Dubbo Regional Council

Dubbo South New Bridge

Strategic Concept Design Report

Revision 1

June 2020

Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.3 and the assumptions and qualifications contained throughout the Report.

Background

Dubbo is a major regional city located at the intersection of the Newell, Mitchell and Golden Highways. Dubbo Regional Council (DRC) is currently in the planning process for managing the growth and residential development of West Dubbo and alleviating CBD traffic congestion. As part of this planning, DRC has recognised that traffic congestion is a critical weak link in the supporting and surrounding infrastructure and several studies have been undertaken identifying the need for a new southern bridge crossing the Macquarie River to provide an alternate route to the CBD and to provide an alternate route for south-west Dubbo residents to the CBD.

Design philosophy

Four (4) route options (Option A, B, C and D) were considered, seeking to utilise existing road corridors and connectivity to existing intersections. Proximity to east-west travel destinations have been considered to provide the most direct alignment possible between the Newell Highway on the west side of the Macquarie River and Macquarie Street on the east side of the river.

The horizontal alignment has been developed to ensure the bridge for each option is positioned on a straight alignment to improve safety and amenity for road users with increased sight distances. This also significantly reduces the cost of the bridge along with the complexity of both design and construction. Option B deviates from this consideration and is the only option which considers a horizontal curve within the bridge.

The vertical alignment of each option has been developed such that the road achieves a minimum flood immunity of 5 % annual exceedance probability (AEP), and the underside of the bridge is clear of water, plus an allowance for freeboard. The existing road levels on the eastern side of the Macquarie River along Bligh Street and Tamworth Street are at approximately the 5 % AEP flood level.

Pedestrians and cyclists have been allowed for in the design with the provision for on road cyclists lanes at intersections, off road cyclists and pedestrians via a 2.5 m wide shared path, and underpass at Golf Links creek for Tracker Riley cycleway, or other underpass access via large culvert, dependant on option.

Cost

Strategic cost estimates were prepared for each alignment option with an allocated 30 % contingency. Individual bridge type options were not costed, with a square metre rate used for the preferred Super-T bridge arrangement on all road alignment options. A summary of construction and design costs is shown in Table E-1.

Table E-1 Strategic cost estimate summary

Item	Description	Option A	Option B	Option C	Option D
1	Total project construction costs	$28,879,004	$31,448,368	$27,806,414	$21,648,607
2	Total design and management costs	$4,033,666	$4,245,530	$3,753,866	$2,922,562
	TOTAL PROJECT COST	**$33,912,670**	**$35,693,898**	**$31,560,280**	**$24,571,169**

Impacts

The different options present different impacts to recreational spaces, existing property and existing intersections. The below table summarises each route option and impact. More detailed discussion of each of these impacts is found within the body of the report.

Table E-2 Impact

Item	Description	Route Option A	Route Option B	Route Option C	Route Option D
1	Requires construction of retaining wall along BIG4 property boundary	x	x	x	
2	Severance of property and acquisition of land				x
3	Severance of Sir Roden Cutler Park	x	x	x	
4	Curved alignment on bridge		x		
5	Encroachment on existing sporting fields		x		
6	Requirement to close off access to Macquarie Street from the east end of Tamworth Street.			x	x

Strategic outcomes

In order to progress the preferred option design development, DRC require State and / or Federal Government funding. This report supports completion of a Strategic Business Case (SBC) document which will allow DRC to complete a Strategic Business Case funding application, to ultimately achieve funding for bridge construction.

Next steps

The next steps for DRC are to:

- Adopt this report for community consultation.
- Undertake community consultation.
- Determine a preferred Option alignment
- Update and adopt current Draft Transport Strategy.

A successful SBC submission will provide funding approval and allow for technical site investigations and a Review of Environmental Factors (REF) to be completed to inform the concept and detailed design and cost estimate.

Figure E-1 Sample Images of proposed South Bridge – Top image is Option B (curved Bridge); Bottom image is Option A (straight Bridge)

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1. Introduction

Dubbo is a major regional city located at the intersection of the Newell, Mitchell and Golden Highways. Dubbo Regional Council (DRC) is currently in the planning process for managing the growth and residential development of West Dubbo and alleviating CBD traffic congestion. As part of this planning, DRC has recognised that traffic congestion is a critical weak link in the supporting and surrounding infrastructure.

Consequently GHD has been engaged by DRC to investigate and develop a strategic concept options report for the construction of an alternate route to the CBD and associated bridge works over the Macquarie River.

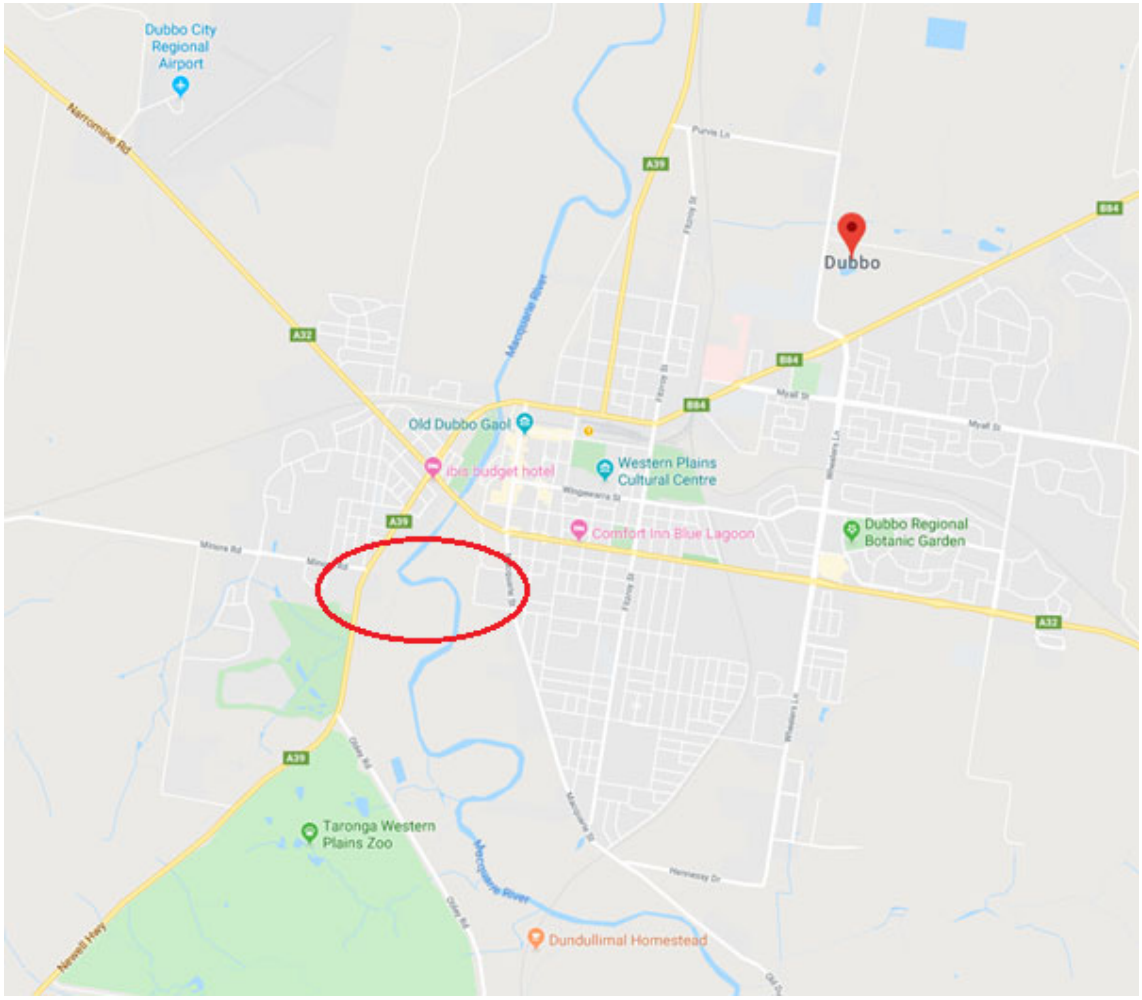


Figure 1-1 Dubbo South bridge location plan

(Image by Google Maps)

1.1 Project background

Located at the junction of major road, rail and air transport routes, Dubbo is a thriving regional service centre. The City is located in the heart of New South Wales and services a wider region of 120,000 people. Dubbo's economic strength lies heavily in the diversity of industries that reinforce its role as a vibrant regional service centre, supported by a flourishing retail sector and over 4,500 registered businesses. Situated in the heart of New South Wales, the Dubbo region is a dynamic growing centre, with a population of over 50,000 smiling people who call the region home. (Reference: https://evocities.com.au/dubbo/).

The city of Dubbo services a population of over 40,000 people and the city is geographically divided by the Macquarie River running north-south. To the west of the river lies largely residential development and land identified for future growth, and to the east, the CBD and expansive residential development.

At present, the Macquarie River may only be crossed at two (2) locations:

- LH Ford Bridge located on the Mitchell Highway, which feeds traffic directly into Cobra Street (the main street); or alternatively.
- Emile Sersier Bridge, on the Newell Highway to the north of the CBD.

It is noted that RMS is pursuing design and construction of a new bridge at the north end of Dubbo (River Street Bridge), which focuses on Newell Highway freight movement improvements and 100 year flood immunity provision for the highway. The River Street Bridge does not:

- Ease CBD congestion.
- Provide an alternate route for south-west Dubbo residents to the CBD.
- Support development in West Dubbo.
- Support the DRC Transport Strategy to 2055, noting the bridge is part of the strategy however is not required in the near term.

GHD has been engaged to provide a strategic concept options report considering potential means of achieving access over the Macquarie River between East and West Dubbo and budget cost estimates.

1.2 Purpose of this report

This Strategic Concept Report aims to determine the most appropriate option for a new bridge in terms of location, engineering, community, environmental constraints and cost. We understand that DRC will use this report to support funding requests to Government authorities in order to further develop design and ultimately proceed to construction of a new bridge. Consequently this report must be read in conjunction with those assumptions, limitations and qualifications discussed throughout.

1.3 Scope and limitations

This report has been prepared by GHD for Dubbo Regional Council and may only be used and relied on by Dubbo Regional Council for the purpose agreed between GHD and the Dubbo Regional Council as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Dubbo Regional Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

Specifically, this Report does not take into account the effects, implications and consequences of or responses to COVID-19, which is a highly dynamic situation and rapidly changing. These effects, implications, consequences of and responses to COVID-19 may have a material effect on the opinions, conclusions, recommendations, assumptions, qualifications and limitations in this Report, and the entire Report must be re-examined and revisited in light of COVID-19. Where this Report is relied on or used without obtaining this further advice from GHD, to the maximum extent permitted by law, GHD disclaims all liability and responsibility to any person in connection with, arising from or in respect of this Report whether such liability arises in contract, tort (including negligence) or under statute.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Dubbo Regional Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has prepared the preliminary cost estimate set out in section 6 and Appendix D of this report ("Cost Estimate") using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD and detailed in section 6 and Appendix D of this report.

The Cost Estimate has been prepared for the purpose of informing option comparisons within the Strategic Concept Options Report and to be used to inform production of a Strategic Business Case and must not be used for any other purpose.

The Cost Estimate is a preliminary estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the project can or will be undertaken at a cost which is the same or less than the Cost Estimate.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

1.4 Assumptions

GHD has assumed that the survey, geotechnical and utility information supplied by DRC is suitable for strategic concept options design development and generation of earthworks volumes to enable cost estimation. As this is a strategic concept design report, no detailed survey, investigations or studies have been carried out.

2. Route options and bridge location

2.1 Dubbo transport routes context

Dubbo is located at the junction of the Newell, Mitchell and Golden Highways, forming a major inland transport route. There are currently two (2) bridge crossings forming an east-west link through central Dubbo along the Golden Highway and Mitchell Highway. RMS are currently in the process of design and construction of a new bridge at the north end of Dubbo, which focuses on Newell Highway freight movement improvements and 100 year flood immunity provision for the highway. This will remove a significant number of heavy vehicles travelling directly through the main commercial/retail street of Dubbo (the Golden Highway).

Beyond the removal of heavy vehicles, Dubbo still experiences significant local traffic congestion through the central CBD from passenger and light vehicles. A southern river crossing would provide an alternate southern route to the CBD and connectivity between Dubbo's southern residential zones.

DRC has invested considerable effort into strategic studies over a period of time. The following existing and adopted studies and strategies have highlighted the need for a southern bridge crossing:

- Dubbo Expanded Urban Area Traffic Management and Roads Contributions Study (PPK Environment and Infrastructure, 1998).
- Dubbo City Planning and Transport Strategy 2036 (Stapleton Transport and Planning, 2009, p81, p93).
- Residential Release Strategy – West Dubbo Urban Release Area (Dubbo City Council, 2011).
- Dubbo Transportation Strategy – (Stapleton Transportation and Planning, 2020).

Community Strategic Plan – current version, undated (Dubbo Regional Council).

2.2 Route selection

The scope of this strategic concept options report requires identification of four (4) strategic option locations for a new south bridge crossing of the Macquarie River. GHD has not undertaken a formal route study but has conducted an investigation into alternative locations for a new bridge as a desktop exercise. Locations were nominally identified with consideration to connections with existing road corridors, intersections and proximity to east-west travel destinations.

2.3 Strategic options

A number of options have been investigated to provide east-west connectivity over the Macquarie River between the Newell Highway and Macquarie Street. The options seek to utilise existing road corridors to provide the most direct alignment possible. With the exception of Option B, horizontal alignment has been considered such that the whole bridge for each option can be on a straight alignment, improving safety and amenity for road users with increased sight distances. This also significantly reduces the cost of the bridge along with the complexity of both design and construction. Each of the options is described below and depicted in Figure 2-1.

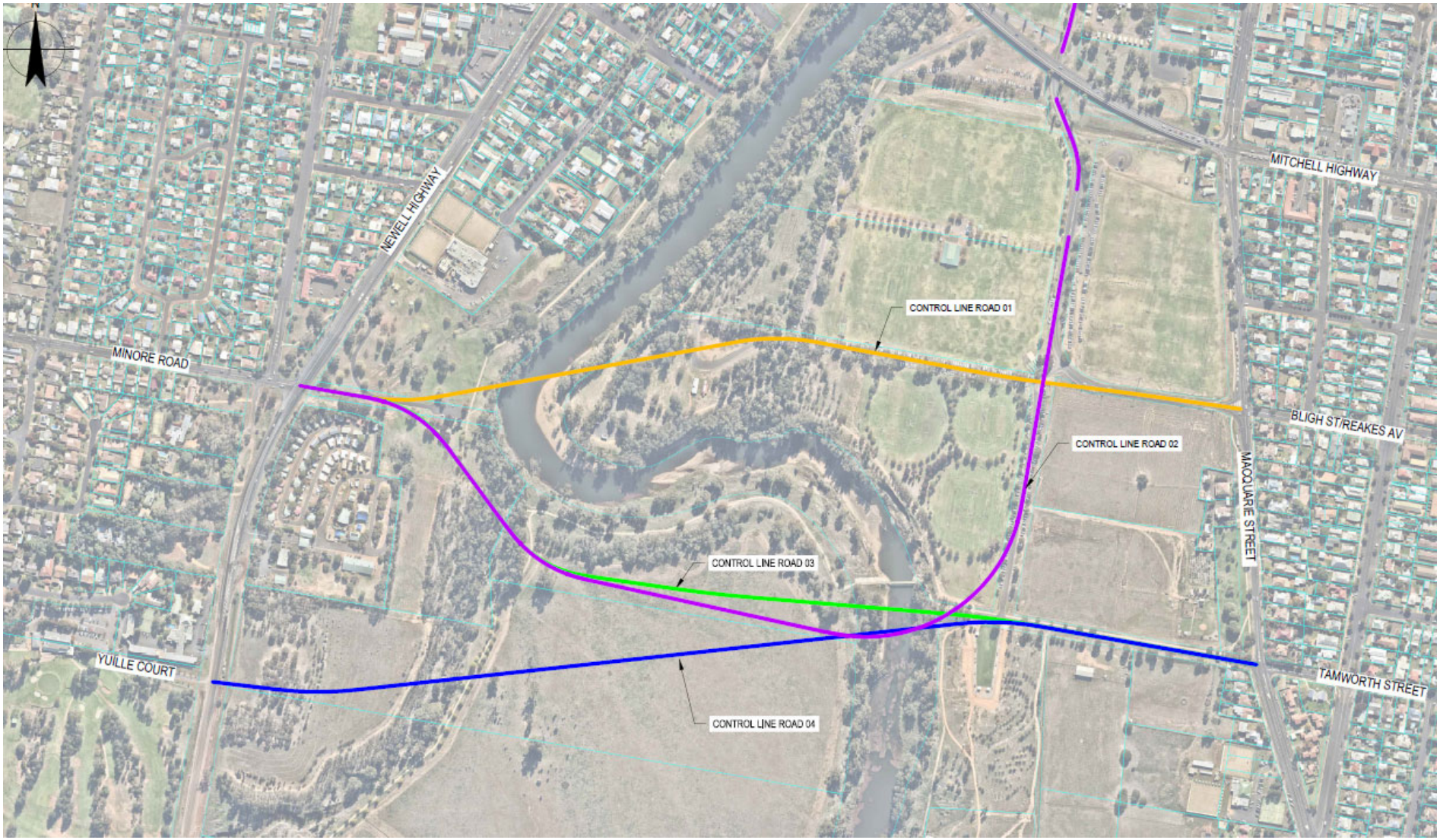


Figure 2-1 Strategic options

2.3.1 Option A (Road 01 – orange route)

Reference Drawing No. 22-12511689-SK002 within Appendix A.

