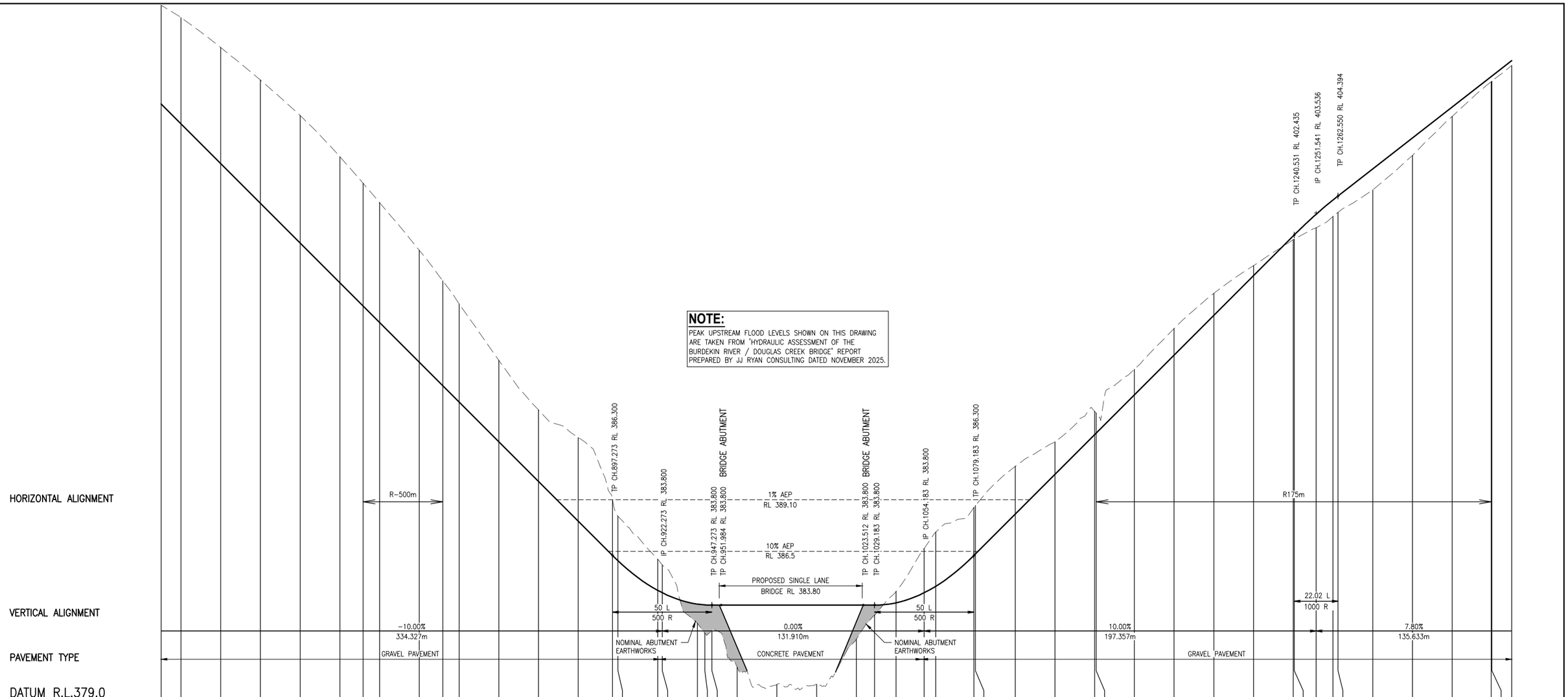
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS ROAD LONG SECTIONS CH0.000 – CH680.00
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC08
SHEET NUMBER 08 OF 14
REVISION A

G26-017-D-PC_Pre_Road_LSec.dwg

NOTE:
PEAK UPSTREAM FLOOD LEVELS SHOWN ON THIS DRAWING ARE TAKEN FROM 'HYDRAULIC ASSESSMENT OF THE BURDEKIN RIVER / DOUGLAS CREEK BRIDGE' REPORT PREPARED BY JJ RYAN CONSULTING DATED NOVEMBER 2025.



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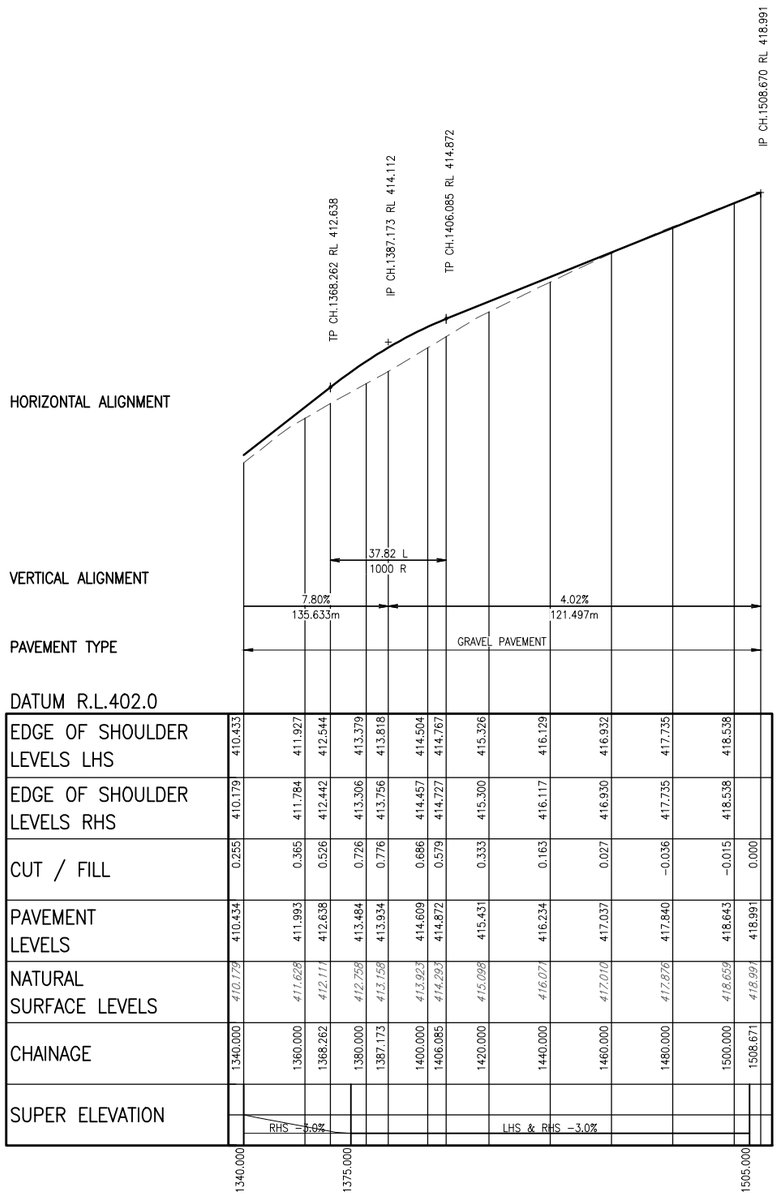

EDGE OF SHOULDER LEVELS LHS	410.433	411.927	412.544	413.379	413.818	414.504	414.767	415.326	416.129	416.932	417.735	418.538	
EDGE OF SHOULDER LEVELS RHS	410.179	411.784	412.442	413.306	413.756	414.457	414.727	415.300	416.117	416.930	417.735	418.538	
CUT / FILL	0.255	0.365	0.526	0.726	0.776	0.686	0.579	0.333	0.163	0.027	−0.036	−0.015	0.000
PAVEMENT LEVELS	410.434	411.993	412.638	413.484	413.934	414.609	414.872	415.431	416.234	417.037	417.840	418.643	418.991
NATURAL SURFACE LEVELS	*410.179*	*411.628*	*412.111*	*412.758*	*413.158*	*413.923*	*414.293*	*415.098*	*416.071*	*417.010*	*417.876*	*418.659*	*418.991*
CHAINAGE	1340.000	1360.000	1368.262	1380.000	1387.173	1400.000	1406.085	1420.000	1440.000	1460.000	1480.000	1500.000	1508.671
SUPER ELEVATION		RHS −5.0%							LHS & RHS −3.0%				

DOUGLAS LONGITUDINAL SECTION CH1340.0 - CH1508.670

SCALES (A1 SIZE) 1:1000 HORIZONTAL 1:100 VERTICAL

0 10 20 30 40 50
0 1 2 3 4 5

30% DESIGN ISSUE

No.	DATE	REVISIONS	DES	DRN	CHK	APD
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED
DATE APRIL 2026
DOCUMENT CONTROL

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS ROAD LONG SECTIONS CH1340.00 – CH1508.67
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC10
SHEET NUMBER 10 OF 14
REVISION A

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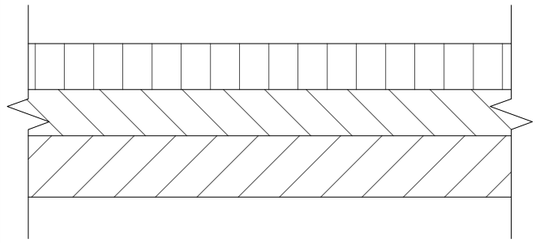
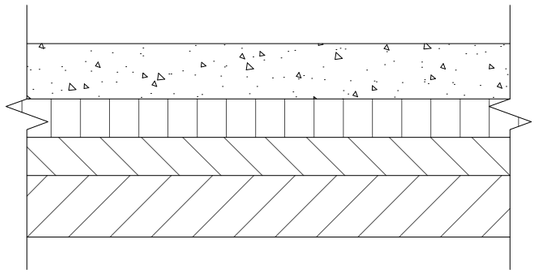


150mm BASE UNBOUND PAVEMENT, CLASS 1, CBR ≥ 80
150mm SUB-BASE UNBOUND PAVEMENT, CLASS 2, CBR ≥ 30
200mm SUB-GRADE UNBOUND PAVEMENT, CLASS 3, CBR ≥ 15 (IF ORDERED)

THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE SUBJECT TO DETAILED DESIGN AND SEPARATE COUNCIL APPROVAL FOLLOWING CBR TESTS OF THE SUBGRADE MATERIAL PLUS LOCAL GRAVEL AVAILABLE

DETAIL A - TYPICAL GRAVEL PAVEMENT SECTION



180mm CONCRETE PAVEMENT
125mm BASE UNBOUND PAVEMENT, CLASS 1, CBR ≥ 80
125mm SUB-BASE UNBOUND PAVEMENT, CLASS 3, CBR ≥ 30
200mm SUB-GRADE UNBOUND PAVEMENT, CLASS 3, CBR ≥ 15 (IF ORDERED)

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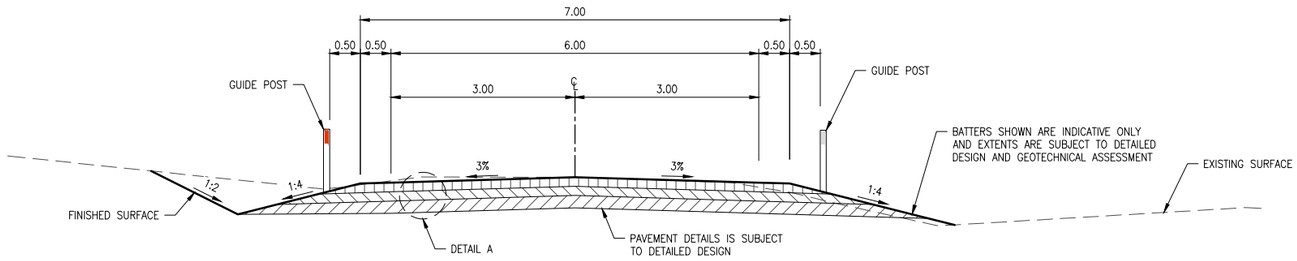
DETAIL B - TYPICAL CONCRETE PAVEMENT SECTION



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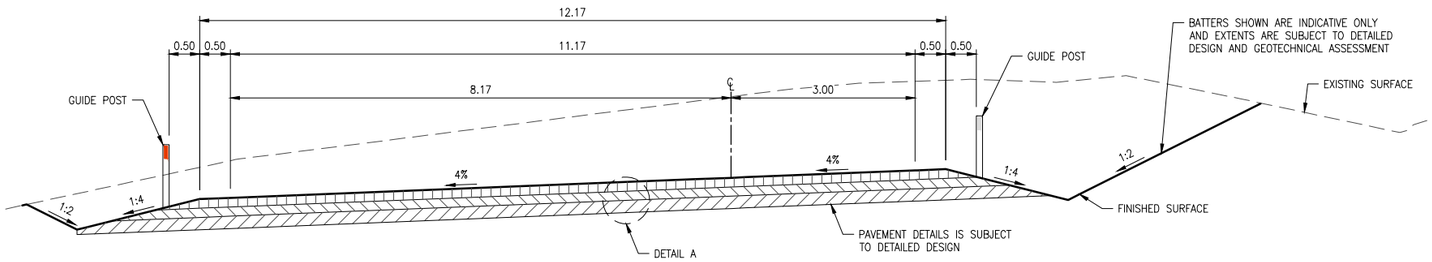

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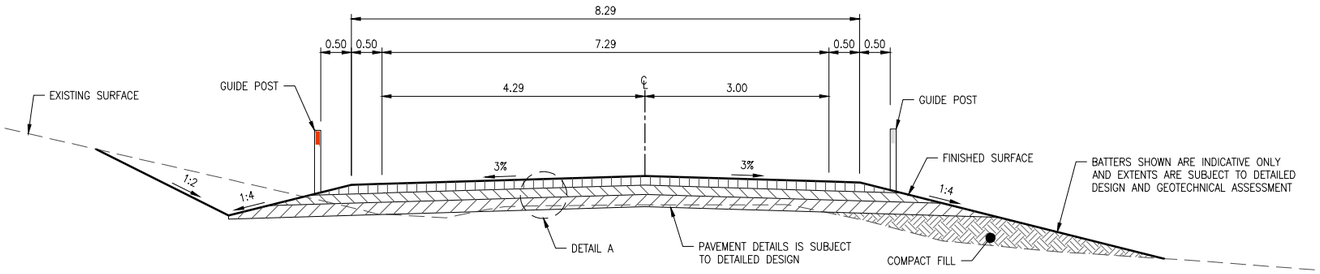

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ROAD TYPICAL SECTIONS

SCALE 1:50 (A1 SIZE) 0 0.5 1.0 1.5 2.0 2.5

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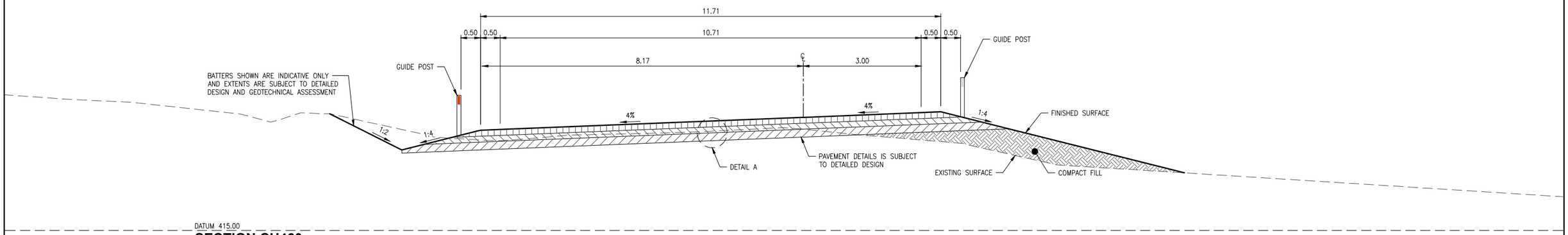

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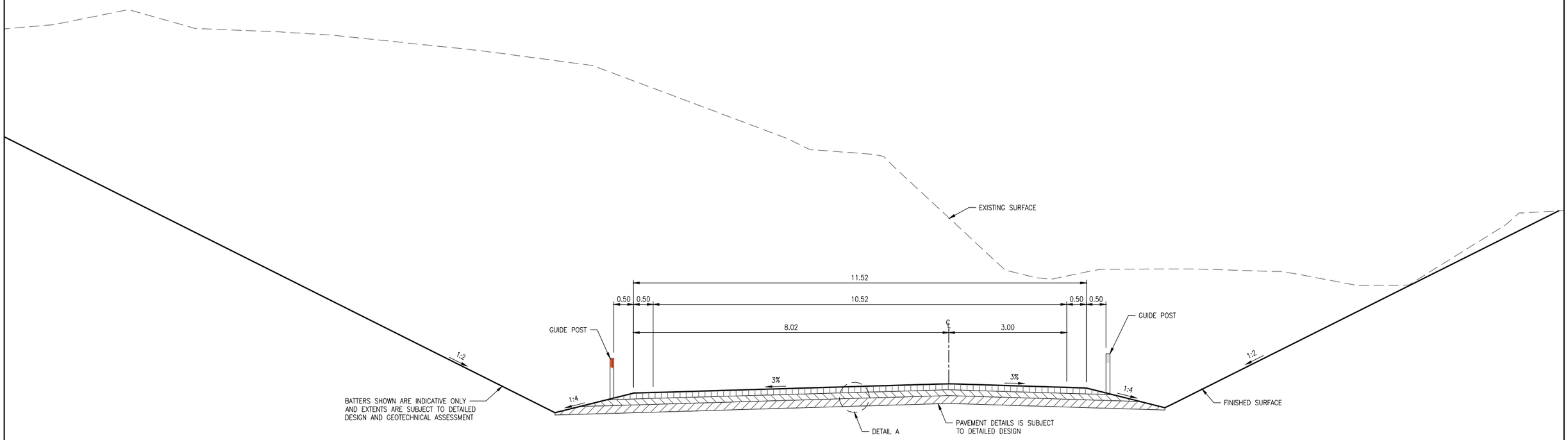

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SECTION CH880

ROAD TYPICAL SECTIONS

SCALE 1:50 (A1 SIZE) 0 0.5 1.0 1.5 2.0 2.5

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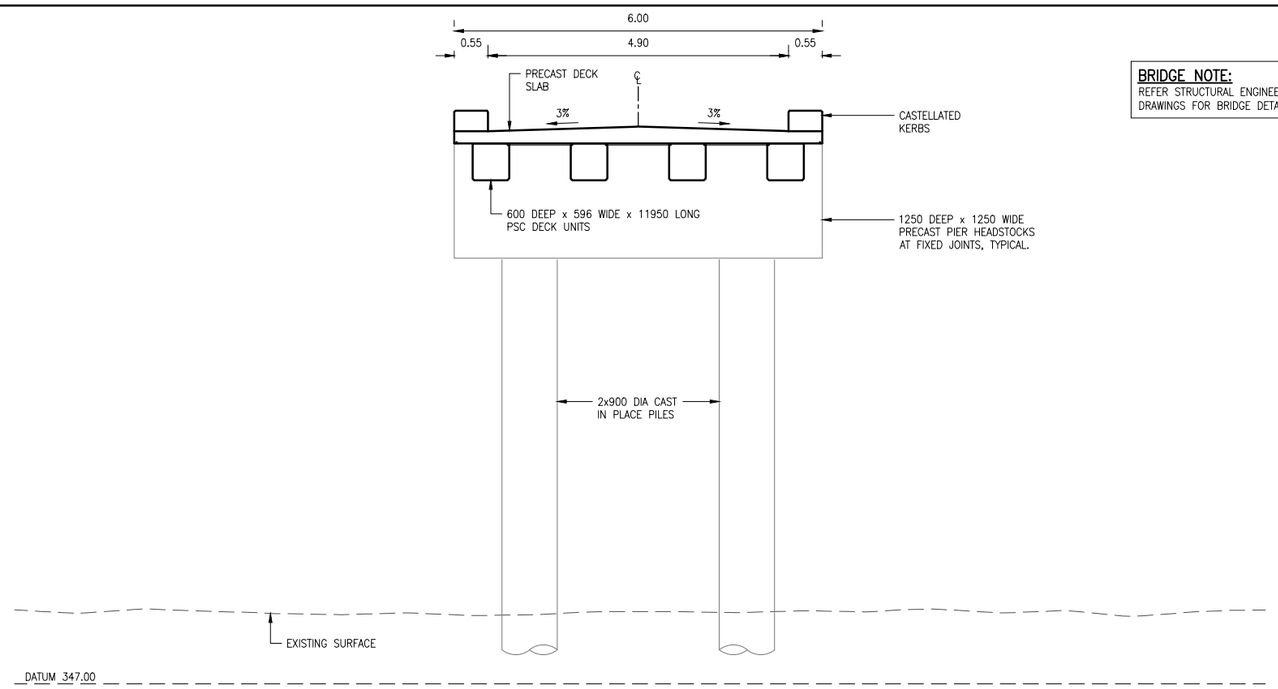
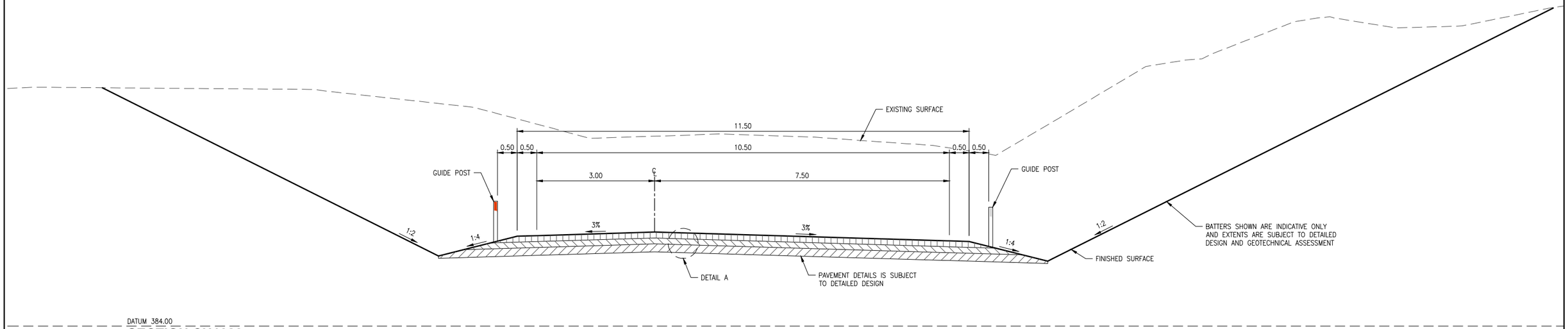


SECTION CH980

BRIDGE NOTE:
REFER STRUCTURAL ENGINEERS DRAWINGS FOR BRIDGE DETAILS



SECTION CH1080

ROAD TYPICAL SECTIONS

SCALE 1:50 (A1 SIZE) 0 0.5 1.0 1.5 2.0 2.5

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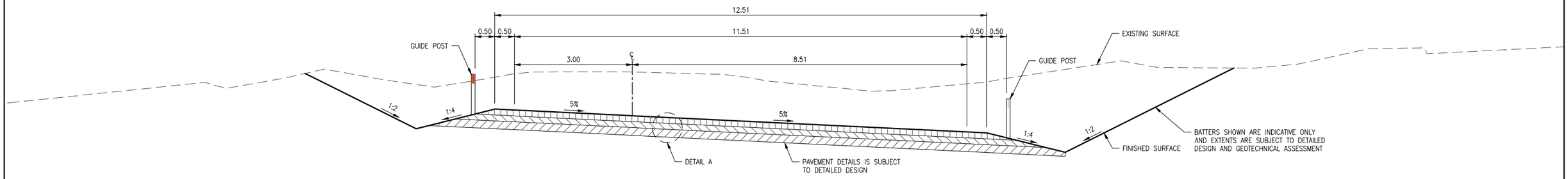

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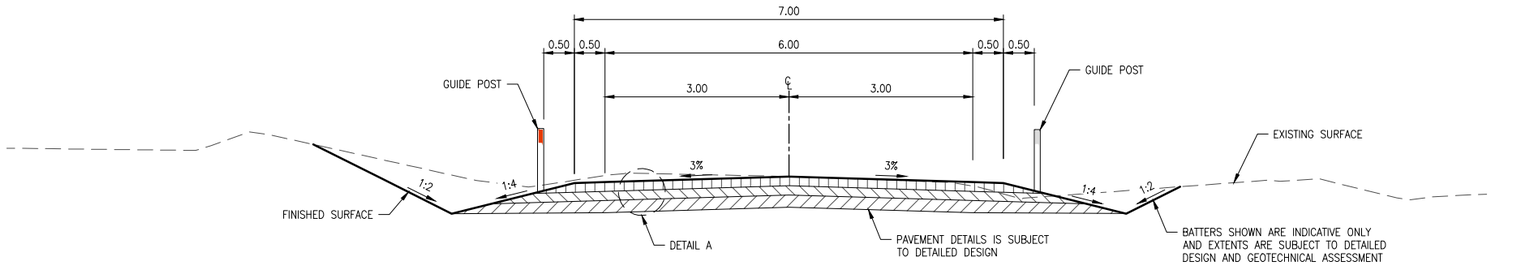

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APPENDIX C HYDROLOGY REPORT

Draft Report

Hydraulic Assessment of the Douglas Creek Crossings

November 2025

Prepared by JJ Ryan Consulting Pty Ltd for Upper Burdekin Wind Farm Pty Limited

www.jjryan.com.au

ABN: 69 145 797 726

JJR-1240801A- WL

Version History

Version Number	Prepared By	Revision Date	Approved By	Approval Date	Description
1.0	A.Kianfar S.Kamyab	07/09/2025	J.Ryan	15/09/2025	Issue for Draft-15% Design
2.0	A.Kianfar S.Kamyab	18/11/2025	J.Ryan	20/11/2025	Issue for Draft-30% Design

Executive Summary

JJ Ryan Consulting ("JJR") was engaged by Upper Burdekin Wind Farm Pty Ltd ("the Principal") to undertake a detailed hydrological and hydraulic assessment of the Douglas Creek crossing on Mount Fox Road as part of the Gawara Baya Wind Farm project. This assessment supports the concept design of a new bridge structure intended to replace the existing low-level crossing, which is hydraulically restrictive, frequently overtopped, and unsuitable for oversized and overmass vehicle access.

The study was undertaken in accordance with Australian Rainfall and Runoff (ARR 2019), Austroads Guide to Road Design, and TMR Road Drainage Design Manual (RDDM) requirements. It involved the development of a RORB hydrological model to estimate design peak flows and a two-dimensional HEC-RAS hydraulic model to simulate flood behaviour under both existing and proposed bridge scenarios. The modelling covered a full range of design flood events from 98% AEP (4EY) to 0.05% AEP, incorporating climate change adjustments and sensitivity testing.

The existing bridge provides limited flood immunity, with overtopping occurring during the 63% AEP event. The structure exerts significant hydraulic control on upstream water levels, resulting in elevated afflux and extended inundation durations. Under current conditions, the Average Annual Time of Submergence (AATOS) is approximately 3.68 hours/year, and the Average Annual Time of Closure (AATOC) is 3.82 hours/year, which adversely affects operational reliability.

The proposed bridge offers substantial improvement in hydraulic performance through a higher deck level, increased span, and reduced waterway obstruction. Modelling confirms that the new structure achieves immunity for the 63% AEP event, eliminating overtopping under frequent flood conditions. The AATOS reduces to 1.89 hours/year, and AATOC reduces to 2.06 hours/year, representing reductions of approximately 49% and 46%, respectively. These improvements significantly enhance network reliability and safety during flood events.

Flood Level Changes (Afflux)

- For frequent events (63% EY and 39% EY), changes in flood levels are negligible (±0.01 m).
- For the 10% AEP event, minor increases of 0.01–0.05 m occur near the proposed bridge.
- For the 2% and 1% AEP events, localised increases of 0.05–0.10 m are observed upstream, with isolated pockets up to 0.25 m adjacent to the road embankment.
- The PMF scenario exhibits the greatest changes, with afflux exceeding 0.25 m in small areas and isolated points approaching 0.50 m.

These changes are confined to the immediate vicinity of the structure and do not extend significantly across the floodplain. The primary cause is the retention of the existing bridge embankment in the proposed scenario, which reduces floodplain conveyance and increases head losses.

Velocity Changes

Velocity impact maps indicate localised changes near the proposed bridge and road embankment:

- For frequent events, velocity changes are negligible.
- For the 10% AEP event, minor increases of 0.10–0.20 m/s occur near the bridge piers.
- For the 2% and 1% AEP events, increases of up to 0.30–0.50 m/s occur adjacent to the piers and narrowed channel section.
- The 0.05% AEP design shows localised increases exceeding 0.50 m/s near the structure.

While these changes are localised, they may increase scour risk at abutments and residual embankment sections. Appropriate scour protection measures, such as rock armouring or reinforced aprons, will be required.

To minimise hydraulic impacts and optimise floodplain performance:

- Remove the existing bridge embankment to restore floodplain conveyance and reduce afflux.
- Incorporate scour protection measures at abutments and concentrated flow zones.

- Undertake sensitivity modelling to confirm the hydraulic benefits of embankment removal or modification.

The proposed bridge design provides enhanced flood immunity, improved operational reliability, and reduced hydraulic impact to the surrounding floodplain. With targeted mitigation measures particularly addressing the retained embankment,the design will achieve compliance with relevant guidelines and deliver a resilient crossing that minimises flood-related disruptions. These outcomes align with best practice for floodplain management and support the long-term operational objectives of the Gawara Baya Wind Farm project.

Adopted Terminology

Australian Rainfall and Runoff (ARR, ed Ball et al, 2019) recommends the use of Annual Exceedance Probability (AEP) terminology to define flood event magnitudes. Annual Exceedance Probability (AEP) is the probability of an event being equalled or exceeded within a year. AEP may be expressed as either a percentage (%) or 1 in X. Therefore a 1% AEP event or 1 in 100 AEP has a 1% chance of being equalled or exceeded in any year. This is interchangeable with a 1 in 100 chance per year terminology.

Historically, terminology such as Annual Recurrence Interval (ARI) or “return period” has been used which can be misleading to the public and stakeholders. Such terms imply that a given event magnitude will only be exceeded once within the specified interval. However, there are examples of rare events such as a 1% AEP occurring within short succession, for example, in consecutive years or multiple times within a ten-year period.

ARI and AEP are often mistaken as being interchangeable for events equal to or more frequent than 10% AEP. The table below describes how they are different and the correlation between them.

For events more frequent than 50% AEP, expressing frequency in terms of Annual Exceedance Probability is appropriate and the term Exceedances per Year (EY) is recommended. For example, an event of 0.5 EY is an event which would, on average, occur every two years. A 1 EY would be expected to occur on average once a year and a 2 EY event is an event that is likely to occur twice in one year. A 2 EY event is equivalent to a design event with a 6 month Average Recurrence Interval.

The Probable Maximum Flood is the statistically largest flood that could possibly occur in a catchment. It is related to the Probable Maximum Precipitation (PMP) which has an approximate probability assigned depending on catchment size. A PMP does not translate to a PMF of the same AEP due to the conservativeness applied to other factors influencing flooding. Therefore, an AEP is not assigned to the PMF.

This report adopts the 1 in X or % AEP terminology in line with ARR2019 recommendations.

Frequency Descriptor	EY	AEP(%)	AEP (1 in x)	ARI
Very Frequent	12			
	6	99.75	1.002	0.17
	4	98.17	1.02	0.25
	3	95.02	1.05	0.33
	2	86.47	1.16	0.5
	1	63.21	1.58	1
Frequent	0.69	50	2	1.44
	0.5	39.35	2.54	2
	0.22	20	5	4.48
	0.2	18.13	5.52	5
	0.11	10	10	9.49
Rare	0.05	5	20	20
	0.02	2	50	50
	0.01	1	100	100
Very Rare	0.005	0.5	200	200
	0.002	0.2	500	500
	0.001	0.1	1000	1000
	0.0005	0.05	2000	2000
	0.0002	0.02	5000	5000
			↓	
			PMP/ PMPDF	

Glossary

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
Afflux	The rise in upstream flood levels caused by an obstruction such as a bridge, embankment or culvert.
AATOS	Average Annual Time of Submergence
AATOC	Average Annual Time of Closure
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
DEM	Digital Elevation Model
EY	Exceedances per Year
HEC-RAS	Hydrologic Engineering Center – River Analysis System
JJR	JJ Ryan Consulting Pty Ltd
LiDAR	Light Detection and Ranging
QUDM	Queensland Urban Drainage Manual
RFFE	Regional Flood Frequency Estimation
RORB	A non-linear rainfall–runoff and streamflow routing model commonly used in Australia.
Scour	Erosion of soil or sediment around bridge piers, abutments or embankments caused by flowing water.
Streamflow Gauge	An instrument that records water level and/or discharge at a river or creek location.
TMR	Department of Transport and Main Roads, Queensland
TOS	Time of Submergence
TOC	Time of Closure
WMIP	Water Monitoring Information Portal
WSL	Water Surface Level
IMMUNITY	Level of flood protection provided to infrastructure or property

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1 INTRODUCTION

1.1 Overview

JJ Ryan Consulting Pty Ltd ("JJR") has been commissioned by Upper Burdekin Wind Farm Pty Ltd ("the Principal") under the Gawara Baya Wind Farm Consultancy Services Agreement (dated 27 May 2025) to undertake hydrological and hydraulic modelling for the Burdekin River and Douglas Creek bridges. This work forms part of Variation Order VO-0036 and includes a review of afflux, assessment of conceptual bridge design options, and consideration of retaining the existing structures. The scope of work encompasses data review, flood frequency analysis, hydraulic modelling, and flood immunity assessment, to inform the bridge design process at the early concept stage.

The existing bridge structures at the major waterway crossings, Burdekin River and Douglas Creek, are not suitable for accommodating oversized and overmass (OSOM) vehicle movements. These structures lack the necessary structural capacity to safely support such loads. Accordingly, the proposed solution involves the construction of new bridges at these key crossings, with the existing bridges to be removed. For this report, these works are referred to as the proposed bridge scenario.

An overview of proposed Bridge is provided in the Figure 1.

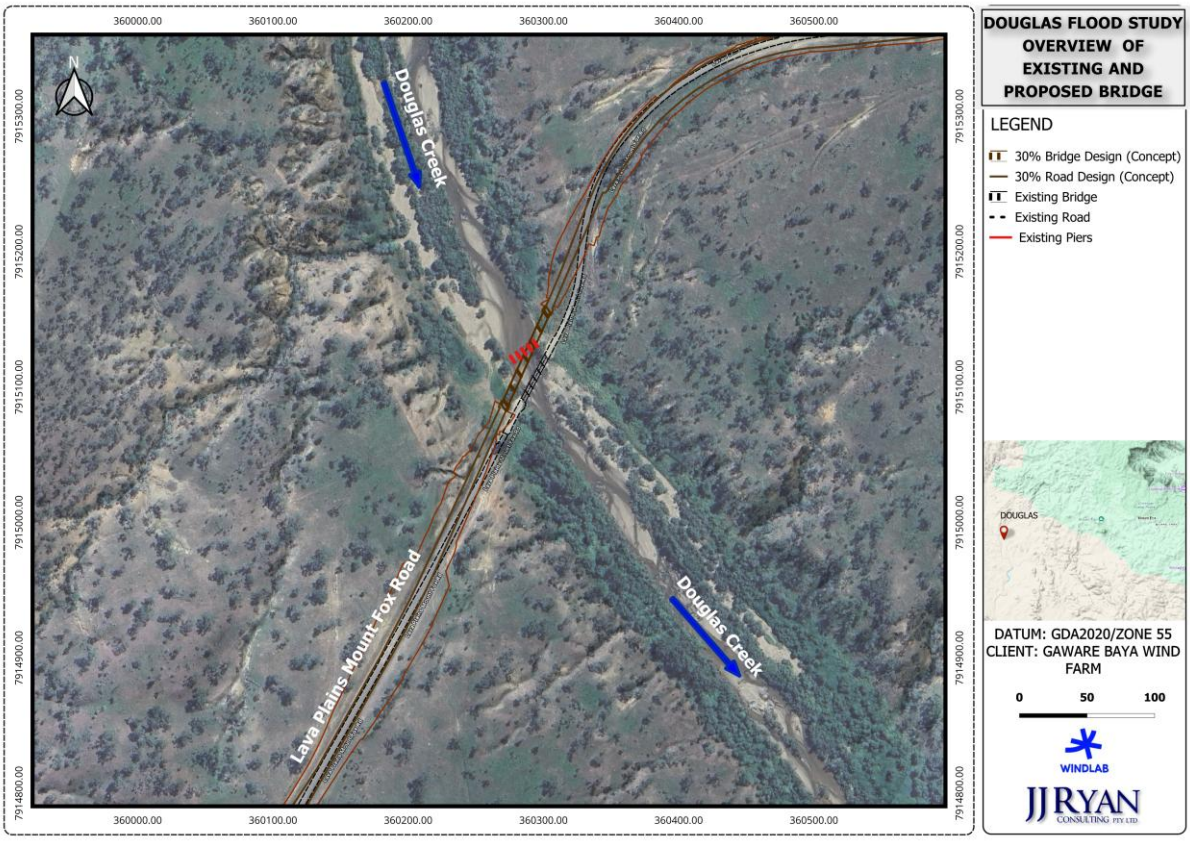


Figure 1– Site Overview: Existing and Proposed Bridge and Adjoining Road Infrastructure

1.2 Purpose

The purpose of this study is to assess the hydrological and hydraulic performance of the Douglas Creek crossing under both existing and proposed bridge configurations. The assessment informs the concept design of the replacement bridge by quantifying changes in flood behaviour, including water levels, velocities, afflux, scour potential and crossing operability across a range of design flood events. The study provides the technical basis for evaluating the suitability of the proposed bridge design, ensuring compliance with relevant guidelines and supporting decision-making for subsequent design phases.

1.3 Study Approach

The study has been conducted in accordance with the scope defined under Variation Order VO-0036 of the Gawara Baya Wind Farm | Consultancy Services Agreement. The methodology has been designed to ensure a robust hydrological and hydraulic assessment of both the existing and proposed bridge scenarios at the Douglas Creek crossing.

- Data Collection and Review
  - Compilation of historical streamflow and rainfall records from relevant gauging stations.
  - Acquisition of topographic data, structure design drawings, and catchment characteristics.
  - Review of available regional flood frequency estimation data.
- Hydrology Analysis
  - Delineation of catchment boundaries and calculation of preliminary times of concentration.
  - Determination of design rainfall depths and temporal patterns for major catchment events.
  - Calibration of hydrological models against observed flood frequency data.
- Hydraulic Modelling
  - Development of a HEC-RAS 2D hydraulic model incorporating both existing and proposed bridge structures.
  - Definition of inflow and outflow boundary conditions.
  - Simulation of a range of design storm events (63%, 39%, 10%, 2%,1% and 0.05% Annual Exceedance Probability).
  - Assessment of afflux, flood levels, and flow velocities in the vicinity of the crossings.
- Scour Assessment
  - Evaluation of potential scour at bridge abutments and piers under proposed bridge conditions.
- Results Analysis and Reporting
  - Comparison of model outputs for existing and proposed bridge scenarios.
  - Assessment of changes in flood behaviour and implications for bridge design.
  - Documentation of key findings, risks, and opportunities for consideration in subsequent design phases.

1.4 Design requirements

The following design guidelines (in order of precedence) were referenced during the analysis:

- QUDM – Queensland Urban Drainage Manual;
- AUSTROADS – Guide to Road Design – Part 5: Drainage;
- AUSTROADS – Guide to Bridge Technology – Part 8: Hydraulic Design of Bridges, Culverts and Floodways;

- TMR – Road Drainage Design Manual (RDDM).

1.4.1 Assessment Criteria

The primary objective of the flood assessment is to determine that flood immunity for critical components of the proposal is achieved and to minimise impacts of the proposal on surrounding properties. The design requirements for the proposal are set out in the Scope and Design Requirements, the proposal specifications and relevant industry standards and guidelines.

Flood immunity for the proposed bridge is to achieve the 63% AEP event for the bridge waterway crossings and pavement wearing surfaces to retain trafficability of the bridge and bypass during the 5% AEP storm event.

The proposal is also required to assess the performance of a range of design flood events up to the 0.05% AEP, including checks that the proposal would not result in any additional property damage in the 1% AEP event and no structural damage to the bridge in a 0.05% AEP event.

The flood assessment evaluates the impacts of the proposal for the following key considerations over a range of flood events:

- Flood level change (afflux);
- Velocity change;
- Change in duration of inundation; and
- Change in frequency of inundation.

Austroads Guide to Road Design Part 5: Drainage (2023) provides guidance for acceptable impacts for major transport infrastructure works on the floodplain for different land use types (referred Table 1).

These suggested acceptable impacts have been used as a guide for assessing impacts and a merits-based approach adopted to determine the acceptable impacts based on the performance of the design, the magnitude of further mitigation measures to reduce afflux and the benefit of the proposal.

Table 1– Acceptable impacts for major transport infrastructure (AGRD, 2023)

	Residential buildings (mm)	Residential yards (mm)	Industrial and Commercial buildings (mm)	Industrial and Commercial yards (mm)	Non-habitable structures (sheds) (mm)	Agricultural (mm) **	Open Space/ Forest (mm) #
Flood Levels	25 (general) 10-20 (sensitive receivers including hospitals, schools and critical infrastructure)	50	50	100	100	200-400	400
Change in duration of inundation	No more than the larger of 10% of the existing duration of inundation or 1hr whichever is largest for durations over 2hrs						
Flow distribution	No more than 10% change						
Velocities	Velocity increases to keep velocities less than 1m/s or if existing >1m/s than no more than 10% change						
Events to be considered	5% AEP and 1% AEP as a minimum 20% AEP or smaller for agricultural land The 0.05% or PMF should be used to check for extreme changes in flood behaviour but not for acceptable impacts						

* if impacts less than or equal to 10mm can be achieved by the project then this is recommended as the acceptable impact. This is the practical limit to which models can predict impact.
** dependent on the type of agriculture and its tolerance. Other criteria may be more important than peak level for example time of inundation.
# conditional on no ecologically sensitive communities where flooding is an issue

The following range of events have been modelled to assess existing flood behaviour:

- 98.%AEP (4EY)
- 63% AEP (1EY)
- 39% AEP (0.5EY)
- 10% AEP (0.11EY)
- 2% AEP (0.02EY)
- 1% AEP (0.01EY)
- 0.05% AEP (0.0005EY)

Section 4 of this report describes the model setup and assessment of existing flood behaviour.

Based on the requirements of Principal and the relevant guidelines referenced above, the hydrologic and hydraulic design parameters adopted for this project are summarised in Table 2.

Table 2 – Adopted design criteria

Item	Design Criteria
Design flood immunity	63% AEP for operational flood immunity
Ultimate effects of the road on regional flooding	98%(4EY), 63%, 39%, 10%,1% AEP and 0.05% AEP
Serviceability effects of afflux on adjacent properties and stability of the adjacent road embankment	39% AEP (but consider more frequent events for a sustainable floodway design.)

1.4.2 Assessment of operational related impacts

The model setup was adjusted to incorporate the design features to represent the proposed design under operational conditions based on the 30% Concept Design Stage. This includes:

- The 30% Concept Design road alignment and earthworks
- Bridge structure

The following range of events have been modelled as part of the flood impact assessment:

- 98%AEP (4EY)
- 63% AEP (1EY)
- 39% AEP (0.5EY)
- 10% AEP (0.11EY)
- 2% AEP (0.02EY)
- 1% AEP (0.01EY)
- 0.05% AEP (0.0005EY)

In addition to the baseline runs listed above, both climate change and blockage scenarios were assessed across the same set of AEP events.

1.5 Structure of the report

This report consists of the following chapters, each outlining key aspects of the hydraulic assessment undertaken to meet the study objectives:

- Chapter 1 – Introduction to the report
- Chapter 2 – Review of available data

- Chapter 3 – Hydrology analysis
- Chapter 4 – Hydraulic modelling of the existing and proposed bridge scenarios
- Chapter 5 – Flood impact assessment

2 Data Collection and Review

The Mount Fox Road & Mount Fox Lava Plains Road Hydrologic and Hydraulic Assessment, prepared by Northern Consulting Engineers("NCE"), was provided by the council as part of the available background information for this project.

The report was therefore reviewed solely to gain a general understanding of the study area, catchment characteristics, and potential hydraulic considerations, but no datasets, modelling outputs, or conclusions from that assessment were adopted for the current study.

This project has therefore been based on newly collected data and purpose-built hydrological and hydraulic modelling to address the specific requirements of the Principal and the relevant design guidelines.

2.1 Previous Studies

A hydrologic and hydraulic assessment of Mount Fox Road and Mount Fox–Lava Plains Road was previously undertaken by NCE on behalf of Windlab Limited. That study evaluated 25 waterway crossings along the route, comprising 23 minor culvert crossings and two major bridge crossings at the Burdekin River and Douglas Creek.

The primary objectives were to determine the time of submergence (TOS), time of closure (TOC), and compliance of the proposed upgrades with the Department of Agriculture and Fisheries (DAF) waterway barrier requirements.

NCE employed Infoworks ICM for hydrologic and hydraulic modelling of minor crossings and TUFLOW 2D modelling for the major river crossings. These models were used to simulate a range of design events, assess crossing performance, and compare existing structures against proposed alternatives, including bed-level and higher-level bridge options. The model data outlined in Table 3.

Table 3 – Supplied Model Data Summary (Douglas Creek – NCE Study)

Description	Parameters
Model	TUFLOW (2D) for major crossings; Infoworks ICM for hydrology
Terrain Data	Windlab LiDAR (±0.3 m vertical), supplemented by ELVIS DEM (0.5 m grid)
Grid	5 m computational grid with SGS sampling frequency of 11
Hydrology Inputs	ARR2019 design rainfall; Thiessen polygons for spatial rainfall distribution
Catchment Area	~705 km² upstream of Douglas Creek gauge
Bridge Data	Existing deck level: 381.86 m AHD; Proposed deck level: 382.30 m AHD
Hydraulic Outputs	Depth, velocity, hazard mapping; TOS/TOC; AATOS/AATOC

While the NCE study provided valuable contextual information on catchment behaviour and crossing performance, its findings were developed for a broader upgrade program and were not specific to the current bridge replacement design.

In particular, the previous assessment focused on accessibility metrics (TOS/TOC) rather than detailed afflux, scour potential, or bridge-specific hydraulic impacts. Accordingly, the present study has relied on newly collected datasets, refined hydrological analysis, and purpose-built HEC-RAS hydraulic modelling to directly address the requirements of the Douglas Creek bridge design under the Upper Burdekin Wind Farm project. Final model result illustrated in the Table 4.

Table 4 – Final model Results (Douglas Creek Crossing) for proposed bridge

AEP Event	Flow (m^3/s)	Depth (m)	Velocity (m/s)	AATOS (hrs/year)	AATOC (hrs/year)
63%(1EY)	198	2.65	2.47	0	0
39%(0.5EY)	384	3.50	3.45	16.25	14.00
18%(0.2EY)	808	4.66	4.13	24.25	22.5
5%(0.05EY)	1,613	6.06	4.78	27.75	25.5
1%(0.01EY)	2,433	7.04	5.23	36.00	34.80
			Total	**11.6**	**10.6**

NCE (2024) Mount Fox Road and Mount Fox–Lava Plains Road Hydrologic and Hydraulic Assessment report is included in Appendix A for reference and comparison.

2.2 Topographical Data

Topographic data, including airborne ground survey (LiDAR) and ground contours, are used to generate the Digital Elevation Model (DEM) which forms the basis of both the hydrologic and hydraulic modelling components of the study.

A number of data sets were provided, and these were cross interrogated to determine if any discrepancies exist in any one data set that may lead to issues in the modelling.

2.2.1 LiDAR Data

Two sources of elevation data were used in this study: the 1-second SRTM dataset and high-resolution LiDAR captured over the Mount Fox Lava Plains.

1-second SRTM (Geoscience Australia, 2010):

This dataset provides elevation data at a 30-metre grid resolution and covers the Douglas Creek catchment area (Figure 2). Due to its relatively coarse resolution, the SRTM data was only used to delineate sub-catchment boundaries in areas where higher-resolution LiDAR data was not available.

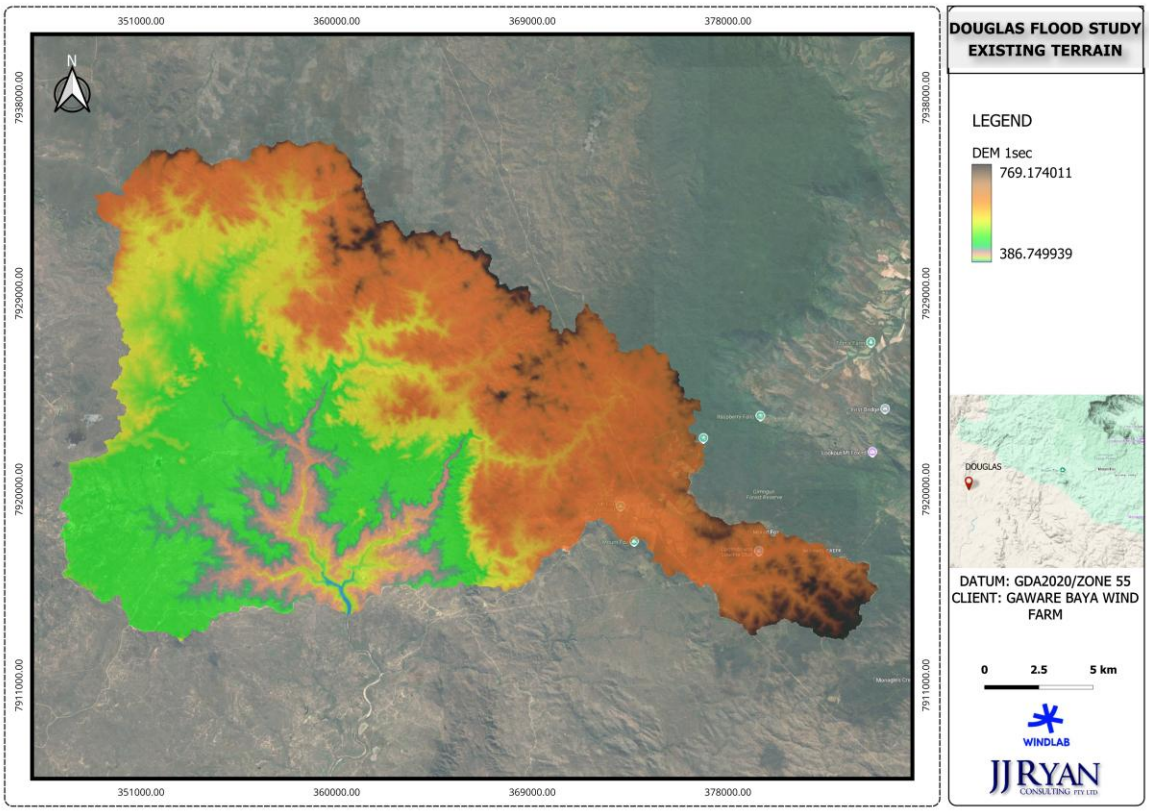


Figure 2 – 1-second SRTM DEM (30 m resolution) for sub-catchment delineation

Mount Fox Lava Plains LiDAR (Windlab, 2023):

This high-resolution LiDAR dataset was commissioned by Windlab in 2023 for use in bridge index analysis (refer to Figure 3). It offers a horizontal accuracy of ±30 cm and a vertical accuracy of ±10 cm, with a grid resolution of 1 metre. Given its detail and coverage of the Douglas Creek corridor and adjacent floodplain, this dataset was selected for use in the hydraulic modelling component of the study.

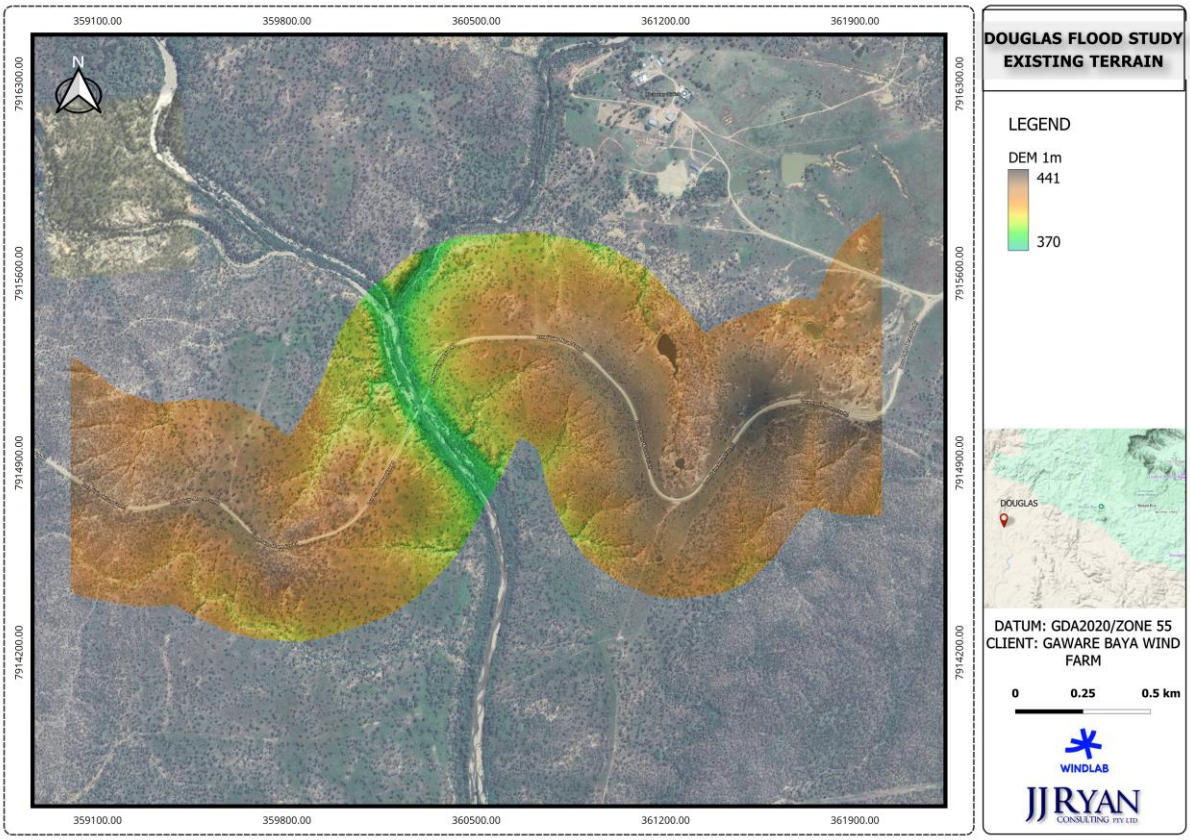


Figure 3 – Mount Fox Lava Plains LiDAR for detailed topography at the Douglas Creek crossing

It should be noted that the method used to collect LiDAR data does not penetrate the surface of water and therefore the data generated does not represent the natural surface level of the bed of the waterway. No bathymetric survey has been undertaken for this reach of the Douglas Creek, and funding was not available for this study to obtain this information.

2.2.2 Field Survey

Field survey was required to provide data additional to the LIDAR information and to complement this with local details where required.

Brazier Motti undertook a feature and level survey in April 2024 for the project area. The survey has been conducted across approximately 400m either side of the road and encompasses each crossing, minor and major.

Field surveys were used to validate the accuracy of the 1m WindLab LiDAR. A comparison between the survey information and the LiDAR data was undertaken, and the results are shown in Figure 4.

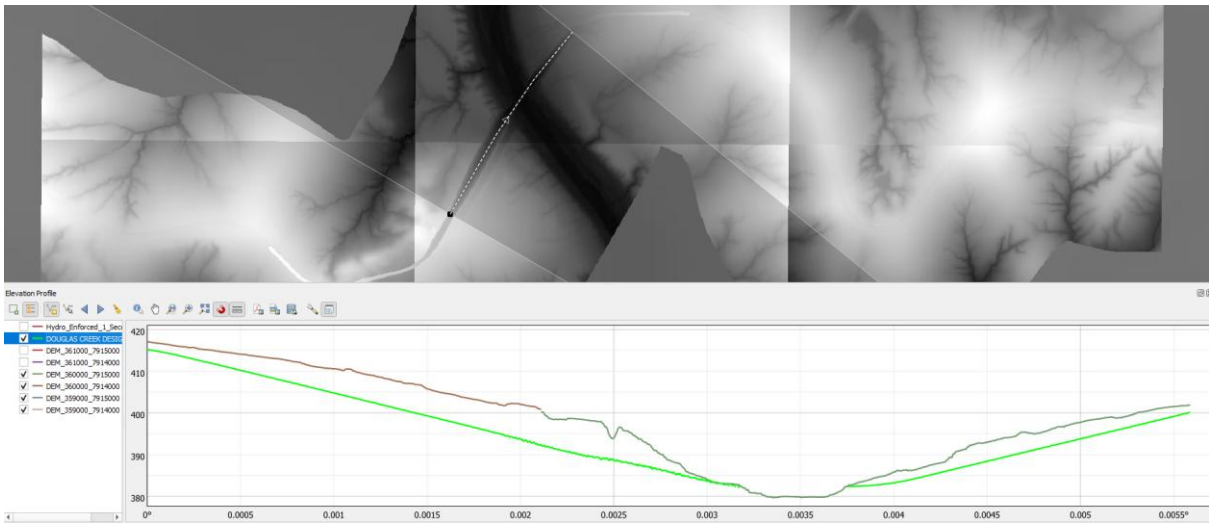


Figure 4 – Difference between survey and LiDAR levels along the road

The difference between survey and LiDAR elevations along the Road. Overall, the LiDAR was found not to correspond well to the survey data, with a mean difference of 800mm and no skew evident. Consequently, only minor modifications to the LiDAR were undertaken in order to more accurately represent the low flow channels in the hydraulic model.

2.2.3 Structure Survey

The Douglas Creek Bridge is located approximately 64 km from the intersection of Mount Fox Road and Gregory Developmental Road, within the Valley of Lagoons, QLD 4850. The bridge spans Douglas Creek, a hydraulically significant waterway prone to rapid rises during intense rainfall events. It serves as a critical link for heavy vehicle movements between Gregory Developmental Road and the Windlab project site.

The existing structure is a low-level crossing comprising reinforced concrete girders supported by blade-wall piers and concrete abutments. The bridge deck includes railway beam barriers and steel girders (255 mm x 255 mm), with an approximate span of 36.28 m and an outside rail width of 4.0 m.

A detailed survey was undertaken by GMC Surveying in September 2025 (refer to Attachment B for

the existing bridge survey). Table 5 shows the key structural features of the Douglas Creek bridge properties captured in the survey.

Table 5 – Existing Bridge Details

Category	Details
Deck Levels	Low deck (soffit): ~381.60 m AHD High deck (top): ~381.72 m AHD
Pier Configuration	Five blade-wall piers Dimensions: 5.7 m × 0.6 m to 5.65 m × 0.7 m
Abutments	Concrete abutments (wingwall lengths unknown) Top level: ~381.35 m AHD Bottom level: ~379.20–379.72 m AHD
Other Details	Manning's n: 0.04 Waterway blockage by piers: ~9.6%

Figure 5 shows the current site condition of the Douglas Creek Bridge, including pier alignment and deck configuration based on the survey.

Figure 5 – Current Site Condition of the Existing Douglas Creek Bridge

Seven (7) piers remain upstream of the existing bridge from the previous bridge location, as shown in Figure 6, approximately 14 m upstream of the current structure. These piers were not surveyed, however, JJR has estimated their dimensions based on available photographs and included them as obstructions in the upstream section of the base case hydraulic model.

Figure 6–Aerial view of Douglas Creek Bridge and upstream area showing the location of seven (7)

Figure 7 outlines the upstream view remaining piers.

Figure 7 – Upstream view of Douglas Creek showing the seven (7) remaining piers

2.3 Concept design

A civil design model of the proposed road works and 30% concept design drawings of the proposal were provided by the project design team. The 50% concept design bridgeworks drawings are included in Appendix C.

2.4 Historical rainfall and stream flow Data

2.4.1 Rainfall Data

Calibration of the hydrologic model requires both pluviograph and daily rainfall data, which was sourced from the Bureau of Meteorology (BoM) and Water Monitoring Information Portal (WMIP).

Pluviograph rainfall data is used to understand the temporal distribution of a historical rainfall event, while daily rainfall data provides the spatial variation in rainfall depths. This data is essential to calibrate the hydrological model.

There are two rainfall observation stations in the vicinity of the study area. However, only one station is located within the study area (Kangaroo Hills, BOM reference 32027), which is a relatively old station that has been collecting data since August 1910. There is no Pluviograph data for stations surrounding the study area.

Figure 8 shows the locations of daily rainfall and pluviograph stations in the region.

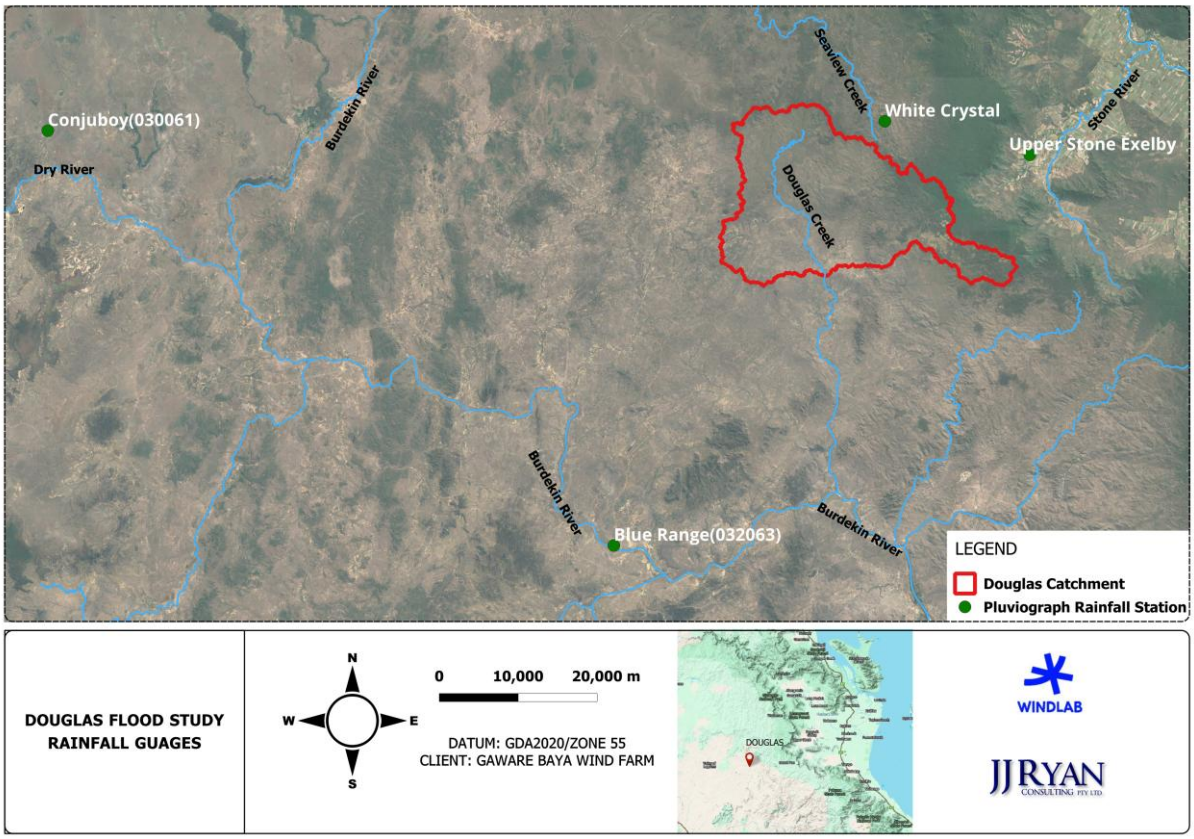


Figure 8 – Rainfall Gauges

As detailed in Table 6, there are three pluviograph stations within, or in the vicinity of, the catchment.

Table 6 – Rainfall Data Station

Station Name	Station Number	Data Available	Start Year	End Year	Cease
White Crystal Standalone Pluviograph*	Station 1160P002	Pluviograph	1982	2025	Open
Upper Stone Exelby	032043	Pluviograph	1972 July	2017 Feb	Closed
Kangaroo Hills	32027	Daily Rainfall	1910	2025	Open

2.4.2 Streamflow Stations

The only stream gauge in the catchment, Douglas Creek at Kangaroo Hills (Station No. 120114A), has records from 1969 to 1988, as shown in Table 7.

Table 7 – Streamflow Gauge Records in the Catchment

Station Name	Station Number	Start Year	End Year	Cease
Douglas Creek at Kangaroo Hills	120114A	1969	1988	Closed

However, these records are too short and incomplete for calibration purposes. Consequently, calibration to observed streamflow is not possible. In line with ARR 2019 v4.2, design hydrology has instead been developed using regional parameter estimates, design rainfall ensembles, and sensitivity testing.

Figure 9 illustrates the gauge's location. Regional Flood Frequency Estimation (RFFE) outputs have been used as an independent benchmark of design peak flows. Hydraulic model results have been validated against historical flood evidence and floodplain behaviour, rather than direct gauge comparison.

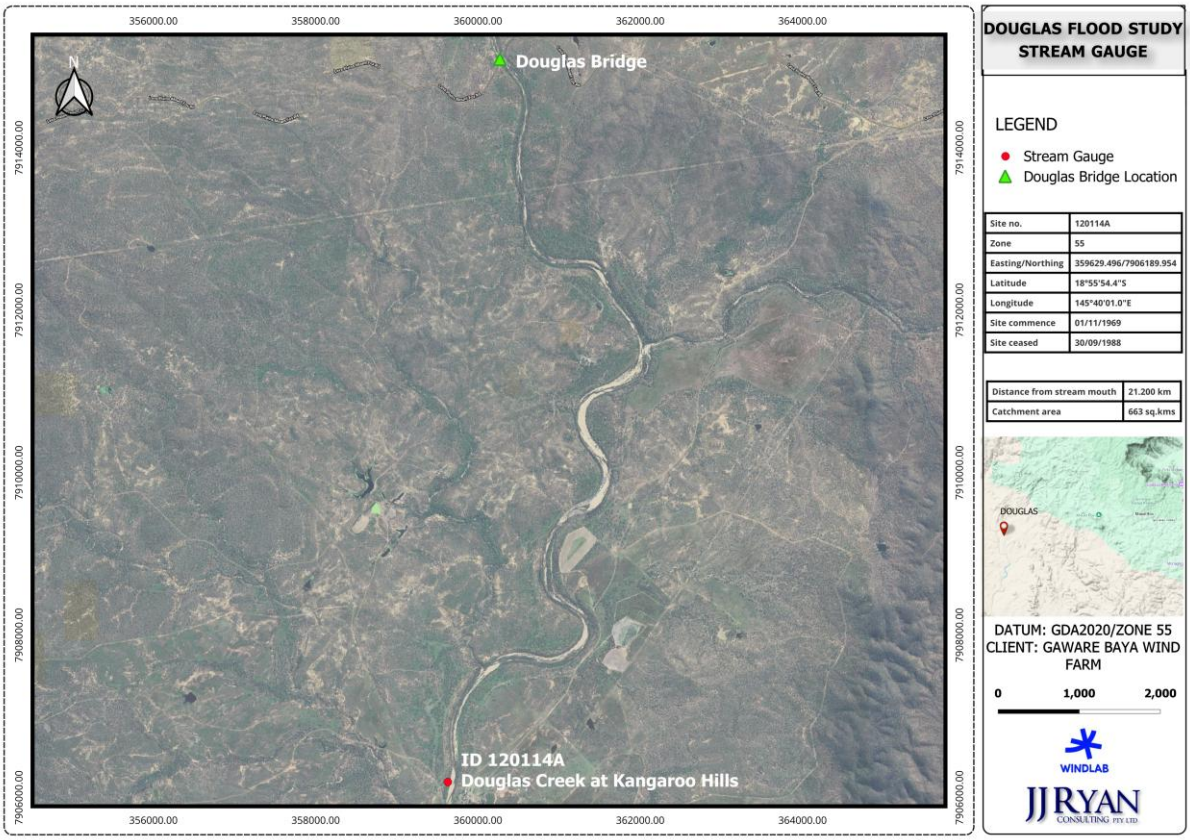


Figure 9 – Location of Stream Gauge within the Catchment

2.4.3 Historic Floods

Douglas Creek has not been continuously monitored by an operational stream gauge, and the available historical records (referred Figure 10) are limited. The absence of a reliable gauged dataset means that a long-term flood history cannot be established for this catchment.

Accordingly, the hydrologic assessment for Douglas Creek has relied on regional flood frequency estimation, rainfall–runoff modelling, and catchment parameterisation in accordance with ARR 2019 guidance. While this approach is consistent with accepted industry practice for ungauged catchments, it introduces greater uncertainty in the estimation of design flows compared with catchments supported by long-term gauged records.

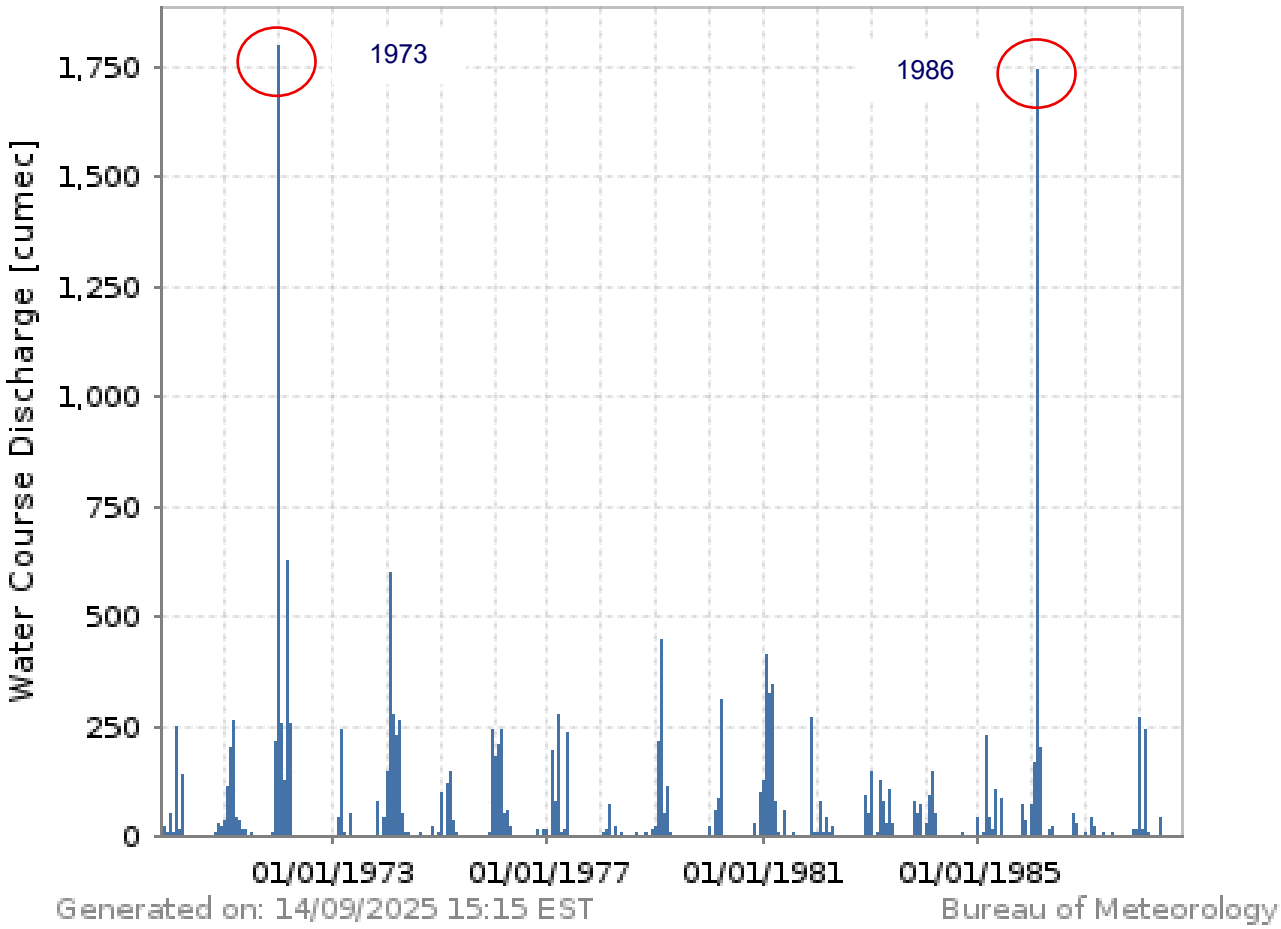


Figure 10 – Historic Streamflow Record at Kangaroo Hills Gauge (Station 120114A)

To provide a regional context, Table 8 presents peak flood levels from significant historical events recorded at the Kangaroo Hills stream gauging station (120114A), located downstream of Douglas Creek near Kangaroo Hills Road.

Table 8 – Significant Flood Events at Kangaroo Hills station

Event	Peak Level (mAHD)	Peak Flow (m3/s)
Dec-1971	5.84	580
Jan-1972	9.28	1799
Jan-1981	5.07	412
Feb-1986	9.13	1741

3 Hydrological Analysis

3.1 Introduction

A hydrological assessment was undertaken for the Douglas Creek catchment to estimate design flood behaviour for subsequent hydraulic modelling. The assessment was undertaken in accordance with the methodologies outlined in *Australian Rainfall and Runoff* (ARR 2019, V4.2), with the primary objective of deriving design event hydrographs for input into the HEC-RAS hydraulic model. These hydrographs form the inflow boundary conditions required to assess afflux, flood levels, velocities, and potential scour at the proposed bridge site.

The rainfall–runoff program RORB (version 6.52) was adopted for this study. RORB is widely used in Queensland for catchments of varying scale and complexity and is consistent with current industry practice. The model was configured using ARR 2019 v4.2 design rainfall data, temporal patterns, and regional loss parameters. A combination of Monte Carlo simulation and ensemble temporal pattern analysis was applied to capture the variability in rainfall and runoff processes.

As Douglas Creek has a limited streamflow record, regional flood frequency estimation was adopted to supplement the hydrological assessment. Model parameters were selected and calibrated in accordance with accepted industry practice to ensure reliable design estimates.

3.2 Model Description

RORB is a non-linear rainfall–runoff and streamflow routing program commonly used in Australia for flood hydrology assessments. The model calculates flood hydrographs by applying initial and continuing loss rates to design rainfall and routing the resulting excess rainfall through conceptual storages. Hydrographs can then be generated at any nominated location within the model domain.

For this study, the RORB model domain was delineated to include the full contributing area relevant to the hydraulic model of Douglas Creek. The Douglas Creek catchment has a total area of approximately 479.2 km² and was subdivided into 32 sub-catchments. This level of subdivision provides sufficient resolution to represent spatial rainfall variability, runoff response, and flow routing in accordance with standard hydrological practice.

Catchment delineation was undertaken using the available Digital Elevation Model (DEM) and verified against topographic mapping and aerial imagery to ensure the model reflects natural drainage patterns and key tributary inflows to Douglas Creek. Delineation also considered catchment divides and hydraulic junctions to achieve realistic runoff generation and conveyance through the system.

Upstream of the catchment is primarily rural with small roads and as such was assumed to consist of entirely pervious area. The roads within this area do not meaningfully increase the catchment runoff. Within Douglas Creek the effective impervious area was represented in accordance with the guidance provided in ARR. The sub-catchment areas and Fraction Impervious are summarised in Table 9.

Table 9 – Catchment Parameter

Catchment ID	Area (km²)	Fraction Impervious (%)	Catchment ID	Area (km²)	Fraction Impervious (%)
A	3.92	0.40	Q	18.30	0.50
B	12.65	0.46	R	17.20	0.49
C	6.10	0.35	S	13.94	0.50
D	70.66	0.47	T	8.28	0.50
E	4.08	0.43	U	0.34	0.50

Catchment ID	Area (km²)	Fraction Impervious (%)	Catchment ID	Area (km²)	Fraction Impervious (%)
F	14.96	0.41	V	6.29	0.50
G	3.91	0.42	W	17.77	0.50
H	17.77	0.47	X	1.18	0.50
I	3.18	0.47	Y	15.29	0.50
J	62.96	0.50	Z	0.65	0.50
K	5.65	0.50	AA	45.92	0.50
L	5.54	0.49	AB	37.31	0.49
M	0.56	0.37	AC	12.30	0.50
N	7.84	0.50	AD	3.42	0.50
O	23.10	0.47	AE	24.90	0.46
P	9.93	0.50	AF	3.27	0.50

The final model configuration, including delineated sub-catchment boundaries is shown in Figure 11. The figure illustrates the Douglas Creek catchment divided into 32 sub-catchments, each labelled with its identifier (A–AF). These boundaries were derived from a one-second Digital Elevation Model (DEM) and verified against topographic mapping and aerial imagery to ensure accurate representation of natural drainage patterns. The colour gradient represents elevation, ranging from approximately 385 m to 777 m AHD, with higher elevations in the northern and eastern areas and lower elevations towards the south-west.

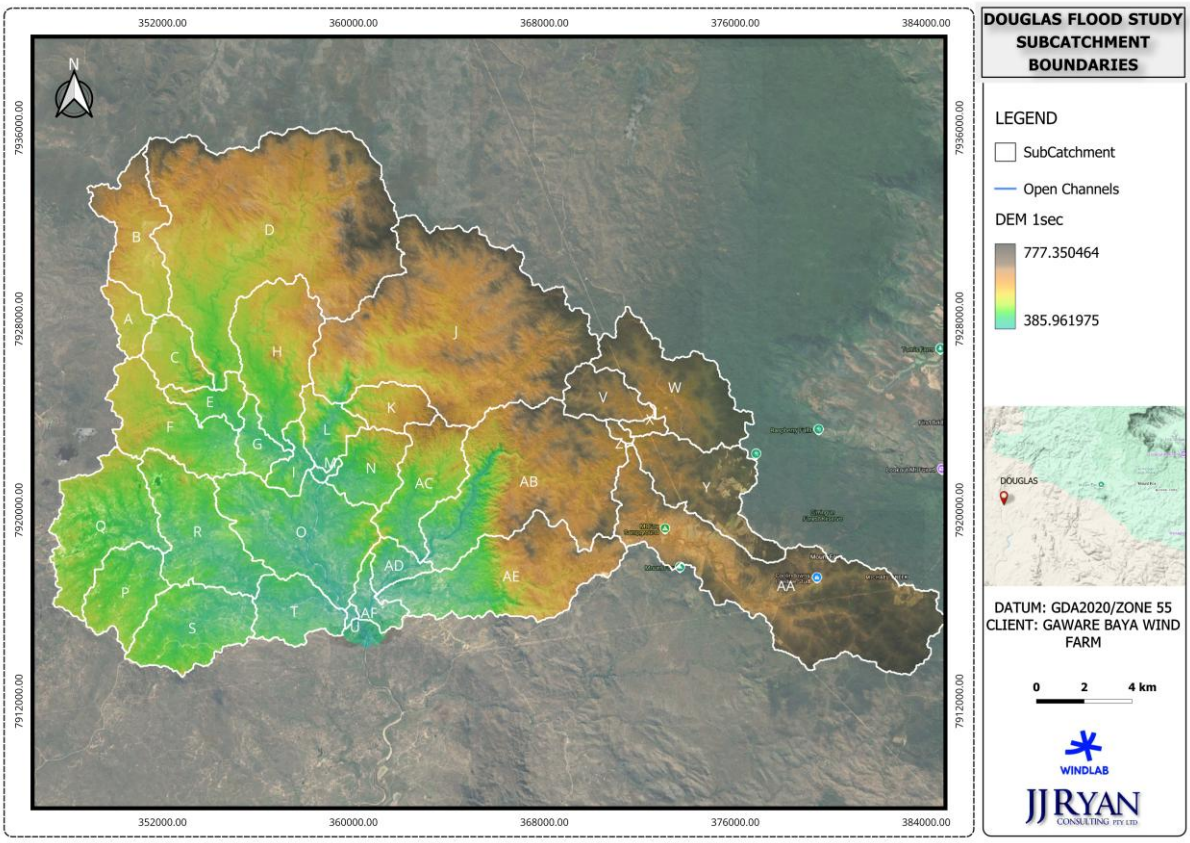


Figure 11 – Sub-catchments Boundaries

The RORB catchment model schematic, showing hydrologic connectivity and flow routing between sub-catchments, is provided in Figure 12.

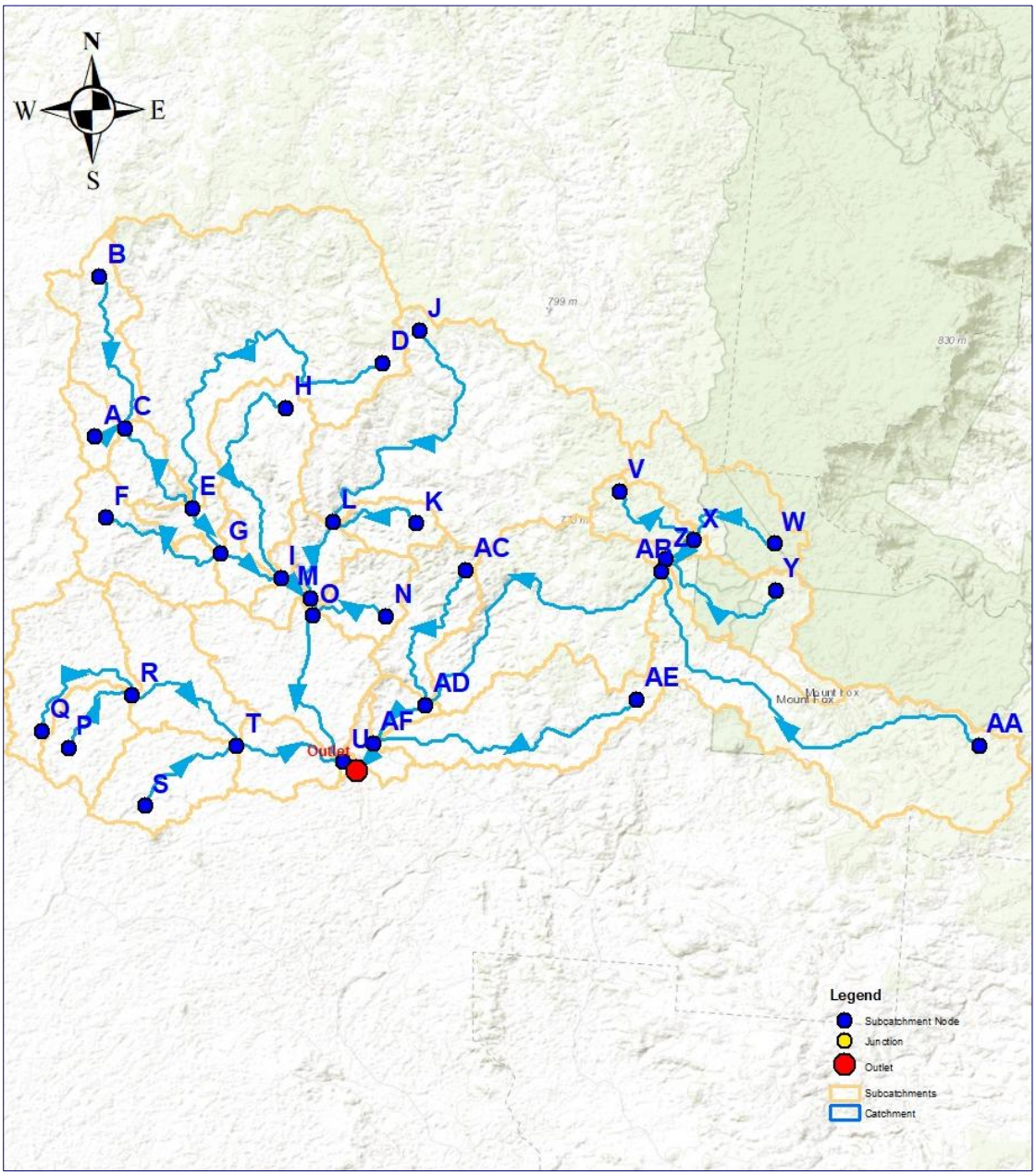


Figure 12 – RORB catchment model schematic

3.3 Flood Frequency Analysis

A Flood Frequency Analysis (FFA) was undertaken for Douglas Creek using the Kangaroo Hills gauge (Station 120114A) to provide benchmark estimates for the RORB hydrologic modelling and the derivation of design hydrographs. The Kangaroo Hills gauge is located downstream on the Douglas Creek and was operational between 1969 and 1988, providing 19 years of instantaneous and annual peak flow data. While this record length does not meet the preferred minimum of 30 years for robust FFA (ARR 2019, Book 3), the analysis offers indicative estimates of flood quantiles that serve as a useful check against regional methods and modelled design flows.

The annual maximum series was extracted and screened to confirm independence and homogeneity. No major storages or significant urbanisation occurred within the contributing catchment during the period of record, meaning the dataset is broadly suitable for statistical analysis.

The FFA was undertaken using HEC-SSP (version 2.3), consistent with ARR 2019 guidance. Probability distributions were fitted using Bayesian Inference. The Log-Pearson Type III (LPIII) distribution provided the best overall fit, particularly for more frequent events, while the Generalised Pareto distribution produced comparable fits at rarer events. Outlier detection was undertaken using the Multiple Grubbs–Beck test, and station skew was adopted.

Table 10 presents the estimated design peak flows, including 95% confidence, and the FFA plot is provided in Appendix D.

Table 10 – Estimated Design Peak Flows – Kangaroo Hills Gauge (120114A)

AEP%	5% Confidence Limit (m3/s)	Quantile Estimate (m3/s)	95% Confidence Limit (m3/s)
98 (4EY)	33	70	108
63	151	212	308
50	191	278	415
39	235	351	544
20	392	599	1102
10	595	942	2239
5	833	1409	4878
2	1207	2288	15735
1	1546	3220	32024
0.05	3683	12197	730375

The Flood Frequency Analysis (FFA) results are illustrated in Figure 13, which presents the fitted Log-Pearson Type III distribution and confidence limits for the Kangaroo Hills gauge (Station 120114A).

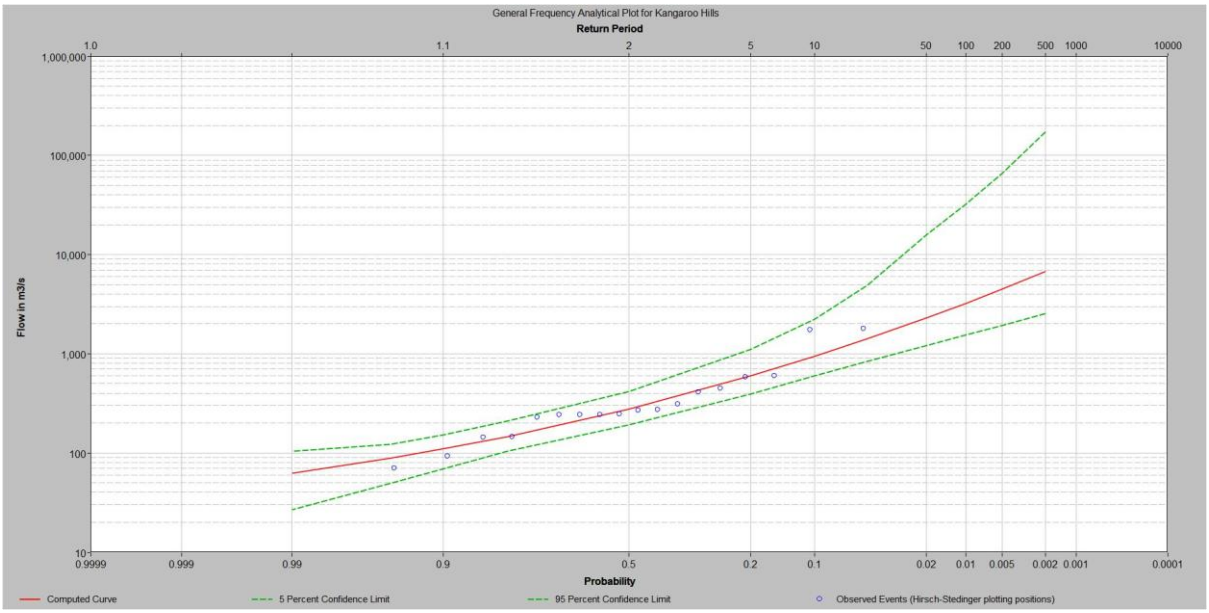


Figure 13 – Flood Frequency Curve – Kangaroo Hills Gauge (120114A)

3.3.1 Regional Flood Frequency Estimation (RFFE)

Flood frequency curves were generated using the RFFE method available online. The catchment area, centroid and model outlet coordinates were used as inputs. This analysis was undertaken to validate the peak flows produced with the adopted input parameters.Table 11 presents the resultant flood quantiles for a range of AEP events.

Table 11 – RFFE Flow Estimates for Douglas Creek

AEP (%)	Expected Quantiles (m^3/s)	5 % Confidence Limit (m^3/s)	95 % Confidence Limit (m^3/s)	Design RORB flow (m^3/s)
50	477	228	1000	386
20	899	441	1860	839
10	1250	582	2700	1233
5	1640	711	3790	1638
2	2220	869	5650	2204
1	2720	985	7420	2670

As displayed, the marginal differences between these flows provide additional certainty that the adopted parameters produce peak flows within acceptable ranges even when compared to neighboring catchments with similar characteristics.

The wide confidence intervals highlight the limitations of the short record, particularly for rare events such as the 1% AEP. For this reason, the at-site results have not been adopted directly for design but have been compared with ARR 2019 Regional Flood Frequency Estimation (RFFE) outputs and RORB model results. This triangulated approach provides greater confidence in the adopted design flows, consistent with ARR 2019 recommendations.

Table 12 – Comparison of At-site FFA, RFFE and RORB Results

AEP (%)	At-site FFA (m^3/s)	RFFE (m^3/s)	Adopted Design Flow (m^3/s)
50	278	477	386
20	392	899	839
10	942	1250	1233
5	1409	1640	1638
2	2288	2220	2204
1	3220	2720	2670

3.4 Model Development

3.4.1 Subarea Delineation, Reach Type and Loss Model

A RORB model was prepared for the Douglas Creek catchment with the downstream outlet at the Mount Fox Road bridge crossing. The creek catchment area, 479.2 km^2, was delineated into 32 subareas as shown in Figure 11. The location of the downstream outlet adopted for the RORB model was largely determined by the extent of LiDAR data available for the hydraulic model.

For the model, nodes were placed at areas of interest (including streamflow gauges and inflow locations to the hydraulic model) and the junction of any two reaches. Reaches were then used to connect the nodes, representing the length and type. As all reaches were classified as natural based on aerial photography, the reach slope was calculated and required to be input into RORB. Additionally, as there

are no significant storages on either the Douglas Creek in the study area, drowned reaches were not required.

In order to determine the corresponding runoff generated by a particular rainfall event, RORB provides two alternative models of the loss processes:

- Initial loss and runoff coefficient (constant proportional rate of loss)
- Initial loss and continuing (constant) loss

Australian Rainfall and Runoff 2019 v4.2 (ARR) states that the continuing loss model is the most suitable for design flood estimation for both rural and urban catchments (ARR, Book 4, Section 2.6.2). For the Douglas Creek RORB model, the continuing loss method was adopted as the majority of the catchment is rural.

3.5 Calibration and Validation

According to the investigation outlined in Section 2.4.3, and the flood study prepared by NCE, four major historic floods were recorded at the Kangaroo Hills streamflow gauge, which ceased operation in 1988. These events occurred in:

- December 1971;
- January 1972;
- January 1981; and
- February 1986.

These historical events were selected due to their large size and the fact that they are recent experiences of flooding in Douglas Creek.

No pluviograph or daily rainfall gauge was installed at the Kangaroo Hills station. Thiessen polygon analysis (refer to Figure 14) indicates that the majority of the Douglas Creek catchment is influenced by rainfall recorded at the White Crystal pluviograph. However, as this gauge only commenced operation in 1982, the February 1986 flood is the only event for which both rainfall and streamflow records are available to support calibration.

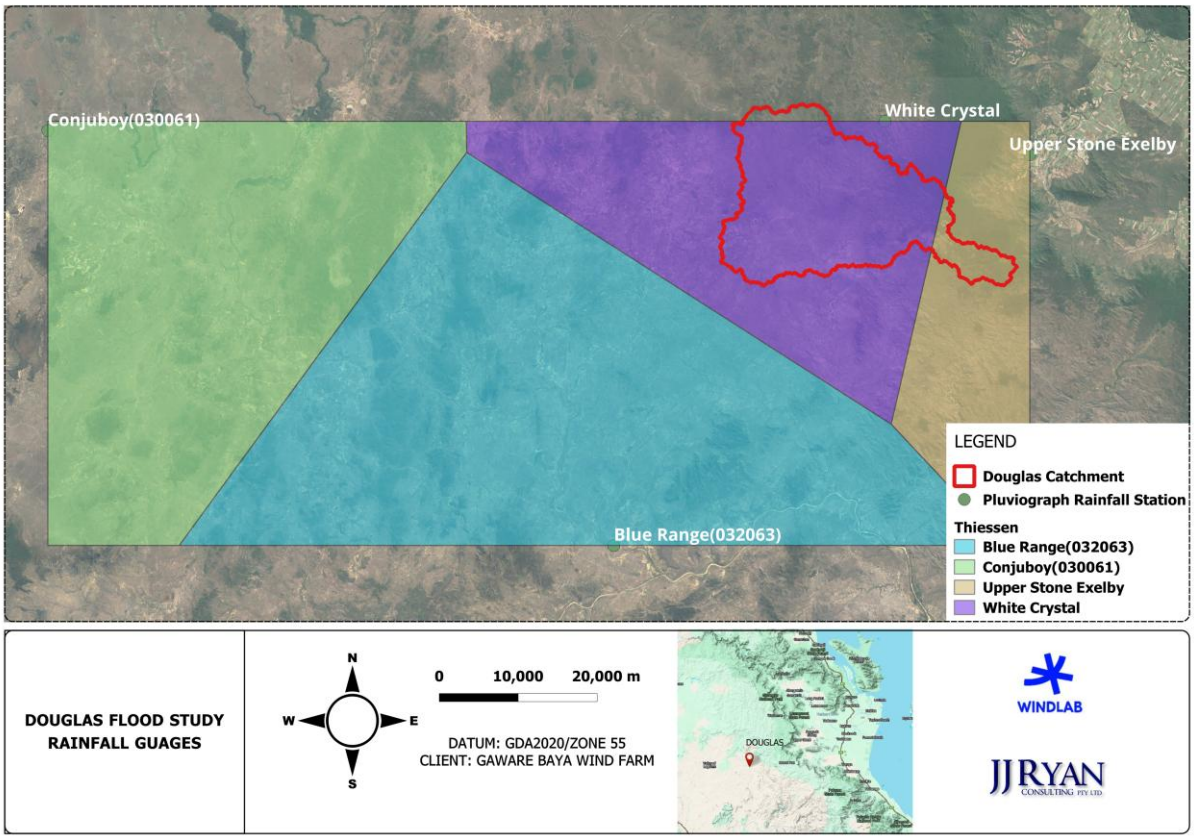


Figure 14 – Thiessen polygons for Douglas Creek Catchment

Rainfall data across the catchment is generally sparse. Most gauges are located around the periphery or outside the broader catchment, leaving the central areas, where the dominant hydrological response occurs, without direct coverage. Consequently, rainfall information corresponding to the peak events identified in the FFA was limited. This constraint reduced the quality of rainfall data available for calibration and, in turn, the reliability of matching streamflow volumes at the gauge.

Given these limitations, calibration and validation focused on reproducing the overall shape and timing characteristics of hydrographs, particularly the rising and falling limbs, rather than concentrating solely on event volumes.

An initial review of the pluviograph data also revealed inconsistencies. While rainfall volume generally aligned with streamflow volums at the gauge, the timing did not always allow for a realistic catchment response. In some cases, the stream gauge recorded multiple flood peaks during a single event that were not reflected in the rainfall data and could not feasibly be reproduced by adjusting model parameters. This suggests that localised rainfall occurred within the catchment, contributing substantially to runoff but not captured by the available pluviographs.

Recognising these discrepancies, JJR placed less emphasis on exact peak timing during calibration, instead prioritising the broader hydrological response in line with available data and accepted industry practice.

The RORB model was calibrated by fitting it to observed rainfall and runoff data from recorded flood events to determine the routing parameter, kc. As recommended in the RORB manual, a value of 0.80 was adopted for the nonlinearity parameter, m. A trial-and-error fitting procedure was used to reproduce the flood peak, volume, and shape of the observed hydrograph. The adopted kc value was then compared to regional estimates to assess its reasonableness.

Details of the selected calibration events are provided in Figure 15.

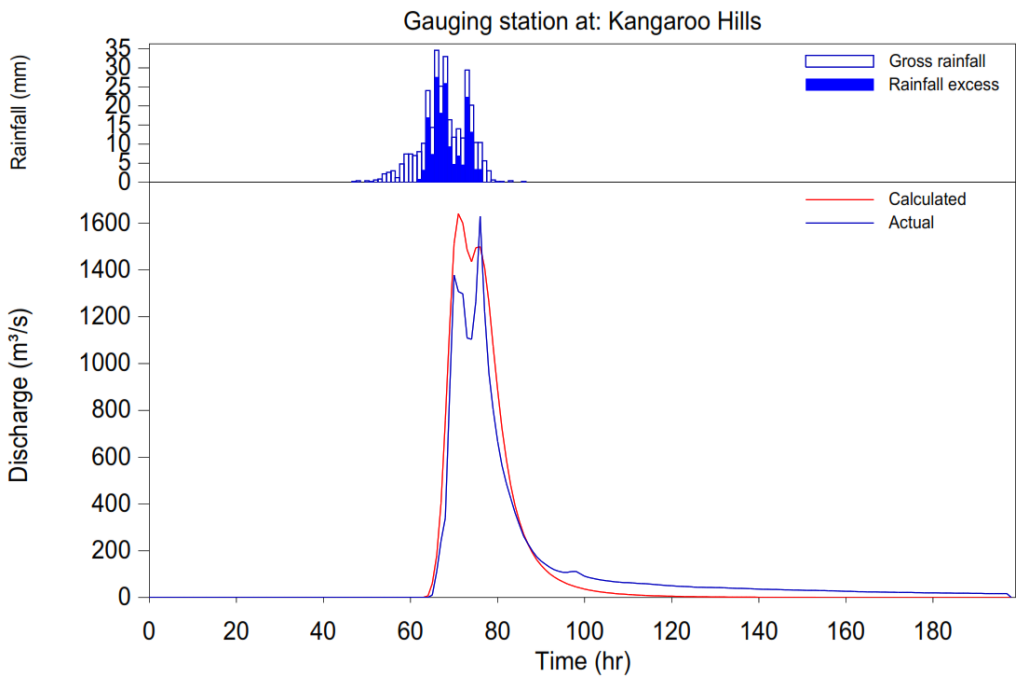


Figure 15 – Comparison of modelled and observed hydrographs for the February 1986 event at Kangaroo Hills gauge (120114A)

The adopted values of kc, m, initial loss (IL) and continuing loss (CL) for the calibration are summarised in Table 13. As shown, the difference between the observed and modelled peak flow is 0.7% while the difference in flood volume is 0.9%. Overall, the model calibration for the February 1986 flood event is considered good.

Table 13 – Model Calibration Results: Douglas Creek at Kangaroo Hills

Parameter	Observed	Calculated	Relative Difference (%)
Peak Flow (m³/s)	1629	1640	0.7
Volume (ML)	80.1×10^6	80.8×10^6	0.9
Time to Peak	76	71	-6.6
kc	–	18.5	–
m	–	0.8	–
IL	–	25	–
CL	–	7	–

3.5.1 Sensitivity Analysis

Although the routing parameter was calibrated to a historic flood event, there remains some uncertainty in the value adopted. In particular, due to the limited available data, the largest event the parameter could be calibrated to has an annual exceedance probability of 5%. Hence, extrapolation of the parameter is required to produce design flood estimates exceeding this value, for example, the 1% AEP event. Therefore, the calibrated value of k_c was compared to a range of recommended prediction equations, as shown in Table 14. This included the regional equations for Queensland as recommended in ARR. Note that the catchment area (A) referred to in the estimation equations is 479.2 km^2. Furthermore, d_{av} provides an indication of the travel distance to the outlet of the RORB model and is given by the weighted average flow distance from all nodes to the catchment outlet. The value of d_{av} obtained for the Douglas Creek RORB model was 20.34km.

Table 14 – Comparison to additional routing parameter estimates

Method	Applicable Region	Equation	Predicted kc
RORB Default Equation (RORB Manual,Equation 2-5)	Australia wide	$kc = 2.2*A^{0.5}*(Qp/2)^{0.8-m}$	48.16
Queensland(Weeks) (Equation 7.6.8 ARR)	Queensland	$kc=1.18*A^{0.48}$	23.18
Australian wide Dyer (1994) Data (Pearse et al. 2002)	Australia wide	$kc = 1.14*d_{av}$	23.19
Australian wide Yu (1989) Data (Pearse et al. 2002)	Australia wide	$kc = 0.96*d_{av}$	19.53

A review of the routing parameter estimates determined from alternative methods indicated that the parameters used in calibration were reasonable Table 15. Therefore, the *kc* value determined from the calibration was considered to be suitable for the design runs.

Table 15 – Adopted RORB model parameters

Kc	m
18.5	0.8

3.6 Model Data

3.6.1 Design Rainfall Estimate

Intensity-Frequency-Duration (IFD) curves from the Bureau of Meteorology were used to generate design rainfall depths for events from 1 minute to 168 hours in duration and from 98% AEP to 0.05 AEP. The IFDs sourced for the catchment centroid (-18.777, 145.690) were factored to the spatial average rainfall depths across the catchment. The BoM IFDs were published in 2016 and best represent the climate period between 1961 and 1990. To represent current climate conditions IFDs were derived via the methodology outlined in Book 1, Chapter 6 - Climate Change Considerations of ARR. The SSP3-7 Current and near-term (2021-2030) scenario was used as it is the climate scenario that best represents emissions to date (Schwalm, et al. 2020).

The resulting increase in rainfall depth is 15% for 1 hour duration and shorter, 8% for durations of 24 hours and longer and the increases interpolated for durations between 1 and 24 hours. The resulting catchment average rainfall depths are presented in Table 16.

Table 16 – Rainfall Depth (mm) for Douglas Creek

Annual Exceedance Probability (AEP)										
Duration	**4EY**	**63.20%**	**50%**	**39%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.05%**
1 hour	19.54	23.38	28.72	37.71	42.75	47.45	57.75	58.90	67.32	76.25
1.5 hour	22.28	26.67	32.84	43.32	49.10	54.49	66.51	67.84	77.70	88.20
2 hour	24.14	28.91	35.68	47.22	53.61	59.52	72.99	74.43	85.51	97.37
3 hour	26.55	31.91	39.51	52.70	60.02	66.61	82.48	84.14	97.39	111.70
4.5 hour	29.31	35.33	43.95	59.11	67.57	75.00	94.18	96.05	112.41	130.15
6 hour	31.32	37.85	47.28	64.01	73.42	81.50	103.51	105.57	124.54	145.46
9 hour	34.98	42.42	53.25	72.88	84.00	93.23	120.25	122.78	146.73	173.60
12 hour	37.74	45.84	57.74	79.58	92.00	102.06	133.55	136.08	163.80	195.53

Annual Exceedance Probability (AEP)										
Duration	**4EY**	**63.20%**	**50%**	**39%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.05%**
18 hour	42.60	51.82	65.52	91.05	105.77	117.45	155.68	158.77	193.21	232.91
24 hour	47.08	57.30	72.59	101.39	117.94	130.98	174.83	178.35	218.49	264.63
30 hour	51.10	62.17	78.80	110.29	128.64	142.92	191.50	195.49	239.53	291.34
36 hour	54.73	66.55	84.38	118.36	138.22	153.34	206.06	210.26	258.27	314.14
48 hour	61.02	74.11	93.98	132.16	154.19	171.20	230.48	235.20	288.79	351.03
72 hour	70.51	85.65	108.71	153.62	178.99	198.83	266.69	272.02	332.01	401.37
96 hour	76.79	93.48	119.11	168.78	197.04	218.75	291.79	297.52	361.16	433.35
120 hour	80.64	98.57	125.83	179.67	210.01	233.25	309.82	315.97	381.47	454.23
144 hour	82.56	101.48	130.47	187.32	219.56	243.64	322.95	329.39	395.63	468.21
168 hour	83.00	102.74	132.94	192.58	226.03	251.10	332.44	339.15	405.69	477.82

It is recommended in ARR that for catchments with an area greater than 20 km^2 that rainfall be spatially varied across the catchment. Rainfall depths have been spatially varied using RORB's inbuilt function based on gridded IFD data

These rainfall intensities were used as input to the RORB model for design event simulations.