Option A provides an east-west connection from the Minore Road intersection with the Newell Highway on the western side of the river, across to Sandy Beach Road and Bligh Street, terminating at the intersection of Bligh Street and Macquarie Street, with the bridge located adjacent to Sandy Beach. The Newell Highway / Minore Road and Macquarie Street / Bligh Street intersections would require upgrade to signalised intersections. The location where the Sandy Beach Road / Bligh Street / South Street intersection currently exists would be reconfigured to a signalised T-junction with through priority given to new collector road. The South Street leg would not be part of the new T-junction. South Street would instead be accessed via Tamworth Street and terminate in a cul-de-sac just south of the new T-junction.

A reconfiguration of existing access roads to Sandy Beach would also need to be accommodated.

It should be noted that the installation of traffic signals at the Newell Highway tie in location may cause additional traffic congestion on the Newell Highway. Traffic impacts would be further investigated in detailed design phase in consultation with TfNSW.

The bridge crossing at Sandy Beach Road would significantly impact the recreational amenity and access to the popular community asset of Sandy Beach, which is a significant negative impact associated with this option.

A retaining wall with an average height of 1.5 m for a length of approximately 120 m is required. Refer to Section 2.4.1 for additional commentary on the retaining wall. The indicative location of the retaining wall is shown on the reference drawing.

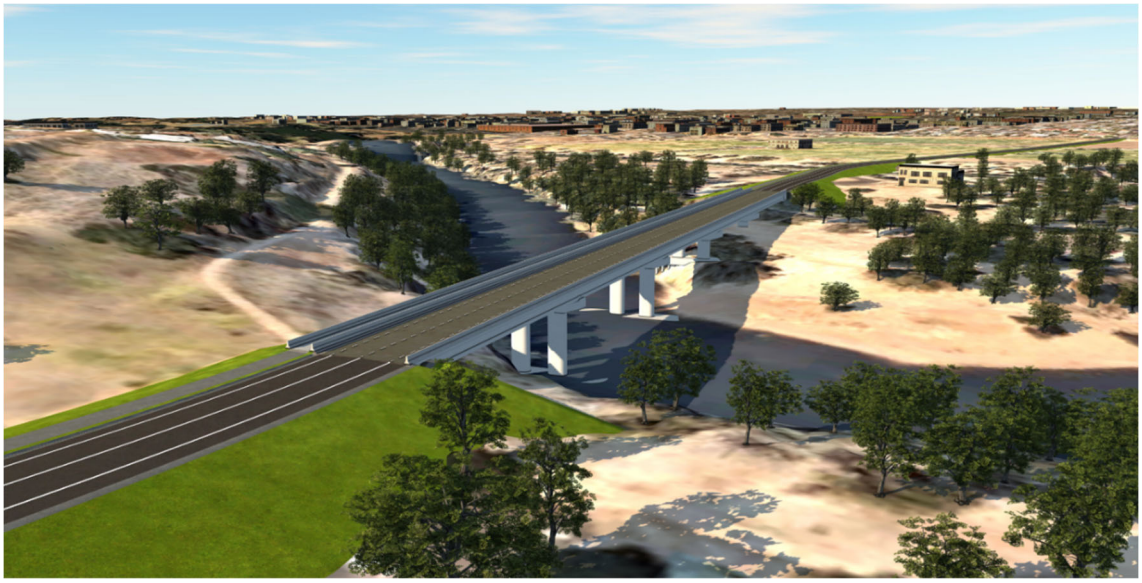


Figure 2-2 Option A – view looking northeast adjacent to new bridge over the Macquarie River

2.3.2 Option B (Road 02 – purple route)

Reference Drawing No. 22-12511689-SK006 within Appendix A.

Option B provides an east-west connection via a curved bridge located to the south of the existing pedestrian bridge. The bridge is fully contained within a horizontal curve with a consistent cross fall for driveability, design speed, sight distance, safety and constructability reasons. The western tie-in of the route is from the Minore Road intersection with the Newell Highway on the western side of the river. The route then follows north along South and Bligh Street terminating at the intersection of Bligh Street and Wingewarra Street.

Motorists would also have an option to utilise the Sandy Beach Road / Bligh Street / South Street intersection to access Macquarie Street at the intersection with Bligh Street / Streakes Avenue. Both these existing intersections would be reconfigured to new signalised intersections.

When compared to Option C, the route to the west of the Macquarie River is very similar, however the eastern route directs traffic in a northbound direction, reconnecting with the road network at the intersection of Bligh Street and Wingewarra Street; or alternatively connecting to the Macquarie Street / Bligh Street / Streakes Avenue intersection via the Sandy Beach Road / Bligh Street / South Street intersection.

Due to the curvature of the alignment in order to achieve design speed, there is some encroachment on to the southern edge of sporting fields on the east side of the river.

It should be noted that the installation of traffic signals at the Newell Highway tie in location may cause additional traffic congestion on the Newell Highway. Traffic impacts would be further investigated in detailed design phase in consultation with TfNSW.

A retaining wall with an average height of 1.5 m for a length of approximately 120 m is required. Refer to Section 2.4.1 for additional commentary on the retaining wall. The indicative location of the retaining wall is shown on the reference drawing.

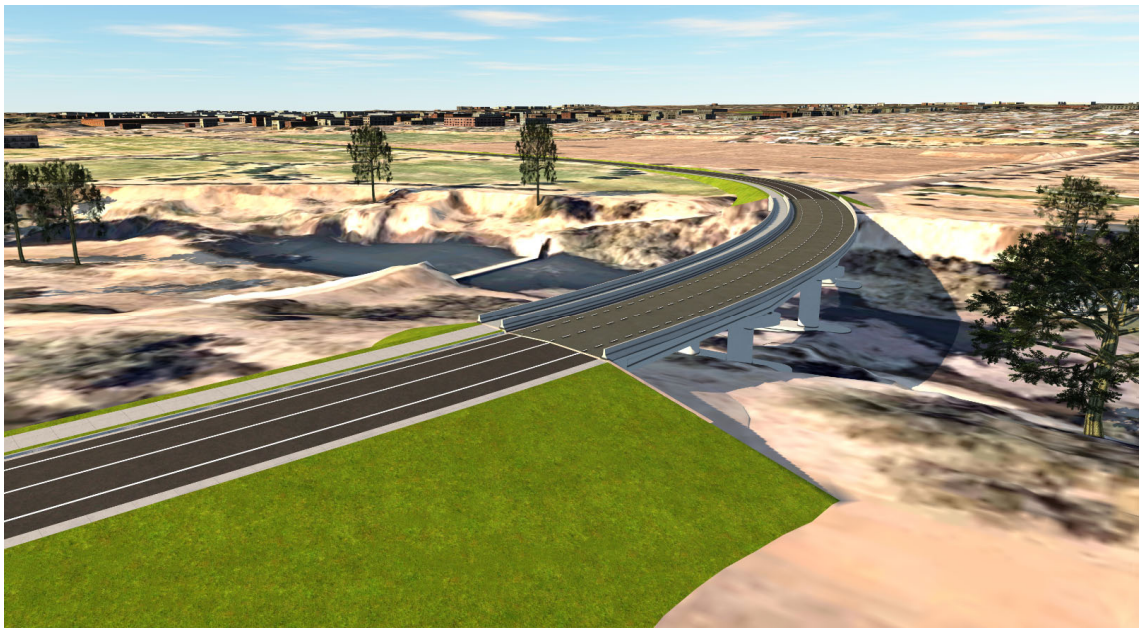


Figure 2-3 Option B – view looking northeast adjacent to new bridge over the Macquarie River

2.3.3 Option C (Road 03 – green route)

Reference Drawing No. 22-12511689-SK003 within Appendix A.

Option C provides an east-west connection from the Minore Road intersection with the Newell Highway on the western side of the river, terminating at the Macquarie Street / Tamworth Street intersection with the bridge located adjacent to the existing pedestrian bridge. Minore Road / Newell Highway and Macquarie Street / Tamworth Street intersections would require upgrades to signalised intersections. The southern end of South Street and the eastern leg of Macquarie Street /Tamworth Street intersection would be closed to improve traffic flow and minimise impacts to resident on Tamworth Street, east of Macquarie Street.

It should be noted that the installation of traffic signals at the Newell Highway tie in location may cause additional traffic congestion on the Newell Highway. Traffic impacts would be further investigated in detailed design phase in consultation with TfNSW.

The main differentiator between this option and Option D is the route taken through private land to the west of the river, and the Newell Highway tie in point. This option minimises impact to the land parcel and more closely follows the tree line, minimising land to be acquired.

Figure 2-4 Option C – view looking northwest adjacent to new bridge over the Macquarie River

A retaining wall with an average height of 1.5 m for a length of approximately 120 m is required. Refer to Section 2.4.1 for additional commentary on the retaining wall. The indicative location of the retaining wall is shown on the reference drawing.

2.3.4 Option D (Road 04 – blue route)

Reference Drawing No. 22-12511689-SK004 within Appendix A.

Option D provides an east-west connection between the Yuille Ct / Newell Highway intersection on the western side of the river, river, terminating at the Macquarie Street / Tamworth Street intersection with the bridge located close to the Tamworth Street carpark. This option is identified as the Tamworth Street option in early RMS consideration of its route selection process (reference RMS Preferred Option Report – New Dubbo Bridge May 2017).

Similar to Option C, the Golf Course entrance / Newell Highway and Macquarie Street / Tamworth Street intersections would require upgrades to signalised intersections. The southern end of South Street and eastern leg of Macquarie/Tamworth Street intersection would be closed to improve traffic flow and minimise impacts to resident on Tamworth Street, east of Macquarie Street.

Comparing the route taken through private land to the west of the river with Option C, this option effectively severs and quarantines the portion of land between the new road and the river. DRC would likely need to acquire the whole parcel of land between the new road alignment and the river.

Figure 2-5 Option D – view looking northwest adjacent to new bridge over the Macquarie River

2.4 Impact to existing property and traffic arrangements

2.4.1 BIG4 Holiday Park retaining wall

As described above for Options A, B and C, the height of the road tie-in in to the Newell highway would require a retaining wall with an average height of 1.5 m for a length of approximately 120 m. The retaining wall is required along the boundary of the BIG4 Holiday Park property to cater for the property line / road batter interface.

Figure 2-6 below provides an image of the retaining wall, while Figure 2.7 shows the retaining wall in plan view.

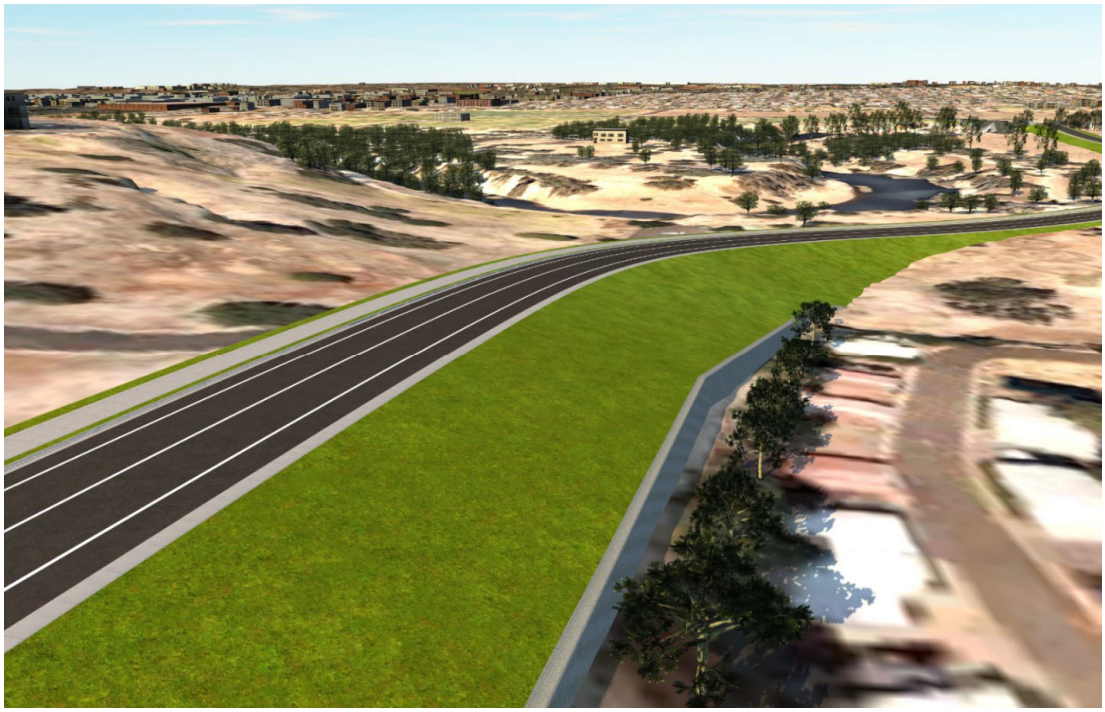


Figure 2-6 Image showing retaining wall

Figure 2-7 Location shown in plan view, required for Options A, B, C

2.4.2 Macquarie Street / Tamworth Street intersection

Option C and D both utilise the section of Tamworth Street to the west of Macquarie Street. Intersections. It is not intended that the section of Tamworth Street to the east of Macquarie Street will be used for direct access to or from the new Bridge. To this end, traffic controls will be put in place to prevent access to or from Tamworth Street east.

The *Dubbo City Planning and Transportation Strategy 2036* (Stapleton Transport and Planning, 2009, p37) notes there was concern connecting Minore Road to the extension of Tamworth Street as a bridge link would filter traffic through South Dubbo. Traffic modelling indicated this was not the case, with existing streets of South Dubbo remaining as the same road hierarchy classification to 2036.

Figure 2-8 below details the intended arrangement.

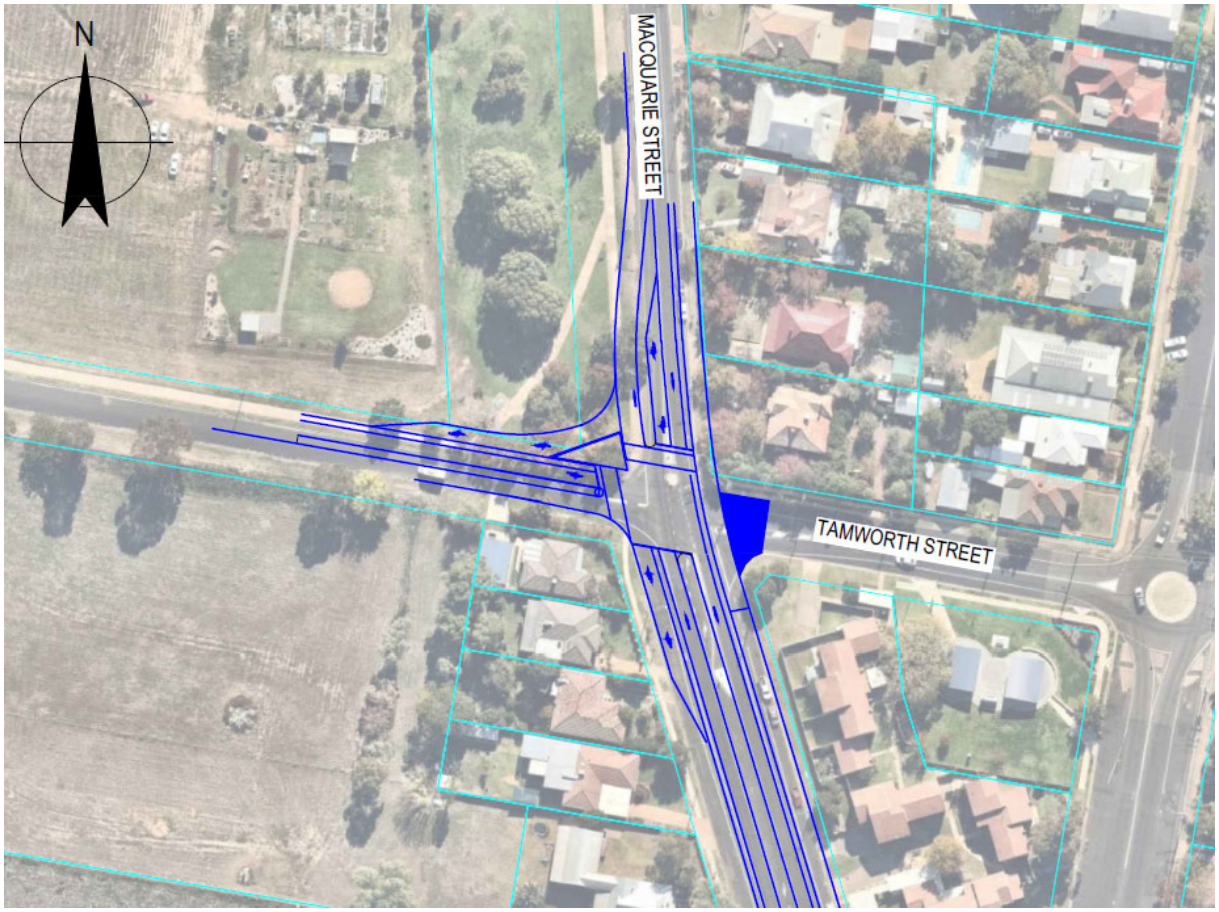


Figure 2-8 Proposed intersection details at Macquarie Street / Tamworth Street intersection detailing no entry / exit via Tamworth Street east of Macquarie Street

3. Site constraints

3.1 Regional geology

Geotechnical investigations of the proposed route alignments were not available at the time of reporting, however DRC provided past geotechnical investigations for two other locations along the Macquarie River.

- 3.16 km from South Bridge – *"Draft Tracker Riley Cycleway Bridge – Detailed Design Report*" by Cardno 2011.
- Opposite Minore Rd 0 km from proposed South Bridge Option 01 and 02 – *"Sir Roden Cutler Carpark – Pavement Investigation and Design*" by Macquarie Tech 2016.

Both reports reference the Dubbo geological map sheet SI 55-4 indicating the site is underlain by Quaternary aged alluvium associated with the Macquarie River Channel which comprises variable amounts of sands, silts, gravels, clay and sandstone bedrock, with sub-surface investigations confirming the geological mapping.

Our structural engineers have considered this information and provided preliminary pile lengths for the purposes of the cost estimate, however these would be reassessed based on targeted geotechnical information during design progression.

Further geotechnical investigations need to be implemented to confirm and/or modify the proposed foundation solutions and inform the pavement design during later stages of design development.

3.2 Site topography

The Macquarie River is a winding watercourse through the city of Dubbo lined with steep banks. The surrounding countryside beyond the banks is relatively flat to gently sloping paddocks and sports ovals with widely scattered trees.

3.3 Hydraulics and flooding

Flooding information, risks and impacts on the subject land and surrounding landowners was interpreted from the Cardno flood maps (2018) and TUFLOW flood model currently being undertaken on behalf of RMS for the nearby Newell Highway Bridge (approximately 1 km north of the proposed south bridge site). The proposed Dubbo South Bridge is required to achieve 5% AEP (20 year ARI) flood immunity.

It is noted that, at the location of the proposed South Bridge, the TUFLOW modelling provided includes the Macquarie River as a simple triangular channel, with poor integration between the Macquarie River channel and the surrounding floodplain. It is noted that Cardno have developed a detailed model at the location of the proposed South Bridge as part of the wider Macquarie River Flood Study, however this was not provided as part of this study. Whilst reasonable for the original purpose of this modelling (i.e. the Newell Highway bridge, about 1 km north), further refinement of the model is required, with the detailed model to be provided by Cardno in the future for detailed design phases of the Bridge.

Figure 3-1 identifies the flood modelling locations in TUFLOW. A summary of TUFLOW results can be found in Appendix C.

Figure 3-1 TUFLOW Flood modelling locations

Adopting the 5 % AEP (20 year ARI) event in the Macquarie River with the backwater effects of the 20 % AEP (5 year ARI) concurrent event in the Talbragar River, the design flood level should be between 260.1 mAHD to 260.3 mAHD. Allowing for 1.5 metres from the bridge soffit to road crest, it appears that the bridge would be inundated in about the 2 % AEP (50 year ARI) event in the Macquarie River with a flood level of 261.8 mAHD.

This level has been adopted as deck level for the options considered within this report.

Design velocities up to the 5 % AEP event in the Macquarie River are typically low (less than 1.5 m/s) throughout.

To better understand the potential impacts of the South Bridge, and better identify the design soffit level, some additional modelling is recommended for the next stage of design development. The following minimum additional scenarios are recommended and focus on the range of events within the Macquarie River, with little (or no) inflows from the Talbragar River:

- Macquarie River 1 % AEP / Talbragar River 20 % AEP
- Macquarie River 2 % AEP / Talbragar River 20 % AEP
- Macquarie River 10 % AEP / Talbragar River 20 % AEP

In considering the flood hydraulics, any new bridge structure would need to consider flood impact on surrounding properties which may include blockage assumptions and consideration of guard rails, bridge, pier and abutment design parameters that considers the flood flows and any potential debris loading, scour risk around piers and abutments and potential mitigation using erosion protection strategies.

3.4 Environmental

We have made no explicit allowance during this strategic concept design options investigation stage for the following potential environmental impacts and associated costs which may arise as a result. It is noted that these are typical items which are discovered during detailed design and mitigation requirements and strategies are developed accordingly.

With the exception of unknown potential items listed below (i.e. presence of acid sulfate soils and presence of indigenous heritage items), it is standard practice for a contractor to consider and manage the below items, which are generally allowed for within the contractor's preliminaries amounts noted in the cost estimate, and the cost estimate has a preliminaries amount noted.

- Fisheries
- Flora and fauna
- Indigenous and non-indigenous heritage
- Acid sulfate soils and land contamination issues
- Soils and water quality
- Changes to hydrology and flooding
- Aquatic ecology
- Noise and vibration
- Traffic and access
- Visual amenity

3.5 Statutory approvals

We have made no allowance for the impacts of any statutory approvals including any planning approvals.

The construction of a new bridge would be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* with DRC the determining authority (as permitted by *State Environmental Planning Policy (Infrastructure) 2007*. A review of environmental factors and associated specialist studies would be required for the planning and approvals process.

3.6 Public utilities

A "Dial Before You Dig" online search indicates the following existing utilities and corresponding authorities that are reported to be within the extents of the study area.

- Dubbo Regional Council – water, sewer reticulation and drainage assets.
- Essential Energy – overhead and underground electricity.
- Jemena Gas Country reticulation.
- Telstra, Nextgen and NBN Co telecommunications conduits.

3.6.1 Utility impacts

Each of the options will impact on existing utility services and will require either protection or relocation to varying extents. For each option below the utility strategy for utility impacts has been assumed which will be subject to further investigations and discussions with utility authority during future detailed design stages.

Option A

- Water and sewer protection on south west side of Newell Highway/Minore Road intersection.
- Water protection and sewer relocation on eastern leg of Newell Highway/Minore Road intersection.

- Sewer relocation at western abutment of bridge over Macquarie River.
- Sewer protection near Sandy Beach reserve.
- Sewer protection at northern leg of Bligh Street intersection.
- Sewer protection at north west side of western leg of Bligh/Macquarie Street intersection.
- Water relocation opposite Bligh Street intersection.
- Approximately 1 x Electrical pole relocation and 8 streetlights.
- Assumed no impact to gas main at western side of Newell Highway intersection or eastern side of Macquarie Street intersection.
- Likely relocation of Nextgen, NBN and Telstra services on eastern side of Newell Highway in vicinity of Minore Road intersection.
- Likely relocation of Telstra and NBN services on southwest side of intersection with Macquarie Street.

Option B

- Water and sewer protection on south west side of Newell Highway/Minore Road intersection.
- Water protection and sewer relocation on eastern leg of Newell Highway/Minore Road intersection.
- Water protection on western side of Sandy Beach Road and Sandy Beach/Bligh Street intersection.
- Potential relocation of water along west side of Bligh Street, south of Bligh Street and Bultje Street intersection and protection of water at Bligh Street/Bultje Street road crossing.
- Sewer relocation at toe of embankment, northern side of alignment at Golf Links Creek.
- Sewer protection on eastern side of Golf Links Creek.
- Approximately 3 x Electrical pole relocation and 8 streetlights.
- Assumed no impact to gas main at western side of Newell Highway intersection.
- Likely relocation of Nextgen, NBN and Telstra services on eastern side of Newell Highway in vicinity of Minore Road intersection.

Option C

- Water and sewer protection on south west side of Newell Highway/Minore Road intersection.
- Water protection and sewer relocation on eastern leg of Newell Highway/Minore Road intersection.
- Sewer relocation at toe of embankment, northern side of alignment at Golf Links Creek.
- Sewer protection on eastern side of Golf Links Creek.
- Water relocation from near South Street to Macquarie Street.
- Sewer protection on northwest corner of intersection with Macquarie Street.
- Approximately 3 x Electrical pole relocation and 2 streetlights.
- Assumed no impact to gas main at western side of Newell Highway intersection or eastern side of Macquarie Street intersection.

- Likely relocation of Nextgen, NBN and Telstra services on eastern side of Newell Highway in vicinity of Minore Road intersection.
- Likely relocation of Telstra and NBN services on northwest, and NBN service on southwest side of intersection with Macquarie Street.

Option D

- Sewer protection on eastern leg of intersection with Newell Highway.
- Sewer protection on east side of Golf Links Creek.
- Water protection and sewer relocation on eastern leg of Newell Highway/Minore Road intersection.
- Sewer relocation at western abutment of bridge over Macquarie River.
- Approximately 2 x Electrical pole relocation and 3 streetlights.
- Assumed no impact to gas main at western side of Newell Highway intersection or eastern side of Macquarie Street intersection.
- Potential relocation of Telstra, NBN and Nextgen service on eastern side of Newell Highway in vicinity of Yuille Court intersection.
- Likely relocation of Telstra and NBN services on northwest, and NBN service on southwest side of intersection with Macquarie Street.

3.7 Land ownership

With reference to Figure 3-2, each option alignment would impact upon adjacent properties other than the lots that are classed as road reserve. The properties along Options A and C are assumed to be Crown or State owned land, with the ownership of Lot 1 DP130730 to be confirmed by DRC. Option D traverses further to the south into Lots 18 & 19 DP753233 which is privately owned, while option B traverses Lot 19 only. Property acquisition has been allowed for in cost estimates and may need to be refined following confirmation of land ownership by DRC.

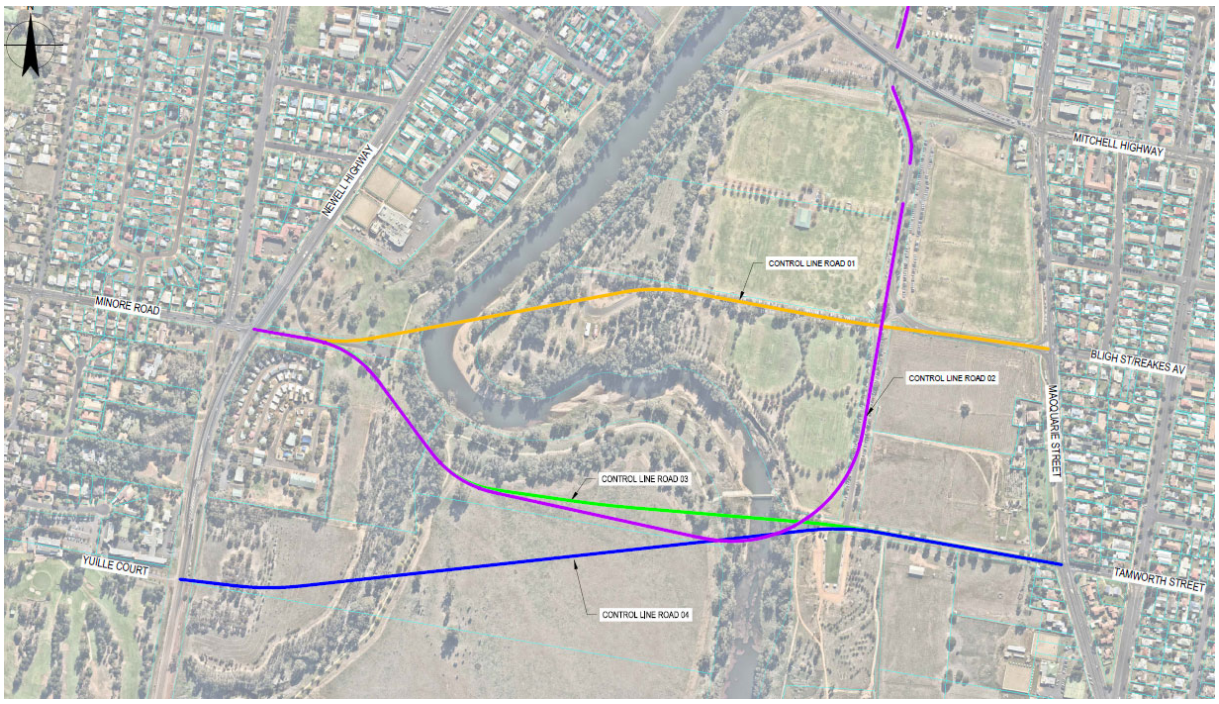


Figure 3-2 Land ownership information

4. Design criteria

4.1 Existing road network

The strategic options investigated seek to provide east-west connectivity over the Macquarie River between the Newell Highway and Macquarie Street. The options connect with existing intersections and utilise portions of existing streets. The existing streets within the study area are described below.

The Newell Highway is a national highway that provides a north-south travel route between Brisbane and Melbourne. At the intersection with Minore Road there are two travel lanes northbound, a right turn and single travel lane in southbound direction. At the intersection with Yuille Court there is a single travel lane and shoulder in each direction.

Minore Road is an urban arterial road that provides access to West Dubbo. The road cross section consists of a travel lane, cycle lane and on street parking in both directions.

Yuille Court is a local access providing access to Dubbo Golf Club.

Sandy Beach Road is a local un-kerbed road that provides access from Bligh Street to the Macquarie River and adjacent sporting fields. Traffic efficiency is likely to be impacted along this road for a potential bridge option due to interaction with local traffic associated with sporting fields.

Bligh Street is a collector road that for the majority of its length runs parallel with Macquarie Street. At the southern end of Bligh Street it turns 90 degrees in an easterly direction and terminates at Macquarie Street. The road has a single travel lane in each direction with a shoulder and no parking along its southern length.

The section of Tamworth Street to the west of Macquarie Street has kerb & gutter and shared pathway on the northern side and table drain on the southern side. The road is a local road with single travel lane in each direction.

Macquarie Street is a collector road consisting of a single travel lane and wide sealed shoulders with on street parking in each direction. South of the intersection with Tamworth Street there is a wide median and right turn lane into Tamworth Street (east of Macquarie Street).

4.2 Traffic volumes

No traffic modelling was undertaken as part of the strategic concept design and route option development. It is understood that DRC has undertaken a recent transport study, however at the time of reporting this has not been adopted by Council and made available. Council's "Dubbo City Planning and Transport Strategy 2036" was provided. This document was prepared in 2009 and provides Council's current Transport Strategy. The document describes traffic modelling undertaken and Table 8.1 shows a projected 11,750 vehicles per day estimated to be using the new South Bridge in 2036. The Table also shows more than a doubling of current vehicle numbers on the existing 2 bridges (Emile Serisier Bridge and LH Ford Bridge) if the "Do nothing" option is followed.

Construction of any of the options would have significant impact on the nature of traffic distribution in Dubbo and the new road/bridge option would experience high traffic volumes due to the new connectivity it would provide. Provision of recent transport study information will be required for design progression in order to refine development of the preferred option to understand traffic movements and confirm intersection types.

4.3 Design speed

The new road is to be designed to be an arterial road with a design speed of 70 km/h, however will be signposted at 60 km/h.

4.4 Cross section

The cross section adopted for the new arterial road and bridge is described in the table below. The road is a rural arterial road with kerb and gutter and footway provided on northern side and no kerb provided on southern side. The cross section caters for on road cyclists and off-road pedestrians and cyclists through provision of 2.5 m shared pathway.

Table 4-1 Cross section criteria

Cross section	Road	Bridge
Travel lane width	3.5 m	3.5 m
Shoulder	2.0 m	1.5 m (south), 1.0 m (north)
Barrier	-	0.53 m x 2 medium performance level barrier 0.14 m pedestrian safety barrier
Verge	1.0 m (Southside) 4.0 m (north side, including shared pathway)	-
Shared pathway width (clear width)	2.5 m (2.5 m)	2.8 m (2.5 m)
Fill batter slope	4H:1V, steepened to 2H:1V where safety barrier provided	-
Cut batter slope	3H:1V	-
Total width	16 m	13.5 m

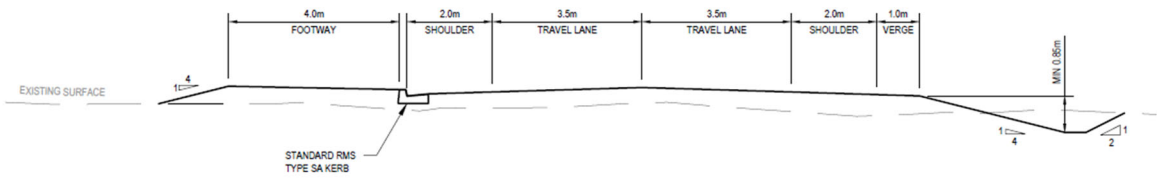


Figure 4-1 Typical cross section - road

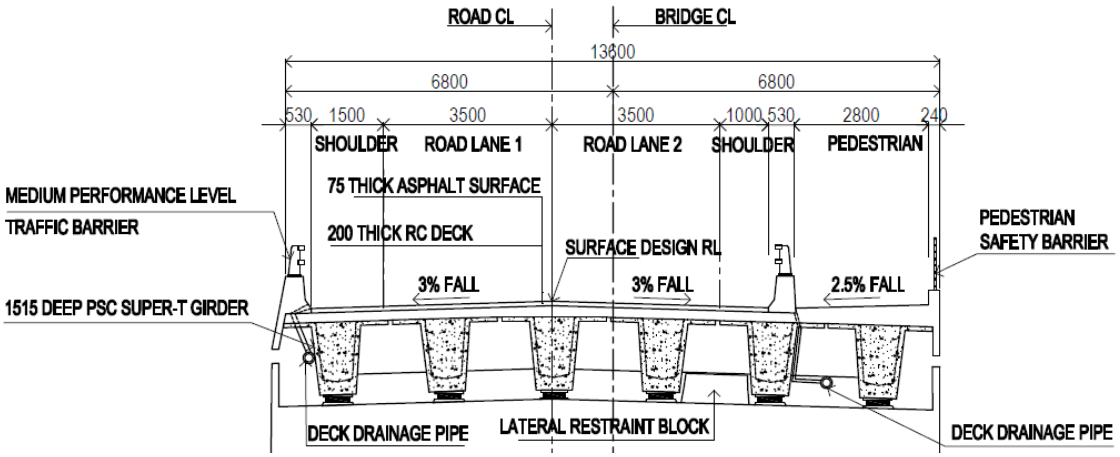


Figure 4-2 Typical cross section - bridge

4.5 Horizontal and vertical geometry

All options considered seek to utilise existing road corridors to provide the most direct alignment possible between the Newell Highway and Macquarie Street. The horizontal alignment has been developed to ensure the bridge for each option is positioned on a straight alignment to improve safety and amenity for road users with increased sight distances. This also significantly reduces the cost of the bridge along with the complexity of both design and construction. Option B deviates from this consideration and is the only option which considers a horizontal curve within the bridge.