3.6.2 Rainfall Spatial Pattern

Spatial variability of design rainfall across the Douglas Creek catchment was represented in RORB using ARR2016 Spatial Pattern, where rainfall multipliers were derived from point rainfall depths obtained from the ARR Data Hub. For each duration (6–144 h), subarea point depths were normalised against the catchment-weighted mean depth to produce spatial multipliers that sum to 100% when area-weighted.

These percentage multipliers were entered into RORB's Edit Rainfall Spatial Pattern table for all durations, allowing the model to automatically adjust totals on a pro-rata basis to maintain storm volume. The same spatial pattern was applied to all AEPs, consistent with ARR guidance that spatial distribution is primarily dependent on storm geometry rather than frequency.

3.6.3 Design Rainfall Losses

As Douglas Creek is an ungauged rural catchment, design rainfall losses were derived in accordance with ARR2019 guidance and validated through comparison with regional methods. Continuing losses were varied with event rarity to reflect the recommended dependence of loss behaviour on antecedent soil moisture conditions. Frequent storm events (98–39% AEP) were assigned higher continuing losses to represent drier catchment states, while rarer events (10% to 0.05% AEP) were assigned progressively lower continuing losses in line with ARR2019, reflecting the increased likelihood that extreme events occur under wet or saturated conditions. The adopted event-based losses are summarised in Table 17.

Table 17 – Adopted Design Rainfall Losses for Douglas Creek

AEP (%)	Initial Loss (mm)	Continuing Loss (mm/h)
98%	25	8
63%	25	8
39%	25	8
10%	25	7
2%	25	5

1%	25	4
0.05%	25	3

It is noted that the available data sources do not provide a complete set of overlapping design events. As a result, direct comparison across all AEPs was not possible. Only the return periods common to the RFFE estimates, gauge-derived FFA values, and RORB model outputs were used when evaluating and validating the loss scenarios presented in Table 18.

Initial and continuing loss values were assessed against independent regional sources, including the ARR Data Hub (IL = 56 mm, CL = 3.4 mm/h) and loss values adopted in the previous Northern Consulting Engineers (NCE) study (IL = 25 mm, CL = 2.5 mm/h). RORB model outputs using these loss combinations were compared with design peak flows estimated from the at-site Flood Frequency Analysis (FFA) and the ARR2019 Regional Flood Frequency Estimation (RFFE) method (Table 18).

Table 18 – Comparison of flows at Douglas Creek at Kangaroo Hills gauge for various design loss combinations

AEP(%)	RFFE Flow Estimates	Gauge Flood Frequency Curve (m3/s)	Data Hub Losses	NCE Report	Fitted Design Losses	Difference*
20	899	599	997	808	877	2.45%
5	1640	1409	1791	1613	1637	0.18%
1	2720	3220	2715	2433	2670	1.83%

3.6.4 Temporal patterns

It is recommended in ARR that for catchments with an area greater than 75 km^2 that aerial temporal patterns are used. Aerial temporal patterns for the Douglas Creek region were sourced from the DataHub (Appendix E). Embedded rainfall bursts have been filtered using the inbuilt function in RORB.

3.6.5 Areal Reduction Factor

Areal Reduction Factors (ARFs) were applied using the functionality in RORB.

3.6.6 Pre-burst Rainfall

Pre-burst rainfall was considered in the RORB model in accordance with *Australian Rainfall and Runoff (ARR 2019)* guidelines. The pre-burst conditions were applied to ensure realistic initial catchment wetness and accurate estimation of runoff response. Pre-burst depths were adopted based on regional ARR DataHub parameters for rural Queensland catchments and were applied to all design temporal patterns prior to the main storm burst. This approach ensures that antecedent conditions are appropriately represented in the hydrological modelling.

3.7 Critical Duration Analysis

A critical duration assessment has been undertaken in order to refine the number of storm durations required to be assessed within the hydraulic model using the Monte Carlo method. A summary of the critical durations of the catchment is presented in Table 19.

Table 19 – Critical durations and Selected Temporal Patterns

Storm Event AEP	Maximum flow(m^3/s)	Critical Duration(hr.)	Selected Ensembles
98% (4EY)	42	12	TP9
63%	204	12	TP1
39%	385	12	TP 7
10%	1233	12	TP9
2%	2204	12	TP9
1%	2670	12	TP9
0.05%	4640	12	TP9

3.8 SUMMARY OF RORB DESIGN FLOWS

The design flows for the current and near-term climate are presented in Table 20 provides a summary of the design flows generated from the RORB model and the associated critical duration. These formed the inflows applied to the hydraulic HEC-RAS model. The Douglas Creek flow at Node Location 'Inflow' was applied directly as the inflow hydrograph to the HEC-RAS model.

Table 20 – Design RORB Flows

AEP (%)	Douglas Creek Design RORB Model	
	Flow (m^3/s)	Critical Duration
98 (4EY)	42	12
63	204	12
39	385	12
10	1233	12
2	2204	12
1	2670	12
0.05	4640	12

3.9 Design Flow Verification

The design flows are largely dependent on the adopted RORB model design parameters. Therefore, these flows were compared to several other peak flow estimates for verification. The methods used to verify the design flows generated from RORB included:

- Regional Flood Frequency Estimation
- Extended Rational Method

3.9.1 Regional Flood Frequency Estimation

ARR recommends the use of the Regional Flood Frequency Estimation (RFFE) tool for estimating peak design flows. The RFFE tool was developed as part of the revision of ARR and is available on the ARR website. The tool requires the following inputs:

- catchment area;
- outlet location; and
- catchment centroid location.

Essentially, the RFFE approach transfers flood frequency characteristics from a group of gauged catchments to the location of interest. This estimation technique is limited to catchments that meet the following criteria:

- Catchment area is greater than 100km^2;
- Urban areas account for less than 10% of total catchment area;
- Catchment does not contain large storages. Small farm dams do not significantly impact on the estimate; and,
- Land use has not changed significantly.

The RFFE tool was used to estimate peak flows on Douglas Creek at Mount Fox Road, and the results are summarised in Table 11.

3.9.2 Rational Method Assessment

Although the *Extended Rational Method* is no longer recommended under *Australian Rainfall and Runoff 2019* (ARR 2019), it was applied to Douglas Creek to provide a comparative estimate of peak flows. This method was used as a broad "sanity check" against the more detailed hydrologic modelling undertaken using RORB.

Time of Concentration

The Bransby–Williams equation was adopted to estimate the time of concentration. For Douglas Creek, the main watercourse length was measured from the most downstream outlet point to the highest point in the catchment. Using the equation inputs (catchment length, area, and slope), the resulting time of concentration for Douglas Creek was calculated as approximately 15.8 hours.

Table 21 – Time of Concentration (Bransby–Williams Equation) – Douglas Creek

Catchment	Length (km)	Area (ha)	Equal Area Slope (%)	Time of Concentration (min)	Time of Concentration (hr)
Douglas Creek	37.49	47,920	0.3	949.4	15.8

Peak Flow Estimation

Using the calculated time of concentration and rainfall intensity data extracted from the Bureau of Meteorology (BoM) IFD Rainfall Data System, a preliminary peak flow estimate was derived for the 1% AEP event. The centroid of the Douglas Creek catchment was adopted as the reference location for rainfall intensity.

The Rational Method equation was applied with a runoff coefficient of 0.65 and a frequency factor of 1.2, consistent with the assumptions used for neighbouring catchments in the NCE study. The results indicate a peak flow of approximately 1,466 m^3/s for the 1% AEP event.

Table 22 – Peak Flow Calculation (Rational Method) – Douglas Creek

Catchment	Area (ha)	Coefficient	Frequency Factor	Peak Flow (m^3/s)
Douglas Creek	47,920	0.65	1.2	1,466

The Rational Method results for Douglas Creek are considered approximate only and are not recommended for direct use in design. Instead, they serve as a comparative check against the more detailed RORB modelling. Given the size of the catchment and the associated uncertainties, these values should be interpreted cautiously and are used primarily to confirm the order of magnitude of modelled design flows.

4 Hydraulic Modelling

The hydraulic modelling package chosen for use in this study was the HEC-RAS finite difference hydrodynamic flood simulation software. HEC-RAS simulates depth-averaged, two and one-dimensional free-surface flows and uses a combination of 2D and 1D modelling schemes to model complex flooding behaviour.

In general, Douglas Creek and the bridge are setup in the 1-dimensional domain, while floodplains are established in the 2-dimensional domain. The 1D and 2D domains are dynamically linked to allow exchange of flow between them.

Two model configurations have been developed from this base model as part of this study:

- Existing scenario model; and
- Proposed scenario model.

The existing scenario model has been developed to form the baseline against which the proposed scenario model results have been assessed. The development of this existing scenario model has included the addition of a nested 2D model domain for the creek, adjustments to the model topography, updates to the existing Douglas Creek bridge crossing Mount Fox Road and changes to the land-use delineation.

The proposed scenario model configuration has been developed from the existing scenario model and includes adjustments to the model topography, removal of the existing culvert, the inclusion of the proposed bridge and changes to the land-use delineation.

The model development details, historical flood analysis, and hydraulic model results are presented in the following sections.

4.1 Hydraulic Model Development

4.1.1 Model Extent and Grid Cell Size

A combined 1D/2D hydrodynamic flood model was developed and simulated using the HEC-RAS software package (Version 6.7). The model was used where the main in-bank areas of the channel and bridge are represented as one-dimensional and the overbank/storage areas were represented as two-dimensional.
The schematisation of the hydraulic model, including model area, inflow locations, boundaries and structure locations outlined in Figure 16.

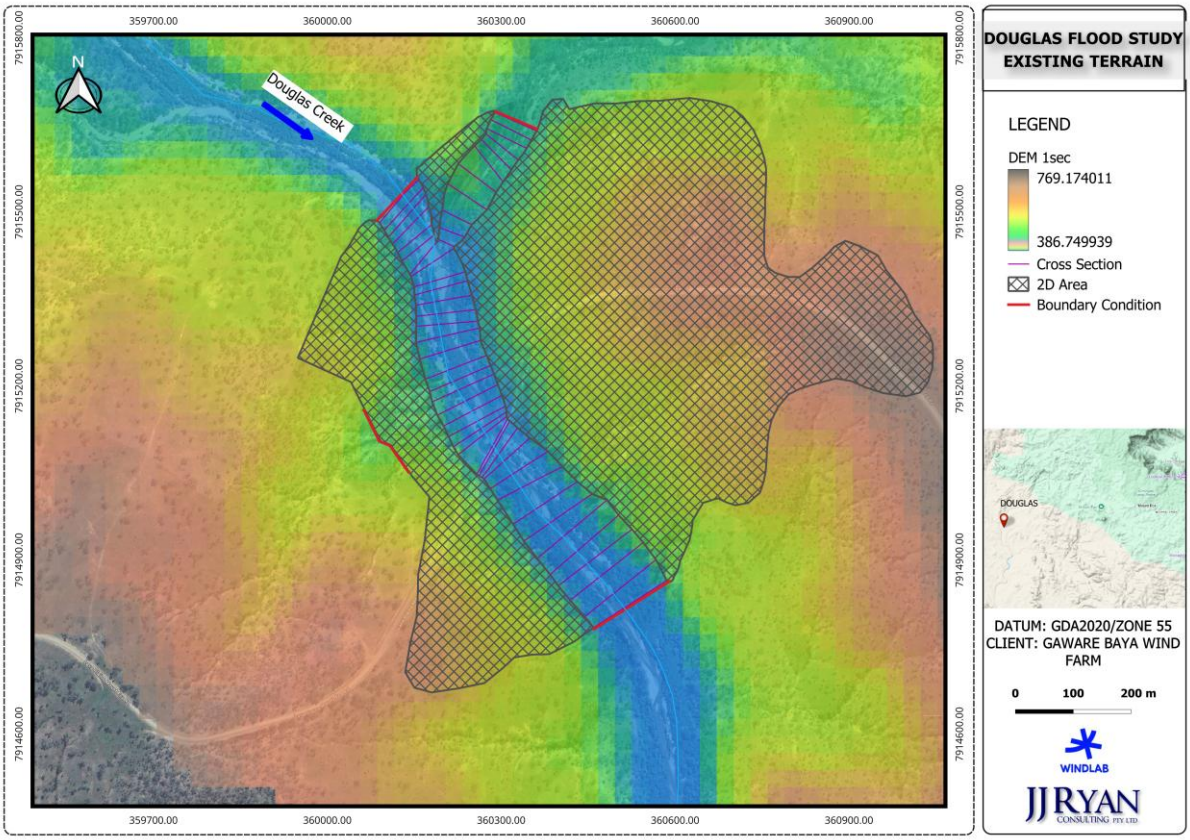


Figure 16 – Hydraulic model extent

A grid size of 5 m was used to define the flow in the 2-dimensional domain of the HEC-RAS model. This resolution was considered appropriate as it provides an adequate definition of the Douglas Creek channel, floodplain, and road embankments, while maintaining efficient model run times.

A time step of 5 second was used during the simulation for both the 1-D and 2-D areas.

4.1.2 Terrain Model

The existing model topography was modified to incorporate the following features:

- Ground-level data in the vicinity of the existing and proposed bridge, based on the DEM provided by the principal; and
- The shape and elevation of the existing Douglas Creek Bridge on Mount Fox Road, derived from available survey data.

For the proposed scenario model, the topography was further adjusted to incorporate the approach embankments to the new bridge, based on TIN survey data. The terrain was also modified to remove the existing low-level bridge and culvert crossing to ensure the model accurately represents the proposed design conditions.

4.1.3 Boundary Conditions

Design inflow hydrographs generated from the RORB hydrological model were applied to the HEC-RAS model as Source Area (SA) inflows. An additional inflow hydrograph was specified at the upstream end of Douglas Creek to define the main flood boundary condition.

At the downstream end of the model domain, a normal depth boundary condition was adopted for all simulations to represent flow continuation beyond the study area.

4.1.4 Hydraulic Roughness

The hydraulic roughness (Manning's *n*) values applied in the HEC-RAS model were derived using aerial imagery and vegetation mapping obtained from Queensland Globe, supplemented with publicly available datasets. Land cover was classified into representative surface types, and Manning's *n* values were assigned accordingly.

For this assessment, a Manning's *n* value of 0.040 was adopted for watercourses, and 0.060 was applied for the broader domain, consistent with the classifications shown in Table 23. These adopted roughness values align with industry standards, referencing the latest *Australian Rainfall and Runoff* guidelines (Ball et al., 2019) and the *Queensland Urban Drainage Manual* (QUDM) (IPWEA, 2017).

Table 23 – Classification Manning's n Values

Description	Manning's n
Waterbody/open channel/watercourse	0.040
Open Paddock with Moderate Trees	0.060
Medium Vegetation	0.070
Medium-Dense Vegetation	0.090
Dense Vegetation	0.100

4.1.5 Bridge

Existing infrastructures with the potential to restrict flow during major flood events in the study area include the Douglas Creek Bridge. These structures were incorporated into the HEC-RAS model using the parameters presented in Table 24.

Table 24 – Existing and Proposed Bridge Parameters

Existing Douglas Bridge Parameters			
Deck Elevation (low)	381.3 m AHD	Pier's Number	5
Deck Elevation (high)	381.7 m AHD	Manning's n	0.04
Span of bridge	≈36 m	Pier's Diameters	600 mm
Proposed Douglas Bridge **Parameters**			
Deck Elevation (low)	383.085	Pier's Number	5
Deck Elevation (high)	383.8	Manning's n	0.04
Span of bridge	72 m	Pier's Diameters	900 mm

4.2 Sensitivity Scenarios

4.2.1 Blockage Consideration

The proposed handrails, which may trap debris during flood events, were incorporated into the hydraulic model as an additional thickness to both the existing and proposed bridge structures. Blockage effects were considered to account for potential flow obstruction caused by structural components and safety barriers, consistent with the *Austroads Guide to Bridge Technology – Part 8* and *TMR RDDM (Section 7.9.3)*.

A conservative approach was adopted by modelling the guardrail height as a solid obstruction at deck level. This method restricts shallow flow conveyance over the bridge deck and simulates the associated rise in upstream water levels during overtopping conditions. The adjustment was implemented by modifying the bridge deck geometry in HEC-RAS to include the guardrail height.

This approach was selected to ensure a realistic representation of hydraulic behaviour under extreme conditions, accounting for head losses, upstream afflux, and flow redistribution. Conservatism was

applied to mitigate uncertainty in debris accumulation and structural interaction during major flood events.

4.2.2 Manning's n

A hydraulic sensitivity assessment was undertaken to evaluate the influence of roughness uncertainty on predicted flood behaviour within the modelled catchment. Manning's n values representing floodplain and channel roughness were systematically varied to assess the model's sensitivity to changes in hydraulic resistance. Two sensitivity scenarios were adopted:

- Decreased Manning's n values (−20%), representing smoother hydraulic conditions; and
- Increased Manning's n values (+20%), representing rougher hydraulic conditions.

These sensitivity tests were applied to the 1% AEP design event, as this event represents the critical flood for assessing design performance and provides a meaningful indication of model robustness under high-flow conditions.

Reducing Manning's n resulted in lower hydraulic resistance, producing generally lower water levels and increased flow velocities throughout the model. Conversely, increasing Manning's n led to elevated water levels and reduced velocities, with more pronounced effects occurring in shallow overbank areas where conveyance is sensitive to roughness variation. The outcomes are consistent with hydraulic theory, where reduced friction enhances flow conveyance and increased friction produces greater afflux and attenuated flow movement.

A summary of model responses for the three scenarios (baseline, −20% n, +20% n) is presented in Table 25 , which illustrates the changes in peak water levels, velocities, and flood timing at key locations. Overall, the model demonstrated moderate but spatially variable sensitivity to roughness adjustments, confirming that the adopted Manning's n values provide a stable and reasonable representation of physical conditions for design-level assessments.

Table 25 – Manning's n sensitivity (1% AEP)

Scenario	upstream WSL at bridge (m AHD)	Δ vs baseline (m)	Peak velocity at bridge (m/s)	Δ velocity (m/s)
Baseline (adopted n)	389.09	0.00	3.34	0.00
+20% Manning's n	389.18	0.02%	3.29	1.5%
−20% Manning's n	389.04	0.01%	3.38	1.2%

4.2.3 Boundary Condition Assessment

A downstream boundary sensitivity assessment was undertaken for the 1% AEP event to evaluate the influence of tailwater assumptions on upstream hydraulic behaviour. In the baseline configuration, the model applied a normal-depth boundary condition at the downstream extent, consistent with typical practice where downstream conditions are assumed to be freely draining. To assess the model's sensitivity to potential downstream control, the normal-depth boundary was replaced with a time-varying stage hydrograph representing a plausible downstream water level response during the 1% AEP design storm.

The stage hydrograph was aligned with the timing and duration of the design inflow hydrograph and applied at the model outlet to simulate potential backwater effects. This alternative boundary condition allows assessment of whether elevated downstream stages could influence peak water levels or flow characteristics upstream of the structure.

Results of the sensitivity test are summarised in Table 26, which compares peak water levels and velocities for the normal-depth and stage-hydrograph conditions. The stage boundary produced a change of 11.16 meters in peak upstream water level relative to the normal-depth baseline, indicating that the hydraulic model exhibits moderate sensitivity to downstream tailwater conditions for the 1% AEP event.

Table 26 – Boundary Sensitivity (1% AEP)

Boundary Condition	Peak Upstream WSL (m AHD)	Δ vs Normal Depth (m)	Peak Velocity (m/s)
Normal Depth	389.09	0.00	3.34
Stage Hydrograph	400.25	2.87%	0.67

5 Hydraulic Modelling Results

5.1 Existing scenario model

To assess the capability of the current drainage system at the road crossing, the 63% AEP to 0.05% AEP events have been simulated using the scenario model currently in use. In order to reduce the afflux, the outcomes of the current flood situation will be compared with the suggested scenario.

The peak water levels from the existing scenario model have been checked against the model results from the Mount Fox Road & Mount Fox Lava Plains Road Hydrologic and Hydraulic Assessment (NCE, 2024) to ensure consistency between results from the existing model configuration and the NCE report. The results indicate that there is a negligible difference in peak water levels between models.

Figures in Appendix E represent the current situation, including peak flood levels, peak velocity, and an extent along Douglas Creek close to the existing bridge. The anticipated peak flood levels at the current Bridge site are shown in Table 27.

Table 27 – Peak flood levels at the current Bridge

Event (AEP)	Peak Flood level at Douglas Bridge(mAHD)	
	Upstream	Downstream
98% (4EY)	380.8	380.8
63%	383.0	382.4
39%	384.0	383.3
10%	386.3	385.3
2%	387.7	386.7
1%	388.7	387.3
0.05%	391.0	389.3

5.1.1 Representative long-section – 63% AEP

The representative river long section for the 63% AEP (1 EY) event is shown in Figure 17. The long section illustrates the channel bed profile, the existing bridge deck level and the modelled 63% AEP water surface. As shown, the flood level rises above the existing deck, resulting in overtopping during this event. This confirms that the existing bridge does not provide flood immunity for the 63% AEP and is overtopped under relatively frequent flood conditions.

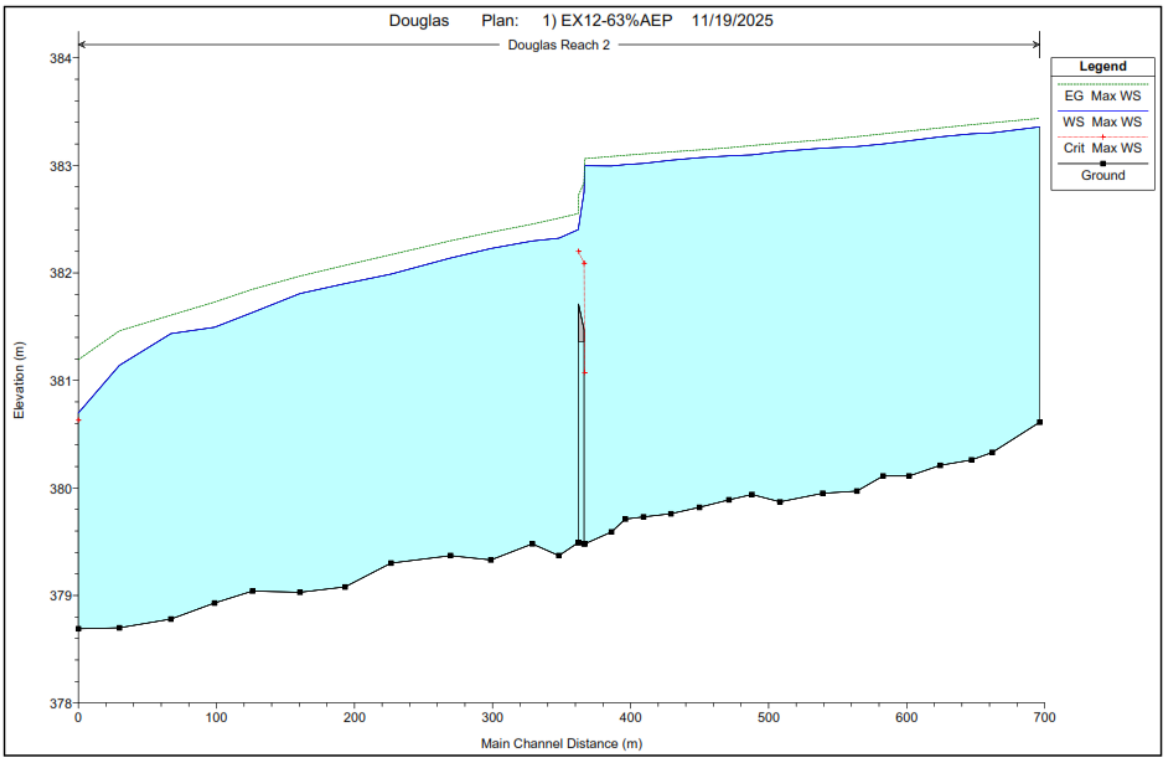


Figure 17 – River long-section for the 63% AEP at the existing bridge

This results in overtopping of the bridge deck, with flow conveyed both through the main channel opening and across the deck. The cross-section confirms that the current structure provides limited operational flood immunity at the design event and that the deck and approaches are vulnerable to frequent inundation and elevated flow velocities.

5.2 Proposed scenario model

5.2.1 Peak Flood levels

The proposed scenario model has been simulated for the 63%,40%, 20%,10%, 1% and 0.05% AEP design flood events.

Peak water levels from the proposed scenario model have been compared to existing scenario model results to determine the impact of the proposed structure on water levels in the vicinity of the proposed bridge. The results indicate that the peak flood levels are almost consistent with the proposed bridge and it has a negligible impact on peak water levels.

Table 28 – Peak Flood level at Proposed Douglas Bridge

Event (AEP)	Peak Flood level at Proposed Douglas Bridge(mAHD)	
	Upstream	Downstream
98% (4EY)	380.8	380.8
63%	382.6	382.5
39%	383.7	383.3
10%	386.5	385.3
2%	388.3	386.7
1%	389.1	387.4
0.05%	391.6	389.5

The model results indicate that the road has immunity from flooding for events up to the 63% AEP (1 EY) event.

5.2.2 Representative long-section – 63% AEP (Proposed Bridge)

The representative river long section for the 63% AEP (1 EY) event is shown in Figure 18. The long section displays the channel bed profile, the proposed bridge deck level and the modelled 63% AEP water surface. As shown, the flood level remains below the proposed deck, indicating that no overtopping occurs in this event. This demonstrates that the proposed bridge provides adequate flood immunity for the 63% AEP, improving performance compared with the existing structure.

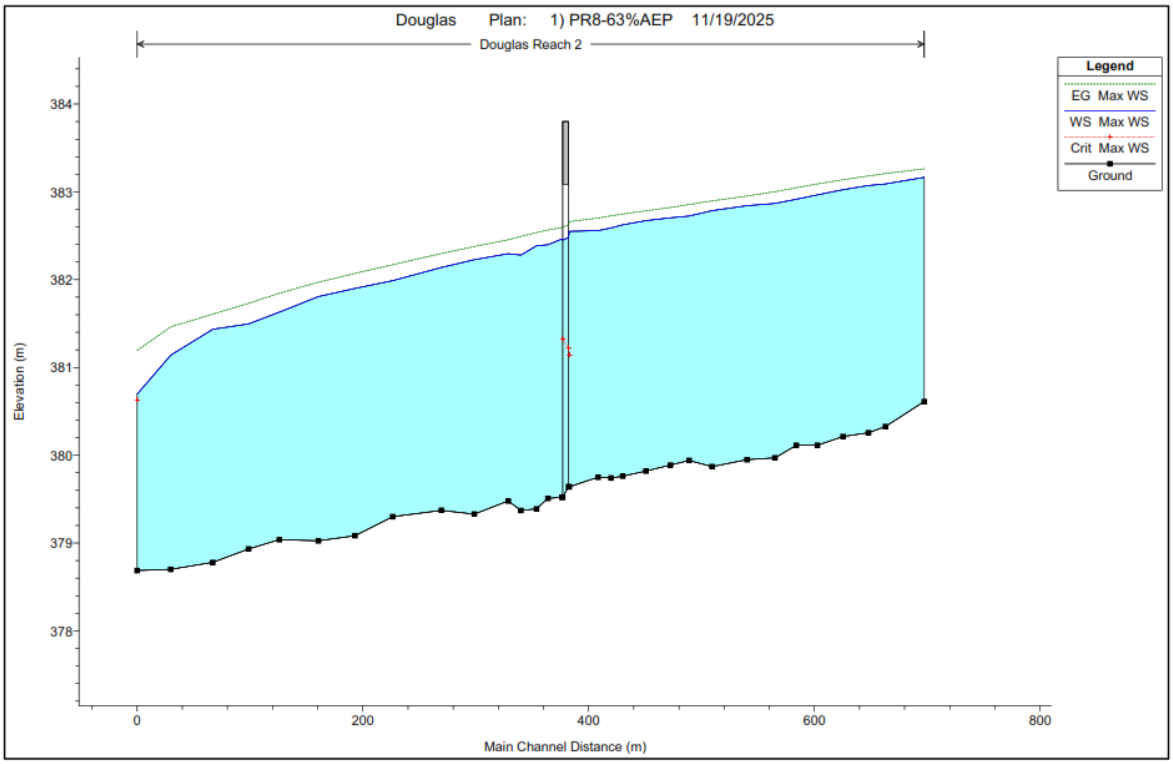


Figure 18 – River long-section for the 63% AEP at the proposed bridge

5.2.3 Peak Velocities

Figures in Appendix G show the peak velocities for each of the six design events assessed. The peak channel velocities at the location of the proposed structure range from 0.7 m/s for the 98% AEP event to 4.1 m/s for the 0.05% AEP event (note that velocities represent depth-averaged conditions).

Table 29 – Peak Velocity at Proposed Douglas Bridge

Event (AEP)	Peak Velocity at Proposed Douglas Bridge(mAHD)	
	Upstream	Downstream
98% (4EY)	0.7	0.8
63%	1.5	1.6
39%	1.9	2.2
10%	2.5	3.4
2%	3.2	4.2
1%	3.3	4.4
0.05%	4.1	5.3

5.3 Inundation Time

The time of submergence or closure is a critical consideration in bridge design and floodway planning. Due to uncertainty regarding the appropriate closure criterion, *Austroads Guide to Road Design (AGRD) Part 5B* recommends that calculations focus on Time of Submergence (TOS) and Average Annual Time of Submergence (AATOS). AATOS represents the average time per year that the road surface is submerged. In practice, the actual time of closure (TOC) often exceeds the submergence period because it includes additional time for post-flood clean-up and inspection. This clean-up duration can be added to TOS based on council estimates.

For this study, TOS and TOC were calculated by extracting modelled water levels at the floodway for all design events ranging from 4EY to 1% AEP. The following assumptions were adopted:

- The road is considered submerged when water depth exceeds 250 mm (total head) at the road crown.
- The road is considered closed when water depth exceeds 300 mm (total head) over the road surface.

These thresholds provide a practical approximation for AATOS and AATOC calculations and are considered sufficiently accurate for this assessment.

The resulting peak water surface levels and calculated times of submergence and closure for all modelled design storm events are summarised in Table 30 for the existing bridge configuration. An AATOS of 3.683 hours/year (0.1535 days/year) was calculated for Douglas Creek at Mount Fox Road under existing conditions.

Table 30 – TOS & TOC for existing bridges (hours)

Event Frequency (EY)	Peak flood level at the road crown (381.77 m AHD)	Average velocity over the road (m/s)	Time of Submergence (hours)	Time of Closure (hours)
63	383	1.14	9.5	10.5
39	384.01	1.42	16.5	17.5
10	386.33	2.4	23	23.5
2	387.68	3.31	25.5	26
1	388.65	3.42	26.5	27
0.05	391.02	4.29	34.5	40
			AATOS (hour/year) =3.683	AATOC (hour/year) =3.8193
			AATOS (day/year) =0.1535	AATOC (day/year) =0.1591

For the proposed bridge configuration, the same methodology was applied. Results indicate a significant reduction in both TOS and TOC compared to the existing arrangement, demonstrating improved flood resilience and reduced closure impacts.

The calculated AATOS for the proposed bridge is 1.8868 hours/year (0.0786 days/year), which is approximately 50% lower than the existing bridge scenario. This improvement highlights the effectiveness of the proposed design in minimising disruption during flood events.

Detailed results for the proposed bridge configuration are presented in Table 31.

Table 31 – TOS & TOC for Proposed bridges (hours)

Event Frequency (EY)	Peak flood level at the road crown (382.3 m AHD)	Average velocity over the road (m/s)	Time of Submergence (hours)	Time of Closure (hours)
63	380.8	0.68	0	0
39	382.55	1.47	0	0
10	383.65	1.87	11.5	13
2	386.46	2.49	16.5	17
1	388.29	3.15	17.5	18.5
0.05	389.09	3.34	20.5	21
			AATOS (hour/year) =1.8868	AATOC (hour/year) =2.0644
			AATOS (day/year) =0.0786	AATOC (day/year) =0.0860

The comparison between results clearly demonstrates the benefit of the proposed bridge design. Under existing conditions, the road experiences an average annual submergence of 3.683 hours/year, whereas the proposed design reduces this to 1.8868 hours/year, representing a reduction of nearly 49%. Similarly, the Average Annual Time of Closure (AATOC) decreases from 3.8193 hours/year to 2.0644 hours/year, a reduction of approximately 46%.

This reduction in inundation time significantly improves network reliability and safety during flood events. The proposed bridge design therefore meets the objective of minimising flood-related disruptions and aligns with best practice recommendations for resilient infrastructure in flood-prone areas.

5.4 Flood Impacts

During the proposed bridge operational phase, there is potential for impacts on existing flood behaviour, primarily due to:

- Loss of floodplain storage as a result of the road embankments located within the floodplain.
- Hydraulic losses and afflux due to the new bridge including bridge piers, bridge abutments, bridge deck and bridge ancillary works.

The existing bridge model was updated to represent the proposal as follows:

- The elevations of the proposed roadways were represented in the model through changes to the model topography.
- The existing model was removed from using change of topography.
- The new bridge, including bridge piers, abutments and bridge deck were included as a model structure.
- Ancillary works at the new bridge, including the road barriers, handrails and guardrails, were represented in the model using various flood model features.

The model was run for 98% AEP,63% AEP, 39% AEP, 10% AEP,2% AEP, 1% AEP and 0.05% AEP design flood events. The model results from the proposed scenario were compared to the existing scenario model results, providing for a relative assessment of the potential changes in flood behaviour as a result of the preliminary concept design.

5.4.1 Changes in flood levels

The afflux maps provided in Appendix H illustrate the variation in flood levels between the proposed bridge and road design and the existing base case across a range of design events, from frequent floods such as the 63% EY event through to the 0.05% AEP.

For the more frequent events, including 63% EY and 39% EY, the changes in flood levels are negligible across the study area, generally within ±0.01 metres. For the 10% AEP event, minor increases in flood levels are observed near the proposed bridge location, typically in the range of 0.01 to 0.05 metres, extending slightly upstream along Douglas Creek.

As the magnitude of the event increases, the extent and severity of afflux also increases. For the 2% AEP and 1% AEP events, localised increases in flood levels occur upstream of the proposed bridge, generally between 0.05 and 0.10m, with isolated pockets reaching up to 0.25m adjacent to the road embankment.

The 0.05% AEP design event exhibits the most notable changes, with afflux exceeding 0.25m in small areas and isolated points approaching 0.50m. These changes are confined to the immediate vicinity of the structure and do not extend significantly across the floodplain, indicating that the impacts are localised rather than widespread.

The primary cause of these increases appears to be the retention of the existing bridge embankment in the proposed scenario. By leaving the embankment in place, the floodplain conveyance is reduced, creating an additional constriction that increases head losses and concentrates flow around the new structure.

This effect is particularly evident during rare and extreme events, where the combined influence of the new bridge and the legacy embankment results in elevated upstream water levels. Downstream of the proposed bridge, flood level changes remain negligible for all events, generally within ±0.01 metres, confirming that the backwater effect does not propagate beyond the immediate structure.

Sensitivity modelling is recommended to isolate the contribution of the existing embankment and evaluate mitigation options. Full removal of the embankment is expected to provide the greatest reduction in afflux, potentially lowering peak increases for the 1% AEP event from approximately 0.12m to less than 0.04 m and eliminating isolated afflux greater than 0.25 metres in the PMF scenario.

5.4.2 Changes in flood velocity

Velocity impact maps in Appendix H indicate localised changes in flow velocities near the proposed bridge and road embankment. For frequent events such as 63% EY and 39% EY, velocity changes are negligible across the floodplain.

For the 10% AEP event, minor increases in velocity are observed adjacent to the bridge piers, generally in the range of 0.10 to 0.20 m/s. As the event magnitude increases, the changes become more pronounced.

For the 2% AEP and 1% AEP events, velocity increases of up to 0.30 to 0.50 m/s occur near the bridge piers and along the narrowed channel section, while minor reductions in velocity are observed immediately upstream of the embankment on the left bank.

The 0.05% AEP design event exhibits the greatest changes, with localised increases exceeding 0.50 m/s adjacent to the structure. These changes are confined to the immediate vicinity of the bridge and do not significantly alter floodplain velocities beyond the structure.

The increased velocities near the piers and embankment are primarily due to flow concentration caused by the combined effect of the new bridge and the retained embankment.

While these changes are localised, they have the potential to increase scour risk at the abutments and around any residual embankment sections. Appropriate scour protection measures, such as rock armouring or reinforced aprons, should be incorporated into the detailed design to manage these risks. Where embankment removal or modification is implemented, velocity patterns are expected to normalise, reducing the need for extensive scour protection and improving hydraulic performance.

In summary, velocity impacts under the proposed design are not considered critical for the broader floodplain but require targeted mitigation at the structure to ensure long-term stability. Implementing embankment removal will further reduce velocity concentrations and associated scour potential, aligning the design with best practice for flood resilience.

Appendices

Appendix A – NCE Hydrologic and Hydraulic Assessment Report

Appendix B – Detailed Survey Undertaken by GMC Surveying

Appendix C – Proposed Bridge Design Drawings

Appendix D – Flood Frequency Analysis Plot

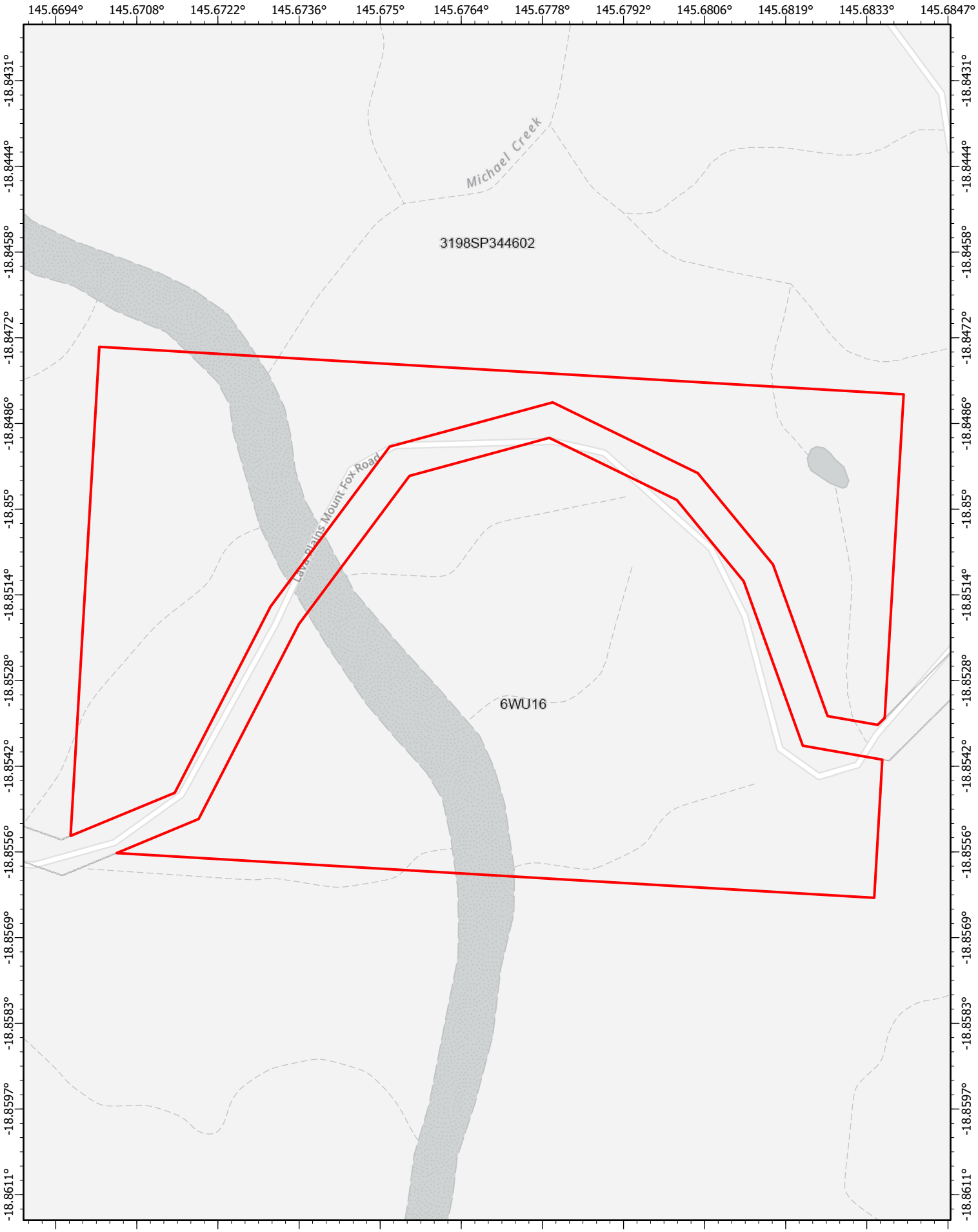
Appendix E – Data Hub

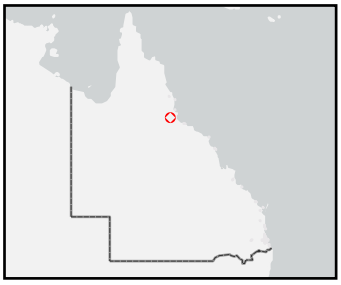
Appendix F – Mapping Output (Existing Scenario)

Appendix G – Mapping Output (Proposed Scenario)

Appendix H – Afflux Maps

APPENDIX D SPP MAPPING





N

Scale: 1:9,300

0 100 200 300 400

Metres

Date: 19/08/2026

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State Planning Policy mapping layers - consolidated list for all selected Lot Plans

(Note: Please refer to following pages for State Interests listed for each selected Lot Plan)

BIODIVERSITY
- MSES - Regulated vegetation (intersecting a watercourse)
- MSES - Regulated vegetation (category R)

NATURAL HAZARDS RISK AND RESILIENCE
- Flood hazard area - Level 1 - Queensland floodplain assessment overlay
- Flood hazard area - local government flood mapping area
- Bushfire prone area

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State Planning Policy mapping layers for selected

Lot Plan: 6WU16 (Area: 1310000 m²)

BIODIVERSITY

- MSES - Regulated vegetation (intersecting a watercourse)
- MSES - Regulated vegetation (category R)

NATURAL HAZARDS RISK AND RESILIENCE

- Flood hazard area - local government flood mapping area
- Bushfire prone area
- Flood hazard area - Level 1 - Queensland floodplain assessment overlay

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APPENDIX E CODE RESPONSES

CHARTERS TOWERS REGIONAL COUNCIL CODE RESPONSES

1. RURAL ZONE CODE

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Built form		
PO1 Buildings are designed and located so as not to adversely impact on the rural character and amenity of the locality.	**AO1.1** Building height does not exceed 12m.	**PO1 – Not Applicable** The Project does not involve buildings.
	AO1.2 Buildings, other than a Roadside stall, are setback a minimum of: 10m from the front boundary and side boundaries for allotments greater than 2ha; or 5m front boundary and side boundaries for allotments less than 2ha.	
Residential density		
PO2 Residential density reflects the low intensity rural character of the locality.	**AO2.1** Residential density is limited to: one Dwelling house (including a Secondary dwelling) per allotment; and Rural workers accommodation up to 400m^2 GFA.	**PO2 – Not Applicable** The Project does not involve residential development.
	AO2.2 Any Secondary dwelling is a maximum of 150m^2 GFA.	
Amenity		
PO3 Sensitive land uses do not encroach on existing or approved rural, mining and extractive industry activities or other uses that may result in an adverse impact on amenity, health or safety. Editor's note–Where not achieving AO3, a site-based assessment is required to demonstrate compliance with PO3.	**AO3** Sensitive land uses are separated: from intensive animal industry uses where: feedlots by a minimum of 1km; poultry farms by a minimum of 800m; from animal keeping where: catteries and kennels by a minimum of 800m; otherwise 500m; aquaculture by a minimum of 300m; from waste disposal areas connected to an animal husbandry operation by a minimum of 1km;	**PO3 – Complies** The Project comprise the upgrade and/or replacement of the existing Douglas Creek crossing located on Lava Plains Mount Fox Road, forming part of the Gawara Baya Wind Farm off-site road network. The Project is not a sensitive land use, and is expected to improve road safety and functionality and is not expected to result in adverse impacts on existing rural, mining, extractive industry or agricultural activities.

<table>
<tr><th>Performance Outcome (PO)</th><th>Acceptable Outcome (AO)</th><th>ERM’s Response</th></tr>
<tr><td></td><td>from cropping on areas of agricultural land by a minimum of 300m;
from other agricultural activities (excluding cropping activities) by a minimum of 50m;
from other rural activities, not elsewhere mentioned, by a minimum of 100m;
from railway activities by a minimum of 100m;
from existing industrial activities by 1km; and
from extractive industry operations as follows:
<table><tr><th>Operation</th><th>Separation distance</th></tr><tr><td>Extraction or processing involving blasting or crushing</td><td>1,000m</td></tr><tr><td>Extraction or processing not involving blasting or crushing</td><td>200m</td></tr><tr><td>Haul route</td><td>100m</td></tr></table></td><td></td></tr>
<tr><td rowspan="2">PO4
Outdoor lighting does not adversely affect the amenity of adjoining properties or create a traffic hazard on adjacent roads.</td><td>AO4.1
Light emanating from any source complies with Australian Standard AS4282 Control of the
Obtrusive Effects of Outdoor Lighting or current version.</td><td rowspan="2">PO4 – Complies
Construction activities will be undertaken in accordance with applicable construction management procedures. Any temporary lighting required during construction will be appropriately directed and managed to minimise impacts on adjoining properties and road users. Construction traffic and road user safety will be managed through the implementation of a Traffic Management Plan.</td></tr>
<tr><td>AO4.2
Outdoor lighting is provided in accordance with Australian Standard AS 1158.1.1 Road Lighting – Vehicular Traffic (Category V) Lighting – Performance and Installation Design Requirements or current version.</td></tr>
<tr><td>PO5
Development does not adversely impact on the amenity of the surrounding rural or rural residential land uses and/or rural landscape character.</td><td>AO5
Plant and air-conditioning equipment, storage areas and processing activities are screened from view of the road or adjoining residential uses.</td><td>PO5 – Not Applicable
The Project will not introduce land uses or structures that would adversely affect the amenity or rural landscape character of the locality.</td></tr>
<tr><td>PO6
Development ensures:
vulnerability to landslip, erosion and land</td><td>AO6
Development is not located on slopes greater than 15%.</td><td>PO6 – Complies
The Project comprise the upgrade and/or replacement of the existing Douglas Creek</td></tr>
</table>

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
degradation is minimised; and the safety of people and property. Editor's note–Where not achieving AO6, a site-based assessment and Landslide risk management plan is required to demonstrate compliance with PO6. Refer to the Natural hazards TPP.		crossing located on Lava Plains Mount Fox Road, forming part of the Gawara Baya Wind Farm off-site road network. Appropriate construction management measures, including a Construction Environmental Management Plan (CEMP), Traffic Management Plan and Erosion and Sediment Control Plan (ESCP), will be implemented to minimise erosion and land degradation risks and ensure the safety of people and property during construction.
Stock routes Editor's note – stock routes are identified on the Agriculture overlay map OM1.		
PO7 Development does not result in encroachment by sensitive land uses and other incompatible uses along the stock route network and uses are setback and buffered from the stock route network to mitigate impacts.	**AO7** Sensitive land uses are separated a minimum of: 200m from a surveyed stock route; or 800m from an unsurveyed stock route.	**PO7 – Not Applicable** The Project does not involve a sensitive land use.
PO8 Development on or adjoining the stock route network does not compromise the connectivity and integrity of the network and protects the ongoing, efficient and safe use of travelling stock by: Maintaining the extent of the stock route network, including where pasturage rights exists; Maintaining access to water facilities and other stock route infrastructure; Using access works that are robust and fit-for-purpose, and provide for the safe passage of stock traversing the stock route; and Where transport or other linear infrastructure crosses a stock rout, providing a practical solution to allow stock to move across the infrastructure safety and in a timely example (for example grade separation).	No acceptable outcome is nominated.	**PO8 – Complies** The Project comprise the upgrade and/or replacement of the existing Douglas Creek crossing located on Lava Plains Mount Fox Road, forming part of the Gawara Baya Wind Farm off-site road network. The Project will maintain the operation of the transport network and is not expected to compromise the connectivity, integrity or ongoing use of any stock route network. Traffic impacts during construction will be managed through a Traffic Management Plan to ensure the safe and efficient movement of road users and construction traffic.
PO9 Development does not result in a loss of secondary values associated with the stock		**PO9 – Not Applicable** The Project is located within existing road reserves and is not expected to adversely affect the

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
route network including recreational, environmental and heritage values.		recreational, environmental or heritage values associated with the stock route network.
Use - Caretakers accommodation		
PO10 Development is ancillary to the primary use.	**A10** No more than 1 Caretaker's accommodation unit is established on the site.	**PO10 – Not Applicable** The Project does not include caretaker's accommodation.
Use - Roadside stall		
PO11 Roadside stalls are of a scale in keeping with the rural character of the locality.	**AO11.1** Structures associated with the use are limited to 30m2 GFA.	**PO11 – Not Applicable** The Project does not involve a roadside stall.
	AO11.2 A Roadside stall is setback a minimum of 10m from the front and side boundaries.	
	AO11.3 The Roadside stall only sells produce grown on site.	
For all assessable development		
Land use		
PO12 Development: is consistent with the rural character of the locality; supports the primary rural function of the zone; and protects rural, natural and scenic values of the locality.	No acceptable outcomes are nominated.	**PO12 – Complies** The Project comprise the upgrade and/or replacement of the existing Douglas Creek crossing located on Lava Plains Mount Fox Road, forming part of the Gawara Baya Wind Farm off-site road network. The works are consistent with and support the rural character of the locality.
PO13 Tourism (including associated accommodation), recreation and entertainment related activities: are small scale; do not impact on the viability of nearby urban and township areas; have a direct nexus with the natural environment or rural activities; avoid locating on productive rural land;		**PO13 – Not Applicable** The Project does not involve tourism, recreation or entertainment activities.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
are not located where they would prejudice the ongoing operation of existing or approved rural activities such as intensive animal industries and intensive horticulture; and (f) are compatible with rural production and agricultural land, natural resources and landscape amenity.		
Design and amenity		
PO14 Development is designed to achieve safety for all users having regard to: maximising casual surveillance and sight lines; avoiding personal concealment and entrapment locations; exterior building design that promotes safety; adequate lighting; appropriate signage and wayfinding; and building entrances, parking areas, loading and storage areas that are well lit and have clearly defined access points. Editor's note–Applicants may find useful guidance in the Queensland Government's Crime Prevention through Environmental Design Guidelines for Queensland.	No acceptable outcome is nominated.	**PO14 – Complies** The Project has been designed to improve road safety for construction traffic, OSOM vehicles and other road users.
PO15 Development minimises potential conflicts with, or impacts on, other uses having regard to vibration, odour, dust or other emissions.	**AO15.1** Development achieves the air quality design objectives set out in the Environmental Protection (Air) Policy 2008, as amended. **AO15.2** Development that involves the storage of materials on site that are capable of generating air contaminants either by wind or when disturbed are managed by: being wholly enclosed in storage bins; or a watering program so material cannot become airborne.	**PO15 – Complies** Potential dust, noise and other construction-related emissions will be temporary in nature and managed through the Construction Environmental Management Plan, Traffic Management Plan and Erosion and Sediment Control Plan.
PO16	**AO16**	**PO16 – Complies**

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Development prevents or minimises the generation of any noise so that nuisance is not caused to adjoining premises or other nearby sensitive land uses.	Development achieves the noise generation levels set out in the Environmental Protection (Noise) Policy 2008, as amended.	Construction activities associated with the proposed upgrades will be undertaken in accordance with relevant environmental management measures to minimise noise impacts and avoid nuisance to surrounding properties. Potential construction impacts will be managed through the implementation of a CEMP.
PO17 Development does not unduly impact on the existing amenity and character of the locality having regard to: the scale, siting and design of buildings and structures; visibility from roads and other public view points, screening vegetation and landscaping; the natural landform and avoidance of visual scarring; and vibration, odour, dust, spray drift and other emissions.	No acceptable outcomes are nominated.	**PO17 – Complies** The Project are limited to upgrades of an existing road corridor and have been designed to minimise environmental and visual impacts while improving road safety and functionality. The development is consistent with the existing character of the locality.
PO18 All uses are located, designed, orientated and constructed to: minimise noise dust, odour or other nuisance from existing lawful uses including rural and industrial uses; minimise nuisance caused by noise, vibration and dust emissions generated to the State-controlled road and rail network in the vicinity of the land; not adversely encroach on airport service uses and other activities associated with the Charters Towers airport; and avoid areas that may place unreasonable risk to people and property from former mining activities and contaminated land. Editor's note – sites of former mining activity may be identified through the Historic Mining Permits, Resources (Mineral Occurrence and Geological Observation Data) and Abandoned Mines layers of MyMinesOnline	No acceptable outcomes are nominated.	**PO18 – Complies** The Project comprise the upgrade and/or replacement of the existing Douglas Creek crossing located on Lava Plains Mount Fox Road, forming part of the Gawara Baya Wind Farm off-site road network, and is not expected to be adversely affected by surrounding rural or industrial \ land uses. Construction and operational impacts, including noise, dust and vibration, will be managed through the implementation of a CEMP and other appropriate environmental management measures. The works do not involve development associated with airport operations and are not expected to create unreasonable risks to people or property.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Maps. However, proponents should be aware that the online mapping does not spatially represent all abandoned mines and their extent. Geotechnical investigation of past mining areas may reveal additional unmapped historic mine sites.		
P019 Development ensures ecological values, habitat corridors, soil and water quality are protected, having regard to: maximising the retention of vegetation and the protection of vegetation from the impacts of development; minimising the potential for erosion and minimisation of earthworks; maximising the retention and protection of natural drainage lines and hydrological regimes' avoidance of release of biohazards into the environment; avoidance of release of biohazards into the environment; mitigating the risk of introducing and spreading weeds and pest animals; and avoidance of leeching by nutrients, pesticides or other contaminants, or potential for salinity.	No acceptable outcome is nominated.	**PO19 – Complies** The Project will be managed through the preparation and implementation of a CEMP, Traffic Management Plan and ESCP. These measures will minimise impacts on ecological values, vegetation, soil and water quality, and manage risks associated with erosion, sedimentation, weeds and pests during construction.
Use - Animal keeping (kennels or catteries)		
PO20 Development is sited, constructed and managed such that: animals are securely housed; and the use does not create an unreasonable nuisance beyond the site boundaries.	**AO20.1** The premises has a minimum site area of 5ha.	**PO20 – Not Applicable** The Project does not involve animal keeping, kennels or catteries
	AO20.2 Buildings used for animal keeping are constructed with impervious reinforced concrete floors, gravity drained to the effluent collection/treatment point.	
	AO20.3 Animal proof fencing or other appropriate barrier features are provided to a minimum height of 1.8m within the site to prevent the escape of animals.	

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
	AO20.4 Animals are kept in fenced enclosures, inside buildings at all times between the hours of 18:00 and 07:00.	
	AO20.5 A person who is responsible for the operation of the use is accommodated on the premises at all times.	
	AO20.6 Animal enclosures are set back to roads, streets and water resources as follows: Road frontages: 50m Top bank of creek, river, stream, wetland, edge of well, bore, dam, weir, intake or the like which provides potable water supply to the site or surrounds: 100m Top bank of dry or perennial gully: 30m	
Use - Agricultural supplies store, Bulk landscaping supplies, Rural industry, Wholesale nursery and Garden centre		
PO21 Development is located and designed on sites of sufficient size, to minimise adverse impacts on: the amenity of the setting, in particular noise, odour and dust emissions; the amenity of neighbours; and operating within the safe and effective design capacity of the region's road system.	**AO21.1** The premises has a minimum site area of 5ha.	**PO21 – Not Applicable** The Project does not involve an agricultural supplies store, bulk landscaping supplies, rural industry, wholesale nursery or garden centre.
	AO21.2 A minimum 15m setback is required from any adjoining property boundary.	
	AO21.3 Sales, storage, handling, packaging and production areas are setback a minimum of: 100m from any sensitive land use (50m for Garden centre); 50m from State-controlled roads and 20m from all other roads; 20m from any residential dwelling on the same or neighbouring site (10m for Garden centre); and 30m from top bank of creek, river, stream or	

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
	wetland edge of well, bore, dam, weir, or intake that provides potable water.	
	AO21.4 Infrastructure and material storage areas are confined to free draining areas and sites on slopes not exceeding 10%.	
	AO21.5 There is direct access from the property boundary to a sealed road.	
	AO21.6 Hours of operation are limited between 07:00 to 17:00.	
Use - Club or community use		
PO22 Development is located and designed on sites of sufficient size, to minimise adverse impacts on: the amenity of the setting, in particular noise, odour and dust emissions; and the amenity of neighbours.	**AO22.1** A minimum site area of 5ha.	**PO22 – Not Applicable** The Project does not involve a club or community use
	AO22.2 Siting and layout includes: the total area of covered buildings and roof structures is no greater than 10% of site area; and no building or structure is closer than 15m to any site boundary.	
	AO22.3 Buildings and structures associated with the use is limited to: shelters; toilets; kiosks; and hall/function area.	
	AO22.4 Hours of operation are limited between 07:00 and 22:00.	
Use - Renewable energy facility (where a solar farm)		
PO23 Development is: located to allow for connections into relevant energy supply networks;	No acceptable outcome is nominated.	**PO23 – Not Applicable** The Project is not a renewable energy facility.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
located to avoid fragmenting highly productive agricultural land; and accessible to an appropriate level of road infrastructure to support the facility.		
PO24 Development ensures the site is returned to its pre-development condition and land use upon cessation of the renewable energy facility.	No acceptable outcome is nominated.	**PO24 – Complies** The Project is not a renewable energy facility.

2. DEVELOPMENT WORKS CODE

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Utility infrastructure and services		
PO1 Development is serviced by an adequate, safe and reliable supply of potable and general use water, connected to reticulated water supply where possible.	**AO1** Development is: (a) connected to Council's reticulated water supply network, including the installation of easily accessed water meters, in accordance with the *Development works Town plan policy*; or (b) if connection to Council's reticulated water supply network is not possible, a potable on site water supply is provided in accordance with the *Development works Town plan policy.*	**PO1 – Not Applicable** The Project comprises upgrades to existing road infrastructure and does not require a potable water supply connection.
PO2 Development is serviced by appropriate waste water disposal infrastructure which ensures: (a) no adverse ecological impacts on the receiving environment; (b) cumulative impacts of onsite waste water treatment are considered in assessing the likely environmental impacts; public health is maintained; (d) the location, site area, soil type and topography is suitable for on site waste water treatment; and (e) the reuse of waste water does not contaminate any surface water or ground water.	**AO2** Development is: (a) connected to Council's reticulated sewerage treatment system, in accordance with the Development works Town plan policy; or if connection to Council's reticulated sewerage treatment system is not possible, waste water is treated in accordance with *Development works Town Plan Policy*.	**PO1 – Not Applicable** The Project comprises upgrades to existing road infrastructure and does not require waste water disposal.
PO3 Electricity supply network and telecommunication service connections are provided to the site and are connected.	**AO3.1** The development is connected to electricity and telecommunications infrastructure in accordance with the standards of the relevant regulatory authority prior to the commencement of any use of the site. **AO3.2** Where not included in the development, provision is made for future telecommunications services	**PO3 – Complies** Existing electricity and telecommunications infrastructure will be protected during construction and the Project are not expected to adversely affect the provision of utility services. Potential impacts on existing infrastructure will be managed through the implementation of a Construction Environmental Management Plan (CEMP) and relevant construction management measures.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
	(such as fibre optic cable) in accordance with the standards of the relevant regulatory authority.	
Stormwater management Editor's note–Refer also to the Stormwater management design objectives in the State planning policy.		
PO4 Stormwater management is designed and operated to ensure that adjoining land and upstream and downstream areas are not adversely affected through any ponding or changes in flows: (a) ensure that adjoining land and upstream and downstream areas are not adversely affected through any ponding or changes in flows; and (b) direct stormwater to a lawful point of discharge through competently designed and constructed outlet works in a manner that reflects the predevelopment status. Editor's note– Stormwater quality must meet the design objectives within the *Development works Town plan policy.*	**AO4.1** Development does not result in an increase in flood level or flood duration on upstream, downstream or adjacent properties. **AO4.2** Stormwater (including roof and surface water) is conveyed to the kerb and channel or other lawful point of discharge in accordance with the requirements of the *Development works Town plan policy.* **AO4.3** Stormwater runoff from all impervious areas (roof, pavements, etc) are not permitted to flow or discharge over adjoining properties.	**PO4 – Complies** The Project include upgrades to drainage infrastructure where required. An ESCP and CEMP will be prepared and implemented to manage erosion, sedimentation and other environmental risks associated with construction activities, including earthworks and the installation, upgrade and replacement of culverts, drainage infrastructure and associated erosion protection measures.
Earthworks		
PO5 Earthworks are undertaken in a manner that: (a) prevents any worsening of soil erosion or water quality on the site, any adjoining land, or land upstream or downstream of the site; (b) produces stable landforms and structures; (c) maintain natural landforms where possible; (d) minimise the height of any batter faces; (e) does not unduly impact on the amenity or privacy for occupants of the site or on adjoining land or on the amenity of	**AO5.1** Earthworks comply with the *Development works Town plan policy.* **AO5.2** The extent of filling or excavation does not exceed 40% of the site area or 500m^2, whichever is lesser. **AO5.3** Excavating or filling is no greater than 1m in height or depth. **AO5.4** Batters have a maximum slope of 25%, are terraced at every rise of 1.5m and each terrace has a depth of 0.75m.	**PO5 – Complies** Earthworks required for the proposed road upgrades have been designed to minimise disturbance and will be managed through the implementation of a CEMP and ESCP to protect land stability, water quality and public safety.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
the streetscape; (f) does not result in the contamination of land or water; and avoids risk to people and property.	**AO5.5** No contaminated material is used as fill.	
PO6 Retaining walls are designed to minimise visual impact through: (a) setbacks from any boundary; and being stepped or terraced to accommodate landscaping.	**AO6.1** The combined height of any retaining walls and fences does not exceed 2m.	**PO6 – Not Applicable** The Project does not include retaining walls.
	AO6.2 A retaining wall is set back at least half the height of the wall from any boundary of the site.	
	AO6.3 Retaining walls over 1.5m are stepped 0.75m for every 1.5m in height, terraced and landscaped.	
	AO6.4 Design and construction of retaining walls over 1m in height are certified by a Registered Professional Engineer of Queensland.	
PO7 The excavation, filling or laying of pipes within the vicinity of electricity supply infrastructure must not create damage or hazard. Editor's note–Development involving filling, excavation or laying of metal pipes on land contiguous to electricity supply infrastructure should be referred to the relevant electricity entity for safety advice on the Project.	**AO7.1** Excavation or filling does not occur within: (a) 10m of any tower, pole, foundation, ground anchorage or stay supporting electric lines or associated equipment; (b) 5m of a substation site boundary; (c) 2m of a padmount substation; or (d) 1m of a padmount transformer or an underground cable.	**PO7 – Complies** The proposed excavation, filling and associated infrastructure works will be carefully managed to avoid damage or hazards during construction. An ESCP and CEMP will be implemented to manage construction risks and protect surrounding infrastructure, people and property.
Parking and access		
PO8 Development includes the provision of adequate and convenient car parking on site to satisfy the anticipated requirements of the land use or activity.	**AO8** Car parking is provided in accordance with Table 8.3.1.3(b)–Car parking requirements.	**PO8 – Not Applicable** The Project comprises road infrastructure upgrades and does not generate a requirement for on-site car parking facilities.
PO9 Development provides end of trip facilities	**AO9** Development provides cycling and pedestrian end	**PO9 – Not Applicable** The Project does not include buildings or

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
for people engaging in active transport (bicycle and pedestrian): (a) to meet the needs of users and promote active modes of travel; (b) at convenient, easily identifiable, safe locations; and in locations that do not obstruct vehicular, bicycle or pedestrian movement paths.	of trip facilities, in accordance with the requirements of the *Development works Town plan policy.*	facilities that require end-of-trip facilities for cyclists or pedestrians.
PO10 Access driveways are designed and constructed to: (a) provide convenient access to the site and maintain the safety and efficiency of the road; (b) minimise conflicts with traffic and pedestrians; and (c) are constructed to a standard that is appropriate to the location and to meet the anticipated volume and type of traffic.	**AO10.1** Access driveways are designed and constructed in accordance with the relevant *Development works Town plan policy.* **AO10.2** Access driveways allow vehicles (with the exception of Dwelling house and Dual occupancy) to enter and exit the site in a forward gear.	**PO10 – Complies** The Project utilise and upgrades existing road infrastructure and access arrangements. Construction traffic and OSOM vehicle movements will be managed through a Traffic Management Plan to maintain the safe and efficient operation of the road network.
PO11 Vehicle movement areas (including internal driveways, access aisles, manoeuvring areas, car parks and service bays) are designed to ensure: (a) a gradient appropriate for the type of vehicles; (b) effective stormwater drainage; (c) clearly marked and signed spaces; (d) convenience and safety for drivers and pedestrians; and (e) adequate dimensions to meet user requirements, including access and egress for emergency vehicles.	**AO11** Manoeuvring, queuing, loading and unloading areas, and parking areas are: (a) designed and constructed in accordance with the Development works Town plan policy; and certified by a Registered Professional Engineer of Queensland.	**PO11 – Complies** Vehicle movement areas associated with the Project have been designed to safely accommodate construction traffic, OSOM vehicles and other road users whilst maintaining appropriate drainage and access arrangements.
PO12 Footpaths in the road reserve are provided along all road frontages and are	**AO12** Footpaths are: (a) provided for the full width and length of all road	**PO12 – Not Applicable** The Project does not include the provision of new footpaths.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
paved in durable and stable materials matching any adjacent development footpaths.	frontages; (b) designed and constructed in accordance with the requirements of the Development works Town plan policy; and certified by a Registered Professional Engineer of Queensland.	
PO13 Pedestrian access to buildings: (a) do not obstruct pedestrian movement (or form physical clutter) on public footpaths; (b) are not visually overbearing (or form visual clutter) in the streetscape; and provide safe, efficient and convenient access including wheelchair access.	**AO13** Steps, escalators, ramps and lifts are: (a) located wholly within the site; and setback a minimum of 1.5m from the front boundary.	**PO13 – Not Applicable** The Project does not involve buildings or pedestrian access structures.
Acoustic and air quality		
PO14 Development minimises potential conflicts with, or impacts on, other uses having regard to vibration, odour, dust or other emissions.	**AO14** Development achieves the air quality design objectives set out in the *Environmental Protection (Air) Policy 2008, as amended.* Editor's note–To achieve compliance, development is planned, designed and managed to ensure emissions from activities achieve the appropriate acoustic objectives (measured at the receptor dB(A)).	**PO14, PO15, and PO16 – Complies** Potential construction impacts, including dust, noise and vibration, will be temporary in nature and managed through the implementation of a CEMP, Traffic Management Plan and other appropriate environmental management measures.
PO15 Development prevents or minimizes the generation of any noise so that: (a) nuisance is not caused to adjoining premises or other nearby sensitive land uses; and desired ambient noise levels in residential areas are not exceeded.	**AO15** Development achieves the noise generation levels set out in the *Environmental Protection (Noise) Policy 2008, as amended*.	
PO16 Development adjacent to State controlled roads or Council controlled arterial road minimise nuisance caused by noise, vibration and dust emissions.	**AO16** Development complies with the requirements of the Department Main Roads - Road Traffic Noise Management Code of Practice and the *Environmental Protection (Noise) Policy 2008*.	

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Lighting		
PO17 External lighting is provided in urban areas to ensure a safe environment.	**AO17** Technical parameters, design, installation, operation and maintenance of outdoor lighting complies with the requirements of *AS4282 – Control of the Obtrusive Effects of Outdoor Lighting.*	**PO17 – Complies** Any temporary lighting required during construction will be appropriately directed and managed to minimise impacts on adjoining properties and road users.
Waste management		
PO18 Development: (a) minimises waste generation (including construction, demolition and operational waste); and provides adequate facilities on site for the storage of waste and recyclables.	**AO18** Waste storage and management arrangements are sited, screened and designed in accordance with the *Development works Town plan policy.*	**PO18 and PO 19 - Complies** Construction and operational waste generated by the Project will be appropriately managed in accordance with the CEMP and relevant waste management requirements.
PO19 Development is designed to allow for safe and efficient servicing of waste and recycling containers through: (a) a development layout that facilitates direct and unobstructed servicing of waste and recycling containers; and (b) minimising the potential for nuisances to be caused by way of noise and odour.	**AO19** Waste and recycling collection services are provided in accordance with the *Development works Town plan policy.*	
For all assessable development		
General		
PO20 Where buildings and structures are located on multiple lots, these are amalgamated to form one lot.	No acceptable outcome specified.	**PO20 – Not Applicable** The Project does not involve buildings or structures across multiple lots.
Wastewater management		
PO20 Wastewater is managed to: (a) avoid wastewater discharge to any	No acceptable outcome specified.	**PO20 and PO21 – Not Applicable** The Project does not generate wastewater requiring discharge, treatment or disposal.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
waterway; or (b) if wastewater discharge to waterways cannot be practically avoided, discharge is minimised to an acceptable level by re-use, recycling, recovery and treatment for disposal to sewer, surface water and groundwater. Editor's note–Wastewater is defined in accordance with *Environmental Protection (Water) Policy 2009*, schedule 2). A wastewater management plan (WWMP) is prepared by a suitably qualified person and addresses: (i) wastewater type; and (ii) climatic conditions; and (iii) water quality objectives (WQOs); and best-practice environmental management.		
PO21 Wastewater discharge maintains ecological processes, riparian vegetation, waterway integrity, and downstream ecosystem health including: (a) protecting applicable water quality objectives for the receiving waters; (b) managing soil disturbance or altering natural hydrology in coastal areas; and avoiding or minimising the release of nutrients of concern.	No acceptable outcome specified.	
Stormwater management		
PO22 Stormwater management systems: (a) implement Water Sensitive Urban Design (WSUD) principles that: (i) protect natural systems and waterways; (ii) allow for the detention of stormwater instead of rapid	**AO22** Stormwater management systems are designed and constructed in accordance with the *Development works Town plan policy.* Editor's note–A site Stormwater Quality Management Plan (SQMP) is prepared in accordance with *Development works Town plan policy.*	**PO22, PO23, PO24, PO25, PO26, and PO 27 - Complies** The Project include upgrades to drainage infrastructure where required. An ESCP and CEMP will be prepared and implemented to manage erosion, sedimentation and other environmental risks associated with construction activities, including earthworks

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
conveyance; (iii) minimise impervious areas; (iv) utilise stormwater to conserve potable water; (v) integrate stormwater treatment into the landscape; (vi) ensure water quality values are protected; (b) must be economically maintained for the life of the system; (c) provide for safe access and maintenance; and (d) maintain natural drainage lines and adequate filtering and settlement of sediment for the protection of watercourses, wetlands from point sources and non-point source stormwater discharges.		and the installation, upgrade and replacement of culverts, drainage infrastructure and associated erosion protection measures.
PO23 Development allows for sufficient site area to accommodate an effective stormwater management system.	No acceptable outcome specified.	
PO24 Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to: (a) existing capacity of stormwater infrastructure and ultimate catchment conditions; discharge for existing and future upstream development; and(c) protecting the integrity of adjacent and downstream development.	No acceptable outcome specified.	
PO25 Major stormwater drainage network elements are designed and constructed with the capacity to control stormwater flows under normal and minor system blockage conditions for the applicable defined flood event ensuring there is no	**AO25** Stormwater infrastructure is designed in accordance with the requirements of the *Development works Town plan policy.*	

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
damage to property or hazards for motorists.		
PO26 Reconfiguration of lots includes stormwater management measures in the design of any road reserve, streetscape or drainage networks to: (a) minimise impacts on the water cycle; (b) protect waterway health by improving stormwater quality and reducing site run-off; and avoid large impervious surfaces.	No acceptable outcome specified.	
PO27 Construction activities for the development avoids or minimise adverse impacts on stormwater quality by: (a) achieving the post construction stormwater management design objectives for pollution load reductions for Western Queensland (TSS 85% TP 60% TN 45% and 90% Gross pollutants) and or In lieu of modelling, the default bio-retention treatment area of 1.5 per cent of the contributing catchment area; and (b) the waterway stability management design objective: limit the peak 1-year ARI event discharge within the receiving waterway to the pre-development peak1-year ARI discharge. (a) An Erosion and Sediment Control Plan (ESCP) is prepared by a suitably qualified person that demonstrates: 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	**AO27** Stormwater quality achieves the stormwater design objectives of the *Development works Town plan policy.*	

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
conditions; or (b) 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 of this Performance outcome.		
Earthworks		
PO28 Earthworks associated with roads: (a) maintain the efficiency of the road network; (b) do not adversely impact upon residents or road infrastructure; and do not obstruct access to the site.	No acceptable outcome specified.	**PO28 – Complies** The proposed earthworks are associated with road widening, pavement upgrades, drainage works and passing bays required to facilitate OSOM vehicle movements. The works have been designed to maintain the safe and efficient operation of the road network while minimising disturbance outside the existing road reserve. Construction traffic and access will be managed through a Traffic Management Plan.
PO29 Development in the Rural zone and Rural residential zone manages soil erosion and sedimentation by: (a) avoiding land clearing or earthworks in the riparian corridor to a designated stream; (b) minimising the extent of disturbance on, or the stabilisation of slopes steeper than 10%; and managing and controlling surface drainage by using natural flow paths.	No acceptable outcome specified.	**PO29 – Complies** Earthworks and vegetation disturbance have been minimised where practicable and will be managed through the implementation of an ESCP. Surface drainage will be maintained through appropriate drainage design and erosion control measures to minimise soil erosion and sedimentation during construction.
PO30 Any disturbed areas within the site are to be progressively rehabilitated through appropriate earthworks and involve the: (b) grading and reshaping of the disturbed areas to provide controlled and stable drainage flow paths; construction of drainage paths which divert high velocity flows away from disturbed	No acceptable outcome specified.	**PO30 – Complies** Construction activities will include the rehabilitation and stabilisation of disturbed areas, including drainage reinstatement, erosion control measures and revegetation where required.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
areas; (c) re-spreading of stored topsoil stripped from the site prior to commencement of construction works; and (d) planting of the disturbed area with native species of grasses, ground covers and trees and placing mulch in between on the surface. Editor's note–Applicants may be required to engage specialists to prepare a rehabilitation plan.		
Land use and transport integration		
PO31 Development: (a) supports a road hierarchy which facilitates efficient movement of all transport modes; and (b) appropriately integrates and connects with surrounding movement networks. Editor's note–Refer to the road hierarchy identified on map AM1.	No acceptable outcome specified.	**PO31 – Complies** The Project upgrades existing road infrastructure and supports the safe and efficient movement of OSOM vehicles, construction traffic and other road users. The works will improve the functionality and connectivity of the existing transport network servicing the locality and the approved Gawara Baya Wind Farm.
PO32 Development provides direct and safe access to public passenger transport facilities.	**AO32** Any through-site pathway connections to public passenger transport facilities are provided in accordance with Austroads guide to road design—Part 6A: Pedestrian and cyclist paths.	**PO32 – Not Applicable** The Project does not involve public passenger transport facilities or through-site pedestrian connections.
Road design		
PO33 Roads providing access to the site are provided, constructed and maintained to a standard which is adequate for the traffic type and volume likely to be generated by the activities on site.	**AO33** Roadworks are provided in accordance with the requirements of the *Development works Town plan policy.*	**PO33 – Complies** The proposed road upgrades have been designed to improve the capacity, safety and functionality of Lava Plains Mount Fox Road for the anticipated traffic volumes, including OSOM haulage vehicles associated with the construction of the Gawara Baya Wind Farm.
PO34 Street lighting and signs are provided to ensure the safety of both vehicles and	**PO34** Street lighting and signage comply with the requirements of the *Development works Town plan*	**PO34 – Complies** Appropriate signage and road safety infrastructure will be installed as part of the

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
pedestrians, and to facilitate access and movement.	*policy.*	Project to support safe access and movement on the road network. A Traffic Management Plan will also be implemented during construction to provide temporary traffic control measures and signage.
Acoustic and air quality		
PO35 Utility services and service structures attached to buildings, do not adversely impact on the acoustic or visual amenity of the surrounding area and are: (a) located as far from sensitive land uses, road frontage boundaries and public open spaces as practical; (b) acoustically shielded and visually screened so as not to be audible or visible from adjoining and nearby sites, public open spaces and roads.	No acceptable outcome specified.	**PO34 – Not Applicable** The Project does not include utility services or service structures attached to buildings. The works are limited to upgrades of existing road infrastructure within the existing road reserve.

3. FLOOD HAZARD OVERLAY CODE

Performance outcomes	Acceptable outcomes	ERM's Response
Siting of development		
PO1 Development: • does not provide unacceptable risks to people and property from flood hazard impacts or, the risks are mitigated to an acceptable or tolerable level; and • does not intensify or locate a use in an extreme or high hazard area, in order to avoid risks to people, property and the environment.	No acceptable outcome is nominated.	**PO1 – Complies** The Project comprises the upgrade and/or replacement of the existing Douglas Creek crossing located on Lava Plains Mount Fox Road. While portions of the Project Area are mapped within a Queensland Reconstruction Authority Level 1 flood hazard area, the works are limited to upgrades of existing transport infrastructure and do not introduce new sensitive land uses or intensify development within the flood hazard area.
PO2 Development is sited to enable safe evacuation in the event of a flood.	No acceptable outcome is nominated.	**PO2 – Complies** The Project is located within an existing public road corridor and will maintain the function and accessibility of the road network. The Project has also been designed to improve safety and resilience of the crossing during flood events.
PO3 Signage is provided within flood hazard areas to alert residents and visitors to the flood hazard.	**AO3** Signage is provided on site (regardless of whether the land is in public or private ownership) indicating: the position and path of all safe evacuation routes off the site; and if the site contains or is within 100m of a floodable waterway, hazard warning signage and depth indicators are also provided at key hazard points such as floodway crossings or entrances to low-lying reserves.	**PO3 – Complies** Appropriate road signage and traffic control measures will be provided during construction in accordance with the Traffic Management Plan to support the safe movement of road users through the Project Area. Where required, signage associated with flood-prone sections of the road network will be maintained or installed in accordance with relevant road authority requirements.
Reconfiguring a lot		
PO4 The siting, layout and design of lot reconfiguration avoids or mitigates the adverse impacts associated with flooding to protect the safety of people and property.	No acceptable outcome is nominated.	**PO4 and PO5 – Not Applicable** The Project does not involve the reconfiguration of a lot.

Performance outcomes	Acceptable outcomes	ERM's Response
PO5 Road and pathway layout ensures residents are not physically isolated from adjacent flood free urban areas and provides a safe and clear evacuation route.	No acceptable outcome is nominated.	
Building floor levels		
PO6 The floor levels of sensitive land uses have an acceptable level of flood immunity to maintain the safety of people from flood hazard impacts. Editor's note–The grouping of land uses known as 'sensitive land uses', as referenced throughout this Town plan is found in section SC1.2 Administrative terms.	**AO6.1** Habitable rooms have a minimum floor level at least 0.3m above the DFE.	**PO6 and PO7– Not Applicable** The Project does not involve the building of floor levels.
	AO6.2 Floor levels of non-habitable rooms (other than Class 10 buildings) are above the DFE, or allow for the flow through of floodwaters on the ground floor.	
	AO6.3 Where involving an extension to an existing residential use that has habitable rooms below the level referred to in AO6.2, any extension does not exceed $25m^2$ GFA.	
PO7 Non-residential development is designed and located to minimise damage to property and contents from flooding impacts.	No acceptable outcome is nominated.	
Earthworks		
PO8 Development including any earthworks must: • not adversely impact on or change the flood characteristics of a floodplain or waterway; • not reduce existing flood storage and flow capacity; • avoid any physical change to a floodplain or natural waterway; avoid increased scour and erosion; • not increase the depth, velocity or direction of the flow, the rate of flood level	No acceptable outcome is nominated.	**PO28 – Complies** The proposed earthworks are associated with the upgrade and/or replacement of the existing Douglas Creek crossing to facilitate OSOM vehicle movements within the existing road reserve. Culvert and drainage upgrades have been incorporated where required to maintain road functionality and drainage performance, while an ESCP will be implemented to manage erosion, sedimentation and potential impacts on surrounding waterways and drainage features during construction.

Performance outcomes	Acceptable outcomes	ERM's Response
rise or the duration of inundation on the site or on land external to the site; and not remove any riparian or riverine vegetation.		
Hazardous materials		
PO9 Public safety and the natural environment are not adversely affected by the impacts of floodwater on hazardous materials manufactured or stored in bulk.	**AO9.1** Development does not involve the manufacture or storage of hazardous materials within a flood hazard area.	**PO9 – Not Applicable** The Project does not involve the manufacture, processing or bulk storage of hazardous materials
	AO9.2 Where it can be demonstrated that there is a low or medium flood risk, the manufacture or storage of hazardous materials takes place above the DFE flood levels. Editor's note–A site specific flood hazard assessment is required to demonstrate compliance with this performance criterion. Refer to the Natural hazards TPP.	
Intensive animal industry		
PO10 The use of land for intensive animal husbandry does not establish or intensify in a flood hazard area, in order to avoid risk to the environment.	**AO10** Intensive animal husbandry, including the storage of bulk food and any associated water treatment facilities, does not occur on land below the DFE.	**PO10 – Not Applicable** The Project does not involve intensive animal husbandry.
Essential community infrastructure **Editor's note–The term essential community infrastructure is defined in the State Planning Policy.**		
PO11 Essential community infrastructure is able to function effectively during and immediately after flood events.	**AO11** Community infrastructure is provided at or above the recommended flood level specified in Table 7.2.2.3(b)—Recommended flood levels of community infrastructure.	**PO11 – Not Applicable** The Project does not involve essential community infrastructure.
PO12 Essential services infrastructure (e.g. on site electricity, gas, water supply, sewerage and	**AO12** Any components of infrastructure that are likely to fail to function or may result in	

Performance outcomes	Acceptable outcomes	ERM's Response
telecommunications) maintains its function during and immediately after a DFE flood event.	contamination when inundated by flood water (e.g. electrical switchgear and motors, water supply pipeline air valves) are: located above the DFE; or designed and constructed to prevent floodwater intrusion/infiltration.	
Emergency management		
PO13 Development in flood hazard areas supports and does not hinder disaster management capacity and capabilities	No acceptable outcome is nominated.	**PO13 – Complies** The Project will be undertaken within an existing road reserve and is not expected to hinder disaster management capacity or emergency response activities. The works will improve the safety and functionality of the transport network, and a Traffic Management Plan will be implemented to maintain safe access for road users, adjacent landholders and emergency vehicles during construction.

4. NATURAL ENVIRONMENT OVERLAY CODE

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Environmental protection and buffering		
PO1 Development maintains and protects and MSES by: • locating in areas that avoid adverse impacts on MSES; or • where adverse environmental impacts cannot be avoided, impacts are minimised and an environmental offset is provided for any residual adverse impacts; and • the underlying ecological processes and biodiversity values of MSES are maintained or enhanced. • Editor's note– • to assist in demonstrating achievement of an environmental and ecological assessment may be required to demonstrate compliance with this performance criterion; • where it is demonstrated that adverse impacts cannot be avoided or minimised, significant residual impacts on matters of state environmental significance may require an offset in accordance in accordance with the *Environmental Offsets Act 2014*.	**AO1** Development locates outside of an area supporting MSES as shown on map OM5.	**PO1 – Complies** The Project is located within an existing road reserve and has been designed to minimise impacts on mapped Matters of State Environmental Significance (MSES). Proposed impacts have been approved through the recent Operational Works - Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA). Construction activities will be undertaken in accordance with the CEMP and other relevant management measures.
Buffers		
PO2 Development is setback from and provides an adequate vegetated buffer to areas containing MSES to: • protect these areas and their values from threatening processes; • avoid edge effects such as undesirable microclimate effects and threats from non-native or pest fauna or flora; and • maintain and enhance ecological	**AO2** A buffer extending from the outside edge of an area of MSES is provided and has a minimum width of 200m where located outside an urban zone.	**PO2 – Complies** The Project is located within an existing road reserve and has been designed to minimise impacts on mapped MSES. Proposed impacts have been approved through the recent Operational Works - Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA). Construction activities will be undertaken in accordance with the CEMP and other relevant

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
connectivity.		management measures.
PO3 An adequate buffer to a wetland in a MSES area is provided and maintained to: • protect or enhance habitat values, connectivity and other ecological processes and values; • protect water quality and aquatic conditions; • maintain natural micro-climatic conditions; • maintain natural hydrological processes; • prevent mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding; and • prevent loss or modification of chemical, physical or biological properties or functions of soil.	**AO3** A vegetated and development free buffer is provided and maintained extending from the high bank of the following: 100m wide buffer to a river; or 50m wide buffer to waterway.	**PO3 – Not Applicable** The Project is not located within or adjacent to a mapped wetland.
PO4 Isolated habitat areas are linked by a continuous corridor to provide effective ecological connectivity and to create additional linkages along waterways, wetlands, drainage lines, ridgelines, and other areas where possible.	**AO4** Development provides a continuous corridor with a minimum width of 100m linking areas of protected vegetation to each other and other vegetation areas off site.	**PO4 – Complies** The Project is located within an existing road reserve and is not expected to result in the fragmentation of habitat or significant impacts on ecological connectivity. Proposed impacts have been approved through the recent Operational Works – Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA).
Assessable development		
General		
PO5 Alterations to natural landforms, hydrology and drainage patterns do not adversely impact on areas containing MSES.	No acceptable outcome is nominated.	**PO5 – Complies** The Project have been designed to minimise impacts on existing landforms, hydrology and drainage patterns. Proposed impacts have been approved through the recent Operational Works – Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA), with erosion and sediment controls implemented during construction.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
PO6 Development retains and enhances riparian vegetation along watercourses and drainage corridors, and vegetation along timbered ridgelines.	No acceptable outcome is nominated.	**PO6 – Complies** Vegetation disturbance will be limited to that necessary to undertake the approved works. Proposed impacts have been approved through the recent Operational Works – Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA), with measures implemented to minimise impacts on riparian vegetation and drainage corridors.
PO7 Development avoids direct and indirect impacts on significant ecological communities and significant species and their habitats, including disturbance from the presence of vehicles, pedestrian use, increased exposure to domestic animals, noise and lighting impacts.	No acceptable outcome is nominated.	**PO7 – Complies** Potential impacts on ecological communities, significant species and habitat values will be managed through the implementation of a CEMP. Proposed impacts have been approved through the recent Operational Works – Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA).
PO8 Areas of habitat that support a critical life cycle stage such as feeding, breeding or roosting or ecological function for threatened species, ecological communities or migratory species are protected and not impacted by development.	No acceptable outcome is nominated.	**PO8 – Complies** The Project have been designed to minimise impacts on habitat areas and ecological values. Proposed impacts have been approved through the recent Operational Works – Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA), with disturbance limited to that necessary to undertake the approved works.
PO9 Buffering, rehabilitation or restoration protects and enhances MSES and their underlying ecological processes, habitat and biodiversity values by: • using site appropriate and locally occurring native species; • replicating as far as practicable, the species composition and structural components of healthy remnant vegetation and associated habitats, including understorey vegetation; and • excluding environmental weeds, declared plants and other non-native plants likely to displace native flora or fauna species or degrade habitat.	No acceptable outcome is nominated.	**PO9 – Complies** Disturbed areas outside the permanent development footprint will be reinstated and stabilised following completion of construction activities. Temporary waterway barrier materials, including temporary rock and geofabric used during construction, will be removed following completion of the bridge works. Natural bed materials will be retained where practicable and the river bed will be allowed to naturally regrade following removal of temporary works.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
PO10 Development: • avoids the introduction of pest species (plant or animal) that pose a risk to the ecological integrity and biodiversity values of MSES; and • includes appropriate pest management practices to control any existing threat of pest species in a way that provides for the long term ecological integrity of MSES.	No acceptable outcome is nominated.	**PO10 – Complies** The CEMP will consolidate the relevant management measures for vegetation clearing, fauna management, weed and pest hygiene, incident reporting and environmental inspections.
Ecological corridors		
PO11 Development protects an ecological corridor through: • enhancing ecological connectivity and habitat extent; and effectively linking habitats on and/or adjacent to the site. • Editor's note–Ecological corridors and habitat linkages have dimensions and characteristics to support: • ecological processes and functions that enable the natural change in distributions of species and provide connectivity between populations of species over long periods of time; • ecological responses to climate change; • connectivity between large tracts and patches of remnant vegetation, habitat areas and areas supporting MSES; and • effective and unhindered day-to-day and seasonal movement of avian, terrestrial and aquatic fauna.	No acceptable outcome is nominated.	**PO11 – Complies** The Project is located within an existing road reserve and is not expected to result in significant impacts on ecological connectivity. Proposed impacts have been approved through the recent Operational Works – Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA). The approved vegetation clearing package was supported by a dedicated Planning Report, Ecological Assessment Report and Relevant Purpose Determination prepared to demonstrate compliance with the requirements of the *Vegetation Management Act 1999* and State Code 16: Native Vegetation Clearing.
Wetland ecological values		
PO12 Development involving the clearing of vegetation protects the biodiversity, ecological values and processes, and hydrological functioning of a wetland area, including: • water quality values; • aquatic habitat values; • terrestrial habitat values; and	No acceptable outcome is nominated.	**PO12 – Not Applicable** The Project is not located within or adjacent to a mapped wetland.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
• usage of the site by native wetland fauna species or communities.		
Wetland hydrology and stormwater management		
PO13 The existing surface water hydrological regime of the wetland is enhanced or maintained through: • providing a net ecological benefit and improvement to the environmental values and functioning of a wetland in a wetland protection area; or • rehabilitating the existing hydrological regime or restore the natural hydrological regime of a wetland.	No acceptable outcome is nominated.	**PO13 – Not Applicable** The Project is not located within or adjacent to a mapped wetland.
Land degradation		
PO14 Development avoids land degradation in a wetland area, including: • mass soil movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding; and • loss or modification of chemical, physical or biological properties or functions of soils.	No acceptable outcome is nominated.	**PO14 – Not Applicable** The Project is not located within or adjacent to a mapped wetland.
PO15 Degraded areas supporting MSES or other environmental values important to the maintenance of underlying ecological processes required to maintain biodiversity, are rehabilitated as near as is practical to the naturally occurring state of native plant species and ecological communities.	No acceptable outcome is nominated.	**PO15 – Complies** Disturbed areas will be rehabilitated and stabilised following construction, including drainage reinstatement, erosion control measures and revegetation where required.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Monitoring		
PO16 During construction and operation of development, ongoing management, monitoring and maintenance is undertaken to ensure impacts on areas supporting MSES and their underlying ecological processes and biodiversity values are avoided or minimised.	No acceptable outcome is nominated.	**PO16 – Complies** A CEMP will be implemented to provide ongoing environmental management, monitoring and maintenance measures to minimise impacts on MSES and associated ecological values during construction.
Environmental Offsets		
PO17 Where development cannot reasonably avoid impacts on MNES or MSES, any unavoidable impacts should be minimised and offset, in accordance with the *Environmental Offsets Regulation 2014.*	No acceptable outcome is nominated.	**PO4 – Not Applicable** Proposed impacts have been approved through the recent Operational Works – Native Vegetation Clearing DA and Relevant Purpose Determination (2604-51908 SDA). Environmental offsets are not assessed as part of this application.

5. BUSHFIRE HAZARD OVERLAY CODE

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Site suitability		
PO1 Development maintains the safety of people and property. Editor's note – A site specific bushfire hazard assessment and management plan is required to demonstrate compliance with this performance criterion. Refer to the Natural hazards Town plan Policy.	No acceptable outcome is nominated.	**PO1 – Complies** The Project comprises the upgrade and/or replacement of the existing Douglas Creek crossing located on Lava Plains Mount Fox Road. The works will improve the safety and functionality of the transport network, with construction activities managed through the implementation of a Traffic Management Plan, CEMP, and ESCP.
PO2 Development does not result in a higher concentration of people living, working or congregating in a bushfire prone area unless it can be demonstrated: • there is an overriding community need in the public interest; and • no other site is suitable and reasonably available.	**AO2** The following uses are not located on land within a high to very high bushfire hazard area: a. Agricultural supplies store; b. Bulk landscape supplies; c. Club; d. Community use; e. Food and drink outlet; f. Function facility; g. Garden centre; h. Market; i. Nature based tourism; j. Outdoor sport and recreation; k. Rural industry; l. Rural workers accommodation; m. Renewable energy facility; n. Tourist park; and o. Wholesale nursery.	**PO2 – Not Applicable** The Project does not involve land uses that increase the concentration of people living, working or congregating within a bushfire hazard area.
Siting of development		
PO3 The siting, layout and design of development avoids or mitigates the risks associated with bushfire hazard through: • being situated on that part of the site that	No acceptable outcome is nominated.	**PO3 – Complies** The Project comprises the upgrade and/or replacement of the existing Douglas Creek crossing located on Lava Plains Mount Fox Road. The Project Area intersects mapped

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
has the lowest level of bushfire risk; • fire mitigation measures that do not adversely impact on areas having high environmental values. Editor's note– a site specific bushfire hazard assessment and management plan is required to demonstrate compliance with this performance criterion. Refer to the Natural hazards TPP; buildings in a bushfire hazard area must meet the requirements of *AS3959-2009 – the Australian Standard for the Construction of Buildings in Bushfire Prone Areas* and the requirements of the Building Code of Australia.		medium potential bushfire intensity areas. The bushfire risk is anticipated to be low, as the works are largely confined to existing transport infrastructure where vegetation in proximity to the Project is limited, with only minor and localised vegetation disturbance anticipated.
Water supply		
PO4 Development in areas with a reticulated water supply has adequate flow and pressure for fire-fighting purposes at all times.	**AO4** The water supply network has a minimum sustained pressure and flow of at least 10 litres per second at 200kPa.	**PO4 and PO5 – Complies** The bushfire risk is anticipated to be low, as the works are largely confined to existing transport infrastructure where vegetation in proximity to the Project is limited, with only minor and localised vegetation disturbance anticipated. The Project does not require a reticulated water supply for firefighting purposes.
PO5 Development in areas without a reticulated water supply has an appropriate dedicated water supply for fire-fighting purposes, that is safely located and freely accessible for fire-fighting purposes at all times.	**AO5** Development involving a gross floor area greater than 50m^2 where a reticulated water supply is not available is: provided with an easily accessible fire resistant on site water storage of not less than 5,000 litres (e.g. concrete tank with fire brigade fittings, in-ground swimming pool, dam fed by a permanent water source) that is within 100m of the development; and (b) has a hard-standing area allowing a heavy rigid fire appliance safe access to within 6m of the storage facility. Editor's note–Plastic water tanks are not considered to be fire resistant.	

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
Roads, fire access trails and firebreaks		
PO6 Roads and fire access trails are designed and constructed to: • enable efficient access to buildings and structures for fire-fighting purposes for emergency services; and • swift evacuation in emergency situations.	**AO6.1** Roads and fire access trails are designed and constructed to: • have a maximum gradient of 12.5%; • a minimum cleared width of 6m and a minimum formed width of 4m; • provides passing and turning areas for fire-fighting appliances at intervals of not less than 500m; • have a vehicular access at each end to roads or a bushfire trail; and • not involve any cul-de-sac.	**PO6 – Complies** The Project will improve the functionality and safety of the existing road network. Construction traffic and access arrangements will be managed through a TMP to maintain safe access for road users and emergency vehicles during construction.
	AO6.2 Development has direct access to an evacuation route with a potential fire intensity exposure no greater than 2kw/m^2. Editor's note–The distance from hazardous vegetation to achieve 2kw/m^2 is generally: 58m in a very high bushfire hazard areas; 52m in a high bushfire hazard area; and 44m in a medium bushfire hazard area.	
	AO6.3 Development incorporates an area of managed vegetation that separates lot boundaries from hazardous vegetation by a distance of: 20m to a high or very high bushfire risk area; or 10m to a medium risk bushfire area and includes a fire access trail. Editor's note– hazardous vegetation is identified through a site specific bushfire hazard assessment. Refer also to the Natural hazards TPP; any fire access trail is secured by public ownership or an access easement in favour of Charters Towers Regional Council and the Queensland Fire and Rescue Service.	

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
PO7 Development provides for adequate fire breaks that minimise bushfire hazard by: (a) separating hazardous vegetation from development areas; and (b) facilitating access for firefighting and emergency vehicles. Editor's note–A site specific bushfire hazard assessment and management plan is required to demonstrate compliance with this performance criterion. Refer to the Natural hazards TPP.	No acceptable outcome is nominated.	**PO7 – Complies** The bushfire risk is anticipated to be low, as the works are largely confined to existing transport infrastructure where vegetation in proximity to the Project is limited, with only minor and localised vegetation disturbance anticipated. The works will maintain access along the road network and facilitate access for emergency and firefighting vehicles.
PO8 Development is located and designed to incorporate a bushfire defendable space which achieves separation between buildings, building envelopes and hazardous vegetation necessary to reduce risk to an acceptable or tolerable level.	**AO8.1** Buildings, or building envelopes, are separated by hazardous vegetation by a distance that achieves a radiant heat flux level at any point on the building, or building envelope, respectively that does not exceed: 10kW/m^2 where involving a vulnerable use, essential service uses or hazardous chemical facility use; or 29W/m^2 otherwise. Editor's note–The radiant flux levels and separation distances are to be established in accordance with hazard assessments. Where a separation distance is proposed to be achieved by utilising existing, cleared developed areas external to the site, certainty must be established (through tenure or other means) that the land will remain cleared of hazardous vegetation. For staged development, temporary separation distances, perimeter roads or fire trails may be absorbed as part of subsequent stages.	**PO8 – Not Applicable** The Project does not involve buildings or building envelopes requiring defendable space from hazardous vegetation.
	AO8.2 Development ensures buildings or building envelopes are separated from adjacent buildings or building envelopes by a minimum	

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response
	distance of 8m.	
Hazardous materials		
PO9 The potential for the release of hazardous materials as a result of a bushfire event is avoided.	**AO9** Development involving the production or storage of hazardous materials is not located within a high or very high bushfire hazard area.	**PO9 – Not Applicable** The Project does not involve the production or storage of hazardous materials.
Reconfiguration of a lot		
PO10 Additional lots avoid the risk of bushfire hazard to: • personal and property safety; and • increased risk of damage to assets. • Editor's note–A site specific bushfire hazard assessment and management plan may demonstrate that the site is not within a bushfire hazard area or has a low degree of bushfire risk. Refer also to the Natural hazards TPP.	**AO10** New lots (including rear lots) do not occur in a bushfire prone area.	**PO10 – Not Applicable** The Project does not involve the reconfiguration of a lot.
Essential community infrastructure Editor's note–The term essential community infrastructure is defined in the State Planning Policy.		
PO11 Development for essential community infrastructure is located, designed and sited to: • protect the safety of people during a bushfire; • not increase the exposure of people to the risk from a bushfire event; and • function effectively during and immediately after bushfire events. • Editor's note–A site specific bushfire hazard assessment and management plan is required to demonstrate compliance with this performance criterion. Refer to the Natural hazards TPP.	No acceptable outcome is nominated	**PO11 – Not Applicable** The Project does not involve essential community infrastructure. The works are limited to upgrades of existing road infrastructure within an existing road reserve.

Performance Outcome (PO)	Acceptable Outcome (AO)	ERM's Response

APPENDIX F COUNCIL PRE-LODGEMENT ADVICE

CHARTERS TOWERS
REGIONAL COUNCIL

25 February 2026

Our Ref: 5176612
File Ref: OPW2025/0004
Enquiries: Timna Green

Hugh Campbell, Development Manager
Windlab
L19, 324 Queen Street
BRISBANE QLD 4000

Sent via email: *hugh.campbell@windlab.com*

Dear Mr Campbell

Re: Operational Work Permit – Gawara Baya Project

Reference is made to emails between yourself and Council's Manager Planning and Development, Timna Green, on 12 January 2026 regarding the approvals pathway for road upgrade works necessitated by the Gawara Baya Project and particularly, that no approvals from Council are required under the planning scheme.

In order to provide clarity on this matter, Council's position is that:

1. The proposed work (summarised at a high level) to be:
   a. **upgrade** of approximately 80 kilometres of unsealed road through placement of ~200 – 400mm of gravel pavement;
   b. condition assessment, **extension** and/or **replacement** of existing cross-road drainage structures;
   c. **construction** of two **new** bridge structures (approximately 150 metres and 40 metres in length respectively)

   to be carried out within Council's existing road reserve, will materially affect premises or the use of premises and are therefore operational work.

2. The carrying out of operational work (the proposed works) is code assessable pursuant to section 5.7 of Council's planning scheme (Charters Towers Regional Town Plan Version 2, which commenced on 10 February 2020), subject to Schedule 6 of the Planning Regulation 2017(PR).

3. Schedule 6 Part 5 sub-sections 26 (1) to (4) do **not** apply in the current circumstances, for the following reasons:
   a. The carrying out of operational work (the proposed works) associated with the material change of use for the Gawara Baya windfarm, is not "***Development for*** *infrastructure activities*" (as stated in the heading to section 26) or, more specifically, "***Development*** *that is the use of, or* ***for*** *the maintenance, repair or upgrading of …….. road transport infrastructure*" (as stated in sub-section 26(3)(c)). For context, Council notes the language used in sub-section 26(5) ("*Development for a supply network or for private electricity works*"), sub-section 26(6) ("*Development for a battery storage facility*") and in the heading for Part 3 section 8 ("*Operational work by or for public sector entity*").

CHARTERS TOWERS
REGIONAL COUNCIL

Date: 25 February 2026
Our Ref: 5176612

b. In any case:

i. The bridges and cross-road drainage structures, being "*ancillary works and encroachments*," are not caught by the exemption in sub-section 26(1), which is restricted to works carried out by or on behalf of the State;

ii. The construction of any road transport infrastructure comprising work on Mount Fox Road is not caught by the exemption in sub-section 26(2), as the infrastructure is not "*government supported infrastructure*", as defined in the PR; and

iii. The proposed works on Mount Fox Road fall outside the definition of "*upgrading*" in section 26, as the need for the works only arises as a result of the proposed material change of use for the wind farm and to accommodate the requirements of heavy vehicles.