Road geometry has been based on the Austroads Guide to Road Resign (AGRD) for a design speed of 60 km/h and signposted speed of 50 km/h. It is assumed that the alignment would be street lit. The horizontal and vertical geometry is compliant for a 60 km/h design speed for all options with the exception of Option A, where the crest and sag curves closest to the Newell Highway intersection are only compliant for 50 km/h. Adopting 60 km/h criteria in this location shifts the vertical curves onto the bridge structure which complicates design and construction, or to remove vertical curves from the bridge completely would mean the structure is much higher leading to additional costs and visual amenity issues.

The vertical alignment of each option has been developed such that the road achieves a minimum flood immunity of 5 % AEP and the bridge soffit is clear of water level plus an allowance for freeboard. The existing road levels on the eastern side of the Macquarie River along Bligh Street and Tamworth Street are at approximately the 5% AEP flood level.

For each option the approach sight distance (ASD) to the Newell Highway intersection dictates the vertical alignment to ensure an approaching car can see the intersection clearly. At these locations the ASD overrides the minimum crest curvature requirement for design speed.

4.6 Pedestrians and cyclists

An allowance has been made for pedestrians and cyclists with a 2.5 m off-road shared pathway provided on the northern side of each alignment, and on road cycle provisions in each direction.

It is noted that Options A, B, C and D all cross the Tracker Riley cycleway, a popular and well used walking and cycling track. To maintain continuity of this route, culverts are to be located and adequately sized to allow pedestrians and cyclists passage.

This could be accomplished via an underpass at Golf Links creek by suitably locating flood relief culverts for Options B, C and D.

4.7 Intersection arrangements

For the purposes of the cost estimate and on the basis that the addition of a new arterial road provided by one of the options will change the traffic environment in southeast and southwest Dubbo, it has been assumed that all intersections are likely to be signalised due to the changes in traffic flow. The table below explains the likely lane arrangements at each key intersection. A visual depiction of these arrangements are shown on drawing 22-12511689-SK007 within Appendix A.

Table 4-2 Nominated intersection arrangements

Intersection	Northern leg	Eastern leg	Southern leg	Western leg
Newell Highway/ Minore Road/ Strategic Option A, C or D	Single through lane in each direction, right and high entry left turn lanes southbound	Single through lane in each direction, right & left turn lanes westbound	Single through lane in each direction, right and high entry left turn lanes northbound	Single through lane westbound, Right turn and through & left eastbound
Bligh Street/ Sandy Beach Road/ South Street/ Strategic Option A	Single lane northbound, right and high entry left turn lanes for southbound	Single through lane westbound, & right turn lane	Cul de sac at South Street	Single through lane eastbound, & left turn lane
Macquarie Street/Bligh Street	Single through lane in each direction, right and left turn lanes for southbound	Single through, right and left lane westbound, single through lane eastbound	Single through lane in each direction, right and left turn lanes northbound	Single through lane westbound, high entry left turn and through & right turn lane eastbound
Bligh Street/ Sandy Beach Road/ South Street/ Strategic Option B	Single lane northbound, right and high entry left turn lanes for southbound	Single through lane westbound, & right turn lane, high entry left turn lanes for southbound	Single lane northbound, right and high entry left turn lanes for southbound	Single through lane eastbound, & high entry left turn lane for northbound, right turn lane for southbound
Newell Highway/ Yuille Court/ Strategic Option D	Single through lane in each direction, right and high entry left turn lanes southbound	Single through lane eastbound, through & right and high entry left turn lanes westbound	Single through lane in each direction, right and left turn lanes northbound	Single through lane westbound, single through/Right/left turn lane eastbound
Strategic Option D (Tamworth Street)/ South Street	Cul de sac at South Street	Single lane in each direction	None	Single lane in each direction
Strategic Option D (Tamworth Street)/ Macquarie Street	Single through lane in each direction, right turn lane for southbound	No access provided to Tamworth Street, east of Macquarie	Single through lane in each direction, left turn lanes northbound	Single through lane westbound, high entry left turn and through & right turn lane eastbound

Intersection	Northern leg	Eastern leg	Southern leg	Western leg
Bligh Street / Bultje Street Strategic Option B	Single through lane in each direction	Single through lane in each direction	Single through lane in each direction	Single through lane in each direction
Bligh Street / Wingewarra Street Street Strategic Option B	Single through lane in each direction, right turn lane	Left turn & right turn lanes	Single through lane in each direction	Single through lane in each direction

5. Structures

1.1 Assumptions

The concept options prepared by GHD are based on the following assumptions:

- The geotechnical information is assumed based on information supplied by DRC from surrounding projects, geotechnical investigations need to be implemented to determine the sensible foundation solutions during later stages of design development.
- Hydraulic information would be modelled and computed further in later stages of design development to determine forces due to water flow and its related actions, i.e. debris, logs, placed onto the structure.
- The concept options (within prefeasibility study) are developed primarily based on the critical criteria including cost consideration, community effects, constructability, timing and safety. Additional criteria is also discussed and may require further considerations in later phases of design.
- Site investigations would be required in later stages of design development to clarify solutions for embankment, retaining wall, approach slabs, abutment, scour protection, foundation levels, utilities, services, and erosion control measures etc.
- An environmental assessment would be developed to examine potential impacts of the new structure on natural environment and communities. This may lead to necessary changes in design.
- The structures presented assume a design life of 100 years except where noted otherwise in this report. Any specific elements' design life would be defined in later design phases.

1.2 Project Inputs

1.2.1 Design Standards

Design standards used in the preparation of the design include but are not limited to:

- Australian Standards including:
  - AS5100 – Bridge Design Set
  - AS1170 – Design Actions Set
  - AS2159 – Pile Design and Installation
  - AS4678 – Earth Retaining Structures
- Roads and Marine Services (RMS) RMS QA Specifications for Roadworks and Bridgeworks including:
  - RMS Bridge Policy Manual which includes Bridge Technical Direction Manual, Bridge Policy Circulars
  - RMS Standard Drawings
  - RMS Bridgeworks QA Specifications
  - ASA and TfNSW Standards and Guidelines
- Reference to Austroads – Guide to Road Design 2016

1.2.2 Design Loading

Design loads are listed in the Table 5-1.

Table 5-1 Design loading

Load group	Detailing	Design Value	Reference
Dead Load	Superimposed wearing surface	22 kN/m3	AS5100-2017
	Steel	77.0 kN/m3	
	Reinforced concrete (precast)	26.5 kN/m3	
	Reinforced concrete (in-situ)	26.5 kN/m3	
Live Load	Road Traffic	SM1600, heavy load platform HLP 320	
	Braking Force	Single vehicle stopping Fbs = 0.45Wbs (200 kN <Fbs<720 kN) Multi-lane moving traffic Fbm = 0.15 Wbm	
Pedestrian, cyclist path and maintenance traffic		As per AS5100.2-2017	
Bridge Barrier impact loads	Medium level performance barriers	As per AS5100.2-2017	
Minimum lateral Restraint	Superstructure-at any point, and any angle between horizontal and vertical	500 kN or 5 % of Superstructure DL, whichever is greater.	
Fatigue load effects		Determined from 70% of the effects of a single A160 axle or 70% of a single M1600 moving traffic load, without UDL, whichever is more severe	
Earth pressure	Fill density	20 kN/m3	
Surcharge load	General UNO	20 kPa	
Thermal Effects	Max. Shade Air Temp Min. Shade Air Temp	44 °C (Region II – inland) -1 °C (Region II – inland)	
Shrinkage and Creep, and Prestress effects		As per AS5100-2017	
Ground water		As per AS5100-2017	
Loads result from water flow and its related actions		As per AS5100-2017	
Wind load		As per AS5100-2017 with reference to AS1170.2-2011	
Road signs and lighting structure		As per AS5100-2017	
Seismic effect	Earthquake	As per AS5100-2017 and reference to AS1170.4-2007	

1.3 Alignments and cross section

5.1.1 Vertical alignment

Vertical alignment is intended to be on single longitudinal fall from 0.2 % to 0.47 %. The constant grade simplifies the design for bridge and benefits stormwater drainage. Where there is a minor change between vertical curve and constant grade fall (e.g. Road D), the design surface level will be accommodated through varying the girder slope and concrete deck slab thickness as required.

Vertical alignments for each road option have been selected to position the girder soffit at least 500 mm above design flood level. For the purpose of this assessment, flood levels have been adopted based on hydraulic information provided by DRC targeting 5% AEP (20 year) immunity. From the flood events contained in the provided information, soffit levels have been based on the 5 % AEP (20 year ARI) event in the Macquarie River in combination with backwater effects from a 20 % AEP (5 year ARI) concurrent event in the Talbragar River.

5.1.2 Horizontal alignment

Horizontal alignment has been considered such that the whole bridge for each option can be on a straight alignment where practical. This significantly reduces the cost of the bridge along with the complexity of both design and construction. Straight alignment of the bridge improves the safety and amenity for road users with increased sight distances. Future development, structure upgrades or replacement will also be easier with a straight bridge.

However, a curved alignment across the bridge in Option B has been adopted to better suit the approaching local road system. The bridge in this case lies on a 210 m radius curve. Despite its challenges to both design and construction, this is considered to provide a lower social impact and interfaces with the surrounding are to present an improved overall solution for this alignment.

5.1.3 Cross section

The bridge cross section requires sufficient width to suit the approach road cross sections. The proposed cross section composition is as follows (and as noted in Figure 4-2):

- 0.53 m medium performance level barrier.
- 1.5 m road shoulder.
- 2 x 3.5 m road traffic lanes (increased to 3.8 m on curve).
- 1.0 m road shoulder.
- 0.53 m medium performance level barrier.
- 2.8 m pedestrian footpath.
- 0.24 m pedestrian safety barrier.
  - Overall bridge's width = 13.6 m for straight alignment.
  - Overall bridge's width = 14.2 m for 210 m Radius curve where each traffic lane is widen by 0.3 m, i.e. Option B.

1.4 Structure options selection criteria

As part of the options development, the following requirements were considered when determining appropriate options:

- Durability and serviceability.
- Aligned with Specifications/ directions, manual guidelines by RMS.
- Meet the hydrology level (20 years ARI Flooding level) and minimize permanent obstructions to waterway as far as practical.
- Safety during construction and throughout the asset's service life.
- Economical solution.
- Low maintenance frequency and repair cost.
- Constructability.
- The complexity and quantity of substructure and foundation elements.
- Limit the construction within the waterway.
- Adverse impacts on the surrounding local area and traffic should be avoided.

5.2 Superstructure options

Seven (7) prospective types of girders have been identified for consideration for Dubbo South Bridge. A discussion of the advantages and disadvantages of each follows below.

5.2.1 Type 1 – Suspension bridge

The total required river crossing length is approximately 220 m, 120 m, and 100 m for Option A, C and D respectively. A suspension bridge has the advantage of achieving clear spans of these lengths and makes a landmark statement. However, this option has been eliminated in this instance noting the following disadvantages:

- Capital cost will be much higher compared to shorter simply supported beam alternatives.
- Relatively high maintenance costs due to accessibility and difficulty to complete maintenance. This also reduces the number of contractors that can undertake this type of work.
- Whole superstructure is inflexible for future development if there is a need for road expansion.
- Significant footing challenges on alluvial soils.
- Construction complexity and time required.
- Sensitivity to earthquake, wind actions, traffic load dynamics, vibration and fatigue requiring a highly specialised treatment.

A suspension bridge option is not recommended in this situation.

5.2.2 Type 2 – Cable stayed bridge

Cable stayed bridges can cross a large span so that the numbers of piers is minimised. The advantages of cable stayed bridges, like suspension bridges, are that they have a unique aesthetic advantage but provide improved durability, stability and safety. However, this option has been eliminated in this instance noting the following disadvantages:

- Capital cost will be much higher compared to shorter simply supported beam alternatives.
- Relatively high maintenance costs due to accessibility and difficulty to complete maintenance. This also reduces the number of contractors that can undertake this type of work.
- Whole superstructure is inflexible for future development if there is a need for road expansion.
- Significant footing challenges on alluvial soil.
- Construction complexity and time required.
- Onerous tower structure foundation required with potential significant impact on waterway.

A cable stayed bridge option is not recommended in this situation.

5.2.3 Type 3 – Integral bridge

An integral bridge has the advantage of improved stability of substructure along with reduced jointing and maintenance costs through fixing the superstructure and substructure elements together. However, this option has been eliminated in this instance noting the following disadvantages:

- Capital cost will be higher compared to simply supported beam alternatives.
- Issues with differential settlement between abutment and approach stiffness compatibility.
- Complexity of construction and adequately allowing for movement.
- The proposed bridge lengths exceed the maximum length permissible (70 m) under RMS' Bridge Policy Circular BPC2007/05 – Design of Integral Bridges.

An integral bridge option is not recommended in this situation.

5.2.4 Type 4 – Steel girder or composite steel-concrete girder bridge

Steel superstructures allow for a lighter weight, cheaper construction. However, this option has been eliminated in this instance noting the following disadvantages:

- High maintenance requirements throughout life of asset, require re-coating to achieve 100 year design life or the selection of specialised materials like weathered steel and sophisticated coating systems.
- Susceptibility to vibration, noise, fatigue and corrosion requiring a highly specialised treatment.

A steel bridge option cannot be recommended in this situation without further development of the design to quantify key items that are highly specialised and can influence the cost and maintainability assessment.

5.2.5 Type 5 – Concrete segmental box bridge

Concrete segmental box girders can cross large spans so that the number of piers and waterway obstructions are minimised. Concrete construction provides improved durability and reduced maintenance requirements during the asset's life. Continuous superstructures reduce jointing and maintenance costs. However, this option has been eliminated in this instance noting the following disadvantages:

- Capital cost will be higher compared to simply supported beam alternatives.
- Construction time and specialised trade requirements will be higher compared to simply supported beam alternatives.
- Requires a higher road level with associated approach embankment height to interface with greater structure depths required, particularly at supports to provide adequate shear and negative moment capacity.

A concrete segmental box option is not recommended in this situation.

5.2.6 Type 6: Simple supported precast prestressed concrete super-t girder

Prestressed concrete Super T girders are a widely adopted simply supported girder system for 18 to 37 m spans in road bridges. Girders are prestressed precast concrete that are constructed and transported to site as discrete elements. Multiple girders are placed side by side with a concrete deck slab cast in place to tie the girders together for each span. The system is cost effective and allows for rapid construction.

Key benefits of this type include:

- Simple and standard construction accessible to tier 1 and 2 contractors.
- Robust elements of concrete construction for reduced maintenance over asset's life.
- Simple support arrangement and load transfer to substructure.

A key disadvantage of this system is the more limited span lengths resulting in a greater number of piers. However this could be mitigated by a strategic location of the piers in the low flow areas.

This type of structure is recommended to be pursued for this application and is discussed in further detail in Section 5.3.

5.2.7 Type 7: Precast prestressed voided concrete plank

Prestressed voided concrete planks are a widely adopted simply supported girder system for 7 to 18 m spans in road bridges. Girders are prestressed precast concrete that are constructed and transported to site as discrete elements. Multiple girders are placed side by side with a concrete deck slab cast in place to tie the girders together for each span. The system is cost effective and allows for rapid construction.

Key benefits of this type include:

- Simple and quick construction.
- Robust elements of concrete construction for reduced maintenance over asset's life.
- Simple support arrangement and load transfer to substructure.

A key disadvantage of this system is the more limited span lengths result in a greater number of piers. This could be mitigated by a strategic location of the piers in the low flow areas but still requires installation of piers in the main waterway.

This type of structure is recommended to be pursued for this application and is discussed in further detail in Section 5.3. A combination of Types 6 & 7 could also be considered so that the Super T spans are reserved for the main river crossings and the planks for the low flow areas

5.3 Superstructure

Based on the superstructure girder options assessment in Section 5.2, two (2) options have been deemed suitable for further selection refinement based on the defined selection criteria.

- Super-T girders.
- Voided plank.

5.3.1 Option 1 – Super-T (preferred)

Super T girders are available in a range of depths. Based on our experience, the 1515 mm deep girder section paired with a minimum 200 mm thick deck slab is likely to be the most practical and cost effective arrangement. This outcome is based on balancing several criteria including maximising clear span, transportability, weight for lifting, stability during construction, cost and limiting approach embankment works.