Yours sincerely

K. Ewer

Karina Ewer - MBA, MCDR, MAHRI, GAICD
Chief Executive Officer

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APPENDIX G TRAFFIC MANAGEMENT PLAN

DAVBRIDGE CONSTRUCTIONS

TRAFFIC MANAGEMENT PLAN

PROJECT:	GAWARA BAYA WINDFARM		
PROJECT NO:	383		
CONTRACT REF:	OFFSITE BRIDGES & ROADS DESIGN AND CONSTRUCT		
CLIENT:	WINDLAB DEVELOPMENTS PTY LTD		
DOC NO:	WL003-OSR-PM-PLN-OF-0023	REV DATE:	29/06/2026

PROJECT DETAILS:	
NAME OF PCBU:	Davbridge
COMPANY ADDRESS:	60 Notar Drive, Ormeau, QLD 4208
PHONE:	(07) 5549 2388
EMAIL:	headoffice@Davbridge.com.au
ABN:	23 065 240 002
CLIENT:	Windlab Developments Pty Ltd
PROJECT NAME:	Gawara Baya Windfarm OSR Works
PROJECT NUMBER:	383
24HR CONTACT NAME:	Jim Downes
24HR CONTACT NUMBER:	0417 676 928

PROJECT MANAGEMENT AUTHORISATION:			
POSITION:	NAME:	SIGNATURE:	DATE:
Construction Manager	Jim Downes		
HSEQ Manager	Rhys Webb		
Project Manager	Eugene Beneke		

DOCUMENT HISTORY:		
REVISION DATE:	AUTHOR:	REASON FOR CHANGE:
29/06/2026	Rhys Webb	INTIAL ISSUE

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1. SCOPE OF WORKS

1.1 PROJECT DESCRIPTION

To facilitate movement of Over Size Over Mass (OSOM) vehicles for the construction of the Gawara Baya Wind Farm (GBWF), Windlab requires completion of specific public infrastructure upgrades prior to the commencement of OSOM deliveries. The following key scope elements form the basis of the works.

- Remediation and upgrade of 78 km of unsealed public road to a nominal width of 6 metres,
- Targeted crossfall and superelevation corrections with tailored remedial works for horizontal and vertical road alignment, along with strategic re-sheeting of the wearing course on Mt Fox Road,
- Construction of four (4) OSOM passing opportunities on Mt Fox Road and one (1) rail crossing.
- Installation of new culverts and stock grids on Mt Fox Road, including demolition of existing structures where necessary,
- Construction of two (2) new Project access bays at the wind farm site (one OSOM and one heavy vehicle access),
- Application of 8,620 m2 of sprayed bituminous treatments and installation of all required road furniture,
- Design and construction of two (2) new two-way bridges, crossing Douglas Creek and Burdekin River, along with their approach road works and tie in to existing roadways,
- Construction of two (2) state road intersections, located at Gregory Development Rd (GDR) & Mount Fox Rd, Greenvale and Hackett Tce & Dalrymple Rd, Charters Towers, and
- Remediation of works locations through the placement of topsoil and application of seed endemic to the region.

The Project is to be delivered in the following Sections:

1. Section 1: LGA Bridge (Burdekin River & Douglas Creek).
2. Section 2: LGA Roads (Mount Fox Road/Lava Plains Mount Fox Road).
3. Section 3: LGA Roads (Project Access Bays).
4. Section 4: State Controlled Roads (GDR & Mount Fox Rd intersection and Hackett Tce & Dalrymple Rd intersection).
5. Section 5: Rehabilitation (All Sections).

The purpose of this Traffic Management Plan is to ensure that Davbridge Constructions and the traffic controller's commitment to safety, traffic management, reporting and reviewing is met during the life of this project. This also includes the following: -

- Traffic Plans
- Traffic Demands
- Traffic Routing
- Traffic Control
- Other road users
- Special (emergency) vehicle requirements; and
- Traffic Controllers

This plan will cover the hazards to persons undertaking work on, or adjacent to, a road. It shall ensure that appropriate control measures for any identified hazard are assessed, controlled, implemented, monitored, and reviewed. All contractors, subcontractors, employers, self-employed persons, workers, and other persons are bound by the requirements set out in this plan.

This plan forms the basis of ongoing programmes in continuous improvement of Traffic Management and the required ongoing training and commitment of all personnel involved in this project. Risk assessments will be conducted prior to erecting any traffic control devices to determine a safe environment of workers and a safe route for pedestrians and on-coming vehicular traffic.

1.2 OBJECTIVE

The primary objective of this Traffic Management Plan is to ensure the safety of both workers and road users at the worksite through quality management systems that follow legislative requirements and ensure a compliant and safe workplace whilst minimising the adverse impacts on traffic flow.

This will be done by providing a plan of action on how to safely move traffic, including vulnerable road users through, past, and/or around the work area. It will also lay out specific requirements to meet the needs of all stakeholders to ensure the project is completed safely and with minimal impact to road users.

2. ABBREVIATIONS & DEFINITIONS

ABBREVIATION	FULL DESCRIPTION
HRCW	HIGH RISK CONSTRUCTION WORK
DAV	DAVBRIDGE CONSTRUCTIONS
TMR	DEPARTMENT OF TRANSPORT AND MAIN ROADS
ROL	ROAD OCCUPANCY LICENSE
SWMS	SAFE WORK METHOD STATEMENT
SZA	SPEED ZONE AUTHORIZATION
TCP/SCR	TRAFFIC CONTROL PERMIT/STATE CONTROLLED ROADS - QUEENSLAND
TGS	TRAFFIC GUIDANCE SCHEME
TMP	TRAFFIC MANAGEMENT PLAN
TMD	TRAFFIC MANAGEMENT DESIGNER
TMI	TRAFFIC MANAGEMENT IMPLEMENTER
TC	TRAFFIC CONTORLLER
CoR	CHAIN OF RESPONSIBILITY
OSOM	OVERSIZE OVERMASS

3. REFERENCES

- Work Health and Safety Act 2011
- Traffic Controllers Accreditation Scheme - Approved Procedure
- Current Edition Manual of Uniform Traffic Control Devices (MUTCD) Part 3: November 2025.
- Current Edition Supplement Manual of Uniform Traffic Control Devices Part 3: November 2019.
- Traffic Management for Construction or Maintenance Work Code of Practice 2008
- Risk Management Guidelines. Companion to AS ISO 31000:2018 Risk management – Guidelines
- MRTS02 Transport and Main Roads Specifications MRTS02 Provision for Traffic- (March 2025)
- TRSBS Road Safety Barrier Systems and End Treatments (Assessed as compliant with AS/NZS 3845.1:2015) and Other Related Road Safety Devices
- TCASAP Traffic Controller Accreditation Scheme: Approved Procedure, Transport and Main Roads-January 2022
- Traffic Act Traffic Operations (Road Use Management) Act 1995
- TORUM Transport Operations (Road Use Management – Accreditation and Other Provisions) Regulation 2015
- Heavy Vehicle National Law Act (HVNL Act) 2012
- Heavy Vehicle National Law Regulations (HVNL Regulations) 2014

4. OBLIGATIONS & RESPONSIBILITIES

4.1 PROJECT ORGANISATIONAL CHART & CONTACT DETAILS

NAME	POSITION	PHONE
Jim Downes	Construction Manager	(07) 5549 2388 / 0417 676 928
Eugene Beneke	Project Manager	(07) 5549 2388 / 0400 998 669
Rhys Webb	HSEQ Manager	(07) 5549 2388 / 0477 091 743
TBC	Project Engineer	(07) 5549 2388 / TBC
TBC	Traffic Control Organisation	TBC

4.2 PROJECT TEAM RESPONSIBILITIES

	CONSTRUCTION MANAGER	PROJECT MANAGER	HSEQ MANAGER	PROJECT ENGINEER	TRAFFIC CONTROL ORGANISATION
Prepare the Traffic Management Plan		X	X		
Approve the TMP	X	X	X		
Traffic Control Risk Assessment	X	X	X	X	X
Prepare HRCW SWMS		X	X		X
Obtain Traffic Control Permit				X	X
Prepare TCP's/TGS					X
Make minor changes to TCPs/TGS			X		
Implement TCPs/TGS				X	X
Worksite Inspections				X	X
Managing accidents at site		X	X		X
Reviewing the TMP		X	X		X
Monitoring traffic controls – Road Sign Checklist				X	X
Vehicle Pre -Start Log Book					X

4.3 PRINCIPAL CONTRACTOR

The Principal Contractor has an obligation to ensure all work at the construction workplace is carried out in a manner that will:

- Ensure compliance with the contract requirements
- Provide a safe passage for both pedestrians and vehicular traffic through the work site
- Minimise delays, impacts and inconvenience to the community

Principal Contractors responsibilities relating to this Traffic Management Plan include but are not limited to;

- ensuring they have the authorisation of the Road Infrastructure Manager to carry out work activity in the road reserve or affecting the road reserve
- ensuring they have an approved and accepted TMP before starting any work
- ensuring that only approved TMPs / TGSs are implemented
- Providing clear direction and support in maintaining the objectives and standards set out in this Traffic Management Plan
- ensuring there is always a copy of the approved TMP and TGS available on-site when the worksite is attended and that this is available for inspection.
- operating in terms of the applicable traffic regulations
- arranging for the publication of approved notices in appropriate media as specified in the request for tender reporting on incidents at worksites to TMI.

- The use of only accredited traffic controllers approved regulatory and advisory signs.
- Providing suitable communication between the Contractor's supervisory staff and the Senior Traffic Controllers, eg. Radio transceiver or mobile phone
- Providing the means necessary to achieve a safe working environment
- Reviewing procedures and best work practices
- Monitor the use of any work method statement to ensure that all persons, to whom the statement applies, comply with the statement
- Not allowing person to start construction work, unless the Principal Contractor has sighted the person's general induction evidence (Blue / White Card)
- Ensure a person has been given a site-specific induction for the workplace before allowing the person to start construction work
- Ensure that all persons working have the opportunity to read and/or understand the Traffic Management Plan prior to starting construction work

4.4 PROJECT MANAGER

The Project Manager is the person appointed by the Principal Contractor to manage the project from inception to delivery.

The following list of requirements is not exhaustive for the responsibilities of a Project Manager:

- Programming of the works
- Outlines the high-risk construction activity i.e. working on, or adjacent to a road
- The Project Manager shall be responsible for ensuring the correct TGS is implemented for the stage of works being conducted to ensure the safety of workers and road users.
- Monitoring, reviewing and amending the Traffic Management Plan, as required
- Managing non-conformances / corrective action and minor incidents
- Ensure that an applicable Safe Work Method Statement (which may be generic if the activity is performed in the same way and in the same or similar circumstances) is delivered through training to all persons affected on the construction site.

4.5 WORKS SUPERVISOR

The following list of requirements is not exhaustive of the responsibilities of a supervisor:

- Review and implement the Traffic Management Plan, Vehicle Movement Plan, or both;
- Ensure compliance with the approved TMP, Traffic Control at Worksite Manual & Amendments, Main Roads specification and the contract requirements
- Periodic inspection of traffic control devices on a daily basis prior to commencement of work in conjunction with the Traffic Controllers Supervisor
- Regular site inspections throughout the shift to ensure all traffic management measures including signage, delineation etc. are implemented and in good working order;
- Ensure that all traffic controllers are licensed or accredited to perform the duties of a traffic controller
- Identify non-conformances and implementation of corrective actions
- Ensure relevant persons complete the Daily Traffic Management Checklist including details of any nonconformances and corrective actions, details of any changes to traffic control devices, details of any traffic controllers onsite etc.

4.6 HSE PERSONNEL

The following list of requirements is not exhaustive of the responsibilities of HSE Personnel:

- Ensure all operations conform to local legislative requirements and national safety standards.
- Ensure daily inspections of site operations and personnel are conducted and recorded on
- Liaise with the NTO and PM on Corrective and Improvement Actions in response to non-compliance of traffic management.

- Liaise with the Site Supervisors and PM on Corrective and Improvement Actions in response to noncompliance of the event areas.

4.7 TRAFFIC MANAGEMENT SUBCONTRACTOR

The following list of requirements is not exhaustive of the responsibilities of the Traffic Management Subcontractor:

- Coordination of Traffic Control Daily Operations.
- Implementation of the approved Traffic Management Plan in accordance with the Traffic Control at Worksites Manual and all other relevant documents
- follow company health and safety procedures, e.g., wear appropriate personal protective equipment (PPE)
- comply with the requirements of the relevant jurisdictional Health and Safety Policies and Acts and its regulations
- take reasonable care for their own health and safety, and take reasonable care that their actions do not adversely affect the health and safety of other persons
- comply with the requirements of the traffic rules
- be aware of the general configuration of signs and devices and report any defect to the Traffic Management Implementer in charge
- hold any other qualifications or licences as required.
- Advising the Principal Contractors Supervisory staff in the first instance of any non–conformances, accidents, near misses or complaints.
- Keeping records of the Traffic Controllers' qualifications and ensuring that they are current
- Providing only duly accredited Traffic Controllers.
- Organise audits of the work site by Traffic Control supervisors when required.
- The Traffic Management Company is to satisfy the requirements as stipulated in the current Traffic Management Registration Scheme.

4.8 TRAFFIC MANAGEMENT IMPLEMENTERS

The person in charge of implementing the temporary traffic management set up at each worksite is to hold a Traffic Management Implementation (TMI) licence.

The following list of requirements is not exhaustive of the responsibilities of Traffic Management Implementers:

- check that the TMP and TGS are appropriate to the worksite. Where they are not suitable, do not proceed until the necessary remedial actions have been taken.
- Direct any modifications to a suitably qualified Traffic Management Design (TMD) qualified person
- keep Daily Diary and have it available (monitoring and record-keeping activities)
- monitor the performance and effectiveness of the implemented TGS.
- hold the qualification appropriate for the highest category of road within the network area for which they are responsible
- have suitable certified documentation available on site as evidence of qualification
- ensure that they are wearing appropriate PPE
- recommend postponing, cancel or modify operations due to adverse traffic, weather or other conditions that affect the safety of the worksite.
- arrange on-site meetings for discussions concerning TTM measures at:
  - the start of each set-up
  - on a regular basis (e.g. daily)
  - each change of a TTM measure due to a change in worksite conditions.
- brief all TCs on the TTM requirements and verify the traffic control is functioning safely
- ensure contingency plans are implemented when excessive traffic delays, emergencies, weather conditions or other factors occur
- ensure that they can be contacted by mobile phone or two-way radio at all times, for the duration of the installation, maintenance, and removal of TTM at the worksite

- where shift work is involved, brief the TMI for the next shift at the worksite on the TTM and inspection requirements before handing over responsibility. Briefing shall be confirmed in writing to acknowledge the handover
- ensure that persons on the worksite operate in terms of the relevant traffic regulations
- ensure worksite inspections of all TTM equipment is completed at least two-hourly or as detailed in the minimum inspection frequency
- notify relevant parties at the start and finish of the work shift.

4.9 TRAFFIC CONTROLLERS

The following list of requirements is not exhaustive of the responsibilities of Traffic Controllers:

- Hold a Traffic Controller qualification
- Have with them suitable certified documentation as evidence of qualification
- Wear appropriate PPE / uniform.
- Control traffic in accordance with the TMP and TGS.

5. IMPLEMENTATION

The person in charge of implementing the temporary traffic management set up at each worksite is to hold a Traffic Management Implementation (TMI) licence.

The Foreman and/or senior Traffic Controller on the construction site shall ensure that all applicable controls and safety devices are implemented prior to the commencement of works on a daily basis.

Details of traffic lane configurations, traffic delays, periods of no lane closures, detours and the use of side tracks applicable to this contract are detailed in the Project Specific requirements of this Plan.

Work shall be programmed to minimise the effect on the road users. Entrances to private property shall be maintained in a usable condition throughout the construction period. Alternate access to private property if required is to be agreed with the property owners concerned.

Traffic control shall comply with all relevant procedures, specifications and specific requirements of the contract. Copies of such shall be held on site by the senior Traffic Controller. Only qualified Traffic Controllers are to be employed on site. Identification cards must be worn whilst performing traffic control duties.

The work site shall be delineated with the use of approved devices to provide a safe and orderly passage for both pedestrian and vehicular traffic at all times. Traffic Guidance Schemes specific to these works will be included within the Appendix and updated when a new TGS is implemented or when changes are made to an existing TGS.

Where necessary to ensure that a safe passage for the community is provided, additional measures shall be adopted. These may include; an increase in the number of traffic controllers on site; advising of specific details via public notices; an increase in signage; employee awareness via the induction process and daily tool box meetings.

The general procedure for setting out a Traffic Guidance Scheme:

- Locate the work are using GPS, landmarks, side streets, chainage etc.
- Install devices as outlined in the TGS for side streets first
- Install devices as outlined in the TGS for the non-working lane (un-affected direction)
- Install devices as outlined in the TGS for the working lane (affected direction) to complete installation
- Conduct a drive through inspection after all devices are in place and before work commences

Recovery of devices at the conclusion of work shall be done in reverse

Signs and devices that have been erected before they are required should be fully covered by a suitable material.

The cover should be removed immediately prior to the commencement of work.

6. AUTHORITIES

6.1 AFFECTED AUTHORITIES

The project will be conducted on Mount Fox Road and Lava Plains Mount Fox Road in the Charters Towers Regional Council local government area. Where works are to interface with roads under TMR Authority, the relevant permits and approvals will be sought before works in these locations proceed.

6.2 AFFECTED SERVICES

There are no services located in the vicinity of the site that are anticipated to be affected by the works being undertaken.

6.3 BUSINESS IMPACTS

The are no businesses below located nearby that are anticipated to be affected by the works being undertaken.

6.4 ADJOINING AREAS OF AUTHORITY

Any changes to traffic conditions that may affect adjoining or nearby Areas of Authority will be communicated to the Principal and the Principal Contractor that may be impacted by changes made by planned works.

7. RISK MANAGEMENT

7.1 RISK ASSESSMENT

An assessment will be undertaken to evaluate the potential health and safety risks to the client, the public and all persons working on, delivering to or visiting the construction site. The measures necessary to control these risks will be determined.

The Project Manager/Project Supervisor shall ensure that site safety risks are identified and assessed prior to commencement of work on site in the *Project Risk Register.* Control measures shall be determined in accordance with the "hierarchy of controls" and in accordance with applicable legislation, Codes of Practice and Australian Standards.

7.2 RISK ASSESSMENT PRIOR TO ESTABLISHING TRAFFIC CONTROLS

Prior to implementing traffic controls the Traffic Risk Assessment form (FRM-013) or similar shall be completed. Where required adjustments shall be made to the applicable TCP and reasons for change recorded.

7.3 HIGH RISK CONSTRUCTION WORK

A HRCW SWMS must be developed for traffic control work – SWMS-002 PROVISION FOR TRAFFIC.

All workers shall be trained in the SWMS and have signed onto the SWMS before work commences

7.4 TRAFFIC CONTROL PERMIT

Davbridge Constructions will manage risks associated with traffic management by ensuring that no activity commences, which has an effect on traffic without an approved Traffic Control Permit to occupy the State Controlled Road (SCR)

An TCP/SCR is required for all works, mobile or static that impact on traffic flow within and on the approaches to the Project. Any related TCP/SCR to the project shall be provided to site traffic controllers. A copy of this permit will be attached in Appendix 11.2.

8. TRAFFIC GUIDANCE SCHEMES

8.1 PREPARATION OF TRAFFIC GUIDANCE SCHEMES

Before undertaking any works that impact on traffic, a Traffic Guidance Scheme shall prepare by a suitably qualified Traffic Management Designer to address the safe movement of traffic past, through or around the work. TGS's shall be issue to site traffic controllers to be implemented. The Traffic Controller shall ensure the TGS is reviewed against the Traffic Risk Assessment form (FRM-013). When traffic control measures are installed, the Traffic Management Implementation Form (FRM-014) shall be used to confirm suitability and to sign off that the Traffic Control works were properly implemented.

A competent person shall complete a daily inspection of the traffic control set up and record the inspection on Daily Traffic Control Checklist (FRM-015). This inspection shall also be used to monitor vandalism and tampering of the traffic signs.

8.2 MINOR MODIFICATIONS TO TGS'S

If required, site specific TGS's can be modified to suit the site conditions at the time of implementation. Only qualified persons (Prepare Work Zone Traffic Management Plan) can make modifications to TGS's.

A Traffic Risk Assessment (FRM-013) or equivalent must be completed before modifying the TGS.

Minor modification of standard TCPs would include the following:

- The inclusion of any road work speed zones
- Varying the size of signs in accordance with Traffic Control at Work Sites Manual, advance warning sign distances
- Varying the spacing of signs and including additional signs in accordance with Traffic Control at Work Sites Manual, spacing between signs
- Including any variable message signs used in addition to all other signs shown on the TGS
- Placing additional signs if it is felt that expected queue lengths might require them in accordance with Traffic Control at Work Sites Manual, avoiding end of queue collisions
- Varying the positioning of signs and devices in accordance with Traffic Control at Work Sites Manual, tolerances on positioning of signs and devices
- Detailing the location of signs required for a roadwork speed zone in accordance with Traffic Control at Work Sites Manual, roadwork speed zones and TGS
- Including the location of signs indicating workers are on site for TGS's showing traffic arrangements when workers are not on site
- Adding additional signs where it is considered they are required for safety reasons i.e. on the approaches to crests or sharp bends
- Adding additional signs where a minor side street joins a work site.

Any TGS's modified using the principles above shall be authorised and marked or numbered to show that they are a modification and which TGS they are a modification of. It is not acceptable to modify a previously modified TGS.

9. CONSTRUCTION TRAFFIC

9.1 SITE TRAFFIC

When operating vehicles and plant within the limits of the site, unless signed otherwise by Temporary Traffic Measures or standard regulatory signs, a site speed limit of 10km/h is to be adhered to. Within the limits of the works, mobile plant has right of way. When approaching mobile plant contact is to be made with the operator via UHF radio prior to approaching or entering their work zone.

9.2 LIGHT VEHICLES

A light vehicle is a vehicle that has a gross vehicle mass (GVM) less than 4.5T. All light vehicles that are to be driven on site, other than those used for transport to and from the designated parking area at the site office, must meet the following requirements:

- Diesel powered 4x4,
- Fitted with an amber flashing light,
- Reverse buzzer,
- Vehicle mounted UHF radio,
- First aid kit,
- Fire extinguisher,
- The owner's manual,
- Daily inspection logbook (physical or electronic),

Any light vehicles that do not meet these requirements are not permitted to enter the site beyond the designated parking area at this site offices.

9.3 HEAVY VEHICLES

A heavy vehicle is defined as a vehicle, that requires a state issued drivers licence to operate, with a GVM or aggregate trailer mass (ATM) of more than 4.5T. The operation of heavy vehicles is to comply with the requirements as per the HVNL Act and Regulations. Failure to comply with legislative requirements will result in corrective actions to be implemented dependant on the breach. Corrective actions may include additional training, removal from site or, in severe breaches, termination of contract or employment.

9.4 CHAIN OF RESPONSIBILTY

Chain of Responsibility (CoR) obligations apply to all parties who influence or control transport activities, including those undertaken by subcontractors, suppliers and transport operators engaged as part of the works. Such activities include:

- Delivery and removal of plant, equipment and materials.
- Transport of spoil, waste and construction materials.
- Delivery of traffic management equipment.
- Oversize Overmass (OSOM) vehicle movements.
- Mobile plant transported on public roads.

Each party involved in a transport task has a legal obligation to ensure, so far as is reasonably practicable, that their actions do not cause or contribute to a breach of heavy vehicle laws. Depending on the activity, Project participants may perform one or more of the following CoR roles:

CoR PARTY	DEFINITION
Employer	Employ a heavy vehicle driver
Prime Contractor	Engaging a self-employed driver of a heavy vehicle under a contract for services
Operator	Direct the control and use of a heavy vehicle
Scheduler	Schedule the transport of goods and passengers in a heavy vehicle, or schedule a driver's work and rest hours
Consignor	Consign goods for transport by a heavy vehicle

CoR PARTY	DEFINITION
Consignee	Receive goods delivered by a heavy vehicle
Packer	Pack or assemble goods for transport in a heavy vehicle
Loading Manager	Manage premises where five or more heavy vehicles are loaded or unloaded each day
Loader	Load a heavy vehicle
Unloader	Unload a heavy vehicle

Every party has a primary duty to eliminate or minimise risks from the heavy vehicle transport activities you influence or control, so far as is reasonably practicable. Davbridge works closely with suppliers and subcontractors to ensure that compliance with CoR obligations by verifying the evidence below before any deliveries are dispatched.

- current vehicle registration
- applicable heavy vehicle permits
- maintenance and inspection records
- driver licence and competency records
- fatigue management procedures (where applicable)
- load restraint procedures
- Safe Work Method Statements or equivalent risk assessments where applicable
- public liability and motor vehicle insurance, and
- any accreditation relevant to the transport task

Incidents, near misses, hazards and suspected breaches are to be reported as per PRO-009 Incident Management with notification of incidents as per the below timeframes.

Classification	Notification Timeframe	Method of communication
Significant or Notifiable Incident	Immediately	Phone call to Principal's Representative to detail: • Time • Location • Known facts • Potential for escalation
	2 hours	Email with detailed incident information including: • Time • Location • Known facts • Actions taken to prevent escalation
	24 hours	Incident entered in Camms/Riskonnect
	As soon as practicable but no later than 1 month	Full incident report (using Principal's template) submitted via Aconex
Moderate	As soon as practicable but no later than 6 hours	Phone call to Principal's Representative to detail: • Time • Location • Known facts • Potential for escalation
	24 hours	Incident entered in Camms/Riskonnect
	Next working day	Full incident report (using Principal's template) submitted via Aconex
Minor	24 hours	Incident entered in Camms/Riskonnect
	7 working days	Full incident report (using Principal's template) submitted via Aconex

9.5 MOBILE PLANT

Mobile plant is equipment that requires either a certificate of competency or High Risk Work Licence (HRWL) to operate. All mobile plant must meet the following requirements prior to mobilising to site:

- Rotating beacon light,
- Reverse buzzer,
- Fire extinguisher,
- UHF two-way radio,
- Daily prestart logbook (physical or electronic),
- OEM or equivalent operator's manual,
- Plant operating safety stickers clearly readable and as per the OEM.

9.6 DELIVERIES

All delivery drivers and escorts are required to complete a driver's induction prior to entering site. The driver's induction will provide the Site requirements and standards in relation to PPE, drug and alcohol testing, the load to be inspected prior to entering to ensure restraint compliance and load stability, the location of toilets and facilities and the requirements of the unloading procedures.

Upon arrival to site delivery drivers will be requirement to check in with site personnel to receive directions to delivery locations. During this check in, drivers will be informed of any exclusion zones or works being undertake on the day that may impede or delay loading or unloading activities. Where required a map of the site with access/egress routes, speed limits and exclusion zones will be provided to drivers before proceeding onto site. The need for an escort within the site will be assessed at the time of delivery. The criteria for requiring an escort will be dependent on activities being undertaken on site and if access is impeded with exclusion zones.

Should a driver be nearing the limit of their fatigue management schedule while on site, they will be required to take a break of at least 15 minutes. Drivers will be encouraged to utilise site facilities while taking their break to discourage continuing to undertake work activities and ensure that a continuous break is achieved.

Many factors can cause a load to be deemed unsafe to unload. When an unloading activity is considered unsafe, works are to cease immediately and assessed to determine why the activity is unsafe and what controls can be implemented to make the unloading activity safe to proceed. Some controls that may be implemented include change the unloading location, repositioning of plant or vehicle, substitute unloading plant or adjust methodology to reposition the load. If safe unloading is not possible, the delivery will be refused, the cause investigated and documented with an NCR issued to responsible party. As part of the NCR process the corrective actions taken to resolve the nonconformance and the processes to be implemented to prevent this occurring again are to be recorded before any further deliveries are dispatched.

10. SAFE WORK PRACTICES

10.1 FATIGUE

Breaks must be taken at a suitable time and on a rotational basis, approval must be gained by the Supervisor before taking any breaks. Traffic Controllers who perform stop / slow duties continuously shall be relieved after two hours work and may either be rested or placed on other duties for a period of at least 15 minutes before being returned to stop / slow duties.

10.2 MOBILE PHONES

Mobile phones must not be used whilst engaging in traffic control duties.

10.3 PEDESTRIANS

- Ensure that pedestrians do not enter areas identified as unsafe
- A safe alternate route should be identified. Pedestrians should be directed/escorted to the safe route.

10.4 PERSONAL PROTECTIVE EQUIPMENT

All personnel undertaking traffic control duties shall wear the appropriate high visibility safety clothing that complies with AS/NZS 1906 & 4602. This may be in addition to other protective equipment required on the site (e.g. protective footwear, gloves (on your person) eye protection, helmet, sun protection, respiratory devices etc).

PPE required:

- Authorised Traffic Controller high visibility orange vest.
- White hard hat with sun brim.
- Safety glasses clear/tinted.
- Orange high visibility rain gear.
- White high visibility night overalls.
- Night wand.

10.5 PLANT AND EQUIPMENT

All plant and equipment at the workplace shall meet statutory requirements and have the required registration, licences or certification where required and have completed prestart checks to ensure serviceability of equipment.

- All mobile equipment shall be fitted with suitable reversing alarms.
- All mobile plant and vehicles shall be fitted with rotating flashing yellow lamps in accordance with AS1742.3.
- Vehicle operators shall complete the Daily Pre- Start Logbook.
- No personnel shall ride on the back of the vehicle when in motion, this includes for setting down and / or collecting signage. Vehicles must be stationary and secure before accessing the back.
- Ensure sufficient distance is kept between workers, members of the public and vehicles. A 3-metre clearance should be maintained.

10.6 SEQUENCE FOR ERECTION AND REMOVAL OF SIGNS AND DEVICES

SEQUENCE OF ERECTION

Before work commences, signs and devices at approaches to the work site shall be erected in accordance with the adopted TCS, in the following order:

- Advance warning and regulatory signs
- All intermediate advance warning and regulatory signs and devices required in advance of the taper or start of the work area
- All delineating devices required to form a taper including flashing arrow signs or temporary hazard markers where required
- Delineation of the work area or sidetrack

- All other warning and regulatory signs, including termination and end of temporary speed zone signs.
- Delineation devices such as cones and bollards shall be placed in the same sequence, i.e. those furthest in advance of the work placed first.
- Where a work area is moving progressively along the road, relocation of the signs ahead should take place in the above sequence. Those behind should be relocated in the reverse sequence.
- Signs and devices that are erected before they are required shall be covered by a suitable, opaque material and, if necessary, inspected at night to ensure they do not give conflicting messages. The cover shall be removed immediately prior to the commencement of work.

ERECTION OF SIGNS AND DEVICES

- Always travel in the direction of normal traffic flow.
- A work vehicle with a flashing arrow or rotating or flashing light(s) shall be positioned between the workers and approaching traffic during placement of traffic control devices.
- Workers shall not crossroads or carriageways on foot when erecting or removing signs.

REMOVAL OF SIGNS AND DEVICES

- Removal of traffic control signs and devices should be undertaken in the reverse order of erection, progressing from the work area out toward the approaches.
- Workers shall not crossroads or carriageways on foot when erecting or removing signs.
- Lane closures delineated by cones and bollards - a work vehicle shall be positioned between the workers and approaching traffic and should generally slowly reverse along the closed roadway allowing workers to remove the traffic control devices. However, subject to the approval of the works supervisor, the work vehicle may proceed in a forward direction towards approaching traffic along the closed roadway, provided that this does not create motorist confusion or distraction, such as headlight glare at night.

SITE ACCESS

Care should be taken when accessing specific TCP zones to avoid other vehicles behind following the maintenance vehicle into the TCP zone.

Flashing lights should be used when access and exiting the TCP zone

Should traffic require to be stopped during works, a Licensed/Competent Traffic Controller shall be responsible for ensuring safe access to and from site.

TRAFFIC SPEED

Traffic Controllers shall be allowed to operate only in an area where traffic speeds have been reduced to 60 km/h or less.

ACCIDENTS AT WORK SITES

In the event of a traffic accident occurring in the vicinity of the works being carried out by Davbridge Constructions, workers may render assistance to ensure that traffic flows are maintained in a safe manner.

Workers shall notify the Site Manager, Project Manager and the HSEQ Manager of the occurrence

A qualified traffic controller shall ensure that the incident scene is made safe to the persons involved in the incident, the travelling public and emergency services until the arrival of the response crew (if required) who will take over traffic control, once their cordon is established.

11. MONITORING & REVIEWS

11.1 RECORDING

Details of all changes in traffic movements shall be recorded and maintained throughout the lifetime of the project.

Regular inspections of traffic control devices shall be carried out a minimum of twice daily and recorded in a Daily Traffic Diary. These records are available for inspection during the project.

Traffic delays shall be assessed and recorded on the traffic diaries. All supervisory staff shall be notified of any delays that exceed the contract requirements.

Non-Conformances and Corrective Actions shall be identified, controlled, and implemented in accordance with Quality Procedures. All non-conformances shall be acted on by the traffic management subcontractor and Principal Contractor on the receipt of written notice of the non-conformance.

REPORTING FORM	RESPONSIBILIT	FREQUENCY
Details of erection and removal of Regulatory Traffic Signs / Devices (M994) **If required for the project/contract*	Project Manager, assisted by Traffic Control Supervisor	Min 5 days prior to commencement and completion of the works
Traffic Management Audit Checklist	Traffic Management Subcontractor	Each day / Shift
Traffic Diaries	HSEQ Manager	Each day / Shift
Complaints Register	Traffic Management Subcontractor	Each day / Shift
Non-Conformance/Corrective Action	Project Manager	As required
Incident Report	Project Manager	As required

11.1 INCIDENT REPORTING

The occurrence of unexpected incidents within the project boundary or any adjacent site will potentially have a negative impact on the operation of the road network and might temporarily restrict construction activities.

In the event of any traffic related accident within the site, Davbridge Constructions or the traffic manager shall immediately record the date and time of the event and take date stamped photos of the traffic control devices in the vicinity of the crash.

Incident/accident reporting, and investigation will be conducted in accordance with the site Emergency Response Plan.

11.2 PROJECT / SITE AUDITS

Audits of the implementation of traffic control shall be scheduled by the HSEQ Manager and form part of the company's audit schedule. Refer to the Audit procedure

The aim of the audits is to not only verify compliance with this Project Management Plan but to also identify improvements to this plan and the Management System as a whole.

11.3 MANAGEMENT REVIEW

The Traffic Management Plan shall be reviewed in accordance with the procedure regarding Company Meetings

12. APPENDICES

12.1 APPENDIX A - TRAFFIC GUIDANCE SCHEME

ERM HAS OVER 140 OFFICES ACROSS THE FOLLOWING COUNTRIES AND TERRITORIES WORLDWIDE

Argentina
Australia
Belgium
Brazil
Brunei
Canada
Chile
China
Colombia
France
Germany
Guyana
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kenya
Malaysia
Mexico
Mozambique
Netherlands
Panama
Peru
Poland
Portugal
Romania
Singapore
South Africa
South Korea
Spain
Switzerland
Taiwan
Thailand
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DOUGLAS CREEK BRIDGE REPLACEMENT

DAVBRIDGE CONSTRUCTIONS

Job No. G26-017D

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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CONSULTANTS: WESTERA CIVIL

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PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	COVER SHEET
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	00
REVISION	P4

GENERAL NOTES

G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS DRAWINGS, SPECIFICATIONS AND INSTRUCTIONS. ANY DISCREPANCIES OR OMISSIONS SHALL BE REFERRED TO THE ENGINEER FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.

G2 PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR SHALL CHECK THE LOCATIONS OF AND AVOID CLASHES WITH EXISTING SERVICES AND STRUCTURES AS NECESSARY.

G3 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING OFF THE DRAWINGS.

G4 ALL DIMENSIONS AND LEVELS SHALL BE CHECKED AND CONFIRMED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF THE WORKS.

G5 THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STRUCTURE AND ADJACENT STRUCTURES IN A STABLE CONDITION AND ENSURING NO PART SHALL BE OVERSTRESSED DURING THE WORKS.

G6 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE RELEVANT CURRENT AUSTRALIAN STANDARDS AND RELEVANT AUTHORITY SPECIFICATIONS/CONDITIONS.

G7 ALL WORKS SHALL BE UNDERTAKEN USING APPROVED SAFE WORKING METHODS IN ACCORDANCE WITH ALL APPLICABLE WORK COVER AND OH&S REQUIREMENTS/REGULATIONS.

G8 PROPRIETARY PRODUCTS ARE TO BE APPROVED BY THE ENGINEER AND THEN INSTALLED/APPLIED STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS.

DESIGN CRITERIA

DESIGN LOADS (TO AS 5100.2):

- DEAD LOADS DUE TO PRECAST ELEMENTS (E.G. DECK UNITS) PLUS IN-SITU CONCRETE ELEMENTS (E.G. ABUTMENTS, PILES, HEADSTOCKS, ETC.)
- SUPERIMPOSED DEAD LOADS DUE TO STEEL TRAFFIC BARRIERS (ALSO PROVISION FOR 85 MIN DWS LOADING);
- SINGLE LANE, SM1600 TRAFFIC LOADS, INCLUDING W80, A160, M1600, M1600 (TRI-AXLE GROUP) AND S1600.
- OVERSIZE OVER MASS VEHICLE LOADS – REFER DESIGN REPORT
- LOW PERFORMANCE LEVEL TRAFFIC BARRIER LOADING;
- EARTH PRESSURE AND SURCHARGE LOADING AT ABUTMENTS;
- PEDESTRIAN LOADING NOT APPLICABLE;
- MINIMUM RESTRAINT LOADING (E.G. 500kN LATERAL LOAD FOR EACH CONTINUOUS DECK SECTION);
- FORCES RESULTING FROM WATER FLOW WITH VELOCITIES AND LEVELS IN ACCORDANCE WITH NORTHERN CONSULTING ENGINEERS HYDRAULIC REPORT MJ2453/04:BB AND EMAIL SUMMARY DATED AUGUST 2026 (REFER BELOW)

FLOOD DESIGN CRITERIA		
EVENT (ARI)	PEAK FLOOD LEVEL (m)	PEAK VELOCITY (m/s)
1	382.52	1.32
2	383.51	1.71
5	385.00	2.12
20	386.94	2.38
100	388.26	2.64
2000	392.33	3.13

- DYNAMIC, SLS AND ULS FACTORS AND LOAD COMBINATIONS AS APPLICABLE.

SOIL CONDITIONS:
THE DESIGN OF THE BRIDGE STRUCTURE (AS DOCUMENTED) HAS BEEN BASED ON THE PARAMETERS AND RESULTS AS OUTLINED IN THE GEOTECHNICAL INVESTIGATION REPORT PREPARED BY CMW GEOSCIENCES (Job No: BNE2024-0196AC – DATED AUGUST 2024). WHERE SPECIFIED ON THE DRAWINGS, FURTHER GEOTECHNICAL ADVICE AND CONFIRMATION OF VARIOUS SOIL CONDITIONS CRITICAL TO THE DESIGN OF THE BRIDGE STRUCTURE IS ALSO TO BE PROVIDED IN WRITING BY A GEOTECHNICAL ENGINEER DURING CONSTRUCTION.

REFERENCE SPECIFICATIONS

WORKMANSHIP & MATERIALS SHALL COMPLY WITH DEPT TRANSPORT AND MAIN ROADS STANDARD SPECIFICATION No's:

MRTS 03	DRAINAGE, RETAINING STRUCTURES AND PROTECTIVE TREATMENTS
MRTS 04	GENERAL EARTHWORKS
MRTS 62	BRIDGE SUBSTRUCTURE
MRTS 63	CAST IN-PLACE PILES
MRTS 68	DYNAMIC TESTING OF PILES
MRTS 70	CONCRETE
MRTS 71	REINFORCING STEEL
MRTS 72	MANUFACTURE OF PRECAST CONCRETE ELEMENTS
MRTS 73	MANUFACTURE OF PRESTRESSED CONCRETE MEMBERS & STRESSING UNTIS
MRTS 74	SUPPLY AND ERECTION OF PRESTRESSED CONCRETE DECK AND KERB UNITS
MRTS 77	BRIDGE DECK
MRTS 78	FABRICATION OF STRUCTURAL STEELWORK
MRTS 80	SUPPLY & ERECTION OF BRIDGE BARRIER
MRTS 81	BRIDGE BEARINGS
MRTS 82	BRIDGE DECK EXPANSION JOINTS
MRTS 83	ANTI-GRAFFITI PROTECTION

CONCRETE

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS5100.5, AND MRTS 70 AND THE REFERENCED STANDARDS THEREIN.

C2 UNLESS NOTED OTHERWISE ON THE DRAWINGS, THE CONCRETE STRENGTH GRADE AND THE COVER TO REINFORCEMENT FOR THE VARIOUS CONCRETE ELEMENTS SHALL BE AS LISTED BELOW (EXPOSURE CLASSIFICATION B2):

	FORMED SURFACES IN CONTACT WITH GROUND		SURFACES CAST AGAINST GROUND		EXTERIOR SURFACES	
ELEMENT	STRENGTH GRADE	COVER	STRENGTH GRADE	COVER	STRENGTH GRADE	COVER
RELIEVING SLABS (PLACED ON BLINDING CONCRETE)	S40	70	S40	70	S40	60
INSITU PIERS & ABUTMENT WING WALLS, BALLAST WALLS AND SIDE WALLS	S40	60	S40	90	S40	60
PRECAST HEADSTOCKS	S50	60	–	–	S50	60
PRECAST DECK UNITS	REFER SPECIFIC DRAWINGS					
DECK SLABS	–	–	–	–	S40	50
CAST IN PLACE PILES	–	–	S40	90	S40	90

C3 UNLESS NOTED OTHERWISE ON DRAWINGS CONCRETE TO HAVE A MAXIMUM AGGREGATE SIZE OF MINIMUM/MAXIMUM SLUMP, A WATER/CEMENT RATIO AND A MAXIMUM FINAL BASIC DRYING SHRINKAGE STRAIN COMPLYING WITH MRTS 70

C4 NO ADDITIVES SHALL BE ADDED OR APPLIED TO THE CONCRETE MIX WITHOUT THE APPROVAL OF THE ENGINEER.

C5 THE MAXIMUM PERMISSIBLE TRANSPORT TIME FOR CONCRETE BETWEEN BATCHING AND PLACEMENT ON SITE SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.

AMBIENT AIR TEMPERATURE	MAX. BATCHING TO PLACEMENT TIME
< 32°C	60 MINUTES
32° – 35°C	45 MINUTES
> 35°C	NO PLACEMENT OF CONCRETE

C6 ALL CONCRETE SHALL BE MECHANICALLY VIBRATED. VIBRATORS SHALL NOT BE USED TO SPREAD CONCRETE.

C7 ALL CONCRETE SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH RELEVANT SPECIFICATIONS AND AS1379 AS APPLICABLE ADOPTING THE PROJECT ASSESSMENT METHOD FOR COMPRESSIVE STRENGTH AND SLUMP COMPLIANCE. THE RESULTS OF ALL TESTS SHALL BE PROMPTLY SUBMITTED

C8 EVAPORATION RETARDING COMPOUNDS CONSISTING PRIMARILY OF, ALIPHATIC ALCOHOL SHALL BE APPLIED TO THE CONCRETE SURFACE WITHIN 10 MINUTES OF THE INITIAL SCREED AND AGAIN AFTER SUBSEQUENT SCREEDING AND FINISHING.

C9 CURING OF ALL CONCRETE SURFACES SHALL COMMENCE IMMEDIATELY AFTER COMPLETING CONCRETE FINISHING AND SHALL CONTINUE FOR 7 DAYS. CONTRACTOR TO CONFIRM METHOD OF CURING WITH ENGINEER PRIOR TO USE.

C10 SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.

C11 CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN OR APPROVED BY THE ENGINEER.

C12 NO HOLES, CHASES OR EMBEDDED ITEMS OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER. CONDUITS, PIPES ETC. SHALL NOT BE PLACED IN THE COVER THICKNESS OF THE CONCRETE.

C13 WHERE SERVICE PIPES PENETRATE CONCRETE ELEMENTS, PROVISION SHOULD BE MADE TO ALLOW FOR MOVEMENT OF THE ELEMENT.

C14 FORMWORK AND FALSEWORK SHALL BE DESIGNED, CONSTRUCTED AND STRIPPED IN ACCORDANCE WITH AS3610 FORMWORK CODE, EXCEPT AS OTHERWISE REQUIRED BY MRTS 70 – CONCRETE OR UNLESS NOTED OTHERWISE ON THE DRAWINGS.

C15 UNLESS NOTED OTHERWISE FORMS AND FALSWORK SHALL REMAIN IN POSITION UNTIL THE TIMES STATED IN MRTS70 – CLAUSE 15.8, HAVE ELAPSED AFTER COMPLETION OF CONCRETING.

C16 IN ACCORDANCE WITH APPLICABLE DTMR AND LOCAL AUTHORITY SPECIFICATIONS, ALL EXPOSED AND ACCESSIBLE CONCRETE SURFACES HALL BE TREATED WITH A NON SACRIFICIAL ANTI GRAFFITI COATING.

REINFORCEMENT

R1 REINFORCEMENT TO BE IN ACCORDANCE WITH MRTS71, AS 5100.5 AND AS/NZS 4671, AND SHALL BE READ IN CONJUNCTION WITH TMR STANDARD DRAWINGS 1043 AND 1044.

R2 ALL REINFORCEMENT SHALL BE ACRS CERTIFIED.

R3 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION OR SCALE.

R4 ALL REINFORCEMENT SHALL BE SECURELY SUPPORTED IN ITS CORRECT POSITION ON PLASTIC BAR CHAIRS, GENERALLY AT NOT GREATER THAN 800mm CENTRES IN BOTH DIRECTIONS.

R5 WELDING AND HEATING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT APPROVAL OF THE ENGINEER.

R6 ALL STEEL REINFORCEMENT IN CONCRETE ELEMENTS SHALL BE INSPECTED BY THE ENGINEER AND PASSED PRIOR TO POURING OF ANY CONCRETE.

R7 LAP REINFORCEMENT ONLY AT LOCATIONS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER.

R8 UNLESS NOTED OTHERWISE ON THE DRAWINGS, BAR REINFORCEMENT SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING TABLE.

TYPICAL BAR REINFORCEMENT LAP LENGTHS		
BAR	LAP LENGTH UNO	HORIZONTAL BARS WITH GREATER THAN 300mm OF CONCRETE CAST BELOW THEM
N12	550	750
N16	800	1100
N20	1100	1400
N24	1250	1600
N28	1400	1800
N32	1600	2100
N36	2000	2500
FABRIC	2 TRANSVERSE BARS + 25mm	2 TRANSVERSE BARS + 25mm

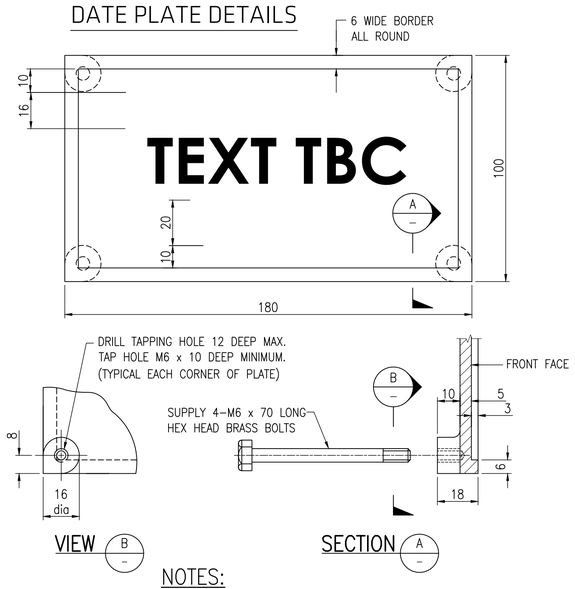
WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.

R9 REINFORCEMENT SUFFIXES:
N GRADE D500N DEFORMED BARS TO AS/NZS 4671
R GRADE R250N PLAIN ROUND BARS TO TO AS/NZS 4671
W GRADE D500L HARD-DRAWN REINFORCMENT WIRE TO TO AS/NZS 4671
RL and SL GRADE D500L WELDED WIRE REINFORCING FABRIC TO TO AS/NZS 4671
REINFORCING NOMENCLATURE SHOWN ON THE DRAWINGS IS AS FOLLOWS:

NOMINAL BAR DIAMETER (mm) — BAR SHAPE
No. OF BARS IN GROUP — 5-16DBR AT 200-NF — LOCATION OR COMMENT
REINFORCING SUFFIX (OMITTED IF GRADE D500N) — SPACING

R10 SPACING OF REINFORCEMENT SHALL BE TAKEN AS EQUAL U.N.O.

DATE PLATE DETAILS



NOTES:
1. DATE PLATE MATERIAL TO BE CAST BRASS.
2. LETTERS AND FIGURES TO BE RAISED 3mm FONT STYLE CENTURY GOTHIC BOLD OR SIMILAR.
3. TOP SURFACE OF BORDER, LETTERS AND FIGURES TO BE POLISHED.
4. BACKGROUND TO HAVE A MATT FINISH.
5. DIMENSIONS ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.

STRUCTURAL STEEL

S1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS4100, AS5100.6 & MRTS 78

S2 THE CONTRACTOR SHALL SUBMIT STRUCTURAL STEEL SHOP DRAWINGS FOR REVIEW BY THE ENGINEER , BEFORE FABRICATION COMMENCES.

S3 THE STEEL MEMBERS SHOWN ON THE STRUCTURAL DRAWINGS ARE THOSE REQUIRED FOR THE COMPLETED STRUCTURE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ANY NECESSARY TEMPORARY CONNECTIONS, SUPPORTS AND BRACING TO MAINTAIN THE STABILITY AND SAFETY OF THE STEELWORK THROUGHOUT THE CONSTRUCTION PERIOD.

S4 UNLESS NOTED OTHERWISE, ALL STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING:

ELEMENT	STEEL GRADE
HOT ROLLED SECTIONS	300 PLUS
WELDED SECTIONS (WB, WC)	300 PLUS
CHS UP TO AND INCLUDING 168 DIA.	C250
CHS GREATER THAN 168 DIA, SHS AND RHS	C350
FLOOR PLATES	250
MERCHANT BAR – ROUNDS, SQUARES AND FLATS	300 PLUS

S5 ALL WELDS, INCLUDING SITE WELDS SHALL BE UNDERTAKEN BY QUALIFIED PERSONNEL IN ACCORDANCE WITH AS1554.1, AS4100 & AS 5100.6 AS APPLICABLE. ALL WELDS SHALL BE FROM E41XX/W40X ELECTRODES AND SHALL BE CATEGORY SP UNLESS NOTED OTHERWISE.

S6 ALL CLEATS AND GUSSET PLATES SHALL BE 10mm THICK, UNLESS NOTED OTHERWISE.

S7 ALL BOLTS SHALL BE M20 8.8/S UNLESS NOTED OTHERWISE. BOLT HOLES SHALL BE 2mm GREATER THAN SPECIFIED BOLT SIZE UNLESS NOTED OTHERWISE.

S8 BOLT DESIGNATIONS SHALL CONFORM TO THE FOLLOWING:

DESIGNATION	AUST. STANDARD	INSTALLATION METHOD
4.6/S	AS 1111	SNUG TIGHT
8.8/S	AS/NZS 1252	SNUG TIGHT
8.8/TB	AS/NZS 1252	FULLY TENSIONED (SOME SLIP ALLOWED)
8.8/TF	AS/NZS 1252	FULLY TENSIONED WITH NO SLIP. CONTACT SURFACES TO BE FREE FROM APPLIED FINISHES

S9 LOAD INDICATING WASHERS SHALL BE USED TO VERIFY TIGHTENING OF BOLTS IN TF AND TB CONNECTIONS.

S10 WASHERS SHALL BE INSTALLED UNDER BOTH BOLT HEAD AND NUT AT ALL SLOTTED BOLT HOLE LOCATIONS.

S11 THE POSITION AND DETAIL OF ANY SPLICES REQUIRED OTHER THAN THOSE SHOWN ON THE DRAWINGS SHALL BE APPROVED BY THE ENGINEER.

S12 FULL CONTACT BEARING SURFACES, WHERE SPECIFIED, SHALL COMPLY WITH CLAUSE 14.4.4.2 OF AS4100.

S13 THE ENDS OF ALL TUBULAR MEMBERS SHALL BE SEALED WITH 6mm MINIMUM PLATES AND CONTINUOUS FILLET WELDS UNLESS NOTED OTHERWISE.

S14 UNLESS NOTED OTHERWISE ALL STEELWORK (INCLUDING FIXINGS) SHALL BE HOT DIP GALVANISED OR PAINTED (INCLUDING CLEANING & PREPARATION) BASED ON THEIR LEVEL OF EXPOSURE (ATMOSPHERIC CORROSIVITY CATEGORY) IN ACCORDANCE WITH AS/NZS 2312, MRTS 78 AND THE REFERENCED STANDARDS THERE IN.

S15 REGARDLESS OF THE PROTECTIVE COATING SYSTEM ADOPTED, SOME ONGOING MAINTENANCE IS TO BE EXPECTED THROUGHOUT THE DESIGN LIFE OF EXPOSED STEELWORK, PARTICULARLY IN COASTAL ENVIRONMENTS.

S16 WHERE THE STEEL PROTECTIVE COATING IS DAMAGED AS A RESULT OF TRANSPORT, HANDLING, DRILLING OR WELDING, THE PROTECTIVE COATING SYSTEM IS TO BE REPAIRED IN ACCORDANCE WITH AS/NZS 2312 AND AS/NZS 4680 (FOR GALVANISED COATINGS), MRTS 78 AND ANY RELEVANT PRODUCT SPECIFICATIONS.

S17 ALL BOLTS, WASHERS AND DRILLED IN ANCHORS SPECIFIED IN EXTERNAL AREAS ARE TO BE HOT DIP GALVANISED IN ACCORDANCE WITH AS1214.

S18 NON-DESTRUCTIVE WELD TESTING, WHERE SPECIFIED, SHALL BE CARRIED OUT BY SUITABLY QUALIFIED PERSONNEL IN ACCORDANCE WITH CLAUSE 7.4 OF AS1554.1 AS APPLICABLE USING APPROPRIATE RADIOGRAPHIC, ULTRASONIC, MAGNETIC PARTICLE OR DYE PENETRATION TECHNIQUES. THE RESULTS SHALL BE PROMPTLY FORWARDED TO THE ENGINEER FOR REVIEW PRIOR TO ERECTION OF THE STEELWORK.

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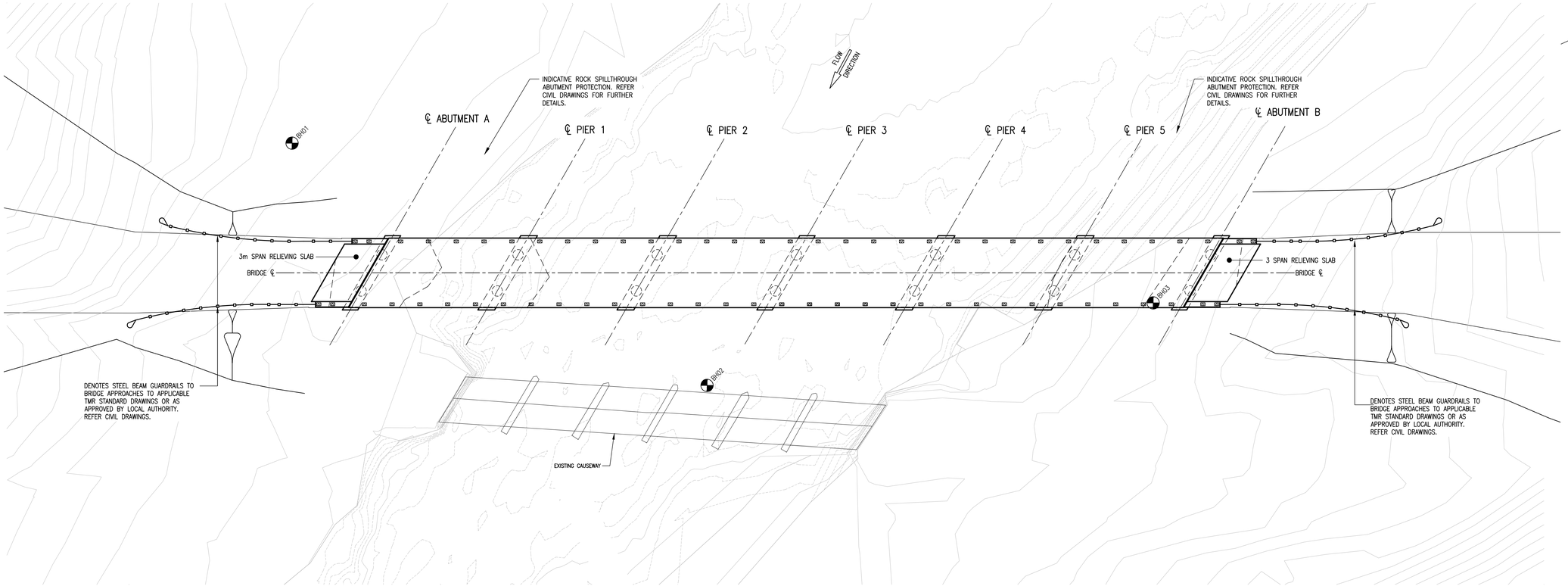
PROJECT: DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK BRIDGE
TITLE: CONSTRUCTION NOTES
CLIENT: DAVBRIDGE CONSTRUCTIONS

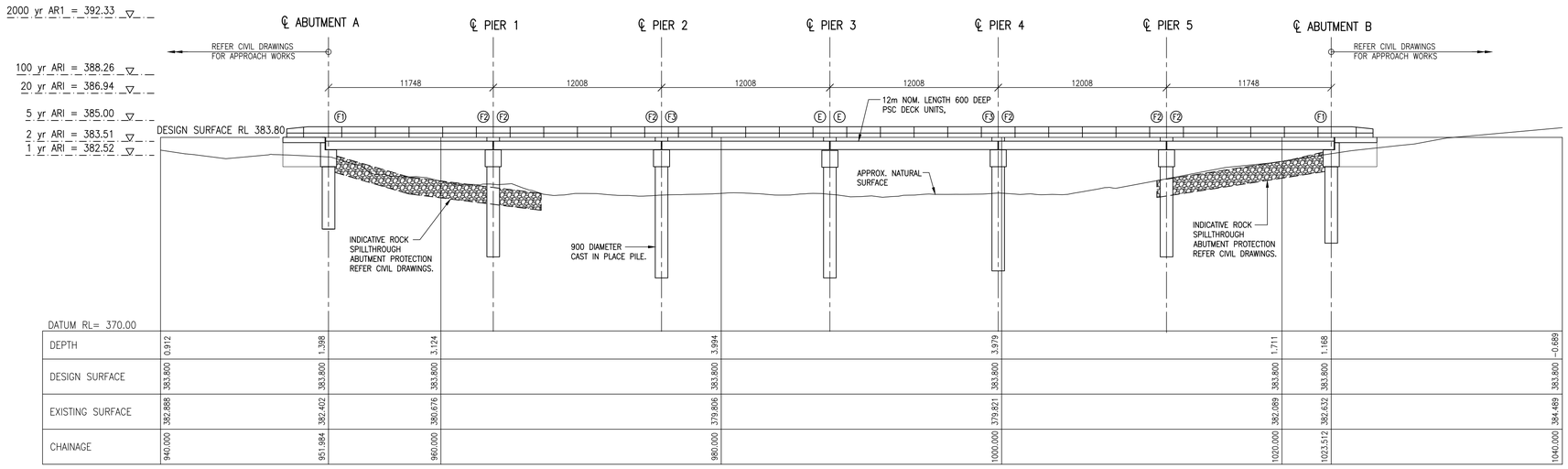
PROJECT NUMBER G26-017D
SHEET NUMBER 1.0
REVISION P4



BRIDGE GENERAL ARRANGEMENT PLAN

SCALE 1:200 (AT A1 SIZE)

DENOTES APPROXIMATE BOREHOLE LOCATION. REFER TO GEOTECHNICAL REPORT



DEPTH	0.912	1.398	3.124	3.994	3.979	1.711	1.168	-0.689
DESIGN SURFACE	383.800	383.800	383.800	383.800	383.800	383.800	383.800	383.800
EXISTING SURFACE	382.888	382.402	380.676	379.806	379.821	382.089	382.632	384.489
CHAINAGE	940.000	951.984	960.000	980.000	1000.000	1020.000	1023.512	1040.000

BRIDGE LONG SECTION (ON ROAD CONTROL LINE)

SCALE 1:200 (AT A1 SIZE)

F1 F2 F3 :DENOTES FIXED END

E :DENOTES EXPANSION END

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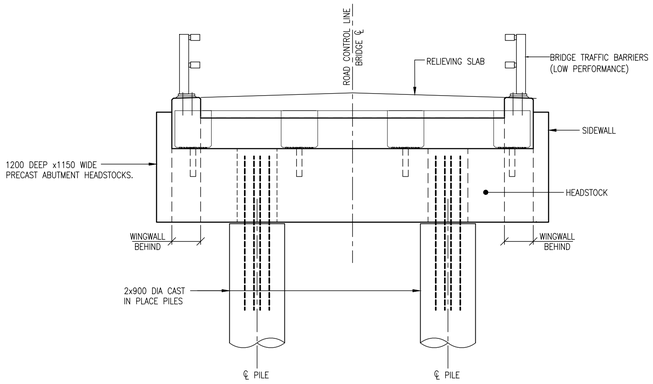
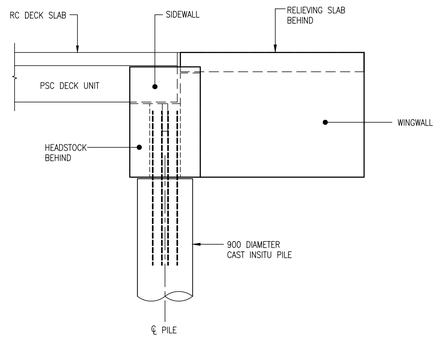
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	GENERAL ARRANGEMENT PLAN AND LONG SECTION
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	2.0
REVISION	P4



ABUTMENT A & B ELEVATION

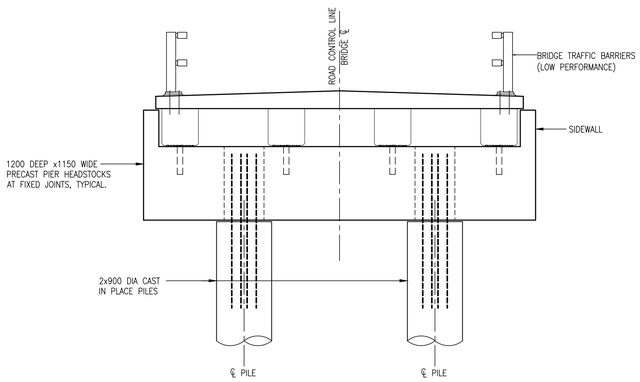
SCALE 1:50



ABUTMENT A & B END ELEVATION

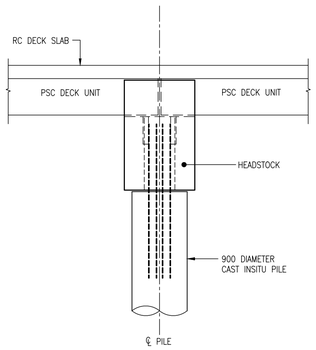
SCALE 1:50

NOTE: BRIDGE BARRIER OMITTED FOR CLARITY



PIERS 1, 2, 4 & 5 ELEVATION

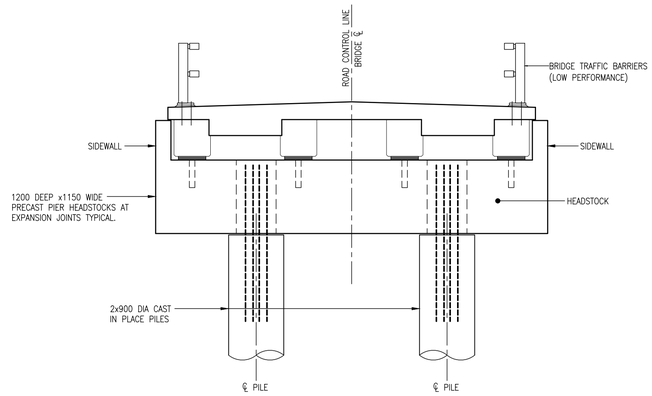
SCALE 1:50



END ELEVATION

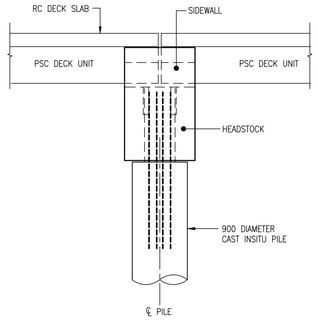
SCALE 1:50

NOTE: BRIDGE BARRIER OMITTED FOR CLARITY



PIER 3 ELEVATION

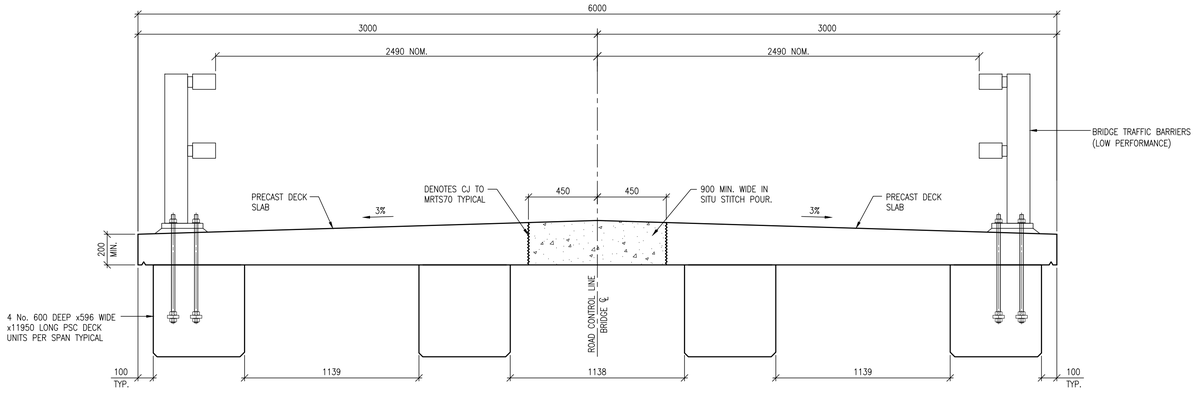
SCALE 1:50



END ELEVATION

SCALE 1:50

NOTE: BRIDGE BARRIER OMITTED FOR CLARITY



TYPICAL DECK SECTION

SCALE 1:20

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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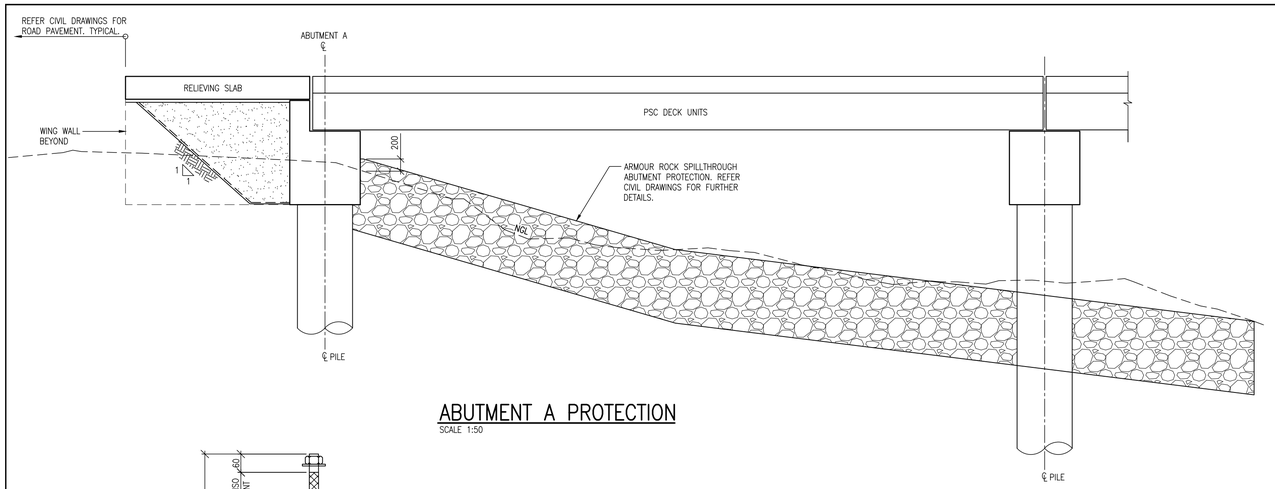
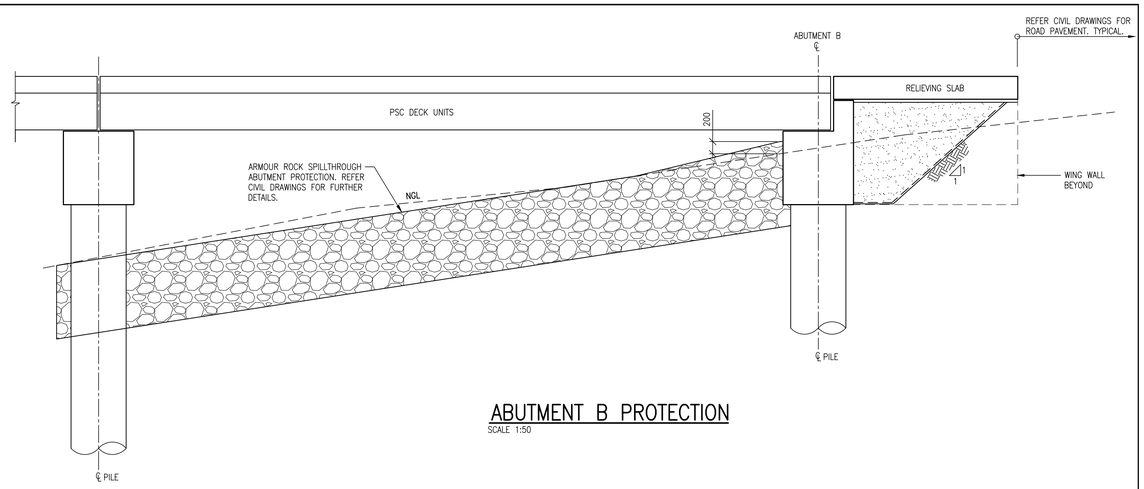
PROJECT: DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK BRIDGE
TITLE: PIER AND ABUTMENT ELEVATIONS & DECK SECTION
CLIENT: DAVBRIDGE CONSTRUCTIONS

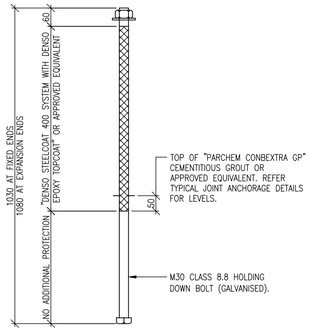
PROJECT NUMBER G26-017D
SHEET NUMBER 2.1
REVISION P4



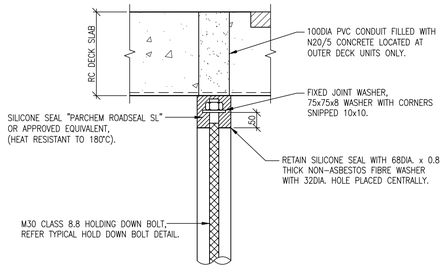
ABUTMENT A PROTECTION
SCALE 1:50



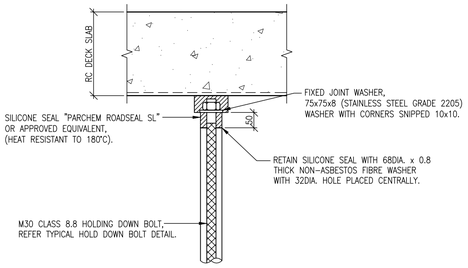
ABUTMENT B PROTECTION
SCALE 1:50



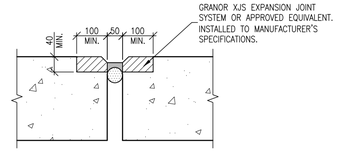
TYPICAL HOLD DOWN BOLT DETAIL



DETAIL A
SCALE 1:10



DETAIL B
SCALE 1:10



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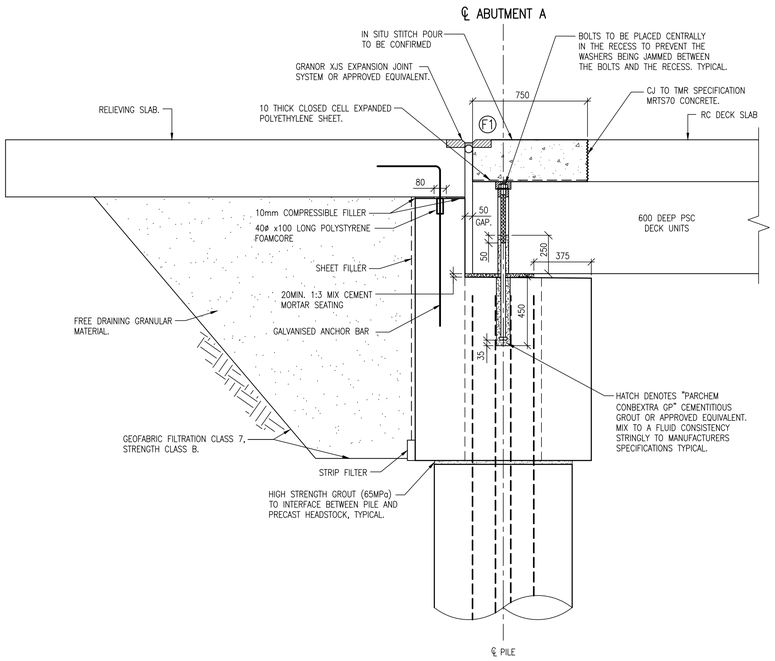
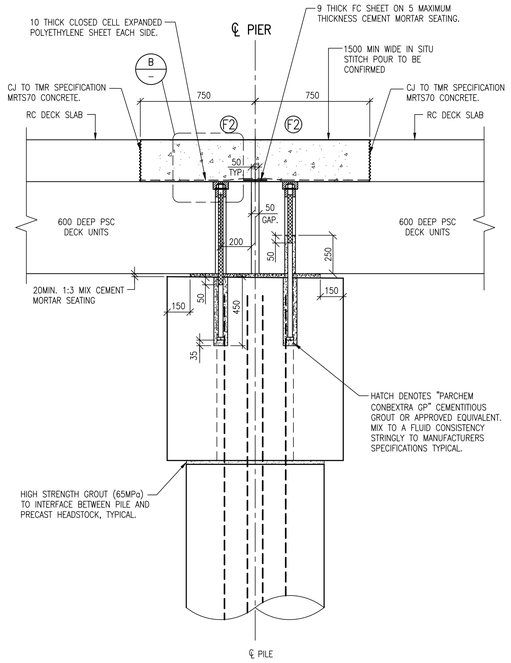
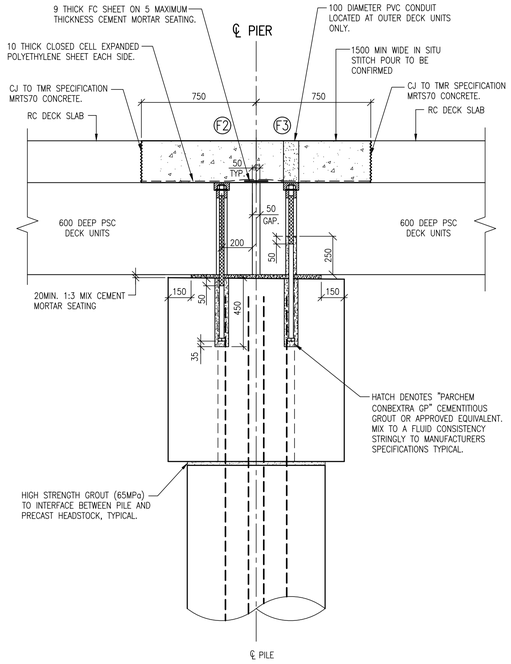


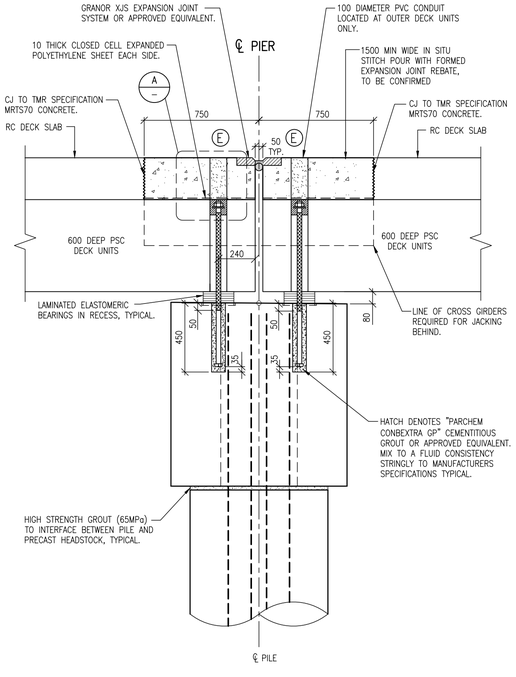
JOINT/ANCHORAGE DETAILS – ABUTMENT A (ABUTMENT B SIMILAR OPP. HAND)
SCALE 1:20



JOINT/ANCHORAGE DETAIL PIERS 1 & 5
SCALE 1:20



JOINT/ANCHORAGE DETAIL PIER 2 (PIER 4 SIMILAR OPP. HAND)
SCALE 1:20



JOINT/ANCHORAGE DETAIL PIER 3
SCALE 1:20

PRELIMINARY ISSUE
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No.	DATE	REVISIONS	DRN	ENG
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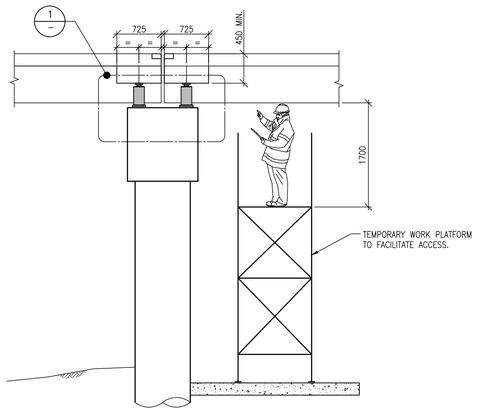
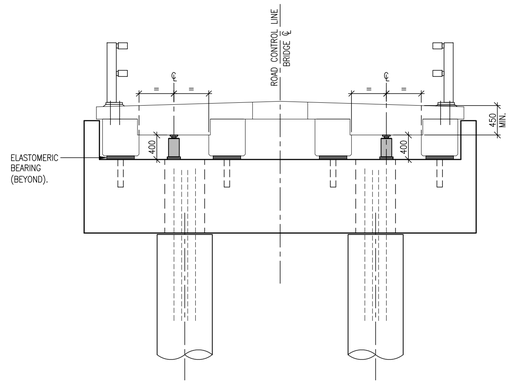
PROJECT: DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK BRIDGE
TITLE: ABUTMENT PROTECTION & JOINT/ANCHORAGE DETAILS
CLIENT: DAVBRIDGE CONSTRUCTIONS

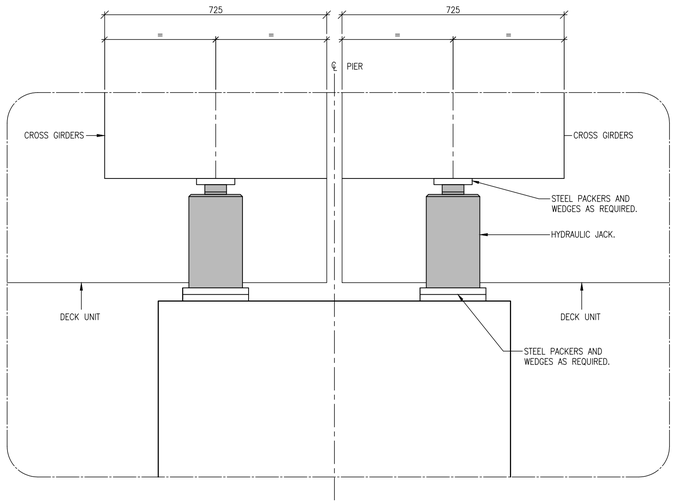
PROJECT NUMBER G26-017D
SHEET NUMBER 2.2
REVISION P4



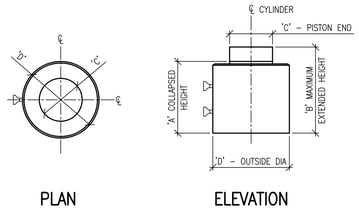
SECTION (PIER 3)
INSPECTION AND MAINTENANCE DIAGRAM



ELEVATION (PIER 3)
PROPOSED JACKING LOCATIONS
SCALE 1:50



DETAIL 1
SCALE 1:5



JACK DIMENSIONS
SCALE 1:10

JACK DETAILS AND DIMENSIONS

LOCATION	SUPPLIER	MODEL No.	JACK CAPACITY (TONNES)	STROKE (mm)	'A' (mm)	'B' (mm)	'C' (mm)	'D' (mm)
PIER 3	ENERPAC	HCL 1008 DOUBLE–ACTING HIGH TONNAGE LOCK NUT HYDRAULIC CYLINDER	100	200	337	537	71	175

DESIGN ASSUMPTIONS:
1. JACKING SHALL BE LIMITED TO 20mm MAXIMUM
2. MAXIMUM DIFFERENTIAL DISPLACEMENT BETWEEN ADJACENT JACKS SHALL BE KEPT TO A MAXIMUM OF 0.5mm
3. SUITABLE GAUGES FOR THE MEASUREMENT OF DECK MOVEMENT SHALL BE INSTALLED BY THE CONTRACTOR.
4. BRIDGE IS TO BE CLOSED TO TRAFFIC DURING JACKING OPERATIONS UNTIL BEARINGS ARE REPLACED.
5. DESIGNED JACKING LOADS BASED ON PERMANENT AFFECTS + ONE 20t GVM CONSTRUCTION VEHICLE TRAVELLING CENTRALLY ONLY.
6. TEMPORARY WORK PLATFORMS SHALL BE DESIGNED AND CERTIFIED BY A SPECIALIST CONTRACTOR TO SUPPORT A LIVE LOAD OF 5KPa.

SITE PREPARATION AND ACCESS
THE CONTRACTOR ENGAGED TO UNDERTAKE THE BEARING REPLACEMENT SHALL PROVIDE TEMPORARY WORK PLATFORMS. SAFE ACCESS TO WORK PLATFORMS SHALL BE PROVIDED TO COINCIDE WITH LOW FLOW OR DRY CONDITIONS. FURTHERMORE, A SAFETY PLAN AND DETAILED WORK METHOD STATEMENT (IN ACCORDANCE WITH RELEVANT LEGISLATION AND STANDARDS) ARE TO BE PROVIDED FOR APPROVAL PRIOR TO THE COMMENCEMENT OF ANY MAINTENANCE WORK.

DRAWINGS OF TEMPORARY WORK PLATFORMS ARE TO BE CERTIFIED BY AN ENGINEER OF RPEQ STATUS AND SUBMITTED TO COUNCIL FOR APPROVAL PRIOR TO INSTALLATION.

BEARING REPLACEMENT PROCEDURE
THE FOLLOWING PROCESS FOR BEARING REPLACEMENT IS PROPOSED BY THE ORIGINAL BRIDGE DESIGNER (INCLUDING DESIGN ASSUMPTIONS). A WRITTEN METHOD STATEMENT FOR BEARING REPLACEMENT SHALL BE SUBMITTED FOR APPROVAL WITH COUNCIL BEFORE PROCEEDING WITH WORKS.

BEFORE JACKING:
1. INSTALL TEMPORARY TRAFFIC MANAGEMENT DEVICES (EG. SIGNS, BARRIERS), AS REQUIRED.
2. INSTALL TEMPORARY WORK PLATFORMS.
3. LOOSEN ANY BRIDGE FURNITURE BEFORE JACKING (E.G. TRAFFIC RAILS, EXPANSION JOINTS ETC.).
4. CLEAN BEARING SHELVES TO ENSURE FREE OF VEGETATION, DEBRIS AND GREASE.
5. LOCATE DECK UNIT HOLD DOWN BOLT PVC CONDUITS AT EDGE OF DECKS AND UTILISE THESE TO SET OUT REMAINDER OF HOLD DOWN BOLT LOCATIONS.
6. SPECIALIST CONTRACTOR TO DRILL CORE HOLES THROUGH RC DECK SLAB TO ACCESS DECK UNIT HOLD DOWN BOLTS.
7. REMOVE NUTS AND WASHERS FROM HOLDING DOWN BOLTS.
8. REMOVE THE CEMENT GROUT IN THE BOTTOM OF THE HOLDING DOWN BOLT HOLES IN THE DECK UNITS AT F3 AND E JOINTS LOCATED AT PIERS 2, 3 & 4.

TRIAL LIFT
A TRIAL LIFT IS REQUIRED PRIOR TO BEARING REPLACEMENT AS THIS ALLOWS FOR IDENTIFICATION OF POTENTIAL PROBLEMS AND MAY LEAD TO A REDESIGN, CHANGES TO THE WORK PROCEDURE OR EQUIPMENT.

9. THE BRIDGE SHALL BE CLOSED TO TRAFFIC PRIOR TO AND DURING JACKING.
10. INSTALL HYDRAULIC JACKING EQUIPMENT UNDER THE DECK UNITS ACCORDING TO THE MANUFACTURE'S INSTRUCTION AND WRITTEN SPECIFICATIONS.
11. JACK AND LIFT BRIDGE AS REQUIRED. ALL JACK POINTS TO BE JACKED SIMULTANEOUSLY. ENSURE MAXIMUM BEARING PRESSURE ON CONCRETE DOES NOT EXCEED 20MPa.
12. DIMENSIONS OF EXISTING BEARINGS SHALL BE CONFIRMED ON SITE.
13. LOWER BRIDGE BACK TO ORIGINAL POSITION.

BEARING REPLACEMENT LIFT
14. REPEAT STEPS 8 AND 9.
15. JACK AND LIFT BRIDGE TO REMOVE EXISTING BEARINGS. ALL JACK POINTS TO BE JACKED SIMULTANEOUSLY. ENSURE MAXIMUM BEARING PRESSURE ON CONCRETE DOES NOT EXCEED 20MPa.
16. REMOVE EXISTING BEARINGS AND REPLACE WITH NEW BEARINGS IN ACCORDANCE WITH THE REQUIREMENTS OF MRTS 75.
17. REMOVE JACKS.
18. REINSTATE MOVEMENT JOINTS, BRIDGE FURNITURE AND SERVICES AS REQUIRED PRIOR TO REOPENING BRIDGE.
19. FILL IN CORED HOLES AND PVC CONDUITS WITH N20/5 CONCRETE.

PRELIMINARY ISSUE
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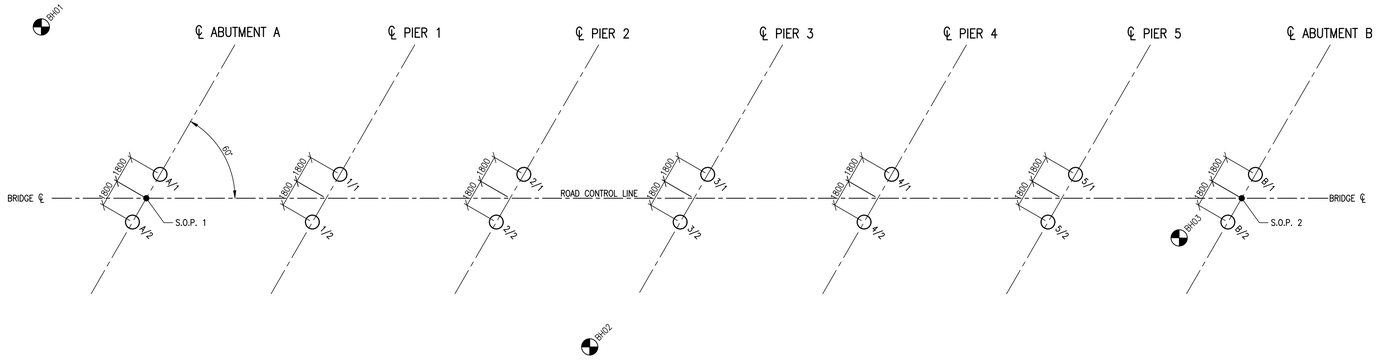
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	INSPECTION & MAINTENANCE DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	2.3
REVISION	P4



PILE SETOUT PLAN

SCALE 1:200

DENOTES APPROXIMATE BOREHOLE LOCATION. REFER TO GEOTECHNICAL REPORT

SETOUT POINT (SOP) COORDINATES

SETOUT POINT	EASTING	NORTHING
S.O.P. 1	360272.21	7915088.63
S.O.P. 2	360301.72	7915153.78

NOTE:
SURVEYOR TO CONFIRM BRIDGE SETOUT PRIOR TO CONSTRUCTION

PILE SCHEDULE / PILE SOCKET LENGTHS (REFER ULTIMATE GEOTECHNICAL PILE SOCKET PARAMETERS)

PILE SCHEDULE						PILE SOCKET LENGTHS				
PILE ID	PILE DIAMETER (mm)	ULTIMATE DESIGN LOAD IN AXIAL COMPRESSION/-TENSION (kN)	APPLICABLE BOREHOLE	LONGITUDINAL REINFORCEMENT	HELIX (SIZE-PITCH)	MAXIMUM NEGLECTED LENGTH (mm)	MINIMUM LENGTH THROUGH FRICTION MATERIAL TYPE 1 (mm)	MINIMUM SOCKET LENGTH INTO FOUNDING MATERIAL (mm)	ESTIMATED PILE CUT-OFF LEVEL (m AHD)	ESTIMATED PILE TOE LEVEL (m AHD)
A/1	900	1850/-500	BH01	11-32A	16Q-200 OR 16PZ-200	1635	–	3000	381.635	377.000
A/2	900	1850/-500	BH01	11-32A	16Q-200 OR 16PZ-200	1635	–	3000	381.635	377.000
1/1	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3435	–	3000	381.635	375.200
1/2	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3435	–	3000	381.635	375.200
2/1	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3435	–	3000	381.635	375.200
2/2	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3435	–	3000	381.635	375.200
3/1	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3385	–	3000	381.585	375.200
3/2	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3385	–	3000	381.585	375.200
4/1	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3435	–	3000	381.635	375.200
4/2	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3435	–	3000	381.635	375.200
5/1	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3435	–	3000	381.635	375.200
5/2	900	2400/-800	BH02	11-28A	16Q-200 OR 16PZ-200	3435	–	3000	381.635	375.200
B/1	900	1850/-500	BH03	11-32A	16Q-200 OR 16PZ-200	1835	500	2500	381.635	376.800
B/2	900	1850/-500	BH03	11-32A	16Q-200 OR 16PZ-200	1835	500	2500	381.635	376.800

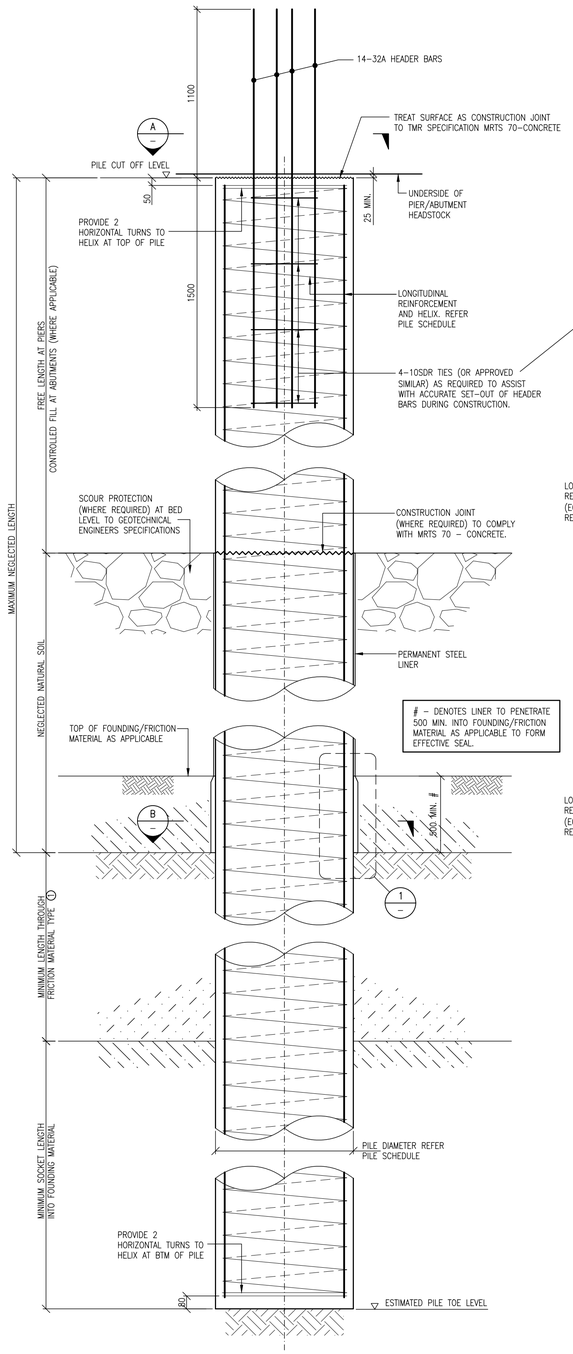
ULTIMATE GEOTECHNICAL PILE SOCKET PARAMATERS (REFER PILING CRITERIA)

PILE MATERIAL	MATERIAL DESCRIPTION	END BEARING (kPa)	SHAFT FRICTION (kPa)
FRICTION MATERIAL TYPE 1	HW MUDSTONE	–	560
FOUNDING MATERIAL	MW MUDSTONE (OR BETTER)	21000	900

PILING NOTES:

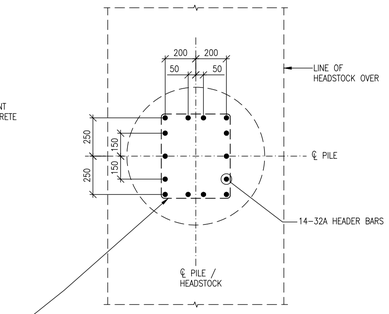
1. IN ACCORDANCE WITH MRTS63, A GEOTECHNICAL ENGINEER (RPEQ. IN QUEENSLAND) SHALL BE ENGAGED TO UNDERTAKE INSPECTIONS AND TESTING DURING PILING WORKS TO CONFIRM (IN WRITING) AS FOLLOWS:
   –THAT THE PILE SOCKET LENGTHS OUTLINED IN THE PILE SCHEDULE HAVE BEEN SATISFIED (OR BETTER) AND
   –THAT THE ULTIMATE GEOTECHNICAL PILE SOCKET PARAMETERS (AS TABULATED) HAVE BEEN CONFIRMED AS A MINIMUM.

   PILE SOCKET LENGTHS AND LEVELS HAVE BEEN ESTIMATED BASED ON THE AVAILABLE GEOTECHNICAL INFORMATION. WHERE GEOTECHNIAL CONDITIONS ARE FOUND TO DIFFER FROM THE PILE SOCKET LENGTHS/PARAMETERS ADOPTED IN DESIGN, THE GEOTECHNICAL ENGINEER IS TO CONFIRM THAT THE ULTIMATE GEOTECHNICAL CAPACITY OF EACH PILE EXCEEDS THE ULTIMATE DESIGN LOAD OUTLINED IN THE PILE SCHEDULE.
2. ALL PILES SHALL BE CONSTRUCTED IN ACCORDANCE WITH MRTS 63.
3. UNLESS NOTED OTHERWISE, ALL PILE DESIGNS HAVE BEEN BASED ON THE GEOTECHNICAL DESIGN PARAMETERS AND BOREHOLE PROFILES OUTLINED IN THE GEOTECHNICAL REPORT PREPARED BY CMW GEOSCIENCES JOB NO. BNE2024-0194AC VERSION REV 1
4. PILE DESIGNS HAVE BEEN BASED ON A GEOTECHNICAL STRENGTH REDUCTION FACTOR (ϕ_g) OF 0.52 OR BETTER. TO BE CONFIRMED ON SITE BY AN INSPECTING GEOTECHNICAL ENGINEER.
5. PERMANENT PILE LINERS SHALL BE PROVIDED IN ACCORDANCE WITH MRTS 63 WHERE REQUIRED TO PREVENT GROUND WATER INGRESS AND PILE SHAFT COLLAPSE.
6. IT IS THE PILING CONTRACTORS RESPONSIBILITY TO REVIEW ALL GEOTECHNICAL INFORMATION AVAILABLE, TO COMPLY WITH THE RECOMMENDATIONS THEREIN, AND TO SELECT SUITABLY SIZED PILING PLANT WITH ROCK AUGERS, CORING BUCKETS AND/OR DOWN-HOLE HAMMER EQUIPMENT TO ENSURE PILE SOCKETS INTO HIGHER STRENGTH ROCK ARE ACHIEVED.
7. THE PERMANENT STEEL LINER AND TOE STIFFENING BAND DIMENSIONS ARE INDICATIVE ONLY, AND SHALL BE DESIGNED AND CERTIFIED BY THE CONTRACTOR AND SUBMITTED TO THE SUPERINTENDENT FOR APPROVAL.