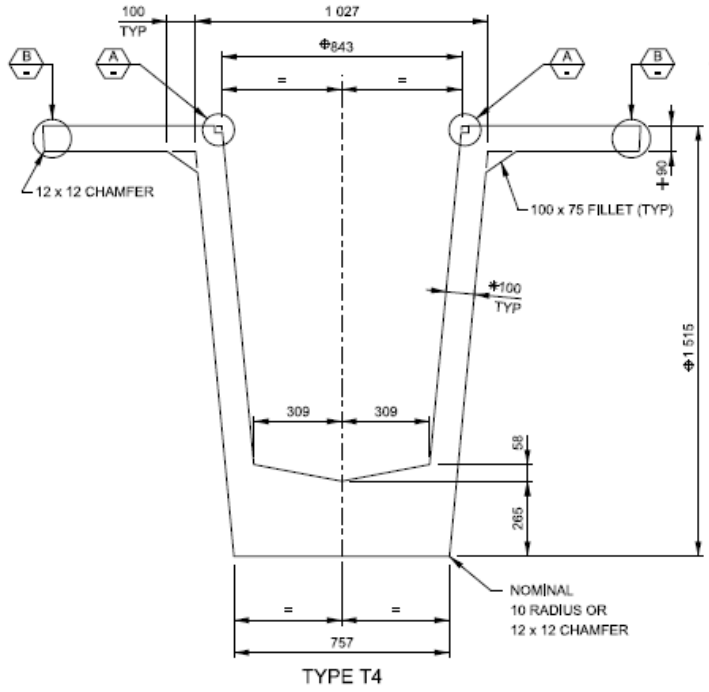


Figure 5-1 1515 mm Super-T Girder section

Based on economic and technical considerations, the recommended range of spans for the 1515 Super-T is from 25 to 33 m (maximum allowed by RMS). The maximum 33 m length has been adopted to apply to this project in order to minimize the number of piers in the waterway. Shorter spans with the same section are proposed to manage the abutment locations whilst maintaining visual amenity and simplify detailing.

The total depth of super structure is calculated as following:

- Asphalt surface layer = 75 mm.
- In-situ reinforced concrete deck = 200 mm.
- Depth of Super–T type 4 = 1515 mm.
- Level difference due to Cross fall computed from design surface level to lowest point (7.165 m) x 3% = 214 mm.

- Total depth (from DSL to Lowest soffit level) is: 2,004 mm.
- In order to include hogging, construction tolerance, use total depth of 2.1 m for Super-T for concept design development.

The cross section is shown in Figure 5-2 and includes 6 girders with 2.25 m spacing. Span configurations are shown in Figure 5-4 to Figure 5-6 for each road alignment.

The eccentricity between bridge centreline and carriageway centreline is 1.22 m. This causes an unequal load effect distribution to girders, pier and piling. A two-way 3% cross fall has been adopted in the carriageway and single 2.5% cross fall of the footpath. The overall cross fall is made by shaping the headstocks and increased deck thickness in the pedestrian slab. A nominal gap is provided between girder flanges to allow placement and to limit unsupported deck direct carrying loads.

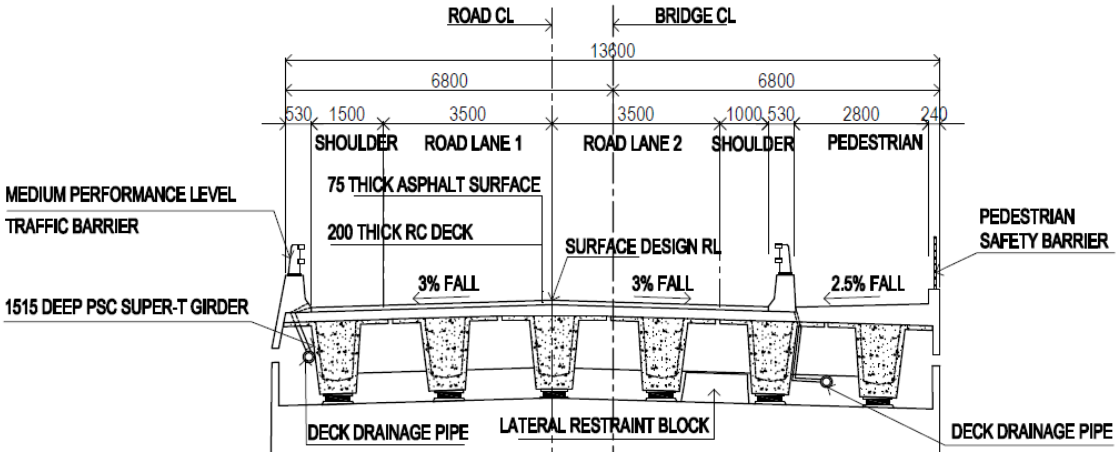


Figure 5-2 Superstructure Option 1 – Cross section with Super-T beams on Road A, C and D

The bridge width has to be wider as a consequence of curving alignment provided in the Road B, e.g. as showed in the Figure 5-3.

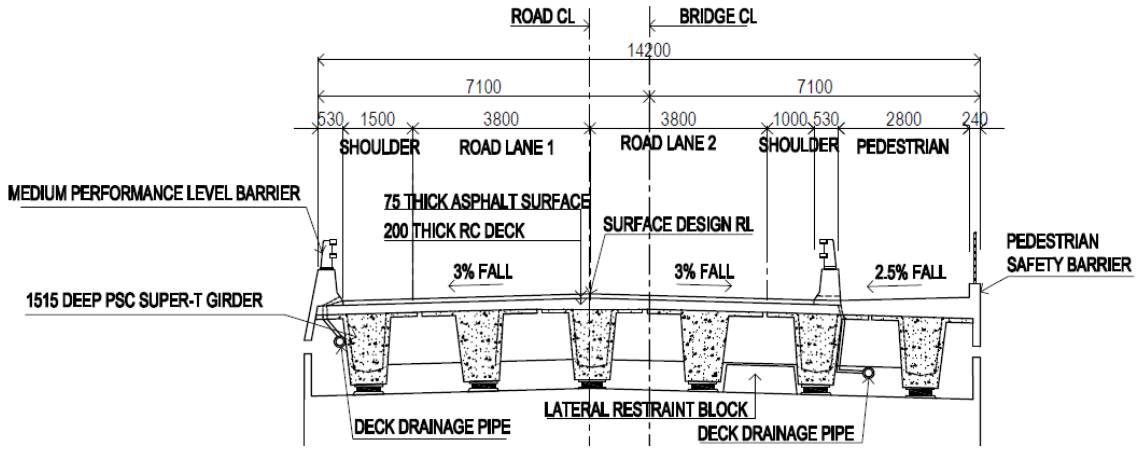


Figure 5-3 Superstructure Option 1 – Cross section with Super-T beams on Road B

Road A

Fitting the Super T structure on the Road A alignment, middle spans will be longer (e.g. 33 m) to minimize the obstruction to waterway, and shorter spans (26.3 m) are used at the ends to limit the total length of the bridge, save capital cost and avoid adverse impacts on community as well as local infrastructure.

Based on geometry of the river bank and surrounding areas along with other local constraints, the proposed configuration for Road A includes 2 x 26.3 m spans and 5 x 33 m spans as shown in Figure 5-4.

Abutment and piers heights as shown are not uncommon and readily designed and constructed.

Figure 5-4 illustrates the spans arrangement using Super – T beams on Road A

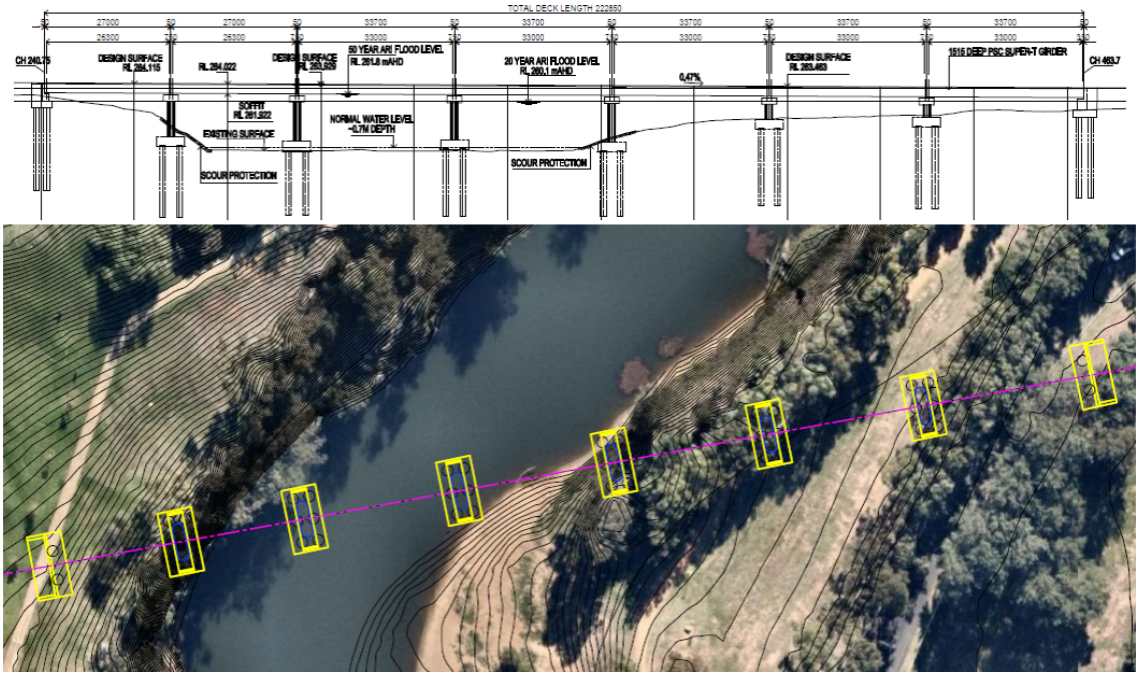


Figure 5-4 Superstructure Option 1 – Span arrangement on Road A

Road C

The proposed bridge for Road C has a total distance of approximately 122 m, comprised of 2 x 33 m central spans and 2 x 26.3 m side spans. This road alignment significantly shortens the bridge length because it crosses a narrower portion of river and the existing ground level to both sides are typically equal.

In order to limit the structure length, the western extent has a high abutment (to Minore Rd) due to the gradual slope of the existing ground level. Treatment of this abutment should be refined during later stages of the design development. Solutions may include a high abutment wall, spill through batter, separate retaining wall or extending the bridge length.

Abutment and pier heights as shown are not uncommon and readily designed and constructed.

Concept arrangement of spans on Road B is depicted in the Figure 5-5.

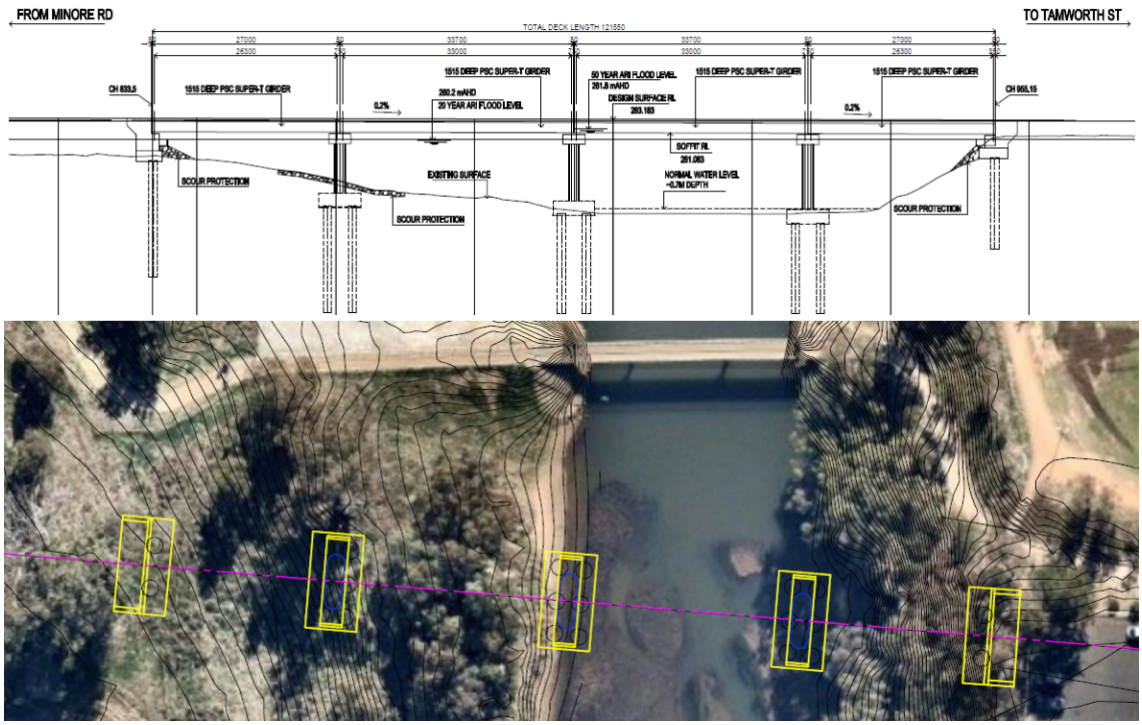


Figure 5-5 Superstructure Option 1 – Span arrangement on Road C

Road D

The proposed bridge for Road D is the shortest with only 3 spans of 33 m. Besides the economic benefit of limited length, this arrangement also has the least obstruction of the waterway. The height of substructure is reasonable, the construction time will be also be the shortest in comparison with other alignments.

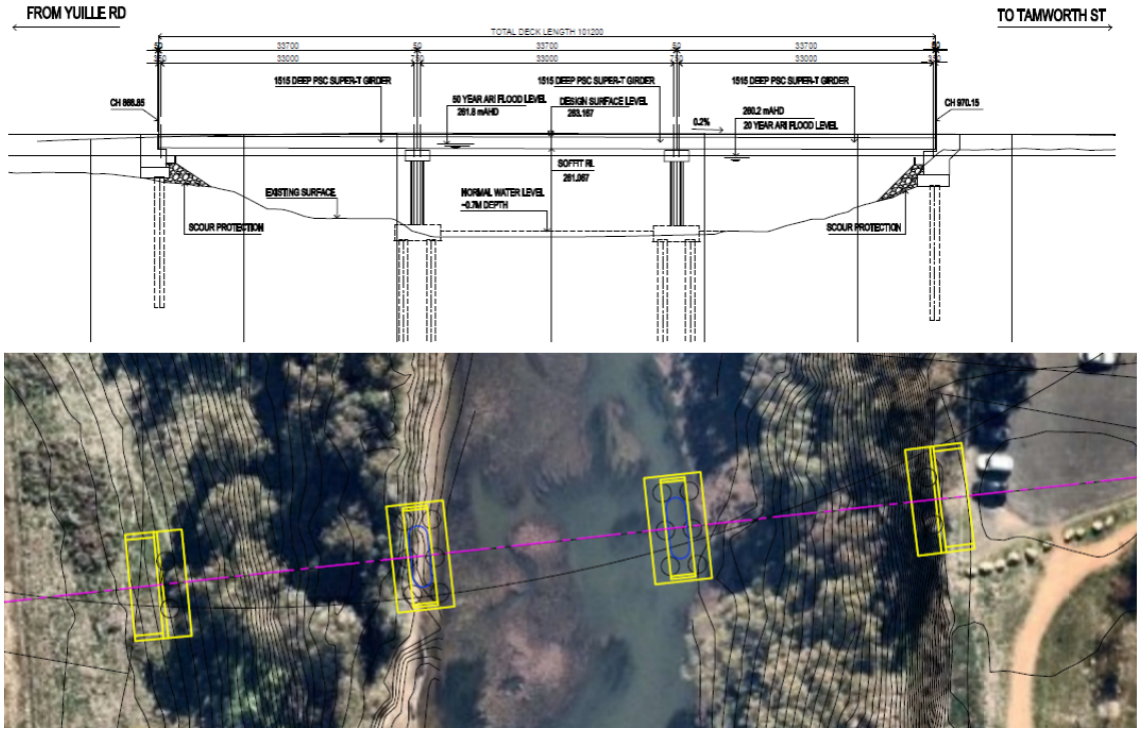


Figure 5-6 Superstructure Option 1 – Span arrangement on Road D

Road B

Road B places the bridge on a curve, i.e. 210 m radius. Hence, the bridge has 4 spans with the note that the design of span which is closest to the bridge's centreline is 30 m, enabling longer spans of edge beams at the outside of curve that do not exceed the typical maximum 33 m span of the 1515 mm deep girders. The curved arrangement, whilst more complex for the bridge, accommodates more favourable overall project outcomes such as improved road geometry and sight distances.

Figure 5-7 Superstructure Option 1 – Span arrangement on Road B

5.3.2 Option 2 – Voided plank

The suggested superstructure for Option 2 is a 600 mm deep Precast Prestressed Concrete Voided Plank (typical spans of 15 m, and 16 m, considering the longer span outer girders of the curved bridge on Road B). Figure 5-8 shows the typical cross section of a void plank that suits these desired spans.

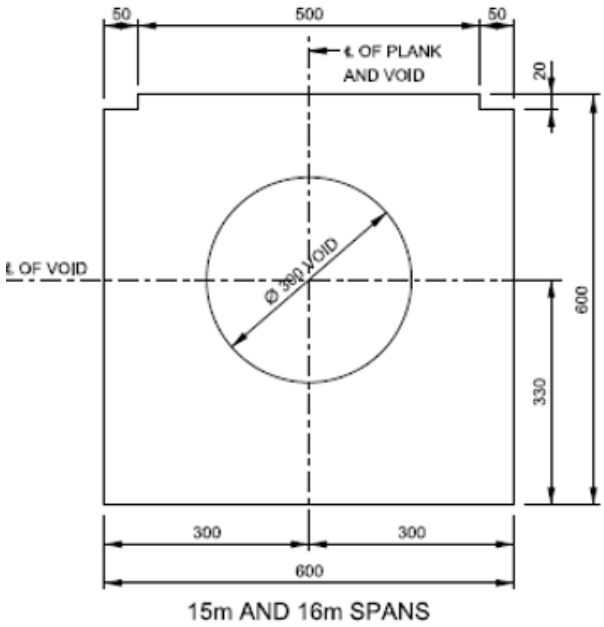


Figure 5-8 Typical RMS precast pre-stressed planks

Advantages

- Voided planks have lower structure depth.
- The soffit level can be above the 50 year ARI for most of the same proposed road alignments, thus improving flood immunity and limiting risk of debris loading and damage.
- Lighter compared to other girder types, and therefore facilitate transport and lifting by smaller machinery or with larger reaches and less crane moves.
- They are inherently more stable and require less temporary support.

Disadvantages

- Savings in foundation costs can be realised due to less load per pier with shorter spans however more piers are required which likely will have a net increase in foundations and impact on waterway performance.

Figure 5-9 shows the proposed bridge cross section where 16 spaced voided planks are situated with nominal gaps between planks of 270 mm.

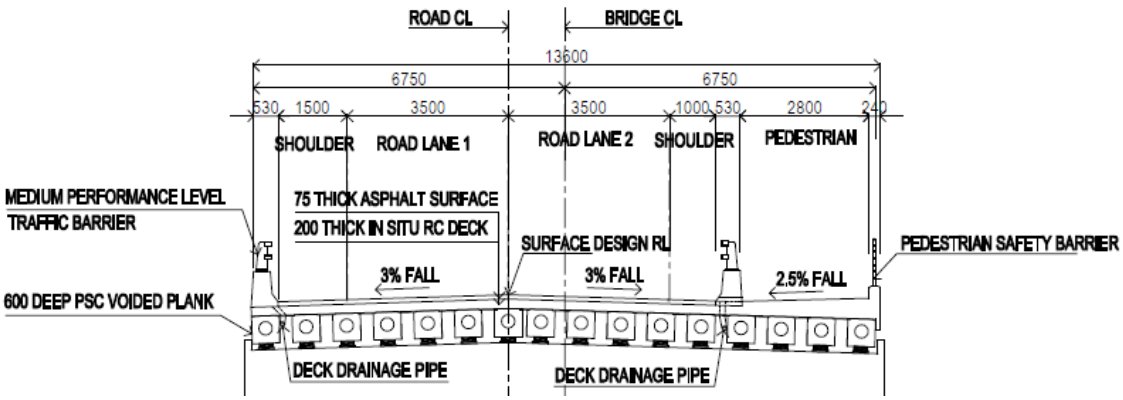


Figure 5-9 Superstructure option 2 – Cross section with Voided planks – bridge on road Option A, C, and D

Due to effects of road horizontal curve the two traffic lanes through the bridge on Option B would be widen as shown in the Figure 5-10.

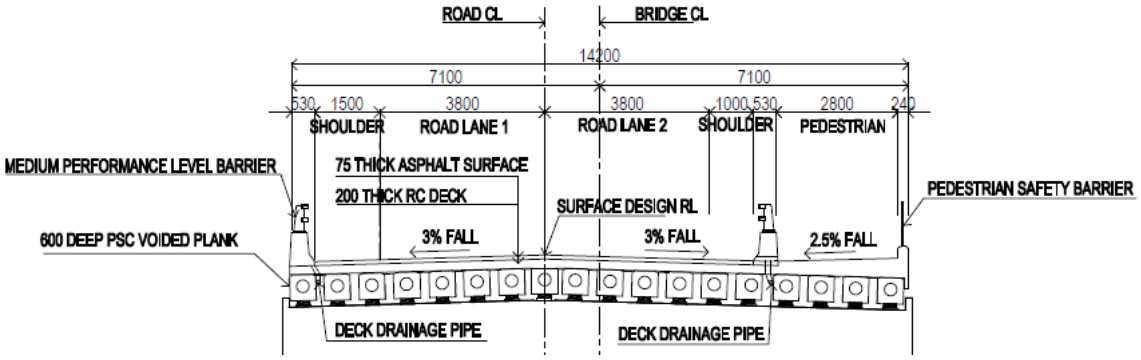


Figure 5-10 Superstructure option 2 – Cross section with voided planks – wider bridge on road B

Span arrangements for plank span configurations are shown below for each road alignment. It is noted that the voided planks require significantly more spans and piers to provide the required waterway opening.

Road A

The bridge on Road A includes 15 spans, 14 piers (5 located in the waterway).

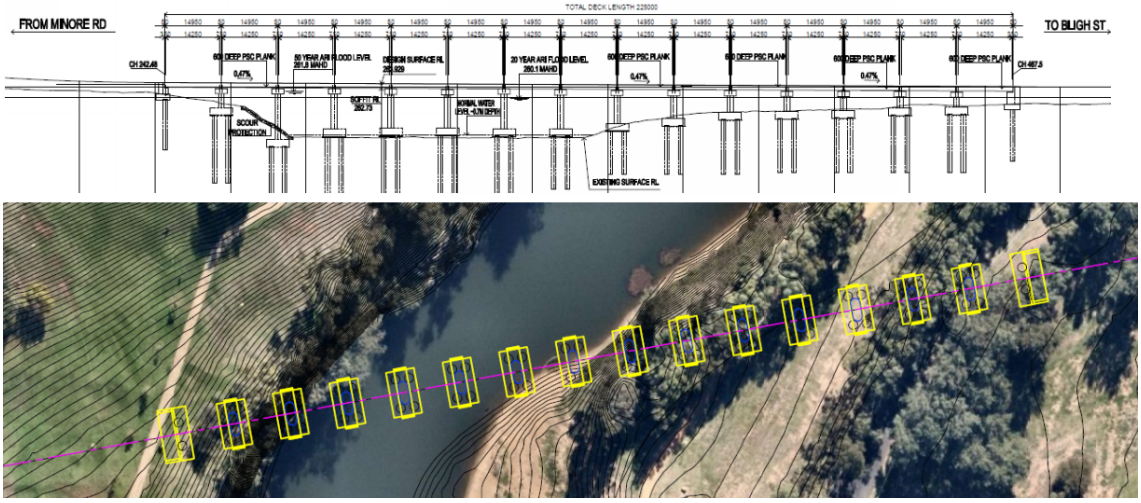


Figure 5-11 Superstructure option 2 – Span arrangement on road A

Road C

The bridge on Road B includes 8 spans, 7 piers (4 located in the waterway).

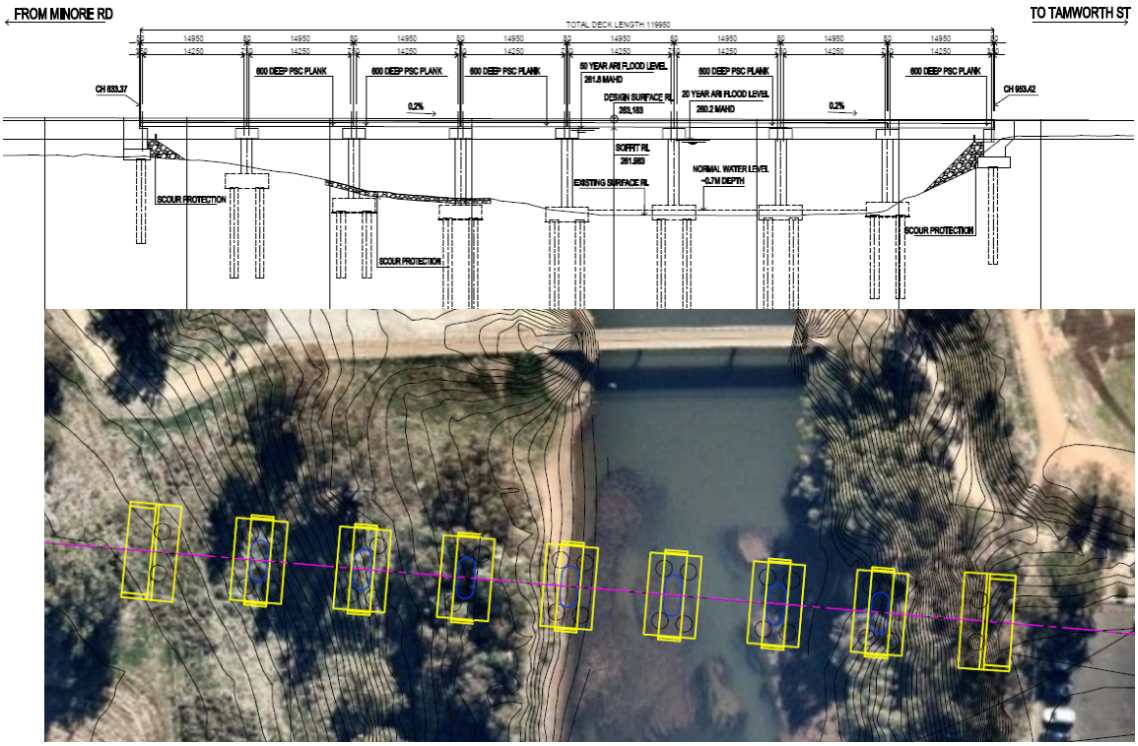


Figure 5-12 Superstructure option 2 – Span arrangement on road C

Road D

Despite being located at the narrowest portion of Macquarie River when compared to other options, 7 spans are still required for the bridge on Road D.

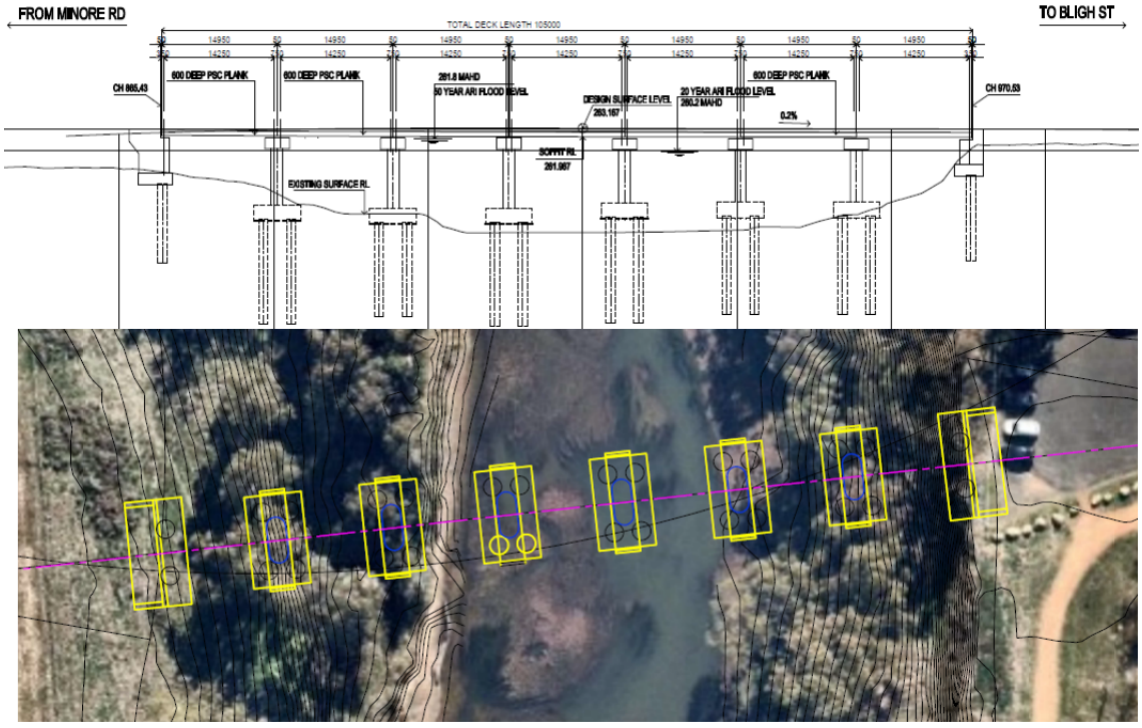


Figure 5-13 Superstructure option 2 – Span arrangement on road D

Road B

The bridge on Road B includes 8 spans, 7 piers (4 located in the waterway).

Figure 5-14 Superstructure option 2 – Span arrangement on road B

5.4 Superstructure option comparison and recommendation

Table 5-2 provides a comparison between the two progressed superstructure options regarding the main selection criteria noted in Section 1.4.

Table 5-2 Compare the most prospective superstructure options

Comparable criteria	Option 1 – 1515 mm Super-T girders	Option 2 – 600 mm Precast prestressed voided plank
Durability	Precast prestressed concrete elements are durable over the design life. Prestressing provides higher stiffness, higher bending capacity and the possibility to achieve control of hogging/sagging during each step of construction. Main durability issue is cracking during transfer of prestress. This is a known issue, easily managed during design and with experienced manufacturers. Reinforced concrete substructure easily able to provide design life requirements.	As per Option 1
Maintenance	Reinforced concrete structure is very durable and less likely to fail due to corrosion. The frequency of maintenance is less than a steel structure.	Same as option 1.

Comparable criteria	Option 1 – 1515 mm Super-T girders	Option 2 – 600 mm Precast prestressed voided plank
Serviceability	Deflection throughout the service life can be assessed and accounted for during design.	As per Option 1
	Larger room between girders that can make it easier to inspect or repair the girders	Limited gap between beams (270 mm) makes inspection and repair more difficult.
	Because the bearing is high, it is possible to inspect and replace bearings when needed.	Lower bearing makes replacement of bearings and beams more difficult.
Provides freeboard above 5% AEP flood (20 year)	Yes	Yes
Provides freeboard above 2% AEP flood (50 year)	No	Yes – ranging from 0.2 m to 0.6 m across road options.
Waterway obstructions	Because Super T has a larger span (33 m), it significantly reduces (by half) pier numbers within the waterway compared to the plank option. Possible to adopt pier arrangement to minimise excavation work, under water work with temporary formwork, sheet piling or adopting through piles without pile caps.	Shorter spans result in more piers in the waterway. Increased partial blockage of waterway during construction and increased number of permanent blockages during service. May lead to long term erosion around the riverbank or increased afflux. Possible to adopt pier arrangement to minimise excavation work, under water work with temporary formwork, sheet piling or adopting through piles without pile caps.
Construction within the waterway	Longer spans results in less piers in the waterway. Heavier girders require larger cranes to allow lifting of river spans or crane to be set up in waterway.	Increased number of piers in the waterway. Lighter girders may allow for crane to be set up further from the waterway.
Superstructure weight	Approx. 55 t per girder (33 m) 6 girders per span Heavier superstructure leads to larger piling, pile cap and piers' components. Larger crane required especially to achieve required reach for lifts over river. Reduced number of heavier lifts, and oversized girders to transport to site.	Approx. 12 t per plank (15 m) 16 planks per span Approx half deck weight per span per pier but approx. twice as many spans compared to Super-T. Larger number of small lifts required (approx. 5x more lifts compared with Super-T option). Allows for smaller cranes, or to utilise same crane with larger reach. Lighter superstructure is advantageous in reducing the number and/or length of piles, smaller pile cap, smaller cross section.
Commonly available units	Standard beams taken from RMS manual guidelines.	Standard beams taken from RMS manual guidelines.

Comparable criteria	Option 1 – 1515 mm Super-T girders	Option 2 – 600 mm Precast prestressed voided plank
Constructability	Common type of construction. Many instances being implemented throughout the state.	Lightweight elements are easy to transport. Common type of construction. Many instances being implemented throughout the state.
Construction timing	Less spans, piers and, girders so likely to have faster construction time.	The more spans, more lifts per span, more components to manufacture and more substructure to construct expect to lead to a longer construction time.
Adverse impacts on the surrounding local area	Fewer girders to deliver to site. Girders would require oversize vehicles Fewer piles to install. Faster delivery project means fewer impacts on environment and community.	More planks to deliver to site. More piling to install. More time in waterway. Slower delivery project means prolonged impact on environment and community.
Foundations	Foundation loads approx. twice that of plank option, however half as many piers required. Pile diameter expected to be larger with similar number of piles compared to plank option. Likely similar rig required to install. Larger pier columns required to carry larger load. Increased impact on waterway per location, less locations required. Net better performance. Expect cost of larger elements would be comfortably offset by the reduced number of setups required.	Lighter foundations expected, however twice as many piers required. Likely similar rig to install piles. Larger number of setups required and notably more in waterway. Thinner pier columns possible but likely governed by slenderness in waterway. Expect higher number results in net larger foundation costs.
Preferred option	**Option 1 – Super T is recommended**	**Not recommended**

5.5 Substructure

As discussed in Section 1.1, due to insufficient geotechnical information at this stage, detailed comparison between potential substructure types will not be discussed in this report. The following sections discuss the main features of some likely substructure options.

Reinforced concrete abutments with spill through batters are considered most appropriate for this application and are assume to be adopted across all options. As such, abutments will not be discussed further. There are potential alternate options available, such as the use of reinforced soil walls, which could be considered during later design development should a constraint be identified e.g. clearances, property acquisition and excessive scour protection requirements.

Below, “substructure” refers to piers and their foundations. Each option is applicable to all piers and road alignment options.

5.5.1 Option A (preferred)

Option A comprises an in-situ reinforced concrete headstock directly connected to 3 bored piles without pile caps. An illustration can be found in Figure 5-15.

The main advantage of this option is that there is no need to construct pile caps within the waterway, and temporary structures are eliminated. This solution reduces the obstruction within the waterway and debris getting stuck around the structure, reducing the possibility of river bank scour.

The main disadvantage is column slenderness. Pile size typically needs to be larger in order to satisfy design code requirements for forces due to water flow, debris, earthquake, braking etc. Pile tolerances become a consideration and are typically managed with a section diameter change nominally below ground level with the above ground portion constructed as a formed column.

There is typically a significant cost and time advantage and construction risks are avoided or mitigated significantly. Excavation and/or below water work is minimised and time is saved by not requiring piles caps to be formed, poured and cured before building columns.