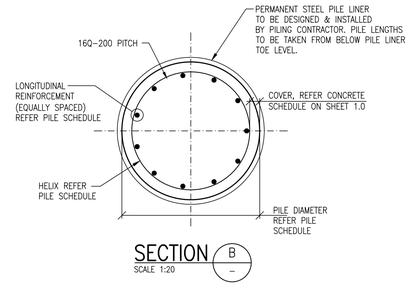


TYPICAL PILE ELEVATION

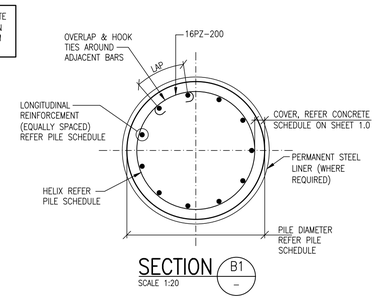
SCALE 1:20



SECTION A
SCALE 1:20

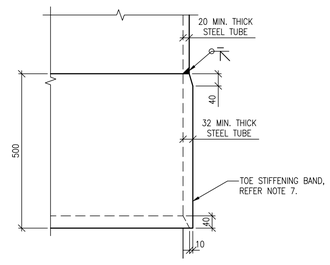


SECTION B
SCALE 1:20



SECTION B1
SCALE 1:20

ALTERNATIVE OPTION



DETAIL 1
SCALE 1:10

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DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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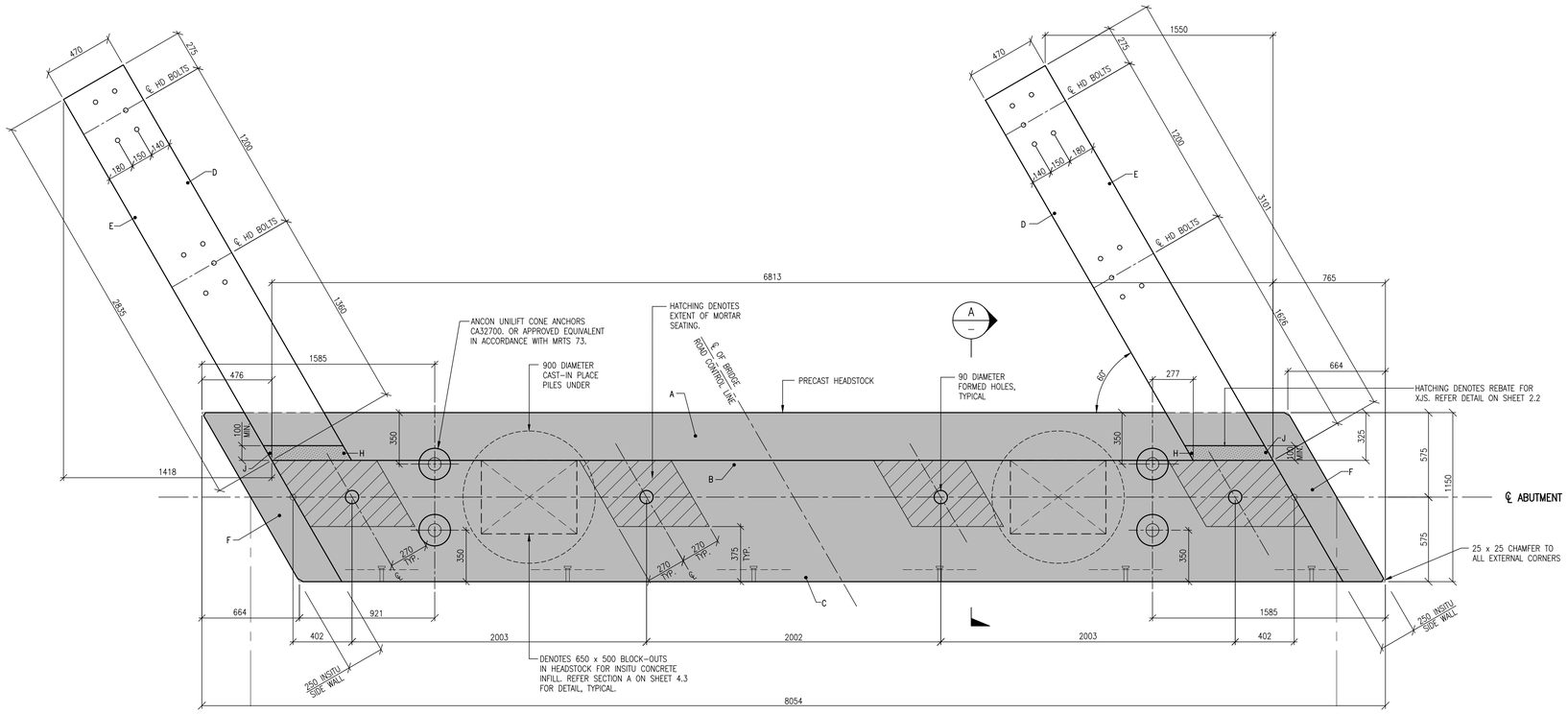
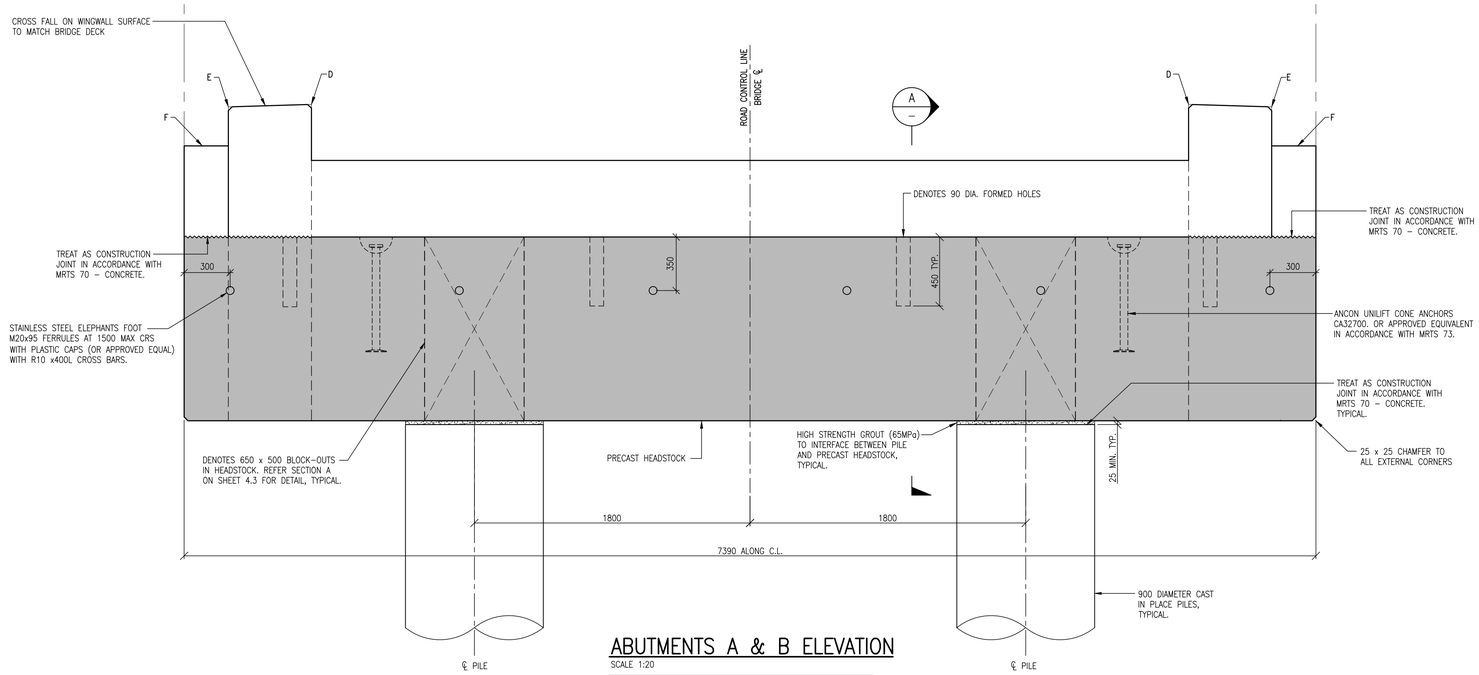
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	PILE SETOUT PLAN, SCHEDULE & DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	3.0
REVISION	P4



ABUTMENTS A & B PLAN

SCALE 1:20



ABUTMENTS A & B ELEVATION

SCALE 1:20

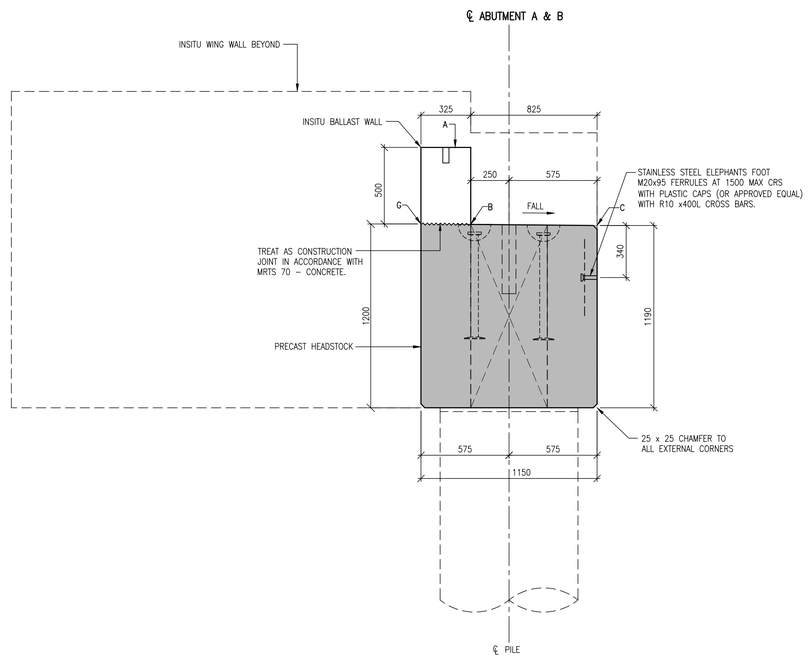
NOTE: SHOWN INDICATIVELY ONLY ON HEADSTOCK/PILE CENTRELINE

PRECAST HEADSTOCK NOTES:

- UNLESS NOTED OTHERWISE, PRECAST HEADSTOCKS TO BE MANUFACTURED IN ACCORDANCE WITH MRTS 73 AND CONCRETE SHALL BE IN ACCORDANCE WITH MRTS 70 (EXPOSURE CLASSIFICATION B2).
- PRECAST CONCRETE MUST ACHIEVE A MINIMUM COMPRESSIVE STRENGTH OF 32MPa PRIOR TO LIFTING.
- EXTERIOR EDGES SHALL BE CHAMFERED 25x25 UNLESS NOTED OTHERWISE.
- CJ DENOTES CONSTRUCTION JOINT TO BE PREPARED IN ACCORDANCE WITH MRTS 70.
- DURING STORAGE, PRECAST HEADSTOCKS SHALL BE IN AN UPRIGHT POSITION AND SUPPORTED AT NOT MORE THAN 1000mm FROM EACH END.
- U.N.O. LIFTING, HANDLING AND TRANSPORTATION OF PRECAST HEADSTOCKS SHALL BE IN ACCORDANCE WITH MRTS 73 SECTIONS 15.3.1 AND 15.3.3 AS APPLICABLE.
- ALL PRECAST HEADSTOCK LIFTING ANCHORS ARE TO BE GALVANISED.
- ALL LIFTING RECESSES ARE TO BE GROUT PATCHED WITH PARCHEM RENDEROK HB70 IN ACCORDANCE WITH MRTS274.
- FOR OTHER GENERAL NOTES REFER SHEET 1.0

ABUTMENT A&B RL SPOT LEVELS
(CONCRETE SURFACE)

SPOT LEVEL	RL (m. AHD)
A	383.360
B	382.857
C	382.850
D	383.726
E	383.712
F	383.455
G	382.860
H	383.686
J	383.672
NOTE: LEVELS ALLOW FOR 30mm HOG	



SECTION A

SCALE 1:20

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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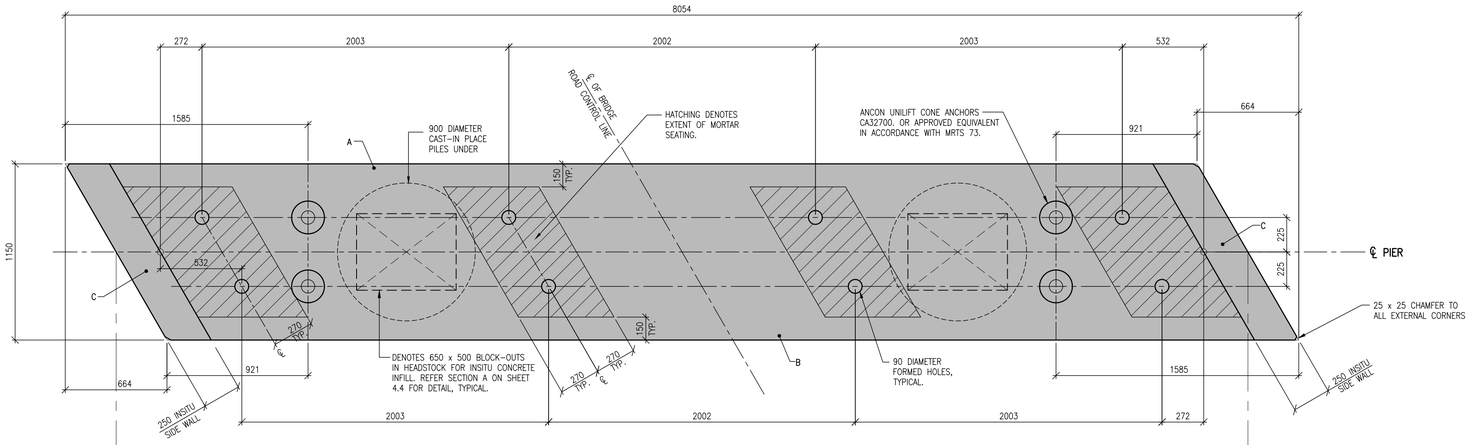
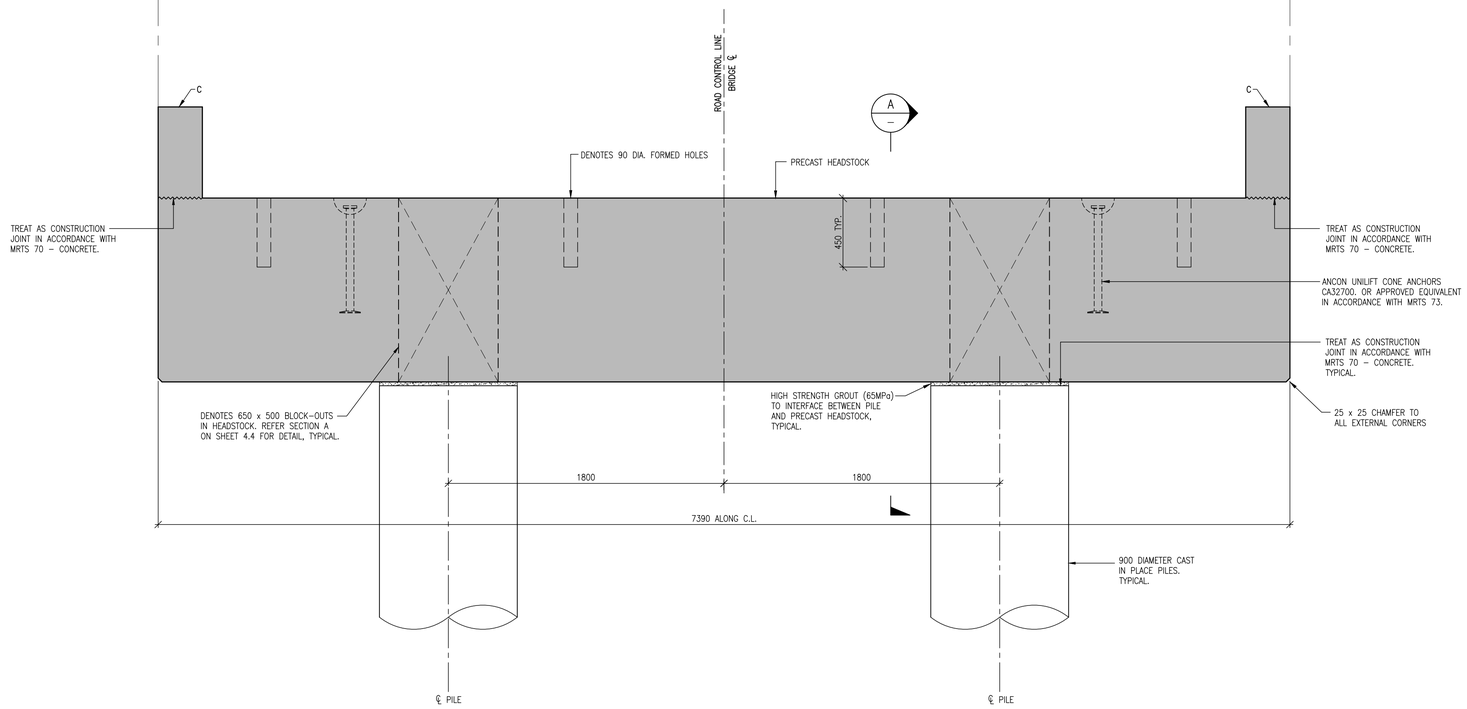
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	ABUTMENT A & B PLAN ELEVATION & SECTION
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER: G26-017D
SHEET NUMBER: 4.0
REVISION: P4



PIERS 1, 2, 4 & 5 PLAN

SCALE 1:20



PIERS 1, 2, 4 & 5 ELEVATION

SCALE 1:20

NOTE: SHOWN INDICATIVELY ONLY ON HEADSTOCK/PILE CENTRELINE

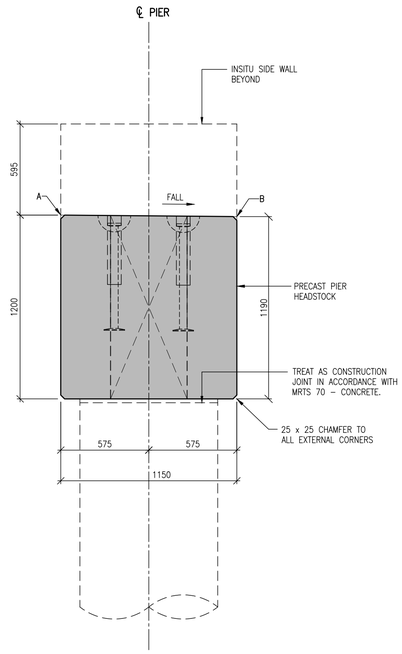
PRECAST HEADSTOCK NOTES:

- UNLESS NOTED OTHERWISE, PRECAST HEADSTOCKS TO BE MANUFACTURED IN ACCORDANCE WITH MRTS 73 AND CONCRETE SHALL BE IN ACCORDANCE WITH MRTS 70 (EXPOSURE CLASSIFICATION B2).
- PRECAST CONCRETE MUST ACHIEVE A MINIMUM COMPRESSIVE STRENGTH OF 32MPa PRIOR TO LIFTING.
- EXTERIOR EDGES SHALL BE CHAMFERED 25x25 UNLESS NOTED OTHERWISE.
- CJ DENOTES CONSTRUCTION JOINT TO BE PREPARED IN ACCORDANCE WITH MRTS 70.
- DURING STORAGE, PRECAST HEADSTOCKS SHALL BE IN AN UPRIGHT POSITION AND SUPPORTED AT NOT MORE THAN 1000mm FROM EACH END.
- U.N.O. LIFTING, HANDLING AND TRANSPORTATION OF PRECAST HEADSTOCKS SHALL BE IN ACCORDANCE WITH MRTS 73 SECTIONS 15.3.1 AND 15.3.3 AS APPLICABLE.
- ALL PRECAST HEADSTOCK LIFTING ANCHORS ARE TO BE GALVANISED.
- ALL LIFTING RECESSES ARE TO BE GROUT PATCHED WITH PARCHEM RENDEROK HB70 IN ACCORDANCE WITH MRTS274.
- FOR OTHER GENERAL NOTES REFER SHEET 1.0

ABUTMENT A&B RL SPOT LEVELS

(CONCRETE SURFACE)

SPOT LEVEL	RL (m. AHD)
A	382.860
B	382.850
C	383.455
NOTE: LEVELS ALLOW FOR 30mm HOG	



SECTION A

SCALE 1:20

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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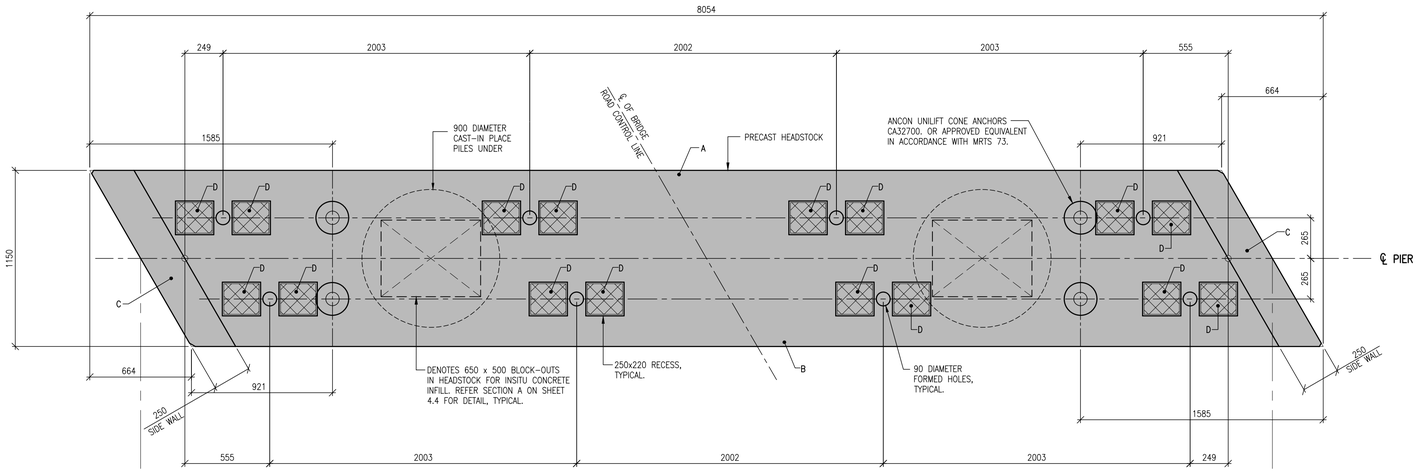
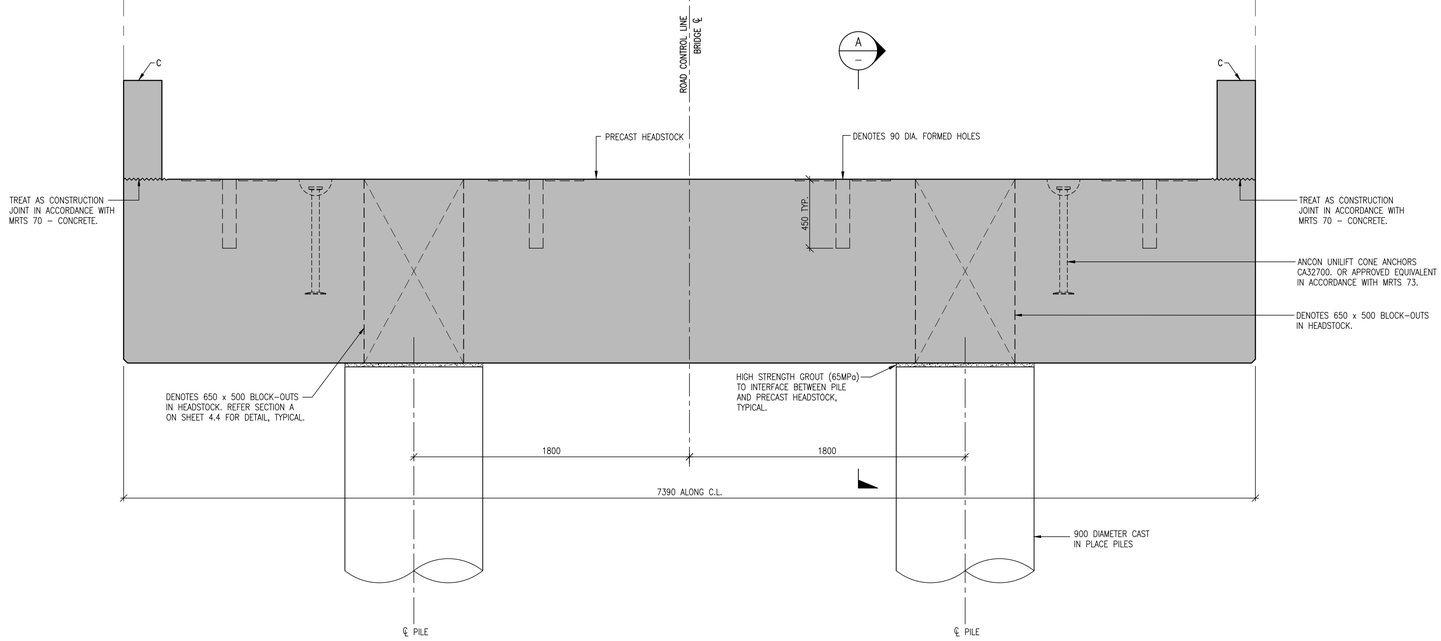
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	FIXED PIER PLAN ELEVATION & SECTION
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	4.1
REVISION	P4



PIER 3 PLAN

SCALE 1:20



PIER 3 ELEVATION

SCALE 1:20

NOTE: SHOWN INDICATIVELY ONLY ON HEADSTOCK/PILE CENTRELINE

PRECAST HEADSTOCK NOTES:

- UNLESS NOTED OTHERWISE, PRECAST HEADSTOCKS TO BE MANUFACTURED IN ACCORDANCE WITH MRTS 73 AND CONCRETE SHALL BE IN ACCORDANCE WITH MRTS 70 (EXPOSURE CLASSIFICATION B2).
- PRECAST CONCRETE MUST ACHIEVE A MINIMUM COMPRESSIVE STRENGTH OF 32MPa PRIOR TO LIFTING.
- EXTERIOR EDGES SHALL BE CHAMFERED 25x25 UNLESS NOTED OTHERWISE.
- CJ DENOTES CONSTRUCTION JOINT TO BE PREPARED IN ACCORDANCE WITH MRTS 70.
- DURING STORAGE, PRECAST HEADSTOCKS SHALL BE IN AN UPRIGHT POSITION AND SUPPORTED AT NOT MORE THAN 1000mm FROM EACH END.
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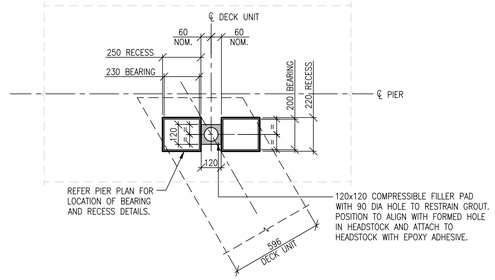
- ALL LIFTING RECESSES ARE TO BE GROUT PATCHED WITH PARCHEM RENDEROK HB70 IN ACCORDANCE WITH MRTS274.
- FOR OTHER GENERAL NOTES REFER SHEET 1.0

ABUTMENT A&B RL SPOT LEVELS
(CONCRETE SURFACE)

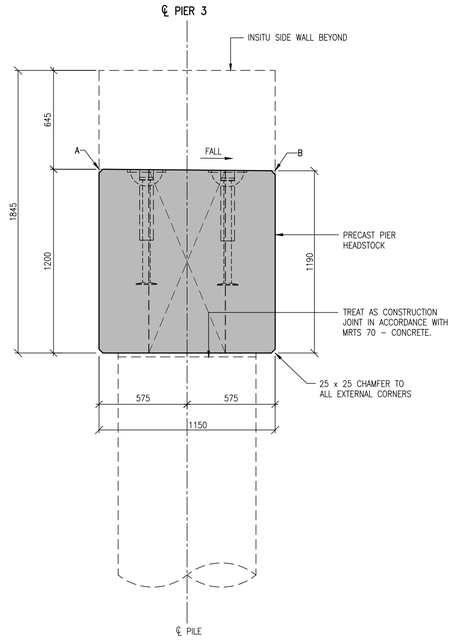
SPOT LEVEL	RL (m. AHD)
A	382.810
B	382.800
C	383.455
D	382.790

NOTE: LEVELS ALLOW FOR 30mm HOG



PLAN – TYPICAL BEARING SHELF DETAIL

SCALE 1:20



SECTION A

SCALE 1:20

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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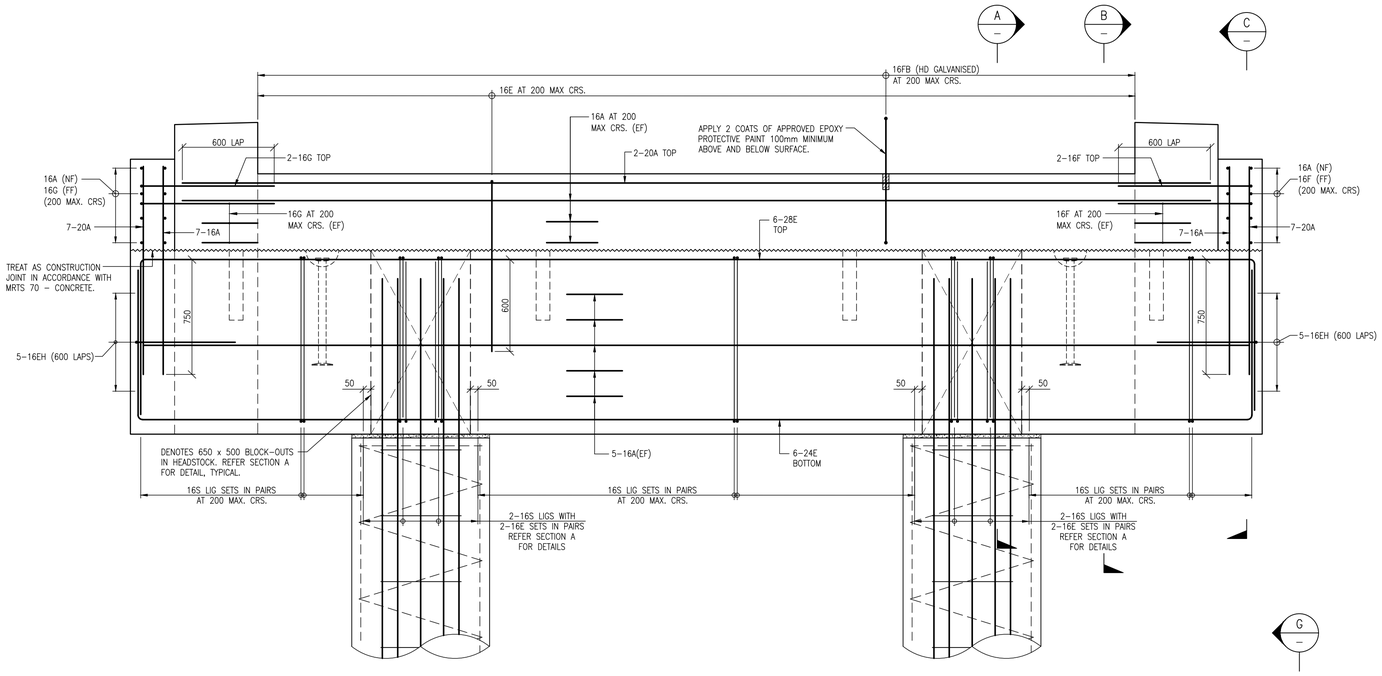
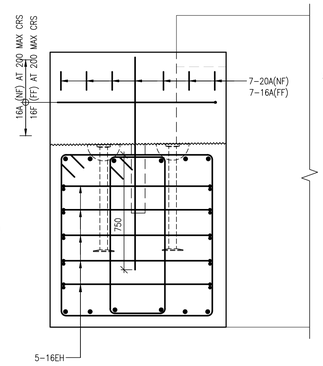
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	EXPANSION PIER PLAN ELEVATION & SECTION
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	4.2
REVISION	P4



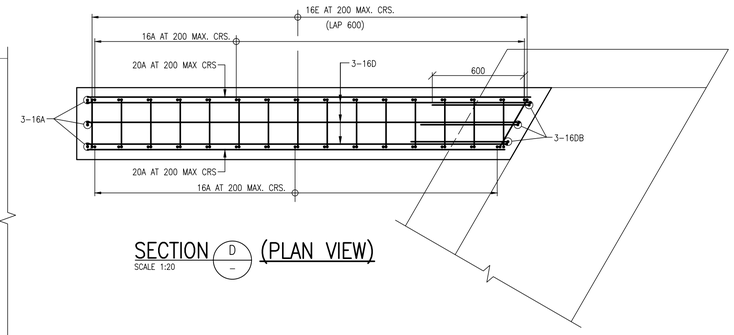
ELEVATION – ABUTMENT A & B REINFORCMENT

SCALE 1:20



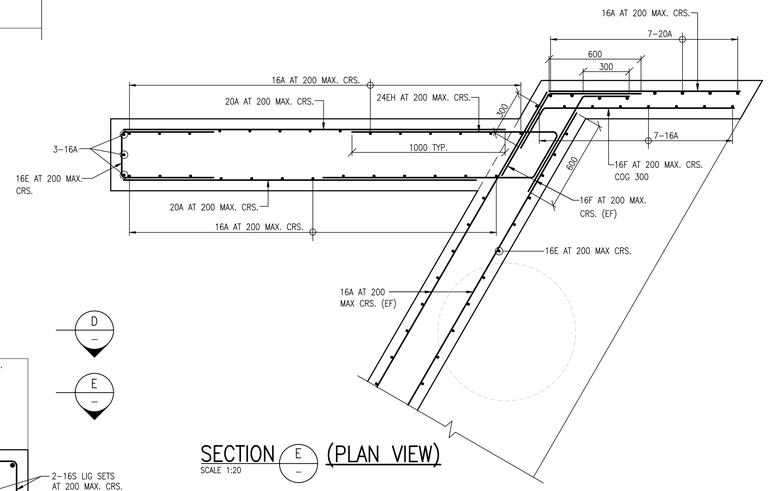
SECTION C

SCALE 1:20



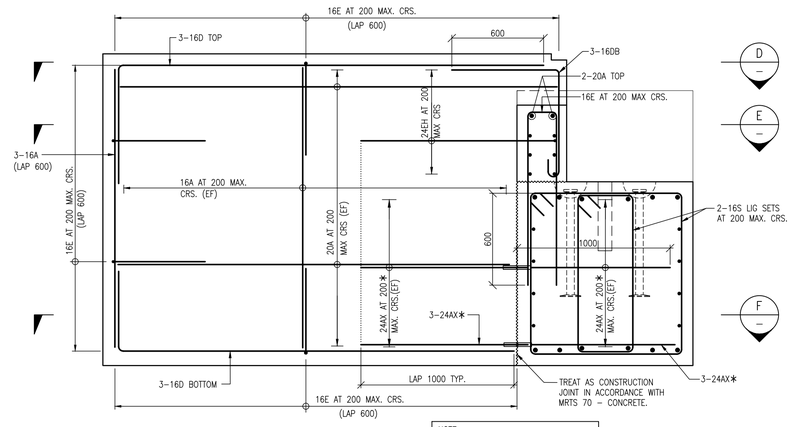
SECTION D (PLAN VIEW)

SCALE 1:20



SECTION E (PLAN VIEW)

SCALE 1:20



NOTE:
* : PROVIDE SRG BARTEK BPS STANDARD COUPLERS OR APPROVED EQUIVALENT TO BAR ENDS.

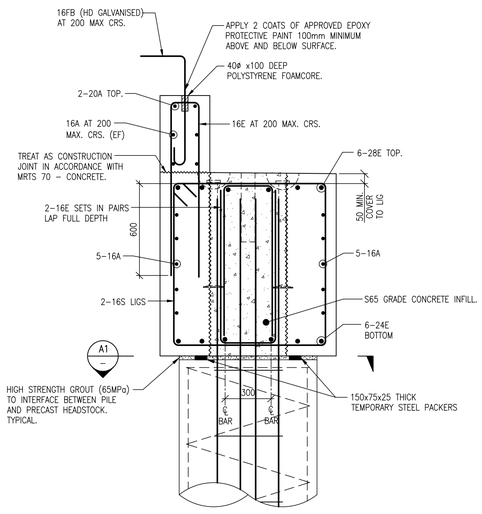
SECTION B

SCALE 1:20

LEGEND:

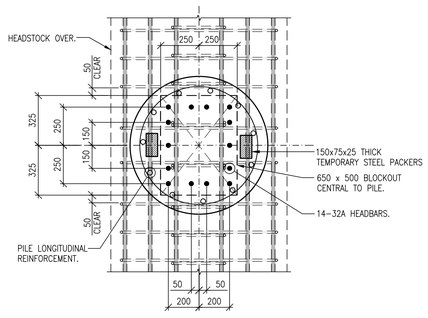
(NF)	:DENOTES NEAR FACE
(FF)	:DENOTES FAR FACE
(EF)	:DENOTES EACH FACE
(TYP)	:DENOTES TYPICAL
(UNO)	:DENOTES UNLESS NOTED OTHERWISE
(SIM)	:DENOTES SIMILAR. REFER TMR STANDARD DRAWING Nos. 1043 Reinforcing Steel – Standard Bar Shapes

NOTE: ALL BARS THROUGH CONSTRUCTION JOINTS TO BE THOROUGHLY CLEANED AND REMOVED OF LOOSE DEBRIS AND RUST PRIOR TO POUR.



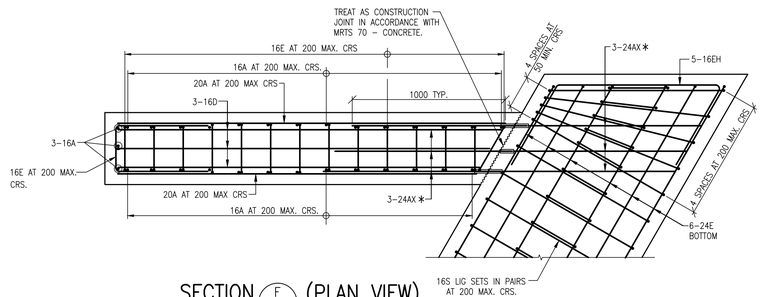
SECTION A

SCALE 1:20



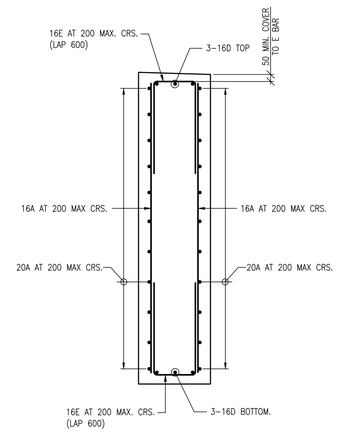
SECTION A1 (PLAN VIEW)

SCALE 1:20



SECTION F (PLAN VIEW)

SCALE 1:20



SECTION G

SCALE 1:20

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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CONSULTANTS: WESTERA CIVIL

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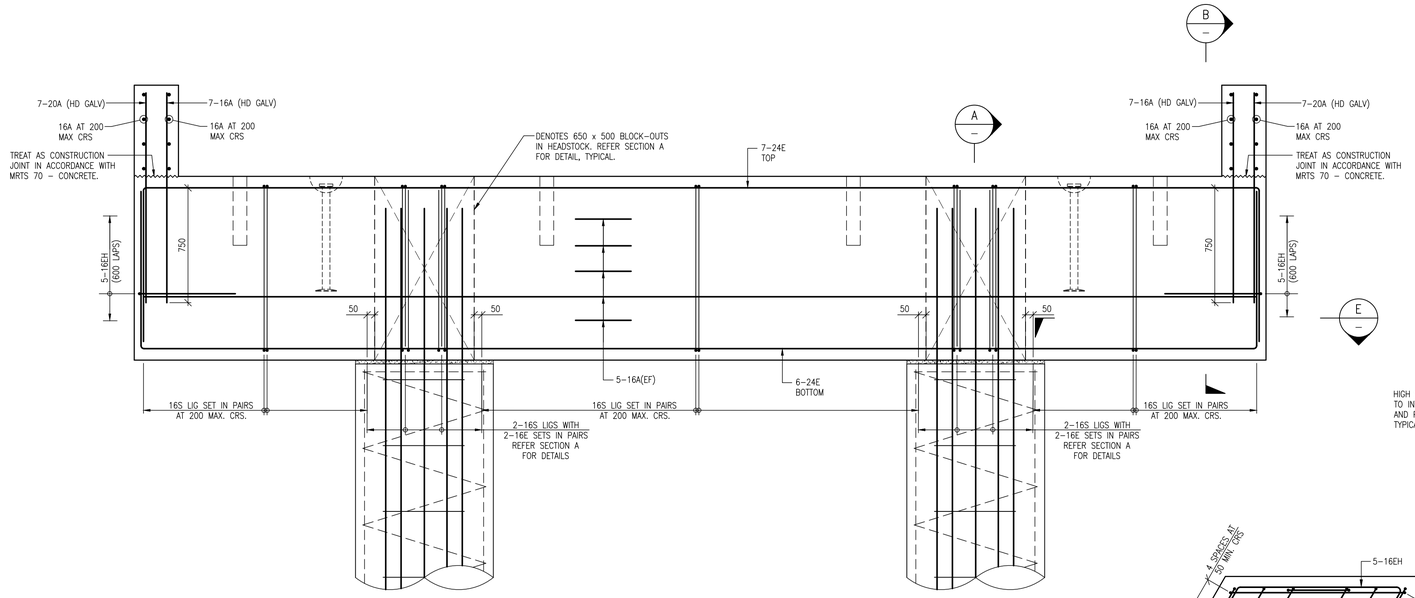
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	ABUTMENT A & B REINFORCEMENT DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS

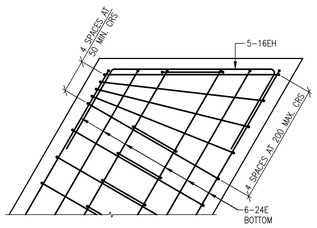
PROJECT NUMBER	G26-017D
SHEET NUMBER	4.3
REVISION	P4

LEGEND:

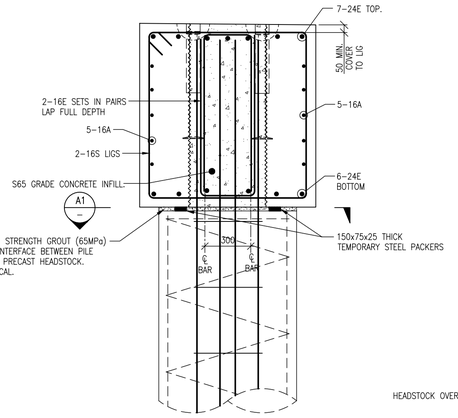
(NF) :DENOTES NEAR FACE
(FF) :DENOTES FAR FACE
(EF) :DENOTES EACH FACE
(TYP) :DENOTES TYPICAL
(UNO) :DENOTES UNLESS NOTED OTHERWISE
(SIM) :DENOTES SIMILAR. REFER TMR STANDARD DRAWING Nos. 1043 Reinforcing Steel – Standard Bar Shapes



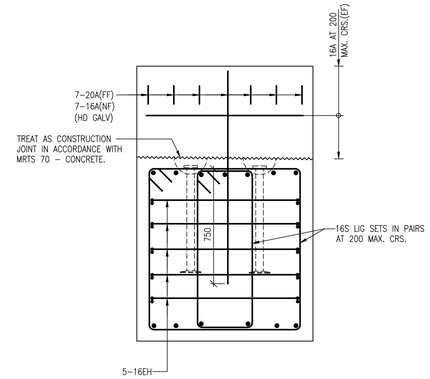
ELEVATION – PIERS 1, 2, 4, & 5, REINFORCEMENT
SCALE 1:20



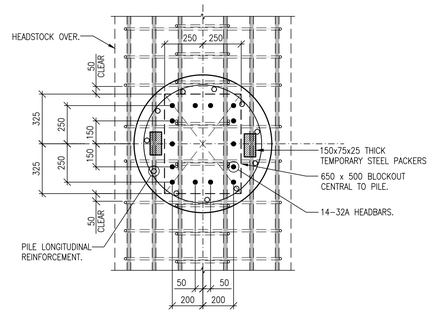
SECTION E (PLAN VIEW)
SCALE 1:20



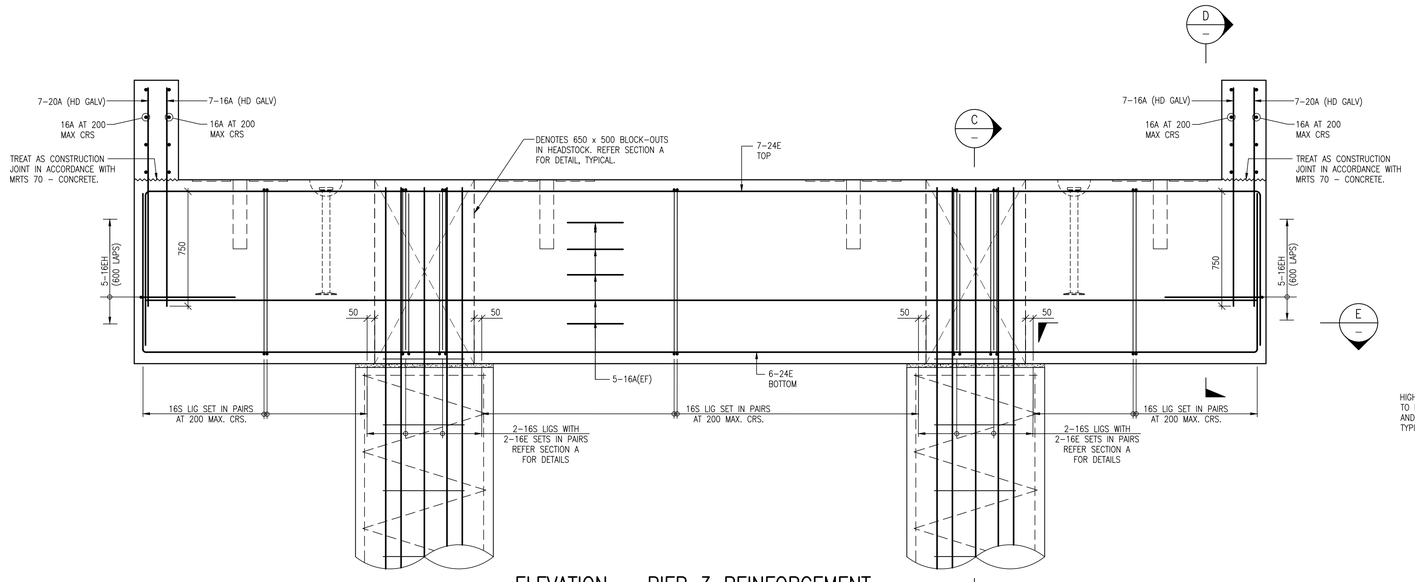
SECTION A
SCALE 1:20



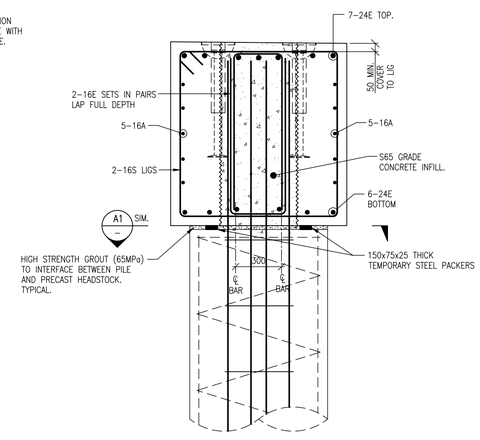
SECTION B
SCALE 1:20



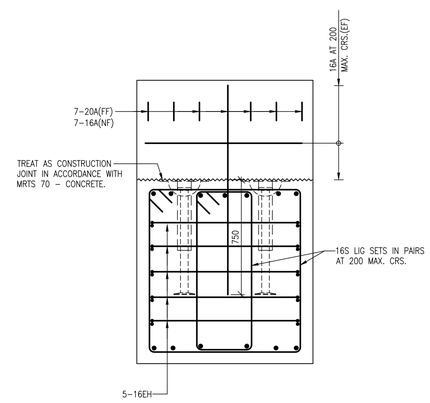
SECTION A1 (PLAN VIEW)
SCALE 1:20



ELEVATION – PIER 3 REINFORCEMENT
SCALE 1:20



SECTION C
SCALE 1:20



SECTION D
SCALE 1:20

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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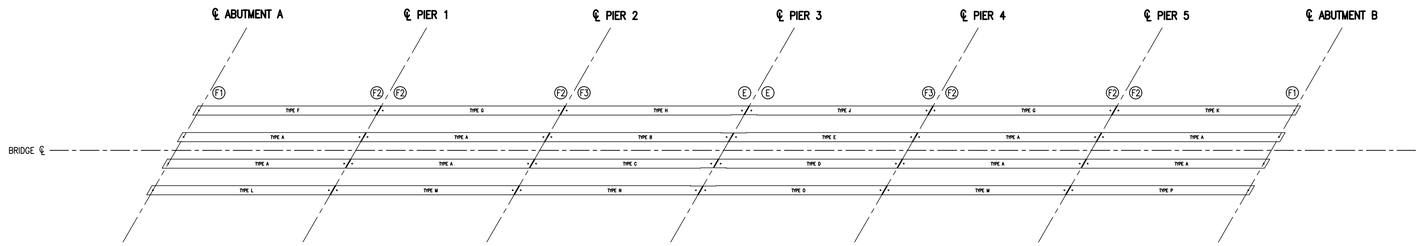
PROJECT: DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK BRIDGE
TITLE: FIXED & EXPANSION HEADSTOCK REINFORCEMENT DETAILS
CLIENT: DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER: G26-017D
SHEET NUMBER: 4.4
REVISION: P4



DECK UNIT SCHEDULE

DECK UNIT REF. No	LENGTH OF DECK UNIT NOM.	LOCATION	END 1	END 2	MASS (Tonnes approx.)	No. OFF	TOTAL MASS (Tonnes approx.)
TYPE A	12m	INNER	FIXED	FIXED	11.5	8	92
TYPE B	12m	INNER	FIXED	EXPANSION	11.5	1	11.5
TYPE C	12m	INNER	FIXED	EXPANSION	11.5	1	11.5
TYPE D	12m	INNER	EXPANSION	FIXED	11.5	1	11.5
TYPE E	12m	INNER	EXPANSION	FIXED	11.5	1	11.5
TYPE F	12m	OUTER	FIXED	FIXED	11.5	1	11.5
TYPE G	12m	OUTER	FIXED	FIXED	11.5	2	23
TYPE H	12m	OUTER	FIXED	EXPANSION	11.5	1	11.5
TYPE J	12m	OUTER	EXPANSION	FIXED	11.5	1	11.5
TYPE K	12m	OUTER	FIXED	FIXED	11.5	1	11.5
TYPE L	12m	OUTER	FIXED	FIXED	11.5	1	11.5
TYPE M	12m	OUTER	FIXED	FIXED	11.5	2	23
TYPE N	12m	OUTER	FIXED	EXPANSION	11.5	1	11.5
TYPE O	12m	OUTER	EXPANSION	FIXED	11.5	1	11.5
TYPE P	12m	OUTER	FIXED	FIXED	11.5	1	11.5

(F1) :DENOTES FIXED END – TYPE 1
(F2) :DENOTES FIXED END – TYPE 2
(F3) :DENOTES FIXED END – TYPE 3
(E) :DENOTES EXPANSION END

DECK UNIT LAYOUT PLAN

SCALE 1:200

NOTES

1. PCS DECK UNITS to be manufactured to MRTS73
2. CONCRETE to be in accordance with MRTS70.
   Class to be S50/20.
   Strength at transfer to be 40MPa minimum.
   Exposure classification for durability and cover is B2.
   Concrete shall be cast in rigid forms and subjected to intense compaction utilising a combination of internal and external vibration. An approved super-workable concrete mix may be used in lieu of intense vibration.
   When casting deck units, the manufacturer shall make allowance for axial shortening (equal amounts each end). All chamfers where shown to be 25 x 25 maximum unless noted otherwise.
3. STEEL REINFORCEMENT to be read in conjunction with TMR Standard Drawings 1043 and 1044.
   Reinforcing steel to be in accordance with AS/NZS 4671 and MRTS71. Stainless steel reinforcing to be in accordance with MRTS71A.
   Deformed bars Grade D500N Round bars Grade R250N. Minimum cover to reinforcing steel and strands to be 40 unless shown otherwise. All carbon reinforcing steel to be Australian Certification Authority for Reinforcing Steel (ACRS) certified. Tolerance shall be in accordance with MRTS 73.
4. STRANDS to be in accordance with MRTS73 and AS/NZS 4672.1 as follows:
   - 7 wire ordinary – 12.7 – 1870 – Relax 2, to MRTS 73 and test requirements to AS/NZS 4672.2. Prestressing force to transfer = 147kN per strand

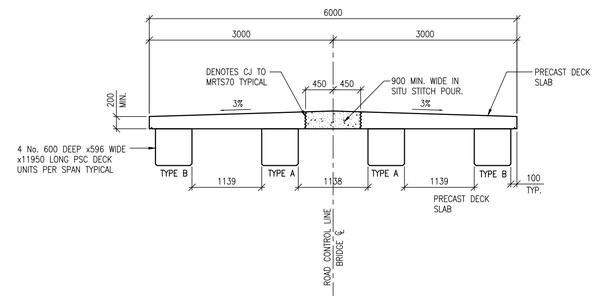
   Ends of strands to be coated with three coats minimum of approved surface tolerant epoxy after grinding flush with ends of units. Each coat to be a minimum of 0.3mm dry film thickness.
5. STEELWORK to be fabricated to the requirements of MRTS78.
   Steel plate to be grade 250 minimum to AS/NZS 3678.
   Flat bar to AS/NZS 3679.1.
   Bolts Class 4.6 to AS 1111.1.
   Bolts Class 8.8 to AS/NZS 1252.
   Material for couplers for anchors to AS 1444.
   Threads for couplers to AS 1275. All anchors, bolts and nuts to be hot dip galvanized to AS 1214.
   All other steelwork to be hot dip galvanised to AS/NZS 4680 unless shown otherwise. Prior to galvanizing, all weld splatter and welding slag to be removed.
   Stainless Steel shall be fabricated to MRTS78A
6. WELDING symbols to AS 1101.3.
   Structural Steel:
   All welds to be in accordance with AS/NZS 1554.1
   All welds, except location tack welds, shall be SP category.
   Welding consumables to be controlled hydrogen type: G49X to AS/NZS 14341-B or T49X to AS/NZS ISO 17632-B unless shown otherwise.
   Reinforcing Steel:
   Welding of bar splices to be in accordance with AS/NZS 1554.3
   Tack Welding for location purposes to conform to AS/NZS 1554.3 Clauses 3.3.1 and 3.3.2
   Welding shall not be carried out within 75 from any bent portion of a bar.
   Welding consumables to be controlled hydrogen type: G49X to AS/NZS 14341-B or T49X to AS/NZS ISO 17632-B unless shown otherwise.
7. ERECTION AND DECK CONSTRUCTION: Supply and erection of PSC deck units to be in accordance with MRTS74.
8. VOIDS where required shall be cellular polystyrene Grade SL to AS 1366.3.
9. PVC DRAINAGE PIPES shall be to AS/NZS 1260.
10. DIMENSIONS are in millimetres unless shown otherwise.
11. FINAL DIMENSIONS: When casting units the manufacturer shall make allowance in formwork for end kick due to hog and axial shortening (equal amounts each end) so that the units assume the the detailed dimensions, shown in the deck unit kick diagram at 100 days.
12. HOG DIFFERENTIAL: Deck Units shall be cast in a span by span configuration, with no more than 3 weeks elapsed between all units in the same span. This is to minimise hog differentials between internal and edge units at the time of erection. Each unit to be clearly marked with its span and unit type.

REFERENCED DOCUMENTS:

Department of Transport and Main Roads Standard Drawings:
- 1043 Reinforcing Steel – Standard Bar Shapes
- 1044 Reinforcing Steel – Standard Hook, Lap and Bend Details and General Steel Reinforcement Information

Department of Transport and Main Roads Specifications:
- MRTS70 Concrete
- MRTS71 Reinforcing Steel
- MRTS71A Stainless Steel Reinforcing
- MRTS73 Manufacture of Prestressed Concrete Members and Stressing Units
- MRTS74 Supply and Erection of Prestressed Concrete Deck and Kerb Units
- MRTS78 Fabrication of Structural Steelwork
- MRTS78A Fabrication of Stainless Structural Stainless Steelwork

Australian Standards:
- AS 1111.1 ISO Metric Hexagon Bolts and Screws – Product Grade C – Bolts
- AS1214 Hot-dip Galvanized Coatings on Threaded Fasteners (ISO Metric Coarse Thread Series)
- AS/NZS 1260 PVC-U Pipes and Fittings for Drain, Waste and Vent Applications
- AS1275 Metric Screw Threads for Fasteners
- AS 1366.3 Rigid Cellular Polystyrene – Moulded
- AS 1444 Wrought Alloy Steels – Standard, Hardenability (H) Series and Hardened and Tempered to Designated Mechanical Properties
- AS/NZS 1554.3 Structural Steel Welding – Welding of Reinforcing Steel
- AS/NZS 3678 Structural Steel – Hot Rolled Plates, Floor Plates and Slabs
- AS/NZS 3679.1 Structural Steel – Hot-rolled Bars and Sections
- AS/NZS 4671 Steel Reinforcing Materials
- AS/NZS 4672.1 Steel Prestressing Materials – General Requirements
- AS/NZS 4672.2 Steel Prestressing Materials – Testing Requirements
- AS/NZS 4680 Hot-dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles
- AS/NZS 4855 Welding Consumables – Covered Electrodes for Manual Metal Arc Welding of Non-alloy and Fine Grain Steels – Classification
- AS 5100 Bridge Design
- AS/NZS ISO 17632 Welding consumables – Tubular cored electrodes for gas shielding and on-gas shielded metal arc-welding of non-alloy and fine grain steels – Classification
- AS/NZS ISO 14341 Welding consumables – wire electrode and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels – Classification



TYPICAL DECK SECTION

SCALE 1:50

PRELIMINARY ISSUE
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No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
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P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
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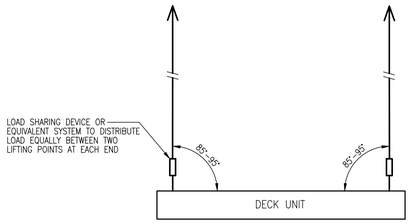
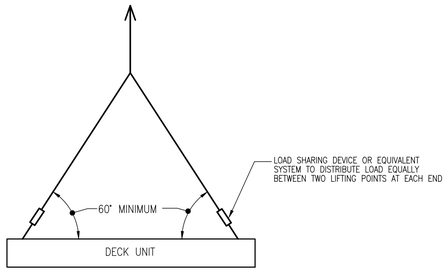
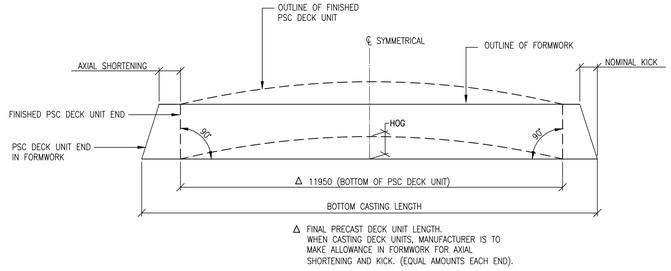
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT	PROJECT NUMBER	G26-017D
LOCATION:	DOUGLAS CREEK BRIDGE	SHEET NUMBER	5.0
TITLE:	DECKING UNIT LAYOUT PLAN, SCHEDULE & SECTION		
CLIENT:	DAVBRIDGE CONSTRUCTIONS	REVISION	P4



SINGLE DECK UNIT LIFTING DIAGRAM IN PRECAST YARD OR ON SITE

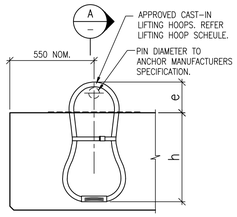


ALTERNATIVE SINGLE DECK UNIT LIFTING DIAGRAM ON SITE (NOT IN PRECAST YARD)

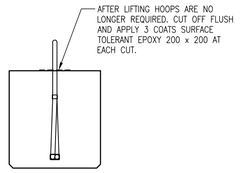


ELEVATION
DECK UNIT KICK DIAGRAM

DECK UNIT HOG SCHEDULE			
	DESIGN HOG (mm)		
DECK UNIT TYPE	TRANSFER	30 DAYS	100 DAYS
A TO P	20	30	40



ELEVATION
DECK UNIT LIFITNG HOOP DETAIL
SCALE 1:20



SECTION A
SCALE 1:20

LIFTING HOOP SCHEDULE						
DECK UNIT TYPE	REQUIRED WLL PER LIFTING HOOP (tonne) #	Ru (kN) ##	LIFTING LOOP		DIMENSION	
			TYPE	WLL (tonne)	h (mm)	e (mm)
A TO P	14.9	146	ANCON LP20	15	545	205

2 No. LIFTING HOOPS PER DECK UNIT/GIRDER WITH A MINIMUM FACTOR OF SAFETY (FoS) OF 4.0
Ru DENOTES CRITICAL CHARACTERISTIC CAPACITY OF CAST-IN LIFTING HOOP i.e. Ru = WLL x FoS

UNILIFT CONE ANCHOR SCHEDULE					
HEADSTOCK	REQUIRED WLL PER LIFTING HOOP (tonne) #	Ru (kN) ##	CONE ANCHOR		DIMENSION
			TYPE	WLL (tonne)	LENGTH
ABUTMENT & PIER	14	137	CA32700	20	700

4 No. UNILIFT CONE ANCHORS PER PRECAST HEADSTOCK WITH A MINIMUM FACTOR OF SAFETY (FoS) OF 4.0
Ru DENOTES CRITICAL CHARACTERISTIC CAPACITY OF CAST-IN UNILIFT CONE ANCHOR i.e. Ru = WLL x FoS

LIFTING NOTES:

L1. Maximum dynamic load factor used for this design is 1.5, unless higher dynamic allowance is required for project specific design.
L2. Maximum mould adhesion used for this design is 1.0kPa
L3. Proprietary lifting anchors shall be a TMR approved product.
L4. Lifting during manufacture, supply and erection to be in accordance with MRTS73 AND MRTS74 as applicable.

CAST IN LIFTING HOOP NOTES:

H1. CAST-IN HOOP CAPACITY to be in accordance with lifting loop schedule.

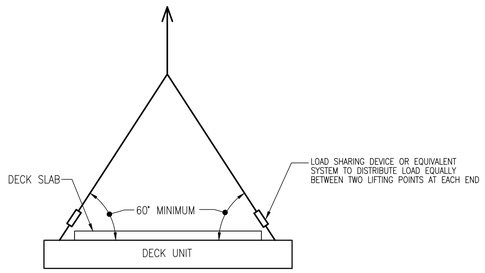
H2. After lifting hoop is no longer required, cut off and grind flush with top of deck unit or girder, apply three coats of approved surface tolerant epoxy to provide a minimum film thickness of 0.3mm dry or 0.6mm wet.

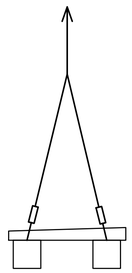
UNILIFT CONE ANCHOR NOTES:

H3. UNILIFT CONE ANCHORS to be in accordance with unilift cone anchor schedule.

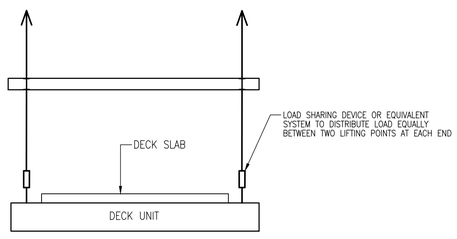
H4. After UNILIFT CONE ANCHORS are no longer required, all lifting recesses are to be grout patched with PARCHEM RENDEROK HB70 in accordance with MRTS274.

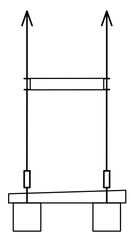
H5. Refer HEADSTOCK PLANS for locations of all UNILIFT CONE ANCHORS.



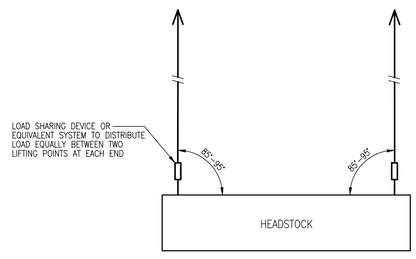


DECK UNIT & SLAB LIFTING DIAGRAM ON SITE (NOT IN PRECAST YARD)

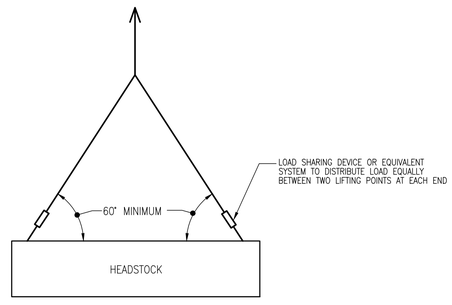




ALTERNATIVE DECK UNIT & SLAB LIFTING DIAGRAM (IN PRECAST YARD OR ON SITE)



HEADSTOCK LIFTING DIAGRAM IN PRECAST YARD OR ON SITE



ALTERNATIVE HEADSTOCK LIFTING DIAGRAM ON SITE (NOT IN PRECAST YARD)

PRELIMINARY ISSUE
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No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
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DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
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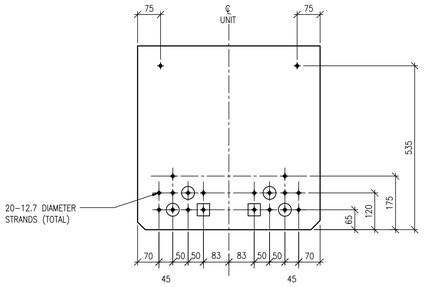
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	FORMWORK KICK DIAGRAM AND LIFTING DIAGRAMS & NOTES, SCHEDULES AND DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.1
REVISION	P4

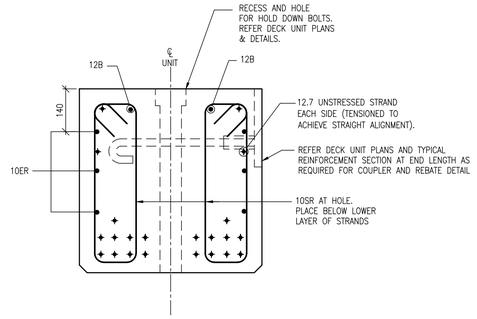


TYPICAL STRAND LAYOUT

SCALE 1:10

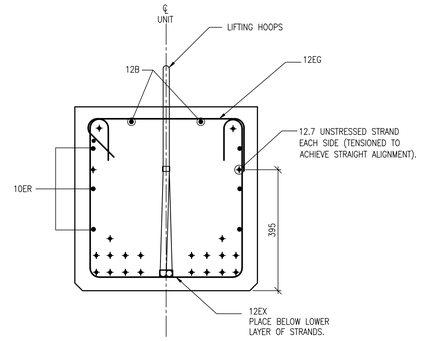
✦ DO NOT DEBOND
⊞ DEBOND STRAND 3000 FROM EACH END
⊗ DEBOND STRAND 1500 FROM EACH END

147 kN STRESSING FORCE



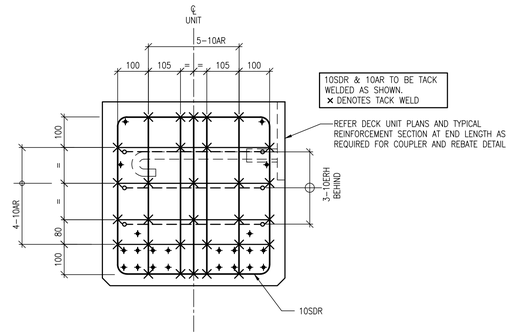
SECTION A 5.3–5.17
SCALE 1:10

TYPICAL DECK UNIT REINFORCEMENT SECTION AT H.D. BOLT HOLE



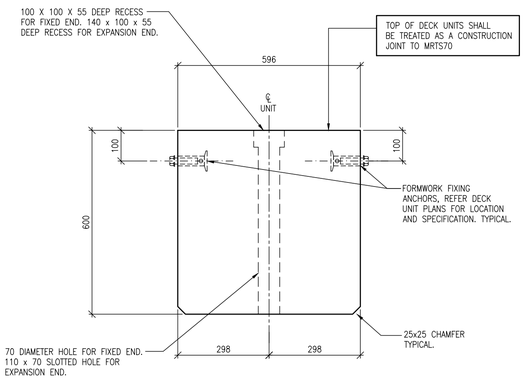
SECTION B 5.3–5.17
SCALE 1:10

TYPICAL DECK UNIT REINFORCEMENT SECTION AT FIXED END WITH LIFTING HOOPS

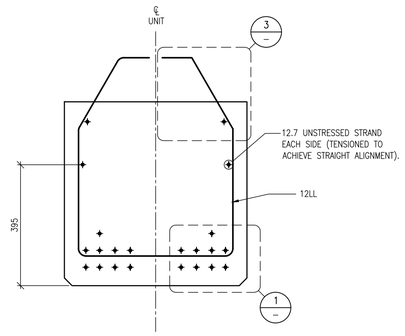


VIEW C 5.3–5.17
SCALE 1:10

TYPICAL DECK UNIT END GRID REINFORCEMENT

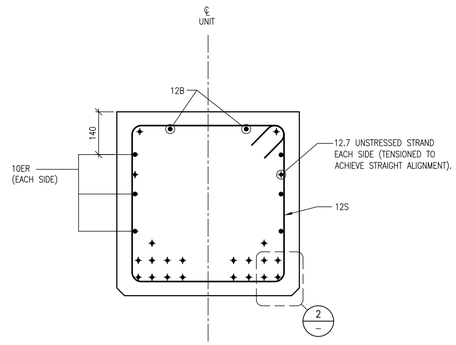


TYPICAL SECTION



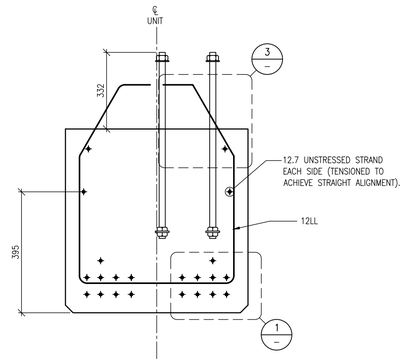
SECTION D 5.3–5.17
SCALE 1:10

TYPICAL REINFORCEMENT SECTION



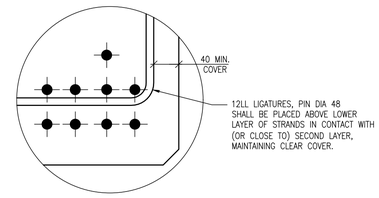
SECTION E 5.3–5.17
SCALE 1:10

TYPICAL REINFORCEMENT SECTION AT FIXED END LENGTH

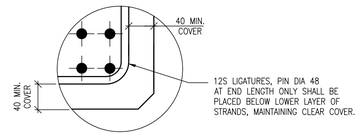


SECTION F 5.3–5.17
SCALE 1:10

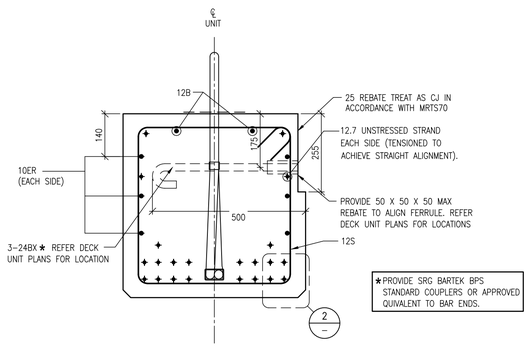
TYPICAL REINFORCEMENT SECTION WITH HOLD DOWN BOLTS



DETAIL 1
NTS

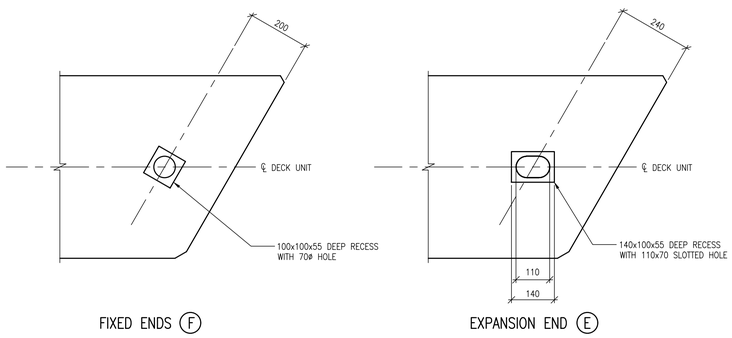


DETAIL 2
NTS



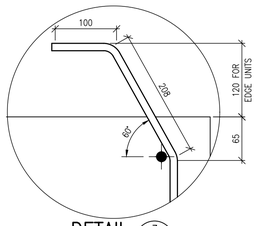
SECTION G 5.3–5.17
SCALE 1:10

TYPICAL DECK UNIT REINFORCEMENT SECTION AT EXPANSION END WITH LIFTING HOOPS

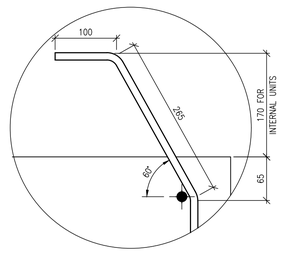


SETOUT FOR HOLD DOWN BOLTS

SCALE 1:10



DETAIL 3
NTS



DETAIL 3
NTS

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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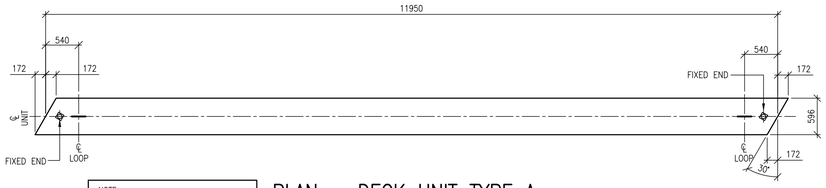
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	TYPICAL DECK UNIT SECTIONS & DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.2
REVISION	P4

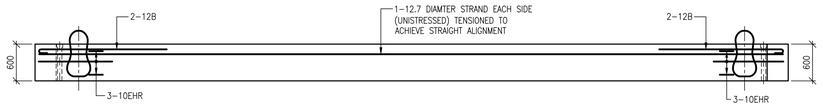


NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

PLAN – DECK UNIT TYPE A

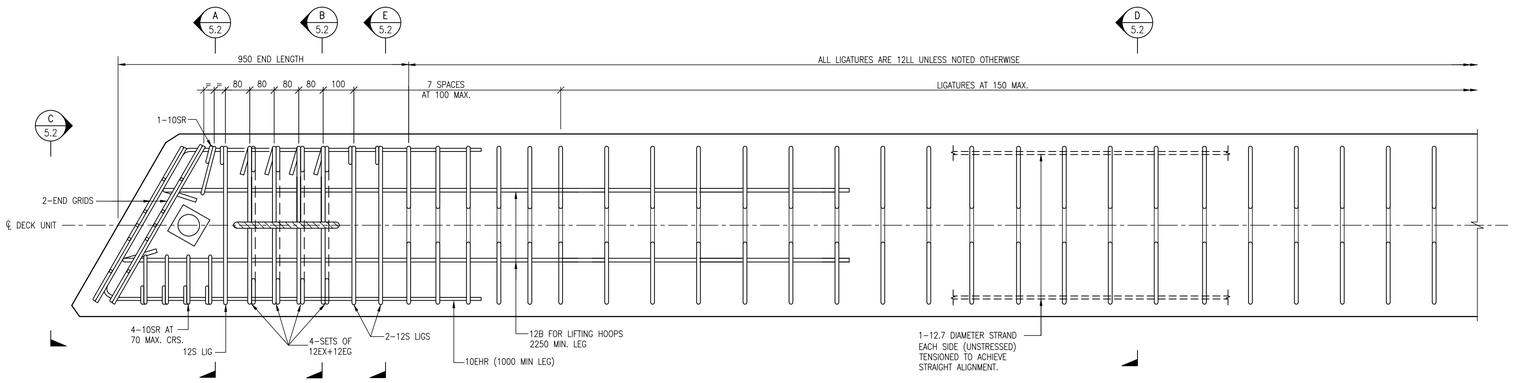
SCALE 1:50

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



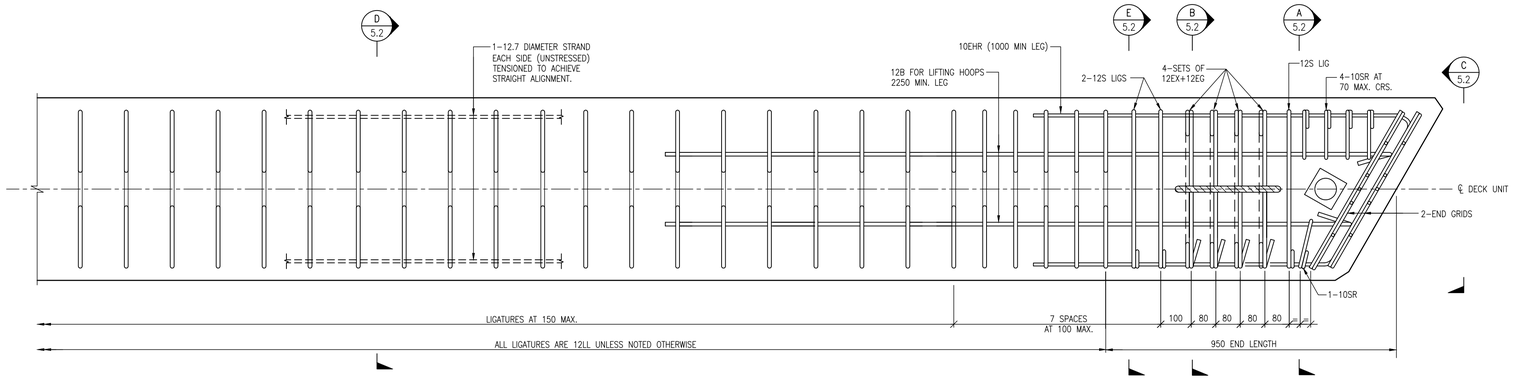
ELEVATION – DECK UNIT TYPE A

SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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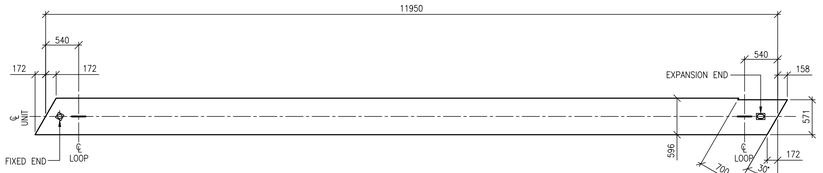
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE A
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.3
REVISION	P4

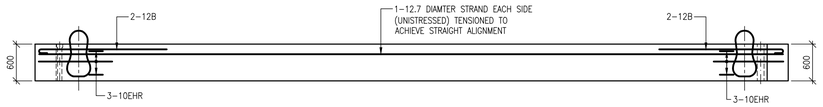


NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

PLAN – DECK UNIT TYPE B

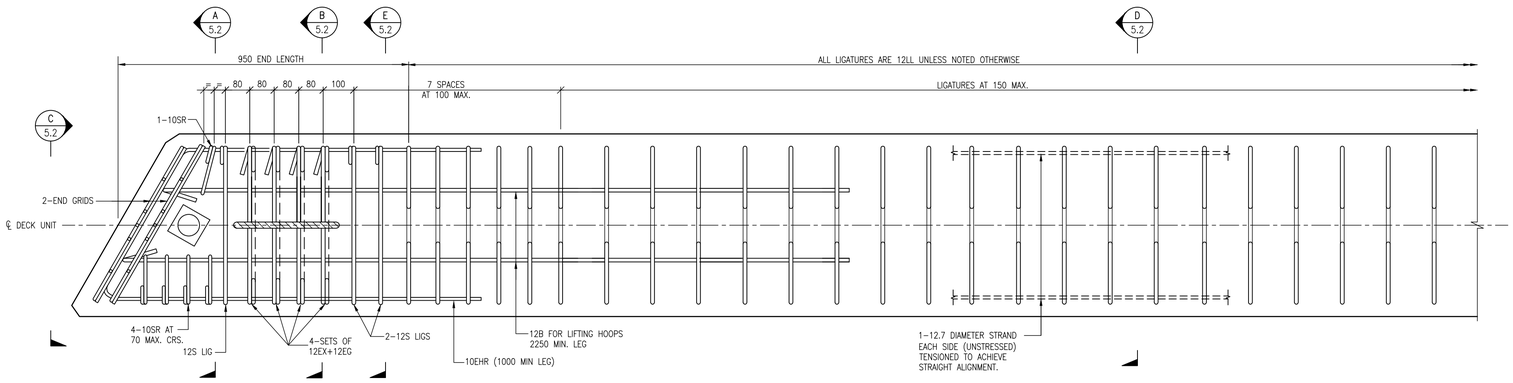
SCALE 1:50

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



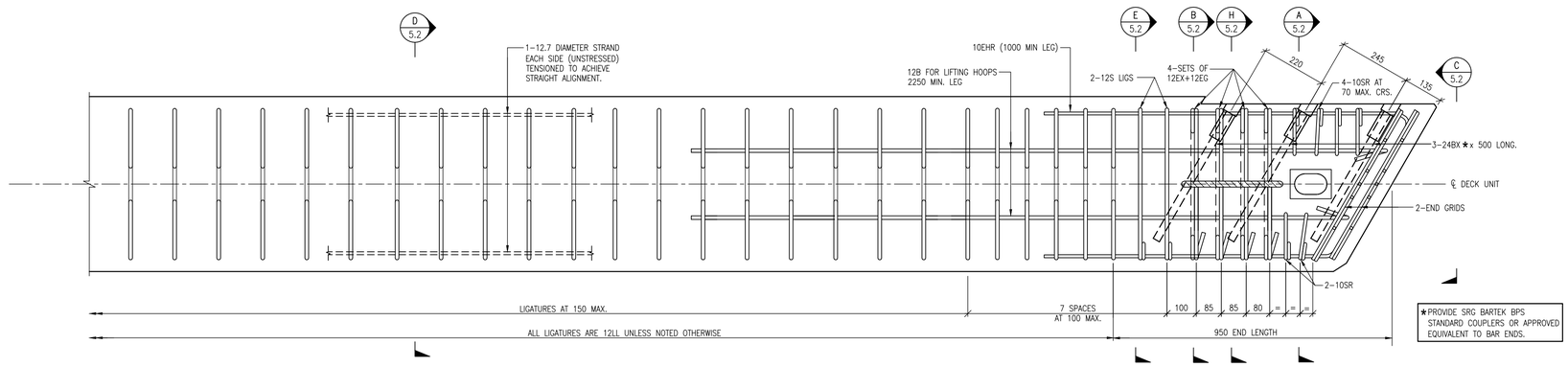
ELEVATION – DECK UNIT TYPE B

SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10



★PROVIDE SRG BARTEK BPS STANDARD COUPLERS OR APPROVED EQUIVALENT TO BAR ENDS.

DECK UNIT EXPANSION END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

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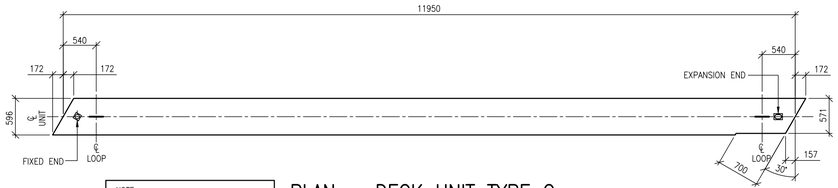
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE B
CLIENT:	DAVBRIDGE CONSTRUCTIONS

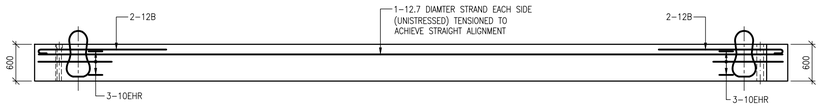
PROJECT NUMBER	G26-017D
SHEET NUMBER	5.4
REVISION	P4



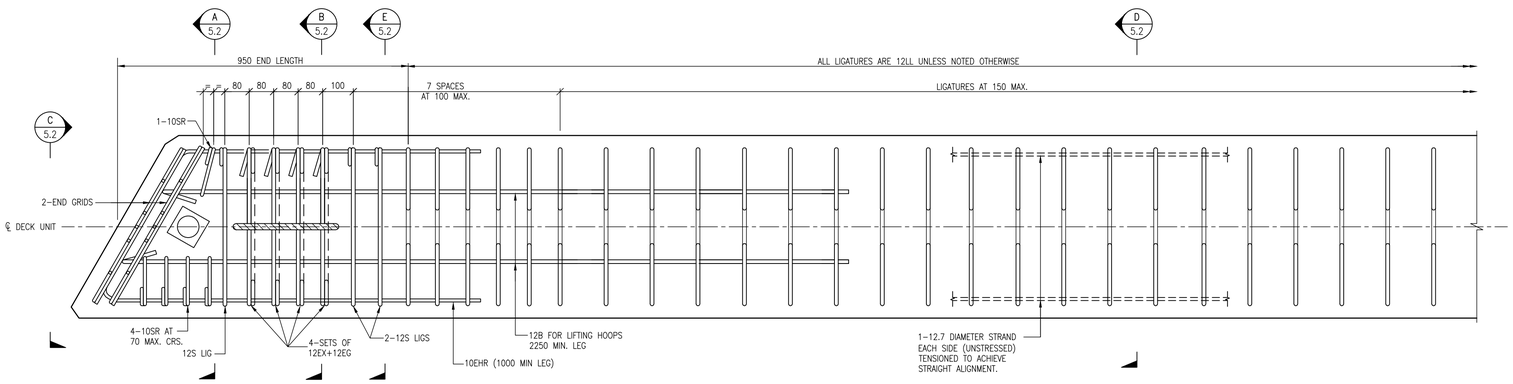
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

PLAN – DECK UNIT TYPE C
SCALE 1:50

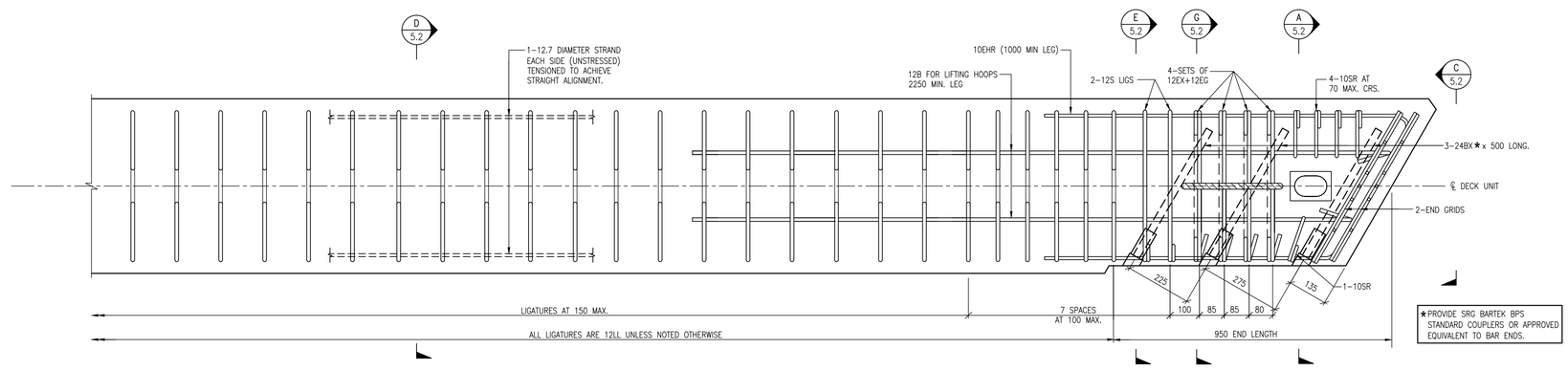
MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



ELEVATION – DECK UNIT TYPE C
SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL
SCALE 1:10



★PROVIDE SRG BARTEK BPS STANDARD COUPLERS OR APPROVED EQUIVALENT TO BAR ENDS.

DECK UNIT EXPANSION END PLAN DETAIL
SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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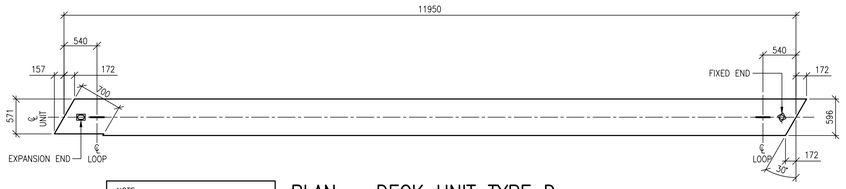
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE C
CLIENT:	DAVBRIDGE CONSTRUCTIONS

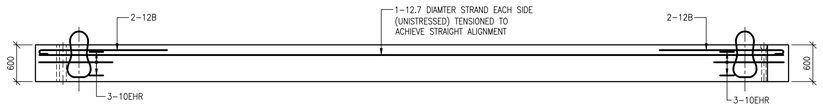
PROJECT NUMBER	G26-017D
SHEET NUMBER	5.5
REVISION	P4



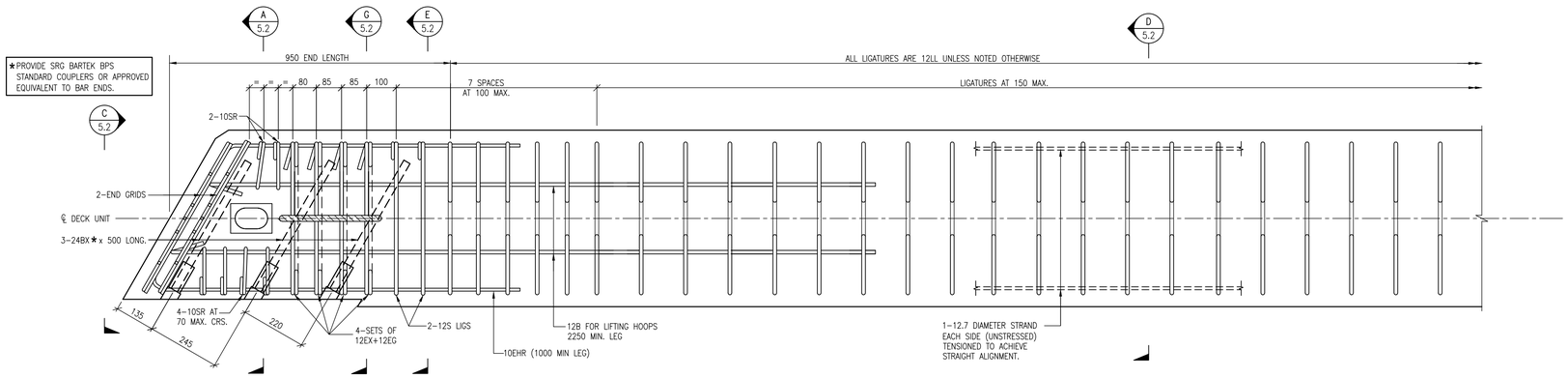
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

PLAN – DECK UNIT TYPE D
SCALE 1:50

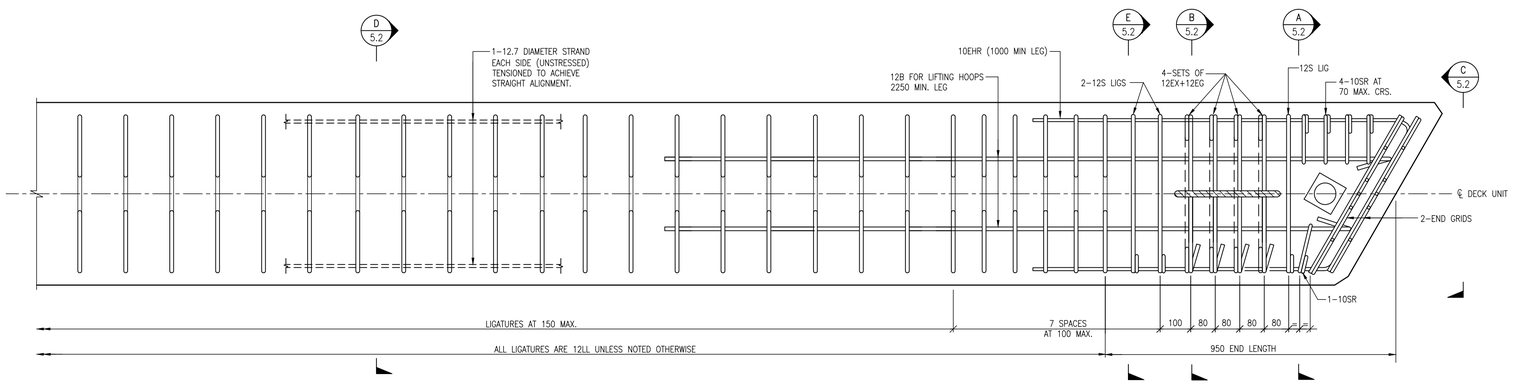
MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



ELEVATION – DECK UNIT TYPE D
SCALE 1:50



DECK UNIT EXPANSION END PLAN DETAIL
SCALE 1:10



DECK UNIT FIXED END PLAN DETAIL
SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
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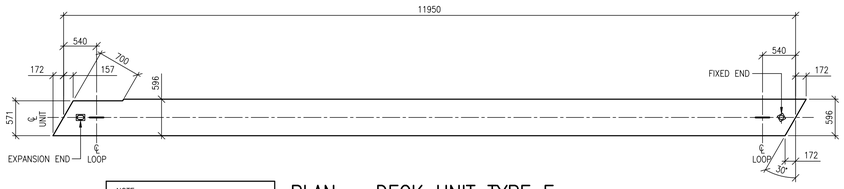
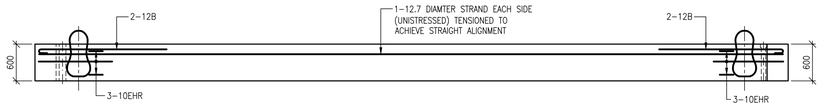
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE D
CLIENT:	DAVBRIDGE CONSTRUCTIONS
PROJECT NUMBER	G26-017D
SHEET NUMBER	5.6
REVISION	P4



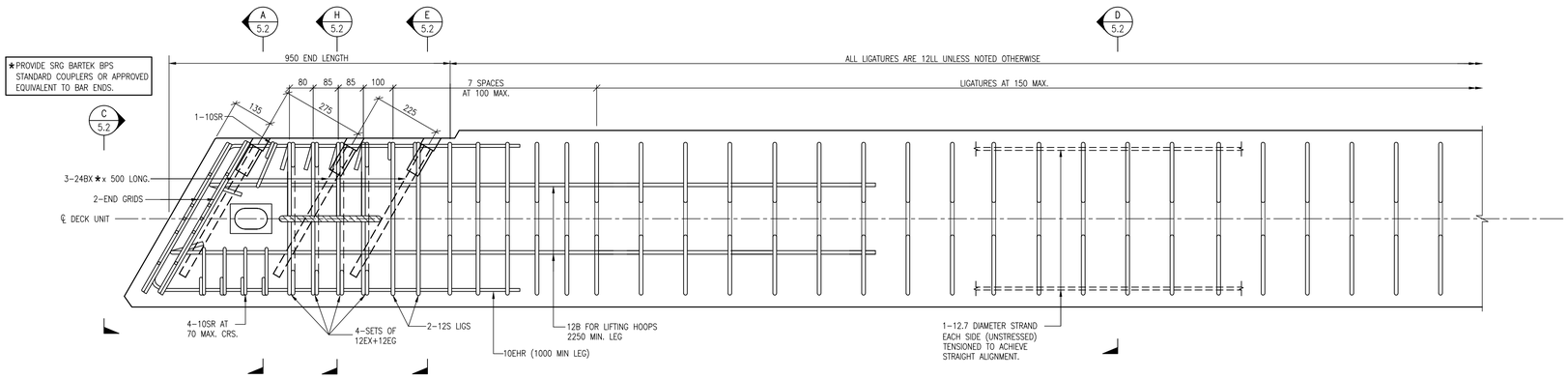
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

PLAN – DECK UNIT TYPE E
SCALE 1:50

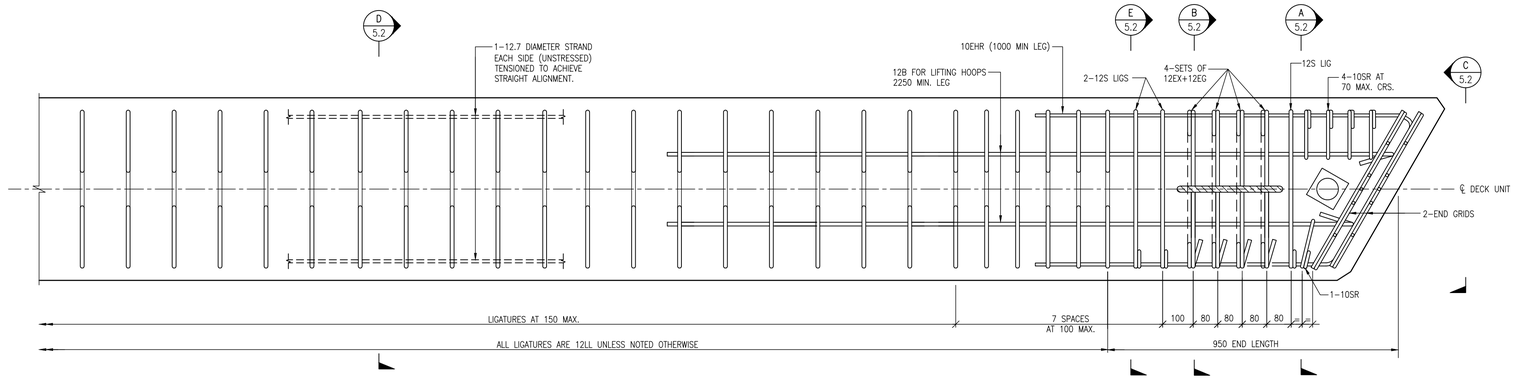
MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



ELEVATION – DECK UNIT TYPE E
SCALE 1:50



DECK UNIT EXPANSION END PLAN DETAIL
SCALE 1:10



DECK UNIT FIXED END PLAN DETAIL
SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
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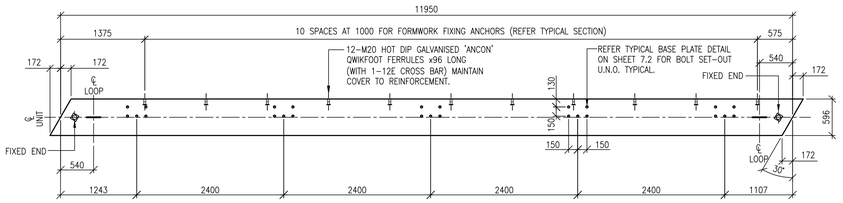
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE E
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.7
REVISION	P4

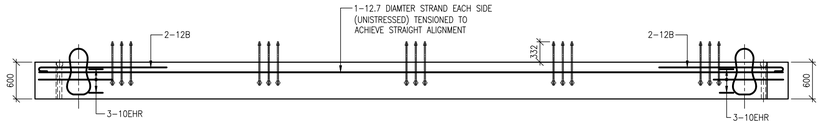


PLAN – DECK UNIT TYPE F

SCALE 1:50

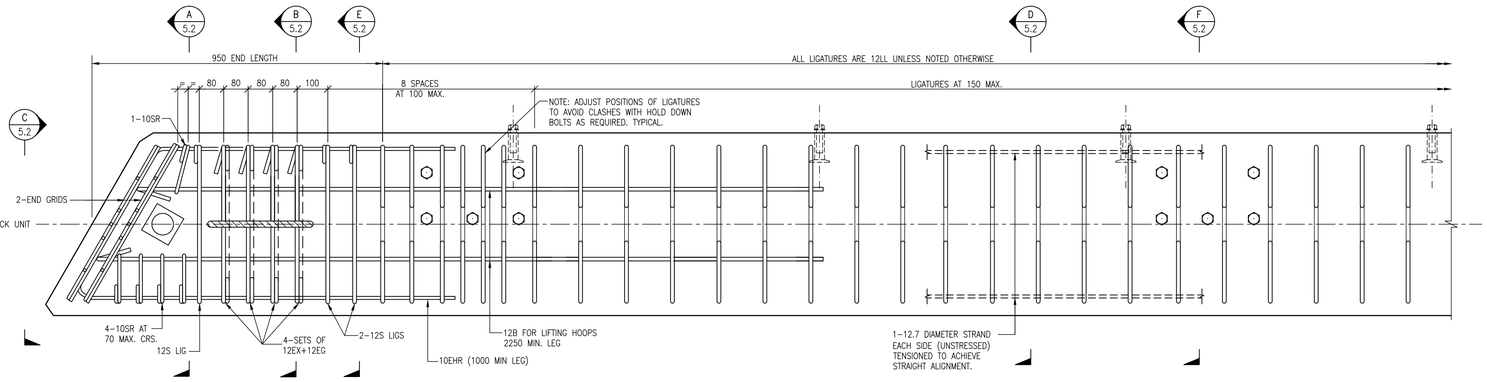
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



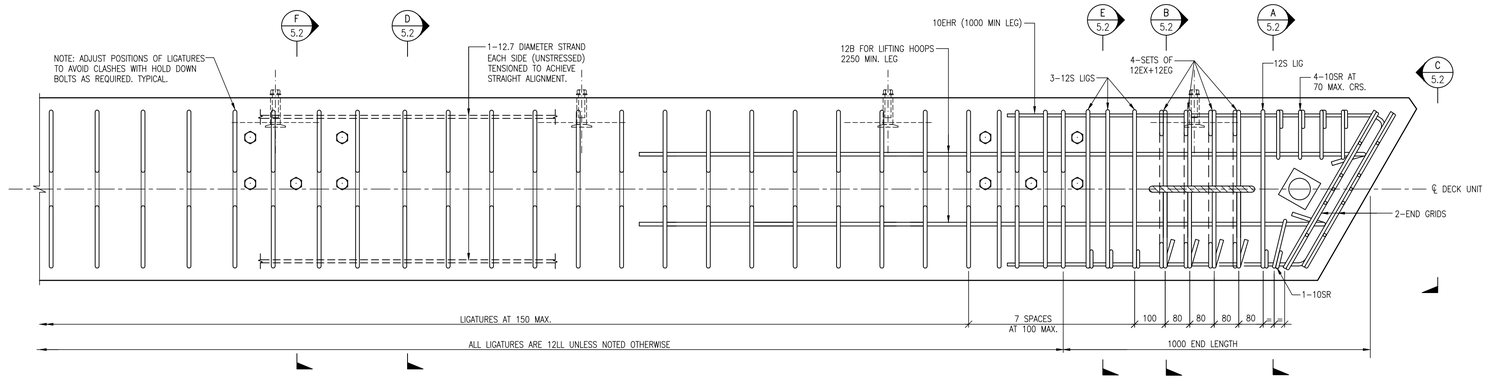
ELEVATION – DECK UNIT TYPE F

SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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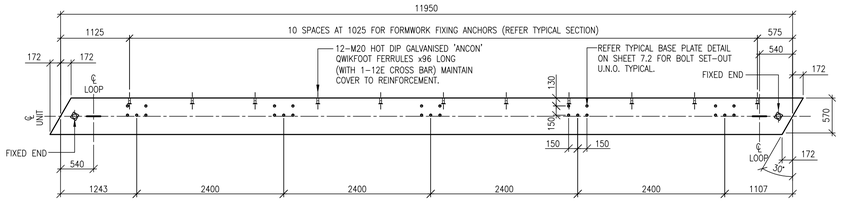
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE F
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.8
REVISION	P4

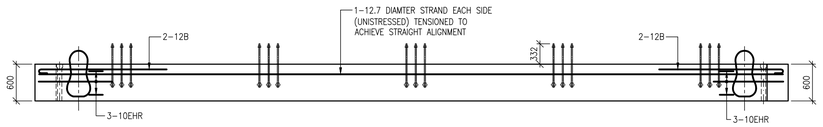


PLAN – DECK UNIT TYPE G

SCALE 1:50

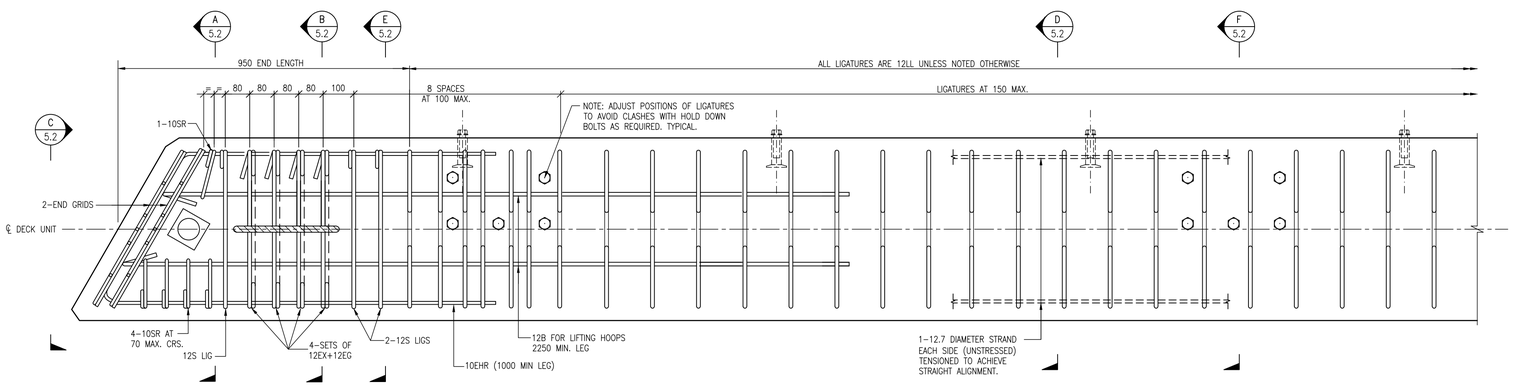
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY

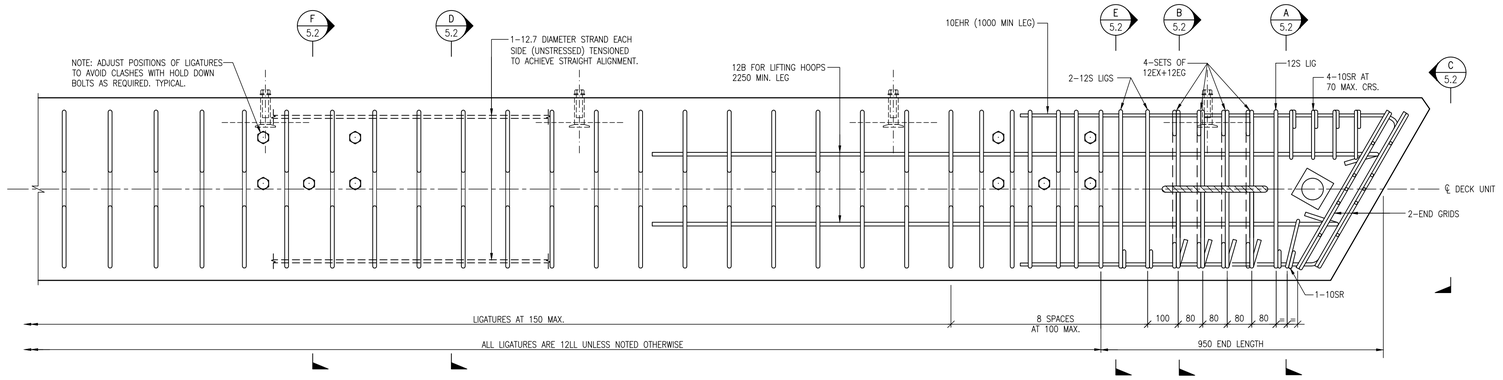


ELEVATION – DECK UNIT TYPE G

SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
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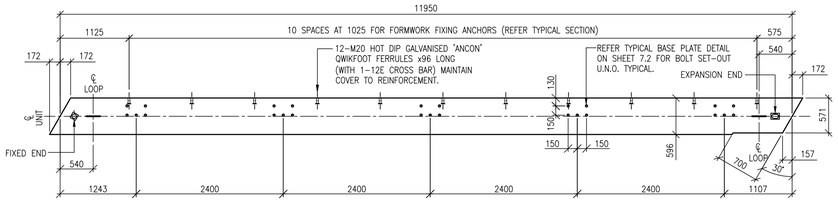
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE G
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.9
REVISION	P4

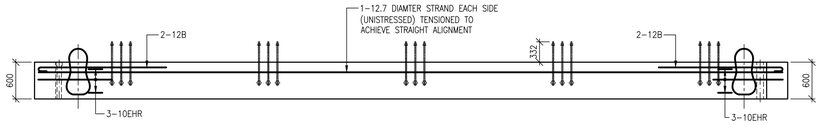


PLAN – DECK UNIT TYPE H

SCALE 1:50

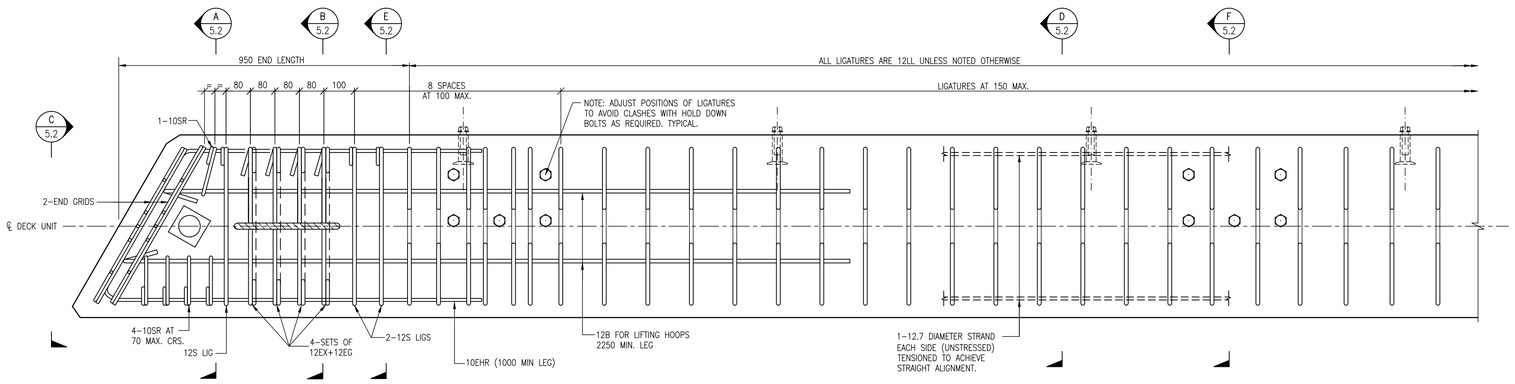
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY

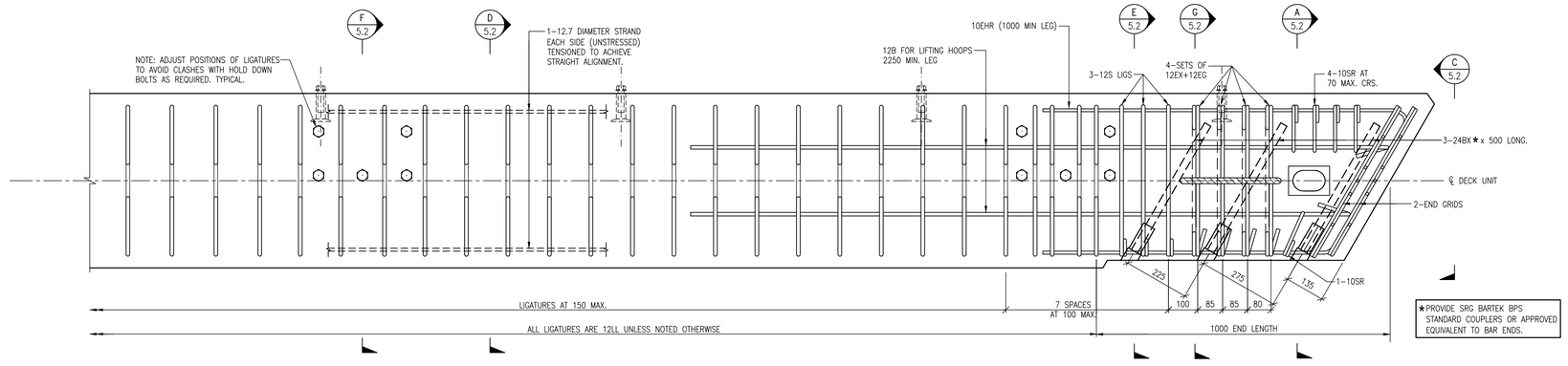


ELEVATION – DECK UNIT TYPE H

SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL



★PROVIDE SRG BARTEK BPS STANDARD COUPLERS OR APPROVED EQUIVALENT TO BAR ENDS.