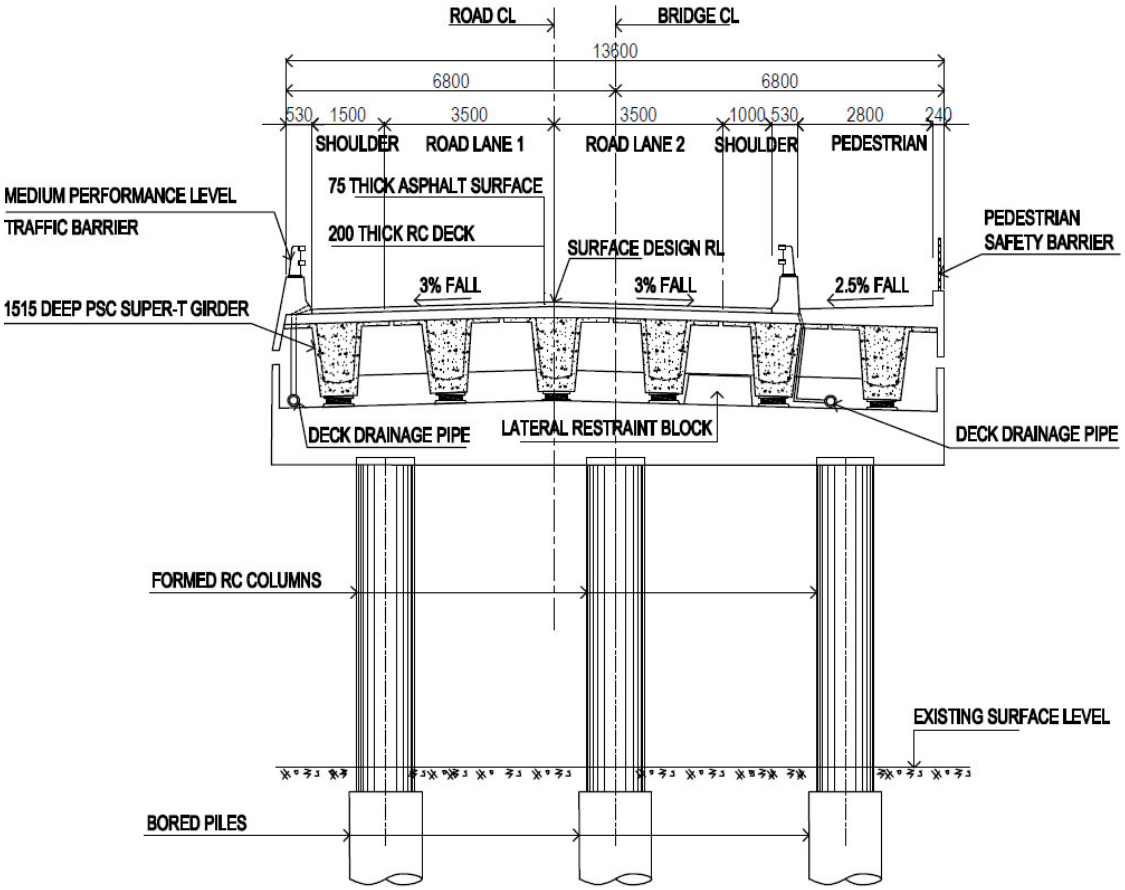


Figure 5-15 Substructure option A

5.5.2 Option B

Option B is a common form of construction due to its efficiency and flexibility. This option includes a cast in-situ reinforced concrete headstock supported by 2 columns, constructed on top of an in-situ pile cap and bored piles to provide a durable foundation (Figure 5-16).

Pile caps in the waterway should typically be nominally exposed above normal water level for navigational visibility. Pile caps outside the waterway should be nominally placed 500 mm below ground level to maximise usable land and improve aesthetics.

Option B allows for efficient pile designs utilising push/pull action and reduced element effective lengths to improve buckling issues. Pile caps accommodate pile tolerances and provide a solid base for construction of columns and headstocks with greater accuracy and can resolve issues with the offset between bridge and road centrelines.

Unlike Option A, this foundation type requires work under water level and below ground level. Excavation and dewatering are required. Impacts may be minimised through scheduling activities during drier periods.

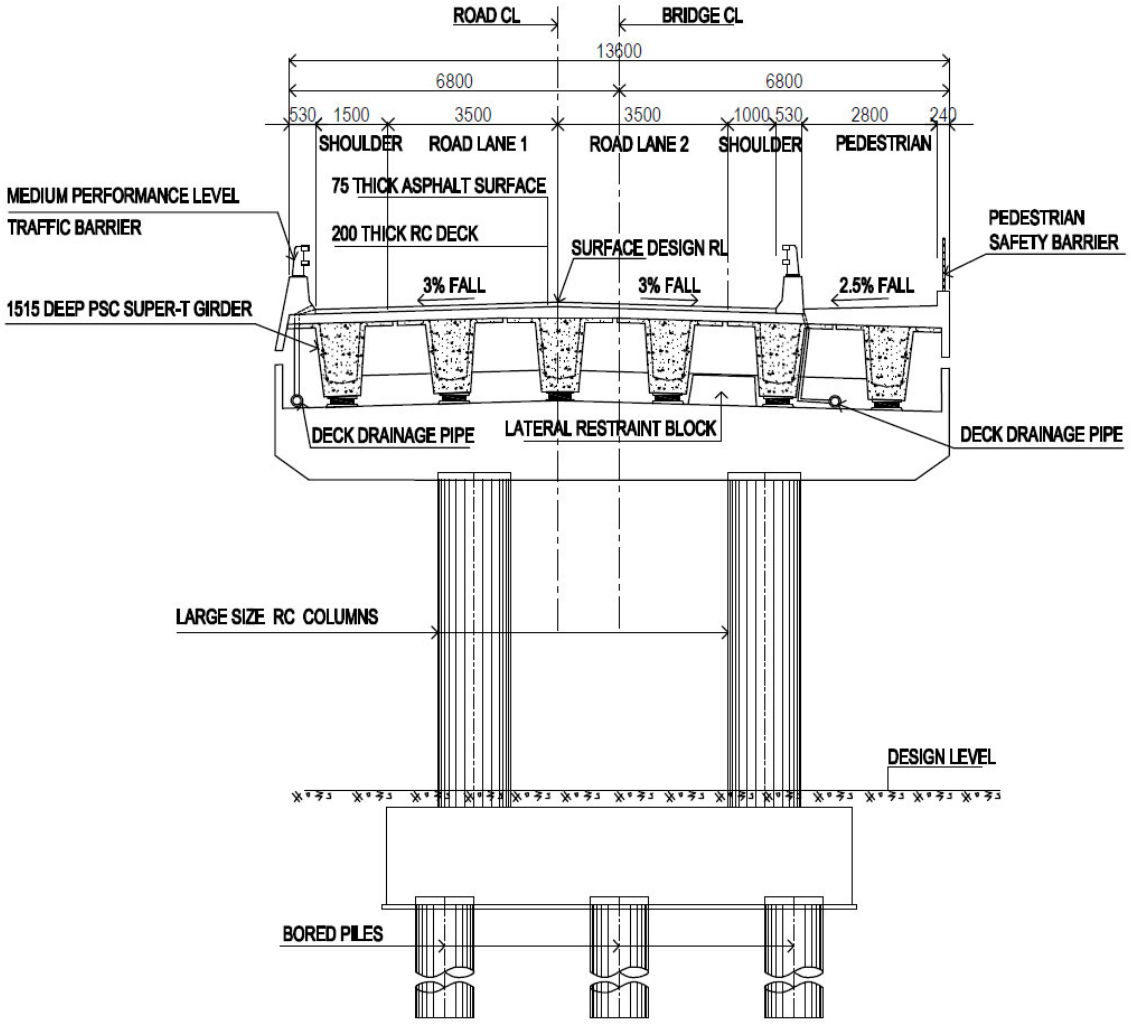


Figure 5-16 Substructure option B

5.5.3 Option C

Option C is similar to Option B except a larger single cast in-situ reinforced concrete column is adopted. This option can provide an alternative aesthetic to the bridge substructure appearance. Any bending moment due to offset between bridge and road centreline offset may challenge this design. The single column is often profiled to improve hydraulic performance in the waterway. Figure 5-17 shows a common arrangement.

Like Option B, pile caps are typically located nominally above normal water level in the waterway and nominally below ground level elsewhere. As such, excavation and dewatering are also required with this option.

The main disadvantage of this arrangement is that pier bodies have heavier weight resulting in higher loads on the piling structure. The need for formwork adjustment due to the variable pier cross sections may also cause constructability issues.

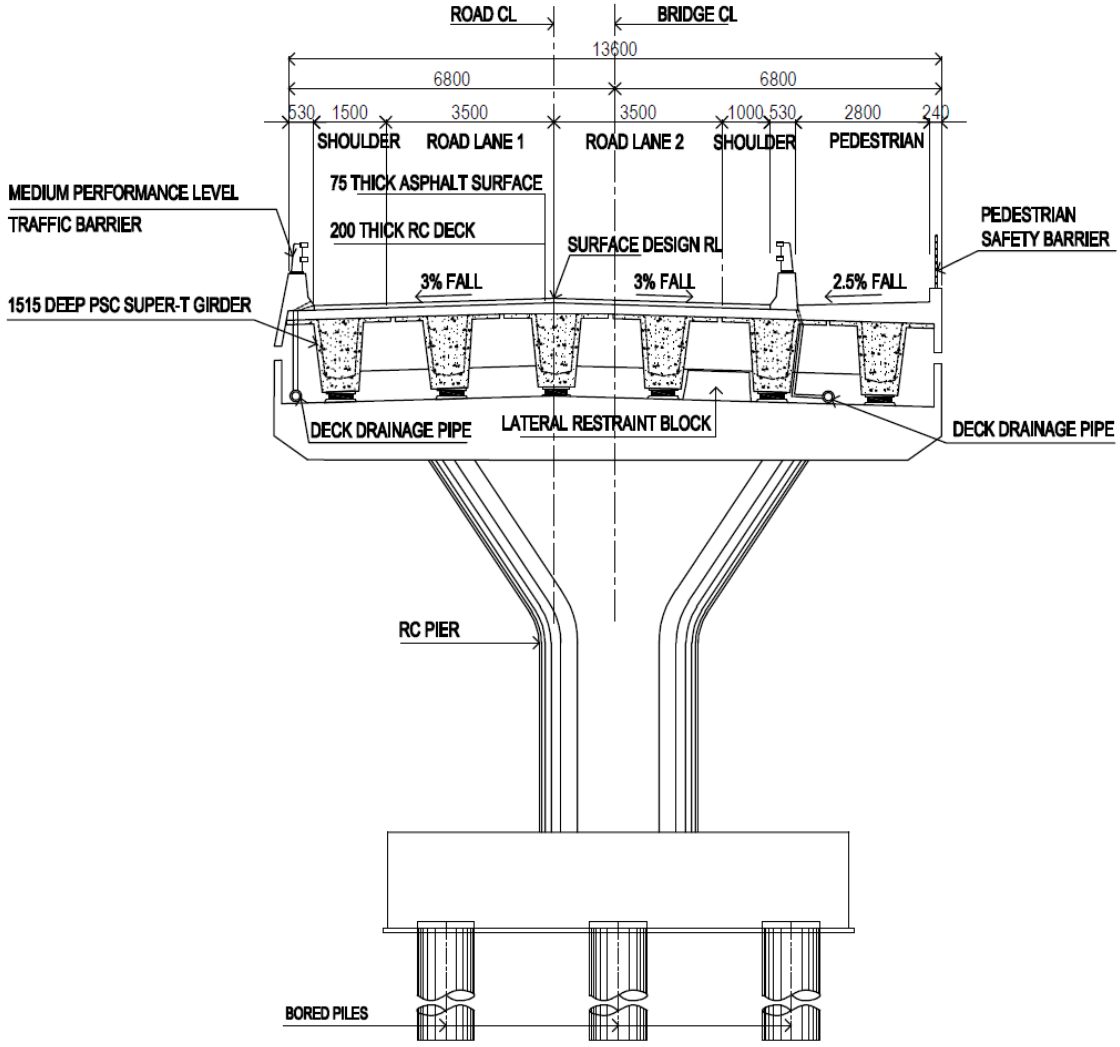


Figure 5-17 Substructure option C

5.6 Conclusion for structure and concept design development

5.6.1 Conclusion for preferred option of bridge type

- **Superstructure**: Option 1 – Precast prestressed Concrete Super-T girders (1515 mm deep).
- **Substructure:** Option A is likely to be preferred given the speed of construction and the cost saving associated with removal of pile caps. However, further consideration will be required in future design development stages once more detailed geotechnical and hydraulic assessments can be undertaken.

6. Strategic cost estimates

6.1 Basis for cost estimates

All cost estimates in this report have been prepared for the purpose of the Dubbo South Bridge strategic concept options report, and must not be used for any other purpose.

The cost estimates are preliminary estimates only and have been developed solely for the purpose of comparing and evaluating different options and may not have been fully scoped. Actual prices, costs and other variables may be different to those used to prepare the cost estimate and may change.

Unless as otherwise specified in this report, no detailed quotation has been obtained for tasks identified in any future construction project. GHD does not represent, warrant or guarantee that the works/project can or will be undertaken at a cost which is the same or less than the cost estimate.

The cost estimates have been prepared using information reasonably available to GHD and is based on assumptions and judgments made by GHD including no allowance for DRC costs (which include but are not limited to costs associated with staffing, project management, supervision, contract management, tendering, approvals, associated works, etc.) to undertake the work and that all work is undertaken in the quickest and most efficient manner without delays for reviews, procurement, installation and shutdowns.

It shall be recognised that the options described within this report are of a specific nature, and much of the work would need to be conducted remote to major cities. As such, associated uplifts to the typical unit rates / costs may apply. The use of regional indices has been allowed for within the cost estimate to address this matter.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected at the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the estimation and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

6.2 Strategic budget capital cost estimates and comparative assessment

Preliminary cost estimates have been prepared on the various route alignment options described in the strategic options development. The strategic costs for these options have been allocated a preliminary risk contingency of 30 % which is used by RMS and other road authorities at this stage of design development.

As discussed throughout the report, we have made a number of assumptions in arriving at these estimates. It should be noted that no comparative cost estimate for the investigated bridge types (i.e. Super-T vs Plank) has been undertaken, with a per square meter rate used for the preferred Super T option. We have made no allowance, other than directly at the bridge location, for any river excavation, shaping or protection up or down stream from the new structure.

A summary of the capital cost estimates can be found in Table 6-1. The full detailed cost estimates can be reviewed in Appendix D.

Table 6-1 Strategic budget capital cost estimates

Item	Description	Route Option A	Route Option B	Route Option C	Route Option D
1	Preliminaries	$2,846,790	$2,955,408	$2,693,447	$2,106,901
2	Roadworks	$7,320,169	$13,709,054	$11,549,712	$8,851,874
3	Bridge	$12,816,890	$7,526,590	$7,146,390	$5,694,000
4	Contingency at 30%	$6,895,155	$7,257,316	$6,416,865	$4,995,832
	TOTAL PROJECT COSTS	**$28,879,004**	**$31,448,368**	**$27,806,414**	**$21,648,607**

Table 6-2 shows costs associated with project development and delivery costs from planning and design development through to completion of construction. These nominal amounts vary from project to project depending on complexity and any unique circumstances. The nominal percentages chosen are conservative and are expected to be adequate for this project.

Table 6-2 Investigations, approvals, design and project management

Item	Description	Route Option A	Route Option B	Route Option C	Route Option D
A	Site Investigations (Nominal 3% of capital cost)	$896,370	$943,451	$834,192	$649,458
B	REF and approvals (Nominal 0.5% of capital cost)	$149,395	$157,242	$139,032	$108,243
C	Concept and Detail design (Nominal 5% of capital cost)	$1,493,950	$1,572,418	$1,390,321	$1,082,430
D	Contract and Project Management (Nominal 5% of capital cost)	$1,493,950	$1,572,418	$1,390,321	$1,082,430
	TOTAL DESIGN AND MANAGEMENT COSTS	**$4,033,666**	**$4,245,530**	**$3,753,866**	**$2,922,562**

Table 6-3 shows overall project costs, and sums the capital costs from Table 7-1 with the other project costs identified at Table 7-2.

Table 6-3 Total capital, investigations, approvals, design and project management costs

Item	Description	Route Option A	Route Option B	Route Option C	Route Option D
	TOTAL PROJECT COSTS	**$33,912,670**	**$35,693,898**	**$31,560,280**	**$24,571,169**

6.3 Additional commentary and route option comparison

6.3.1 Route Option A

The second most expensive option is mainly a result of the additional bridge length required for this alignment. Earthworks for the roadworks are less than Option C and D. There are also costs for additional traffic control signals required compared to Option C and D. The combination of highest cost and impact on a popular recreation area (Sandy Beach) makes this the least attractive option to pursue.

The main disadvantage of this option is the impact to the Sandy Beach recreational area, with the bridge going through the middle of the precinct.

Figure 6-1 View looking northeast adjacent to new bridge over the Macquarie River

6.3.2 Route Option B

This option is the most expensive however provides an options on the eastern side of the river to access the new bridge via Macquarie Street, or further to the north from Wingewarra Street. When comparing this option to Option C, the route on the western side of the river is very similar, however the eastern route is much longer. In addition the curved bridge presents some technical construction challenges and is less desirable from a design perspective than a straight bridge. Due to the curvature of the alignment in order to achieve design speed, there is some encroachment on to the southern edge of sporting fields on the east side of the river.

6.3.3 Route Option C

This option has relatively similar roadworks costs and slightly higher bridge costs compared to Option D. Signalised intersection works are the same as Option D. The main differentiator between this option and Option D is the route taken through private land to the west of the river. This option minimises impact to the existing land parcel and more closely follows the tree line and minimises land to be acquired.

6.3.4 Route Option D

It appears the least expensive option with the shortest bridge span length, however the highest roadworks costs associated with the longest road alignment. The western tie-in point of Yuille Ct is further South than DRC would prefer.