DECK UNIT EXPANSION END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
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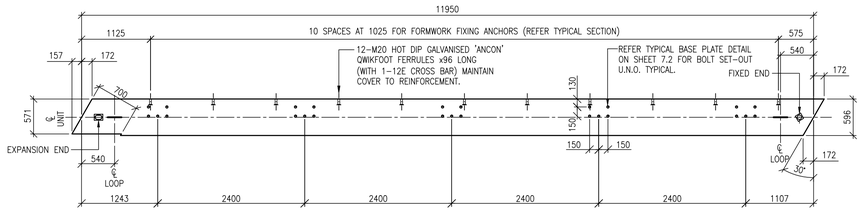
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE H
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.10
REVISION	P4

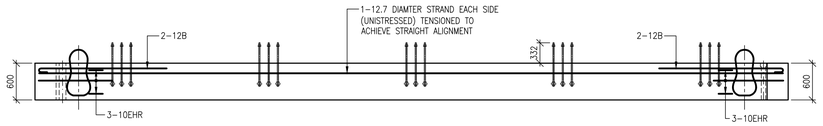


PLAN – DECK UNIT TYPE J

SCALE 1:50

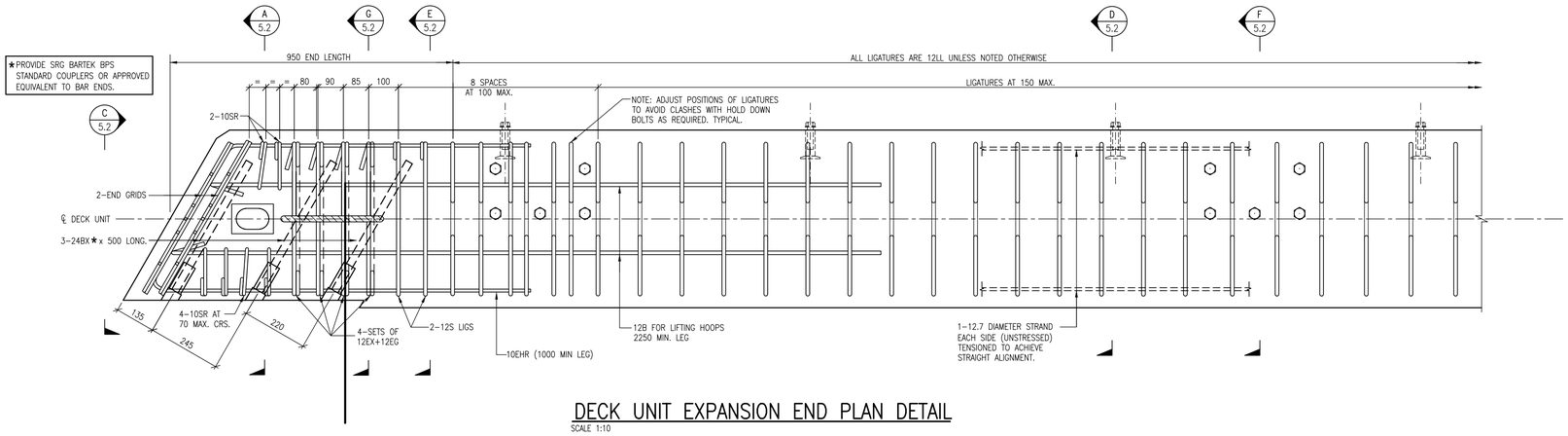
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



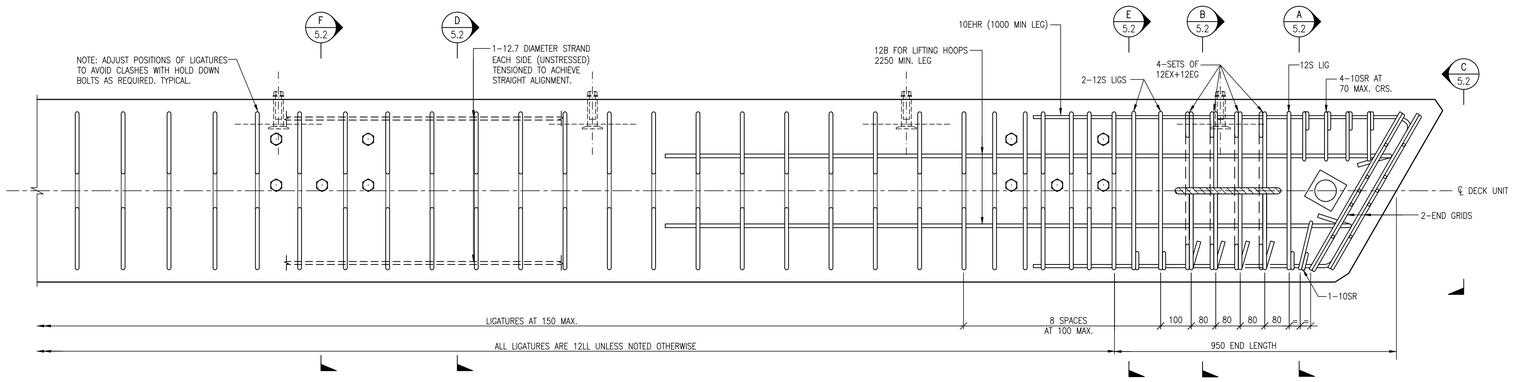
ELEVATION – DECK UNIT TYPE J

SCALE 1:50



DECK UNIT EXPANSION END PLAN DETAIL

SCALE 1:10



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
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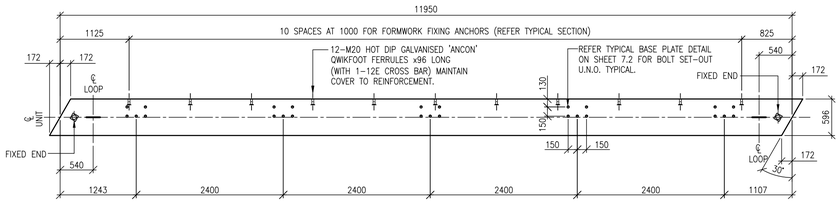
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE J
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.11
REVISION	P4

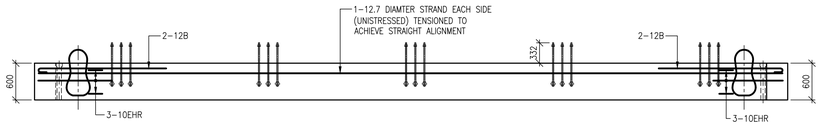


PLAN – DECK UNIT TYPE K

SCALE 1:50

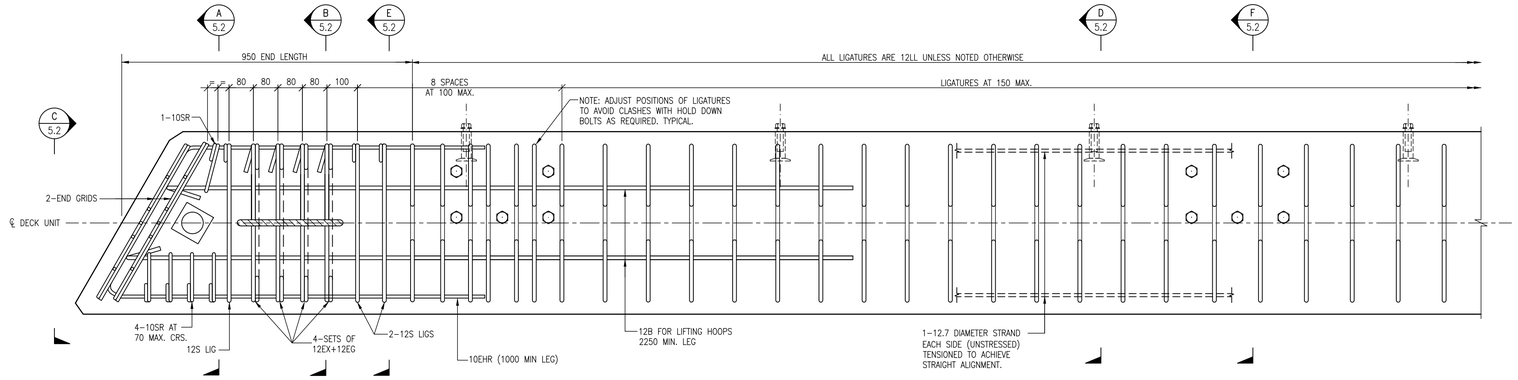
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



ELEVATION – DECK UNIT TYPE K

SCALE 1:50



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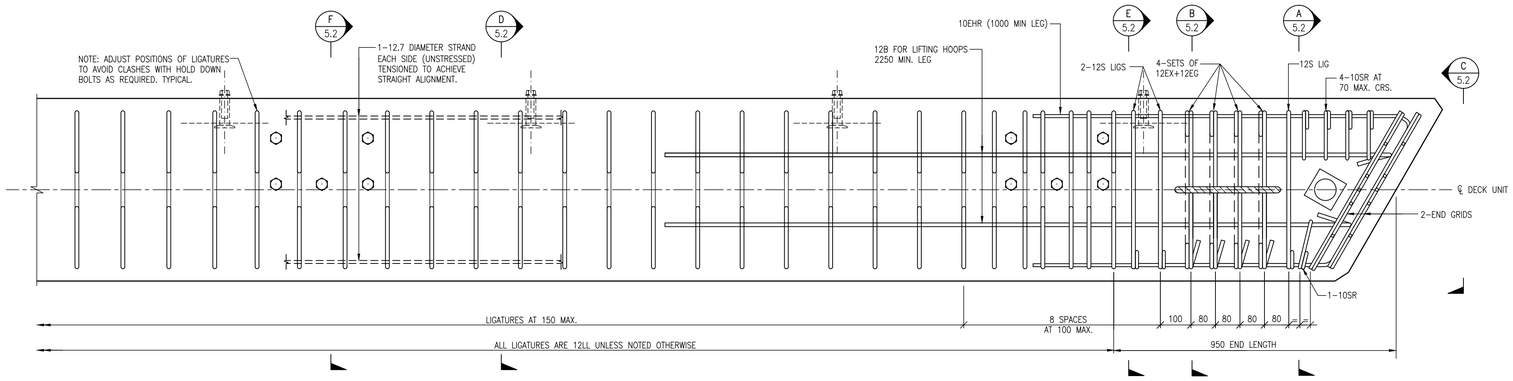

DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
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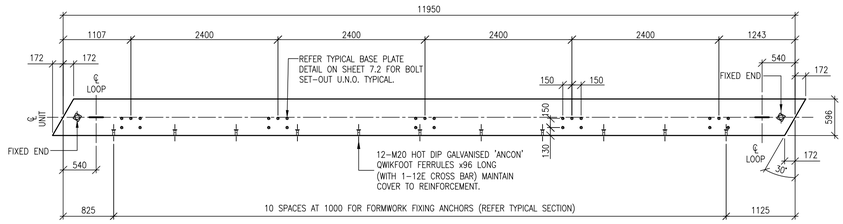
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE K
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.12
REVISION	P4

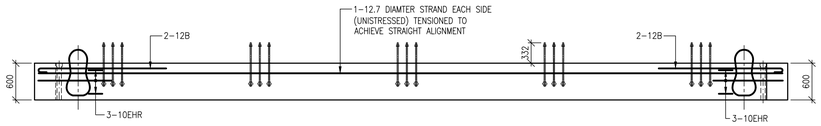


PLAN – DECK UNIT TYPE L

SCALE 1:50

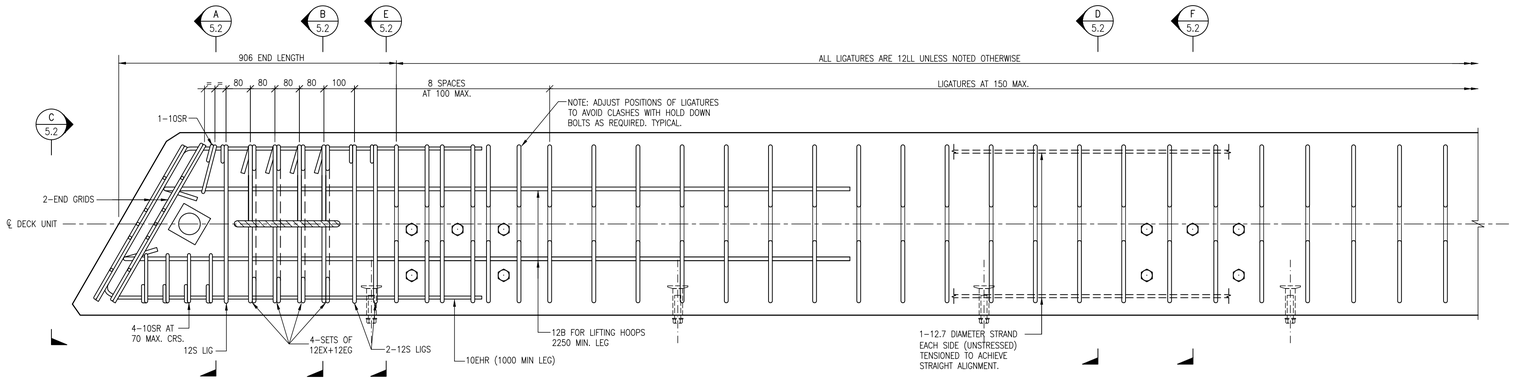
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



ELEVATION – DECK UNIT TYPE L

SCALE 1:50



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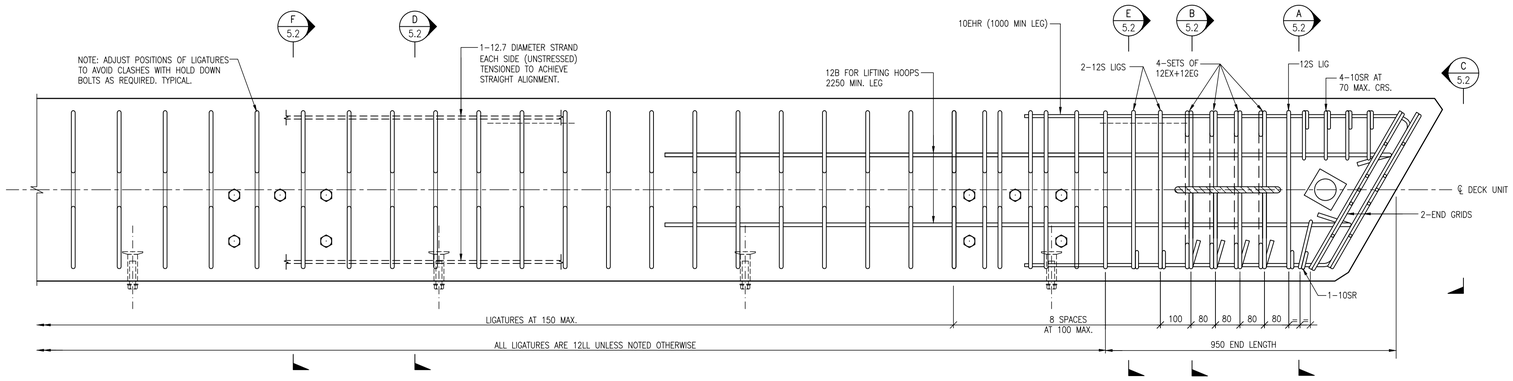

DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
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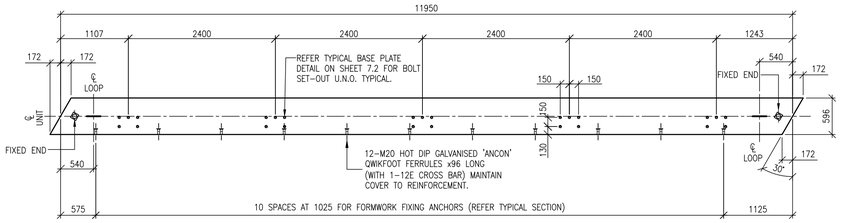
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE L
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.13
REVISION	P4

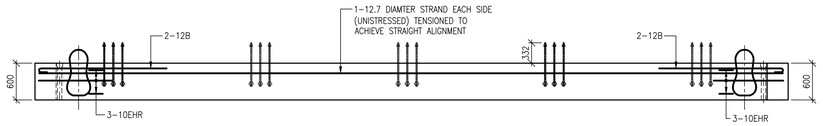


PLAN – DECK UNIT TYPE M

SCALE 1:50

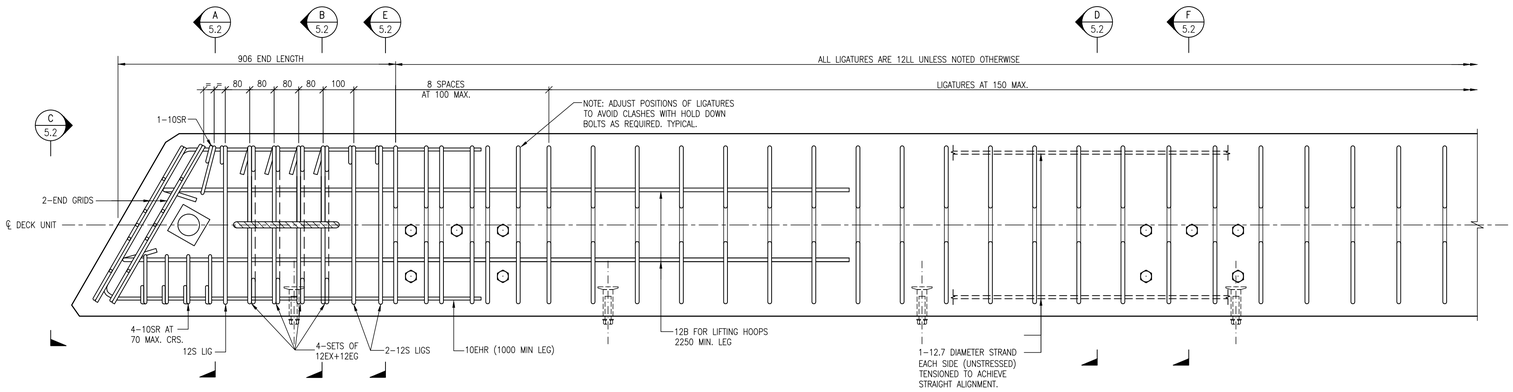
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY

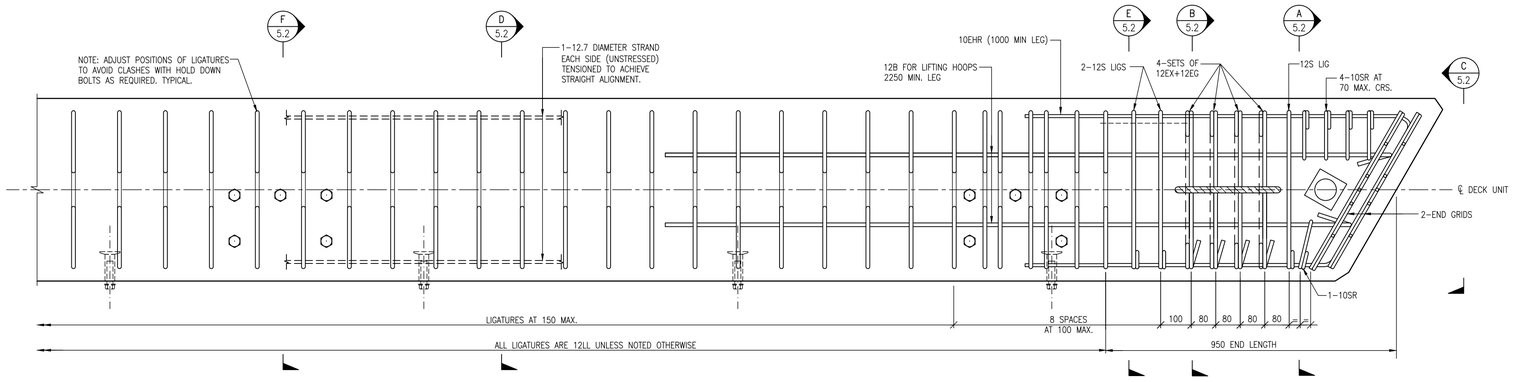


ELEVATION – DECK UNIT TYPE M

SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

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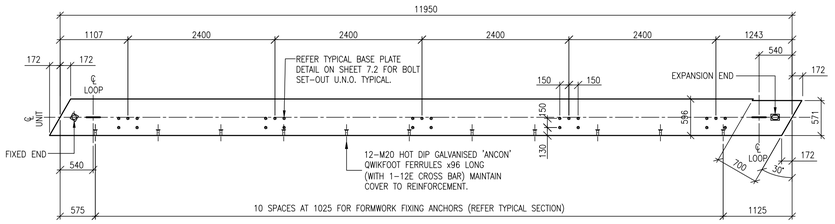
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE M
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.14
REVISION	P4

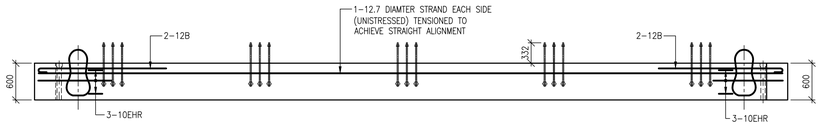


PLAN – DECK UNIT TYPE N

SCALE 1:50

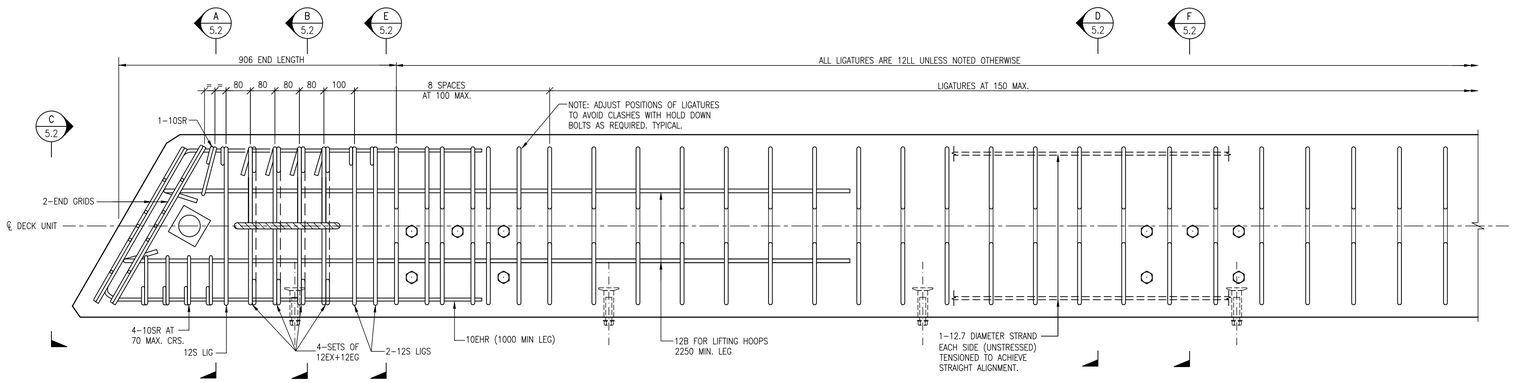
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY

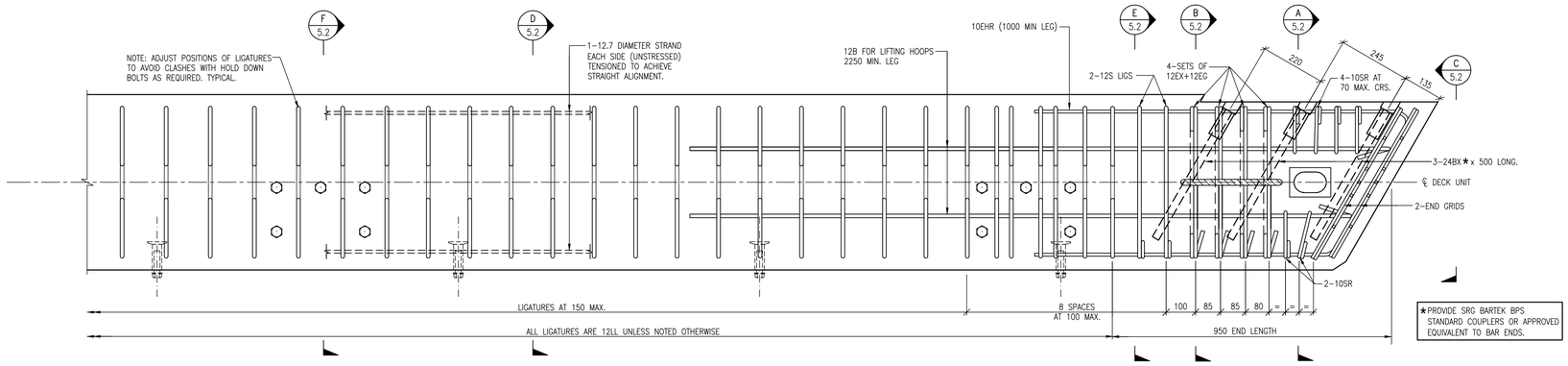


ELEVATION – DECK UNIT TYPE N

SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL



★PROVIDE SRG BARTEK BPS STANDARD COUPLERS OR APPROVED EQUIVALENT TO BAR ENDS.

DECK UNIT EXPANSION END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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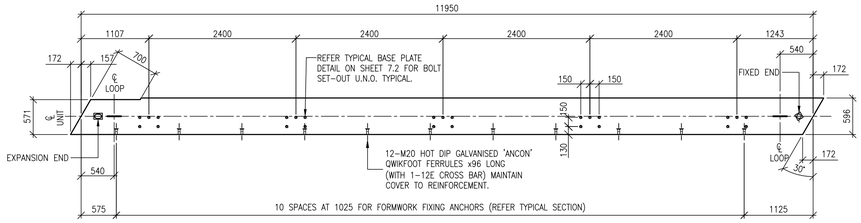
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE N
CLIENT:	DAVBRIDGE CONSTRUCTIONS
PROJECT NUMBER	G26-017D
SHEET NUMBER	5.15
REVISION	P4

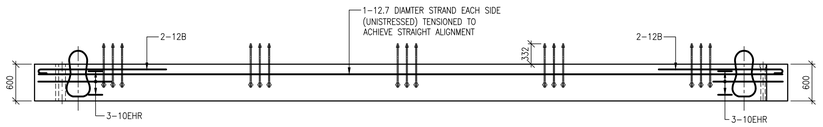


PLAN – DECK UNIT TYPE O

SCALE 1:50

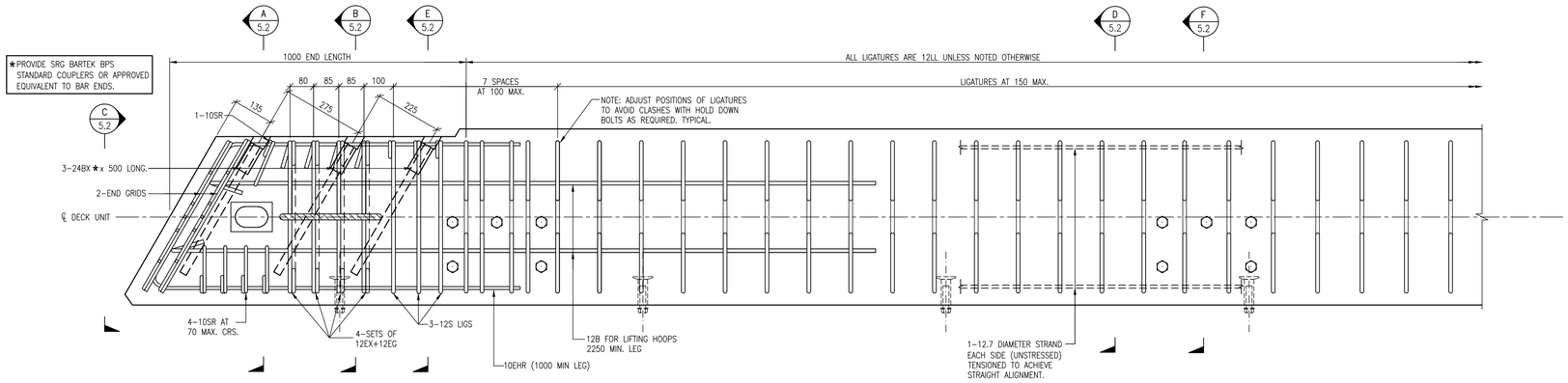
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY



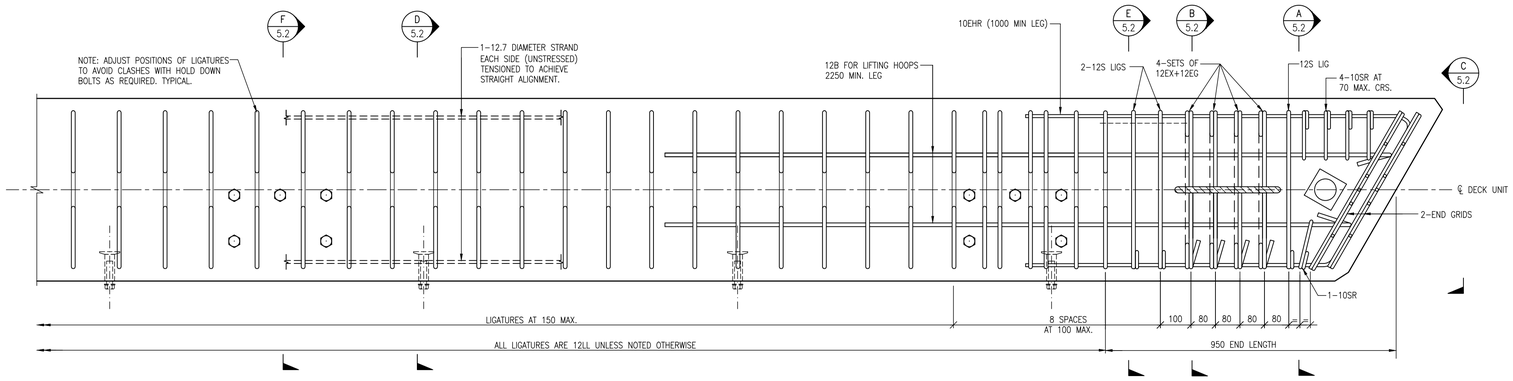
ELEVATION – DECK UNIT TYPE O

SCALE 1:50



DECK UNIT EXPANSION END PLAN DETAIL

SCALE 1:10



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
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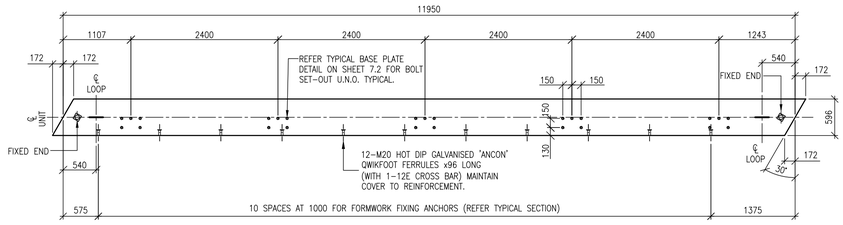
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE O
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.16
REVISION	P4

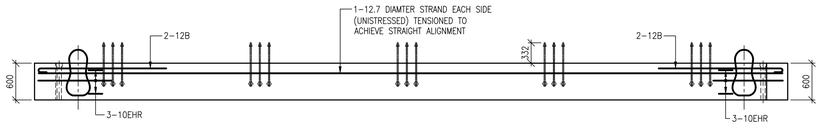


PLAN – DECK UNIT TYPE P

SCALE 1:50

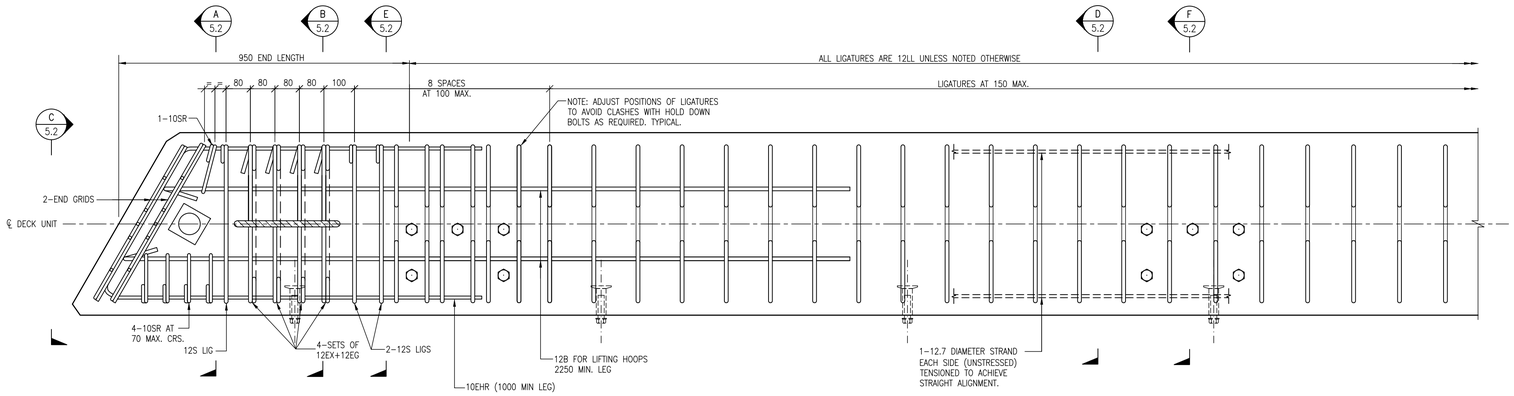
NOTE
ALL LIFTING LOOPS TO BE CUT-OFF FLUSH WITH DECK SURFACE FOLLOWING LIFTING.
APPLY 3 COATS SURFACE TOLERANT EPOXY 200 x 200 AT EACH CUT.

MAIN STRANDS NOT SHOWN ON PLAN OR ELEVATION FOR CLARITY

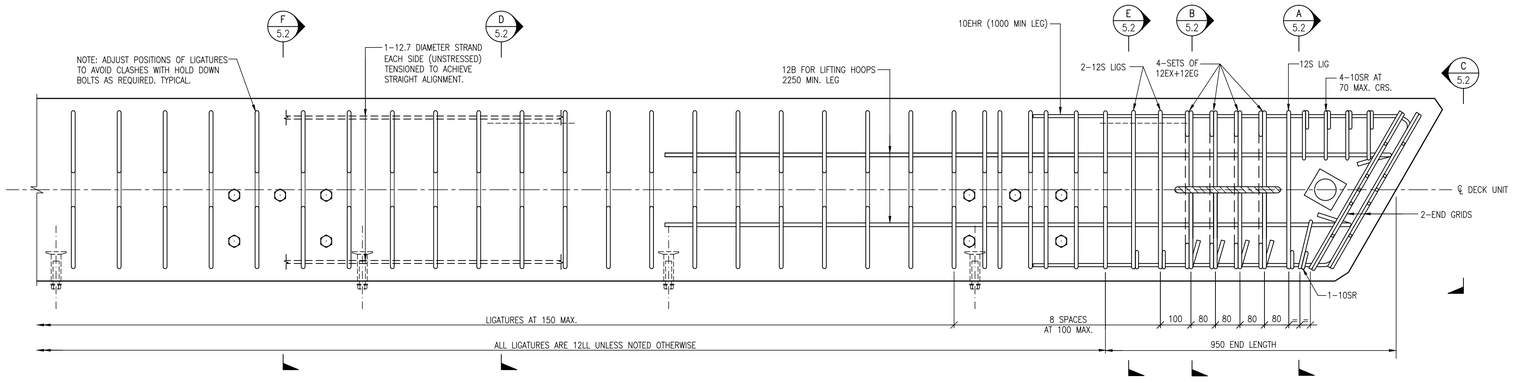


ELEVATION – DECK UNIT TYPE P

SCALE 1:50



DECK UNIT FIXED END PLAN DETAIL



DECK UNIT FIXED END PLAN DETAIL

SCALE 1:10

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

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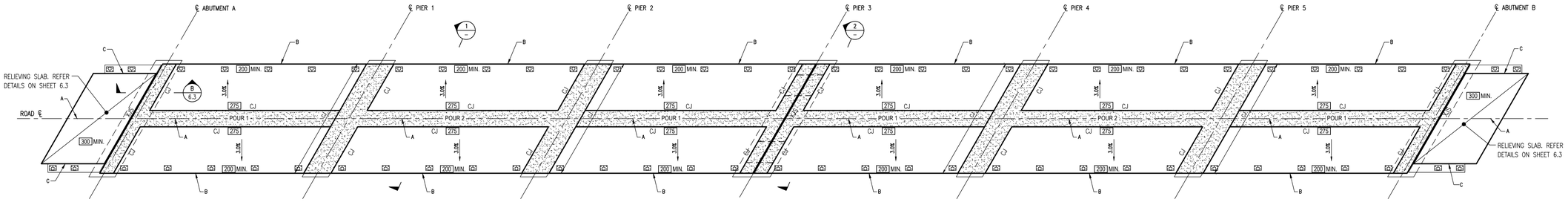
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	DECK UNIT TYPE P
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	5.17
REVISION	P4



PRECAST DECK SLAB PLAN

SCALE 1:125

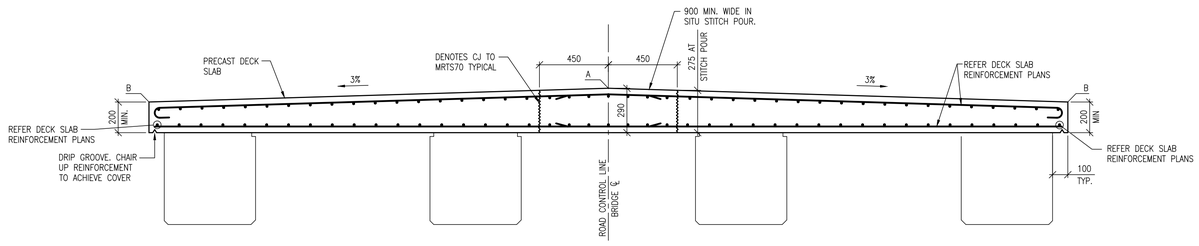
LEGEND	
MARK	DESCRIPTION
200	DENOTES DECK SLAB & RELIVING SLAB THICKNESS.
	DENOTES EXTENT OF STITCH POUR ZONE
CJ	CONSTRUCTION JOINT, REFER DESK SLAB NOTES.
XJS	DENOTES GRANOR CJS EXPANSION JOINT SYSTEM OR APPROVED EQUIVALENT. REFER SHEET 2.2 FOR DETAILS

TYPICAL BAR REINFORCEMENT LAP LENGTHS	
BAR	LAP LENGTH UNO
N12	550
N16	800
N20	1100
WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.	

DECK DESIGN LEVELS	
REF. No	DESIGN R.L.
A	383.800
B	383.710
C	383.726

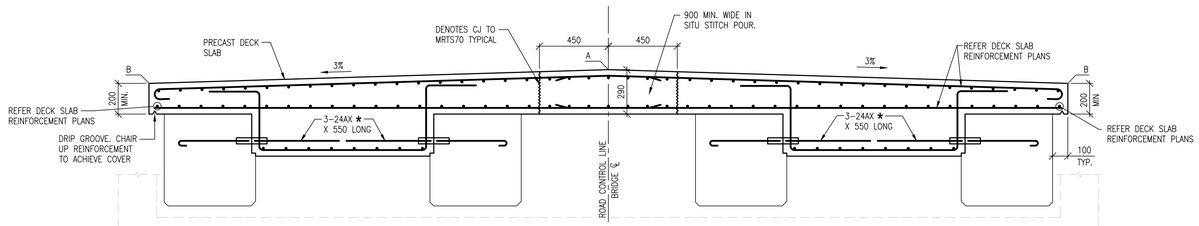
DECK SLAB NOTES

- REFER SHEET 1.0 FOR CONCRETE GRADE AND COVER REQUIREMENTS.
- REFER TMR STANDARD DRAWING 1043 REINFORCING STEEL STANDARD SHAPES, HOOKS, LAPS, BENDS ETC.
- REFER TMR STANDARD DRAWING 1043 REINFORCING STEEL – LAP LENGTHS, FOR ALL STANDARD LAP AND SPLICE DETAILS UNLESS NOTED OTHERWISE
- ALL LEVELS ARE TO TOP OF CONCRETE DECK U.N.O
- CJ DENOTES CONSTRUCTION JOINT IN ACCORDANCE WITH MRTS 70 CONCRETE.
- CONSTRUCTION OF THE REINFORCED CONCRETE DECK SHALL BE IN ACCORDANCE WITH MRTS77 BRIDGE DECK.



SECTION 1 – TYPICAL DECK SECTION

SCALE 1:20



★ PROVIDE SRG BARTEK BPS STANDARD COUPLERS OR APPROVED EQUIVALENT TO BAR ENDS.

TYPICAL DECK SECTION AT EXPANSION END

SECTION 2 –

SCALE 1:20

PRELIMINARY ISSUE
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P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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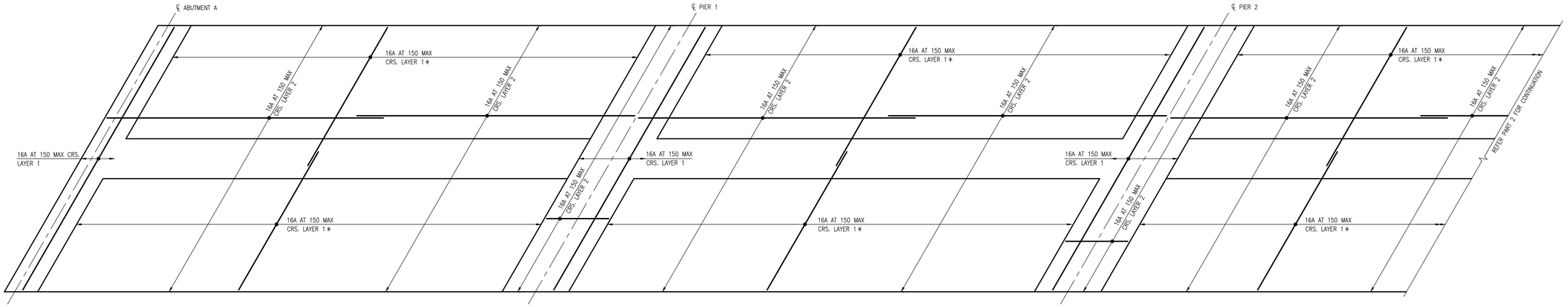
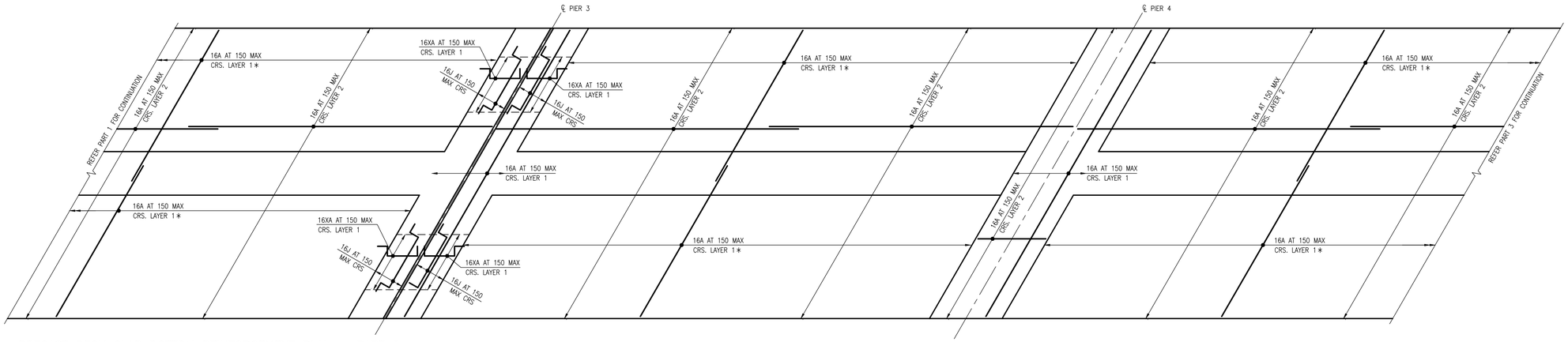
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	PRECAST DECK SLAB PLAN AND DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	6.0
REVISION	P4



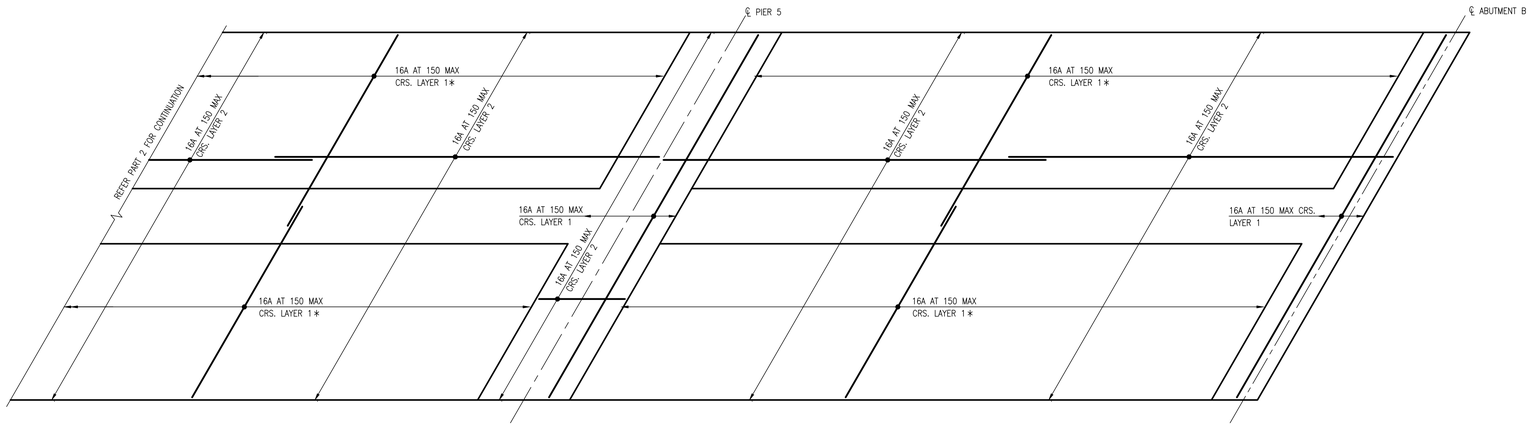
PRECAST DECK SLAB BOTTOM REINFORCEMENT PLAN – PART 1

SCALE 1:50



PRECAST DECK SLAB BOTTOM REINFORCEMENT PLAN – PART 2

SCALE 1:50



PRECAST DECK SLAB BOTTOM REINFORCEMENT PLAN – PART 3

SCALE 1:50

TYPICAL BAR REINFORCEMENT LAP LENGTHS	
BAR	LAP LENGTH UNO
N12	550
N16	800
N20	1100

WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.

∗	DENOTES REINFORCEMENT TO BE STAGGERED THROUGH CJ TO AVOID CLASHES WITH ADJACENT POUR REINFORCEMENT

LAYER 1 NOTE:

ALL LAYER 1 REINFORCEMENT SHALL BE PLACED SUCH THAT THE BOTTOM COVER IS STRICTLY IN ACCORDANCE WITH NOTE C2 ON SHEET 1.1. ADDITIONAL BARS BENEATH LAYER 1 TO ASSIST WITH PLACEMENT ARE NOT PERMITTED. (UNLESS APPROVED OTHERWISE).

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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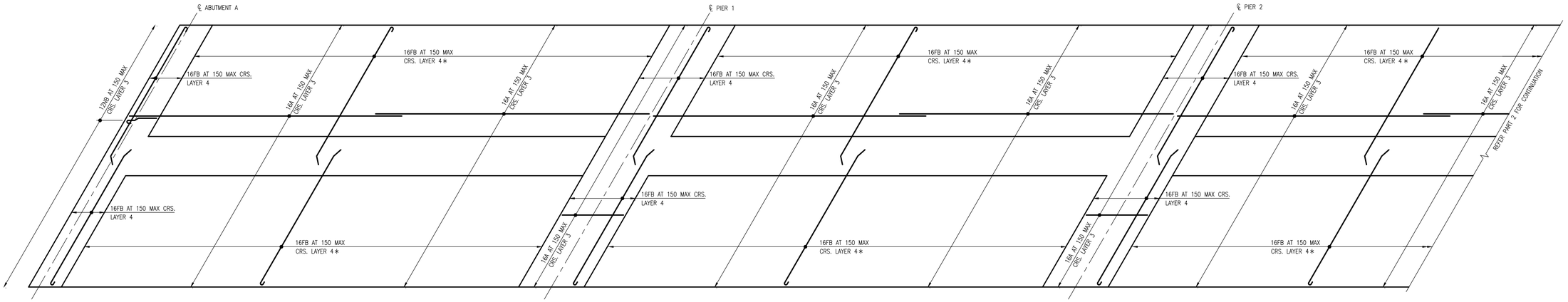
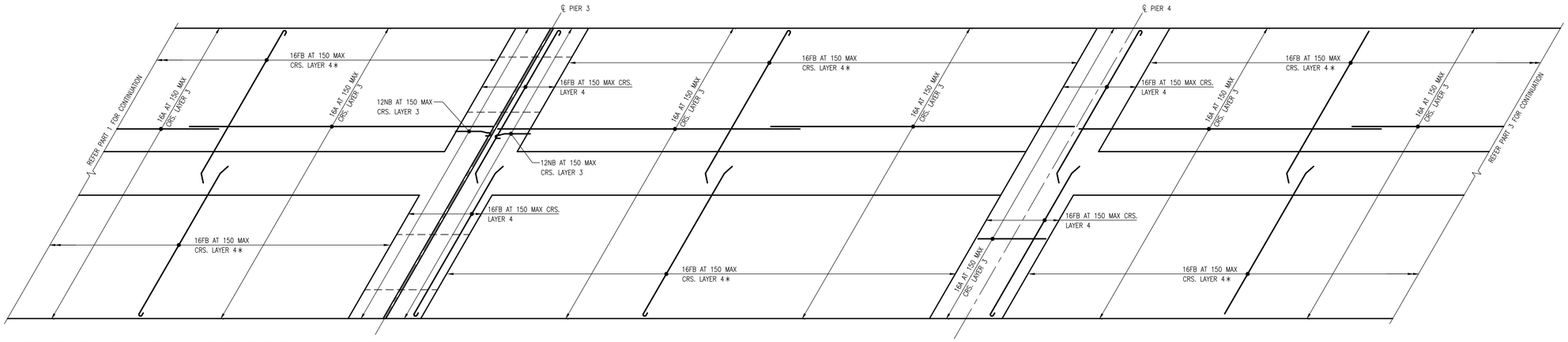
PROJECT: DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK BRIDGE
TITLE: PRECAST DECK SLAB BOTTOM REINFORCEMENT PLAN
CLIENT: DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER G26-017D
SHEET NUMBER 6.1
REVISION P4



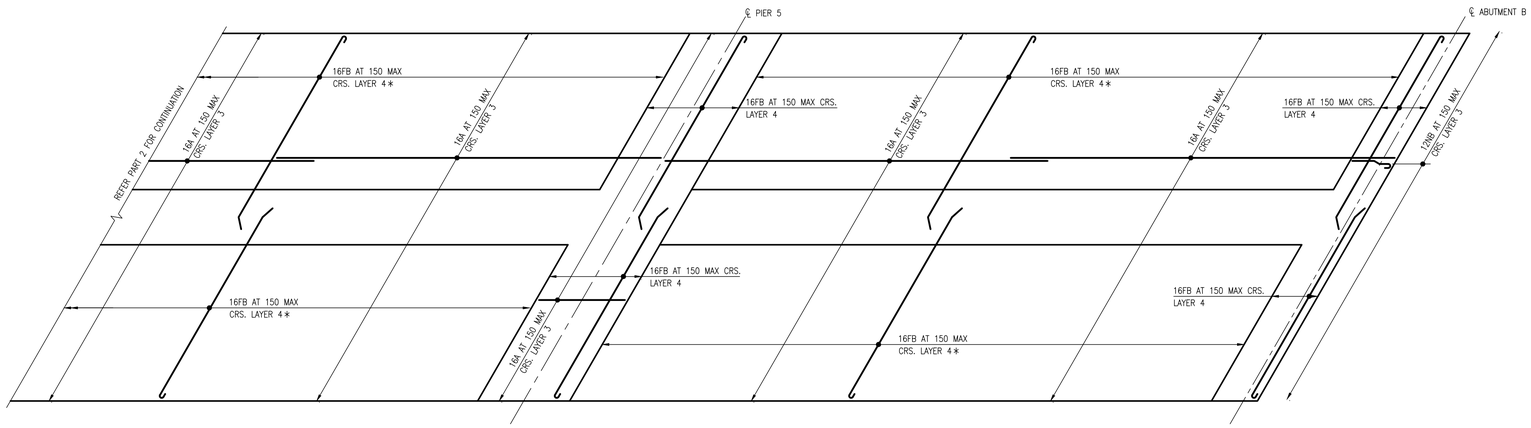
PRECAST DECK SLAB TOP REINFORCEMENT PLAN – PART 1

SCALE 1:50



PRECAST DECK SLAB TOP REINFORCEMENT PLAN – PART 2

SCALE 1:50



PRECAST DECK SLAB TOP REINFORCEMENT PLAN – PART 3

SCALE 1:50

TYPICAL BAR REINFORCEMENT LAP LENGTHS	
BAR	LAP LENGTH UNO
N12	550
N16	800
N20	1100
WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.	
∗	DENOTES REINFORCEMENT TO BE STAGGERED THROUGH CJ TO AVOID CLASHES WITH ADJACENT POUR REINFORCEMENT

LAYER 4 NOTE:

ALL LAYER 4 REINFORCEMENT SHALL BE PLACED SUCH THAT THE TOP COVER IS STRICTLY IN ACCORDANCE WITH NOTE C2 ON SHEET 1.1. REDUCED CHAIR HEIGHTS OR ADDITIONAL REINFORCEMENT ABOVE LAYER 4 TO ASSIST WITH PLACEMENT ARE NOT PERMITTED. (UNLESS APPROVED OTHERWISE).

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

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P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
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CONSULTANTS: WESTERA CIVIL

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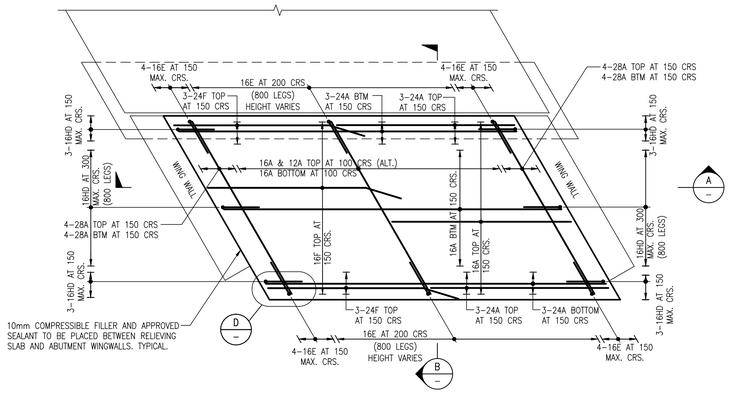
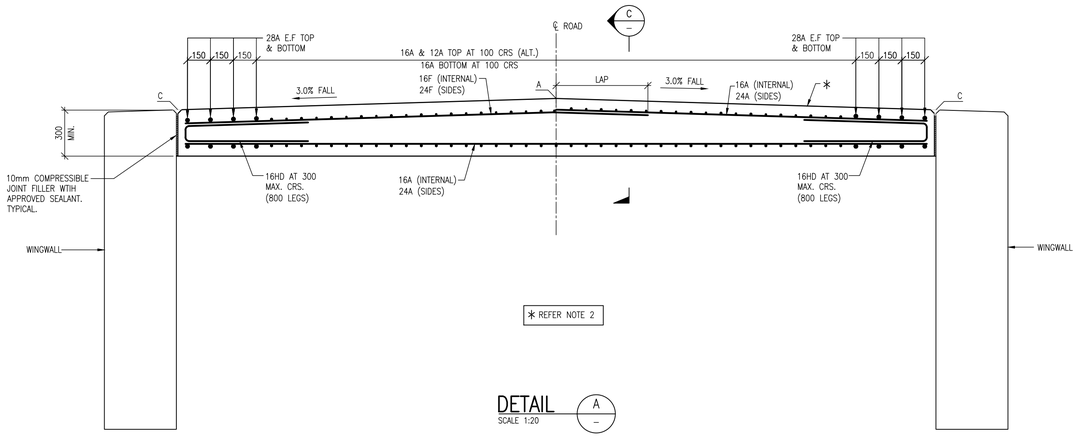
PROJECT: DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK BRIDGE
TITLE: PRECAST DECK SLAB TOP REINFORCEMENT PLAN
CLIENT: DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER G26-017D
SHEET NUMBER 6.2
REVISION P4



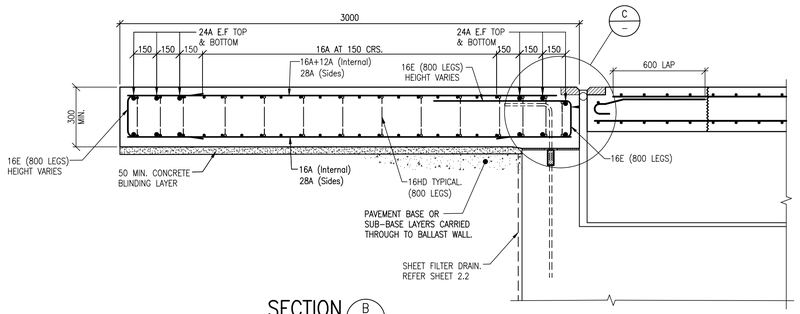
RELIEVING SLAB REINFORCEMENT PLAN

SCALE 1:50



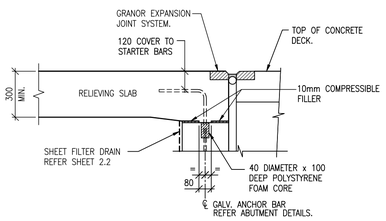
DETAIL A

SCALE 1:20



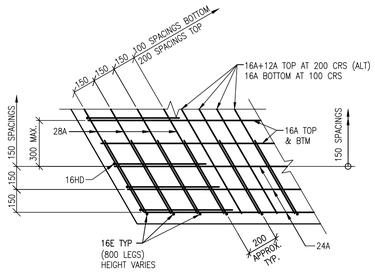
SECTION B

SCALE 1:20



DETAIL C

SCALE 1:20



DETAIL D

SCALE 1:20

NOTES.

1. RELIEVING SLABS are to be constructed on
   (a) blinding concrete
2. CROSSFALL OR SUPERELEVATION of the slab is to be the same as that of the adjacent bridge.
3. CONCRETE Shall be in accordance with MRTS 70 class to be S40/20 except as follows:
   Blinding concrete N20/20
   Exposure classification B2
   Construction joints are not necessary, but may be used to permit traffic flow during construction.
   Continuity of reinforcement across the joint is essential
4. STEEL REINFORCEMENT to be read in conjunction with Standard Drawings 1043 and 1044 and in accordance with MRTS 71
   Reinforcing steel to be in accordance with AS/NZS 4671
   Deformed bars Grade D500N
   Refer Sheet 1.0 for all covers to Reinforcement
   Cover to reinforcing steel to be 60 unless shown otherwise
5. TACK WELDING for location purposes to AS/NZS 1554.3 Clauses 3.3.1 and 3.3.2
   Welding consumables to be E4916, E4918 or W50X
6. DIMENSIONS are in millimetres unless shown otherwise

ASSOCIATED DOCUMENTS:
Design Criteria for Bridges and other Structures.

REFERENCED DOCUMENTS:
Standard Drawings:
1043 Reinforcing Steel – Standard Bar Shapes
1044 Reinforcing Steel – Standard Hook, Lap and Bend Details and General Steel Reinforcement Information

Australian Standards:
AS/NZS 1554.3 Structural Steel Welding – Welding of Reinforcing Steel
AS/NZS 4671 Steel Reinforcing Materials
AS 5100.5 Bridge design Concrete

DEPARTMENT OF TRANSPORT AND MAIN ROADS SPECIFICATIONS.
MRTS 70 Concrete
MRTS 71 Reinforcing Steel

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	RELIEVING SLAB REINFORCEMENT PLAN AND DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	6.3
REVISION	P4

NOTE:
REFER TMR STANDARD DRAWINGS 2200 & 2203 FOR TYPICAL DETAILS AS APPLICABLE.

NOTE:
ALL ELEVATION DIMENSIONS ARE MEASURED PARALLEL TO TOP OF KERB UNIT SURFACE

BRIDGE TRAFFIC BARRIER SCHEDULE

MARK	DESCRIPTION
IP1	INTERMEDIATE POST TYPE.
EP1, EP2	END POST TYPES.
TP1, TP2	TRANSITION POST TYPES.
RT1–RT8	RAIL TYPES.
R1, R2	RAIL JOINT ASSEMBLY TYPE

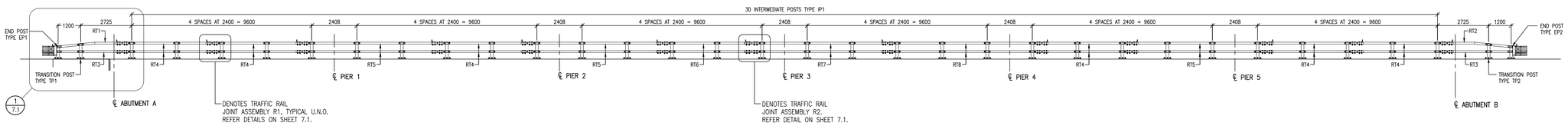
NOTES

1. DELINEATION on the bridge traffic barrier system shall be installed in the location and to the spacing shown on the drawing. Delineators shall be consistent with the requirements specified in MRTS14.
2. STEELWORK to be fabricated to the requirements of MRTS78.
   RHS and SHS to be Grade C450LO to AS/NZS 1163.
   All hollow section material manufactured to AS/NZS 1163 will require abrasive blasting to develop a surface profile of 50µm prior to hot dip galvanizing.
   All plate material manufactured to AS/NZS 1594 will require abrasive blasting to develop a surface profile of 50µm prior to hot dip galvanizing.
   Steel plate to AS/NZS 3678, and steel grades are as noted.
   Flat bar to be Grade 300 to AS/NZS 3679.1.
   Bolts Class 8.8, nuts Class 8 and washers for Class 8.8 bolts shall be fabricated in accordance with Technical Note 66 (TN66) and AS/NZS 1252, thin nuts Class 5 to AS 1112.4.
   The exposed end of threaded bar shall have the original galvaising finish.
   All threaded bars, bolts and nuts shall be hot dip galvanized to AS 1214.
   All other steelwork to be hot dip galvanized to AS/NZS 4680 unless shown otherwise.
   Prior to galvanizing all weld splatter and welding slag to be removed.
   Members to be branded with suitable type number after fabrication.
3. WELDING symbols conform to AS 1101.3
   All welding to AS/NZS 1554.1.
   All welds except location tack welds to be SP category.
   Welding consumables to be controlled hydrogen type: G493 to AS/NZS ISO 14341-B or T493 to AS/NZS ISO 17632-B unless shown otherwise.
4. DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DOCUMENTS:
Design Criteria for Bridges and other Structures

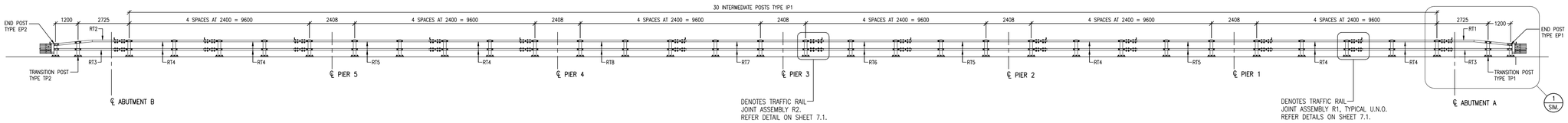
REFERENCED DOCUMENTS:
Departmental Standard Drawings:
1475 Steel Beam Guardrail – Installation on Bridge and Barrier Approaches
1481 Fabrication details for the beam rails and rail components
2200 Post and rail traffic barriers regular performance level

Departmental Specifications and Technical Notes:
MRTS14 Road Furniture
MRTS78 Fabrication of Structural Steelwork
MRTS80 Supply and Erection of Bridge Barrier
TN66 Commercial and Fabricated Bolts and Nuts



WEST ELEVATION – BRIDGE TRAFFIC BARRIER

SCALE 1:125



EAST ELEVATION – BRIDGE TRAFFIC BARRIER

SCALE 1:125

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No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
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P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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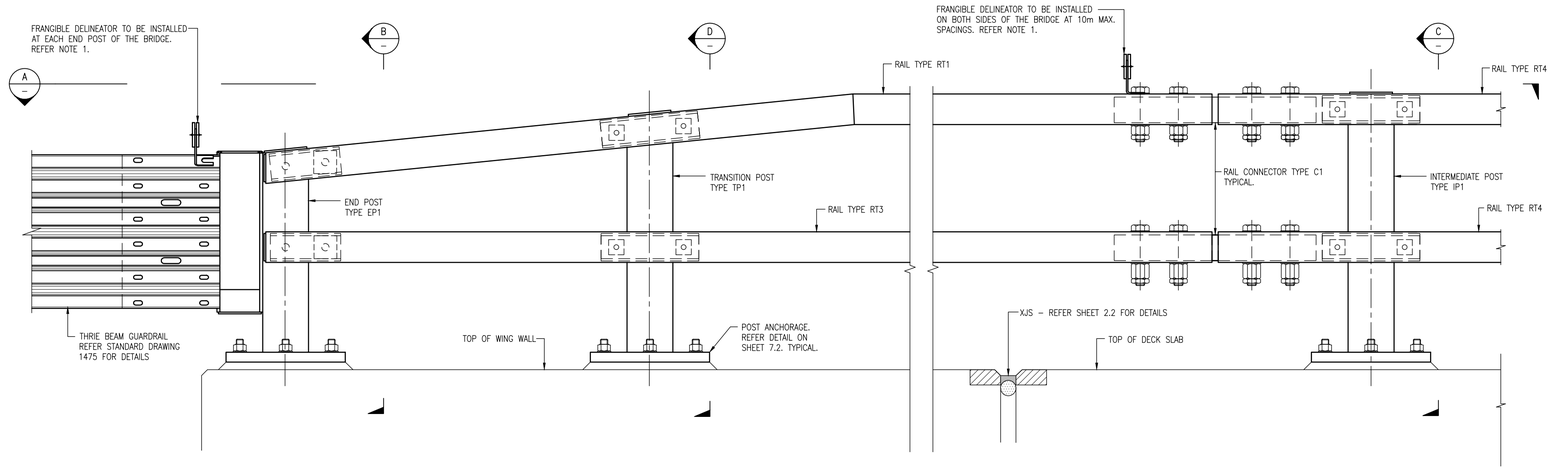
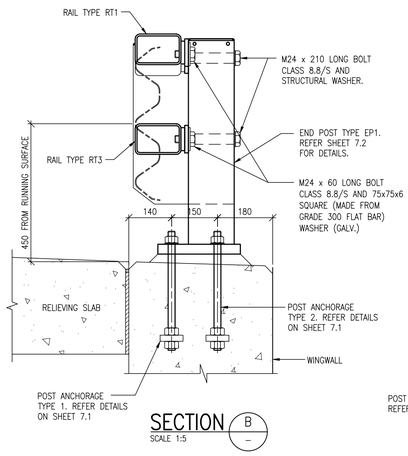
PROJECT: DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK BRIDGE
TITLE: BRIDGE BARRIER ELEVATIONS & NOTES
CLIENT: DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER G26-017D
SHEET NUMBER 7.0
REVISION P4



DETAIL 1/7.0 SCALE 1:10 TYPICAL ASSEMBLY – END, TRANSITION AND INTERMEDIATE POSTS



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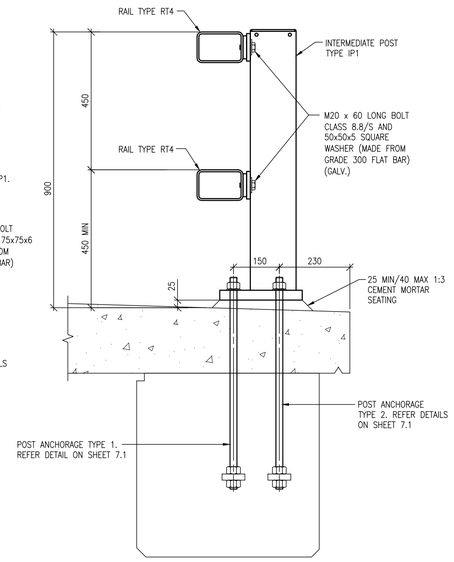
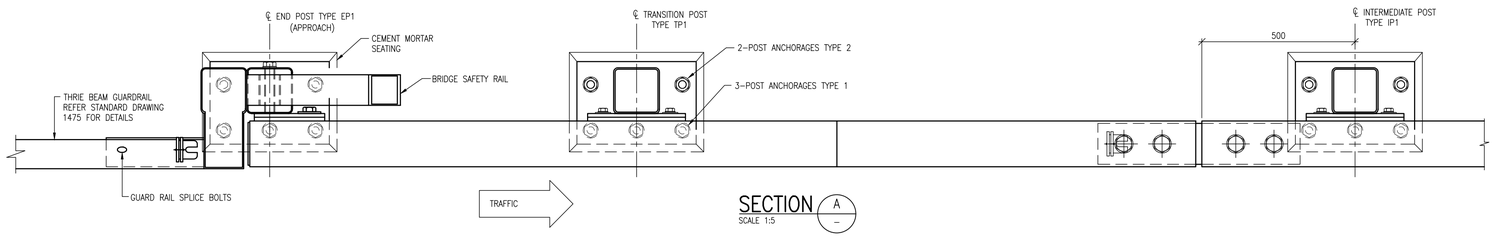
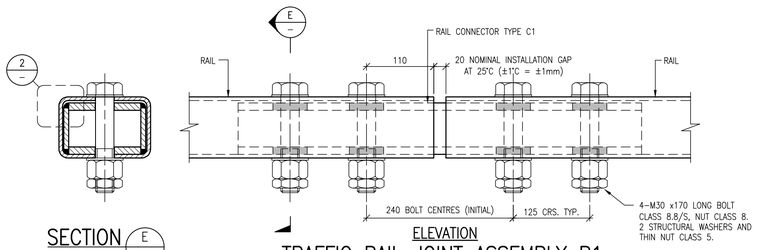


SECTION C SCALE 1:5

SECTION D SCALE 1:5 SIMILAR.



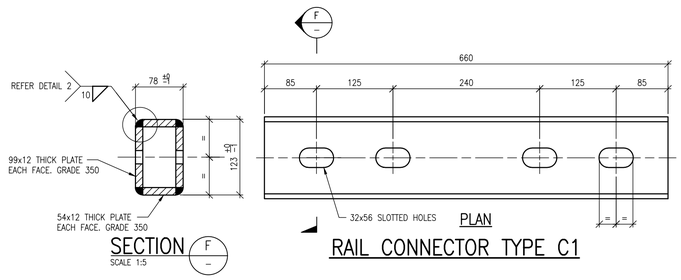
SECTION A SCALE 1:5



SECTION E SCALE 1:5

ELEVATION

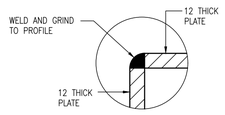
TRAFFIC RAIL JOINT ASSEMBLY R1



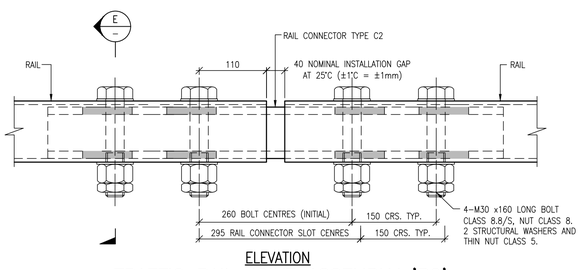
SECTION F SCALE 1:5

PLAN

RAIL CONNECTOR TYPE C1

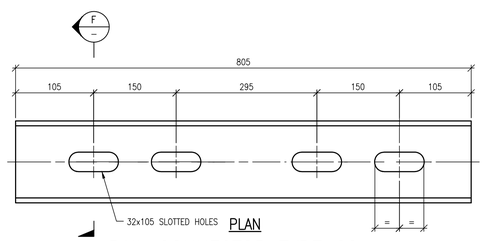


DETAIL 2 SCALE 1:10



ELEVATION

TRAFFIC RAIL JOINT ASSEMBLY 'R2'



PLAN

RAIL CONNECTOR TYPE C2

PRELIMINARY ISSUE
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No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.
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DATE	DEC 2025
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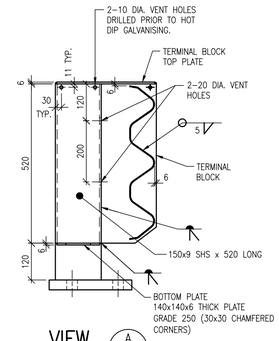
PROJECT: DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK BRIDGE
TITLE: BRIDGE BARRIER ELEVATIONS AND DETAILS
CLIENT: DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER G26-017D
SHEET NUMBER 7.1
REVISION P4



VIEW A
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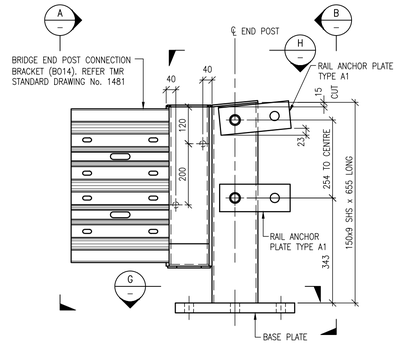
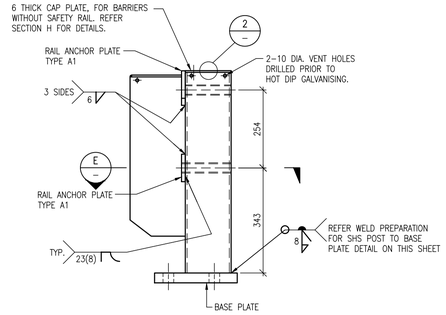
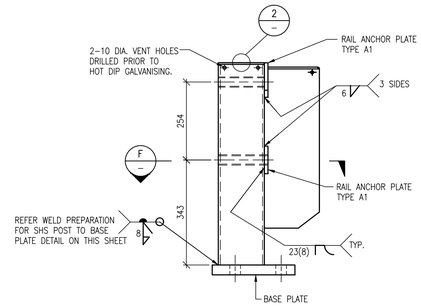


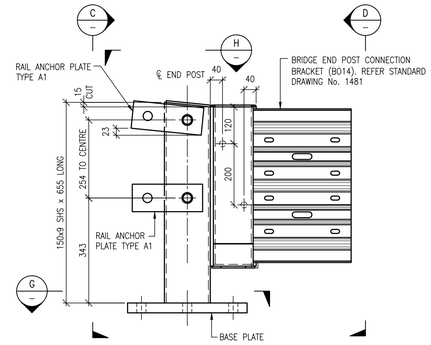
END POST – TYPE EP1 (APPROACH)
SCALE 1:10



VIEW B
SCALE 1:10



VIEW C
SCALE 1:10



END POST – TYPE EP2 (DEPARTURE)
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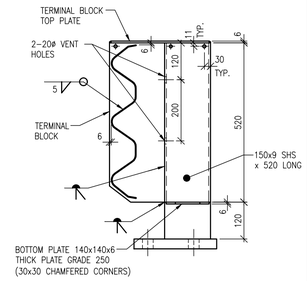
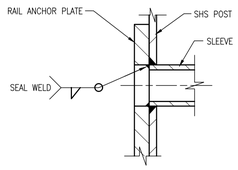
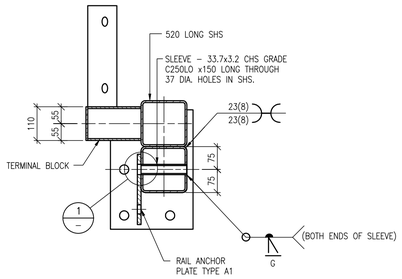


VIEW D
SCALE 1:10

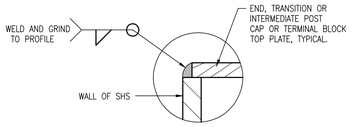


DETAIL 1
SCALE 1:2.5



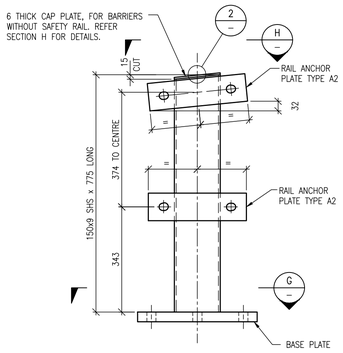
SECTION E
SCALE 1:10

SECTION F OPP. HAND
SCALE 1:10

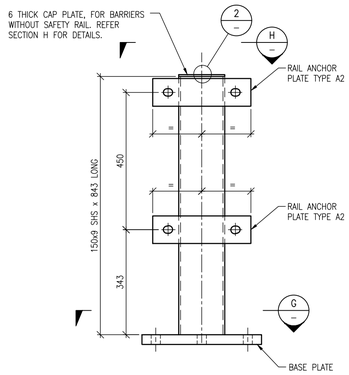


DETAIL 2
SCALE 1:5

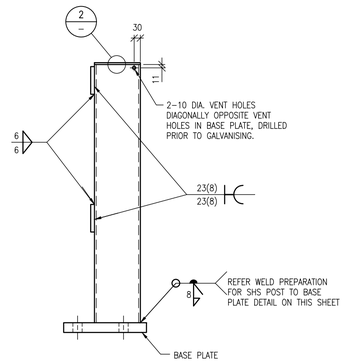
FOR 6 THICK CAP PLATE TO SHS POST



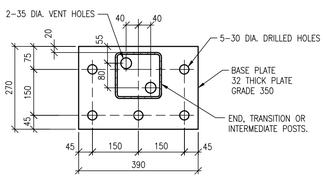
TRANSITION POST – TYPE TP1
(TYPE TP2 SIMILAR – OPPOSITE HAND)
SCALE 1:10



INTERMEDIATE POSTS – TYPE IP1
SCALE 1:10

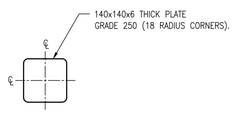


TRANSITION & INTERMEDIATE POSTS
TYPICAL END VIEW
SCALE 1:10



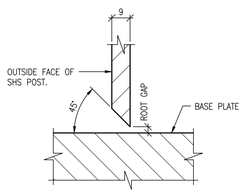
TYPICAL BASE PLATE DETAIL

SECTION G
SCALE 1:10

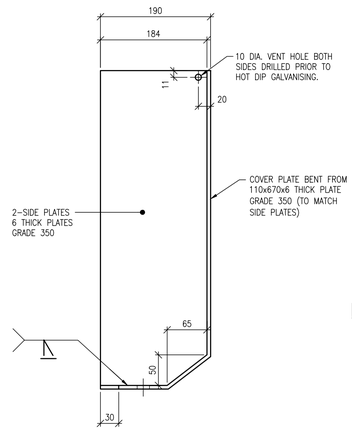


SECTION H
SCALE 1:10

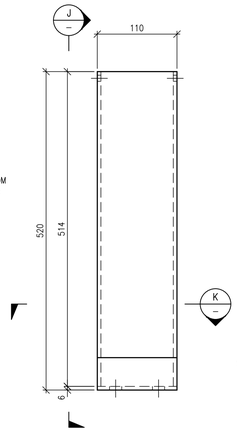
6 THICK CAP PLATE. TYPICAL FOR POSTS WITHOUT BRDIGE SAFETY RAIL.



WELD PREPARATION FOR SHS POST TO BASE PLATE

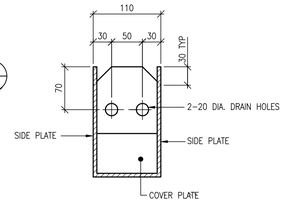


VIEW J

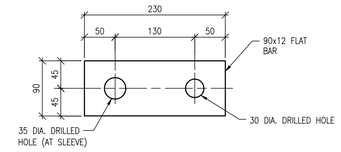


ELEVATION

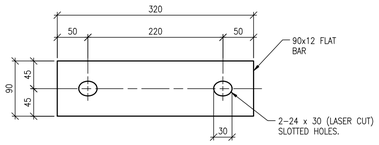
TERMINAL BLOCK
SCALE 1:5



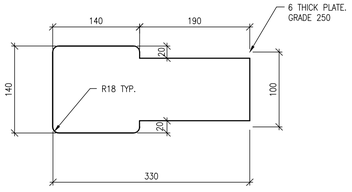
SECTION K



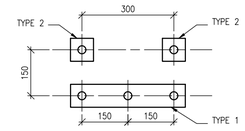
RAIL ANCHOR PLATE – TYPE A1
SCALE 1:5



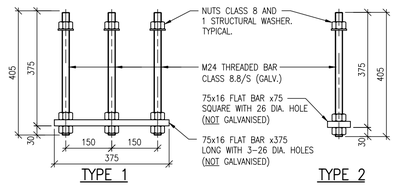
RAIL ANCHOR PLATE – TYPE A2
SCALE 1:5



TERMINAL BLOCK TOP PLATE
SCALE 1:5



ANCHORAGE GROUP SETOUT
SCALE 1:10



(NOTE: TACK WELDING TO THREADED ROD SHAFT IS NOT PERMITTED)

POST ANCHORAGES

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
P2	15/07/26	WORK IN PROGRESS	R.K	M.S
P3	04/08/26	WORK IN PROGRESS	R.K	M.S
P4	14/08/26	85% DESIGN ISSUE	R.K	M.S

DESIGNED	M.S.	CHECKED	B.C.
DRAWN	L.A.D.	APPROVED	
DATE	DEC 2025		
PAGE SIZE	A1	For and on behalf of WESTERA PARTNERS PTY. LTD.	

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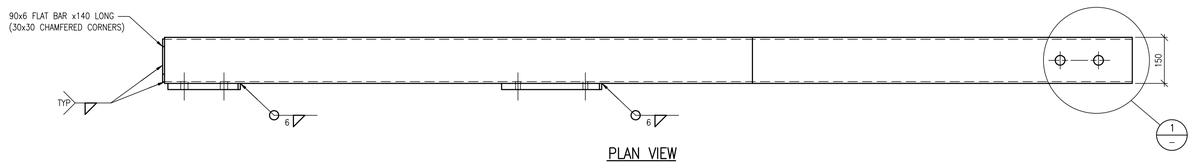
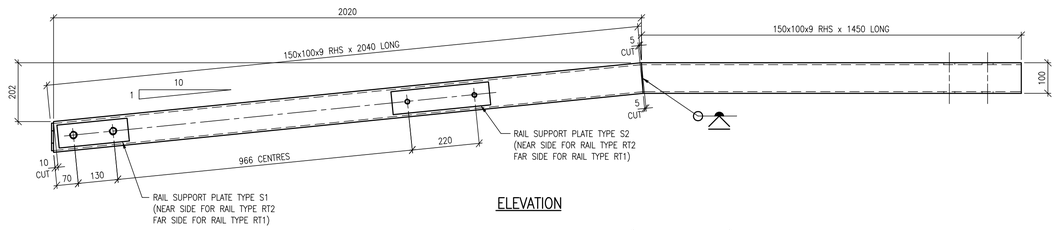
PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	BRIDGE BARRIER ELEVATIONS AND DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS
PROJECT NUMBER	G26-017D
SHEET NUMBER	7.2
REVISION	P4



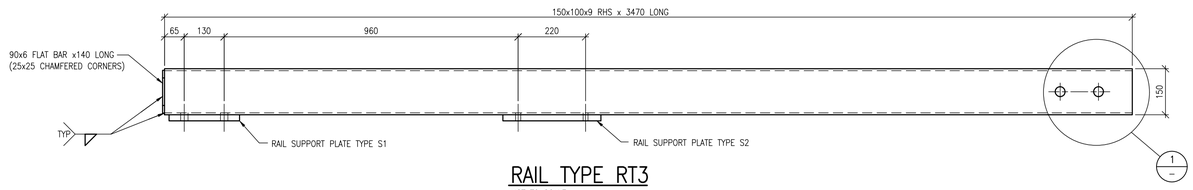
PLAN VIEW



ELEVATION

RAIL TYPES RT1 AND RT2 (AS NOTED)

NOT TO SCALE



RAIL TYPE RT3

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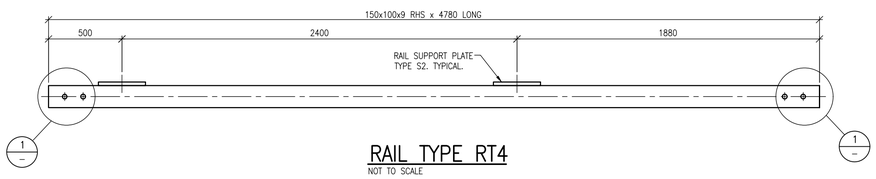

RAIL TYPE RT4

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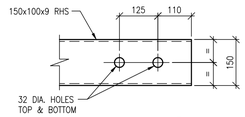
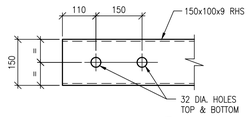
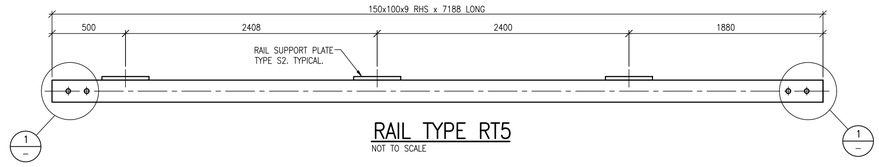


DETAIL 1 –
SCALE 1:5



DETAIL 2 –
SCALE 1:5



RAIL TYPE RT5

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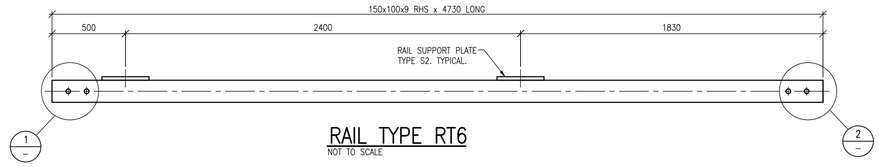

RAIL TYPE RT6

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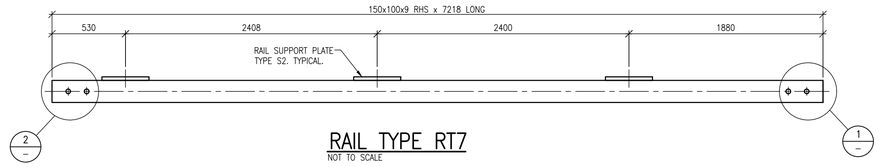

RAIL TYPE RT7

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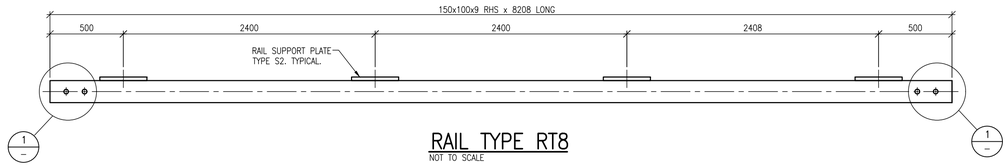

RAIL TYPE RT8

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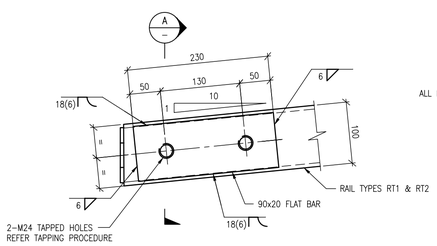
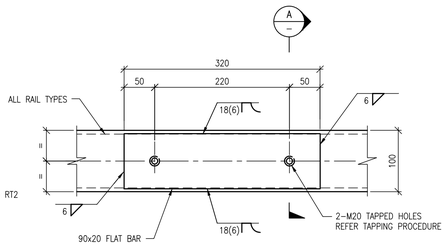


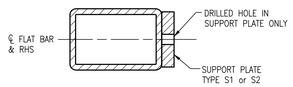
RAIL SUPPORT PLATE – TYPE S1

SCALE 1:5



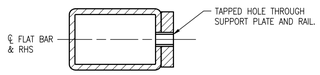
RAIL SUPPORT PLATE – TYPE S2

SCALE 1:5



SECTION A –
SCALE 1:5

BEFORE GALVANISING



SECTION A –
SCALE 1:5

AFTER GALVANISING

TAPPING PROCEDURE:–

1. DRILL HOLES THROUGH THE SUPPORT PLATES ONLY (USING THE CORRECT TAPPING DRILL TO MATCH BOLT SIZE TO MATCH BOLT SIZE OR SMALLER SIZE DRILL).
2. POSITION AND WELD THE SUPPORT PLATES TO THE RAIL.
3. FILL THE HOLES IN THE SUPPORT PLATES WITH NATURAL SILICONE.
4. HOT DIP GALVANISE THE RAIL.
5. AFTER GALVANISING, DRILL AND TAP THE REQUIRED SIZE HOLES THROUGH THE SUPPORT PLATES AND THE RAIL.

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

No.	DATE	REVISIONS	DRN	ENG
P1	20/04/26	30% DESIGN ISSUE		
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DESIGNED	M.S.	CHECKED	B.C.
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PROJECT:	DOUGLAS CREEK BRIDGE REPLACEMENT
LOCATION:	DOUGLAS CREEK BRIDGE
TITLE:	BRIDGE BARRIER ELEVATIONS AND DETAILS
CLIENT:	DAVBRIDGE CONSTRUCTIONS

PROJECT NUMBER	G26-017D
SHEET NUMBER	7.3
REVISION	P4

DOUGLAS CREEKS BRIDGE REPLACEMENT

LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX

DAVBRIDGE CONSTRUCTIONS

Project Number: G26-017

LOCALITY PLAN

NOT TO SCALE

INDEX OF DRAWINGS

PRELIMINARY GENERAL DRAWINGS

G26-017-D-PG01	PRELIMINARY COVER SHEET

PRELIMINARY CIVIL DRAWINGS

G26-017-D-PC01	PRELIMINARY CIVIL NOTES AND LEGEND
G26-017-D-PC02	PRELIMINARY CIVIL WORKS SITE PLAN
G26-017-D-PC03	PRELIMINARY CIVIL WORKS PLAN 1 of 5
G26-017-D-PC04	PRELIMINARY CIVIL WORKS PLAN 2 of 5
G26-017-D-PC05	PRELIMINARY CIVIL WORKS PLAN 3 of 5
G26-017-D-PC06	PRELIMINARY CIVIL WORKS PLAN 4 of 5
G26-017-D-PC07	PRELIMINARY CIVIL WORKS PLAN 5 of 5
G26-017-D-PC08	PRELIMINARY BRIDGE APPROACH DETAILS
G26-017-D-PC09	PRELIMINARY ROAD LONGITUDINAL SECTIONS CH0.000 - CH680.00
G26-017-D-PC10	PRELIMINARY ROAD LONGITUDINAL SECTIONS CH680.00 - CH1340.00
G26-017-D-PC11	PRELIMINARY ROAD LONGITUDINAL SECTIONS CH1340.00 - CH1514.482
G26-017-D-PC12	PRELIMINARY ROAD CROSS SECTIONS 1 OF 10
G26-017-D-PC13	PRELIMINARY ROAD CROSS SECTIONS 2 OF 10
G26-017-D-PC14	PRELIMINARY ROAD CROSS SECTIONS 3 OF 10
G26-017-D-PC15	PRELIMINARY ROAD CROSS SECTIONS 4 OF 10
G26-017-D-PC16	PRELIMINARY ROAD CROSS SECTIONS 5 OF 10
G26-017-D-PC17	PRELIMINARY ROAD CROSS SECTIONS 6 OF 10
G26-017-D-PC18	PRELIMINARY ROAD CROSS SECTIONS 7 OF 10
G26-017-D-PC19	PRELIMINARY ROAD CROSS SECTIONS 8 OF 10
G26-017-D-PC20	PRELIMINARY ROAD CROSS SECTIONS 9 OF 10
G26-017-D-PC21	PRELIMINARY ROAD CROSS SECTIONS 10 OF 10
G26-017-D-PC22	PRELIMINARY ROAD TYPICAL SECTIONS 1 of 4
G26-017-D-PC23	PRELIMINARY ROAD TYPICAL SECTIONS 2 of 4
G26-017-D-PC24	PRELIMINARY ROAD TYPICAL SECTIONS 3 of 4
G26-017-D-PC25	PRELIMINARY ROAD TYPICAL SECTIONS 4 of 4
G26-017-D-PC26	PRELIMINARY ROAD SIGNAGE PLAN 1 OF 2
G26-017-D-PC27	PRELIMINARY ROAD SIGNAGE PLAN 2 OF 2
G26-017-D-PC28	PRELIMINARY VEHICLE TURN PATH
G26-017-D-PC29	PRELIMINARY VERTICAL VEHICLE TURN PATH

PRELIMINARY EARTHWORKS DRAWINGS

G26-017-D-PE01	PRELIMINARY EARTHWORKS SITE PLAN
G26-017-D-PE02	PRELIMINARY EARTHWORKS PLAN 1 of 5
G26-017-D-PE03	PRELIMINARY EARTHWORKS PLAN 2 of 5
G26-017-D-PE04	PRELIMINARY EARTHWORKS PLAN 3 of 5
G26-017-D-PE05	PRELIMINARY EARTHWORKS PLAN 4 of 5
G26-017-D-PE06	PRELIMINARY EARTHWORKS PLAN 5 of 5

SAFETY IN DESIGN

REFER SEPARATE SiD DOCUMENT

WL003-OSR-CV-SID-OF-001_B Risk Assessment_RevB

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	30% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026
DOCUMENT CONTROL

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY COVER SHEET
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PG01
SHEET NUMBER 01 OF 01
REVISION B

G26-017-D-PG_Pre_Coversheet.dwg

GENERAL NOTES

G1 WESTERA PARTNERS HAS LIMITED CONTROL OR INPUT TO LOCAL GOVERNMENT OR OTHER LEGISLATED APPROVALS UNLESS SPECIFICALLY ENGAGED BY IT'S CLIENT. ANY CHANGES TO APPROVAL REQUIREMENTS (INCLUDING ORDERS FOR SUSPENSION OF WORKS ETC) SHOULD BE COMMUNICATED TO WESTERA PARTNERS AND ALL OTHER RELEVANT DESIGNERS TO ALLOW ASSESSMENT OF POTENTIAL RISKS AND ENSURE DESIGN AND SAFETY COMPLIANCE.

G2 ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LOCAL AUTHORITIES STANDARD DRAWINGS & SPECIFICATIONS AND COMPLETED TO THE SATISFACTION OF THE SUPERINTENDENT AND LOCAL AUTHORITY.

G3 UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.

G4 PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR MUST LOCATE ALL EXISTING SERVICES AND PROMPTLY PROVIDE THE LOCATION DATA TO THE DESIGN ENGINEER TO ASSESS IMPACTS ON THE DESIGN.

G5 THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE TO BE VERIFIED FOLLOWING SUB-SOIL TESTS OF THE SUB-GRADE MATERIAL.

G6 WATER PIPES SHALL BE;
- P.V.C.-M WATER PIPES ARE TO BE SERIES 2 PN16 SN10 R.R.J.
- D.I.C.L. WATER PIPES ARE TO BE PN35 WITH ALL FITTINGS TO BE FUSION BONDED POLYMERIC COATED.
- PE WATER PIPES ARE TO BE PN16 SDR11 PE100. DN25 AND DN32 WATER SERVICES SHALL BE PE80B.

G7 ALL "AS CONSTRUCTED" INFORMATION IS TO BE RECORDED AS REQUIRED BY THE LOCAL AUTHORITY AND SUBMITTED TO THE SUPERINTENDENT IMMEDIATELY AFTER COMPLETION OF THE WORKS.

G8 ALL ALLOTMENTS ARE TO BE GRADED AT A MINIMUM GRADE OF 1 IN 200.

CONCRETE NOTES

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600 CONCRETE STRUCTURES CODE AND THE REFERENCED STANDARDS THEREIN.

C2 THE CONCRETE STRENGTH GRADE AND THE COVER TO REINFORCEMENT FOR THE VARIOUS CONCRETE ELEMENTS SHALL BE AS LISTED BELOW:
- CLIMATE ZONE: ~~TROPICAL~~ TEMPERATE ~~ARID~~
- LOCATION: ~~COASTAL~~ ~~NEAR COASTAL~~ INLAND

ELEMENT	EXPOSURE CLASSIFICATION	STRENGTH GRADE	MINIMUM COVER
MANHOLES	B1	N32	40
FIELD INLET PITS	B1	N32	40
INTERNAL ROADS	B1	N32	40
KERB/CHANNEL	B1	N32	–
FOOTPATHS	B1	N32	40
RETAINING WALL PANELS	B1	N32	30*
BORED PIERS	B1	N32	40

*RIGID FORMWORK & INTENSE COMPACTION

C3 CONCRETE TO HAVE A MAXIMUM AGGREGATE SIZE OF 20mm WITH 80mm MAXIMUM SLUMP, A WATER/CEMENT RATIO OF NOT GREATER THAN 0.65 AND A MAXIMUM FINAL BASIC DRYING SHRINKAGE STRAIN OF 800 x 10^{-6} UNLESS APPROVED OTHERWISE.

C4 NO ADDITIVES SHALL BE ADDED OR APPLIED TO THE CONCRETE MIX WITHOUT THE APPROVAL OF THE ENGINEER.

C5 THE MAXIMUM PERMISSIBLE TRANSPORT TIME FOR CONCRETE BETWEEN BATCHING AND PLACEMENT ON SITE SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.

AMBIENT AIR TEMPERATURE	MAX. BATCHING TO PLACEMENT TIME
10° – 24°C	120 MINUTES
25° – 27°C	90 MINUTES
28° – 30°C	60 MINUTES
31° – 33°C	45 MINUTES
34° – 36°C	30 MINUTES
37°C+	NO PLACEMENT OF CONCRETE UNLESS CHILLED WATER OR ICE IN MIX

C6 ALL CONCRETE SHALL BE MECHANICALLY VIBRATED. VIBRATORS SHALL NOT BE USED TO SPREAD CONCRETE.

C7 ALL CONCRETE SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH AS1379 ADOPTING THE PROJECT ASSESSMENT METHOD FOR COMPRESSIVE STRENGTH AND SLUMP COMPLIANCE. THE RESULTS OF ALL TESTS SHALL BE PROMPTLY SUBMITTED TO THE ENGINEER FOR REVIEW.

C8 WHEN THE AIR TEMPERATURE EXCEEDS 30°C, ALIPHATIC ALCOHOL SHALL BE APPLIED TO THE CONCRETE SURFACE OF SLABS IMMEDIATELY AFTER THE INITIAL SCREED AND AGAIN AFTER BULL FLOATING.

C9 CURING OF ALL CONCRETE SURFACES SHALL COMMENCE IMMEDIATELY AFTER COMPLETING CONCRETE FINISHING AND SHALL CONTINUE FOR 7 DAYS. CONTRACTOR TO CONFIRM METHOD OF CURING WITH ENGINEER PRIOR TO USE.

C10 SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.

C11 BEAM DEPTHS ARE WRITTEN FIRST AND INCLUDE SLAB THICKNESS, IF ANY.

C12 NO HOLES, CHASES OR EMBEDDED ITEMS OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER. CONDUITS, PIPES ETC. SHALL NOT BE PLACED IN THE COVER THICKNESS OF THE CONCRETE.

C13 WHERE SERVICE PIPES PENETRATE CONCRETE ELEMENTS, PROVISION SHOULD BE MADE TO ALLOW FOR MOVEMENT OF THE ELEMENT.

C14 FORMWORK SHALL BE DESIGNED, CONSTRUCTED AND STRIPPED IN ACCORDANCE WITH AS3610 FORMWORK CODE, UNLESS NOTED OTHERWISE ON THE DRAWINGS.

C15 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION OR SCALE.

C16 ALL REINFORCEMENT SHALL BE SECURELY SUPPORTED IN ITS CORRECT POSITION ON PLASTIC BAR CHAIRS, GENERALLY AT NOT GREATER THAN 800mm CENTRES IN BOTH DIRECTIONS.

C17 WELDING AND HEATING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT APPROVAL OF THE ENGINEER.

C18 ALL STEEL REINFORCEMENT IN CONCRETE ELEMENTS SHALL BE INSPECTED BY THE ENGINEER AND PASSED PRIOR TO POURING OF ANY CONCRETE.

C19 LAP REINFORCEMENT ONLY AT LOCATIONS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER.

C20 SLAB FABRIC SHALL BE LAPPED ONE FULL PANEL OF FABRIC PLUS 50mm SO THAT THE TWO OUTERMOST TRANSVERSE WIRES OF ONE SHEET OVERLAP THE TWO OUTERMOST TRANSVERSE WIRES OF THE SHEET BEING LAPPED BY 50mm.

C21 BAR REINFORCEMENT SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING TABLE.

TYPICAL BAR REINFORCEMENT LAP LENGTHS		
BAR	LAP LENGTH UNO	HORIZONTAL BARS WITH GREATER THAN 300mm OF CONCRETE CAST BELOW THEM
N12	550	750
N16	800	1100
N20	1100	1400
N24	1250	1600
N28	1400	1800
N32	1600	2100
N36	2000	2500

WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.

C22 A VAPOUR BARRIER OF 0.2mm (200um) MINIMUM THICK POLYTHENE SHEETING SHALL BE PLACED BENEATH SLABS ON GROUND UNLESS NOTED OTHERWISE.

LEGEND

GENERAL

2 COAT BITUMEN SEAL PAVEMENT
GRAVEL PAVEMENT
REINFORCED CONCRETE PAVEMENT
TURF
ROCK ARMOUR
CEMENT GROUTED STONE PITCHING
TELECOMMUNICATION
GAS MAIN
ELECTRICITY OVERHEAD
ELECTRICITY UNDERGROUND
LIGHT POLE
POWER POLE
PIT (TELSTRA/ELEC)
EDGE OF BITUMEN
FENCE
EXISTING SURFACE LEVEL
EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
DESIGN SURFACE LEVEL
DESIGN CONTOUR MINOR
DESIGN CONTOUR MAJOR
RETAINING WALL
STAGE BOUNDARY

STORMWATER DRAINAGE

NEW | EXISTING

STORMWATER PIPE
SAG GULLY PIT
ON GRADE GULLY PIT
MANHOLE
600 x 600 FIELD INLET
900 x 600 FIELD INLET
1050 DIA FIELD INLET
HEADWALL
KERB ADAPTER WITH ROOFWATER PIPE
STORMWATER STRUCTURE LABEL

WATER

NEW | EXISTING | DISUSED

WATER MAIN
FIRE HYDRANT
DUAL OUTLET FIRE HYDRANT
SWABBING DUAL OUTLET FIRE HYDRANT
SWABBING FIRE HYDRANT
ISOLATION VALVE
SCOUR VALVE
AIR VALVE
DEAD END
TEST/CHLORINATION POINT
REDUCER
PIPE MATERIAL CHANGE
WATER SERVICE PRE-TAPPED TEE
WATER SERVICE PIPE & CONDUIT
FLOW METER
FLUSHING POINT
WATER IRRIGATION
REDUCE PRESSURE ZONE (RPZ)

SEWERAGE

NEW | EXISTING | DISUSED

GRAVITY SEWER MAIN
SEWER RISING MAIN
SEWER VACUUM MAIN
MAINTENANCE HOLE & END OF LINE
END OF LINE
MAINTENANCE SHAFT
HORIZONTAL/VERTICAL BEND
COMPOUND BEND
STUB / TEMPORARY END
RODDING END
PROPERTY CONNECTION
OVERFLOW MAINTENANCE HOLE
ISOLATION VALVE
SCOUR VALVE AND CHAMBER
GAS RELEASE VALVE
FLUSHING POINT
DISCHARGE MAINTENANCE HOLE
NON-RETURN/REFLUX VALVE
VENT POLE / ODOUR CONTROL UNIT

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026
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APPROVED

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PHONE 07 4772 1144

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL NOTES AND LEGEND
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC01
SHEET NUMBER 01 OF 16
REVISION B

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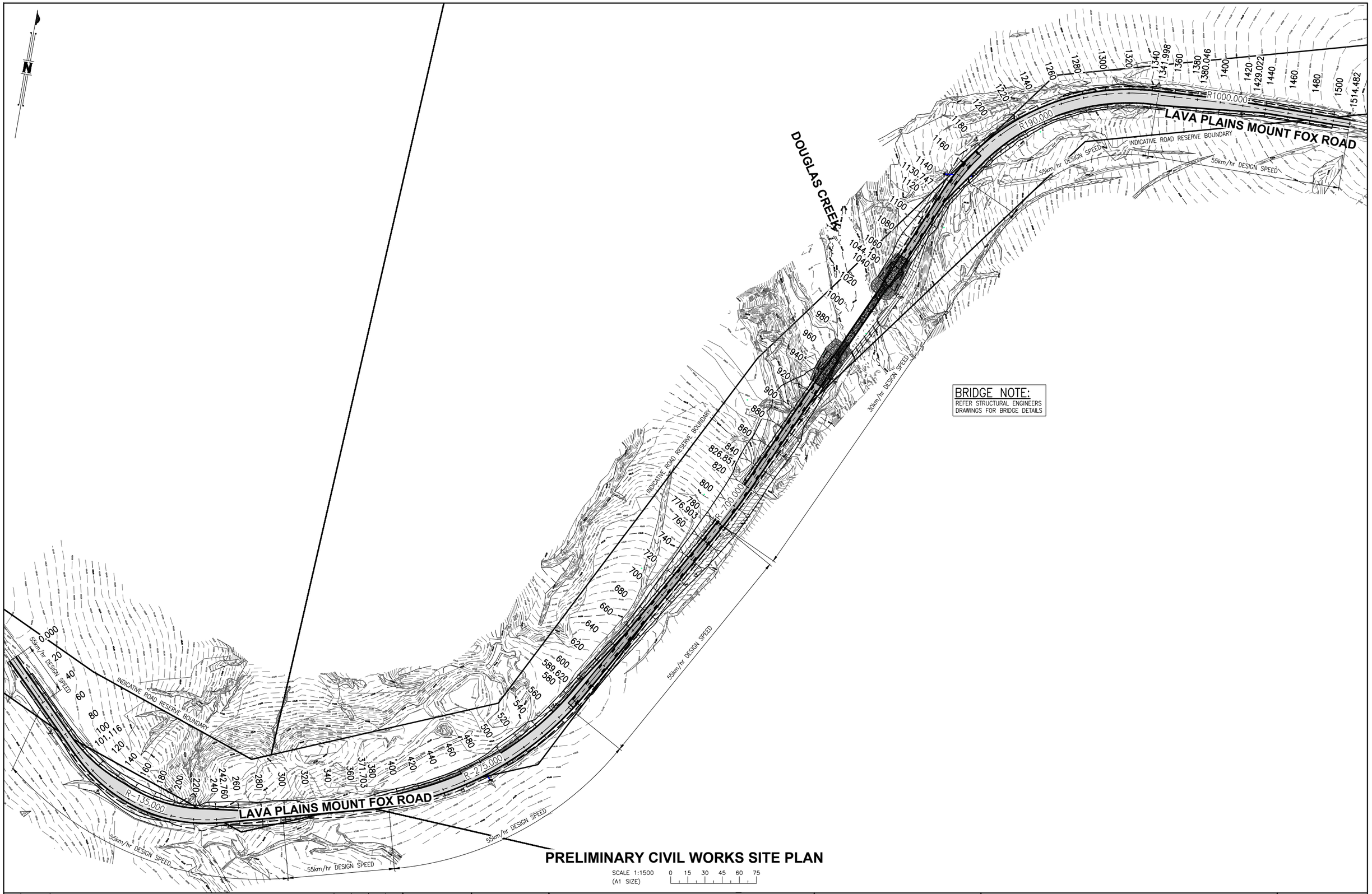

BRIDGE NOTE:
REFER STRUCTURAL ENGINEERS DRAWINGS FOR BRIDGE DETAILS

PRELIMINARY CIVIL WORKS SITE PLAN

SCALE 1:1500 (A1 SIZE) 0 15 30 45 60 75

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	S.J.I.
DATE	APRIL 2026

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PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY CIVIL WORKS SITE PLAN
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26-017-D-PC02
SHEET NUMBER: 02 OF 16
REVISION: B

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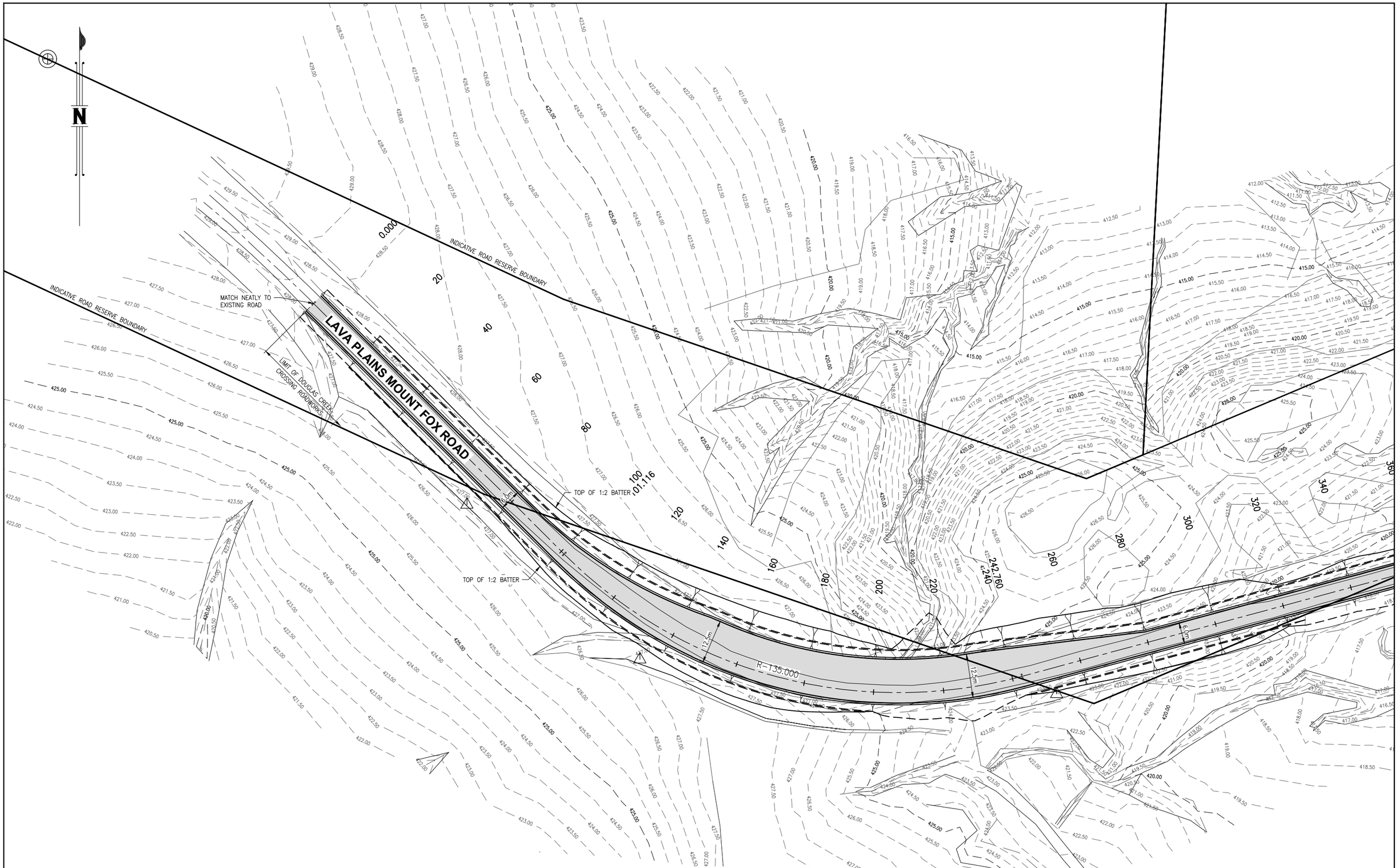

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

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CHECKED P.C.G.
APPROVED S.J.I.
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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS PLAN 1 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC03
SHEET NUMBER 03 OF 27
REVISION B

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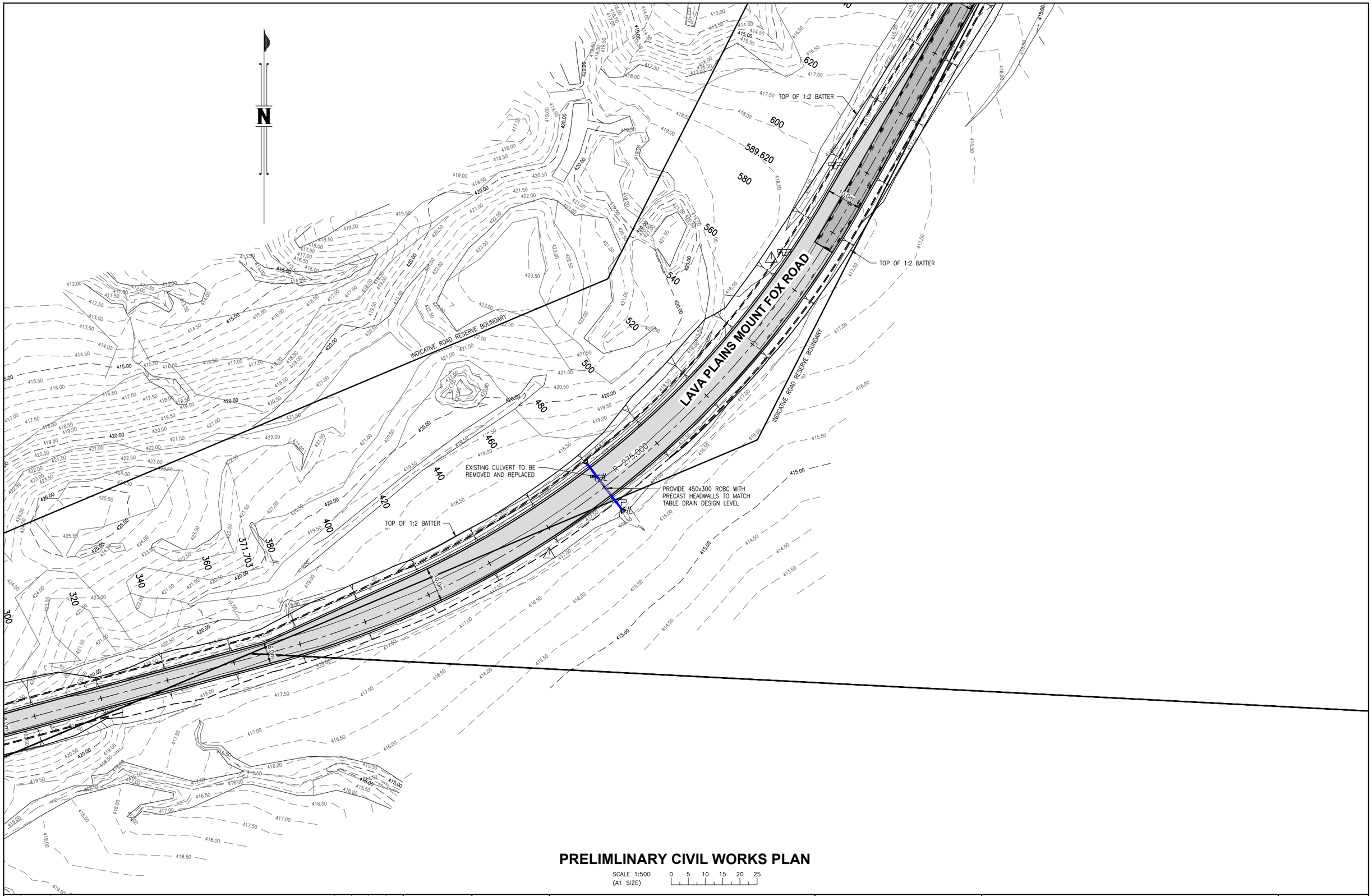

PRELIMLINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

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CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS PLAN 2 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC04
SHEET NUMBER 04 OF 27
REVISION B

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PRELIMLINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

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CHECKED P.C.G.
APPROVED S.J.I.
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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS PLAN 3 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC05
SHEET NUMBER 05 OF 27
REVISION B

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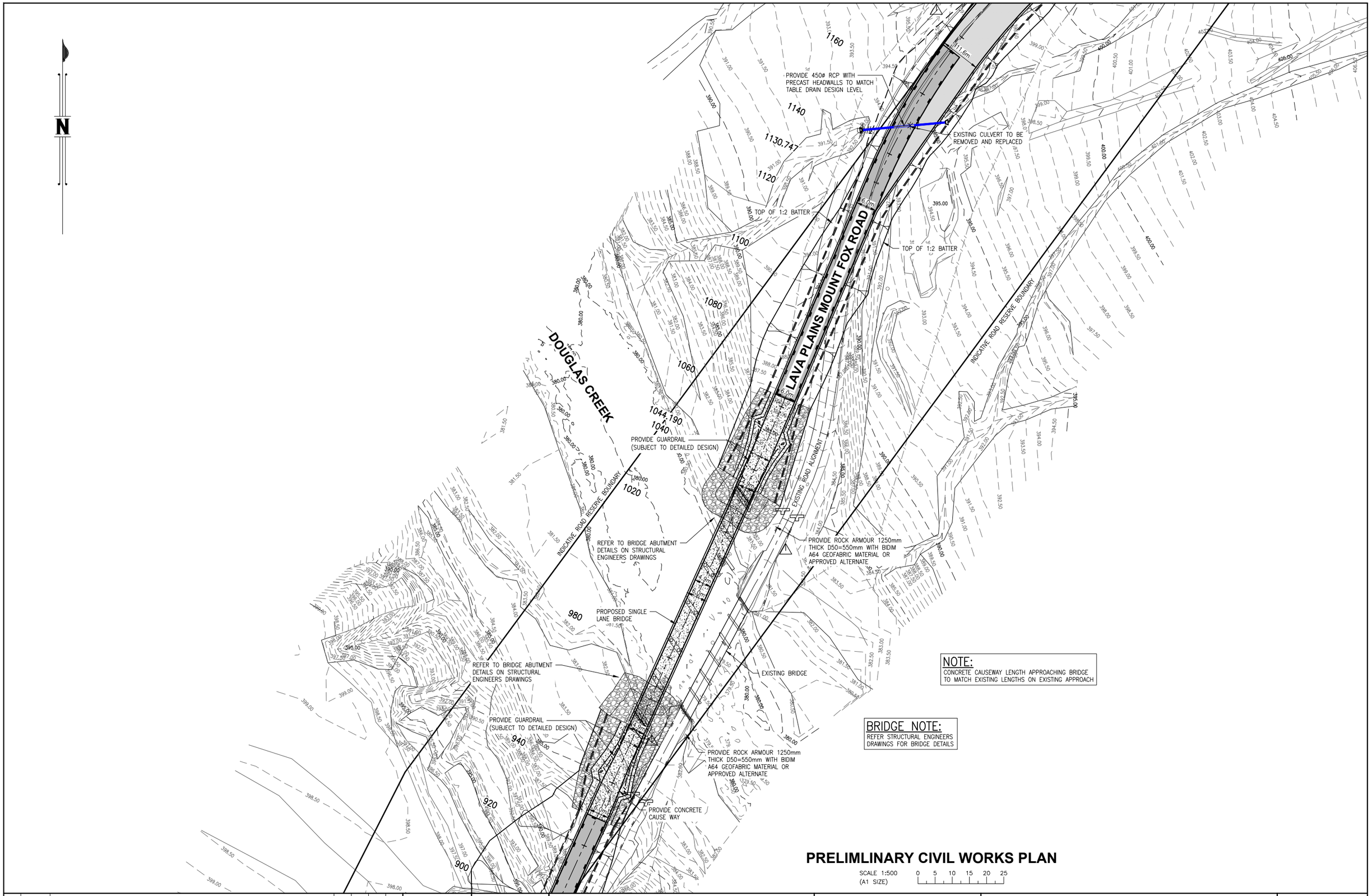

PRELIMLINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS PLAN 4 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC06
SHEET NUMBER 06 OF 27
REVISION B

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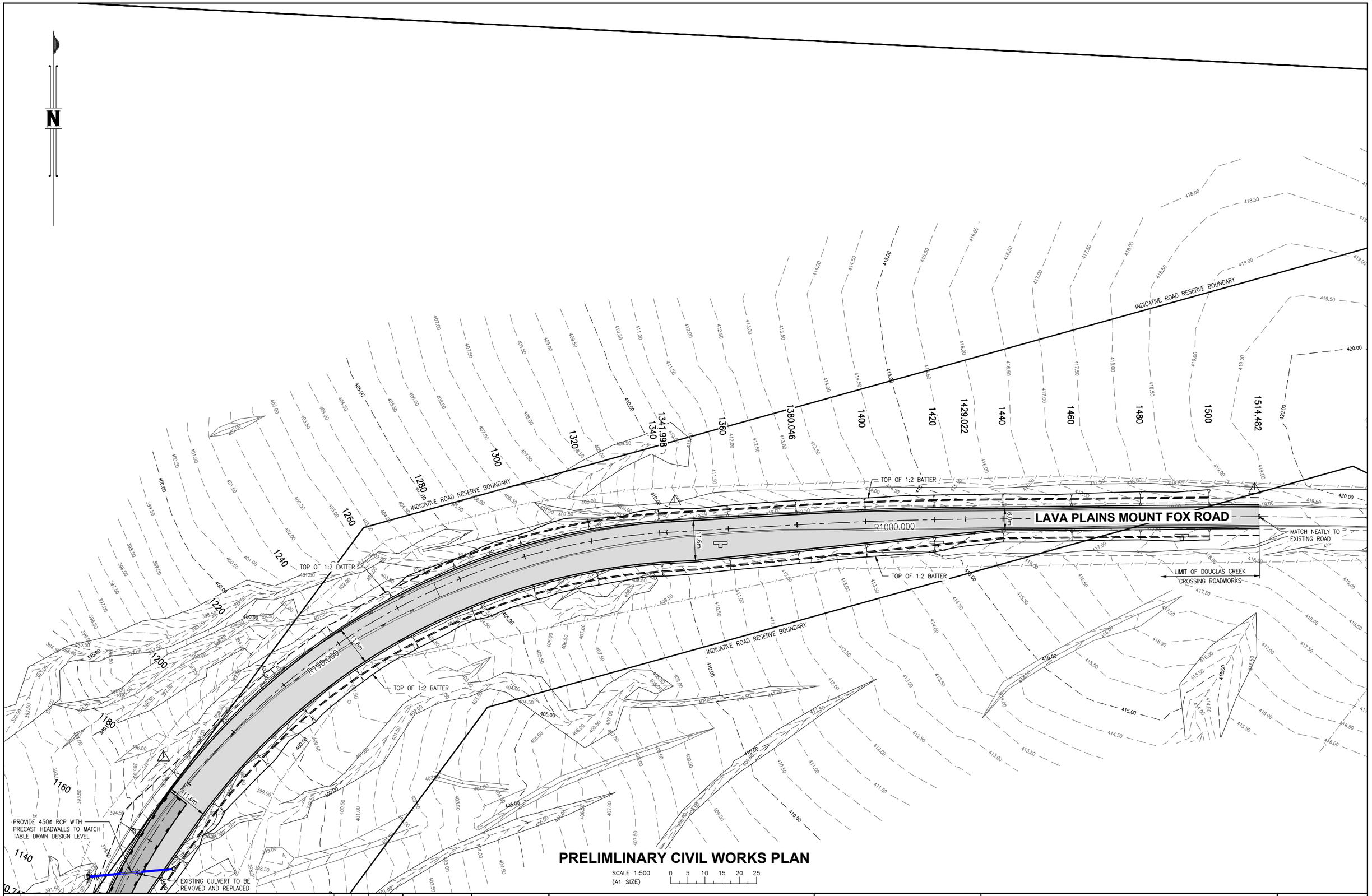

PRELIMLINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY CIVIL WORKS PLAN 5 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC07
SHEET NUMBER 07 OF 27
REVISION B

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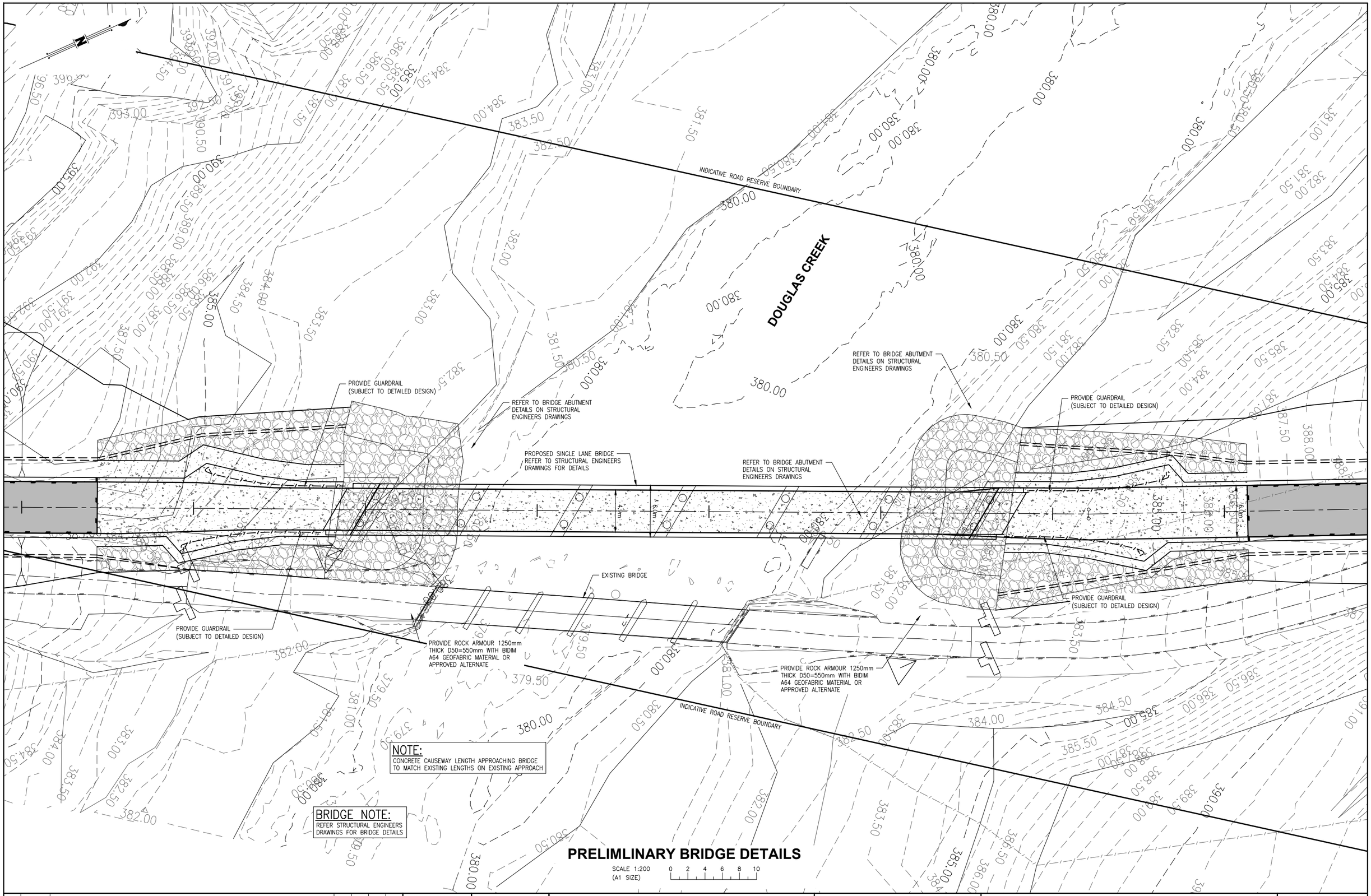

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	S.J.I.
DATE	APRIL 2026

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PROJECT	DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION	DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE	PRELIMINARY BRIDGE DETAILS
CLIENT	DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS	PRELIMINARY N.F.C.
DRAWING NUMBER	G26-017-D-PC08
SHEET NUMBER	08 OF 27
REVISION	B

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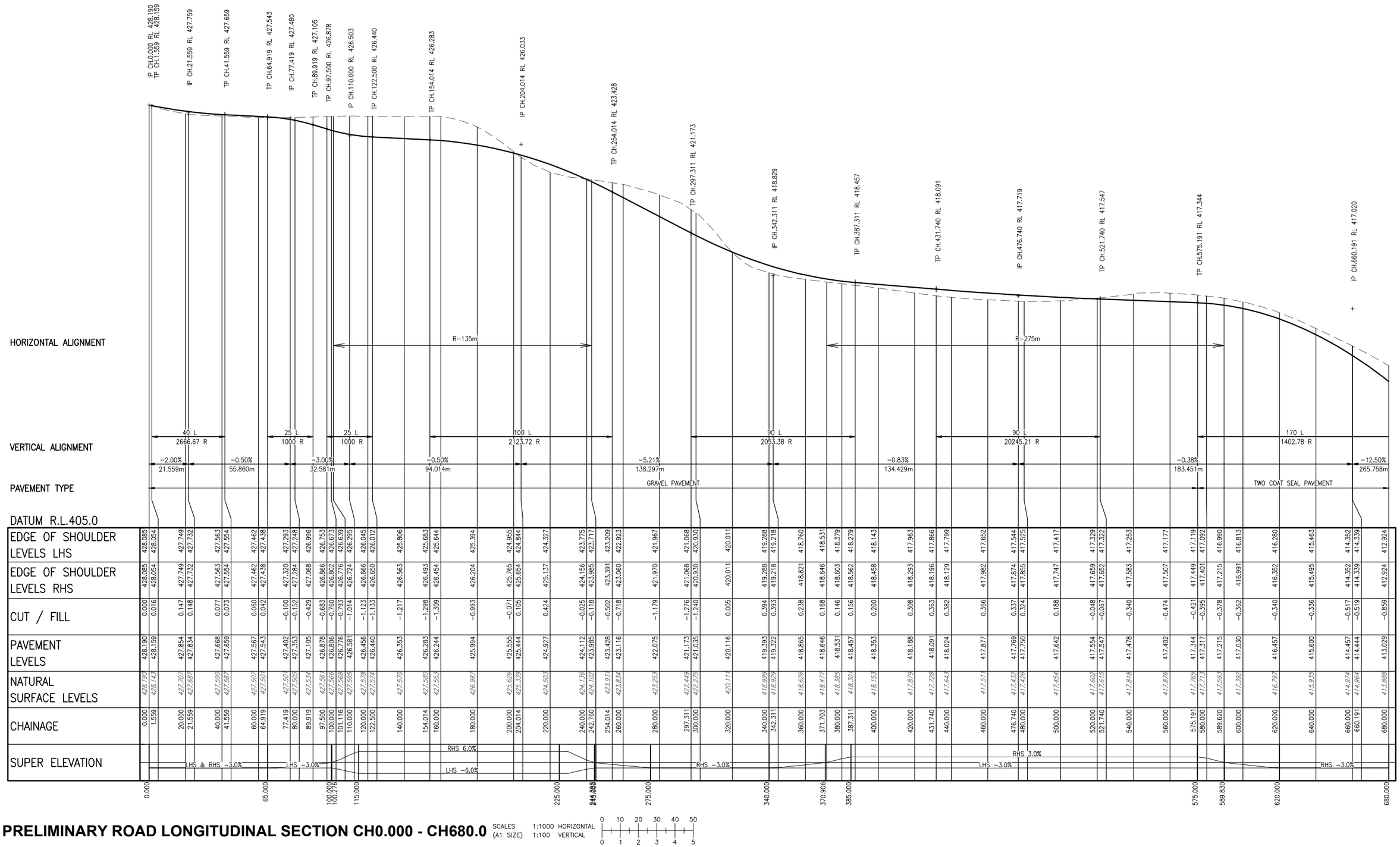

PRELIMINARY ROAD LONGITUDINAL SECTION CH0.000 - CH680.0

SCALES (A1 SIZE) 1:1000 HORIZONTAL 0 10 20 30 40 50
1:100 VERTICAL 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	30% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026
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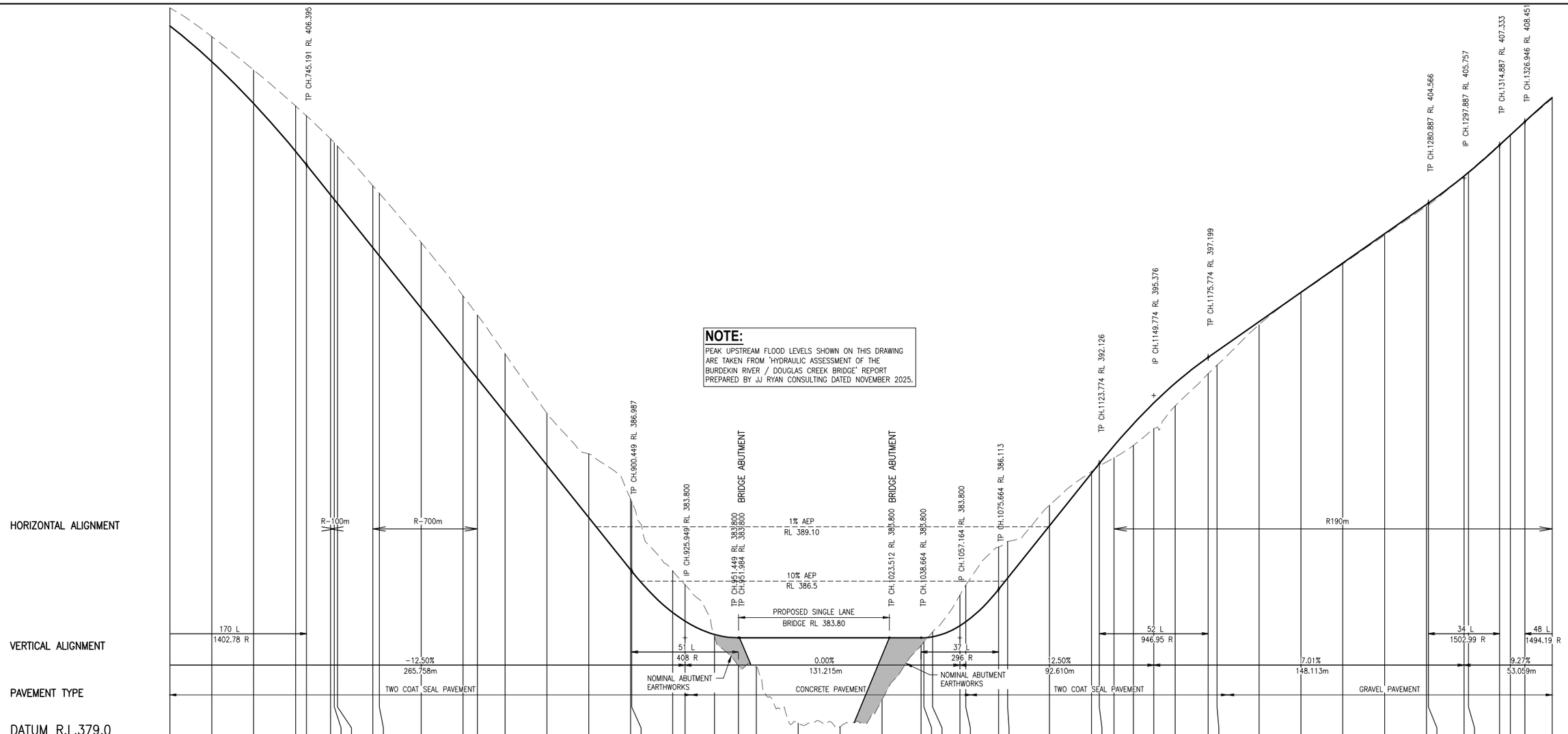
PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY ROAD LONGITUDINAL SECTIONS CH0.000 – CH680.00
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26-017-D-PC09
SHEET NUMBER: 09 OF 29
REVISION: B

G26-017-D-PC_Pre_Road_LSec.dwg



NOTE:
PEAK UPSTREAM FLOOD LEVELS SHOWN ON THIS DRAWING ARE TAKEN FROM 'HYDRAULIC ASSESSMENT OF THE BURDEKIN RIVER / DOUGLAS CREEK BRIDGE' REPORT PREPARED BY JJ RYAN CONSULTING DATED NOVEMBER 2025.

CHAINAGE	EDGE OF SHOULDER LEVELS LHS	EDGE OF SHOULDER LEVELS RHS	CUT / FILL	PAVEMENT LEVELS	NATURAL SURFACE LEVELS
680.000	412.924	412.924	-0.859	413.029	413.888
700.000	411.211	411.211	-1.200	411.316	412.516
720.000	409.212	409.212	-1.598	409.317	410.915
740.000	406.929	406.929	-2.166	407.034	409.200
745.191	406.290	406.290	-2.339	406.395	408.734
756.710	404.850	404.850	-2.675	404.955	407.630
758.513	404.624	404.624	-2.712	404.729	407.441
760.000	404.439	404.439	-2.739	404.544	407.282
776.903	402.326	402.326	-2.963	402.431	405.394
780.000	401.939	401.939	-2.989	402.044	405.033
800.000	399.439	399.439	-3.131	399.544	402.675
820.000	396.939	396.939	-3.087	397.044	400.131
826.851	396.082	396.082	-3.029	396.187	399.216
840.000	394.439	394.439	-2.817	394.544	397.361
860.000	391.939	391.939	-2.490	392.044	394.533
880.000	389.439	389.439	-3.042	389.544	392.586
900.000	386.939	386.939	-3.382	387.044	390.425
900.449	386.882	386.883	-3.334	386.987	390.321
920.000	384.907	384.907	-1.987	385.012	386.999
925.949	384.517	384.517	-1.737	384.597	386.333
940.000	383.840	383.865	0.086	383.961	383.875
951.449	383.726	383.727	1.335	383.800	382.465
960.000	383.726	383.726	1.385	383.800	382.415
980.000	383.726	383.726	4.071	383.800	379.729
1000.000	383.726	383.726	4.251	383.800	379.549
1020.000	383.726	383.726	2.958	383.800	380.842
1038.664	383.695	383.698	0.360	383.800	383.440
1040.000	383.698	383.699	0.204	383.803	383.599
1044.190	383.747	383.767	-0.232	383.852	384.084
1057.164	384.307	384.327	-1.454	384.378	385.832
1060.000	384.464	384.483	-1.749	384.569	386.318
1075.664	386.008	386.026	-2.026	386.113	388.138
1080.000	386.550	386.566	-1.745	386.654	388.400
1100.000	389.050	389.061	-0.985	389.154	390.140
1120.000	391.614	391.555	-0.087	391.654	391.741
1123.774	392.100	392.018	0.115	392.126	392.012
1130.747	392.972	392.819	0.569	392.972	392.403
1140.000	394.123	393.760	1.024	394.015	392.991
1149.774	395.159	394.698	1.231	395.019	393.789
1160.000	396.102	395.608	1.081	395.962	394.881
1175.774	397.339	396.835	0.777	397.199	396.422
1180.000	397.635	397.131	0.667	397.495	396.828
1200.000	399.036	398.532	0.145	398.896	398.751
1220.000	400.438	399.934	0.020	400.298	400.279
1240.000	401.840	401.336	0.049	401.700	401.651
1260.000	403.242	402.738	0.069	403.102	403.033
1280.000	404.643	404.139	0.090	404.503	404.413
1280.887	404.706	404.202	0.092	404.566	404.474
1297.887	405.994	405.490	-0.011	405.853	405.864
1300.000	406.167	405.663	-0.019	406.027	406.046
1314.887	407.473	406.969	-0.030	407.333	407.363
1320.000	407.947	407.443	-0.016	407.807	407.823
1326.946	408.591	408.087	0.013	408.451	408.438
1340.000	409.627	409.316	0.043	409.604	409.561

PRELIMINARY ROAD LONGITUDINAL SECTION CH680.0 - CH1340.0

SCALES (A1 SIZE) 1:1000 HORIZONTAL 1:100 VERTICAL

0 10 20 30 40 50
0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	30% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026
DOCUMENT CONTROL

For and on behalf of WESTERA PARTNERS PTY. LTD.
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NORTHERN NSW T 02 6674 8047 E nsw@westerapartners.com.au
CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR BRAZIER MOTTI PHONE 07 4772 1144
DATUM A.H.D. PSM30343 RL.491.533

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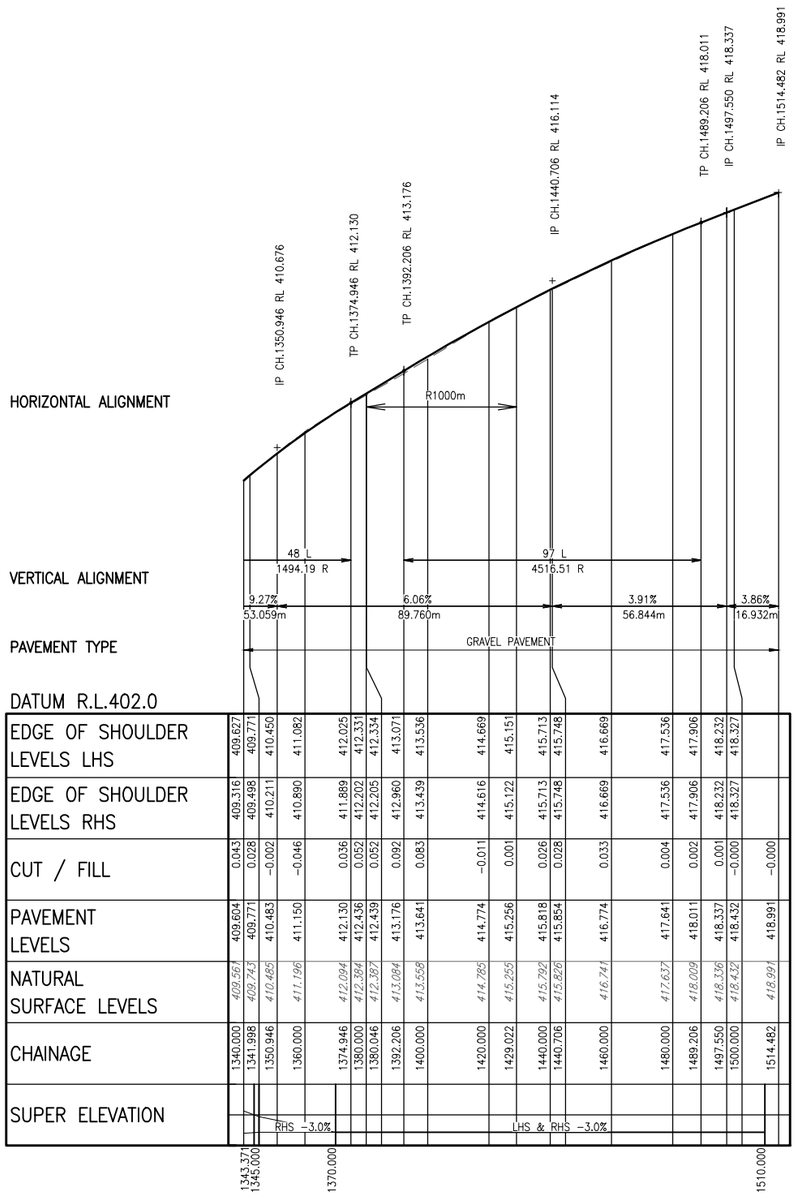
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD LONGITUDINAL SECTIONS CH680.00 – CH1340.00
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC10
SHEET NUMBER 10 OF 29
REVISION B

G26-017-D-PC_Pre_Road_LSec.dwg



EDGE OF SHOULDER LEVELS LHS	409.627	409.771	410.450	411.082	412.025	412.331	412.334	413.071	413.536	414.669	415.151	415.713	415.748	416.669	417.536	417.906	418.232	418.327	
EDGE OF SHOULDER LEVELS RHS	409.316	409.498	410.211	410.890	411.889	412.202	412.205	412.960	413.439	414.616	415.122	415.713	415.748	416.669	417.536	417.906	418.232	418.327	
CUT / FILL	0.043	0.028	−0.002	−0.046	0.036	0.052	0.052	0.092	0.083	−0.011	0.001	0.026	0.028	0.033	0.004	0.002	0.001	−0.000	−0.000
PAVEMENT LEVELS	409.604	409.771	410.483	411.150	412.130	412.436	412.439	413.176	413.641	414.774	415.256	415.818	415.854	416.774	417.641	418.011	418.337	418.432	418.991
NATURAL SURFACE LEVELS	*409.561*	*409.743*	*410.485*	*411.196*	*412.094*	*412.384*	*412.387*	*413.084*	*413.558*	*414.785*	*415.255*	*415.792*	*415.826*	*416.741*	*417.637*	*418.009*	*418.336*	*418.432*	*418.991*
CHAINAGE	1340.000	1341.998	1350.946	1360.000	1374.946	1380.000	1380.046	1392.206	1400.000	1420.000	1429.022	1440.000	1440.706	1460.000	1480.000	1489.206	1497.550	1500.000	1514.482

PRELIMINARY ROAD LONGITUDINAL SECTION CH1340.0 - CH1514.482

SCALES (A1 SIZE) 1:1000 HORIZONTAL 1:100 VERTICAL

0 10 20 30 40 50
0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	30% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026
DOCUMENT CONTROL

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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NORTHERN NSW T 02 6674 8047
E nsw@westerapartners.com.au
CENTRAL VICTORIA T 03 5441 0922
E centralvic@westerapartners.com.au

SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD LONGITUDINAL SECTIONS CH1340.00 – CH1514.482
CLIENT DAVBRIDGE CONSTRUCTIONS

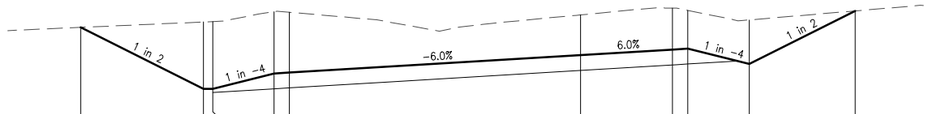
DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC11
SHEET NUMBER 11 OF 29
REVISION B

G26-017-D-PC_Pre_Road_LSec.dwg

Datum R.L. 425.000

DESIGN S.L.	427.459	426.748	426.748	427.248	427.263	427.353	427.294	427.284	426.784	427.015
EXISTING S.L.	*427.459*	*427.321*	*427.291*	*427.323*	*427.379*	*427.505*	*427.361*	*427.244*	*427.025*	*427.015*
DESIGN OFFSET	-7.221	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.962

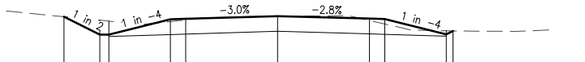
CHAINAGE 80



Datum R.L. 424.000

DESIGN S.L.	427.147	425.144	425.144	425.644	425.674	426.244	426.424	426.454	425.954	427.684
EXISTING S.L.	*427.147*	*427.323*	*427.336*	*427.659*	*427.640*	*427.553*	*427.774*	*427.698*	*427.388*	*427.684*
DESIGN OFFSET	-16.305	-12.300	-12.000	-10.000	-9.500	0.000	3.000	3.500	5.500	8.960

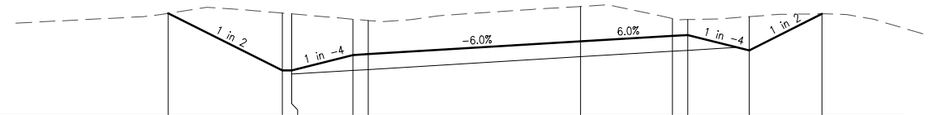
CHAINAGE 160



Datum R.L. 425.000

DESIGN S.L.	427.474	426.890	426.890	427.390	427.405	427.495	427.410	427.396	426.896	427.009
EXISTING S.L.	*427.474*	*427.360*	*427.330*	*427.314*	*427.368*	*427.493*	*427.348*	*427.234*	*427.014*	*427.009*
DESIGN OFFSET	-6.969	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.727

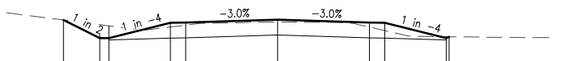
CHAINAGE 70.878



Datum R.L. 424.000

DESIGN S.L.	427.344	425.482	425.482	425.982	426.012	426.428	426.608	426.638	426.138	427.326
EXISTING S.L.	*427.344*	*427.352*	*427.327*	*427.154*	*427.110*	*427.569*	*427.178*	*427.143*	*427.237*	*427.326*
DESIGN OFFSET	-13.450	-9.727	-9.427	-7.427	-6.927	0.000	3.000	3.500	5.500	7.877

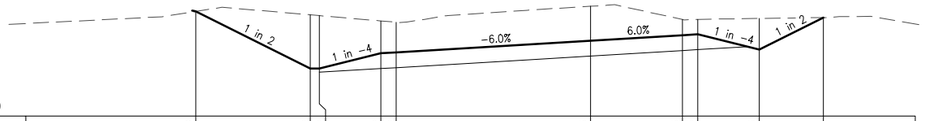
CHAINAGE 125



Datum R.L. 425.000

DESIGN S.L.	427.656	427.063	427.063	427.563	427.578	427.668	427.578	427.563	427.063	427.112
EXISTING S.L.	*427.656*	*427.504*	*427.466*	*427.431*	*427.490*	*427.590*	*427.425*	*427.310*	*427.114*	*427.112*
DESIGN OFFSET	-6.986	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.999

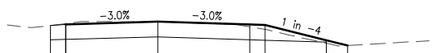
CHAINAGE 40



Datum R.L. 424.000

DESIGN S.L.	427.410	425.545	425.545	426.045	426.075	426.456	426.636	426.666	426.166	427.211
EXISTING S.L.	*427.410*	*427.300*	*427.274*	*427.101*	*427.058*	*427.578*	*427.148*	*427.147*	*427.182*	*427.211*
DESIGN OFFSET	-12.874	-9.144	-8.844	-6.844	-6.344	0.000	3.000	3.500	5.500	7.591

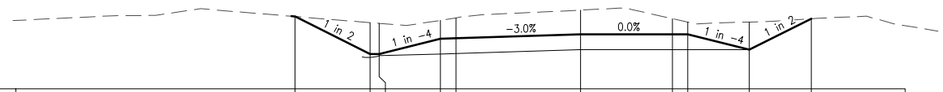
CHAINAGE 120



Datum R.L. 426.000

DESIGN S.L.	428.065	428.101	428.190	428.101	428.086	427.586	427.412
EXISTING S.L.	*428.065*	*428.129*	*428.190*	*428.027*	*427.943*	*427.489*	*427.412*
DESIGN OFFSET	-3.500	-3.000	0.000	3.000	3.500	5.500	6.195

CHAINAGE 0



Datum R.L. 425.000

DESIGN S.L.	427.359	426.139	426.139	426.639	426.654	426.776	426.776	426.776	426.276	427.289
EXISTING S.L.	*427.359*	*427.160*	*427.136*	*427.234*	*427.316*	*427.568*	*427.287*	*427.174*	*427.179*	*427.289*
DESIGN OFFSET	-9.309	-6.868	-6.588	-4.568	-4.088	0.000	3.000	3.500	5.500	7.527

CHAINAGE 101.116

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	30% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
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CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

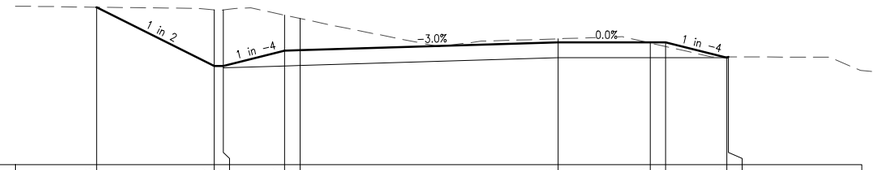
DATUM A.H.D.
PSM30343
RL.491.533

USE FIGURED DIMENSIONS ONLY. DO NOT SCALE, IF A DISCREPANCY ARISES CHECK WITH THE PROJECT ENGINEER AND/OR SUPERVISING AUTHORITY. DO NOT WORK FROM REDUCED SCALE DRAWINGS (A1-A3 SIZE PAPER). COPYRIGHT OF ALL DRAWINGS & WORKS EXECUTED FROM THEM IS VESTED IN WESTERA PARTNERS AND USE OF THERE FORE WITHOUT PERMISSION IS STRICTLY PROHIBITED! IT IS THE BUILDERS RESPONSIBILITY TO ENSURE ALL WORKS ARE CARRIED OUT WITH DUE CARE AND DILIGENCE TO COMPLY WITH THE CONTRACT DOCUMENTS.

PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 1 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC12
SHEET NUMBER 12 OF 29
REVISION B

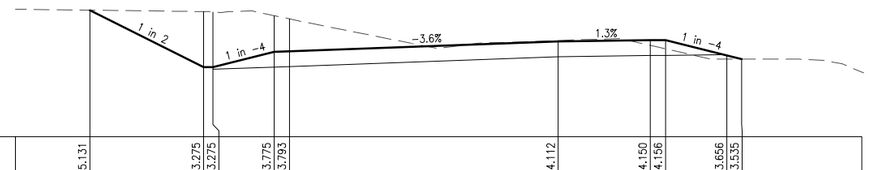
G26-017-D-PC_Pre_Road_XSec.dwg



Datum R.L. 420.000

DESIGN S.L.	425.133		423.217	423.217		423.717	423.732		423.985		423.985	423.985		423.485	423.511	
EXISTING S.L.	*425.133*		*425.049*	*425.044*		*424.873*	*424.766*		*424.102*		*423.964*	*423.851*		*423.511*	*423.511*	
DESIGN OFFSET	-15.056		-11.224	-10.924		-8.924	-8.424		0.000		3.000	3.500		5.500	5.554	

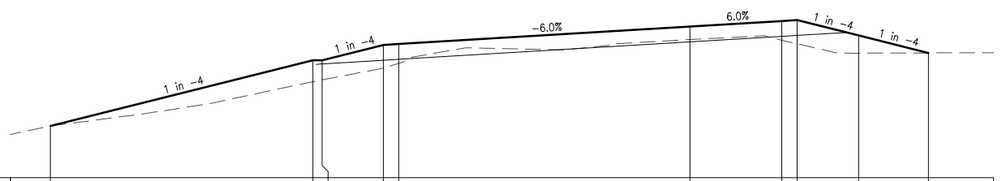
CHAINAGE 242.76



Datum R.L. 421.000

DESIGN S.L.	425.131		423.275	423.275		423.775	423.793		424.112		424.150	424.156		423.656	423.535	
EXISTING S.L.	*425.131*		*425.084*	*425.071*		*424.951*	*424.844*		*424.136*		*423.981*	*423.868*		*423.536*	*423.535*	
DESIGN OFFSET	-15.280		-11.568	-11.268		-9.268	-8.768		0.000		3.000	3.500		5.500	5.985	

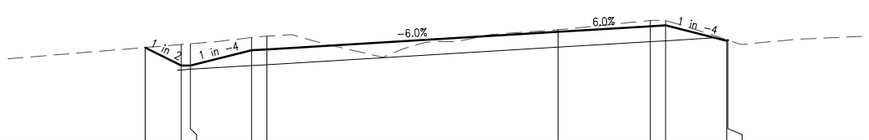
CHAINAGE 240



Datum R.L. 420.000

DESIGN S.L.	421.688		423.827	423.827		424.327	424.357		424.927		425.107	425.137		424.637	424.068	
EXISTING S.L.	*421.688*		*423.128*	*423.186*		*423.579*	*423.728*		*424.503*		*424.482*	*424.366*		*424.059*	*424.068*	
DESIGN OFFSET	-20.858		-12.300	-12.000		-10.000	-9.500		0.000		3.000	3.500		5.500	7.778	

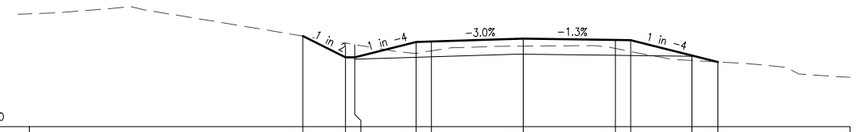
CHAINAGE 220



Datum R.L. 422.000

DESIGN S.L.		425.044	424.455	424.455		424.955	424.985		425.555		425.735	425.765		425.265	425.282	
EXISTING S.L.		*425.044*	*425.141*	*425.166*		*425.368*	*425.417*		*425.626*		*425.921*	*425.925*		*425.293*	*425.282*	
DESIGN OFFSET		-13.479	-12.300	-12.000		-10.000	-9.500		0.000		3.000	3.500		5.500	5.534	

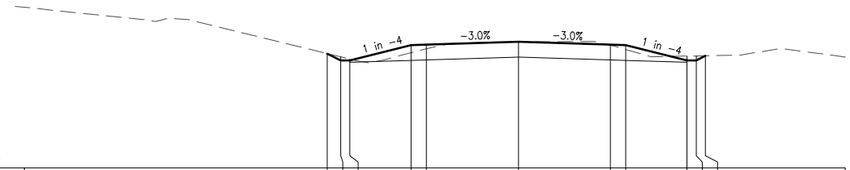
CHAINAGE 200



Datum R.L. 416.000

DESIGN S.L.		418.953	418.260	418.260		418.760	418.775		418.865		418.827	418.821		418.321	418.109	
EXISTING S.L.		*418.953*	*418.724*	*418.675*		*418.389*	*418.469*		*418.626*		*418.548*	*418.449*		*418.155*	*418.109*	
DESIGN OFFSET		-7.187	-5.800	-5.500		-3.500	-3.000		0.000		3.000	3.500		5.500	6.346	

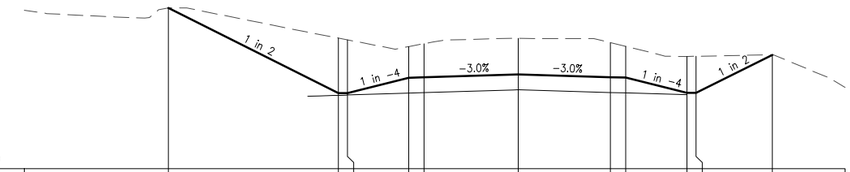
CHAINAGE 360



Datum R.L. 416.000

DESIGN S.L.		419.729	419.511	419.511		420.011	420.026		420.116		420.026	420.011		419.511	419.511	419.659
EXISTING S.L.		*419.729*	*419.622*	*419.549*		*419.763*	*419.888*		*420.111*		*420.003*	*419.867*		*419.649*	*419.654*	*419.659*
DESIGN OFFSET		-6.234	-5.800	-5.500		-3.500	-3.000		0.000		3.000	3.500		5.500	5.800	6.095

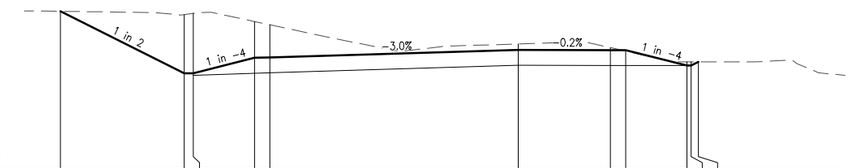
CHAINAGE 320



Datum R.L. 419.000

DESIGN S.L.		424.239		421.467	421.467		421.967	421.982		422.075		421.985	421.970		421.470	421.470	422.711
EXISTING S.L.		*424.239*		*423.259*	*423.201*		*422.981*	*423.076*		*423.253*		*423.111*	*422.989*		*422.659*	*422.665*	*422.711*
DESIGN OFFSET		-11.416		-5.873	-5.573		-3.573	-3.073		0.000		3.000	3.500		5.500	5.800	8.283

CHAINAGE 280



Datum R.L. 420.000

DESIGN S.L.	425.137		423.120	423.120		423.620	423.635		423.879		423.872	423.871		423.371	423.371	423.491
EXISTING S.L.	*425.137*		*425.031*	*425.070*		*424.805*	*424.698*		*424.073*		*423.956*	*423.843*		*423.492*	*423.492*	*423.491*
DESIGN OFFSET	-14.934		-10.902	-10.602		-8.602	-8.102		0.000		3.000	3.500		5.500	5.634	5.874

CHAINAGE 245

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	30% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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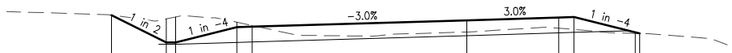
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 2 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC13
SHEET NUMBER 13 OF 29
REVISION B

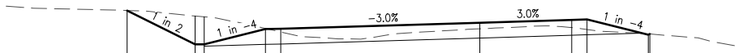
G26-017-D-PC_Pre_Road_XSec.dwg



Datum R.L. 415.000

DESIGN S.L.	418.193	417.299	417.299	417.799	417.814	418.024	418.114	418.129	417.629	417.594				
EXISTING S.L.	*418.193*	*418.071*	*418.132*	*417.964*	*417.856*	*417.643*	*417.764*	*417.723*	*417.598*	*417.594*				
DESIGN OFFSET	-11.589	-9.800	-9.500	-7.500	-7.000	0.000	3.000	3.500	5.500	5.639				

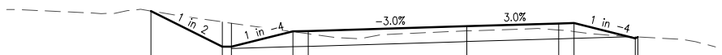
CHAINAGE 440



Datum R.L. 416.000

DESIGN S.L.	418.749	417.643	417.643	418.143	418.158	418.353	418.443	418.458	417.958	417.982				
EXISTING S.L.	*418.749*	*418.571*	*418.541*	*418.162*	*418.047*	*418.153*	*418.193*	*418.131*	*417.986*	*417.982*				
DESIGN OFFSET	-11.504	-9.291	-8.991	-6.991	-6.491	0.000	3.000	3.500	5.500	5.549				

CHAINAGE 400



Datum R.L. 416.000

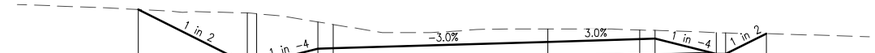
DESIGN S.L.	418.971	417.808	417.808	418.308	418.323	418.478	418.568	418.583	418.083	418.125				
EXISTING S.L.	*418.971*	*418.618*	*418.576*	*418.298*	*418.231*	*418.324*	*418.352*	*418.303*	*418.129*	*418.125*				
DESIGN OFFSET	-10.302	-7.976	-7.676	-5.676	-5.176	0.000	3.000	3.500	5.500	5.584				

CHAINAGE 385

Datum R.L. 416.000

DESIGN S.L.	418.809	418.031	418.031	418.531	418.546	418.646	418.646	418.646	418.146	418.208				
EXISTING S.L.	*418.809*	*418.585*	*418.540*	*418.276*	*418.309*	*418.477*	*418.443*	*418.388*	*418.220*	*418.208*				
DESIGN OFFSET	-7.676	-6.120	-5.820	-3.820	-3.320	0.000	3.000	3.500	5.500	5.625				

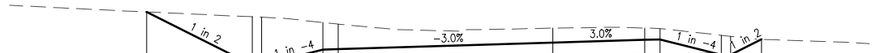
CHAINAGE 371.703



Datum R.L. 416.000

DESIGN S.L.	418.399	416.619	416.619	417.119	417.134	417.344	417.434	417.449	416.949	416.949	417.616			
EXISTING S.L.	*418.399*	*418.288*	*418.267*	*417.992*	*417.910*	*417.767*	*417.729*	*417.718*	*417.646*	*417.635*	*417.616*			
DESIGN OFFSET	-13.359	-9.800	-9.500	-7.500	-7.000	0.000	3.000	3.500	5.500	5.800	7.133			

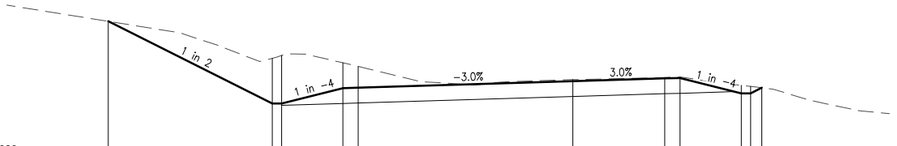
CHAINAGE 575



Datum R.L. 416.000

DESIGN S.L.	418.400	416.677	416.677	417.177	417.192	417.402	417.492	417.507	417.007	417.007	417.510			
EXISTING S.L.	*418.400*	*418.244*	*418.231*	*418.058*	*418.006*	*417.876*	*417.878*	*417.861*	*417.640*	*417.607*	*417.510*			
DESIGN OFFSET	-13.247	-9.800	-9.500	-7.500	-7.000	0.000	3.000	3.500	5.500	5.800	6.807			

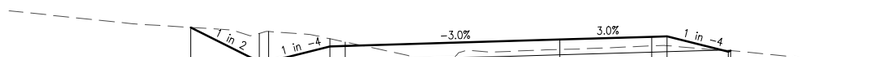
CHAINAGE 560



Datum R.L. 415.000

DESIGN S.L.	419.507	416.829	416.829	417.329	417.344	417.554	417.644	417.659	417.159	417.159	417.341			
EXISTING S.L.	*419.507*	*418.303*	*418.393*	*418.152*	*418.035*	*417.602*	*417.675*	*417.687*	*417.420*	*417.384*	*417.341*			
DESIGN OFFSET	-15.156	-9.800	-9.500	-7.500	-7.000	0.000	3.000	3.500	5.500	5.800	6.163			

CHAINAGE 520



Datum R.L. 415.000

DESIGN S.L.	418.145	417.025	417.025	417.525	417.540	417.750	417.840	417.855	417.355	417.390				
EXISTING S.L.	*418.145*	*417.951*	*418.011*	*417.777*	*417.670*	*417.426*	*417.544*	*417.552*	*417.393*	*417.390*				
DESIGN OFFSET	-12.041	-9.800	-9.500	-7.500	-7.000	0.000	3.000	3.500	5.500	5.570				

CHAINAGE 480

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	30% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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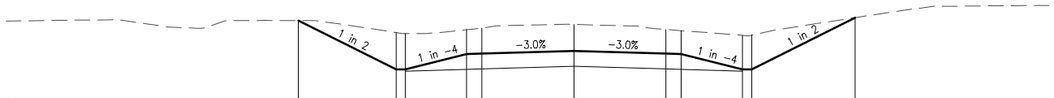
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 3 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC14
SHEET NUMBER 14 OF 29
REVISION B

G26-017-D-PC_Pre_Road_XSec.dwg



Datum R.L. 411.000

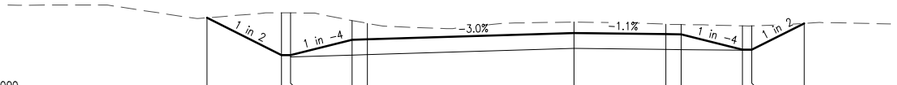
DESIGN S.L.	414.016		412.424	412.424	412.924	412.939	413.029		412.939	412.924	412.424	412.424	414.109										
EXISTING S.L.	*414.016*		*413.626*	*413.595*	*413.717*	*413.772*	*413.889*		*413.723*	*413.686*	*413.533*	*413.538*	*414.109*										
DESIGN OFFSET	-8.985		-5.800	-5.500	-3.500	-3.000	0.000		3.000	3.500	5.500	5.800	9.170										

CHAINAGE 680

Datum R.L. 414.000

DESIGN S.L.	416.131		414.963	414.963	415.463	415.478	415.600		415.510	415.495	414.995	414.995	415.945										
EXISTING S.L.	*416.131*		*415.883*	*415.830*	*415.772*	*415.820*	*415.935*		*415.745*	*415.708*	*415.626*	*415.620*	*415.945*										
DESIGN OFFSET	-9.184		-6.849	-6.549	-4.549	-4.049	0.000		3.000	3.500	5.500	5.800	7.701										

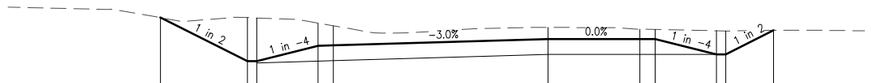
CHAINAGE 640



Datum R.L. 415.000

DESIGN S.L.	417.529		416.313	416.313	416.813	416.828	417.030		416.996	416.991	416.491	416.491	417.346										
EXISTING S.L.	*417.529*		*417.688*	*417.688*	*417.441*	*417.348*	*417.392*		*417.322*	*417.309*	*417.267*	*417.265*	*417.346*										
DESIGN OFFSET	-11.973		-9.540	-9.240	-7.240	-6.740	0.000		3.000	3.500	5.500	5.800	7.510										

CHAINAGE 600



Datum R.L. 415.000

DESIGN S.L.	417.909		416.490	416.490	416.990	417.005	417.215		417.215	417.215	416.715	416.715	417.495										
EXISTING S.L.	*417.909*		*417.911*	*417.900*	*417.733*	*417.645*	*417.593*		*417.537*	*417.525*	*417.480*	*417.473*	*417.495*										
DESIGN OFFSET	-12.639		-9.800	-9.500	-7.500	-7.000	0.000		3.000	3.500	5.500	5.800	7.360										

CHAINAGE 589.62

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	S.J.I.
DATE	APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.

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SURVEYOR BRAZIER MOTTI PHONE 07 4772 1144
DATUM A.H.D. PSM30343 RL.491.533

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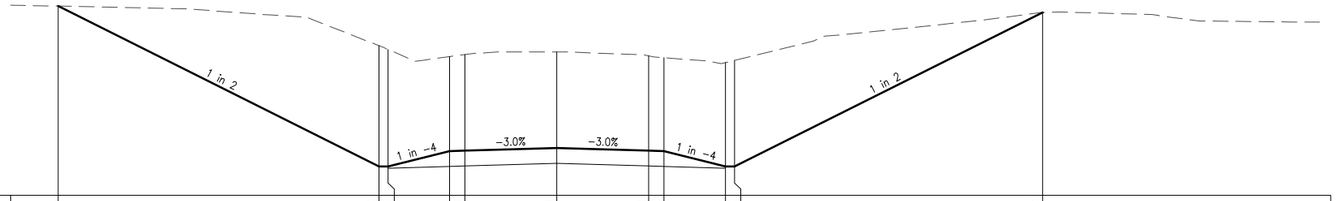
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 4 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC15
SHEET NUMBER 15 OF 29
REVISION B

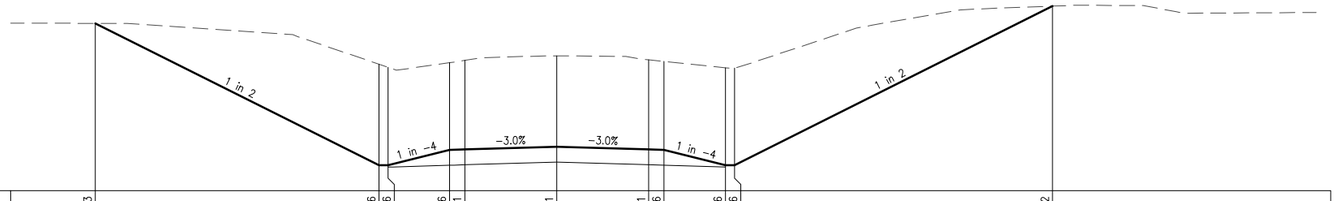
G26-017-D-PC_Pre_Road_XSec.dwg



Datum R.L. 398.000

DESIGN S.L.	404.172	398.939	398.939	399.439	399.454	399.544	399.454	399.439	398.939	398.939	403.963
EXISTING S.L.	*404.172*	*402.878*	*402.753*	*402.522*	*402.590*	*402.675*	*402.544*	*402.484*	*402.327*	*402.400*	*403.963*
DESIGN OFFSET	-16.267	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	15.848

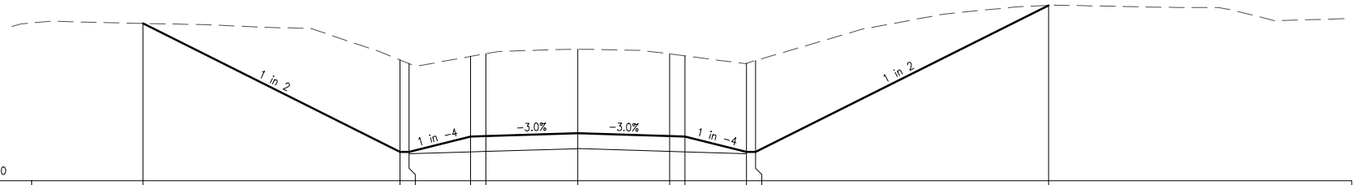
CHAINAGE 800



Datum R.L. 401.000

DESIGN S.L.	406.453	401.826	401.826	402.326	402.341	402.431	402.341	402.326	401.826	401.826	407.012
EXISTING S.L.	*406.453*	*405.118*	*405.016*	*405.167*	*405.245*	*405.394*	*405.262*	*405.210*	*405.005*	*404.993*	*407.012*
DESIGN OFFSET	-15.054	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	16.173

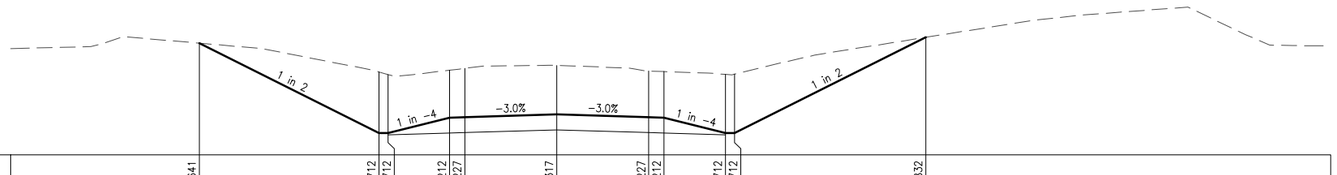
CHAINAGE 776.903



Datum R.L. 403.000

DESIGN S.L.	408.128	403.939	403.939	404.439	404.454	404.544	404.454	404.439	403.939	403.939	408.716
EXISTING S.L.	*408.128*	*406.939*	*406.818*	*407.049*	*407.138*	*407.282*	*407.135*	*407.069*	*406.828*	*406.916*	*408.716*
DESIGN OFFSET	-14.178	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	15.355

CHAINAGE 760



Datum R.L. 408.000

DESIGN S.L.	411.641	408.712	408.712	409.212	409.227	409.317	409.227	409.212	408.712	408.712	411.832
EXISTING S.L.	*411.641*	*410.704*	*410.620*	*410.760*	*410.822*	*410.915*	*410.734*	*410.717*	*410.626*	*410.632*	*411.832*
DESIGN OFFSET	-11.658	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	12.040

CHAINAGE 720

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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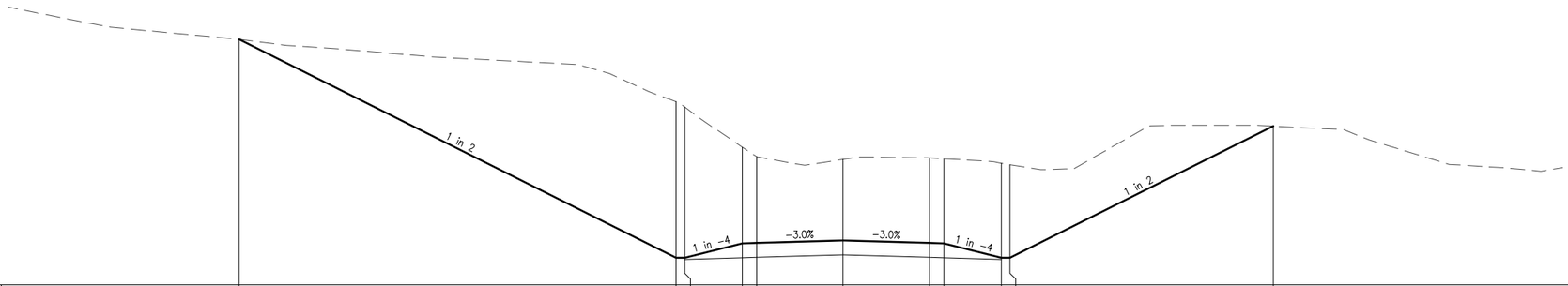
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 5 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC16
SHEET NUMBER 16 OF 29
REVISION B

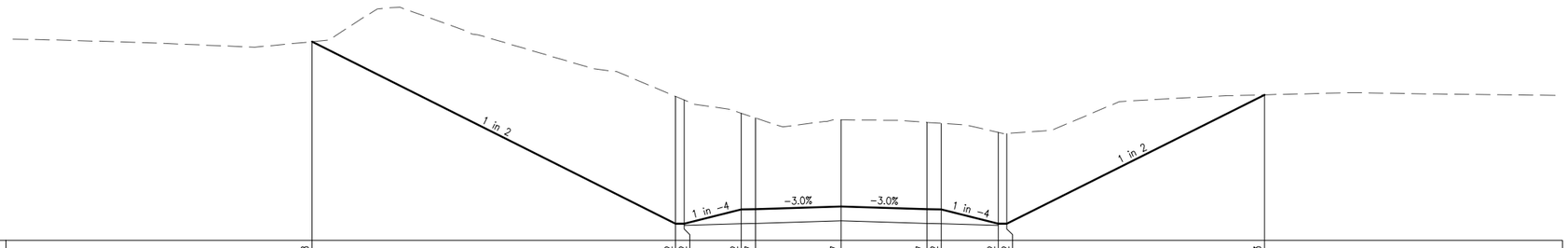
G26-017-D-PC_Pre_Road_XSec.dwg



Datum R.L. 393.000

DESIGN S.L.	401.531	393.939	393.939	394.439	394.454	394.544	394.454	394.439	393.939	393.939	398.515
EXISTING S.L.	*401.531*	*399.365*	*399.178*	*397.786*	*397.455*	*397.361*	*397.412*	*397.383*	*397.224*	*397.176*	*398.515*
DESIGN OFFSET	-20.984	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	14.953

CHAINAGE 840



Datum R.L. 395.000

DESIGN S.L.	401.948	395.582	395.582	396.082	396.097	396.187	396.097	396.082	395.582	395.582	400.093
EXISTING S.L.	*401.949*	*400.037*	*399.911*	*398.446*	*398.281*	*398.216*	*398.128*	*398.094*	*398.780*	*398.737*	*400.093*
DESIGN OFFSET	-18.532	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	14.821

CHAINAGE 826.851

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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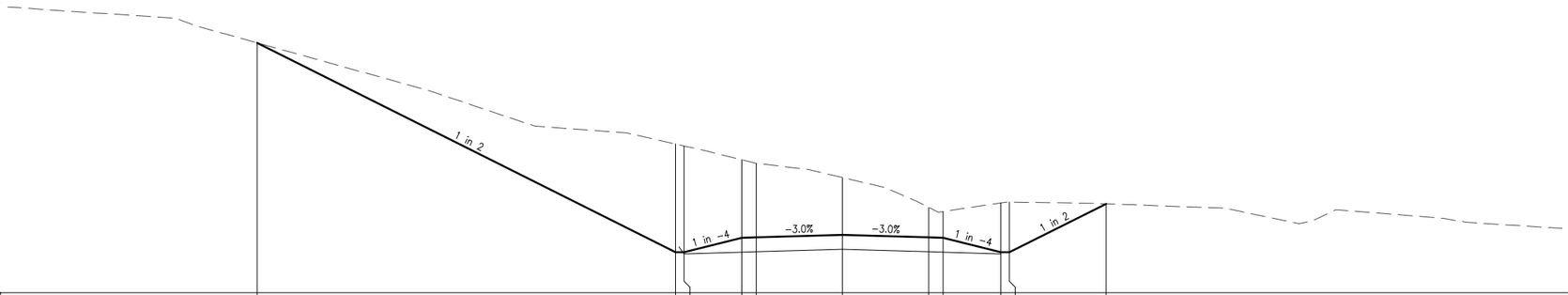
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 6 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC17
SHEET NUMBER 17 OF 29
REVISION B

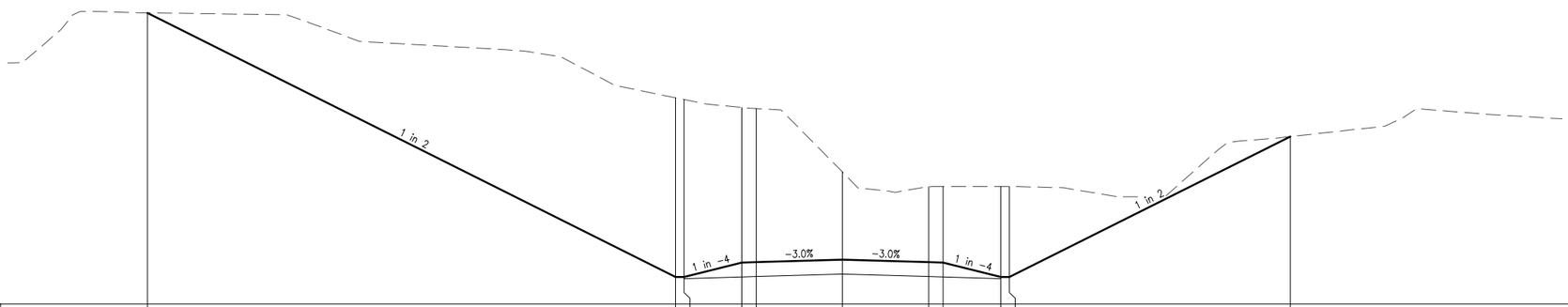
G26-017-D-PC_Pre_Road_XSec.dwg



Datum R.L. 383.000

DESIGN S.L.	391.675	384.407	384.407	384.907	384.922	385.012	384.922	384.907	384.407	384.407	386.085
EXISTING S.L.	*391.675*	*388.164*	*388.096*	*387.616*	*387.494*	*386.999*	*385.961*	*385.819*	*386.118*	*386.146*	*386.085*
DESIGN OFFSET	-20.337	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	9.157

CHAINAGE 920



Datum R.L. 388.000

DESIGN S.L.	398.114	388.939	388.939	389.439	389.454	389.544	389.454	389.439	388.939	388.939	393.817
EXISTING S.L.	*398.114*	*395.163*	*395.102*	*394.827*	*394.788*	*392.586*	*392.072*	*392.084*	*392.084*	*392.083*	*393.817*
DESIGN OFFSET	-24.151	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	15.557

CHAINAGE 880

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026
DOCUMENT CONTROL

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
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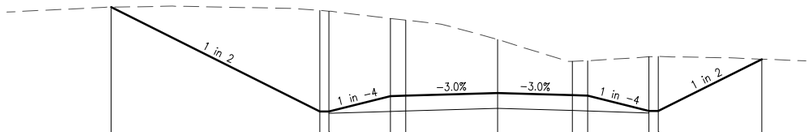
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 7 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC18
SHEET NUMBER 18 OF 29
REVISION B

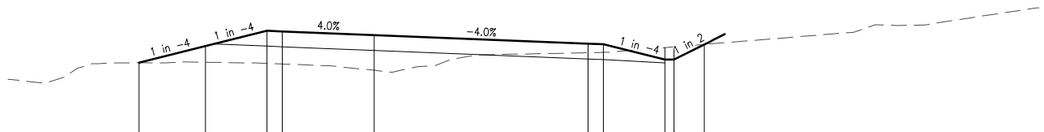
G26-017-D-PC_Pre_Road_XSec.dwg



Datum R.L. 385.000

DESIGN S.L.	389.453		386.050	386.050	386.550	386.565	386.655	386.581	386.566	386.066	386.066	387.757	
EXISTING S.L.	*389.453*		*389.346*	*389.322*	*389.085*	*389.030*	*388.400*	*387.686*	*387.703*	*387.835*	*387.847*	*387.757*	
DESIGN OFFSET	-12.608		-5.800	-5.500	-3.500	-3.000	0.000	2.439	2.939	4.939	5.239	8.620	

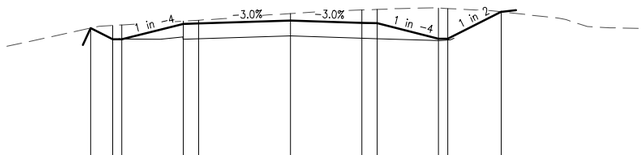
CHAINAGE 1080



Datum R.L. 391.000

DESIGN S.L.	393.640	394.182	394.682	394.662	394.542	394.262	394.242	393.742	393.742	394.240	
EXISTING S.L.	*393.640*	*393.657*	*393.618*	*393.600*	*393.394*	*393.966*	*393.978*	*394.134*	*394.159*	*394.240*	
DESIGN OFFSET	-7.667	-5.500	-3.500	-3.000	0.000	6.980	7.480	9.480	9.780	10.775	

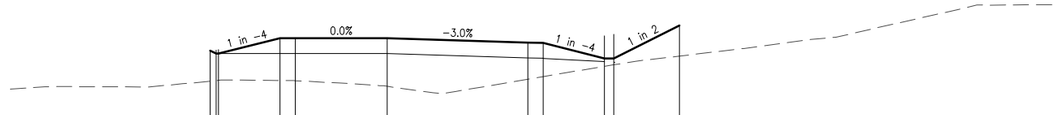
CHAINAGE 1145



Datum R.L. 379.000

DESIGN S.L.	383.607	383.247	383.247	383.747	383.762	383.852	383.782	383.767	383.267	383.267	384.140	
EXISTING S.L.	*383.607*	*383.695*	*383.713*	*383.837*	*383.867*	*384.094*	*384.199*	*384.219*	*384.262*	*384.247*	*384.140*	
DESIGN OFFSET	-6.522	-5.800	-5.500	-3.500	-3.000	0.000	2.328	2.828	4.828	5.128	6.875	

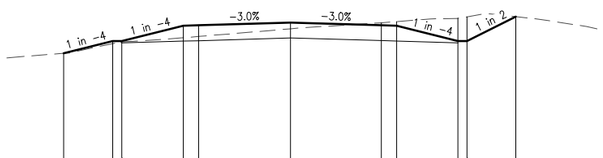
CHAINAGE 1044.19



Datum R.L. 390.000

DESIGN S.L.	392.568	392.472	392.472	392.972	392.972	392.972	392.834	392.819	392.319	392.319	393.391	
EXISTING S.L.	*392.568*	*392.590*	*392.600*	*392.594*	*392.587*	*392.403*	*392.637*	*392.722*	*393.055*	*393.105*	*393.391*	
DESIGN OFFSET	-5.770	-5.578	-5.500	-3.500	-3.000	0.000	4.591	5.091	7.091	7.391	9.533	

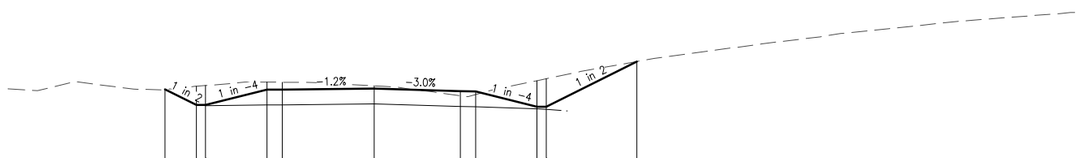
CHAINAGE 1130.747



Datum R.L. 379.000

DESIGN S.L.	382.799	383.198	383.198	383.698	383.713	383.803	383.714	383.699	383.199	383.199	383.995	
EXISTING S.L.	*382.799*	*383.120*	*383.172*	*383.307*	*383.349*	*383.599*	*383.794*	*383.834*	*383.941*	*383.992*	*383.995*	
DESIGN OFFSET	-7.396	-5.800	-5.500	-3.500	-3.000	0.000	2.960	3.460	5.460	5.760	7.353	

CHAINAGE 1040



Datum R.L. 389.000

DESIGN S.L.	391.624	391.114	391.114	391.614	391.620	391.655	391.570	391.555	391.055	391.055	392.533	
EXISTING S.L.	*391.624*	*391.729*	*391.757*	*391.860*	*391.858*	*391.741*	*391.420*	*391.455*	*391.909*	*391.972*	*392.533*	
DESIGN OFFSET	-6.820	-5.800	-5.500	-3.500	-3.000	0.000	2.812	3.312	5.312	5.612	8.567	

CHAINAGE 1120

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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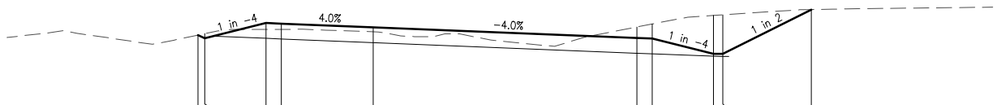
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 8 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC19
SHEET NUMBER 19 OF 29
REVISION B

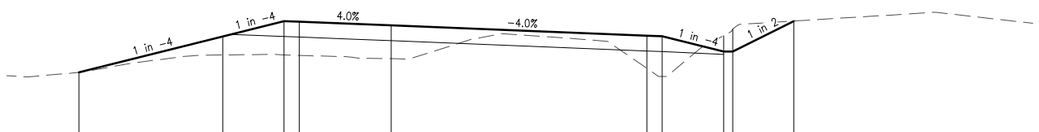
G26-017-D-PC_Pre_Road_XSec.dwg



Datum R.L. 396.000

DESIGN S.L.	398.644	398.536	399.036	399.016	398.896	398.552	398.532	398.032	398.032	399.476
EXISTING S.L.	*398.644*	*398.689*	*398.829*	*398.830*	*398.751*	*398.908*	*399.005*	*399.284*	*399.304*	*399.476*
DESIGN OFFSET	−5.715	−5.500	−3.500	−3.000	0.000	8.600	9.100	11.100	11.400	14.287

CHAINAGE 1200



Datum R.L. 392.000

DESIGN S.L.	394.429	395.602	396.102	396.082	395.962	395.628	395.608	395.108	395.108	396.102
EXISTING S.L.	*394.429*	*394.996*	*395.022*	*394.982*	*394.881*	*394.561*	*394.298*	*395.627*	*395.837*	*396.102*
DESIGN OFFSET	−10.191	−5.500	−3.500	−3.000	0.000	8.339	8.839	10.839	11.139	13.127

CHAINAGE 1160

Datum R.L. 407.000

DESIGN S.L.	408.401	408.371	408.371	408.871	408.851	408.731	408.387	408.367	407.867	407.867	408.524
EXISTING S.L.	*408.401*	*408.376*	*408.397*	*408.739*	*408.792*	*408.703*	*408.792*	*408.835*	*408.686*	*408.664*	*408.524*
DESIGN OFFSET	−5.861	−5.800	−5.500	−3.500	−3.000	0.000	8.600	9.100	11.100	11.400	12.715

CHAINAGE 1330

Datum R.L. 406.000

DESIGN S.L.	407.950	407.447	407.447	407.947	407.927	407.807	407.463	407.443	406.943	406.943	407.725
EXISTING S.L.	*407.950*	*408.110*	*408.068*	*407.806*	*407.865*	*407.823*	*407.639*	*407.742*	*407.870*	*407.848*	*407.725*
DESIGN OFFSET	−6.806	−5.800	−5.500	−3.500	−3.000	0.000	8.600	9.100	11.100	11.400	12.965

CHAINAGE 1320

Datum R.L. 403.000

DESIGN S.L.	404.074	404.143	404.143	404.643	404.623	404.503	404.159	404.139	403.639	403.639	404.343
EXISTING S.L.	*404.074*	*404.115*	*404.173*	*404.264*	*404.368*	*404.413*	*404.548*	*404.614*	*404.551*	*404.506*	*404.343*
DESIGN OFFSET	−6.079	−5.800	−5.500	−3.500	−3.000	0.000	8.600	9.100	11.100	11.400	12.808

CHAINAGE 1280

Datum R.L. 400.000

DESIGN S.L.	401.685	401.340	401.840	401.820	401.700	401.356	401.336	400.836	400.836	401.727
EXISTING S.L.	*401.685*	*401.653*	*401.652*	*401.695*	*401.651*	*401.634*	*401.648*	*401.682*	*401.688*	*401.727*
DESIGN OFFSET	−6.191	−5.500	−3.500	−3.000	0.000	8.600	9.100	11.100	11.400	13.182

CHAINAGE 1240

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	S.J.I.
DATE	APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.

APPROVED

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E centralvic@westerapartners.com.au

SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY ROAD CROSS SECTIONS 9 OF 10
CLIENT: DAVBRIDGE CONSTRUCTIONS

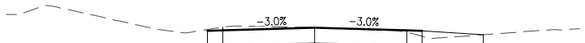
DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26–017–D–PC20
SHEET NUMBER: 20 OF 29
REVISION: B

G26–017–D–PC_Pre_Road_XSec.dwg

Datum R.L. 412.000

DESIGN S.L.	413.576	413.036	413.036	413.536	413.551	413.641	413.454	413.439	412.939	412.939	413.547
EXISTING S.L.	413.576	413.435	413.396	413.465	413.573	413.558	413.330	413.395	413.668	413.711	413.547
DESIGN OFFSET	-6.880	-5.800	-5.500	-3.500	-3.000	0.000	6.239	6.739	8.739	9.039	10.256

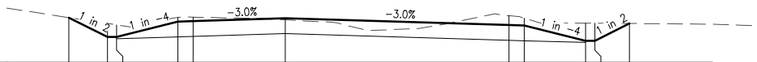
CHAINAGE 1400



Datum R.L. 417.000

DESIGN S.L.	418.886	418.901	418.991	418.901	418.886	418.762
EXISTING S.L.	418.871	418.910	418.991	418.877	418.709	418.762
DESIGN OFFSET	-3.500	-3.000	0.000	3.000	3.500	5.500

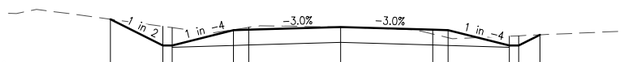
CHAINAGE 1514.482



Datum R.L. 411.000

DESIGN S.L.	412.462	411.834	411.834	412.334	412.349	412.439	412.220	412.205	411.705	411.705	412.270
EXISTING S.L.	412.462	412.270	412.225	412.465	412.479	412.387	412.523	412.443	412.280	412.278	412.270
DESIGN OFFSET	-7.057	-5.800	-5.500	-3.500	-3.000	0.000	7.300	7.800	9.800	10.100	11.229

CHAINAGE 1380.046



Datum R.L. 416.000

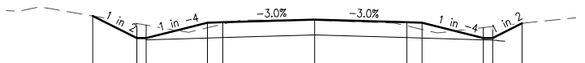
DESIGN S.L.	417.895	417.036	417.036	417.536	417.551	417.641	417.551	417.536	417.036	417.036	417.385
EXISTING S.L.	417.895	417.662	417.621	417.551	417.632	417.637	417.411	417.293	417.341	417.354	417.385
DESIGN OFFSET	-7.518	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	6.498

CHAINAGE 1480

Datum R.L. 409.000

DESIGN S.L.	411.106	410.582	410.582	411.082	411.092	411.150	410.905	410.890	410.390	410.390	410.931
EXISTING S.L.	411.106	410.898	410.848	411.295	411.289	411.196	411.116	411.223	410.939	410.937	410.931
DESIGN OFFSET	-6.847	-5.800	-5.500	-3.500	-3.000	0.000	8.172	8.672	10.672	10.972	12.056

CHAINAGE 1360



Datum R.L. 414.000

DESIGN S.L.	415.933	415.213	415.213	415.713	415.728	415.818	415.728	415.713	415.213	415.213	415.695
EXISTING S.L.	415.933	415.685	415.634	415.548	415.665	415.792	415.614	415.496	415.552	415.587	415.695
DESIGN OFFSET	-7.239	-5.800	-5.500	-3.500	-3.000	0.000	3.000	3.500	5.500	5.800	6.764

CHAINAGE 1440

Datum R.L. 408.000

DESIGN S.L.	409.851	409.271	409.271	409.771	409.771	409.771	409.513	409.498	408.998	408.998	409.636
EXISTING S.L.	409.851	409.644	409.589	409.851	409.859	409.743	409.858	409.825	409.704	409.693	409.636
DESIGN OFFSET	-6.960	-5.800	-5.500	-3.500	-3.000	0.000	8.600	9.100	11.100	11.400	12.677

CHAINAGE 1341.998

Datum R.L. 414.000

DESIGN S.L.	415.323	414.651	414.651	415.151	415.166	415.256	415.137	415.122	414.622	414.622	415.131
EXISTING S.L.	415.323	415.103	415.054	414.911	415.081	415.255	414.891	414.898	415.035	415.057	415.131
DESIGN OFFSET	-7.144	-5.800	-5.500	-3.500	-3.000	0.000	3.984	4.484	6.484	6.784	7.803

CHAINAGE 1429.022

PRELIMINARY ROAD CROSS SECTIONS

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

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SURVEYOR BRAZIER MOTTI PHONE 07 4772 1144
DATUM A.H.D. PSM30343 RL.491.533

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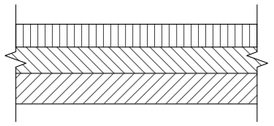
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD CROSS SECTIONS 10 OF 10
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC21
SHEET NUMBER 21 OF 29
REVISION B

G26-017-D-PC_Pre_Road_XSec.dwg

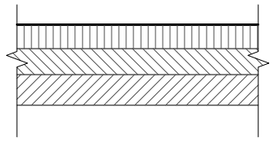


150mm BASE UNBOUND PAVEMENT, TYPE 2.1, CBR >80
170mm UPPER SUBBASE, TYPE 2.3, CBR >45
200mm LOWER SUBBASE, TYPE 2.3, CBR >45 (IF ORDERED)

THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE SUBJECT TO DETAILED DESIGN AND SEPARATE COUNCIL APPROVAL FOLLOWING CBR TESTS OF THE SUBGRADE MATERIAL PLUS LOCAL GRAVEL AVAILABLE

DETAIL A - TYPICAL GRAVEL PAVEMENT SECTION

NTS

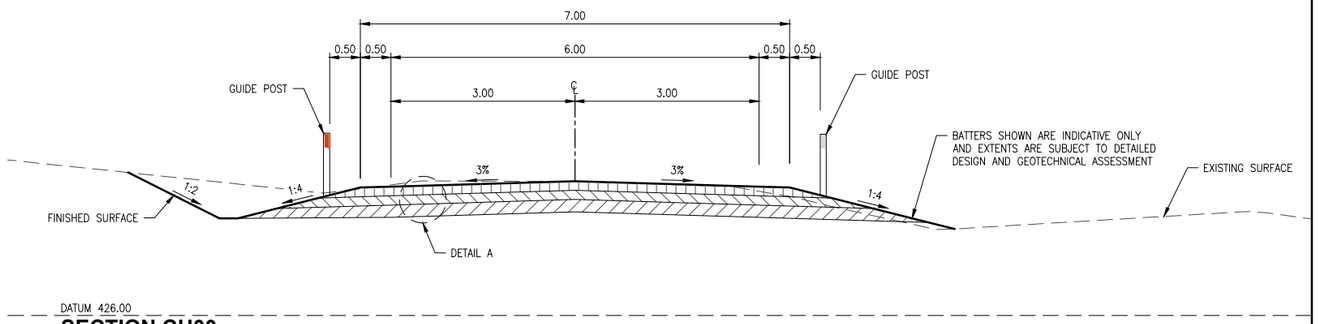


14/10 2-COAT SEAL
7mm PRIMER SEAL
150mm BASE UNBOUND PAVEMENT, TYPE 2.1, CBR >80
170mm UPPER SUBBASE, TYPE 2.3, CBR >45
200mm LOWER SUBBASE, TYPE 2.3, CBR >45 (IF ORDERED)

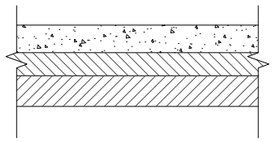
THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE SUBJECT TO DETAILED DESIGN AND SEPARATE COUNCIL APPROVAL FOLLOWING CBR TESTS OF THE SUBGRADE MATERIAL PLUS LOCAL GRAVEL AVAILABLE

DETAIL B - TYPICAL 2-COAT SEAL PAVEMENT SECTION

NTS



SECTION CH00

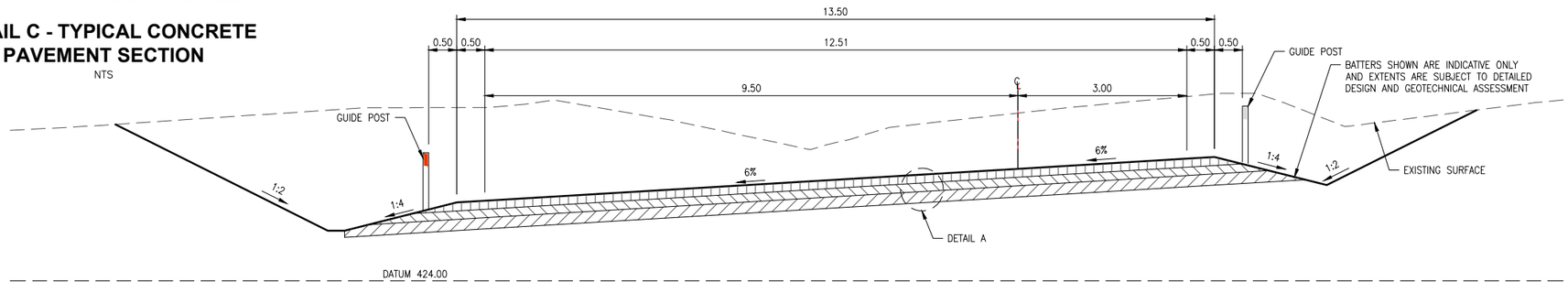


180mm CONCRETE PAVEMENT (40 MPa)
150mm UPPER SUBBASE, TYPE 2.3, CBR >45
200mm LOWER SUBBASE, TYPE 2.3, CBR >45 (IF ORDERED)

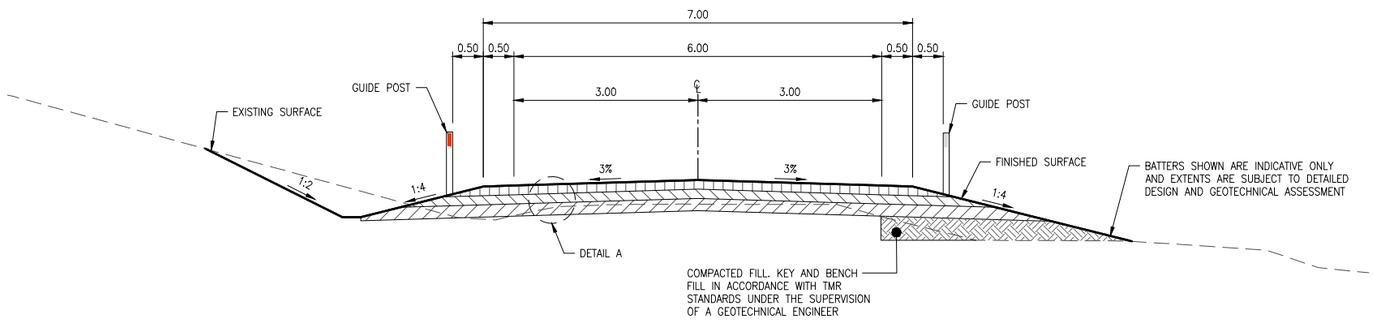
THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE SUBJECT TO DETAILED DESIGN AND SEPARATE COUNCIL APPROVAL FOLLOWING CBR TESTS OF THE SUBGRADE MATERIAL PLUS LOCAL GRAVEL AVAILABLE

DETAIL C - TYPICAL CONCRETE PAVEMENT SECTION

NTS



SECTION CH180



SECTION CH340

ROAD TYPICAL SECTIONS

SCALE 1:50 (A1 SIZE) 0 0.5 1.0 1.5 2.0 2.5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	S.J.I.
DATE	APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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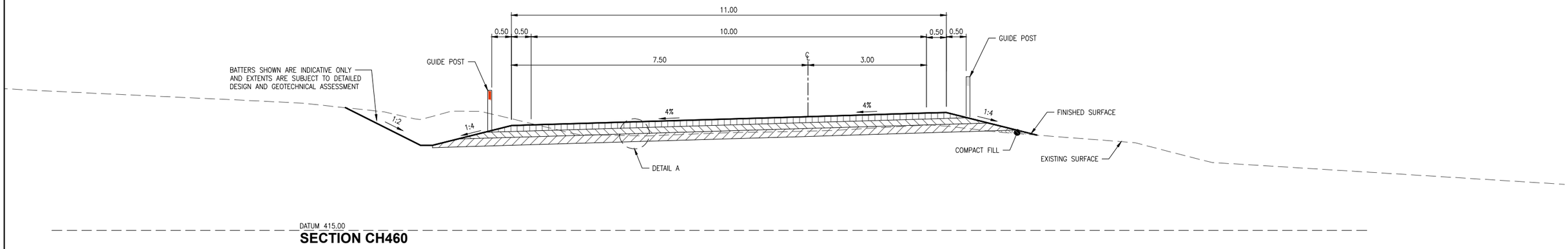
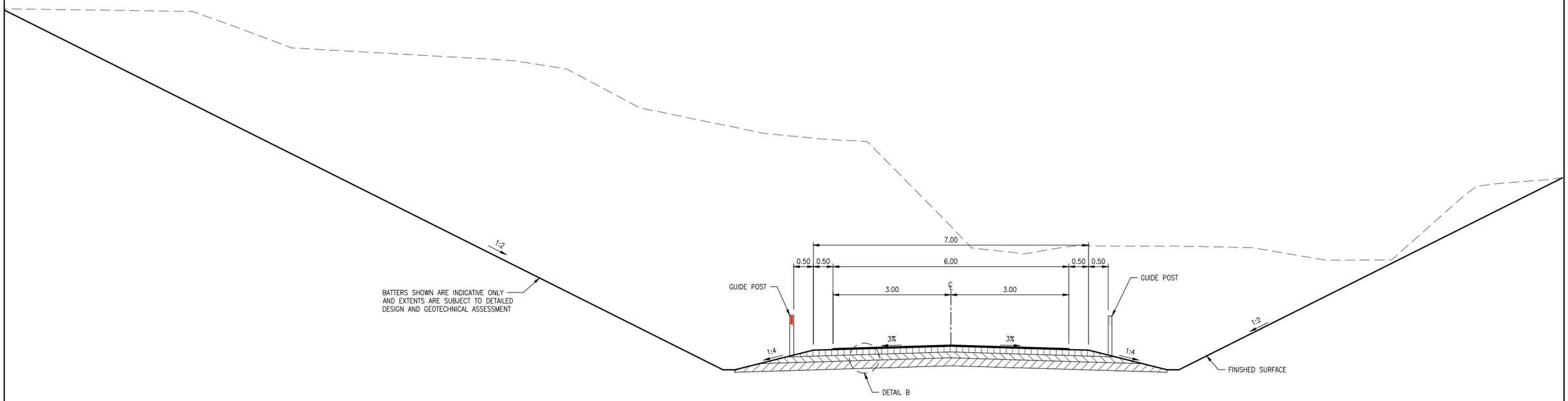
PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY ROAD TYPICAL SECTIONS 1 of 4
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26-017-D-PC22
SHEET NUMBER: 22 OF 29
REVISION: B

G26-017-D-PC_Pre_Typ_Sec.dwg



SECTION CH460



DATUM 385.00

SECTION CH880

ROAD TYPICAL SECTIONS

SCALE 1:50 (A1 SIZE) 0 0.5 1.0 1.5 2.0 2.5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
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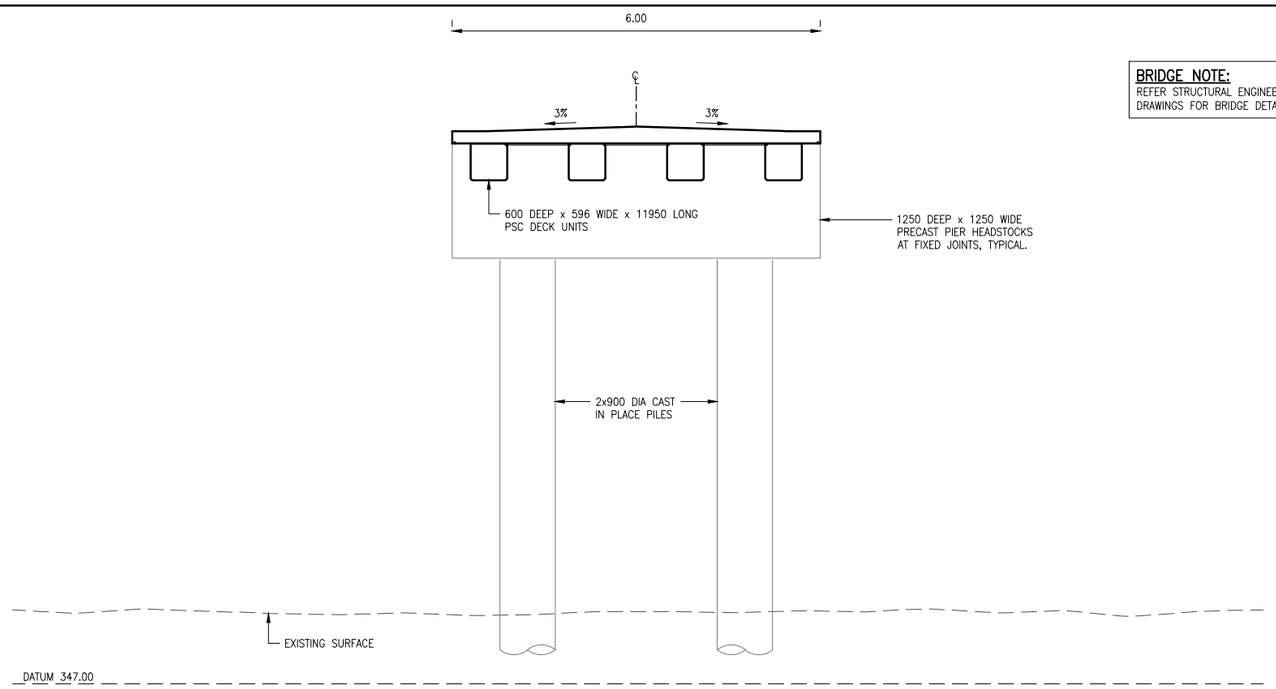
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD TYPICAL SECTIONS 2 of 4
CLIENT DAVBRIDGE CONSTRUCTIONS

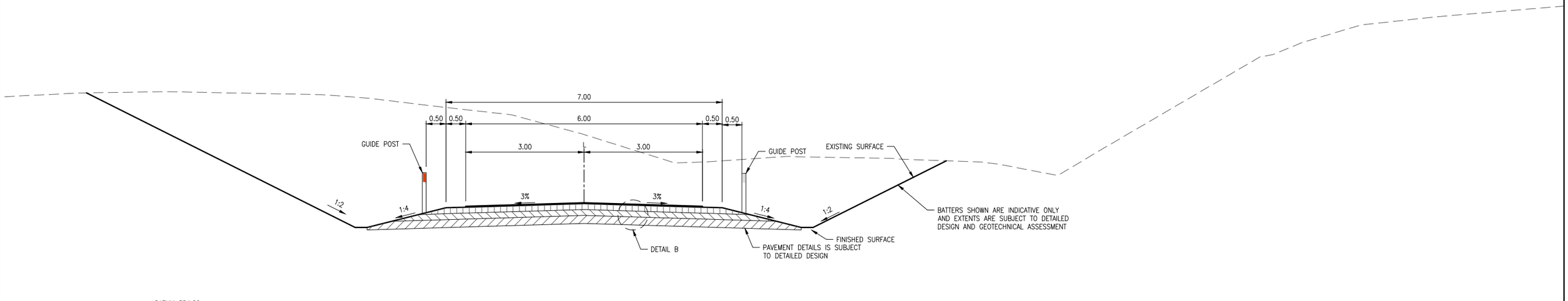
DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC23
SHEET NUMBER 23 OF 29
REVISION B

G26-017-D-PC_Pre_Typ_Sec.dwg



BRIDGE NOTE:
REFER STRUCTURAL ENGINEERS DRAWINGS FOR BRIDGE DETAILS

SECTION CH980



SECTION CH1080

ROAD TYPICAL SECTIONS

SCALE 1:50
(A1 SIZE)
0 0.5 1.0 1.5 2.0 2.5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL
DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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NORTHERN NSW T 02 6674 8047 E nsw@westerapartners.com.au
CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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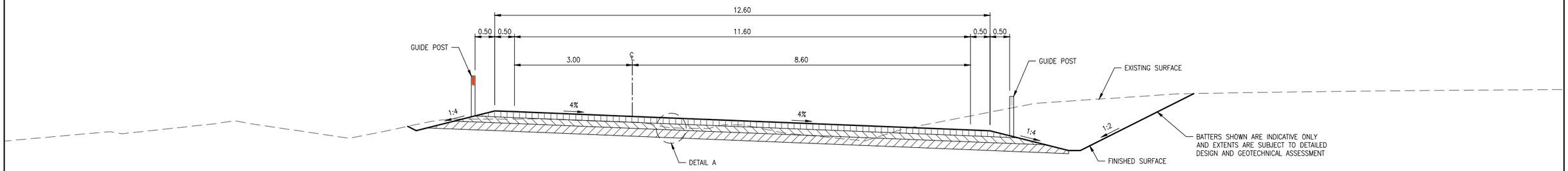
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD TYPICAL SECTIONS 3 of 4
CLIENT DAVBRIDGE CONSTRUCTIONS

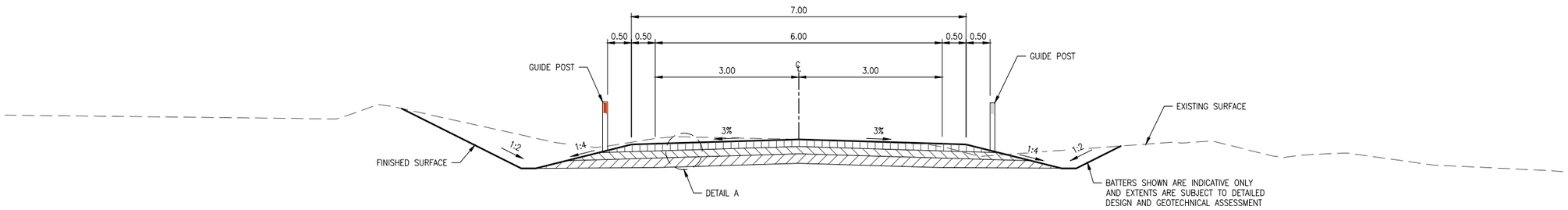
DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PC24
SHEET NUMBER 24 OF 29
REVISION B

G26-017-D-PC_Pre_Typ_Sec.dwg



DATUM 395.00

SECTION CH1200



DATUM 417.00

SECTION CH1514.48

ROAD TYPICAL SECTIONS

SCALE 1:50 (A1 SIZE) 0 0.5 1.0 1.5 2.0 2.5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL	
DESIGNED	W.J.H.
DRAWN	W.J.H.
CHECKED	P.C.G.
APPROVED	S.J.I.
DATE	APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.

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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
PSM30343
RL.491.533

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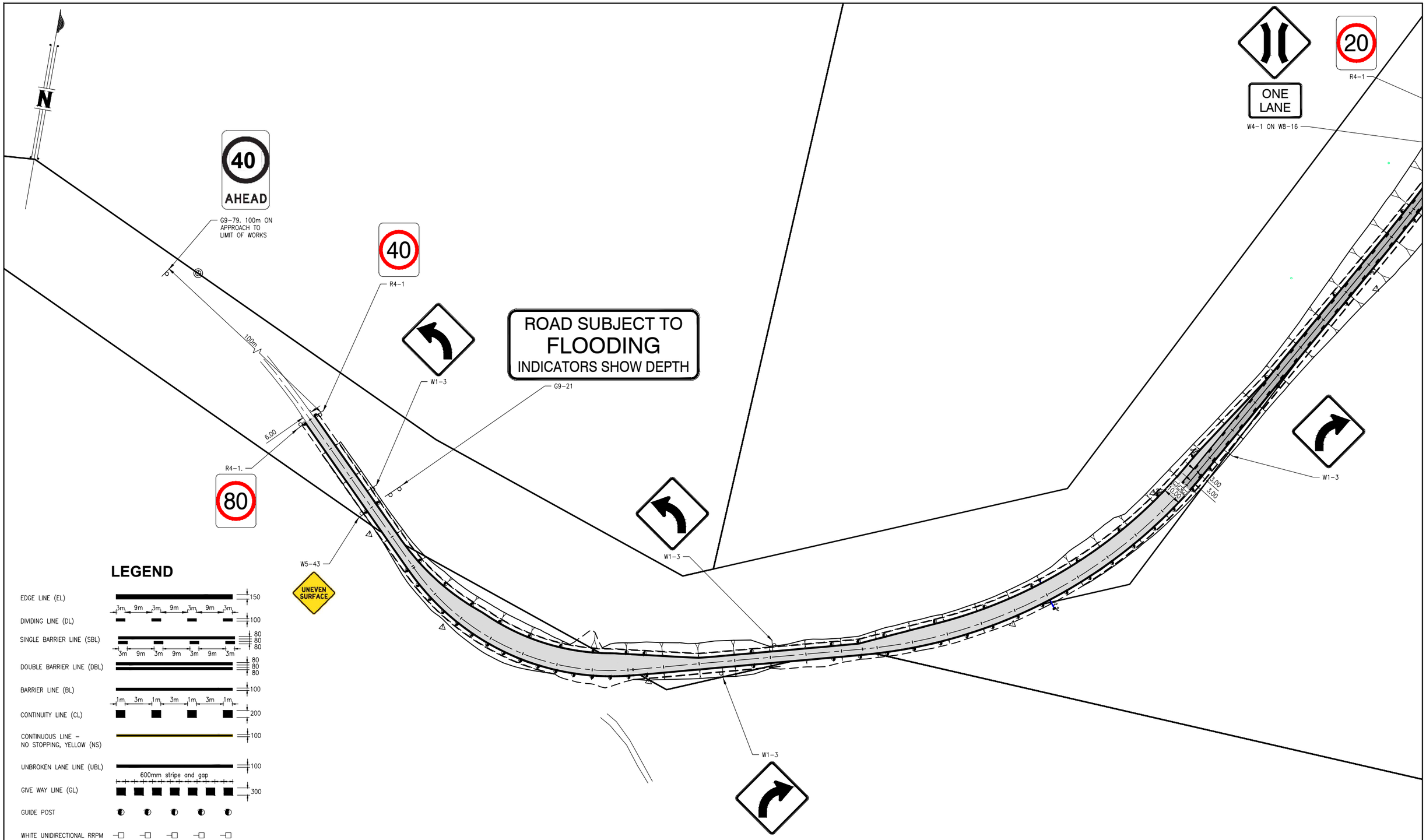
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY ROAD TYPICAL SECTIONS 4 of 4
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26–017–D–PC25
SHEET NUMBER: 25 OF 29
REVISION: B

G26–017–D–PC_Pre_Typ_Sec.dwg



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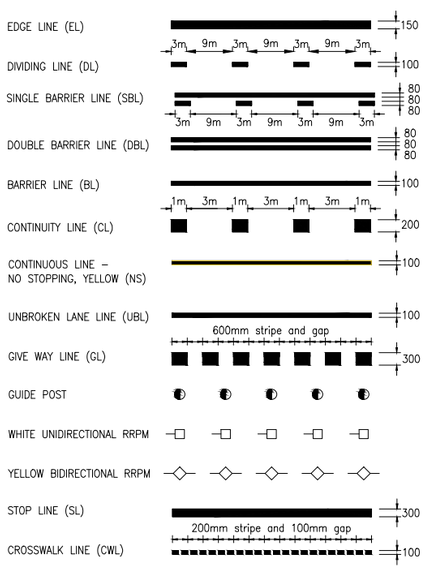

PRELIMINARY SIGNAGE PLAN

SCALE 1:1000 (A1 SIZE) 0 10 20 30 40 50

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL	
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DATE	APRIL 2026

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BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
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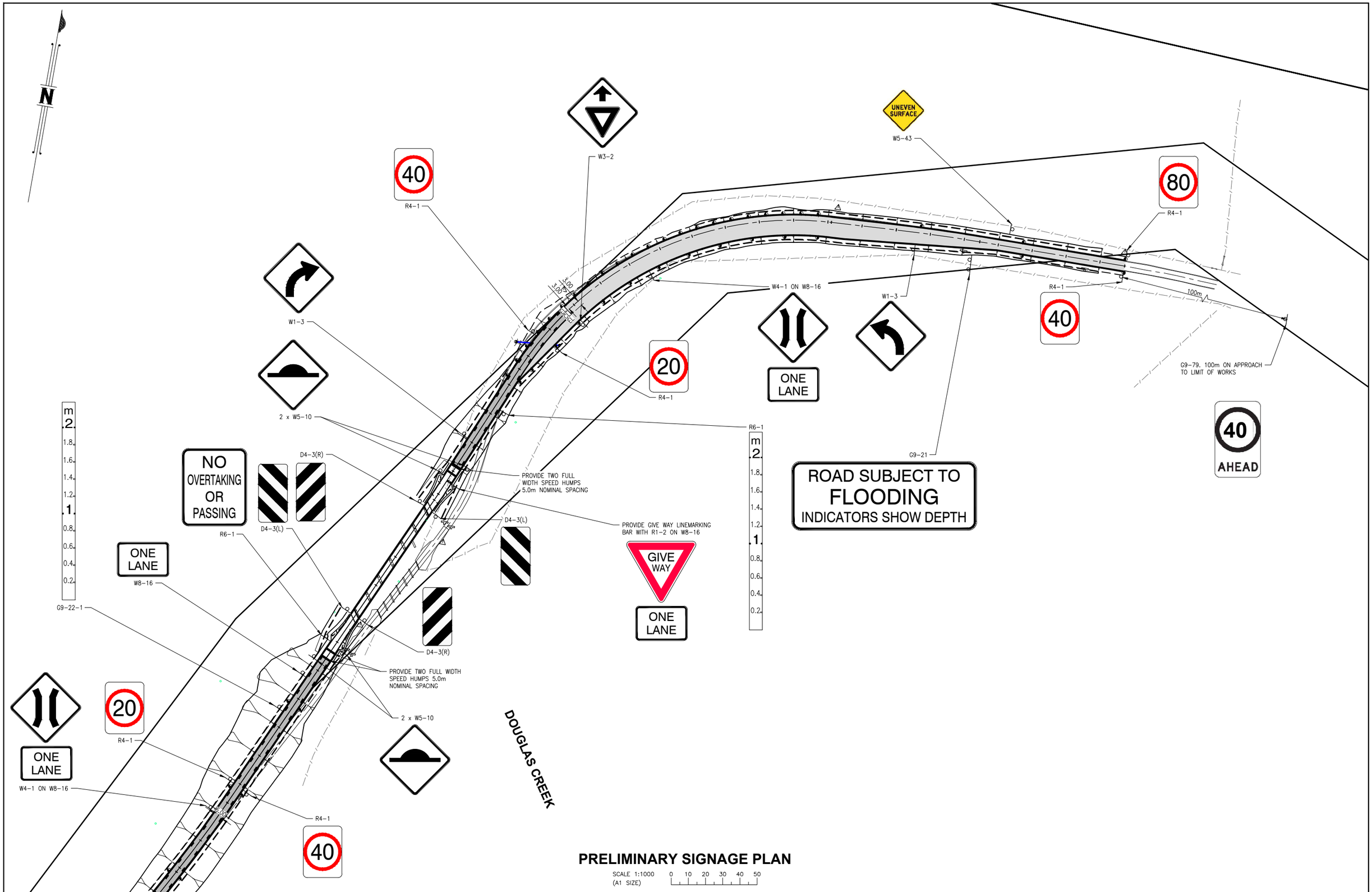
PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY ROAD SIGNAGE PLAN 1 OF 2
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26-017-D-PC26
SHEET NUMBER: 26 OF 29
REVISION: B

G26-017-D-PC_Pre_Linemarking.dwg



PRELIMINARY SIGNAGE PLAN

SCALE 1:1000 (A1 SIZE) 0 10 20 30 40 50

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
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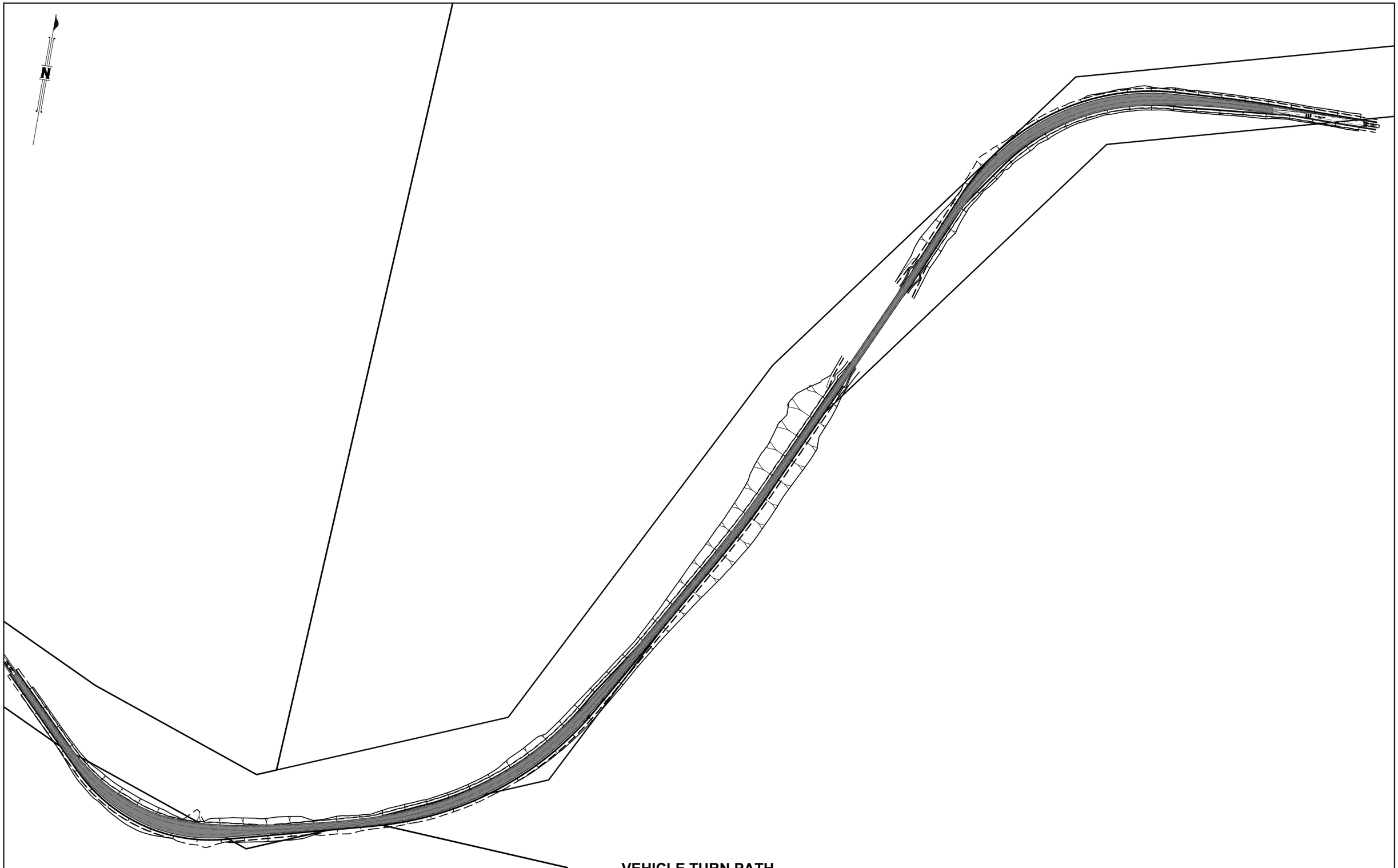
PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY ROAD SIGNAGE PLAN 2 OF 2
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26-017-D-PC27
SHEET NUMBER: 27 OF 29
REVISION: B

G26-017-D-PC_Pre_Linemarking.dwg



VEHICLE TURN PATH

SCALE 1:1500 (A1 SIZE)

0 15 30 45 60 75

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL

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CHECKED P.C.G.
APPROVED S.J.I.
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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY VEHICLE TURN PATH
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26–017–D–PC28
SHEET NUMBER 28 OF 29
REVISION B

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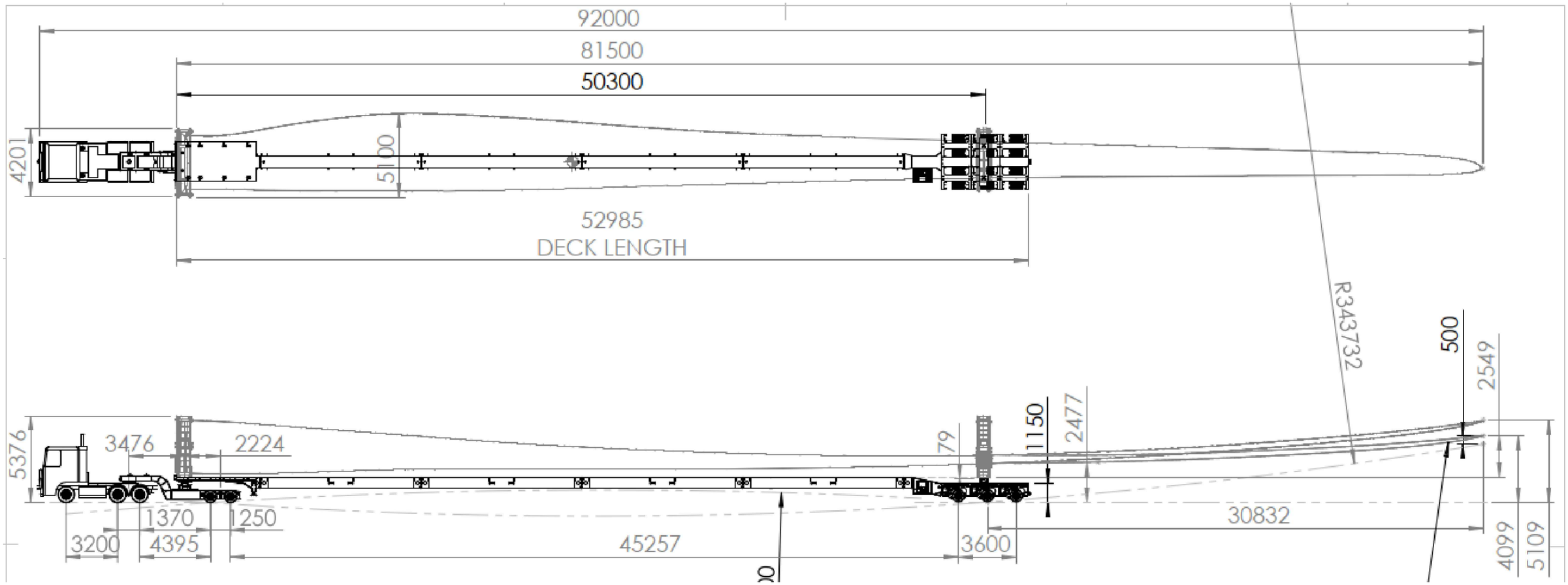
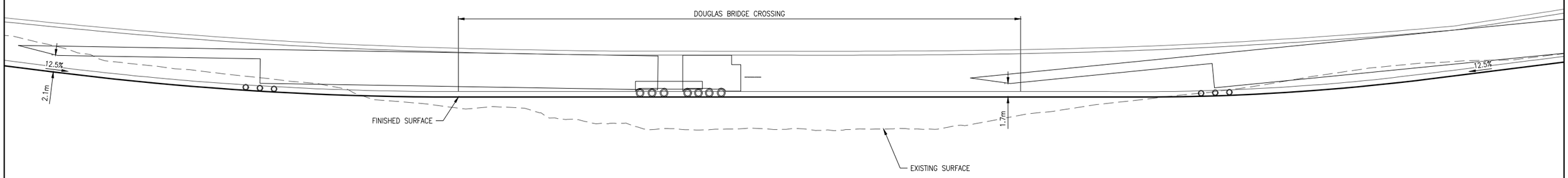


DOUGLAS CREEK



VERTICAL VEHICLE TURN PATH

SCALE 1:250 (A1 SIZE) 0 2.5 5 7.5 10 12.5

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	50% DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	–	–				

DOCUMENT CONTROL	
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CHECKED	P.C.G.
APPROVED	S.J.I.
DATE	APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.

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SURVEYOR
BRAZIER MOTTI
PHONE 07 4772 1144

DATUM A.H.D.
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RL.491.533

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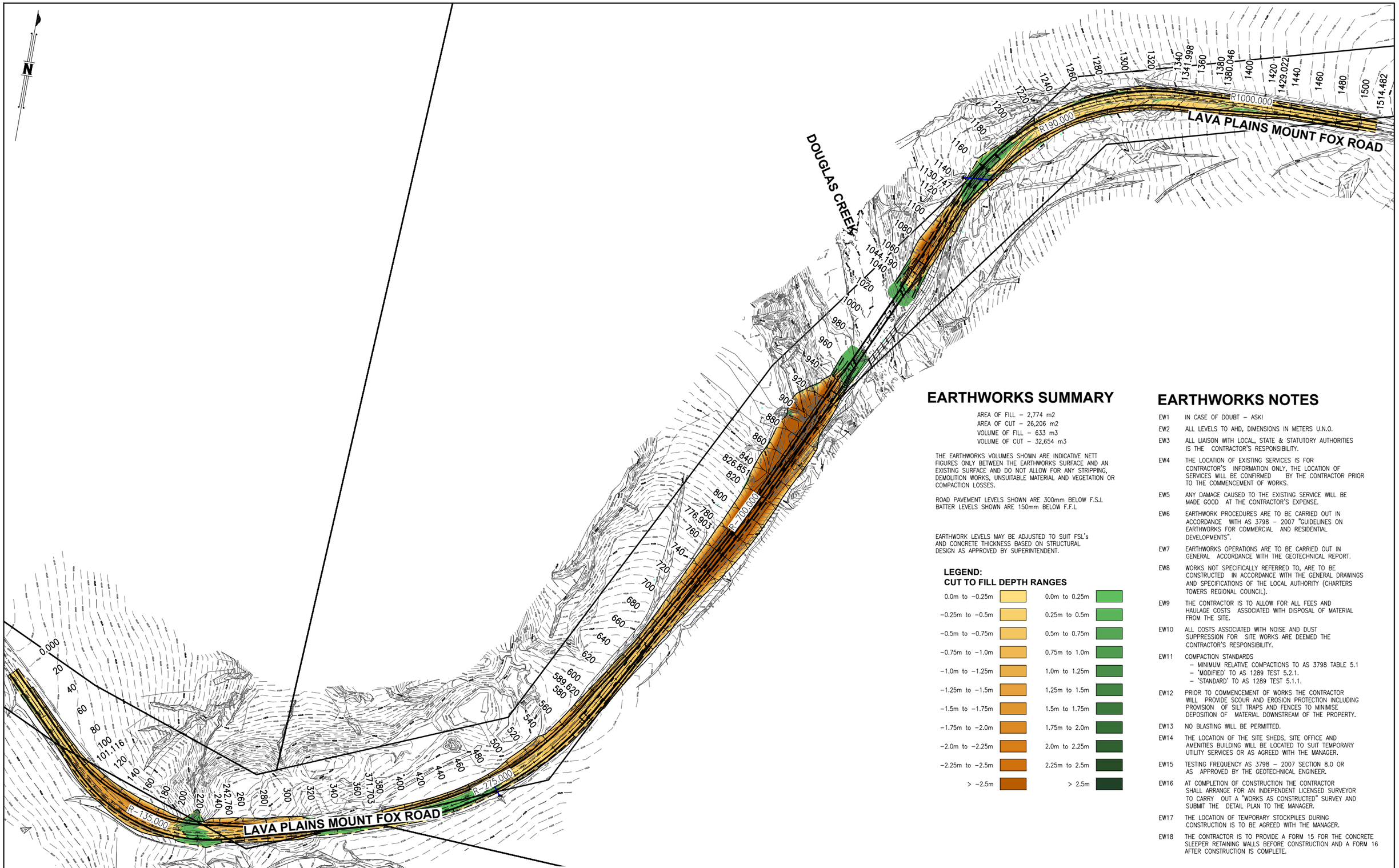
PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY VERTICAL VEHICLE TURN PATH
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26-017-D-PC29
SHEET NUMBER: 29 OF 29
REVISION: B

G26-017-D-PC_Pre_Turnpaths.dwg



PRELIMINARY EARTHWORKS SITE PLAN

SCALE 1:1500 (A1 SIZE)

0 15 30 45 60 75

EARTHWORKS SUMMARY

AREA OF FILL – 2,774 m2
AREA OF CUT – 26,206 m2
VOLUME OF FILL – 633 m3
VOLUME OF CUT – 32,654 m3

THE EARTHWORKS VOLUMES SHOWN ARE INDICATIVE NETT FIGURES ONLY BETWEEN THE EARTHWORKS SURFACE AND AN EXISTING SURFACE AND DO NOT ALLOW FOR ANY STRIPPING, DEMOLITION WORKS, UNSUITABLE MATERIAL AND VEGETATION OR COMPACTION LOSSES.

ROAD PAVEMENT LEVELS SHOWN ARE 300mm BELOW F.S.L
BATTER LEVELS SHOWN ARE 150mm BELOW F.F.L

EARTHWORK LEVELS MAY BE ADJUSTED TO SUIT FSL's AND CONCRETE THICKNESS BASED ON STRUCTURAL DESIGN AS APPROVED BY SUPERINTENDENT.

LEGEND: CUT TO FILL DEPTH RANGES

0.0m to −0.25m	0.0m to 0.25m
−0.25m to −0.5m	0.25m to 0.5m
−0.5m to −0.75m	0.5m to 0.75m
−0.75m to −1.0m	0.75m to 1.0m
−1.0m to −1.25m	1.0m to 1.25m
−1.25m to −1.5m	1.25m to 1.5m
−1.5m to −1.75m	1.5m to 1.75m
−1.75m to −2.0m	1.75m to 2.0m
−2.0m to −2.25m	2.0m to 2.25m
−2.25m to −2.5m	2.25m to 2.5m
> −2.5m	> 2.5m

EARTHWORKS NOTES

EW1 IN CASE OF DOUBT – ASK!

EW2 ALL LEVELS TO AHD, DIMENSIONS IN METERS U.N.O.

EW3 ALL LIAISON WITH LOCAL, STATE & STATUTORY AUTHORITIES IS THE CONTRACTOR'S RESPONSIBILITY.

EW4 THE LOCATION OF EXISTING SERVICES IS FOR CONTRACTOR'S INFORMATION ONLY, THE LOCATION OF SERVICES WILL BE CONFIRMED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORKS.

EW5 ANY DAMAGE CAUSED TO THE EXISTING SERVICE WILL BE MADE GOOD AT THE CONTRACTOR'S EXPENSE.

EW6 EARTHWORK PROCEDURES ARE TO BE CARRIED OUT IN ACCORDANCE WITH AS 3798 – 2007 "GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS".

EW7 EARTHWORKS OPERATIONS ARE TO BE CARRIED OUT IN GENERAL ACCORDANCE WITH THE GEOTECHNICAL REPORT.

EW8 WORKS NOT SPECIFICALLY REFERRED TO, ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE GENERAL DRAWINGS AND SPECIFICATIONS OF THE LOCAL AUTHORITY (CHARTERS TOWERS REGIONAL COUNCIL).

EW9 THE CONTRACTOR IS TO ALLOW FOR ALL FEES AND HAULAGE COSTS ASSOCIATED WITH DISPOSAL OF MATERIAL FROM THE SITE.

EW10 ALL COSTS ASSOCIATED WITH NOISE AND DUST SUPPRESSION FOR SITE WORKS ARE DEEMED THE CONTRACTOR'S RESPONSIBILITY.

EW11 COMPACTION STANDARDS
- MINIMUM RELATIVE COMPACTIONS TO AS 3798 TABLE 5.1
- 'MODIFIED' TO AS 1289 TEST 5.2.1.
- 'STANDARD' TO AS 1289 TEST 5.1.1.

EW12 PRIOR TO COMMENCEMENT OF WORKS THE CONTRACTOR WILL PROVIDE SCOUR AND EROSION PROTECTION INCLUDING PROVISION OF SILT TRAPS AND FENCES TO MINIMISE DEPOSITION OF MATERIAL DOWNSTREAM OF THE PROPERTY.

EW13 NO BLASTING WILL BE PERMITTED.

EW14 THE LOCATION OF THE SITE SHEDS, SITE OFFICE AND AMENITIES BUILDING WILL BE LOCATED TO SUIT TEMPORARY UTILITY SERVICES OR AS AGREED WITH THE MANAGER.

EW15 TESTING FREQUENCY AS 3798 – 2007 SECTION 8.0 OR AS APPROVED BY THE GEOTECHNICAL ENGINEER.

EW16 AT COMPLETION OF CONSTRUCTION THE CONTRACTOR SHALL ARRANGE FOR AN INDEPENDENT LICENSED SURVEYOR TO CARRY OUT A "WORKS AS CONSTRUCTED" SURVEY AND SUBMIT THE DETAIL PLAN TO THE MANAGER.

EW17 THE LOCATION OF TEMPORARY STOCKPILES DURING CONSTRUCTION IS TO BE AGREED WITH THE MANAGER.

EW18 THE CONTRACTOR IS TO PROVIDE A FORM 15 FOR THE CONCRETE SLEEPER RETAINING WALLS BEFORE CONSTRUCTION AND A FORM 16 AFTER CONSTRUCTION IS COMPLETE.

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL	
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CHECKED	P.C.G.
APPROVED	S.J.I.
DATE	APRIL 2026

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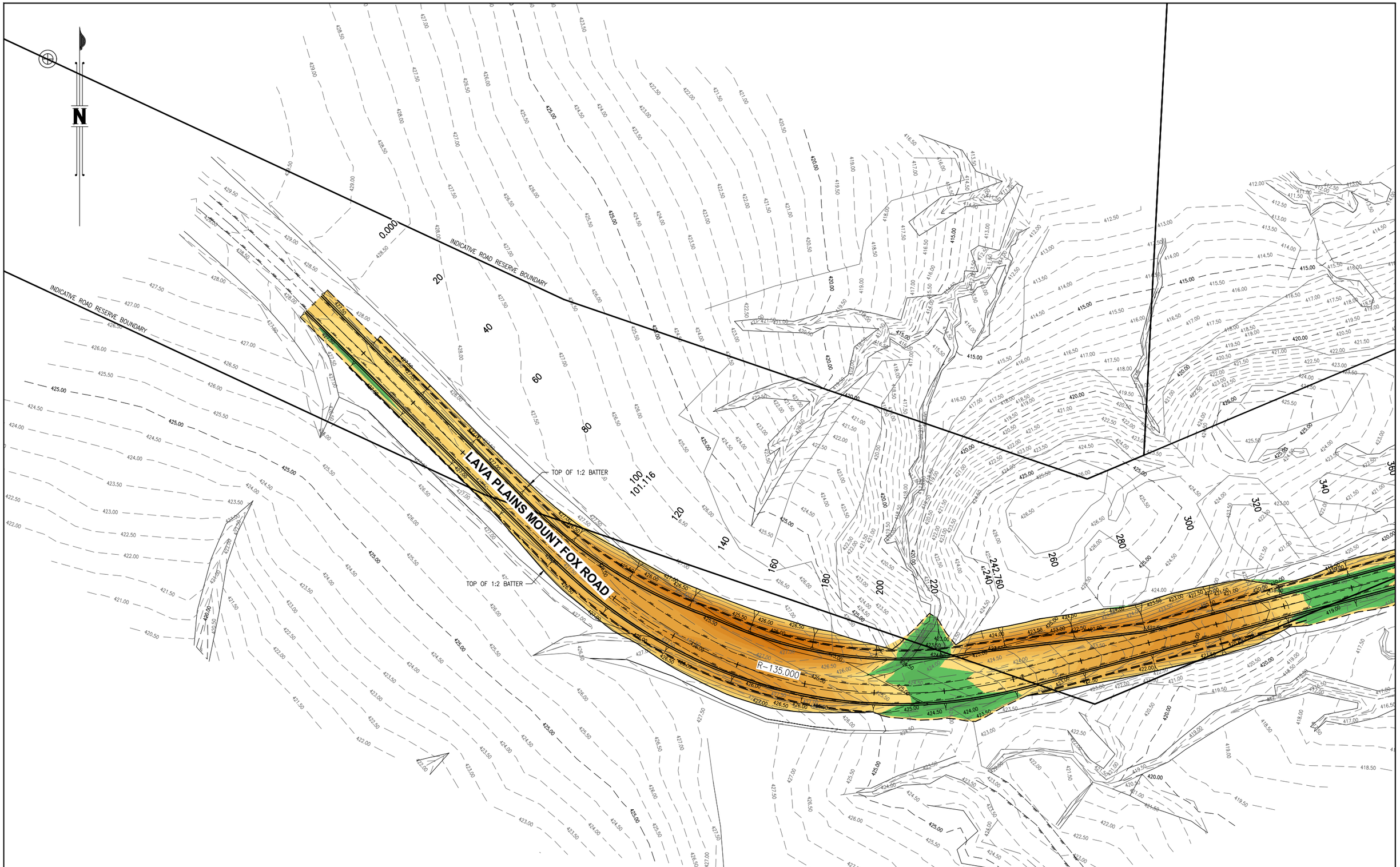
PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY EARTHWORKS SITE PLAN
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26–017–D–PE01
SHEET NUMBER: 01 OF 06
REVISION: B

G26–017–D–PE_Pre_Earth_Site.dwg



PRELIMINARY EARTHWORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL

DESIGNED W.J.H.
DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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PHONE 07 4772 1144

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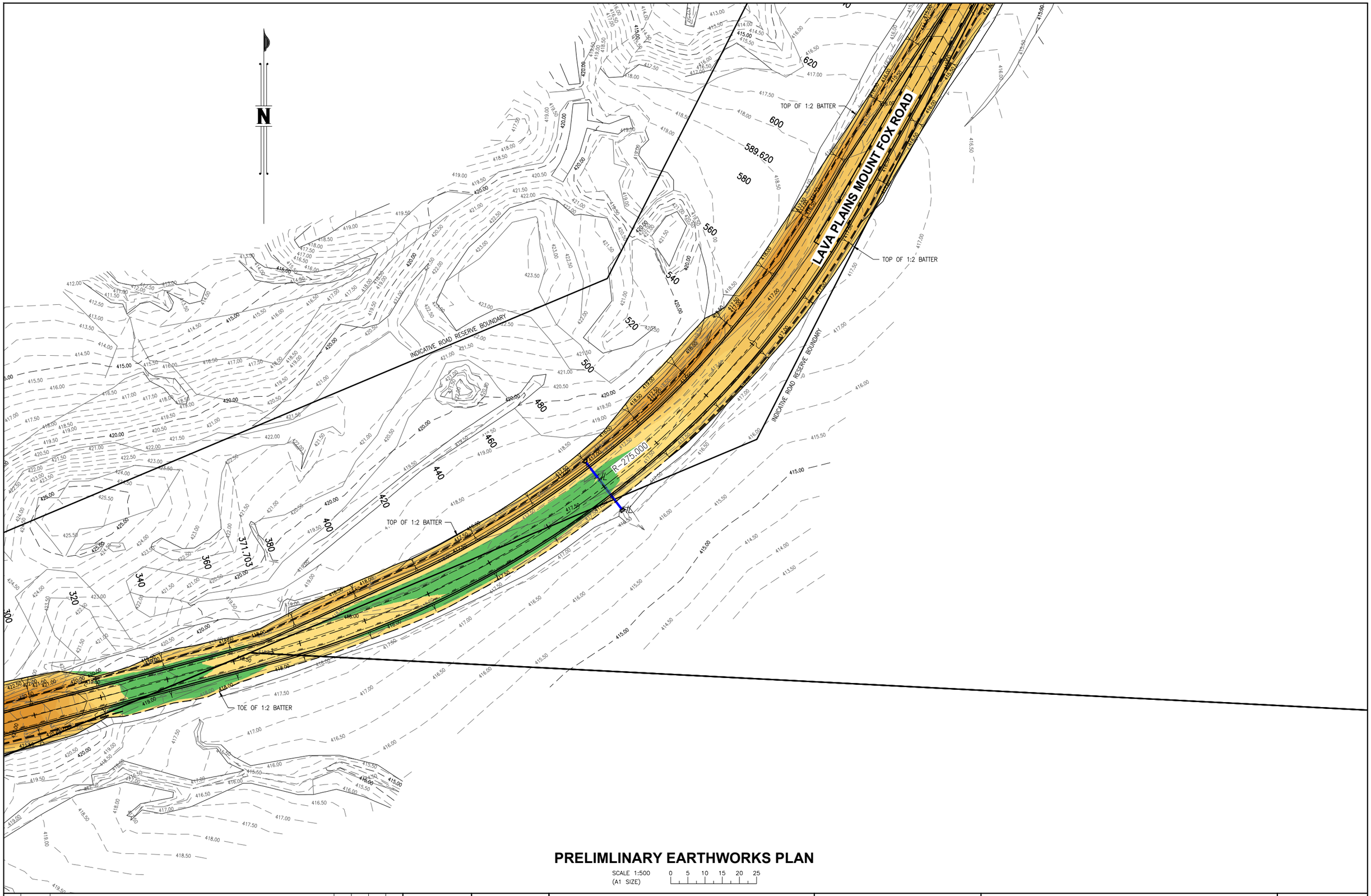
PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY EARTHWORKS PLAN 1 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PE02
SHEET NUMBER 02 OF 06
REVISION B



PRELIMLINARY EARTHWORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL: DESIGNED W.J.H. | DRAWN W.J.H. | CHECKED P.C.G. | APPROVED S.J.I. | DATE APRIL 2026

For and on behalf of WESTERA PARTNERS PTY. LTD.
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PROJECT: DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION: DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE: PRELIMINARY EARTHWORKS PLAN 2 of 5
CLIENT: DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: G26-017-D-PE03
SHEET NUMBER: 03 OF 06
REVISION: B

G26-017-D-PE_Pre_Earthwks.dwg

PRELIMLINARY EARTHWORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

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DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY EARTHWORKS PLAN 3 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PE04
SHEET NUMBER 04 OF 06
REVISION B

G26-017-D-PE_Pre_Earthwks.dwg

PRELIMLINARY EARTHWORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
B	07.08.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	
A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

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DRAWN W.J.H.
CHECKED P.C.G.
APPROVED S.J.I.
DATE APRIL 2026

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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY EARTHWORKS PLAN 4 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PE05
SHEET NUMBER 05 OF 06
REVISION B

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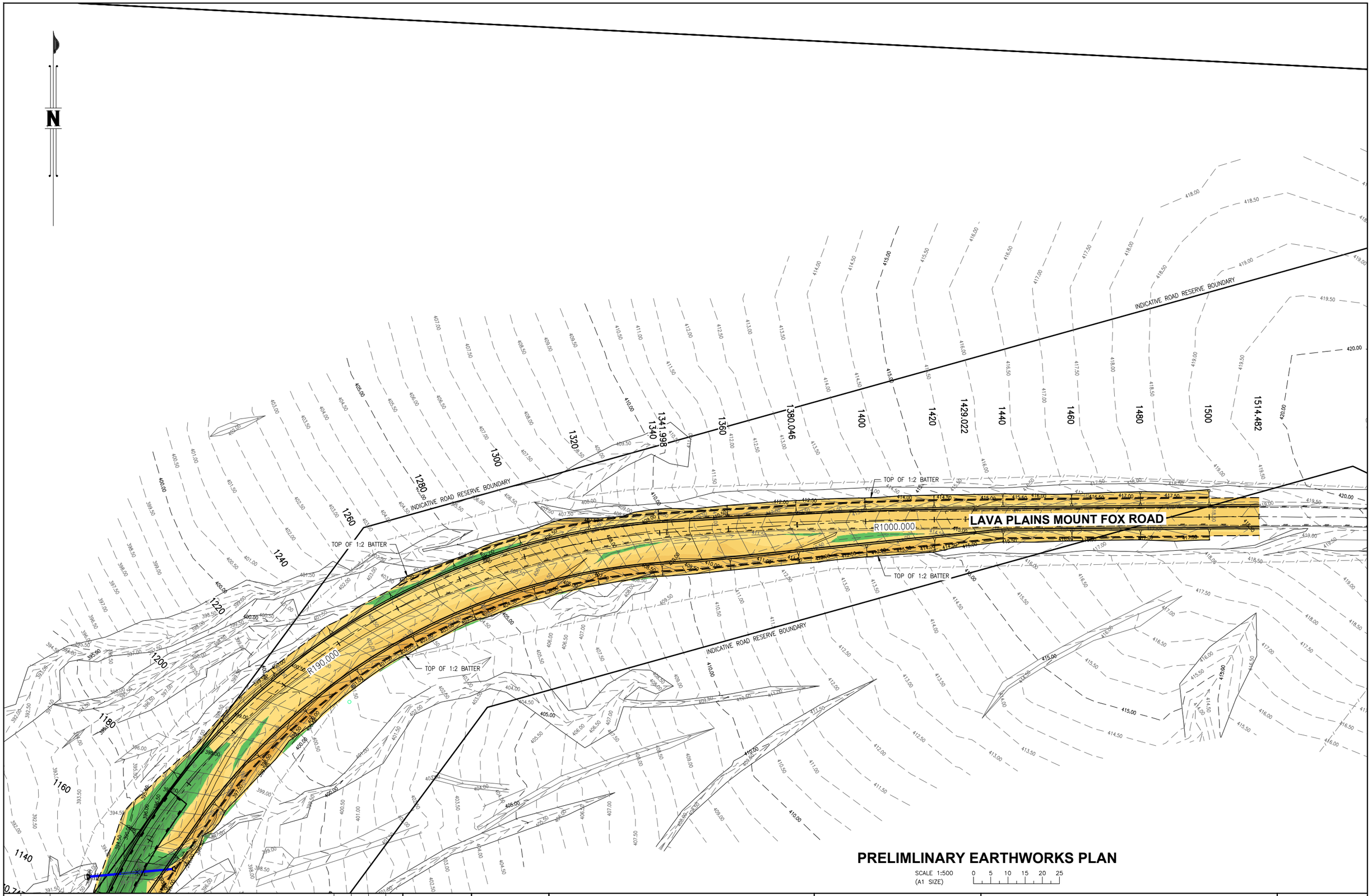

PRELIMLINARY EARTHWORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD
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A	29.04.26	CONCEPT DESIGN ISSUE	W.J.H.	W.J.H.	P.C.G.	S.J.I.

DOCUMENT CONTROL
DESIGNED W.J.H.
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PROJECT DOUGLAS CREEKS BRIDGE REPLACEMENT
LOCATION DOUGLAS CREEK CROSSING, LAVA PLAINS MOUNT FOX ROAD, MOUNT FOX
TITLE PRELIMINARY EARTHWORKS PLAN 5 of 5
CLIENT DAVBRIDGE CONSTRUCTIONS

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER G26-017-D-PE06
SHEET NUMBER 06 OF 06
REVISION B

G26-017-D-PE_Pre_Earthwks.dwg

Date:	10/08/2026	Pages:	11
To:	Lachlan McCulloch	Copy:	
From:	James Mansfield	Rev:	0 – Issue for Construction
Project	**Mount Fox Road Design Optimisation**		
Subject	**Optimisation Design Technical Memorandum**		

1. INTRODUCTION

1.1. Overview

Upper Burdekin Wind Farm Pty Ltd (UBWF) proposes to construct the Gawara Baya Wind Farm (GBWF) in North Queensland, on a site situated approximately 30 kilometres south-west of Ingham and 120 kilometres north-west of Townsville. The GBWF is located on approximately 20,780 hectares and will comprise up to 68 Wind Turbine Generators.

Delivery of the turbines and their associated components will require oversized and over mass (OSOM) vehicle movements from the Port of Townsville to the Site via the Department of Transport and Main Roads (DTMR) administered Flinders Highway and Gregory Developmental Road and the Charters Towers Regional Council (CTRC) administered Mount Fox Road and Lava Plains Mount Fox Road (henceforth referred to as Mt Fox Road) to access the Site.

A locality plan is shown in Figure 1.

Figure 1: Locality Plan

An Issued for Construction (100% Design Review) package was developed by Premise for Upper Burdekin Wind Farm Pty Ltd for all upgrade works to enable OSOM access from the Port of Townsville to the GBWF site. This package included hydrologic and hydraulic design of longitudinal and cross drainage infrastructure and road upgrade design to Mt Fox Road to facilitate the OSOM vehicles including:

- Road horizontal and vertical alignment upgrades,
- Pavement design,
- Provision of 4No. passing bays,
- Upgrade of the Greenvale Rail Crossing and,
- Upgrade of Lava Plains Mount Fox Road / Lot 3198 intersection

Following the Early Works Contract award by UBWF to Cooper McCullough Group(CMG)/Davbridge, Tenvra was engaged by CMG to undertake value engineering and design on the proposed Premise road pavement and culvert structures and localised optimisation to the vertical alignment where defective to facilitate OSOM access.

This technical memorandum provides details of the optimisations completed from the Premise IFC (100% design review) design.

1.2. Scope

The scope of this design optimisation includes:

- Minor vertical alignment amendments to achieve compliance for OSOM,
- Signage positioning and design where alignment is not compliant to 100 km/h operating speed,
- Pavement design, and,
- Optimisation of culverts whilst match existing hydraulic performance.

The Mt Fox Road alignment has been separated into road Segments, with the following sections defined from a CH = 0m point at the intersection with the Gregory Developmental Road:

- Road Segment 1: 0m – 19,230m
- Road Segment 2: 19,230m – 38,460m
- Road Segment 3: 38,460m – 57,640m
- Road Segment 4: 57,640m – 76,780m

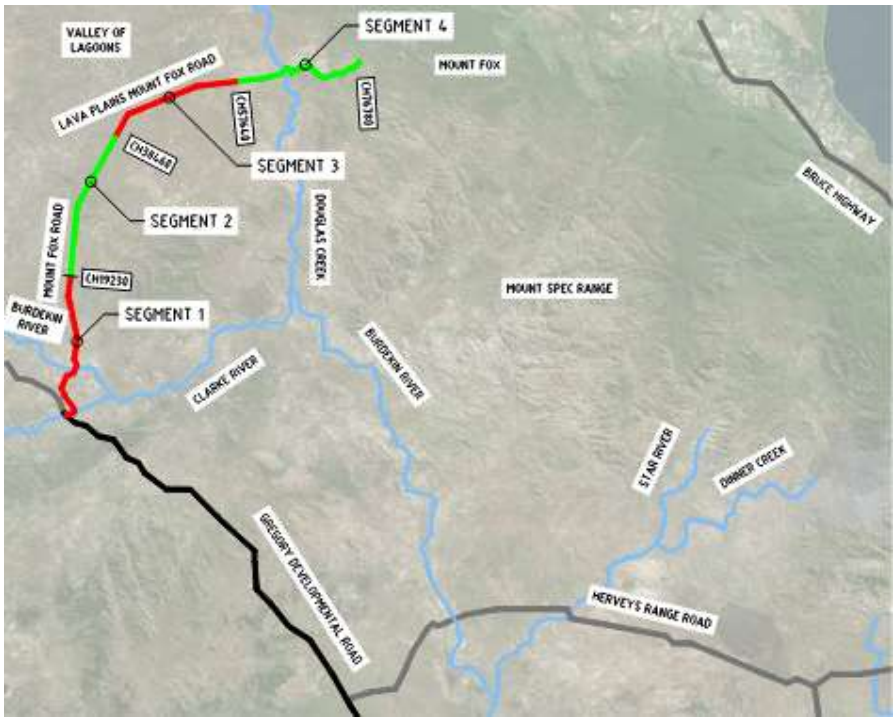

Figure 2: Road Segments

Under this round of optimisation, road segments 1 and 2 were assessed with segments 3 and 4 excluded from the assessment and report at this time. The Greenvale Rail Crossing and Passing Bay design in Sections 1 and 2 were further excluded from the optimisation scope as the Premise design was assessed to be compliant.

1.3. Scope Qualifications

Key scope qualifications are outlined in the table below:

Table 1 – Key Scope Qualifications

Description
The assessed road was developed based on survey supplied by the Client or extracted from public sources including: • Survey provided 26/02/2026 • Detailed survey provided 17/04/2026 and, • LiDAR extracted from Elvis - Elevation and Depth - Foundation Spatial Data on 29/04/2026 from 2018 and 2021. The scope of this assessment did not include optimisation of the survey data; therefore all results are a direct reflection off the supplied data. The Construction Contractor should validate the design prior to construction to identify any discrepancies.
The road alignment assessed is documented in *Gawara Baya Wind Farm - Mount Fox Road DESIGN REPORT* (Report No: WL003-OSR-CV-RPT-OF-0005) developed by Premise in October 2024 and its supporting design documentation.
No hydrologic assessment has been undertaken as part of this optimisation. Any changes from the Premise design have matched or exceeded hydraulic performance of the culvert structures proposed by Premise and assume that hydrology is consistent in this approach.
Hydraulic assessment and design of culverts have used the 'superseded' (current) version of the Department of Agriculture, Fisheries and Forestry (DAFF) Accepted Development Requirements (ADR) for Waterway Barrier Works (WBW) which will be replaced by an updated version on 30/11/2026. It is understood that the 'superseded' ADR will be applicable to these works under the following conditions: • Notification of Waterway Barrier Works is lodged prior to 30/11/2026; and, • Works are commenced within the waterway within 20 days of the notification and evidenced photographically. • Works are completed within 180 days (Red streams) or 360 days (Amber and Green streams) It is noted that if **both** of the above requirements are not achieved, the culvert structures proposed in mapped creeks will be required to comply with the updated ADR which provides more onerous requirements and will result in substantial change.

1.4. Reference Documents

The following documents were utilised to inform this assessment:

- Survey:
  - Survey provided 26/02/2026
  - Detailed survey provided 17/04/2026 and,
  - LiDAR extracted from Elvis - Elevation and Depth - Foundation Spatial Data on 29/04/2026 from 2018 and 2021.
- Gawara Baya Wind Farm - Mount Fox Road DESIGN REPORT (Report No: WL003-OSR-CV-RPT-OF-0005) and supporting information including design drawings for package WDL-0005, relevant models and survey and OSOM vehicle specifications.
- GBWF - OSR D&C - Optimised Drainage Schedule - Mount Fox Road_Rev.0
- Waterway barrier works accepted development requirements—superseded (1st October 2018)
- Austroads Guide to Road Design (AGRD) Parts 3 and 5B
- AS 1742 Manual for Uniform Traffic Control Devices (MUTCD)

2. Road Alignment

The road alignment was assessed for compliance against Austroads for the OSOM and was derived from design models prepared by Premise for UBWF Pty Ltd and provided to Tenvra. This assessment addresses road segments 1 and 2 only. Modifications to the alignment were limited to localised vertical alignment corrections addressing OSOM vehicle non-compliance, pavement depths and adjustments to cover depth required to support culvert optimisations (culvert type/size).

2.1. Horizontal Geometry

The horizonal geometry of the road was not changed from the existing alignment (and Premise design) as part of this optimisation. The existing road is unsealed and the project is to support OSOM access on the existing formation not a new road. As such, an Operating Speed Assessment was undertaken to check for Stopping Sight Distance (SSD) in both northbound and southbound directions for a 100 km/h operating speed. Any non-compliances noted have been managed through the provision of advisory signage as summarised in Table *2* with the signage schedule provided in the design drawings. A horizontal swept path check was undertaken for the OSOM blade transport vehicle at a speed of 1 km/h, adopting the vehicle specifications provided in the Gawara Baya Wind Farm – Mount Fox Road Design Report (Report No. WL003-OSR-CV-RPT-OF-0005). The check assessed whether the vehicle's wheels departed the roadway and did not consider interaction with adjacent structures, trees, or fences. The horizontal geometry in Segments 1 and 2 was confirmed as compliant for the OSOM vehicle.

Table 2 – Operating Speed Assessment

Northbound					
Region (fail zone ch)	**Length (m)**	**Max SSD deficiency (m)**	**Equiv. SSD speed (km/h)**	**Treatment category**	**Signage / delineation treatment**
1130 - 1160	30	12	88	Horizontal curve	Covered by curve sign S2.1-NB-01 (R250): warning + advisory + CAMs where warranted. Guideposts through curve.
1450 - 1530	80	62	79	Horizontal curve	Covered by curve sign S2.1-NB-03 (R367): warning + advisory + CAMs where warranted. Guideposts through curve.
2670 - 2840	170	181	41	Crest (SSD)	W5-11 CREST sign S2.1-NB-C1 @ Ch 2874 + W8-2(40) advisory; flag for geometric review/departure. Guideposts through crest.
3300 - 3500	200	116	27	Horizontal curve	Covered by curve sign S2.1-NB-04 (R450): warning + advisory + CAMs where warranted. Guideposts through curve.
4570 - 4720	150	153	38	Crest (SSD)	W5-11 CREST sign S2.1-NB-C2 @ Ch 4746 + W8-2(30) advisory; flag for geometric review/departure. Guideposts through crest.
5090 - 5190	100	110	50	Horizontal curve	Covered by curve sign S2.1-NB-07 (R260): warning + advisory + CAMs where warranted. Guideposts through curve.
5290 - 5400	110	138	44	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
8190 - 8290	100	77	70	Horizontal curve	Covered by curve sign S2.1-NB-12 (R300): warning + advisory + CAMs where warranted. Guideposts through curve.
8450 - 8500	50	57	76	Horizontal curve	Covered by curve sign S2.1-NB-12 (R300): warning + advisory + CAMs where warranted. Guideposts through curve.
9030 - 9150	120	90	73	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
9580 - 9870	290	163	47	Horizontal curve	Covered by curve sign S2.1-NB-15 (R490): warning + advisory + CAMs where warranted. Guideposts through curve.
11680 - 11830	150	107	69	Crest (SSD)	W5-11 CREST sign S2.1-NB-C3 @ Ch 11878. Guideposts through crest.
11920 - 12070	150	95	73	Crest (SSD)	W5-11 CREST sign S2.1-NB-C3 @ Ch 11878. Guideposts through crest.
12300 - 12400	100	105	68	Floodway	Floodway signage S2.1-FW @ Ch 12345: W5-7-1 + flood depth indicators (SD1170) + guideposts both sides.
12850 - 12940	90	96	72	Horizontal curve	Covered by curve sign S2.1-NB-16 (R450): warning + advisory + CAMs where warranted. Guideposts through curve.
13190 - 13330	140	109	68	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).

13920 - 14070	150	60	84	Crest (SSD)	W5-11 CREST sign S2.1-NB-C5 @ Ch 14123. Guideposts through crest.
16000 - 16000	0	3	100	Trivial	No treatment - fails only near 100 km/h by <20 m; within tolerance.
17250 - 17350	100	87	72	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
17600 - 17730	130	67	70	Horizontal curve	Covered by curve sign S2.1-NB-19 (R250): warning + advisory + CAMs where warranted. Guideposts through curve.
17810 - 17910	100	110	63	Horizontal curve	Covered by curve sign S2.1-NB-19 (R250): warning + advisory + CAMs where warranted. Guideposts through curve.
18740 - 18810	70	13	89	Horizontal curve	Covered by curve sign S2.1-NB-21 (R355): warning + advisory + CAMs where warranted. Guideposts through curve.
Southbound					
340 - 370	30	35	91	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
1670 - 1770	100	46	88	Horizontal curve	Covered by curve sign S2.1-SB-21 (R367): warning + advisory + CAMs where warranted. Guideposts through curve.
2900 - 2980	80	89	40	Crest (SSD)	W5-11 CREST sign S2.1-SB-C1 @ Ch 2874 + W8-2(40) advisory; flag for geometric review/departure. Guideposts through crest.
3540 - 3700	160	82	27	Horizontal curve	Covered by curve sign S2.1-SB-18 (R300): warning + advisory + CAMs where warranted. Guideposts through curve.
4760 - 4950	190	199	37	Crest (SSD)	W5-11 CREST sign S2.1-SB-C2 @ Ch 4746 + W8-2(30) advisory; flag for geometric review/departure. Guideposts through crest.
5330 - 5360	30	95	70	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
5450 - 5650	200	200	41	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
8410 - 8480	70	77	66	Horizontal curve	Covered by curve sign S2.1-SB-12 (R300): warning + advisory + CAMs where warranted. Guideposts through curve.
8600 - 8750	150	132	58	Horizontal curve	Covered by curve sign S2.1-SB-10 (R400): warning + advisory + CAMs where warranted. Guideposts through curve.
9270 - 9400	130	120	64	Horizontal curve	Covered by curve sign S2.1-SB-09 (R430): warning + advisory + CAMs where warranted. Guideposts through curve.
9750 - 10110	360	215	43	Horizontal curve	Covered by curve sign S2.1-SB-08 (R490): warning + advisory + CAMs where warranted. Guideposts through curve.
10750 - 10810	60	29	93	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
11940 - 12060	120	109	68	Crest (SSD)	W5-11 CREST sign S2.1-SB-C3 @ Ch 11988. Guideposts through crest.
12110 - 12290	180	64	82	Crest (SSD)	W5-11 CREST sign S2.1-SB-C3 @ Ch 11988. Guideposts through crest.
12510 - 12660	150	110	67	Crest (SSD)	W5-11 CREST sign S2.1-SB-C4 @ Ch 12467. Guideposts through crest.
13430 - 13570	140	113	65	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
14210 - 14320	110	84	76	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
15300 - 15330	30	15	97	Horizontal curve	Covered by curve sign S2.1-SB-06 (R410): warning + advisory + CAMs where warranted. Guideposts through curve.
17470 - 17570	100	67	74	Sag / terrain	Guide-post delineation + geometric review at RSA. No standard warning sign applies (sag does not conceal road; W5-9 DIP not warranted for broad R>=450 sags).
17810 - 17960	150	91	69	Horizontal curve	Covered by curve sign S2.1-SB-04 (R250): warning + advisory + CAMs where warranted. Guideposts through curve.
18540 - 18580	40	7	99	Trivial	No treatment - fails only near 100 km/h by <20 m; within tolerance.
18950 - 19050	100	57	76	Horizontal curve	Covered by curve sign S2.1-SB-01 (R275): warning + advisory + CAMs where warranted. Guideposts through curve.

2.2. Vertical Geometry

The vertical geometry was assessed for compliance with AGRD Part 3. 7 No. non-compliances for OSOM were noted from the provided design model that were rectified in the optimised design model, these are summarised in Table 3.

Table 3 – Vertical Geometry non compliances

Road Segment	Chainage (m)	K Value	Radius	Change in Grade	VC Type	Action
1	3391.629	4.5	450	-3.70%	Crest	Increased VC radius to R550m. Regrade adjacent grades if required maintain VC apex.
1	5320.591	4.5	450	-2.60%	Crest	Increased VC radius to R550m. Regrade adjacent grades if required maintain VC apex.
1	5365.243	3	-300	3.58%	Sag	Increased VS radius to R450m. Regrade adjacent grades if required to reduce fill.
1	5377.368	3	-300	2.40%	Sag	Increased VS radius to R450m. Regrade adjacent grades if required to reduce fill.
1	12951.283	0	0	-0.37%	No VC	Provided R550m crest between vertical grades.
2	23123.338	0	0	0.35%	No VC	N/A - Remove one of the back-to-back identical vertical grades.
2	37607.698	4.749	474.879	-5.38%	Crest	Increased VC radius to R550m. Regrade adjacent grades if required maintain VC apex.

3. Pavement

The Premise pavement design proposed a 320 mm overlay design thickness of unsealed gravel material, adopting a subgrade strength of CBR 3%. This thickness was based on the material specification provided by Premise in Attachment A of Appendix F1 of the Gawara Baya Wind Farm – Mount Fox Road Design Report (Report No. WL003-OSR-CV-RPT-OF-0005).

The pavement optimisation focused on two changes. The first was updating the material specification to a standard derived in part from Australian Road Research Board (ARRB) guidance, to align with both the existing Mt Fox Road gravel pavement and the material available from nearby quarries. The second was revising the design pavement depth to account for the depth of existing pavement.

Existing subgrade geotechnical test results were reviewed and adopted as a nominal subgrade strength of CBR 3%, with two localised sections assumed at CBR 8%. These values are to be validated by the Contractor prior to construction. The test results generally indicated an existing pavement depth of 100 mm which, following assessment, has been incorporated within the total 320 mm pavement depth. This is illustrated in

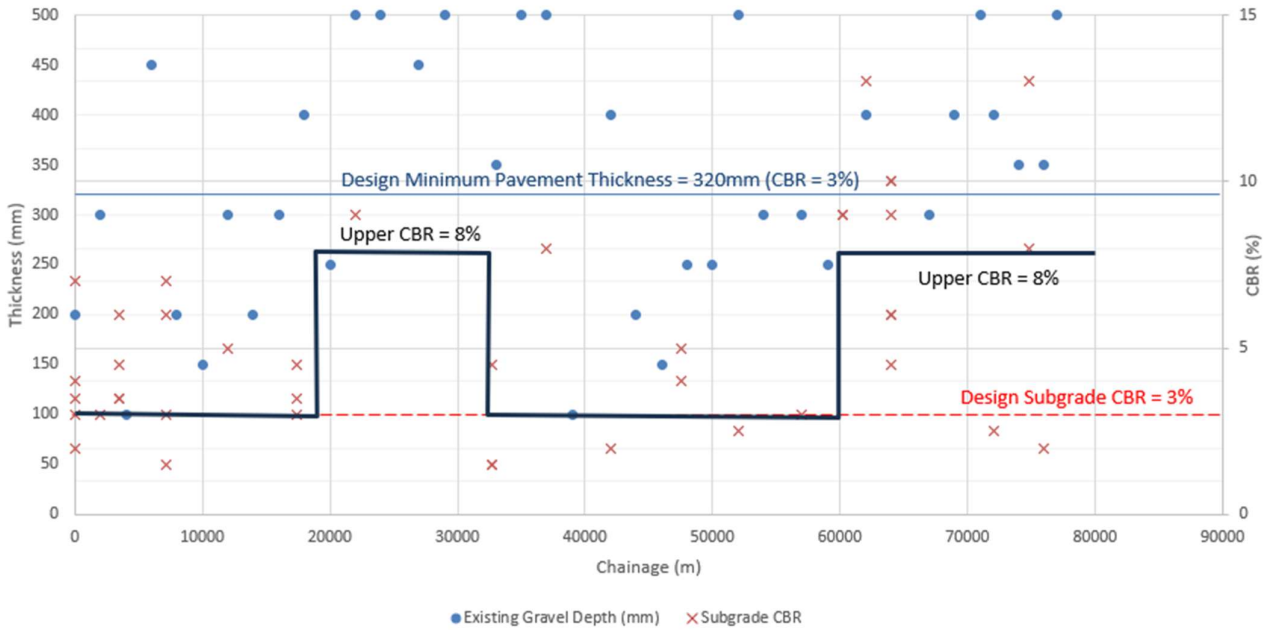

Figure 3. The additional pavement depth required to achieve the 320 mm total is to be quantified by the Contractor following site validation.

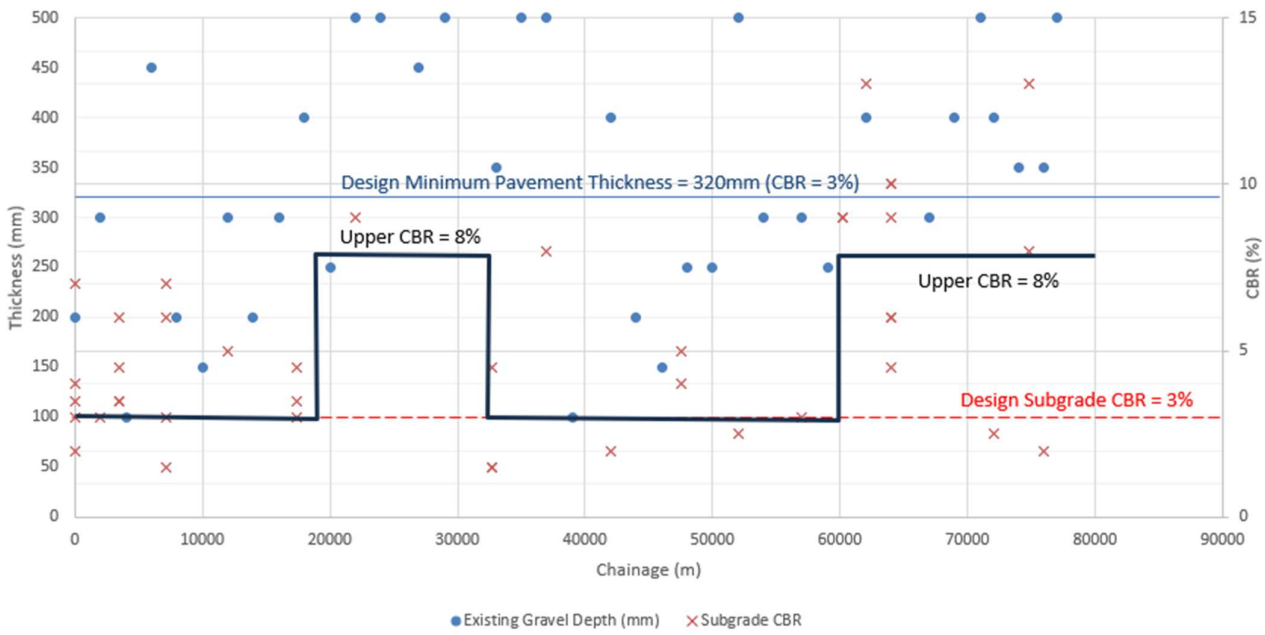

Figure 3: Geotechnical Assessment

MOUNT FOX ROAD OVERLAY MATERIAL REQUIREMENTS			
TMR TEST METHOD	TEST DESCRIPTION	SPECIFICATION LIMITS	MIN FREQUENCY
Q103A	% passing 37.5mm sieve % passing 26.5mm sieve % passing 2.65mm sieve % passing 4.75mm sieve % passing 0.425mm sieve	100% - (for Gc) - (for Gc) - (for Gc) - (for Sp)	1 per 2500 Tonnes
Q106	Linear Shrinkage (LS)	- (for Sp)	1 per 2500 Tonnes
Q113A	Unsoaked CBR (100% Std Compaction)	≥15%	1 per 5000 Tonnes
	Shrinkage Product (Sp)	100-240 - preferable 100-365 - allowable	1 per 2500 tonnes
	Grading Coefficient (Gc)	10-34 (NOTE 1)	1 per 2500 tonnes

NOTE 1 - GRADING COEFFICIENT BASED ON TESTING UNDERTAKEN ON THE EXISTING WEARING COURSE AND AVAILABLE MATERIAL SOURCES

SHRINKAGE PRODUCT (Sp) = LINEAR SHRINKAGE x % PASSING 0.425mm SIEVE
GRADING COEFFICIENT (Gc) = (% PASSING 26.5mm SIEVE - % PASSING 2.0mm SIEVE) x % PASSING 4.75mm SIEVE / 100

(NOTE - % PASSING 2.36mm SIEVE, IN LIEU OF % PASSING 2.0mm SIEVE, MAY BE USED

Figure 4: Optimised Pavement Material Specification

4. Drainage Structures

Optimisation of drainage structures was undertaken on a hydraulic basis only, with hydrologic assessment excluded from scope with the Premise methodology for all DAF waterways considered sufficient and in line with industry standards. The existing methodology for unmapped waterways was considered appropriate for structures with minimal risk to site access. Upon review of the Premise design package, it was further deemed that red and amber mapped waterway structures were generally fit for purpose under and unable to be optimised without consideration of hydrology due to the waterway barrier ADR obligations. On green mapped and unmapped waterways there were two methods of optimisation utilised:

Extension of existing culverts for unmapped and green mapped waterways

Under the current 'superseded' ADR for Maintenance of existing culvert crossings and associated infrastructure within a moderate impact (amber) and low impact (green) waterway:

Increasing the length of a culvert cell (upstream-downstream) is considered waterway barrier works. Culvert cell lengthening must:

- *not result in an intentional duplication of the existing culvert crossing; and*
- *not raise the base of the culvert cell; and*
- *not reduce the culvert cell cross-sectional area of the existing culvert configuration.*

It is therefore noted that existing culverts in green mapped waterways may be extended without consideration for hydraulic performance so long as the total length of the extended culvert is less than twice the original length.

This optimisation approach was adopted for green mapped and unmapped waterways where applicable, noting that existing corrugated metal pipe structures were proposed for replacement with new RCP. Existing culverts proposed for extension are required to be assessed for condition by the Contractor prior to construction.

Adoption of culvert with equivalent or greater flow area at same hydraulic grade

Optimised culverts were designed to match or exceed the hydraulic performance of the structures proposed by Premise, without requirement to assess hydrology by matching the hydraulic grade of the Premise designed culvert and proposing an alternative culvert with equal or greater flow area. This approach primarily focussed on Reinforced Concrete Box Culvert (RCBC) structures suitable for redesign as Reinforced Concrete Pipe (RCP), on the basis that the simpler construction methodology reduces construction time and cost.

This was concentrated in unmapped and green-mapped waterways, where RCBC are not required under WBW-accepted development ('superseded' version). Table *4* summarises the proposed hydraulic structure types relative to the Premise design.

Table 4 – Segment 1 & 2 Culvert Breakdown

Waterway Category	Number of total Structures	Premise Design			Tenvra Optimisation		
		Number of new RCBC Structures	Number of new RCP Structures	Number of Existing structures extended	Number of new RCBC Structures	Number of new RCP Structures	Number of Existing structures extended
Red	2	2	0	0	2	0	0
Amber	1	1	0	0	1	0	0
Green	14	8	6	0	1	10	3
Unmapped	24	3	21	0	0	10	14
Total	**41**	**14**	**27**	**0**	**4**	**20**	**17**

Summary

Tenvra has completed a design optimisation of the Premise Issued for Construction (100% Design Review) package for Mount Fox Road, covering road Segments 1 and 2 (CH 0 m – 38,460 m) to facilitate OSOM vehicle access to the Gawara Baya Wind Farm. Segments 3 and 4 were excluded from the assessment and this report at this time. The optimisation was limited to pavement design, culvert structures and localised vertical alignment corrections, including adjustments to cover depth required to support the culvert optimisations; horizontal geometry was not changed from the existing alignment (and Premise design).

An Operating Speed Assessment was undertaken for Stopping Sight Distance in both directions at a 100 km/h operating speed. Non-compliances identified have been managed through advisory signage and delineation as summarised in Table 2, with the signage schedule provided in the design drawings. A horizontal swept path check was undertaken for the OSOM blade transport vehicle at 1 km/h, which confirmed the horizontal geometry in Segments 1 and 2 as compliant for the OSOM vehicle; the check assessed departure of the vehicle's wheels from the roadway only and did not consider interaction with adjacent structures, trees or fences. Vertical geometry was assessed against AGRD Part 3; seven (7) OSOM non-compliances were identified in the provided design model and have been rectified in the optimised model, principally by increasing vertical curve radii to R550 m at crests and R450 m at sags, as summarised in Table 3.

The pavement optimisation revised the material specification to a standard derived in part from ARRB guidance, aligning with the existing Mt Fox Road gravel pavement and material available from nearby quarries, and accounted for the existing pavement depth. A nominal subgrade strength of CBR 3% has been adopted, with two localised sections assumed at CBR 8%. The existing pavement depth of approximately 100 mm indicated by the test results has been incorporated within the total 320 mm design pavement depth. Subgrade strengths, existing pavement depth and the additional depth required to achieve the 320 mm total are to be validated and quantified by the Contractor prior to construction.

Drainage optimisation was undertaken on a hydraulic basis only, with hydrologic assessment excluded from scope; all optimised structures match or exceed the hydraulic performance of the Premise design. Red and amber mapped waterway structures were retained unchanged. On green mapped and unmapped waterways, structures were optimised either by extending existing culverts in accordance with the 'superseded' ADR — limited to a total extended length of less than twice the original, and with existing corrugated metal pipe structures proposed for replacement with new RCP — or by substituting RCP of equal or greater flow area at the same hydraulic grade. Across Segments 1 and 2 this reduces the new RCBC structures from fourteen (14) to four (4) and allows seventeen (17) existing structures to be extended rather than replaced, with a corresponding reduction in construction time and cost. Existing culverts proposed for extension are to be assessed for condition by the Contractor prior to construction.

The hydraulic design relies on the 'superseded' DAFF Accepted Development Requirements for Waterway Barrier Works. This is contingent on notification of Waterway Barrier Works being lodged prior to 30/11/2026 and works commencing within the waterway within 20 days of that notification. If these conditions are not met, culverts in mapped waterways must comply with the updated ADR, which imposes more onerous requirements and would result in substantial change.

Appendix A - Design Drawing Register

Drawing No.	Drawing Name	Revision
TVA0028-DWG-CI-0100	Cover Sheet, Locality Plan & Drawing Schedule	0
TVA0028-DWG-CI-0101	Vehicle Parameters & Typical Profile	HOLD
TVA0028-DWG-CI-0102	Typical Sections – Sheet 1 of 2	HOLD
TVA0028-DWG-CI-0103	Typical Sections – Sheet 2 of 2	0
TVA0028-DWG-CI-0104	Culvert Schedule – Sheet 1 of 2	0
TVA0028-DWG-CI-0105	Culvert Schedule – Sheet 2 of 2	HOLD
TVA0028-DWG-CI-0106	Miscellaneous Details	0
TVA0028-DWG-CI-0107	General Notes	0
TVA0028-DWG-CI-0108	Soil Erosion & Sediment Controls – Sheet 1 of 2	HOLD
TVA0028-DWG-CI-0109	Soil Erosion & Sediment Controls – Sheet 2 of 2	HOLD
TVA0028-DWG-CI-0110	Culvert Layout Plan – Sheet 1 of 8	0
TVA0028-DWG-CI-0111	Culvert Layout Plan – Sheet 2 of 8	0
TVA0028-DWG-CI-0112	Culvert Layout Plan – Sheet 3 of 8	0
TVA0028-DWG-CI-0113	Culvert Layout Plan – Sheet 4 of 8	0
TVA0028-DWG-CI-0114	Culvert Layout Plan – Sheet 5 of 8	HOLD
TVA0028-DWG-CI-0115	Culvert Layout Plan – Sheet 6 of 8	HOLD
TVA0028-DWG-CI-0116	Culvert Layout Plan – Sheet 7 of 8	HOLD
TVA0028-DWG-CI-0117	Culvert Layout Plan – Sheet 8 of 8	HOLD
TVA0028-DWG-CI-0118	Culvert Details Segment 1 – Sheet 1 of 3	0
TVA0028-DWG-CI-0119	Culvert Details Segment 1 – Sheet 2 of 3	0
TVA0028-DWG-CI-0120	Culvert Details Segment 1 – Sheet 3 of 3	0
TVA0028-DWG-CI-0121	Culvert Details Segment 2 – Sheet 1 of 3	0
TVA0028-DWG-CI-0122	Culvert Details Segment 2 – Sheet 2 of 3	0
TVA0028-DWG-CI-0123	Culvert Details Segment 2 – Sheet 3 of 3	0
TVA0028-DWG-CI-0124	Culvert Details Segment 3 – Sheet 1 of 1	HOLD
TVA0028-DWG-CI-0125	Culvert Details Segment 4 – Sheet 1 of 3	HOLD
TVA0028-DWG-CI-0126	Culvert Details Segment 4 – Sheet 2 of 3	HOLD
TVA0028-DWG-CI-0127	Culvert Details Segment 4 – Sheet 3 of 3	HOLD
TVA0028-DWG-CI-0128	Signage Schedule – Segment 1	0
TVA0028-DWG-CI-0129	Signage Schedule – Segment 2	0

Appendix B - Road Alignment Geometry Reports

Section	PT	Raw Ch	Chainage	Height	Grade	K Value	Radius	Length	Parabola Required?	Change in Grade	VC Type	Compliant?	Action
1	IP1	150.249		368.241	-0.50%				No				
1	TC	167.845		368.153	-0.50%	26	2600		No				
1	IP2	179.545		368.094	%	26	-2600	23.4	Yes	0.90%	Sag	Yes	
1	CT	191.245		368.141	0.40%	26	2600		No				
1	TC	217.804		368.247	0.40%	26	2600		No				
1	IP3	226.904		368.283	%	26	2600	18.2	Yes	-0.70%	Crest	Yes	
1	CT	236.004		368.256	-0.30%	26	2600		No				
1	TC	242.112		368.238	-0.30%	6	600		No				
1	IP4	245.712		368.227	%	6	-600	7.2	Yes	1.20%	Sag	Yes	
1	CT	249.312		368.259	0.90%	6	600		No				
1	TC	263.117		368.384	0.90%	20	2000		No				
1	IP5	268.517		368.432	%	20	2000	10.8	Yes	-0.54%	Crest	Yes	
1	CT	273.917		368.452	0.36%	20	2000		No				
1	TC	287.331		368.5	0.36%	32	3200		No				
1	IP6	292.771		368.52	%	32	-3200	10.88	Yes	0.34%	Sag	Yes	
1	CT	298.211		368.558	0.70%	32	3200		No				
1	TC	306.267		368.614	0.70%	20	2000		No				
1	IP7	313.767		368.667	%	20	2000	15	Yes	-0.75%	Crest	Yes	
1	CT	321.267		368.663	-0.05%	20	2000		No				
1	TC	358.148		368.644	-0.05%	20	2000		No				
1	IP8	365.648		368.641	%	20	2000	15	Yes	-0.75%	Crest	Yes	
1	CT	373.148		368.581	-0.80%	20	2000		No				
1	TC	440.501		368.042	-0.80%	35	3500		No				
1	IP9	451.001		367.958	%	35	-3500	21	Yes	0.60%	Sag	Yes	
1	CT	461.501		367.937	-0.20%	35	3500		No				
1	TC	472.646		367.915	-0.20%	11	1100		No				
1	IP10	478.146		367.904	%	11	1100	11	Yes	-1.00%	Crest	Yes	
1	CT	483.646		367.838	-1.20%	11	1100		No				
1	TC	495.279		367.698	-1.20%	10	1000		No				
1	IP11	498.131		367.664	%	10	-1000	5.704	Yes	0.57%	Sag	Yes	
1	CT	500.983		367.646	-0.63%	10	1000		No				
1	TC	513.145		367.569	-0.63%	10	1000		No				
1	IP12	521.793		367.515	%	10	-1000	17.296	Yes	1.73%	Sag	Yes	
1	CT	530.441		367.61	1.10%	10	1000		No				
1	TC	539.818		367.713	1.10%	15	1500		No				
1	IP13	545.668		367.777	%	15	1500	11.7	Yes	-0.78%	Crest	Yes	
1	CT	551.518		367.796	0.32%	15	1500		No				
1	TC	590.856		367.922	0.32%	26	2600		No				
1	IP14	600.216		367.952	%	26	2600	18.72	Yes	-0.72%	Crest	Yes	
1	CT	609.576		367.914	-0.40%	26	2600		No				
1	TC	652.123		367.744	-0.40%	60	6000		No				
1	IP15	661.123		367.708	%	60	-6000	18	Yes	0.30%	Sag	Yes	
1	CT	670.123		367.699	-0.10%	60	6000		No				
1	TC	735.403		367.634	-0.10%	60	6000		No				
1	IP16	753.403		367.616	%	60	6000	36	Yes	-0.60%	Crest	Yes	
1	CT	771.403		367.49	-0.70%	60	6000		No				
1	TC	832.054		367.065	-0.70%	25	2500		No				
1	IP17	850.804		366.934	%	25	-2500	37.5	Yes	1.50%	Sag	Yes	
1	CT	869.554		367.084	0.80%	25	2500		No				
1	TC	881.229		367.178	0.80%	12	1200		No				
1	IP18	886.029		367.216	%	12	1200	9.6	Yes	-0.80%	Crest	Yes	
1	CT	890.829		367.216	0.00%	12	1200		No				
1	TC	891.645		367.216	0.00%	22	2200		No				
1	IP19	899.345		367.216	%	22	-2200	15.4	Yes	0.70%	Sag	Yes	
1	CT	907.045		367.27	0.70%	22	2200		No				
1	TC	911.773		367.303	0.70%	50	5000		No				
1	IP20	924.273		367.39	%	50	5000	25	Yes	-0.50%	Crest	Yes	
1	CT	936.773		367.415	0.20%	50	5000		No				
1	TC	944.867		367.432	0.20%	25	2500		No				
1	IP21	951.117		367.444	%	25	-2500	12.5	Yes	0.50%	Sag	Yes	
1	CT	957.367		367.488	0.70%	25	2500		No				
1	TC	960.728		367.511	0.70%	12	1200		No				
1	IP22	966.728		367.553	%	12	1200	12	Yes	-1.00%	Crest	Yes	
1	CT	972.728		367.535	-0.30%	12	1200		No				
1	TC	981.151		367.51	-0.30%	60	6000		No				
1	IP23	988.651		367.488	%	60	-6000	15	Yes	0.25%	Sag	Yes	
1	CT	996.151		367.484	-0.05%	60	6000		No				
1	TC	1045.116		367.459	-0.05%	20	2000		No				
1	IP24	1048.616		367.458	%	20	-2000	7	Yes	0.35%	Sag	Yes	
1	CT	1052.116		367.468	0.30%	20	2000		No				
1	TC	1053.267		367.472	0.30%	90	9000		No				
1	IP25	1084.767		367.566	%	90	9000	63	Yes	-0.70%	Crest	Yes	
1	CT	1116.267		367.44	-0.40%	90	9000		No				
1	TC	1117.418		367.436	-0.40%	20	2000		No				
1	IP26	1120.918		367.422	%	20	-2000	7	Yes	0.35%	Sag	Yes	
1	CT	1124.418		367.42	-0.05%	20	2000		No				
1	TC	1173.866		367.395	-0.05%	60	6000		No				
1	IP27	1188.866		367.388	%	60	-6000	30	Yes	0.50%	Sag	Yes	
1	CT	1203.866		367.455	0.45%	60	6000		No				
1	TC	1219.631		367.526	0.45%	20	2000		No				
1	IP28	1235.431		367.597	%	20	2000	31.6	Yes	-1.58%	Crest	Yes	
1	CT	1251.231		367.419	-1.13%	20	2000		No				
1	TC	1255.256		367.373	-1.13%	60	6000		No				
1	IP29	1268.156		367.227	%	60	-6000	25.8	Yes	0.43%	Sag	Yes	
1	CT	1281.056		367.137	-0.70%	60	6000		No				
1	TC	1445.183		365.988	-0.70%	30	3000		No				
1	IP30	1461.683		365.873	%	30	-3000	33	Yes	1.10%	Sag	Yes	
1	CT	1478.183		365.939	0.40%	30	3000		No				
1	TC	1494.722		366.005	0.40%	6.5	650		No				
1	IP31	1503.497		366.04	%	6.5	-650	17.55	Yes	2.70%	Sag	Yes	
1	CT	1512.272		366.312	3.10%	6.5	650		No				
1	TC	1529.782		366.855	3.10%	8	800		No				
1	IP32	1539.382		367.152	%	8	800	19.2	Yes	-2.40%	Crest	Yes	
1	CT	1548.982		367.22	0.70%	8	800		No				
1	TC	1558.753		367.288	0.70%	22	2200		No				
1	IP33	1568.653		367.357	%	22	-2200	19.8	Yes	0.90%	Sag	Yes	
1	CT	1578.553		367.516	1.60%	22	2200		No				
1	TC	1584.091		367.604	1.60%	14	1400		No				
1	IP34	1596.691		367.806	%	14	1400	25.2	Yes	-1.80%	Crest	Yes	
1	CT	1609.291		367.781	-0.20%	14	1400		No				
1	TC	1628.986		367.741	-0.20%	24	2400		No				
1	IP35	1637.986		367.723	%	24	2400	18	Yes	-0.75%	Crest	Yes	
1	CT	1646.986		367.638	-0.95%	24	2400		No				
1	TC	1661.754		367.497	-0.95%	35	3500		No				
1	IP36	1674.879		367.373	%	35	-3500	26.25	Yes	0.75%	Sag	Yes	
1	CT	1688.004		367.346	-0.20%	35	3500		No				
1	TC	1782.313		367.158	-0.20%	35	3500		No				
1	IP37	1796.313		367.13	%	35	-3500	28	Yes	0.80%	Sag	Yes	
1	CT	1810.313		367.214	0.60%	35	3500		No				
1	TC	1863.742		367.534	0.60%	50	5000		No				
1	IP38	1888.742		367.684	%	50	-5000	50	Yes	1.00%	Sag	Yes	
1	CT	1913.742		368.084	1.60%	50	5000		No				
1	TC	1939.842		368.502	1.60%	100	10000		No				
1	IP39	1959.842		368.822	%	100	-10000	40	Yes	0.40%	Sag	Yes	
1	CT	1979.842		369.222	2.00%	100	10000		No				
1	TC	1992.357		369.472	2.00%	30	3000		No				
1	IP40	2004.357		369.712	%	30	-3000	24	Yes	0.80%	Sag	Yes	
1	CT	2016.357		370.048	2.80%	30	3000		No				
1	TC	2018.982		370.122	2.80%	20	2000		No				
1	IP41	2028.382		370.385	%	20	2000	18.8	Yes	-0.94%	Crest	Yes	
1	CT	2037.782		370.56	1.86%	20	2000		No				
1	TC	2126.192		372.204	1.86%	68	6800		No				
1	IP42	2165.632		372.938	%	68	6800	78.88	Yes	-1.16%	Crest	Yes	
1	CT	2205.072		373.214	0.70%	68	6800		No				
1	TC	2284.901		373.773	0.70%	70	7000		No				
1	IP43	2297.501		373.861	%	70	7000	25.2	Yes	-0.36%	Crest	Yes	
1	CT	2310.101		373.904	0.34%	70	7000		No				
1	TC	2362.635		374.082	0.34%	78	7800		No				
1	IP44	2439.075		374.342	%	78	-7800	152.88	Yes	1.96%	Sag	Yes	
1	CT	2515.515		376.1	2.30%	78	7800		No				
1	TC	2541.787		376.705	2.30%	70	7000		No				
1	IP45	2562.787		377.188	%	70	-7000	42	Yes	0.60%	Sag	Yes	
1	CT	2583.787		377.797	2.90%	70	7000		No				
1	TC	2705.383		381.323	2.90%	40	4000		No				
1	IP46	2723.383		381.845	%	40	4000	36	Yes	-0.90%	Crest	Yes	
1	CT	2741.383		382.205	2.00%	40	4000		No				
1	TC	2744.48		382.267	2.00%	23	2300		No				
1	IP47	2758.28		382.543	%	23	-2300	27.6	Yes	1.20%	Sag	Yes	
1	CT	2772.08		382.985	3.20%	23	2300		No				
1	TC	2856.515		385.686	3.20%	5.5	550		No				
1	IP48	2872.19		386.188	%	5.5	550	31.35	Yes	-5.70%	Crest	Yes	
1	CT	2887.865		385.796	-2.50%	5.5	550		No				
1	TC	2897.353		385.559	-2.50%	40.5	4050		No				

1	IP49	2913.553	385.154	%	40.5	-4050	32.4	Yes	0.80%	Sag	Yes		
1	CT	2929.753	384.879	-1.70%	40.5	4050		No					
1	TC	2986.846	383.908	-1.70%	60	6000		No					
1	IP50	3007.846	383.551	%	60	-6000	42	Yes	0.70%	Sag	Yes		
1	CT	3028.846	383.341	-1.00%	60	6000		No					
1	TC	3094.787	382.682	-1.00%	48	4800		No					
1	IP51	3139.187	382.238	%	48	4800	88.8	Yes	-1.65%	Crest	Yes		
1	CT	3183.587	380.972	-2.85%	48	4800		No					
1	TC	3299.007	377.683	-2.85%	33	3300		No					
1	IP52	3324.582	376.954	%	33	-3300	51.15	Yes	1.55%	Sag	Yes		
1	CT	3350.157	376.621	-1.30%	33	3300		No					
1	TC	3383.304	376.19	-1.30%	4.5	450		No					
1	IP53	3391.629	376.082	%	4.5	450	16.65	Yes	-3.70%	Crest	No	Increase VC radius to R550m. Regrade adjacent grades if required maintain VC apex.	
1	CT	3399.954	375.666	-5.00%	4.5	450		No					
1	TC	3400.1	375.659	-5.00%	7.5	750		No					
1	IP54	3416.6	374.834	%	7.5	-750	33	Yes	4.40%	Sag	Yes		
1	CT	3433.1	374.735	-0.60%	7.5	750		No					
1	TC	3456.075	374.597	-0.60%	4.5	450		No					
1	IP55	3468.369	374.523	%	4.5	-450	24.588	Yes	5.46%	Sag	Yes		
1	CT	3480.663	375.121	4.86%	4.5	450		No					
1	TC	3483.658	375.267	4.86%	5.5	550		No					
1	IP56	3516.969	376.887	%	5.5	550	66.622	Yes	-12.11%	Crest	Yes		
1	CT	3550.28	374.472	-7.25%	5.5	550		No					
1	TC	3552.623	374.302	-7.25%	4.5	450		No					
1	IP57	3564.096	373.471	%	4.5	-450	22.946	Yes	5.10%	Sag	Yes		
1	CT	3575.568	373.224	-2.15%	4.5	450		No					
1	TC	3607.732	372.533	-2.15%	65	6500		No					
1	IP58	3651.607	371.589	%	65	-6500	87.75	Yes	1.35%	Sag	Yes		
1	CT	3695.482	371.238	-0.80%	65	6500		No					
1	TC	3747.353	370.823	-0.80%	60	6000		No					
1	IP59	3769.253	370.648	%	60	6000	43.8	Yes	-0.73%	Crest	Yes		
1	CT	3791.153	370.313	-1.53%	60	6000		No					
1	TC	3806.146	370.084	-1.53%	60	6000		No					
1	IP60	3817.846	369.905	%	60	-6000	23.4	Yes	0.39%	Sag	Yes		
1	CT	3829.546	369.771	-1.14%	60	6000		No					
1	TC	3864.656	369.371	-1.14%	56	5600		No					
1	IP61	3878.096	369.218	%	56	-5600	26.88	Yes	0.48%	Sag	Yes		
1	CT	3891.536	369.129	-0.66%	56	5600		No					
1	TC	3900.69	369.069	-0.66%	50	5000		No					
1	IP62	3916.19	368.966	%	50	5000	31	Yes	-0.62%	Crest	Yes		
1	CT	3931.69	368.768	-1.28%	50	5000		No					
1	TC	4025.52	367.567	-1.28%	60	6000		No					
1	IP63	4036.92	367.421	%	60	6000	22.8	Yes	-0.38%	Crest	Yes		
1	CT	4048.32	367.232	-1.66%	60	6000		No					
1	TC	4058.141	367.069	-1.66%	55	5500		No					
1	IP64	4090.041	366.539	%	55	-5500	63.8	Yes	1.16%	Sag	Yes		
1	CT	4121.941	366.38	-0.50%	55	5500		No					
1	TC	4127.794	366.35	-0.50%	30	3000		No					
1	IP65	4139.794	366.29	%	30	3000	24	Yes	-0.80%	Crest	Yes		
1	CT	4151.794	366.134	-1.30%	30	3000		No					
1	TC	4166.665	365.941	-1.30%	60	6000		No					
1	IP66	4189.165	365.649	%	60	-6000	45	Yes	0.75%	Sag	Yes		
1	CT	4211.665	365.525	-0.55%	60	6000		No					
1	TC	4331.778	364.864	-0.55%	40	4000		No					
1	IP67	4344.778	364.793	%	40	-4000	26	Yes	0.65%	Sag	Yes		
1	CT	4357.778	364.806	0.10%	40	4000		No					
1	TC	4475.681	364.924	0.10%	34	3400		No					
1	IP68	4513.081	364.961	%	34	-3400	74.8	Yes	2.20%	Sag	Yes		
1	CT	4550.481	365.821	2.30%	34	3400		No					
1	TC	4602.438	367.016	2.30%	32	3200		No					
1	IP69	4632.838	367.715	%	32	-3200	60.8	Yes	1.90%	Sag	Yes		
1	CT	4663.238	368.992	4.20%	32	3200		No					
1	TC	4722.942	371.5	4.20%	5.5	550		No					
1	IP70	4743.017	372.343	%	5.5	550	40.15	Yes	-7.30%	Crest	Yes		
1	CT	4763.092	371.721	-3.10%	5.5	550		No					
1	TC	4770.281	371.498	-3.10%	45	4500		No					
1	IP71	4783.781	371.079	%	45	4500	27	Yes	-0.60%	Crest	Yes		
1	CT	4797.281	370.58	-3.70%	45	4500		No					
1	TC	4825.139	369.549	-3.70%	36	3600		No					
1	IP72	4852.139	368.55	%	36	-3600	54	Yes	1.50%	Sag	Yes		
1	CT	4879.139	367.956	-2.20%	36	3600		No					
1	TC	4928.638	366.867	-2.20%	42	4200		No					
1	IP73	4964.338	366.082	%	42	-4200	71.4	Yes	1.70%	Sag	Yes		
1	CT	5000.038	365.903	-0.50%	42	4200		No					
1	TC	5068.925	365.559	-0.50%	80	8000		No					
1	IP74	5080.925	365.499	%	80	8000	24	Yes	-0.30%	Crest	Yes		
1	CT	5092.925	365.403	-0.80%	80	8000		No					
1	TC	5135.145	365.065	-0.80%	52	5200		No					
1	IP75	5166.345	364.815	%	52	-5200	62.4	Yes	1.20%	Sag	Yes		
1	CT	5197.545	364.94	0.40%	52	5200		No					
1	TC	5216.749	365.017	0.40%	9.386	938.599		No					
1	IP76	5234.113	365.087	%	9.386	938.599	34.728	Yes	-3.70%	Crest	Yes		
1	CT	5251.477	364.513	-3.30%	9.386	938.599		No					
1	TC	5271.232	363.862	-3.30%	9.943	994.32		No					
1	IP77	5280.678	363.55	%	9.943	-994.32	18.892	Yes	1.90%	Sag	Yes		
1	CT	5290.124	363.418	-1.40%	9.943	994.32		No					
1	TC	5314.741	363.073	-1.40%	4.5	450		No					
1	IP78	5320.591	362.991	%	4.5	450	11.7	Yes	-2.60%	Crest	No	Increase VC radius to R550m. Regrade adjacent grades if required maintain VC apex.	
1	CT	5326.441	362.757	-4.00%	4.5	450		No					
1	TC	5326.46	362.756	-4.00%	5.5	550		No					
1	IP79	5337.515	362.314	%	5.5	-550	22.11	Yes	4.02%	Sag	Yes		
1	CT	5348.57	362.316	0.02%	5.5	550		No					
1	TC	5359.873	362.319	0.02%	3	300		No					
1	IP80	5365.243	362.32	%	3	-300	10.74	Yes	3.58%	Sag	No	Increase VS radius to R450m. Regrade adjacent grades if required to reduce fill.	
1	CT	5370.613	362.513	3.60%	3	300		No					
1	TC	5373.768	362.627	3.60%	3	300		No					
1	IP81	5377.368	362.756	%	3	-300	7.2	Yes	2.40%	Sag	No	Increase VS radius to R450m. Regrade adjacent grades if required to reduce fill.	
1	CT	5380.968	362.972	6.00%	3	300		No					
1	TC	5400.475	364.143	6.00%	8	800		No					
1	IP82	5429.275	365.871	%	8	800	57.6	Yes	-7.20%	Crest	Yes		
1	CT	5458.075	365.525	-1.20%	8	800		No					
1	TC	5470.447	365.376	-1.20%	25	2500		No					
1	IP83	5483.947	365.214	%	25	-2500	27	Yes	1.08%	Sag	Yes		
1	CT	5497.447	365.198	-0.12%	25	2500		No					
1	TC	5537.137	365.151	-0.12%	60	6000		No					
1	IP84	5548.537	365.137	%	60	6000	22.8	Yes	-0.38%	Crest	Yes		
1	CT	5559.937	365.08	-0.50%	60	6000		No					
1	TC	5562.711	365.066	-0.50%	15	1500		No					
1	IP85	5569.911	365.03	%	15	-1500	14.4	Yes	0.96%	Sag	Yes		
1	CT	5577.111	365.063	0.46%	15	1500		No					
1	TC	5582.148	365.086	0.46%	25	2500		No					
1	IP86	5597.273	365.156	%	25	2500	30.25	Yes	-1.21%	Crest	Yes		
1	CT	5612.398	365.043	-0.75%	25	2500		No					
1	TC	5615.742	365.017	-0.75%	20	2000		No					
1	IP87	5625.242	364.946	%	20	-2000	19	Yes	0.95%	Sag	Yes		
1	CT	5634.742	364.965	0.20%	20	2000		No					
1	TC	5674.401	365.045	0.20%	10	1000		No					
1	IP88	5679.801	365.055	%	10	1000	10.8	Yes	-1.08%	Crest	Yes		
1	CT	5685.201	365.008	-0.88%	10	1000		No					
1	TC	5685.866	365.002	-0.88%	10	1000		No					
1	IP89	5691.466	364.953	%	10	-1000	11.2	Yes	1.12%	Sag	Yes		
1	CT	5697.066	364.966	0.24%	10	1000		No					
1	TC	5925.003	365.513	0.24%	60	6000		No					
1	IP90	5938.803	365.546	%	60	-6000	27.6	Yes	0.46%	Sag	Yes		
1	CT	5952.603	365.643	0.70%	60	6000		No					
1	TC	5962.031	365.709	0.70%	60	6000		No					
1	IP91	5980.031	365.835	%	60	6000	36	Yes	-0.60%	Crest	Yes		
1	CT	5998.031	365.853	0.10%	60	6000		No					
1	TC	6015.304	365.87	0.10%	80	8000		No					
1	IP92	6027.496	365.882	%	80	-8000	24.384	Yes	0.31%	Sag	Yes		
1	CT	6039.688	365.932	0.41%	80	8000		No					
1	TC	6050.785	365.977	0.41%	30	3000		No					
1	IP93	6059.107	366.01	%	30	3000	16.644	Yes	-0.56%	Crest	Yes		
1	CT	6067.429	365.998	-0.15%	30	3000		No					
1	TC	6094.996	365.956	-0.15%	50	5000		No					
1	IP94	6118.746	365.921	%	50	-5000	47.5	Yes	0.95%	Sag	Yes		
1	CT	6142.496	366.111	0.80%	50	5000		No					
1	TC	6143.433	366.118	0.80%	40	4000		No					
1	IP95	6155.233	366.213	%	40	4000	23.6	Yes	-0.59%	Crest	Yes		
1	CT	6167.033	366.238	0.21%	40	4000		No					
1	TC	6173.026	366.25	0.21%	50	5000		No					
1	IP96	6188.276	366.282	%	50	5000	30.5	Yes	-0.61%	Crest	Yes		
1	CT	6203.526	366.221	-0.40%	50	5000		No					
1	TC	6232.357	366.106	-0.40%	60	6000		No					
1	IP97	6255.157	366.015	%	60	-6000	45.6	Yes	0.76%	Sag	Yes		

1	CT	6277.957	366.097	0.36%	60	6000		No					
1	TC	6406.764	366.56	0.36%	40	4000		No					
1	IP98	6423.964	366.622	%	40	4000	34.4	Yes	-0.86%	Crest	Yes		
1	CT	6441.164	366.536	-0.50%	40	4000		No					
1	TC	6460.527	366.439	-0.50%	40	4000		No					
1	IP99	6480.527	366.339	%	40	-4000	40	Yes	1.00%	Sag	Yes		
1	CT	6500.527	366.439	0.50%	40	4000		No					
1	TC	6502.773	366.451	0.50%	60	6000		No					
1	IP100	6515.073	366.512	%	60	6000	24.6	Yes	-0.41%	Crest	Yes		
1	CT	6527.373	366.523	0.09%	60	6000		No					
1	TC	6589.161	366.579	0.09%	60	6000		No					
1	IP101	6603.861	366.592	%	60	6000	29.4	Yes	-0.49%	Crest	Yes		
1	CT	6618.561	366.533	-0.40%	60	6000		No					
1	TC	6629.725	366.489	-0.40%	40	4000		No					
1	IP102	6647.725	366.417	%	40	-4000	36	Yes	0.90%	Sag	Yes		
1	CT	6665.725	366.507	0.50%	40	4000		No					
1	TC	6754.207	366.949	0.50%	22.28	2228		No					
1	IP103	6765.347	367.005	%	22.28	2228	22.28	Yes	-1.00%	Crest	Yes		
1	CT	6776.487	366.949	-0.50%	22.28	2228		No					
1	TC	6851.175	366.576	-0.50%	5.5	550		No					
1	IP104	6877.3	366.445	%	5.5	550	52.25	Yes	-9.50%	Crest	Yes		
1	CT	6903.425	363.833	-10.00%	5.5	550		No					
1	TC	6989.25	355.25	-10.00%	4.5	450		No					
1	IP105	7011.75	353	%	4.5	-450	45	Yes	10.00%	Sag	Yes		
1	CT	7034.25	353	0.00%	4.5	450		No					
1	TC	7174.249	353	0.00%	4.5	450		No					
1	IP106	7196.749	353	%	4.5	-450	45	Yes	10.00%	Sag	Yes		
1	CT	7219.249	355.25	10.00%	4.5	450		No					
1	TC	7302.748	363.6	10.00%	5.5	550		No					
1	IP107	7328.869	366.212	%	5.5	550	52.241	Yes	-9.50%	Crest	Yes		
1	CT	7354.989	366.343	0.50%	5.5	550		No					
1	TC	7433.625	366.737	0.50%	15.7	1570		No					
1	IP108	7443.843	366.789	%	15.7	1570	20.435	Yes	-1.30%	Crest	Yes		
1	CT	7454.061	366.707	-0.80%	15.7	1570		No					
1	TC	7589.55	365.623	-0.80%	50	5000		No					
1	IP109	7614.55	365.423	%	50	-5000	50	Yes	1.00%	Sag	Yes		
1	CT	7639.55	365.473	0.20%	50	5000		No					
1	TC	7643.227	365.48	0.20%	50	5000		No					
1	IP110	7670.727	365.535	%	50	5000	55	Yes	-1.10%	Crest	Yes		
1	CT	7698.227	365.288	-0.90%	50	5000		No					
1	TC	7701.734	365.256	-0.90%	50	5000		No					
1	IP111	7726.734	365.031	%	50	-5000	50	Yes	1.00%	Sag	Yes		
1	CT	7751.734	365.056	0.10%	50	5000		No					
1	TC	8330.581	365.635	0.10%	10	1000		No					
1	IP112	8346.581	365.851	%	10	1000	32	Yes	-3.20%	Crest	Yes		
1	CT	8362.581	365.155	-3.10%	10	1000		No					
1	TC	8443.086	362.66	-3.10%	8.035	803.456		No					
1	IP113	8473.618	361.713	%	8.035	-803.456	61.063	Yes	7.60%	Sag	Yes		
1	CT	8504.149	363.087	4.50%	8.035	803.456		No					
1	TC	8523.072	363.938	4.50%	10	1000		No					
1	IP114	8544.822	364.917	%	10	1000	43.5	Yes	-4.35%	Crest	Yes		
1	CT	8566.572	364.95	0.15%	10	1000		No					
1	TC	8662.917	365.094	0.15%	50	5000		No					
1	IP115	8666.667	365.1	%	50	5000	7.5	Yes	-0.15%	Crest	Yes		
1	CT	8670.417	365.1	0.00%	50	5000		No					
1	TC	8793.999	365.1	0.00%	50	5000		No					
1	IP116	8802.749	365.1	%	50	-5000	17.5	Yes	0.35%	Sag	Yes		
1	CT	8811.499	365.131	0.35%	50	5000		No					
1	TC	8865.195	365.319	0.35%	30	3000		No					
1	IP117	8879.895	365.37	%	30	-3000	29.4	Yes	0.98%	Sag	Yes		
1	CT	8894.595	365.566	1.33%	30	3000		No					
1	TC	8954.986	366.369	1.33%	20	2000		No					
1	IP118	8969.786	366.566	%	20	2000	29.6	Yes	-1.48%	Crest	Yes		
1	CT	8984.586	366.543	-0.15%	20	2000		No					
1	TC	8987.767	366.539	-0.15%	22.5	2250		No					
1	IP119	8998.454	366.523	%	22.5	-2250	21.375	Yes	0.95%	Sag	Yes		
1	CT	9009.142	366.608	0.80%	22.5	2250		No					
1	TC	9057.268	366.993	0.80%	36.5	3650		No					
1	IP120	9070.408	367.098	%	36.5	-3650	26.28	Yes	0.72%	Sag	Yes		
1	CT	9083.548	367.298	1.52%	36.5	3650		No					
1	TC	9121.995	367.882	1.52%	40	4000		No					
1	IP121	9146.795	368.259	%	40	-4000	49.6	Yes	1.24%	Sag	Yes		
1	CT	9171.595	368.944	2.76%	40	4000		No					
1	TC	9175.455	369.05	2.76%	17.5	1750		No					
1	IP122	9199.255	369.707	%	17.5	1750	47.6	Yes	-2.72%	Crest	Yes		
1	CT	9223.055	369.717	0.04%	17.5	1750		No					
1	TC	9242.378	369.724	0.04%	17.5	1750		No					
1	IP123	9250.603	369.728	%	17.5	1750	16.45	Yes	-0.94%	Crest	Yes		
1	CT	9258.828	369.654	-0.90%	17.5	1750		No					
1	TC	9312.055	369.175	-0.90%	17	1700		No					
1	IP124	9330.925	369.005	%	17	-1700	37.74	Yes	2.22%	Sag	Yes		
1	CT	9349.795	369.254	1.32%	17	1700		No					
1	TC	9350.518	369.263	1.32%	17	1700		No					
1	IP125	9360.718	369.398	%	17	1700	20.4	Yes	-1.20%	Crest	Yes		
1	CT	9370.918	369.41	0.12%	17	1700		No					
1	TC	9420.26	369.47	0.12%	30	3000		No					
1	IP126	9446.96	369.502	%	30	-3000	53.4	Yes	1.78%	Sag	Yes		
1	CT	9473.66	370.009	1.90%	30	3000		No					
1	TC	9554.368	371.542	1.90%	80	8000		No					
1	IP127	9572.16	371.88	%	80	8000	35.584	Yes	-0.45%	Crest	Yes		
1	CT	9589.952	372.139	1.46%	80	8000		No					
1	TC	9611.85	372.458	1.46%	6.5	650		No					
1	IP128	9616.383	372.524	%	6.5	-650	9.066	Yes	1.40%	Sag	Yes		
1	CT	9620.916	372.653	2.85%	6.5	650		No					
1	TC	9640.115	373.2	2.85%	14	1400		No					
1	IP129	9675.465	374.208	%	14	-1400	70.7	Yes	5.05%	Sag	Yes		
1	CT	9710.815	377	7.90%	14	1400		No					
1	TC	9727.72	378.336	7.90%	9	900		No					
1	IP130	9751.435	380.209	%	9	900	47.43	Yes	-5.27%	Crest	Yes		
1	CT	9775.15	380.833	2.63%	9	900		No					
1	TC	9785.347	381.101	2.63%	20	2000		No					
1	IP131	9800.447	381.498	%	20	-2000	30.2	Yes	1.51%	Sag	Yes		
1	CT	9815.547	382.124	4.14%	20	2000		No					
1	TC	9866.891	384.249	4.14%	9	900		No					
1	IP132	9894.521	385.393	%	9	900	55.26	Yes	-6.14%	Crest	Yes		
1	CT	9922.151	384.84	-2.00%	9	900		No					
1	TC	9941.516	384.453	-2.00%	25	2500		No					
1	IP133	9951.516	384.253	%	25	-2500	20	Yes	0.80%	Sag	Yes		
1	CT	9961.516	384.133	-1.20%	25	2500		No					
1	TC	9967.188	384.065	-1.20%	32	3200		No					
1	IP134	9973.588	383.988	%	32	3200	12.8	Yes	-0.40%	Crest	Yes		
1	CT	9979.988	383.886	-1.60%	32	3200		No					
1	TC	10031.408	383.063	-1.60%	30	3000		No					
1	IP135	10040.408	382.919	%	30	-3000	18	Yes	0.60%	Sag	Yes		
1	CT	10049.408	382.829	-1.00%	30	3000		No					
1	TC	10069.488	382.628	-1.00%	32	3200		No					
1	IP136	10081.328	382.51	%	32	3200	23.68	Yes	-0.74%	Crest	Yes		
1	CT	10093.168	382.304	-1.74%	32	3200		No					
1	TC	10123.865	381.77	-1.74%	40	4000		No					
1	IP137	10136.665	381.547	%	40	-4000	25.6	Yes	0.64%	Sag	Yes		
1	CT	10149.465	381.406	-1.10%	40	4000		No					
1	TC	10229.035	380.531	-1.10%	78	7800		No					
1	IP138	10270.765	380.072	%	78	-7800	83.46	Yes	1.07%	Sag	Yes		
1	CT	10312.495	380.059	-0.03%	78	7800		No					
1	TC	10321.957	380.057	-0.03%	20	2000		No					
1	IP139	10340.957	380.051	%	20	2000	38	Yes	-1.90%	Crest	Yes		
1	CT	10359.957	379.684	-1.93%	20	2000		No					
1	TC	10360.106	379.681	-1.93%	18	1800		No					
1	IP140	10374.956	379.395	%	18	-1800	29.7	Yes	1.65%	Sag	Yes		
1	CT	10389.806	379.353	-0.28%	18	1800		No					
1	TC	10449.707	379.185	-0.28%	25	2500		No					
1	IP141	10464.082	379.145	%	25	-2500	28.75	Yes	1.15%	Sag	Yes		
1	CT	10478.457	379.27	0.87%	25	2500		No					
1	TC	10524.43	379.67	0.87%	50	5000		No					
1	IP142	10537.68	379.785	%	50	-5000	26.5	Yes	0.53%	Sag	Yes		
1	CT	10550.93	379.971	1.40%	50	5000		No					
1	TC	10576.703	380.332	1.40%	85	8500		No					
1	IP143	10648.953	381.343	%	85	8500	144.5	Yes	-1.70%	Crest	Yes		
1	CT	10721.203	381.127	-0.30%	85	8500		No					
1	TC	10765.284	380.994	-0.30%	200	20000		No					
1	IP144	10952.284	380.433	%	200	-20000	374	Yes	1.87%	Sag	Yes		
1	CT	11139.284	383.369	1.57%	200	20000		No					
1	TC	11331.31	386.384	1.57%	250	25000		No					
1	IP145	11440.06	388.091	%	250	25000	217.5	Yes	-0.87%	Crest	Yes		
1	CT	11548.81	388.853	0.70%	250	25000		No					

1	TC	11789.495	390.537	0.70%	40	4000		No					
1	IP146	11805.095	390.647	%	40	-4000	31.2	Yes	0.78%	Sag	Yes		
1	CT	11820.695	390.878	1.48%	40	4000		No					
1	TC	11848.493	391.289	1.48%	20	2000		No					
1	IP147	11873.293	391.656	%	20	2000	49.6	Yes	-2.48%	Crest	Yes		
1	CT	11898.093	391.408	-1.00%	20	2000		No					
1	TC	11941.229	390.977	-1.00%	5.5	550		No					
1	IP148	11946.592	390.923	%	5.5	-550	10.725	Yes	1.95%	Sag	Yes		
1	CT	11951.954	390.974	0.95%	5.5	550		No					
1	TC	11969.412	391.14	0.95%	20	2000		No					
1	IP149	11987.912	391.316	%	20	2000	37	Yes	-1.85%	Crest	Yes		
1	CT	12006.412	391.149	-0.90%	20	2000		No					
1	TC	12053.729	390.723	-0.90%	80	8000		No					
1	IP150	12065.729	390.615	%	80	-8000	24	Yes	0.30%	Sag	Yes		
1	CT	12077.729	390.543	-0.60%	80	8000		No					
1	TC	12081.437	390.521	-0.60%	26	2600		No					
1	IP151	12093.137	390.451	%	26	2600	23.4	Yes	-0.90%	Crest	Yes		
1	CT	12104.837	390.275	-1.50%	26	2600		No					
1	TC	12155.926	389.509	-1.50%	16	1600		No					
1	IP152	12169.526	389.305	%	16	1600	27.2	Yes	-1.70%	Crest	Yes		
1	CT	12183.126	388.87	-3.20%	16	1600		No					
1	TC	12198.741	388.37	-3.20%	24	2400		No					
1	IP153	12207.141	388.101	%	24	-2400	16.8	Yes	0.70%	Sag	Yes		
1	CT	12215.541	387.891	-2.50%	24	2400		No					
1	TC	12254.17	386.925	-2.50%	24	2400		No					
1	IP154	12262.57	386.715	%	24	-2400	16.8	Yes	0.70%	Sag	Yes		
1	CT	12270.97	386.564	-1.80%	24	2400		No					
1	TC	12274.409	386.502	-1.80%	24	2400		No					
1	IP155	12285.209	386.308	%	24	2400	21.6	Yes	-0.90%	Crest	Yes		
1	CT	12296.009	386.016	-2.70%	24	2400		No					
1	TC	12324.927	385.236	-2.70%	4.5	450		No					
1	IP156	12335.727	384.944	%	4.5	-450	21.6	Yes	4.80%	Sag	Yes		
1	CT	12346.527	385.171	2.10%	4.5	450		No					
1	TC	12421.021	386.735	2.10%	22	2200		No					
1	IP157	12449.621	387.336	%	22	2200	57.2	Yes	-2.60%	Crest	Yes		
1	CT	12478.221	387.193	-0.50%	22	2200		No					
1	TC	12632.157	386.423	-0.50%	60	6000		No					
1	IP158	12641.457	386.377	%	60	6000	18.6	Yes	-0.31%	Crest	Yes		
1	CT	12650.757	386.301	-0.81%	60	6000		No					
1	TC	12768.673	385.346	-0.81%	80	8000		No					
1	IP159	12786.273	385.204	%	80	-8000	35.2	Yes	0.44%	Sag	Yes		
1	CT	12803.873	385.138	-0.37%	80	8000		No					
1	TC	12844.309	384.989	-0.37%	200	20000		No					
1	IP160	12857.309	384.941	%	200	20000	26	Yes	-0.13%	Crest	Yes		
1	CT	12870.309	384.876	-0.50%	200	20000		No					
1	TC	12917.184	384.641	-0.50%	20	2000		No					
1	IP161	12925.384	384.6	%	20	-2000	16.4	Yes	0.82%	Sag	Yes		
1	CT	12933.584	384.627	0.32%	20	2000		No					
1	IP162	12951.283	384.683	%				Yes	-0.37%	No VC	No	Provide R550m crest between vertical grades.
1	TC	13029.836	384.644	-0.05%	12	1200		No					
1	IP163	13042.256	384.638	%	12	1200	24.84	Yes	-2.07%	Crest	Yes		
1	CT	13054.676	384.374	-2.12%	12	1200		No					
1	TC	13067.636	384.1	-2.12%	4.5	450		No					
1	IP164	13075.331	383.937	%	4.5	-450	15.39	Yes	3.42%	Sag	Yes		
1	CT	13083.026	384.037	1.30%	4.5	450		No					
1	TC	13141.835	384.801	1.30%	40	4000		No					
1	IP165	13172.635	385.202	%	40	4000	61.6	Yes	-1.54%	Crest	Yes		
1	CT	13203.435	385.128	-0.24%	40	4000		No					
1	TC	13214.069	385.102	-0.24%	26	2600		No					
1	IP166	13224.079	385.078	%	26	-2600	20.02	Yes	0.77%	Sag	Yes		
1	CT	13234.089	385.131	0.53%	26	2600		No					
1	TC	13284.762	385.4	0.53%	20	2000		No					
1	IP167	13296.062	385.46	%	20	-2000	22.6	Yes	1.13%	Sag	Yes		
1	CT	13307.362	385.647	1.66%	20	2000		No					
1	TC	13342.366	386.228	1.66%	20	2000		No					
1	IP168	13368.166	386.656	%	20	2000	51.6	Yes	-2.58%	Crest	Yes		
1	CT	13393.966	386.419	-0.92%	20	2000		No					
1	TC	13419.568	386.184	-0.92%	20	2000		No					
1	IP169	13431.668	386.072	%	20	2000	24.2	Yes	-1.21%	Crest	Yes		
1	CT	13443.768	385.815	-2.13%	20	2000		No					
1	TC	13453.331	385.611	-2.13%	15	1500		No					
1	IP170	13461.056	385.446	%	15	-1500	15.45	Yes	1.03%	Sag	Yes		
1	CT	13468.781	385.361	-1.10%	15	1500		No					
1	TC	13495.495	385.067	-1.10%	5.5	550		No					
1	IP171	13503.36	384.981	%	5.5	-550	15.73	Yes	2.86%	Sag	Yes		
1	CT	13511.225	385.119	1.76%	5.5	550		No					
1	TC	13533.523	385.512	1.76%	12	1200		No					
1	IP172	13541.083	385.645	%	12	1200	15.12	Yes	-1.26%	Crest	Yes		
1	CT	13548.643	385.683	0.50%	12	1200		No					
1	TC	13562.389	385.751	0.50%	10	1000		No					
1	IP173	13568.389	385.781	%	10	-1000	12	Yes	1.20%	Sag	Yes		
1	CT	13574.389	385.883	1.70%	10	1000		No					
1	TC	13615.41	386.581	1.70%	20	2000		No					
1	IP174	13622.41	386.7	%	20	2000	14	Yes	-0.70%	Crest	Yes		
1	CT	13629.41	386.77	1.00%	20	2000		No					
1	TC	13659.511	387.071	1.00%	20	2000		No					
1	IP175	13665.511	387.131	%	20	-2000	12	Yes	0.60%	Sag	Yes		
1	CT	13671.511	387.227	1.60%	20	2000		No					
1	TC	13692.408	387.561	1.60%	32	3200		No					
1	IP176	13707.128	387.797	%	32	3200	29.44	Yes	-0.92%	Crest	Yes		
1	CT	13721.848	387.897	0.68%	32	3200		No					
1	TC	13732.501	387.969	0.68%	20	2000		No					
1	IP177	13742.201	388.035	%	20	-2000	19.4	Yes	0.97%	Sag	Yes		
1	CT	13751.901	388.195	1.65%	20	2000		No					
1	TC	13764.61	388.405	1.65%	32	3200		No					
1	IP178	13777.41	388.616	%	32	3200	25.6	Yes	-0.80%	Crest	Yes		
1	CT	13790.21	388.725	0.85%	32	3200		No					
1	TC	13806.195	388.861	0.85%	30	3000		No					
1	IP179	13829.895	389.062	%	30	-3000	47.4	Yes	1.58%	Sag	Yes		
1	CT	13853.595	389.638	2.43%	30	3000		No					
1	TC	13857.326	389.729	2.43%	12	1200		No					
1	IP180	13864.106	389.894	%	12	1200	13.56	Yes	-1.13%	Crest	Yes		
1	CT	13870.886	389.982	1.30%	12	1200		No					
1	TC	13930.756	390.76	1.30%	40	4000		No					
1	IP181	13940.756	390.89	%	40	4000	20	Yes	-0.50%	Crest	Yes		
1	CT	13950.756	390.97	0.80%	40	4000		No					
1	TC	13981.916	391.219	0.80%	40	4000		No					
1	IP182	13988.716	391.274	%	40	-4000	13.6	Yes	0.34%	Sag	Yes		
1	CT	13995.516	391.351	1.14%	40	4000		No					
1	TC	14001.999	391.425	1.14%	20	2000		No					
1	IP183	14009.299	391.508	%	20	2000	14.6	Yes	-0.73%	Crest	Yes		
1	CT	14016.599	391.538	0.41%	20	2000		No					
1	TC	14018.668	391.547	0.41%	38.5	3850		No					
1	IP184	14047.35	391.664	%	38.5	-3850	57.365	Yes	1.49%	Sag	Yes		
1	CT	14076.033	392.209	1.90%	38.5	3850		No					
1	TC	14076.651	392.221	1.90%	18	1800		No					
1	IP185	14082.321	392.329	%	18	1800	11.34	Yes	-0.63%	Crest	Yes		
1	CT	14087.991	392.401	1.27%	18	1800		No					
1	TC	14101.61	392.574	1.27%	10	1000		No					
1	IP186	14105.76	392.626	%	10	-1000	8.3	Yes	0.83%	Sag	Yes		
1	CT	14109.91	392.714	2.10%	10	1000		No					
1	TC	14111.795	392.753	2.10%	5.5	550		No					
1	IP187	14121.42	392.955	%	5.5	550	19.25	Yes	-3.50%	Crest	Yes		
1	CT	14131.045	392.821	-1.40%	5.5	550		No					
1	TC	14131.201	392.818	-1.40%	6.5	650		No					
1	IP188	14137.539	392.73	%	6.5	-650	12.675	Yes	1.95%	Sag	Yes		
1	CT	14143.876	392.764	0.55%	6.5	650		No					
1	TC	14173.881	392.93	0.55%	20	2000		No					
1	IP189	14186.381	392.998	%	20	2000	25	Yes	-1.25%	Crest	Yes		
1	CT	14198.881	392.911	-0.70%	20	2000		No					
1	TC	14245.91	392.582	-0.70%	35	3500		No					
1	IP190	14273.91	392.386	%	35	-3500	56	Yes	1.60%	Sag	Yes		
1	CT	14301.91	392.638	0.90%	35	3500		No					
1	TC	14351.289	393.082	0.90%	20	2000		No					
1	IP191	14361.289	393.172	%	20	2000	20	Yes	-1.00%	Crest	Yes		
1	CT	14371.289	393.162	-0.10%	20	2000		No					
1	TC	14403.099	393.13	-0.10%	40	4000		No					
1	IP192	14418.699	393.115	%	40	-4000	31.2	Yes	0.78%	Sag	Yes		
1	CT	14434.299	393.221	0.68%	40	4000		No					
1	TC	14459.003	393.389	0.68%	36	3600		No					
1	IP193	14475.563	393.501	%	36	-3600	33.12	Yes	0.92%	Sag	Yes		
1	CT	14492.123	393.766	1.60%	36	3600		No					
1	TC	14503.708	393.952	1.60%	45	4500		No					
1	IP194	14523.958	394.276	%	45	4500	40.5	Yes	-0.90%	Crest	Yes		
1	CT	14544.208	394.417	0.70%	45	4500		No					

1	TC	14581.036	394.675	0.70%	80	8000		No					
1	IP195	14602.236	394.824	%	80	8000	42.4	Yes	-0.53%	Crest	Yes		
1	CT	14623.436	394.86	0.17%	80	8000		No					
1	TC	14699.335	394.989	0.17%	40	4000		No					
1	IP196	14713.735	395.013	%	40	4000	28.8	Yes	-0.72%	Crest	Yes		
1	CT	14728.135	394.934	-0.55%	40	4000		No					
1	TC	14732.126	394.912	-0.55%	20	2000		No					
1	IP197	14744.226	394.845	%	20	-2000	24.2	Yes	1.21%	Sag	Yes		
1	CT	14756.326	394.925	0.66%	20	2000		No					
1	TC	14768.099	395.003	0.66%	30	3000		No					
1	IP198	14781.599	395.092	%	30	3000	27	Yes	-0.90%	Crest	Yes		
1	CT	14795.099	395.06	-0.24%	30	3000		No					
1	TC	14797.054	395.055	-0.24%	20	2000		No					
1	IP199	14808.454	395.028	%	20	-2000	22.8	Yes	1.14%	Sag	Yes		
1	CT	14819.854	395.13	0.90%	20	2000		No					
1	TC	14828.38	395.207	0.90%	30	3000		No					
1	IP200	14848.63	395.389	%	30	3000	40.5	Yes	-1.35%	Crest	Yes		
1	CT	14868.88	395.298	-0.45%	30	3000		No					
1	TC	14931.474	395.016	-0.45%	10	1000		No					
1	IP201	14936.224	394.995	%	10	1000	9.5	Yes	-0.95%	Crest	Yes		
1	CT	14940.974	394.928	-1.40%	10	1000		No					
1	TC	14943.684	394.891	-1.40%	25	2500		No					
1	IP202	14986.184	394.296	%	25	-2500	85	Yes	3.40%	Sag	Yes		
1	CT	15028.684	395.146	2.00%	25	2500		No					
1	TC	15029.234	395.157	2.00%	5.5	550		No					
1	IP203	15031.709	395.206	%	5.5	550	4.95	Yes	-0.90%	Crest	Yes		
1	CT	15034.184	395.233	1.10%	5.5	550		No					
1	TC	15125.009	396.232	1.10%	100	10000		No					
1	IP204	15243.509	397.536	%	100	10000	237	Yes	-2.37%	Crest	Yes		
1	CT	15362.009	396.031	-1.27%	100	10000		No					
1	TC	15404.151	395.496	-1.27%	20	2000		No					
1	IP205	15418.451	395.314	%	20	2000	28.6	Yes	-1.43%	Crest	Yes		
1	CT	15432.751	394.928	-2.70%	20	2000		No					
1	TC	15441.857	394.682	-2.70%	4.5	450		No					
1	IP206	15452.207	394.403	%	4.5	-450	20.7	Yes	4.60%	Sag	Yes		
1	CT	15462.557	394.599	1.90%	4.5	450		No					
1	TC	15493.973	395.196	1.90%	20	2000		No					
1	IP207	15500.773	395.325	%	20	2000	13.6	Yes	-0.68%	Crest	Yes		
1	CT	15507.573	395.408	1.22%	20	2000		No					
1	TC	15755.911	398.438	1.22%	40	4000		No					
1	IP208	15770.111	398.611	%	40	4000	28.4	Yes	-0.71%	Crest	Yes		
1	CT	15784.311	398.684	0.51%	40	4000		No					
1	TC	15798.083	398.754	0.51%	50	5000		No					
1	IP209	15812.833	398.829	%	50	-5000	29.5	Yes	0.59%	Sag	Yes		
1	CT	15827.583	398.991	1.10%	50	5000		No					
1	TC	15858.811	399.335	1.10%	23	2300		No					
1	IP210	15869.161	399.449	%	23	2300	20.7	Yes	-0.90%	Crest	Yes		
1	CT	15879.511	399.47	0.20%	23	2300		No					
1	TC	15890.996	399.493	0.20%	25	2500		No					
1	IP211	15899.371	399.509	%	25	-2500	16.75	Yes	0.67%	Sag	Yes		
1	CT	15907.746	399.582	0.87%	25	2500		No					
1	TC	15926.697	399.747	0.87%	60	6000		No					
1	IP212	15943.797	399.896	%	60	6000	34.2	Yes	-0.57%	Crest	Yes		
1	CT	15960.897	399.947	0.30%	60	6000		No					
1	TC	15970.695	399.976	0.30%	30	3000		No					
1	IP213	15987.345	400.026	%	30	-3000	33.3	Yes	1.11%	Sag	Yes		
1	CT	16003.995	400.281	1.41%	30	3000		No					
1	TC	16012.046	400.375	1.41%	20	2000		No					
1	IP214	16020.146	400.489	%	20	2000	16.2	Yes	-0.81%	Crest	Yes		
1	CT	16028.246	400.538	0.60%	20	2000		No					
1	TC	16042.648	400.624	0.60%	20	2000		No					
1	IP215	16048.648	400.66	%	20	-2000	12	Yes	0.60%	Sag	Yes		
1	CT	16054.648	400.732	1.20%	20	2000		No					
1	TC	16057.036	400.761	1.20%	60	6000		No					
1	IP216	16070.236	400.919	%	60	6000	26.4	Yes	-0.44%	Crest	Yes		
1	CT	16083.436	401.019	0.76%	60	6000		No					
1	TC	16132.143	401.389	0.76%	12	1200		No					
1	IP217	16139.103	401.442	%	12	1200	13.92	Yes	-1.16%	Crest	Yes		
1	CT	16146.063	401.415	-0.40%	12	1200		No					
1	TC	16151.624	401.392	-0.40%	12	1200		No					
1	IP218	16158.464	401.365	%	12	-1200	13.68	Yes	1.14%	Sag	Yes		
1	CT	16165.304	401.416	0.74%	12	1200		No					
1	TC	16165.425	401.416	0.74%	12	1200		No					
1	IP219	16172.685	401.47	%	12	1200	14.52	Yes	-1.21%	Crest	Yes		
1	CT	16179.945	401.436	-0.47%	12	1200		No					
1	TC	16209.977	401.295	-0.47%	40	4000		No					
1	IP220	16221.977	401.239	%	40	-4000	24	Yes	0.60%	Sag	Yes		
1	CT	16233.977	401.254	0.13%	40	4000		No					
1	TC	16254.412	401.281	0.13%	60	6000		No					
1	IP221	16266.412	401.296	%	60	6000	24	Yes	-0.40%	Crest	Yes		
1	CT	16278.412	401.264	-0.27%	60	6000		No					
1	TC	16307.391	401.186	-0.27%	40	4000		No					
1	IP222	16319.991	401.152	%	40	-4000	25.2	Yes	0.63%	Sag	Yes		
1	CT	16332.591	401.197	0.36%	40	4000		No					
1	TC	16367.45	401.322	0.36%	80	8000		No					
1	IP223	16377.85	401.36	%	80	8000	20.8	Yes	-0.26%	Crest	Yes		
1	CT	16388.25	401.37	0.10%	80	8000		No					
1	TC	16390.034	401.372	0.10%	80	8000		No					
1	IP224	16408.834	401.391	%	80	-8000	37.6	Yes	0.47%	Sag	Yes		
1	CT	16427.634	401.498	0.57%	80	8000		No					
1	TC	16442.484	401.583	0.57%	20	2000		No					
1	IP225	16452.384	401.639	%	20	2000	19.8	Yes	-0.99%	Crest	Yes		
1	CT	16462.284	401.598	-0.42%	20	2000		No					
1	TC	16474.04	401.548	-0.42%	30	3000		No					
1	IP226	16487.24	401.493	%	30	-3000	26.4	Yes	0.88%	Sag	Yes		
1	CT	16500.44	401.553	0.46%	30	3000		No					
1	TC	16515.585	401.623	0.46%	35	3500		No					
1	IP227	16527.653	401.679	%	35	3500	24.136	Yes	-0.69%	Crest	Yes		
1	CT	16539.721	401.651	-0.23%	35	3500		No					
1	TC	16555.107	401.616	-0.23%	60	6000		No					
1	IP228	16571.895	401.577	%	60	-6000	33.576	Yes	0.56%	Sag	Yes		
1	CT	16588.683	401.632	0.33%	60	6000		No					
1	TC	16762.879	402.207	0.33%	65	6500		No					
1	IP229	16784.654	402.279	%	65	-6500	43.55	Yes	0.67%	Sag	Yes		
1	CT	16806.429	402.497	1.00%	65	6500		No					
1	TC	16884.294	403.276	1.00%	40	4000		No					
1	IP230	16901.694	403.45	%	40	4000	34.8	Yes	-0.87%	Crest	Yes		
1	CT	16919.094	403.472	0.13%	40	4000		No					
1	TC	16977.922	403.549	0.13%	80	8000		No					
1	IP231	17000.722	403.578	%	80	-8000	45.6	Yes	0.57%	Sag	Yes		
1	CT	17023.522	403.738	0.70%	80	8000		No					
1	TC	17065.566	404.032	0.70%	40	4000		No					
1	IP232	17079.366	404.129	%	40	4000	27.6	Yes	-0.69%	Crest	Yes		
1	CT	17093.166	404.13	0.01%	40	4000		No					
1	TC	17095.98	404.13	0.01%	43.3	4330		No					
1	IP233	17108.754	404.132	%	43.3	-4330	25.547	Yes	0.59%	Sag	Yes		
1	CT	17121.527	404.208	0.60%	43.3	4330		No					
1	TC	17180.704	404.563	0.60%	20	2000		No					
1	IP234	17191.704	404.629	%	20	2000	22	Yes	-1.10%	Crest	Yes		
1	CT	17202.704	404.574	-0.50%	20	2000		No					
1	TC	17282.799	404.174	-0.50%	20	2000		No					
1	IP235	17304.799	404.064	%	20	-2000	44	Yes	2.20%	Sag	Yes		
1	CT	17326.799	404.438	1.70%	20	2000		No					
1	TC	17361.531	405.028	1.70%	32.5	3250		No					
1	IP236	17407.031	405.802	%	32.5	3250	91	Yes	-2.80%	Crest	Yes		
1	CT	17452.531	405.301	-1.10%	32.5	3250		No					
1	TC	17566.921	404.043	-1.10%	20	2000		No					
1	IP237	17587.421	403.818	%	20	-2000	41	Yes	2.05%	Sag	Yes		
1	CT	17607.921	404.012	0.95%	20	2000		No					
1	TC	17651.172	404.423	0.95%	5.5	550		No					
1	IP238	17658.075	404.489	%	5.5	550	13.805	Yes	-2.51%	Crest	Yes		
1	CT	17664.977	404.381	-1.56%	5.5	550		No					
1	TC	17676.292	404.205	-1.56%	10	1000		No					
1	IP239	17693.942	403.929	%	10	-1000	35.3	Yes	3.53%	Sag	Yes		
1	CT	17711.592	404.277	1.97%	10	1000		No					
1	TC	17743.777	404.911	1.97%	22	2200		No					
1	IP240	17787.227	405.767	%	22	2200	86.9	Yes	-3.95%	Crest	Yes		
1	CT	17830.677	404.907	-1.98%	22	2200		No					
1	TC	17861.225	404.302	-1.98%	54	5400		No					
1	IP241	17889.035	403.751	%	54	-5400	55.62	Yes	1.03%	Sag	Yes		
1	CT	17916.845	403.487	-0.95%	54	5400		No					
1	TC	17977.851	402.907	-0.95%	10	1000		No					
1	IP242	17989.151	402.8	%	10	1000	22.6	Yes	-2.26%	Crest	Yes		
1	CT	18000.451	402.437	-3.21%	10	1000		No					
1	TC	18018.676	401.852	-3.21%	4.5	450		No					

1	IP243	18032.649	401.404	%	4.5	-450	27.945	Yes	6.21%	Sag	Yes		
1	CT	18046.621	401.823	3.00%	4.5	450		No					
1	TC	18048.308	401.874	3.00%	5.5	550		No					
1	IP244	18053.973	402.044	%	5.5	550	11.33	Yes	-2.06%	Crest	Yes		
1	CT	18059.638	402.097	0.94%	5.5	550		No					
1	TC	18078.645	402.275	0.94%	60	6000		No					
1	IP245	18098.445	402.462	%	60	-6000	39.6	Yes	0.66%	Sag	Yes		
1	CT	18118.245	402.778	1.60%	60	6000		No					
1	TC	18146.146	403.225	1.60%	80	8000		No					
1	IP246	18184.146	403.833	%	80	-8000	76	Yes	0.95%	Sag	Yes		
1	CT	18222.146	404.802	2.55%	80	8000		No					
1	TC	18260.208	405.772	2.55%	80	8000		No					
1	IP247	18286.208	406.435	%	80	8000	52	Yes	-0.65%	Crest	Yes		
1	CT	18312.208	406.929	1.90%	80	8000		No					
1	TC	18369.967	408.027	1.90%	80	8000		No					
1	IP248	18439.167	409.342	%	80	8000	138.4	Yes	-1.73%	Crest	Yes		
1	CT	18508.367	409.459	0.17%	80	8000		No					
1	TC	18552.861	409.535	0.17%	80	8000		No					
1	IP249	18596.061	409.608	%	80	-8000	86.4	Yes	1.08%	Sag	Yes		
1	CT	18639.261	410.148	1.25%	80	8000		No					
1	TC	18735.976	411.357	1.25%	31	3100		No					
1	IP250	18770.851	411.793	%	31	-3100	69.75	Yes	2.25%	Sag	Yes		
1	CT	18805.726	413.014	3.50%	31	3100		No					
1	TC	18847.81	414.487	3.50%	24	2400		No					
1	IP251	18885.01	415.789	%	24	2400	74.4	Yes	-3.10%	Crest	Yes		
1	CT	18922.21	415.938	0.40%	24	2400		No					
1	TC	19150.029	416.849	0.40%	60	6000		No					
1	IP252	19168.029	416.921	%	60	-6000	36	Yes	0.60%	Sag	Yes		
1	CT	19186.029	417.101	1.00%	60	6000		No					
1	TC	19233.518	417.576	1.00%	80	8000		No					
1	IP253	19267.518	417.916	%	80	8000	68	Yes	-0.85%	Crest	Yes		
1	CT	19301.518	417.967	0.15%	80	8000		No					
1	IP254	19389.791	418.099	0.15%				No	-0.15%				

Section	PT	Raw Ch	Chainage	Height	Grade	K Value	Radius	Length	Parabola Required?	Change in Grade	VC Type	Compliant?	Action
2	IP1	19389.627		418.11	0.65%				No				
2	TC	19479.239		418.692	0.65%	25	2500		No				
2	IP2	19499.864		418.826	%	25	2500	41.25	Yes	-1.65%	Crest	Yes	
2	CT	19520.489		418.62	-1.00%	25	2500		No				
2	TC	19524.876		418.576	-1.00%	20	2000		No				
2	IP3	19527.876		418.546	%	20	-2000	6	Yes	0.30%	Sag	Yes	
2	CT	19530.876		418.525	-0.70%	20	2000		No				
2	TC	19587.637		418.128	-0.70%	60	6000		No				
2	IP4	19626.637		417.855	%	60	-6000	78	Yes	1.30%	Sag	Yes	
2	CT	19665.637		418.089	0.60%	60	6000		No				
2	TC	19715.064		418.385	0.60%	12	1200		No				
2	IP5	19719.264		418.411	%	12	1200	8.4	Yes	-0.70%	Crest	Yes	
2	CT	19723.464		418.406	-0.10%	12	1200		No				
2	TC	19746.079		418.384	-0.10%	4.5	450		No				
2	IP6	19750.354		418.379	%	4.5	-450	8.55	Yes	1.90%	Sag	Yes	
2	CT	19754.629		418.456	1.80%	4.5	450		No				
2	TC	19759.523		418.545	1.80%	5.5	550		No				
2	IP7	19767.086		418.681	%	5.5	550	15.125	Yes	-2.75%	Crest	Yes	
2	CT	19774.648		418.609	-0.95%	5.5	550		No				
2	TC	19782.33		418.536	-0.95%	20	2000		No				
2	IP8	19801.83		418.351	%	20	-2000	39	Yes	1.95%	Sag	Yes	
2	CT	19821.33		418.546	1.00%	20	2000		No				
2	TC	19822.354		418.556	1.00%	66.667	6666.667		No				
2	IP9	19832.354		418.656	%	66.667	6666.667	20	Yes	-0.30%	Crest	Yes	
2	CT	19842.354		418.726	0.70%	66.667	6666.667		No				
2	TC	19855.848		418.82	0.70%	30	3000		No				
2	IP10	19864.848		418.883	%	30	-3000	18	Yes	0.60%	Sag	Yes	
2	CT	19873.848		419	1.30%	30	3000		No				
2	TC	19885.515		419.152	1.30%	40	4000		No				
2	IP11	19905.515		419.412	%	40	4000	40	Yes	-1.00%	Crest	Yes	
2	CT	19925.515		419.472	0.30%	40	4000		No				
2	TC	19927.806		419.479	0.30%	20	2000		No				
2	IP12	19932.806		419.494	%	20	-2000	10	Yes	0.50%	Sag	Yes	
2	CT	19937.806		419.534	0.80%	20	2000		No				
2	TC	20023.628		420.22	0.80%	80	8000		No				
2	IP13	20029.232		420.265	%	80	-8000	11.208	Yes	0.14%	Sag	Yes	
2	CT	20034.836		420.318	0.94%	80	8000		No				
2	TC	20036.387		420.332	0.94%	80	8000		No				
2	IP14	20057.991		420.536	%	80	8000	43.208	Yes	-0.54%	Crest	Yes	
2	CT	20079.595		420.622	0.40%	80	8000		No				
2	TC	20087.486		420.654	0.40%	50	5000		No				
2	IP15	20094.986		420.684	%	50	-5000	15	Yes	0.30%	Sag	Yes	
2	CT	20102.486		420.736	0.70%	50	5000		No				
2	TC	20313.27		422.212	0.70%	20	2000		No				
2	IP16	20318.27		422.247	%	20	-2000	10	Yes	0.50%	Sag	Yes	
2	CT	20323.27		422.307	1.20%	20	2000		No				
2	TC	20393.973		423.155	1.20%	20	2000		No				
2	IP17	20400.973		423.239	%	20	2000	14	Yes	-0.70%	Crest	Yes	
2	CT	20407.973		423.274	0.50%	20	2000		No				
2	TC	20471.373		423.591	0.50%	60	6000		No				
2	IP18	20495.373		423.711	%	60	-6000	48	Yes	0.80%	Sag	Yes	
2	CT	20519.373		424.023	1.30%	60	6000		No				
2	TC	20677.821		426.083	1.30%	105.43	10542.963		No				
2	IP19	20707.821		426.473	%	105.43	10542.963	60	Yes	-0.57%	Crest	Yes	
2	CT	20737.821		426.692	0.73%	105.43	10542.963		No				
2	TC	20740.581		426.712	0.73%	30	3000		No				
2	IP20	20750.618		426.786	%	30	-3000	20.073	Yes	0.67%	Sag	Yes	
2	CT	20760.654		426.926	1.40%	30	3000		No				
2	TC	20779.119		427.185	1.40%	80	8000		No				
2	IP21	20789.119		427.325	%	80	8000	20	Yes	-0.25%	Crest	Yes	
2	CT	20799.119		427.44	1.15%	80	8000		No				
2	TC	20870.963		428.266	1.15%	30	3000		No				
2	IP22	20878.463		428.352	%	30	3000	15	Yes	-0.50%	Crest	Yes	
2	CT	20885.963		428.401	0.65%	30	3000		No				
2	TC	20902.289		428.507	0.65%	30	3000		No				
2	IP23	20911.289		428.565	%	30	-3000	18	Yes	0.60%	Sag	Yes	
2	CT	20920.289		428.678	1.25%	30	3000		No				
2	TC	20949.209		429.039	1.25%	50	5000		No				
2	IP24	20965.459		429.243	%	50	-5000	32.5	Yes	0.65%	Sag	Yes	
2	CT	20981.709		429.551	1.90%	50	5000		No				
2	TC	20989.734		429.704	1.90%	40	4000		No				
2	IP25	21002.918		429.954	%	40	4000	26.368	Yes	-0.66%	Crest	Yes	
2	CT	21016.102		430.118	1.24%	40	4000		No				
2	TC	21026.839		430.251	1.24%	30	3000		No				
2	IP26	21042.727		430.448	%	30	-3000	31.776	Yes	1.06%	Sag	Yes	
2	CT	21058.615		430.814	2.30%	30	3000		No				
2	TC	21099.704		431.759	2.30%	11	1100		No				
2	IP27	21123.354		432.303	%	11	1100	47.3	Yes	-4.30%	Crest	Yes	
2	CT	21147.004		431.83	-2.00%	11	1100		No				
2	TC	21148.213		431.805	-2.00%	9	900		No				
2	IP28	21167.113		431.427	%	9	-900	37.8	Yes	4.20%	Sag	Yes	
2	CT	21186.013		431.843	2.20%	9	900		No				
2	TC	21199.96		432.15	2.20%	8	800		No				
2	IP29	21210.56		432.383	%	8	800	21.2	Yes	-2.65%	Crest	Yes	
2	CT	21221.16		432.336	-0.45%	8	800		No				
2	TC	21242.819		432.238	-0.45%	25	2500		No				
2	IP30	21254.694		432.185	%	25	2500	23.75	Yes	-0.95%	Crest	Yes	
2	CT	21266.569		432.018	-1.40%	25	2500		No				
2	TC	21288.153		431.716	-1.40%	15	1500		No				
2	IP31	21292.653		431.653	%	15	-1500	9	Yes	0.60%	Sag	Yes	
2	CT	21297.153		431.617	-0.80%	15	1500		No				
2	TC	21314.921		431.475	-0.80%	30	3000		No				
2	IP32	21341.921		431.259	%	30	3000	54	Yes	-1.80%	Crest	Yes	
2	CT	21368.921		430.557	-2.60%	30	3000		No				
2	TC	21376.927		430.349	-2.60%	38.462	3846.154		No				
2	IP33	21401.927		429.699	%	38.462	-3846.154	50	Yes	1.30%	Sag	Yes	
2	CT	21426.927		429.374	-1.30%	38.462	3846.154		No				
2	TC	21437.973		429.23	-1.30%	30	3000		No				
2	IP34	21443.973		429.152	%	30	3000	12	Yes	-0.40%	Crest	Yes	
2	CT	21449.973		429.05	-1.70%	30	3000		No				
2	TC	21456.223		428.944	-1.70%	30	3000		No				
2	IP35	21464.473		428.804	%	30	-3000	16.5	Yes	0.55%	Sag	Yes	
2	CT	21472.723		428.709	-1.15%	30	3000		No				
2	TC	21534.167		428.002	-1.15%	40	4000		No				
2	IP36	21543.251		427.898	%	40	4000	18.168	Yes	-0.45%	Crest	Yes	
2	CT	21552.335		427.752	-1.60%	40	4000		No				
2	TC	21589.533		427.155	-1.60%	57.837	5783.691		No				
2	IP37	21599.533		426.995	%	57.837	5783.691	20	Yes	-0.35%	Crest	Yes	
2	CT	21609.533		426.8	-1.95%	57.837	5783.691		No				
2	TC	21652.986		425.953	-1.95%	30	3000		No				
2	IP38	21667.986		425.66	%	30	-3000	30	Yes	1.00%	Sag	Yes	
2	CT	21682.986		425.518	-0.95%	30	3000		No				
2	TC	21739.274		424.983	-0.95%	9	900		No				
2	IP39	21750.074		424.88	%	9	-900	21.6	Yes	2.40%	Sag	Yes	
2	CT	21760.874		425.037	1.45%	9	900		No				
2	TC	21770.255		425.173	1.45%	15	1500		No				
2	IP40	21779.93		425.313	%	15	1500	19.35	Yes	-1.29%	Crest	Yes	
2	CT	21789.605		425.329	0.16%	15	1500		No				
2	TC	21799.57		425.345	0.16%	27.027	2702.703		No				
2	IP41	21809.57		425.361	%	27.027	-2702.703	20	Yes	0.74%	Sag	Yes	
2	CT	21819.57		425.451	0.90%	27.027	2702.703		No				
2	TC	21864.932		425.859	0.90%	44.444	4444.445		No				
2	IP42	21874.932		425.949	%	44.444	-4444.445	20	Yes	0.45%	Sag	Yes	
2	CT	21884.932		426.084	1.35%	44.444	4444.445		No				
2	TC	22016.625		427.862	1.35%	35.294	3529.412		No				
2	IP43	22031.625		428.064	%	35.294	-3529.412	30	Yes	0.85%	Sag	Yes	
2	CT	22046.625		428.394	2.20%	35.294	3529.412		No				
2	TC	22057.661		428.637	2.20%	57.143	5714.286		No				
2	IP44	22077.661		429.077	%	57.143	5714.286	40	Yes	-0.70%	Crest	Yes	
2	CT	22097.661		429.377	1.50%	57.143	5714.286		No				
2	TC	22148.718		430.143	1.50%	25	2500		No				
2	IP45	22158.718		430.293	%	25	-2500	20	Yes	0.80%	Sag	Yes	
2	CT	22168.718		430.523	2.30%	25	2500		No				
2	TC	22193.628		431.096	2.30%	20	2000		No				
2	IP46	22212.128		431.521	%	20	2000	37	Yes	-1.85%	Crest	Yes	
2	CT	22230.628		431.605	0.45%	20	2000		No				
2	TC	22295.665		431.897	0.45%	20	2000		No				
2	IP47	22318.665		432.001	%	20	2000	46	Yes	-2.30%	Crest	Yes	
2	CT	22341.665		431.575	-1.85%	20	2000		No				
2	TC	22343.404		431.543	-1.85%	27	2700		No				
2	IP48	22394.029		430.607	%	27	-2700	101.25	Yes	3.75%	Sag	Yes	
2	CT	22444.654		431.568	1.90%	27	2700		No				
2	TC	22455.509		431.775	1.90%	38	3800		No				

2	IP49	22503.009	432.677	%	38	3800	95	Yes	-2.50%	Crest	Yes		
2	CT	22550.509	432.392	-0.60%	38	3800		No					
2	TC	22570.764	432.271	-0.60%	44.444	4444.445		No					
2	IP50	22580.764	432.211	%	44.444	4444.445	20	Yes	-0.45%	Crest	Yes		
2	CT	22590.764	432.106	-1.05%	44.444	4444.445		No					
2	TC	22604.806	431.958	-1.05%	44.444	4444.445		No					
2	IP51	22614.806	431.853	%	44.444	-4444.445	20	Yes	0.45%	Sag	Yes		
2	CT	22624.806	431.793	-0.60%	44.444	4444.445		No					
2	TC	22675.575	431.489	-0.60%	80	8000.001		No					
2	IP52	22685.575	431.429	%	80	-8000.001	20	Yes	0.25%	Sag	Yes		
2	CT	22695.575	431.394	-0.35%	80	8000.001		No					
2	TC	22724.39	431.293	-0.35%	62	6200		No					
2	IP53	22750.74	431.201	%	62	6200	52.7	Yes	-0.85%	Crest	Yes		
2	CT	22777.09	430.884	-1.20%	62	6200		No					
2	TC	22797.342	430.641	-1.20%	8	800		No					
2	IP54	22800.942	430.598	%	8	-800	7.2	Yes	0.90%	Sag	Yes		
2	CT	22804.542	430.587	-0.30%	8	800		No					
2	TC	22808.608	430.575	-0.30%	6	600		No					
2	IP55	22814.608	430.557	%	6	600	12	Yes	-2.00%	Crest	Yes		
2	CT	22820.608	430.419	-2.30%	6	600		No					
2	TC	22821.548	430.398	-2.30%	22.727	2272.727		No					
2	IP56	22846.548	429.823	%	22.727	-2272.727	50	Yes	2.20%	Sag	Yes		
2	CT	22871.548	429.798	-0.10%	22.727	2272.727		No					
2	TC	22900.05	429.769	-0.10%	16.667	1666.667		No					
2	IP57	22910.05	429.759	%	16.667	1666.667	20	Yes	-1.20%	Crest	Yes		
2	CT	22920.05	429.629	-1.30%	16.667	1666.667		No					
2	TC	22925.021	429.564	-1.30%	28.571	2857.143		No					
2	IP58	22945.021	429.304	%	28.571	-2857.143	40	Yes	1.40%	Sag	Yes		
2	CT	22965.021	429.324	0.10%	28.571	2857.143		No					
2	TC	22987.383	429.347	0.10%	80	7999.999		No					
2	IP59	22997.383	429.357	%	80	7999.999	20	Yes	-0.25%	Crest	Yes		
2	CT	23007.383	429.342	-0.15%	80	7999.999		No					
2	TC	23007.501	429.342	-0.15%	21.429	2142.857		No					
2	IP60	23015.001	429.33	%	21.429	-2142.857	15	Yes	0.70%	Sag	Yes		
2	CT	23022.501	429.372	0.55%	21.429	2142.857		No					
2	TC	23038.831	429.461	0.55%	20	2000		No					
2	IP61	23049.831	429.522	%	20	2000	22	Yes	-1.10%	Crest	Yes		
2	CT	23060.831	429.461	-0.55%	20	2000		No					
2	IP62	23123.338	429.118	%				Yes	0.35%	No VC	No	N/A - Remove one of the back to back identical vertical grades.
2	TC	23157.591	429.049	-0.20%	30	3000		No					
2	IP63	23175.591	429.013	%	30	-3000	36	Yes	1.20%	Sag	Yes		
2	CT	23193.591	429.193	1.00%	30	3000		No					
2	TC	23203.955	429.297	1.00%	14.706	1470.588		No					
2	IP64	23216.455	429.422	%	14.706	1470.588	25	Yes	-1.70%	Crest	Yes		
2	CT	23228.955	429.334	-0.70%	14.706	1470.588		No					
2	TC	23236.866	429.279	-0.70%	22	2200		No					
2	IP65	23255.016	429.152	%	22	-2200	36.3	Yes	1.65%	Sag	Yes		
2	CT	23273.166	429.324	0.95%	22	2200		No					
2	TC	23299.934	429.579	0.95%	60	6000		No					
2	IP66	23316.434	429.735	%	60	6000	33	Yes	-0.55%	Crest	Yes		
2	CT	23332.934	429.801	0.40%	60	6000		No					
2	TC	23483.558	430.404	0.40%	37.5	3750		No					
2	IP67	23513.558	430.524	%	37.5	-3750	60	Yes	1.60%	Sag	Yes		
2	CT	23543.558	431.124	2.00%	37.5	3750		No					
2	TC	23577.339	431.799	2.00%	10	1000		No					
2	IP68	23588.339	432.019	%	10	-1000	22	Yes	2.20%	Sag	Yes		
2	CT	23599.339	432.481	4.20%	10	1000		No					
2	TC	23656.286	434.873	4.20%	20	2000		No					
2	IP69	23670.286	435.461	%	20	2000	28	Yes	-1.40%	Crest	Yes		
2	CT	23684.286	435.853	2.80%	20	2000		No					
2	TC	23694.874	436.15	2.80%	15	1500		No					
2	IP70	23704.624	436.423	%	15	-1500	19.5	Yes	1.30%	Sag	Yes		
2	CT	23714.374	436.822	4.10%	15	1500		No					
2	TC	23722.951	437.174	4.10%	18	1800		No					
2	IP71	23750.851	438.318	%	18	1800	55.8	Yes	-3.10%	Crest	Yes		
2	CT	23778.751	438.597	1.00%	18	1800		No					
2	TC	23808.869	438.898	1.00%	20	2000		No					
2	IP72	23821.869	439.028	%	20	-2000	26	Yes	1.30%	Sag	Yes		
2	CT	23834.869	439.327	2.30%	20	2000		No					
2	TC	23850.707	439.691	2.30%	20	2000		No					
2	IP73	23870.107	440.138	%	20	2000	38.8	Yes	-1.94%	Crest	Yes		
2	CT	23889.507	440.207	0.36%	20	2000		No					
2	TC	23930.916	440.356	0.36%	17	1700		No					
2	IP74	23956.926	440.45	%	17	1700	52.02	Yes	-3.06%	Crest	Yes		
2	CT	23982.936	439.748	-2.70%	17	1700		No					
2	TC	23994.51	439.435	-2.70%	23.077	2307.692		No					
2	IP75	24009.51	439.03	%	23.077	-2307.692	30	Yes	1.30%	Sag	Yes		
2	CT	24024.51	438.82	-1.40%	23.077	2307.692		No					
2	TC	24040.311	438.599	-1.40%	31.915	3191.489		No					
2	IP76	24055.311	438.389	%	31.915	-3191.489	30	Yes	0.94%	Sag	Yes		
2	CT	24070.311	438.32	-0.46%	31.915	3191.489		No					
2	TC	24098.356	438.191	-0.46%	30	3000		No					
2	IP77	24114.256	438.118	%	30	-3000	31.8	Yes	1.06%	Sag	Yes		
2	CT	24130.156	438.213	0.60%	30	3000		No					
2	TC	24153.925	438.356	0.60%	35	3500		No					
2	IP78	24201.175	438.639	%	35	-3500	94.5	Yes	2.70%	Sag	Yes		
2	CT	24248.425	440.199	3.30%	35	3500		No					
2	TC	24277.861	441.17	3.30%	11	1100		No					
2	IP79	24309.211	442.205	%	11	1100	62.7	Yes	-5.70%	Crest	Yes		
2	CT	24340.561	441.452	-2.40%	11	1100		No					
2	TC	24354.683	441.113	-2.40%	12	1200		No					
2	IP80	24366.683	440.825	%	12	1200	24	Yes	-2.00%	Crest	Yes		
2	CT	24378.683	440.297	-4.40%	12	1200		No					
2	TC	24391.159	439.748	-4.40%	19	1900		No					
2	IP81	24424.409	438.285	%	19	-1900	66.5	Yes	3.50%	Sag	Yes		
2	CT	24457.659	437.986	-0.90%	19	1900		No					
2	TC	24472.329	437.854	-0.90%	15	1500		No					
2	IP82	24485.829	437.733	%	15	1500	27	Yes	-1.80%	Crest	Yes		
2	CT	24499.329	437.368	-2.70%	15	1500		No					
2	TC	24528.627	436.577	-2.70%	20	2000		No					
2	IP83	24538.627	436.307	%	20	-2000	20	Yes	1.00%	Sag	Yes		
2	CT	24548.627	436.137	-1.70%	20	2000		No					
2	TC	24576.389	435.665	-1.70%	9	900		No					
2	IP84	24603.839	435.198	%	9	-900	54.9	Yes	6.10%	Sag	Yes		
2	CT	24631.289	436.406	4.40%	9	900		No					
2	TC	24632.214	436.447	4.40%	11	1100		No					
2	IP85	24654.764	437.439	%	11	1100	45.1	Yes	-4.10%	Crest	Yes		
2	CT	24677.314	437.507	0.30%	11	1100		No					
2	TC	24698.73	437.571	0.30%	15	1500		No					
2	IP86	24722.73	437.643	%	15	-1500	48	Yes	3.20%	Sag	Yes		
2	CT	24746.73	438.483	3.50%	15	1500		No					
2	TC	24750.643	438.62	3.50%	7	700		No					
2	IP87	24756.259	438.817	%	7	700	11.233	Yes	-1.61%	Crest	Yes		
2	CC	24761.875	438.923	1.90%	7	700		No					
2	IP88	24801.6	439.676	%	10.063	1006.292	79.45	Yes	-7.90%	Crest	Yes		
2	CT	24841.325	437.292	-6.00%	10.063	1006.292		No					
2	TC	24850.942	436.715	-6.00%	6	600		No					
2	IP89	24858.935	436.236	%	6	-600	15.986	Yes	2.66%	Sag	Yes		
2	CT	24866.928	435.969	-3.34%	6	600		No					
2	TC	24911.574	434.48	-3.34%	10	1000		No					
2	IP90	24916.146	434.327	%	10	1000	9.143	Yes	-0.91%	Crest	Yes		
2	CT	24920.717	434.133	-4.25%	10	1000		No					
2	TC	24929.284	433.769	-4.25%	10	1000		No					
2	IP91	24955.534	432.653	%	10	-1000	52.5	Yes	5.25%	Sag	Yes		
2	CT	24981.784	432.916	1.00%	10	1000		No					
2	TC	25028.651	433.385	1.00%	12.121	1212.121		No					
2	IP92	25038.651	433.485	%	12.121	1212.121	20	Yes	-1.65%	Crest	Yes		
2	CT	25048.651	433.42	-0.65%	12.121	1212.121		No					
2	TC	25099.773	433.087	-0.65%	20	2000		No					
2	IP93	25124.273	432.928	%	20	-2000	49	Yes	2.45%	Sag	Yes		
2	CT	25148.773	433.369	1.80%	20	2000		No					
2	TC	25192.967	434.165	1.80%	20	2000		No					
2	IP94	25219.967	434.651	%	20	2000	54	Yes	-2.70%	Crest	Yes		
2	CT	25246.967	434.408	-0.90%	20	2000		No					
2	TC	25252.288	434.36	-0.90%	11	1100		No					
2	IP95	25283.422	434.079	%	11	-1100	62.268	Yes	5.66%	Sag	Yes		
2	CT	25314.555	435.562	4.76%	11	1100		No					
2	TC	25359.187	437.686	4.76%	8	800		No					
2	IP96	25364.144	437.922	%	8	-800	9.914	Yes	1.24%	Sag	Yes		
2	CT	25369.101	438.22	6.00%	8	800		No					
2	TC	25393.906	439.708	6.00%	10	1000		No					
2	IP97	25402.906	440.248	%	10	1000	18	Yes	-1.80%	Crest	Yes		
2	CT	25411.906	440.626	4.20%	10	1000		No					
2	TC	25429.628	441.37	4.20%	15	1500		No					
2	IP98	25444.628	442	%	15	-1500	30	Yes	2.00%	Sag	Yes		

2	CT	25459.628	442.93	6.20%	15	1500		No					
2	TC	25468.78	443.498	6.20%	17	1700		No					
2	IP99	25492.58	444.973	%	17	1700	47.6	Yes	-2.80%	Crest	Yes		
2	CT	25516.38	445.783	3.40%	17	1700		No					
2	TC	25578.508	447.895	3.40%	8	800		No					
2	IP100	25586.108	448.153	%	8	800	15.2	Yes	-1.90%	Crest	Yes		
2	CT	25593.708	448.267	1.50%	8	800		No					
2	TC	25622.002	448.692	1.50%	10	1000		No					
2	IP101	25632.002	448.842	%	10	1000	20	Yes	-2.00%	Crest	Yes		
2	CT	25642.002	448.792	-0.50%	10	1000		No					
2	TC	25675.552	448.624	-0.50%	37.5	3750		No					
2	IP102	25690.552	448.549	%	37.5	3750	30	Yes	-0.80%	Crest	Yes		
2	CT	25705.552	448.354	-1.30%	37.5	3750		No					
2	TC	25755.694	447.702	-1.30%	90	9000		No					
2	IP103	25825.444	446.795	%	90	-9000	139.5	Yes	1.55%	Sag	Yes		
2	CT	25895.194	446.97	0.25%	90	9000		No					
2	TC	25906.963	446.999	0.25%	26.667	2666.667		No					
2	IP104	25916.963	447.024	%	26.667	-2666.667	20	Yes	0.75%	Sag	Yes		
2	CT	25926.963	447.124	1.00%	26.667	2666.667		No					
2	TC	25958.431	447.439	1.00%	21.429	2142.857		No					
2	IP105	25973.431	447.589	%	21.429	2142.857	30	Yes	-1.40%	Crest	Yes		
2	CT	25988.431	447.529	-0.40%	21.429	2142.857		No					
2	TC	26057.14	447.254	-0.40%	70	7000		No					
2	IP106	26085.14	447.142	%	70	-7000	56	Yes	0.80%	Sag	Yes		
2	CT	26113.14	447.254	0.40%	70	7000		No					
2	TC	26121.727	447.288	0.40%	20	2000		No					
2	IP107	26135.727	447.344	%	20	2000	28	Yes	-1.40%	Crest	Yes		
2	CT	26149.727	447.204	-1.00%	20	2000		No					
2	TC	26200.262	446.699	-1.00%	52.941	5294.118		No					
2	IP108	26245.262	446.249	%	52.941	-5294.118	90	Yes	1.70%	Sag	Yes		
2	CT	26290.262	446.564	0.70%	52.941	5294.118		No					
2	TC	26292.127	446.577	0.70%	75	7500		No					
2	IP109	26307.127	446.682	%	75	7500	30	Yes	-0.40%	Crest	Yes		
2	CT	26322.127	446.727	0.30%	75	7500		No					
2	TC	26344.641	446.795	0.30%	18	1800		No					
2	IP110	26362.191	446.847	%	18	-1800	35.1	Yes	1.95%	Sag	Yes		
2	CT	26379.741	447.242	2.25%	18	1800		No					
2	TC	26410.898	447.343	2.25%	41.379	4137.931		No					
2	IP111	26440.898	448.618	%	41.379	4137.931	60	Yes	-1.45%	Crest	Yes		
2	CT	26470.898	448.858	0.80%	41.379	4137.931		No					
2	TC	26487.467	448.991	0.80%	25	2500		No					
2	IP112	26517.467	449.231	%	25	2500	60	Yes	-2.40%	Crest	Yes		
2	CT	26547.467	448.751	-1.60%	25	2500		No					
2	TC	26554.12	448.644	-1.60%	13	1300		No					
2	IP113	26568.745	448.41	%	13	-1300	29.25	Yes	2.25%	Sag	Yes		
2	CT	26583.37	448.505	0.65%	13	1300		No					
2	TC	26589.8	448.547	0.65%	15	1500		No					
2	IP114	26612.675	448.696	%	15	1500	45.75	Yes	-3.05%	Crest	Yes		
2	CT	26635.55	448.147	-2.40%	15	1500		No					
2	TC	26656.79	447.637	-2.40%	17.391	1739.13		No					
2	IP115	26666.79	447.397	%	17.391	1739.13	20	Yes	-1.15%	Crest	Yes		
2	CT	26676.79	447.042	-3.55%	17.391	1739.13		No					
2	TC	26695.469	446.379	-3.55%	30	3000		No					
2	IP116	26707.469	445.953	%	30	-3000	24	Yes	0.80%	Sag	Yes		
2	CT	26719.469	445.623	-2.75%	30	3000		No					
2	TC	26738.499	445.1	-2.75%	30	3000		No					
2	IP117	26749.749	444.79	%	30	3000	22.5	Yes	-0.75%	Crest	Yes		
2	CT	26760.999	444.397	-3.50%	30	3000		No					
2	TC	26780.454	443.716	-3.50%	7	700		No					
2	IP118	26799.004	443.066	%	7	-700	37.1	Yes	5.30%	Sag	Yes		
2	CT	26817.554	443.4	1.80%	7	700		No					
2	TC	26829.954	443.624	1.80%	20	2000		No					
2	IP119	26840.954	443.822	%	20	2000	22	Yes	-1.10%	Crest	Yes		
2	CT	26851.954	443.899	0.70%	20	2000		No					
2	TC	26887.966	444.151	0.70%	20	2000		No					
2	IP120	26908.966	444.298	%	20	2000	42	Yes	-2.10%	Crest	Yes		
2	CT	26929.966	444.004	-1.40%	20	2000		No					
2	TC	26988.278	443.187	-1.40%	30	3000		No					
2	IP121	26998.778	443.04	%	30	3000	21	Yes	-0.70%	Crest	Yes		
2	CT	27009.278	442.82	-2.10%	30	3000		No					
2	TC	27066.26	441.623	-2.10%	81.633	8163.265		No					
2	IP122	27166.26	439.523	%	81.633	-8163.265	200	Yes	2.45%	Sag	Yes		
2	CT	27266.26	439.873	0.35%	81.633	8163.265		No					
2	TC	27290.659	439.959	0.35%	60.87	-6086.957		No					
2	IP123	27325.659	440.081	%	60.87	-6086.957	70	Yes	1.15%	Sag	Yes		
2	CT	27360.659	440.606	1.50%	60.87	6086.957		No					
2	TC	27489.876	442.544	1.50%	60	6000		No					
2	IP124	27516.876	442.949	%	60	6000	54	Yes	-0.90%	Crest	Yes		
2	CT	27543.876	443.111	0.60%	60	6000		No					
2	TC	27580.077	443.329	0.60%	78	7800		No					
2	IP125	27650.277	443.75	%	78	-7800	140.4	Yes	1.80%	Sag	Yes		
2	CT	27720.477	445.435	2.40%	78	7800		No					
2	TC	27809.469	447.57	2.40%	17	1700		No					
2	IP126	27851.119	448.57	%	17	1700	83.3	Yes	-4.90%	Crest	Yes		
2	CT	27892.769	447.529	-2.50%	17	1700		No					
2	TC	28024.821	444.227	-2.50%	87.5	8750		No					
2	IP127	28059.821	443.352	%	87.5	-8750	70	Yes	0.80%	Sag	Yes		
2	CT	28094.821	442.757	-1.70%	87.5	8750		No					
2	TC	28121.179	442.309	-1.70%	47	4700		No					
2	IP128	28144.679	441.91	%	47	-4700	47	Yes	1.00%	Sag	Yes		
2	CT	28168.179	441.745	-0.70%	47	4700		No					
2	TC	28187.077	441.613	-0.70%	70	7000		No					
2	IP129	28260.577	441.099	%	70	-7000	147	Yes	2.10%	Sag	Yes		
2	CT	28334.077	442.128	1.40%	70	7000		No					
2	TC	28446.039	443.695	1.40%	20	2000		No					
2	IP130	28457.039	443.849	%	20	2000	22	Yes	-1.10%	Crest	Yes		
2	CT	28468.039	443.882	0.30%	20	2000		No					
2	TC	28489.53	443.946	0.30%	10	1000		No					
2	IP131	28505.53	443.994	%	10	-1000	32	Yes	3.20%	Sag	Yes		
2	CT	28521.53	444.554	3.50%	10	1000		No					
2	TC	28547.464	445.462	3.50%	26	2600		No					
2	IP132	28574.764	446.418	%	26	2600	54.6	Yes	-2.10%	Crest	Yes		
2	CT	28602.064	446.8	1.40%	26	2600		No					
2	TC	28619.121	447.039	1.40%	50	5000.002		No					
2	IP133	28629.121	447.179	%	50	-5000.002	20	Yes	0.40%	Sag	Yes		
2	CT	28639.121	447.359	1.80%	50	5000.002		No					
2	TC	28653.797	447.623	1.80%	10	1000		No					
2	IP134	28658.794	447.713	%	10	1000	9.994	Yes	-1.00%	Crest	Yes		
2	CT	28663.791	447.753	0.80%	10	1000		No					
2	TC	28670.45	447.806	0.80%	10	1000		No					
2	IP135	28677.447	447.862	%	10	-1000	13.994	Yes	1.40%	Sag	Yes		
2	CT	28684.444	448.016	2.20%	10	1000		No					
2	TC	28691.412	448.169	2.20%	26	2600		No					
2	IP136	28697.912	448.312	%	26	2600	13	Yes	-0.50%	Crest	Yes		
2	CT	28704.412	448.423	1.70%	26	2600		No					
2	TC	28741.494	449.053	1.70%	50	5000		No					
2	IP137	28754.867	449.281	%	50	5000	26.745	Yes	-0.54%	Crest	Yes		
2	CT	28768.239	449.436	1.17%	50	5000		No					
2	TC	28814.765	449.978	1.17%	50	5000		No					
2	IP138	28826.392	450.114	%	50	5000	23.255	Yes	-0.47%	Crest	Yes		
2	CT	28838.02	450.195	0.70%	50	5000		No					
2	TC	28924.672	450.802	0.70%	50	5000		No					
2	IP139	28937.945	450.895	%	50	5000	26.545	Yes	-0.53%	Crest	Yes		
2	CT	28951.217	450.917	0.17%	50	5000		No					
2	TC	28984.261	450.973	0.17%	26	2600		No					
2	IP140	29000.263	451	%	26	-2600	32.003	Yes	1.23%	Sag	Yes		
2	CT	29016.265	451.224	1.40%	26	2600		No					
2	TC	29043.377	451.604	1.40%	20	2000		No					
2	IP141	29053.377	451.744	%	20	2000	20	Yes	-1.00%	Crest	Yes		
2	CT	29063.377	451.784	0.40%	20	2000		No					
2	TC	29133.639	452.065	0.40%	71.429	7142.857		No					
2	IP142	29158.639	452.165	%	71.429	7142.857	50	Yes	-0.70%	Crest	Yes		
2	CT	29183.639	452.09	-0.30%	71.429	7142.857		No					
2	TC	29248.803	451.894	-0.30%	42	4200		No					
2	IP143	29374.803	451.516	%	42	-4200	252	Yes	6.00%	Sag	Yes		
2	CT	29500.803	458.698	5.70%	42	4200		No					
2	TC	29527.214	460.204	5.70%	5.5	550		No					
2	IP144	29539.589	460.909	%	5.5	550	24.75	Yes	-4.50%	Crest	Yes		
2	CT	29551.964	461.058	1.20%	5.5	550		No					
2	TC	29591.397	461.531	1.20%	7	700		No					
2	IP145	29599.097	461.623	%	7	700	15.4	Yes	-2.20%	Crest	Yes		
2	CT	29606.797	461.546	-1.00%	7	700		No					
2	TC	29620.589	461.408	-1.00%	24.242	2424.242		No					
2	IP146	29640.589	461.208	%	24.242	-2424.242	40	Yes	1.65%	Sag	Yes		
2	CT	29660.589	461.338	0.65%	24.242	2424.242		No					

2	TC	29717.573	461.709	0.65%	22.642	2264.151		No				
2	IP147	29747.573	461.904	%	22.642	-2264.151	60	Yes	2.65%	Sag	Yes	
2	CT	29777.573	462.894	3.30%	22.642	2264.151		No				
2	TC	29813.535	464.08	3.30%	11	1100		No				
2	IP148	29851.485	465.333	%	11	1100	75.9	Yes	-6.90%	Crest	Yes	
2	CT	29889.435	463.967	-3.60%	11	1100		No				
2	TC	29908.416	463.283	-3.60%	5	500		No				
2	IP149	29918.666	462.914	%	5	-500	20.5	Yes	4.10%	Sag	Yes	
2	CT	29928.916	462.965	0.50%	5	500		No				
2	TC	29973.838	463.19	0.50%	20	2000		No				
2	IP150	29983.838	463.24	%	20	2000	20	Yes	-1.00%	Crest	Yes	
2	CT	29993.838	463.19	-0.50%	20	2000		No				
2	TC	30017.668	463.071	-0.50%	40	4000		No				
2	IP151	30023.668	463.041	%	40	-4000	12	Yes	0.30%	Sag	Yes	
2	CT	30029.668	463.029	-0.20%	40	4000		No				
2	TC	30070.675	462.947	-0.20%	100	10000		No				
2	IP152	30081.895	462.924	%	100	-10000	22.44	Yes	0.22%	Sag	Yes	
2	CT	30093.115	462.927	0.02%	100	10000		No				
2	TC	30140.186	462.939	0.02%	31.5	3150		No				
2	IP153	30190.97	462.951	%	31.5	3150	101.569	Yes	-3.22%	Crest	Yes	
2	CT	30241.754	461.326	-3.20%	31.5	3150		No				
2	TC	30371.577	457.172	-3.20%	59	5900		No				
2	IP154	30466.588	454.131	%	59	-5900	190.021	Yes	3.22%	Sag	Yes	
2	CT	30561.599	454.151	0.02%	59	5900		No				
2	TC	30584.903	454.156	0.02%	23	2300		No				
2	IP155	30626.64	454.164	%	23	-2300	83.474	Yes	3.63%	Sag	Yes	
2	CT	30668.377	455.688	3.65%	23	2300		No				
2	TC	30718.742	457.526	3.65%	12	1200		No				
2	IP156	30740.042	458.304	%	12	1200	42.6	Yes	-3.55%	Crest	Yes	
2	CT	30761.342	458.325	0.10%	12	1200		No				
2	TC	30769.327	458.333	0.10%	8	800		No				
2	IP157	30779.327	458.343	%	8	-800	20	Yes	2.50%	Sag	Yes	
2	CT	30789.327	458.603	2.60%	8	800		No				
2	TC	30792.656	458.689	2.60%	8.14	813.953		No				
2	IP158	30810.156	459.144	%	8.14	813.953	35	Yes	-4.30%	Crest	Yes	
2	CT	30827.656	458.847	-1.70%	8.14	813.953		No				
2	TC	30828.404	458.834	-1.70%	18	1800		No				
2	IP159	30847.304	458.513	%	18	1800	37.8	Yes	-2.10%	Crest	Yes	
2	CT	30866.204	457.795	-3.80%	18	1800		No				
2	TC	30881.354	457.219	-3.80%	7	700		No				
2	IP160	30890.454	456.873	%	7	-700	18.2	Yes	2.60%	Sag	Yes	
2	CT	30899.554	456.764	-1.20%	7	700		No				
2	TC	30942.181	456.253	-1.20%	20	2000		No				
2	IP161	30969.181	455.929	%	20	-2000	54	Yes	2.70%	Sag	Yes	
2	CT	30996.181	456.334	1.50%	20	2000		No				
2	TC	31096.991	457.846	1.50%	20	2000		No				
2	IP162	31116.491	458.138	%	20	-2000	39	Yes	1.95%	Sag	Yes	
2	CT	31135.991	458.811	3.45%	20	2000		No				
2	TC	31184.31	460.478	3.45%	12	1200		No				
2	IP163	31226.01	461.917	%	12	1200	83.4	Yes	-6.95%	Crest	Yes	
2	CT	31267.71	460.457	-3.50%	12	1200		No				
2	TC	31293.506	459.554	-3.50%	20	2000		No				
2	IP164	31305.506	459.134	%	20	2000	24	Yes	-1.20%	Crest	Yes	
2	CT	31317.506	458.57	-4.70%	20	2000		No				
2	TC	31334.779	457.758	-4.70%	30	3000		No				
2	IP165	31358.779	456.63	%	30	-3000	48	Yes	1.60%	Sag	Yes	
2	CT	31382.779	455.886	-3.10%	30	3000		No				
2	TC	31475.02	453.027	-3.10%	20	2000		No				
2	IP166	31484.02	452.748	%	20	-2000	18	Yes	0.90%	Sag	Yes	
2	CT	31493.02	452.55	-2.20%	20	2000		No				
2	TC	31541.874	451.475	-2.20%	35	3500		No				
2	IP167	31588.865	450.441	%	35	-3500	93.982	Yes	2.69%	Sag	Yes	
2	CT	31635.856	450.669	0.49%	35	3500		No				
2	TC	31664.017	450.806	0.49%	80	8000		No				
2	IP168	31698.181	450.972	%	80	-8000	68.328	Yes	0.85%	Sag	Yes	
2	CT	31732.345	451.429	1.34%	80	8000		No				
2	TC	31750.859	451.677	1.34%	60	6000		No				
2	IP169	31784.18	452.123	%	60	-6000	66.642	Yes	1.11%	Sag	Yes	
2	CT	31817.501	452.94	2.45%	60	6000		No				
2	TC	31818.014	452.952	2.45%	27	2700		No				
2	IP170	31842.989	453.564	%	27	2700	49.95	Yes	-1.85%	Crest	Yes	
2	CT	31867.964	453.714	0.60%	27	2700		No				
2	TC	31922.611	454.042	0.60%	25	2500		No				
2	IP171	31950.111	454.207	%	25	2500	55	Yes	-2.20%	Crest	Yes	
2	CT	31977.611	453.767	-1.60%	25	2500		No				
2	TC	31977.707	453.765	-1.60%	10	1000		No				
2	IP172	31996.207	453.469	%	10	-1000	37	Yes	3.70%	Sag	Yes	
2	CT	32014.707	453.858	2.10%	10	1000		No				
2	TC	32019.001	453.948	2.10%	40	4000		No				
2	IP173	32031.113	454.203	%	40	-4000	24.224	Yes	0.61%	Sag	Yes	
2	CT	32043.225	454.53	2.71%	40	4000		No				
2	TC	32060.126	454.988	2.71%	22	2200		No				
2	IP174	32085.928	455.686	%	22	2200	51.603	Yes	-2.35%	Crest	Yes	
2	CT	32111.73	455.778	0.36%	22	2200		No				
2	TC	32139.294	455.878	0.36%	20	2000		No				
2	IP175	32150.394	455.918	%	20	2000	22.2	Yes	-1.11%	Crest	Yes	
2	CT	32161.494	455.834	-0.75%	20	2000		No				
2	TC	32232.022	455.305	-0.75%	20	2000		No				
2	IP176	32239.522	455.249	%	20	2000	15	Yes	-0.75%	Crest	Yes	
2	CT	32247.022	455.137	-1.50%	20	2000		No				
2	TC	32309.907	454.193	-1.50%	50	4999.999		No				
2	IP177	32324.907	453.968	%	50	-4999.999	30	Yes	-0.60%	Crest	Yes	
2	CT	32339.907	453.653	-2.10%	50	4999.999		No				
2	TC	32412.271	452.134	-2.10%	6	600		No				
2	IP178	32425.171	451.863	%	6	-600	25.8	Yes	4.30%	Sag	Yes	
2	CT	32438.071	452.147	2.20%	6	600		No				
2	TC	32494.232	453.382	2.20%	40	4000		No				
2	IP179	32504.232	453.602	%	40	-4000	20	Yes	0.50%	Sag	Yes	
2	CT	32514.232	453.872	2.70%	40	4000		No				
2	TC	32702.974	458.968	2.70%	34.5	3450		No				
2	IP180	32741.787	460.016	%	34.5	3450	77.625	Yes	-2.25%	Crest	Yes	
2	CT	32780.599	460.191	0.45%	34.5	3450		No				
2	TC	32853.989	460.521	0.45%	20	2000		No				
2	IP181	32878.489	460.631	%	20	-2000	49	Yes	2.45%	Sag	Yes	
2	CT	32902.989	461.342	2.90%	20	2000		No				
2	TC	32917.464	461.762	2.90%	13	1300		No				
2	IP182	32956.464	462.893	%	13	1300	78	Yes	-6.00%	Crest	Yes	
2	CT	32995.464	461.684	-3.10%	13	1300		No				
2	TC	33018.171	460.98	-3.10%	10	1000		No				
2	IP183	33026.171	460.732	%	10	-1000	16	Yes	1.60%	Sag	Yes	
2	CT	33034.171	460.612	-1.50%	10	1000		No				
2	TC	33071.671	460.049	-1.50%	10	1000		No				
2	IP184	33078.471	459.947	%	10	1000	13.6	Yes	-1.36%	Crest	Yes	
2	CT	33085.271	459.753	-2.86%	10	1000		No				
2	TC	33139.912	458.19	-2.86%	8.3	830		No				
2	IP185	33165.476	457.459	%	8.3	-830	51.128	Yes	6.16%	Sag	Yes	
2	CT	33191.04	458.303	3.30%	8.3	830		No				
2	TC	33222.44	459.339	3.30%	20.5	2050		No				
2	IP186	33243.248	460.025	%	20.5	2050	41.615	Yes	-2.03%	Crest	Yes	
2	CT	33264.055	460.29	1.27%	20.5	2050		No				
2	TC	33292.39	460.65	1.27%	12	1200		No				
2	IP187	33316.21	460.952	%	12	1200	47.64	Yes	-3.97%	Crest	Yes	
2	CT	33340.03	460.309	-2.70%	12	1200		No				
2	TC	33349.19	460.062	-2.70%	30	3000		No				
2	IP188	33362.69	459.697	%	30	3000	27	Yes	-0.90%	Crest	Yes	
2	CT	33376.19	459.211	-3.60%	30	3000		No				
2	TC	33399.759	458.363	-3.60%	24.5	2450		No				
2	IP189	33460.274	456.184	%	24.5	-2450	121.03	Yes	4.94%	Sag	Yes	
2	CT	33520.789	456.995	1.34%	24.5	2450		No				
2	TC	33529.495	457.112	1.34%	20	2000		No				
2	IP190	33534.895	457.184	%	20	2000	10.8	Yes	-0.54%	Crest	Yes	
2	CT	33540.295	457.227	0.80%	20	2000		No				
2	TC	33556.532	457.357	0.80%	20	2000		No				
2	IP191	33566.532	457.437	%	20	-2000	20	Yes	1.00%	Sag	Yes	
2	CT	33576.532	457.617	1.80%	20	2000		No				
2	TC	33580.044	457.68	1.80%	20	2000		No				
2	IP192	33588.044	457.824	%	20	2000	16	Yes	-0.80%	Crest	Yes	
2	CT	33596.044	457.904	1.00%	20	2000		No				
2	TC	33614.836	458.092	1.00%	20	2000		No				
2	IP193	33619.836	458.142	%	20	-2000	10	Yes	0.50%	Sag	Yes	
2	CT	33624.836	458.217	1.50%	20	2000		No				
2	TC	33627.024	458.25	1.50%	16	1600		No				
2	IP194	33639.024	458.43	%	16	1600	24	Yes	-1.50%	Crest	Yes	
2	CT	33651.024	458.43	0.00%	16	1600		No				
2	TC	33667.588	458.43	0.00%	40	4000		No				

2	IP195	33681.588	458.43	%	40	4000	28	Yes	-0.70%	Crest	Yes	
2	CT	33695.588	458.332	-0.70%	40	4000		No				
2	TC	33724.068	458.133	-0.70%	32	3200		No				
2	IP196	33744.795	457.988	%	32	3200	41.453	Yes	-1.30%	Crest	Yes	
2	CT	33765.521	457.574	-2.00%	32	3200		No				
2	TC	33781.203	457.261	-2.00%	16	1600		No				
2	IP197	33822.04	456.446	%	16	1600	81.674	Yes	-5.11%	Crest	Yes	
2	CT	33862.877	453.547	-7.10%	16	1600		No				
2	TC	33865.452	453.364	-7.10%	5.5	550		No				
2	IP198	33874.802	452.7	%	5.5	-550	18.7	Yes	3.40%	Sag	Yes	
2	CT	33884.152	452.354	-3.70%	5.5	550		No				
2	TC	33904.078	451.617	-3.70%	5	500		No				
2	IP199	33921.078	450.988	%	5	-500	34	Yes	6.80%	Sag	Yes	
2	CT	33938.078	451.515	3.10%	5	500		No				
2	TC	33944.361	451.71	3.10%	6.8	680		No				
2	IP200	33949.801	451.878	%	6.8	-680	10.88	Yes	1.60%	Sag	Yes	
2	CT	33955.241	452.134	4.70%	6.8	680		No				
2	TC	33957.025	452.218	4.70%	10	1000		No				
2	IP201	33965.325	452.808	%	10	1000	16.6	Yes	-1.66%	Crest	Yes	
2	CT	33973.625	452.86	3.04%	10	1000		No				
2	TC	34018.32	454.219	3.04%	35.714	3571.43		No				
2	IP202	34028.32	454.523	%	35.714	-3571.43	20	Yes	0.56%	Sag	Yes	
2	CT	34038.32	454.883	3.60%	35.714	3571.43		No				
2	TC	34049.999	455.303	3.60%	12.5	1250		No				
2	IP203	34092.187	456.822	%	12.5	1250	84.375	Yes	-6.75%	Crest	Yes	
2	CT	34134.374	455.493	-3.15%	12.5	1250		No				
2	TC	34160.578	454.668	-3.15%	20	2000		No				
2	IP204	34169.813	454.377	%	20	2000	18.47	Yes	-0.92%	Crest	Yes	
2	CT	34179.048	454.081	-4.07%	20	2000		No				
2	TC	34183.217	453.831	-4.07%	22	2200		No				
2	IP205	34211.525	452.678	%	22	-2200	56.617	Yes	2.57%	Sag	Yes	
2	CT	34239.834	452.253	-1.50%	22	2200		No				
2	TC	34277.256	451.692	-1.50%	33	3300		No				
2	IP206	34285.395	451.57	%	33	-3300	16.279	Yes	0.49%	Sag	Yes	
2	CT	34293.535	451.488	-1.01%	33	3300		No				
2	TC	34301.093	451.412	-1.01%	40	4000		No				
2	IP207	34321.227	451.209	%	40	-4000	40.268	Yes	1.01%	Sag	Yes	
2	CT	34341.361	451.209	0.00%	40	4000		No				
2	TC	34372.507	451.209	0.00%	27	2700		No				
2	IP208	34392.757	451.209	%	27	-2700	40.5	Yes	1.50%	Sag	Yes	
2	CT	34413.007	451.513	1.50%	27	2700		No				
2	TC	34436.472	451.865	1.50%	15	1500		No				
2	IP209	34452.972	452.112	%	15	1500	33	Yes	-2.20%	Crest	Yes	
2	CT	34469.472	451.997	-0.70%	15	1500		No				
2	TC	34513.904	451.686	-0.70%	45	4500		No				
2	IP210	34543.154	451.481	%	45	-4500	58.5	Yes	1.30%	Sag	Yes	
2	CT	34572.404	451.656	0.60%	45	4500		No				
2	TC	34575.294	451.674	0.60%	30	3000		No				
2	IP211	34614.294	451.908	%	30	3000	78	Yes	-2.60%	Crest	Yes	
2	CT	34653.294	451.128	-2.00%	30	3000		No				
2	TC	34705.115	450.091	-2.00%	30	3000		No				
2	IP212	34735.115	449.491	%	30	3000	60	Yes	-2.00%	Crest	Yes	
2	CT	34765.115	448.291	-4.00%	30	3000		No				
2	TC	34796.71	447.028	-4.00%	5	500		No				
2	IP213	34815.21	446.288	%	5	-500	37	Yes	7.40%	Sag	Yes	
2	CT	34833.71	446.917	3.40%	5	500		No				
2	TC	34849.464	447.452	3.40%	6	600		No				
2	IP214	34854.864	447.636	%	6	-600	10.8	Yes	1.80%	Sag	Yes	
2	CT	34860.264	447.917	5.20%	6	600		No				
2	TC	34888.569	449.388	5.20%	22	2200		No				
2	IP215	34920.469	451.047	%	22	2200	63.8	Yes	-2.90%	Crest	Yes	
2	CT	34952.369	451.781	2.30%	22	2200		No				
2	TC	34974.127	452.281	2.30%	33	3300		No				
2	IP216	35040.127	453.799	%	33	3300	132	Yes	-4.00%	Crest	Yes	
2	CT	35106.127	452.677	-1.70%	33	3300		No				
2	TC	35166.104	451.658	-1.70%	10	1000		No				
2	IP217	35172.604	451.547	%	10	-1000	13	Yes	1.30%	Sag	Yes	
2	CT	35179.104	451.521	-0.40%	10	1000		No				
2	TC	35201.768	451.431	-0.40%	52.631	5263.052		No				
2	IP218	35253.872	451.222	%	52.631	5263.052	104.208	Yes	-1.98%	Crest	Yes	
2	CT	35305.976	449.982	-2.38%	52.631	5263.052		No				
2	TC	35545.796	444.274	-2.38%	135	13500		No				
2	IP219	35594.396	443.118	%	135	13500	97.2	Yes	-0.72%	Crest	Yes	
2	CT	35642.996	441.611	-3.10%	135	13500		No				
2	TC	35680.272	440.456	-3.10%	9	900		No				
2	IP220	35709.072	439.563	%	9	-900	57.6	Yes	6.40%	Sag	Yes	
2	CT	35737.872	440.513	3.30%	9	900		No				
2	TC	35750.395	440.926	3.30%	50	5000		No				
2	IP221	35760.395	441.256	%	50	5000	20	Yes	-0.40%	Crest	Yes	
2	CT	35770.395	441.546	2.90%	50	5000		No				
2	TC	35836.129	443.453	2.90%	45	4500		No				
2	IP222	35860.879	444.17	%	45	4500	49.5	Yes	-1.10%	Crest	Yes	
2	CT	35885.629	444.616	1.80%	45	4500		No				
2	TC	35894.215	444.771	1.80%	20	2000		No				
2	IP223	35909.715	445.05	%	20	-2000	31	Yes	1.55%	Sag	Yes	
2	CT	35925.215	445.569	3.35%	20	2000		No				
2	TC	35945.046	446.233	3.35%	29	2900		No				
2	IP224	36008.121	448.346	%	29	2900	126.15	Yes	-4.35%	Crest	Yes	
2	CT	36071.196	447.715	-1.00%	29	2900		No				
2	TC	36154.858	446.879	-1.00%	45	4500		No				
2	IP225	36180.283	446.625	%	45	-4500	50.85	Yes	1.13%	Sag	Yes	
2	CT	36205.708	446.658	0.13%	45	4500		No				
2	TC	36248.536	446.713	0.13%	10	1000		No				
2	IP226	36253.186	446.719	%	10	1000	9.3	Yes	-0.93%	Crest	Yes	
2	CT	36257.836	446.682	-0.80%	10	1000		No				
2	TC	36274.266	446.551	-0.80%	40	4000		No				
2	IP227	36281.266	446.495	%	40	-4000	14	Yes	0.35%	Sag	Yes	
2	CT	36288.266	446.463	-0.45%	40	4000		No				
2	TC	36303.742	446.394	-0.45%	15	1500		No				
2	IP228	36313.492	446.35	%	15	-1500	19.5	Yes	1.30%	Sag	Yes	
2	CT	36323.242	446.433	0.85%	15	1500		No				
2	TC	36332.73	446.513	0.85%	10	1000		No				
2	IP229	36336.172	446.542	%	10	1000	6.884	Yes	-0.69%	Crest	Yes	
2	CT	36339.614	446.548	0.16%	10	1000		No				
2	TC	36358.073	446.578	0.16%	83	8300		No				
2	IP230	36390.791	446.631	%	83	-8300	65.437	Yes	0.79%	Sag	Yes	
2	CT	36423.51	446.942	0.95%	83	8300		No				
2	TC	36448.262	447.177	0.95%	42	4200		No				
2	IP231	36457.712	447.266	%	42	4200	18.9	Yes	-0.45%	Crest	Yes	
2	CT	36467.162	447.314	0.50%	42	4200		No				
2	TC	36569.594	447.826	0.50%	80	8000		No				
2	IP232	36580.794	447.882	%	80	-8000	22.4	Yes	0.28%	Sag	Yes	
2	CT	36591.994	447.969	0.78%	80	8000		No				
2	TC	36683.97	448.687	0.78%	30	3000		No				
2	IP233	36692.67	448.754	%	30	3000	17.4	Yes	-0.58%	Crest	Yes	
2	CT	36701.37	448.772	0.20%	30	3000		No				
2	TC	36730.37	448.83	0.20%	30	3000		No				
2	IP234	36738.32	448.846	%	30	-3000	15.9	Yes	0.53%	Sag	Yes	
2	CT	36746.27	448.904	0.73%	30	3000		No				
2	TC	36783.865	449.178	0.73%	20	2000		No				
2	IP235	36792.565	449.242	%	20	-2000	17.4	Yes	0.87%	Sag	Yes	
2	CT	36801.265	449.381	1.60%	20	2000		No				
2	TC	36804.229	449.428	1.60%	30	3000		No				
2	IP236	36816.229	449.62	%	30	3000	24	Yes	-0.80%	Crest	Yes	
2	CT	36828.229	449.716	0.80%	30	3000		No				
2	TC	36837.664	449.792	0.80%	35	3500		No				
2	IP237	36882.289	450.149	%	35	-3500	89.25	Yes	2.55%	Sag	Yes	
2	CT	36926.914	451.644	3.35%	35	3500		No				
2	TC	36930.702	451.771	3.35%	26	2600		No				
2	IP238	36974.252	453.23	%	26	2600	87.1	Yes	-3.35%	Crest	Yes	
2	CT	37017.802	453.23	0.00%	26	2600		No				
2	TC	37026.142	453.23	0.00%	30	3000		No				
2	IP239	37044.142	453.23	%	30	3000	36	Yes	-1.20%	Crest	Yes	
2	CT	37062.142	453.014	-1.20%	30	3000		No				
2	TC	37072.097	452.894	-1.20%	30	3000		No				
2	IP240	37082.597	452.768	%	30	-3000	21	Yes	0.70%	Sag	Yes	
2	CT	37093.097	452.716	-0.50%	30	3000		No				
2	TC	37116.938	452.596	-0.50%	20	2000		No				
2	IP241	37151.938	452.421	%	20	-2000	70	Yes	3.50%	Sag	Yes	
2	CT	37186.938	453.471	3.00%	20	2000		No				
2	TC	37217.793	454.397	3.00%	8.9	890		No				
2	IP242	37227.316	454.683	%	8.9	890	19.046	Yes	-2.14%	Crest	Yes	
2	CT	37236.839	454.765	0.86%	8.9	890		No				
2	TC	37253.435	454.907	0.86%	8.2	820		No				
2	IP243	37266.309	455.018	%	8.2	-820	25.748	Yes	3.14%	Sag	Yes	

2	CT	37279.183		455.533	4.00%	8.2	820		No				
2	TC	37291.202		456.014	4.00%	5.5	550		No				
2	IP244	37307.289		456.657	%	5.5	550	32.175	Yes	-5.85%	Crest	Yes	
2	CT	37323.377		456.36	-1.85%	5.5	550		No				
2	TC	37330.657		456.225	-1.85%	15	1500		No				
2	IP245	37340.782		456.038	%	15	1500	20.25	Yes	-1.35%	Crest	Yes	
2	CT	37350.907		455.714	-3.20%	15	1500		No				
2	TC	37377.908		454.85	-3.20%	20	2000		No				
2	IP246	37395.908		454.274	%	20	2000	36	Yes	-1.80%	Crest	Yes	
2	CT	37413.908		453.374	-5.00%	20	2000		No				
2	TC	37416.919		453.223	-5.00%	11	1100		No				
2	IP247	37456.519		451.243	%	11	-1100	79.2	Yes	7.20%	Sag	Yes	
2	CT	37496.119		452.114	2.20%	11	1100		No				
2	TC	37508.281		452.382	2.20%	17	1700		No				
2	IP248	37537.181		453.018	%	17	1700	57.8	Yes	-3.40%	Crest	Yes	
2	CT	37566.081		452.671	-1.20%	17	1700		No				
2	TC	37566.323		452.668	-1.20%	4.5	450		No				
2	IP249	37577.123		452.538	%	4.5	-450	21.6	Yes	4.80%	Sag	Yes	
2	CT	37587.923		452.927	3.60%	4.5	450		No				
2	TC	37594.914		453.179	3.60%	4.749	474.879		No				
2	IP250	37607.698		453.639	%	4.749	474.879	25.567	Yes	-5.38%	Crest	No	Increase VC radius to R550m. Regrade adjacent grades if required maintain VC apex.
2	CT	37620.482		453.411	-1.78%	4.749	474.879		No				
2	TC	37631.5		453.214	-1.78%	30	3000		No				
2	IP251	37638.76		453.085	%	30	-3000	14.52	Yes	0.48%	Sag	Yes	
2	CT	37646.02		452.991	-1.30%	30	3000		No				
2	TC	37657.934		452.836	-1.30%	27	2700		No				
2	IP252	37687.634		452.45	%	27	2700	59.4	Yes	-2.20%	Crest	Yes	
2	CT	37717.334		451.41	-3.50%	27	2700		No				
2	TC	37720.561		451.297	-3.50%	25	2500		No				
2	IP253	37728.686		451.013	%	25	2500	16.25	Yes	-0.65%	Crest	Yes	
2	CT	37736.811		450.676	-4.15%	25	2500		No				
2	TC	37746.587		450.27	-4.15%	16.4	1640		No				
2	IP254	37761.757		449.64	%	16.4	-1640	30.34	Yes	1.85%	Sag	Yes	
2	CT	37776.927		449.291	-2.30%	16.4	1640		No				
2	TC	37783.145		449.148	-2.30%	7	700		No				
2	IP255	37799.595		448.77	%	7	-700	32.9	Yes	4.70%	Sag	Yes	
2	CT	37816.045		449.165	2.40%	7	700		No				
2	TC	37855.155		450.103	2.40%	9.5	950		No				
2	IP256	37876.53		450.616	%	9.5	950	42.75	Yes	-4.50%	Crest	Yes	
2	CT	37897.905		450.168	-2.10%	9.5	950		No				
2	TC	37898.483		450.155	-2.10%	12	1200		No				
2	IP257	37921.283		449.677	%	12	-1200	45.6	Yes	3.80%	Sag	Yes	
2	CT	37944.083		450.064	1.70%	12	1200		No				
2	TC	37990.029		450.845	1.70%	8	800		No				
2	IP258	38003.229		451.07	%	8	800	26.4	Yes	-3.30%	Crest	Yes	
2	CT	38016.429		450.859	-1.60%	8	800		No				
2	TC	38032.791		450.597	-1.60%	12.7	1270		No				
2	IP259	38037.871		450.515	%	12.7	1270	10.16	Yes	-0.80%	Crest	Yes	
2	CT	38042.951		450.394	-2.40%	12.7	1270		No				
2	TC	38053.022		450.152	-2.40%	7.261	726.072		No				
2	IP260	38076.256		449.594	%	7.261	-726.072	46.469	Yes	6.40%	Sag	Yes	
2	CT	38099.491		450.524	4.00%	7.261	726.072		No				
2	TC	38170.996		453.384	4.00%	15	1500		No				
2	IP261	38180.371		453.759	%	15	1500	18.75	Yes	-1.25%	Crest	Yes	
2	CT	38189.746		454.017	2.75%	15	1500		No				
2	TC	38190.368		454.034	2.75%	12	1200		No				
2	IP262	38199.668		454.289	%	12	-1200	18.6	Yes	1.55%	Sag	Yes	
2	CT	38208.968		454.689	4.30%	12	1200		No				
2	TC	38217.933		455.075	4.30%	14	1400		No				
2	IP263	38223.533		455.316	%	14	1400	11.2	Yes	-0.80%	Crest	Yes	
2	CT	38229.133		455.512	3.50%	14	1400		No				
2	TC	38254.409		456.396	3.50%	25	2499.994		No				
2	IP264	38264.409		456.746	%	25	2499.994	20	Yes	-0.80%	Crest	Yes	
2	CT	38274.409		457.016	2.70%	25	2499.994		No				
2	TC	38286.367		457.339	2.70%	10	1000		No				
2	IP265	38294.367		457.555	%	10	1000	16	Yes	-1.60%	Crest	Yes	
2	CT	38302.367		457.643	1.10%	10	1000		No				
2	TC	38322.306		457.863	1.10%	66.667	6666.661		No				
2	IP266	38332.306		457.973	%	66.667	-6666.661	20	Yes	0.30%	Sag	Yes	
2	CT	38342.306		458.113	1.40%	66.667	6666.661		No				
2	TC	38381.683		458.664	1.40%	10	1000		No				
2	IP267	38391.433		458.8	%	10	1000	19.5	Yes	-1.95%	Crest	Yes	
2	CT	38401.183		458.747	-0.55%	10	1000		No				
2	TC	38409.39		458.702	-0.55%	11	1100		No				
2	IP268	38420.665		458.64	%	11	-1100	22.55	Yes	2.05%	Sag	Yes	
2	CT	38431.94		458.809	1.50%	11	1100		No				
2	IP269	38440.255		458.933	1.50%				No	-1.50%			

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