Comparing the route taken through private land to the west of the river with Option C, this option effectively severs and quarantines the portion of land between the new road and the river. DRC would likely need to acquire the whole parcel of land between the new road alignment and the river.

6.3.5 Route Options A, B, C

With regard to Options A, B and C, it is noted that the connection of the new bridge access road to the intersection of the Newell Highway and Minore Street results in severance of Sir Roden Cutler Park immediately to the east of the BIG4 Holiday Park. Further consideration of provision of an access culvert to this southern portion of the park will be undertaken during further design and community consultation.

Figure 6-2 Routes B and C – view from Newell Highway, looking east with Sir Roden Cutler carpark on left of image.

6.3.6 Budget Considerations

Assuming Council wish to consider all options at this strategic stage, an overall budget of $31.5 million (Capital costs) and $37.0 million (Total Project Costs including investigations, approvals, design development and project management) could be adopted for DRC programming and planning purposes. This figure would be subject to further design, engineering and changes following the receipt and analysis of additional information and the development of a more detailed estimate.

7. Next steps

The development of the strategic concept options has progressed as far as possible without site investigations and the approvals process along with further design inputs to allow detailed design and corresponding more accurate costing information.

We understand that DRC intends to make a Strategic Business Case submission to appropriate Government departments to seek funding for further design development and ultimately bridge construction.

The next steps for DRC are to:

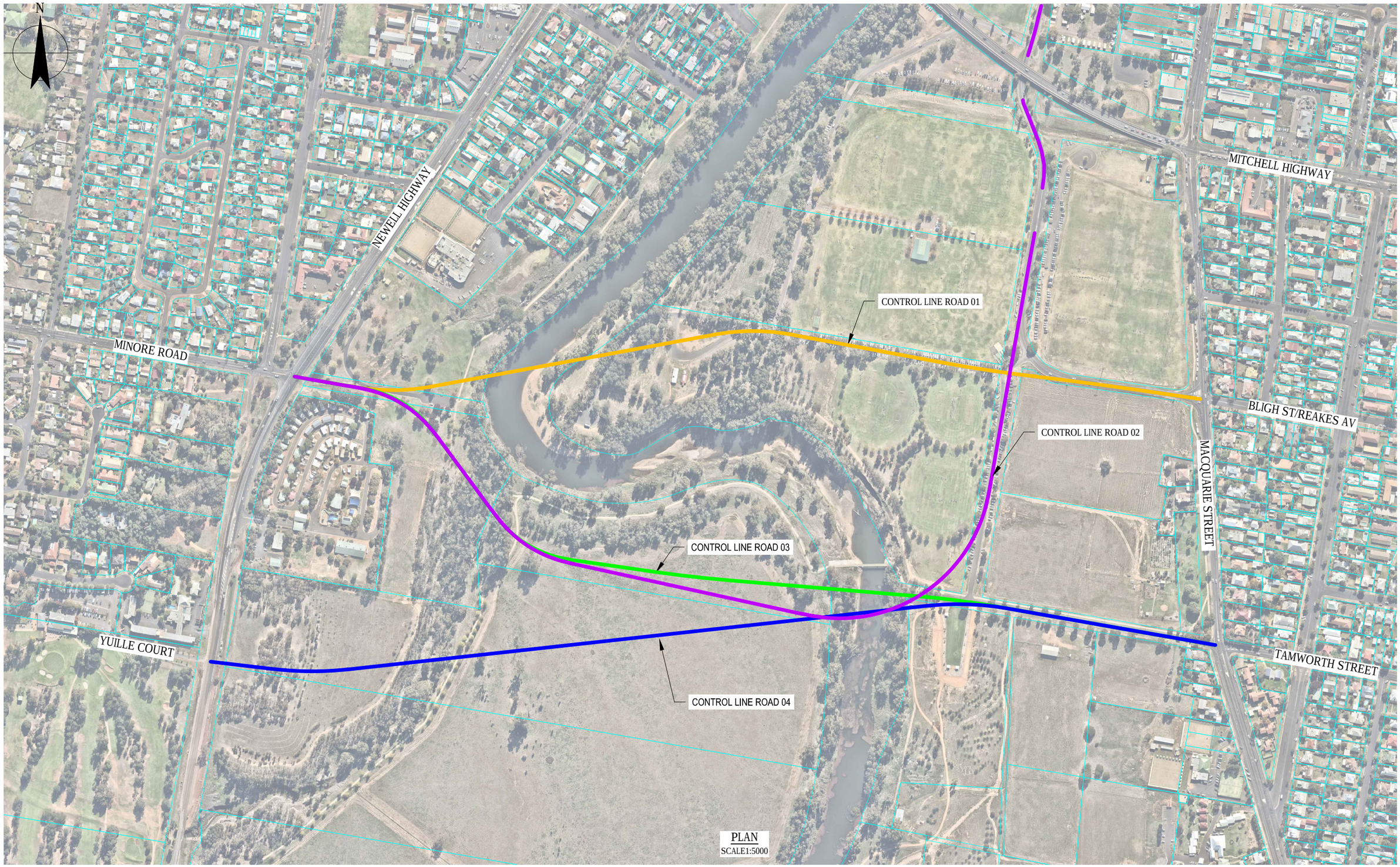
- Adopt this report for community consultation.
- Undertake community consultation.
- Determine a preferred Option alignment.
- Update and adopt current Draft Transport Strategy.

From a technical perspective in terms of progression of bridge design, a successful application for funding would allow the next steps to be undertaken:

- Site investigations.
- REF, approvals.
- Firm the concept and detailed design and cost.
- Detail design and contract documentation.

Appendices

Appendix A - Summary of options comparison



PRELIMINARY

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
B	UPDATED ALIGNMENTS					16.10.19
A	DRAFT ALIGNMENTS FOR DISCUSSION					30.07.19

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SCALE 1:5000 AT ORIGINAL SIZE

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T 61 7 3316 3000 **F** 61 7 3316 3333
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Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client DUBBO REGIONAL COUNCIL
Project DUBBO SOUTH BRIDGE
Title STRATEGIC CONCEPT OPTIONS

Original Size **A3** Drawing No: **22-12511689-SK001** Rev: **B**

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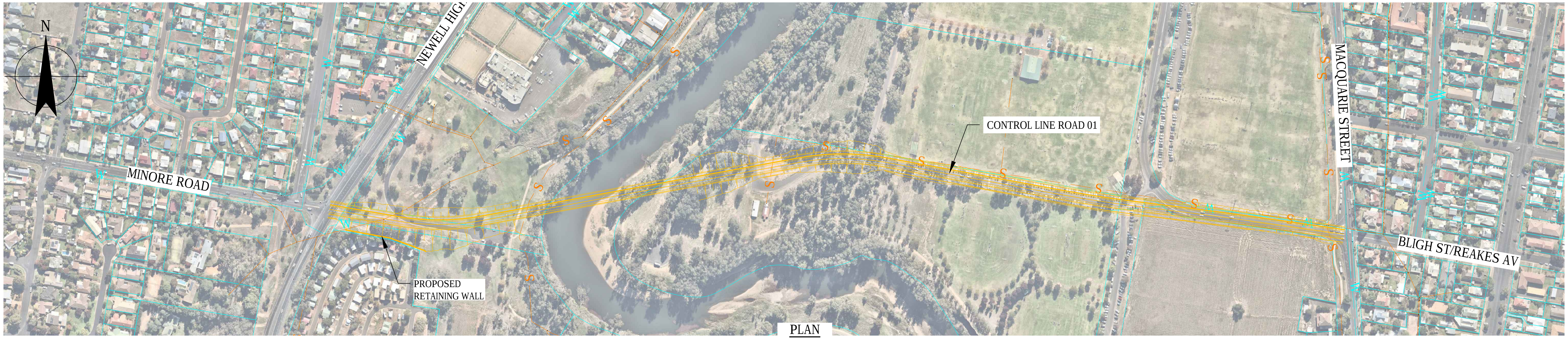

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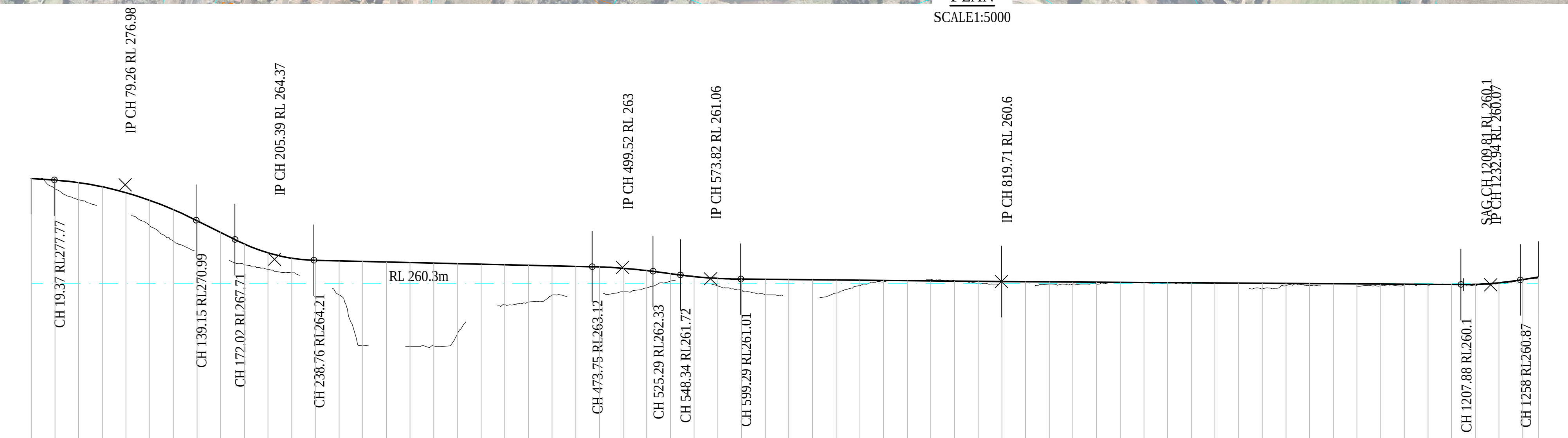

DATUM RL. 229.00

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HORIZONTAL ALIGNMENT: L=85.32m | L=105.80m R=-300.00m | L=399.32m | L=109.27m R=300.00m | L=212.90m | L=103.15m R=-1750.00m | L=55.72m | L=108.94m R=6000.00m | L=92.84m

CHAINAGE	LEVEL DIFFERENCE CUT - / FILL +	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
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20.000	1.44	277.764	276.32
40.000	2.87	277.346	274.47
60.000	3.18	276.638	273.45
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100.000	4.28	274.353	270.07
120.000	5.33	272.775	267.44
140.000	5.35	270.908	265.56
160.000	4.49	268.908	264.42
180.000	3.48	266.954	263.47
200.000	2.81	265.467	262.66
220.000	2.48	264.552	262.08
240.000	2.77	264.208	261.44
260.000	5.73	264.115	258.38
280.000	14.19	264.022	249.83
300.000	14.31	263.929	249.62
320.000	14.24	263.836	249.59
340.000	14.04	263.742	249.70
360.000	11.87	263.649	251.78
380.000	7.86	263.556	255.70
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420.000	6.24	263.370	257.13
440.000	4.96	263.277	258.32
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540.000	1.27	261.942	260.67
560.000	1.01	261.452	260.44
580.000	1.24	261.136	259.90
600.000	1.84	261.010	259.17
620.000	2.56	260.972	258.41
640.000	2.84	260.935	258.09
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820.000	0.52	260.600	260.08
840.000	0.62	260.574	259.96
860.000	0.38	260.548	260.17
880.000	0.38	260.522	260.14
900.000	0.31	260.497	260.19
920.000	0.24	260.471	260.23
940.000	0.05	260.445	260.40
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LONGITUDINAL SECTION - ROAD 01

HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
B	REVISED ALIGNMENT				16.10.19
A	DRAFT ALIGNMENTS FOR DISCUSSION				30.07.19

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 50 100 150m
SCALE 1:5000 AT ORIGINAL SIZE

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DO NOT SCALE

Drawn L.SCHNEIDER | Designer L.SCHNEIDER
Drafting Check | Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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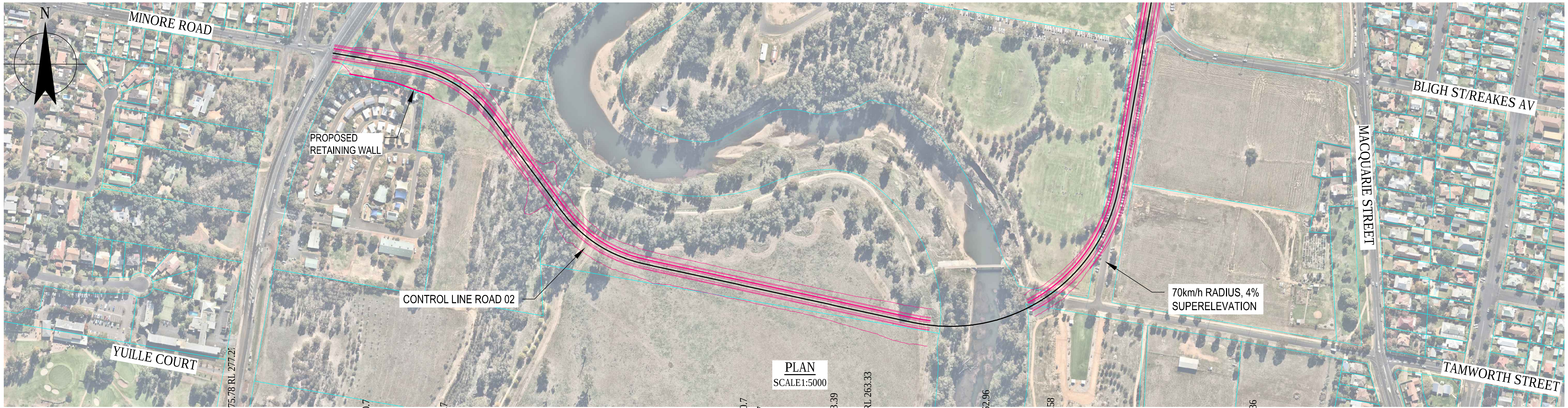
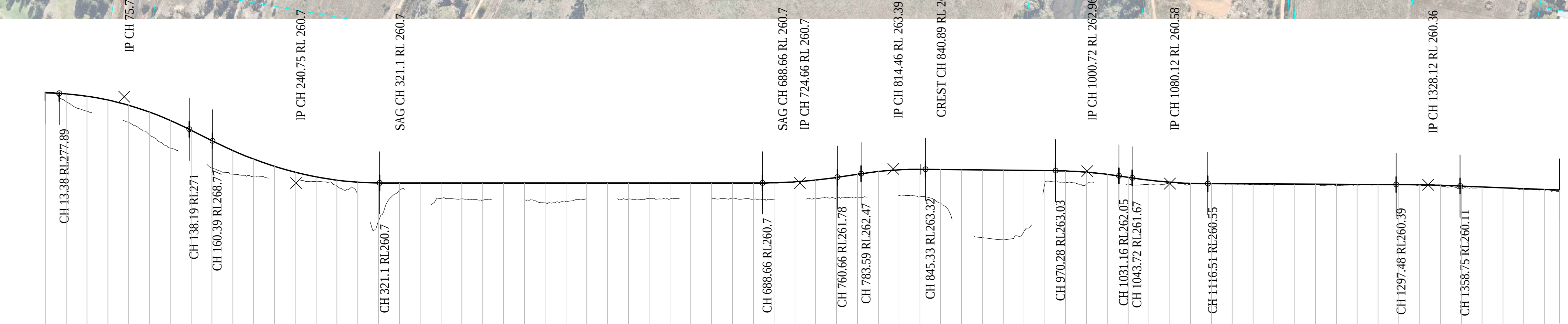
Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **STRATEGIC CONCEPT OPTIONS**
OPTION A - ROAD 01

Original Size **A3** Drawing No: **22-12511689-SK002** Rev: **B**

Plot Date: 11 June 2020 - 4:46 PM Plotted By: Blake Drew Cad File No: G:\22\12511689\CADD\Drawings\22-12511689-SK002.dwg



PLAN
SCALE1:5000



DATUM RL. 229.00

VERTICAL ALIGNMENT: L=13.38m; G=-1%; K=13.8, L=124.82m; L=22.2m; G=-10.04%; K=16, L=160.72m; L=367.55m, G=0%; K=24, L=72m; L=22.93m; G=3%; K=19.1, L=61.75m; L=124.94m, G=-0.23%; K=22, L=60.88m; L=12.57m; G=-3%; K=25, L=72.79m; L=180.97m, G=-0.09%; K=84, L=61.27m; L=95.47m, G=-0.82%

HORIZONTAL ALIGNMENT: L=74.42m; TRANSITION L=40.00m; L=82.43m, R=161.00m; TRANSITION L=40.00m; L=105.65m; TRANSITION L=40.00m; L=75.54m, R=-161.00m; TRANSITION L=40.00m; L=302.75m; TRANSITION L=40.00m; L=298.53m, R=-210.00m; TRANSITION L=40.00m; L=274.91m

CHAINAGE	LEVEL DIFFERENCE CUT - / FILL +	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
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20.000	1.50	277.812	276.32
40.000	2.90	277.371	274.47
60.000	3.18	276.640	273.46
80.000	3.28	275.620	272.34
100.000	4.36	274.309	269.94
120.000	5.33	272.709	267.38
140.000	5.08	270.820	265.74
160.000	5.25	268.811	263.56
180.000	4.54	266.922	262.38
200.000	3.31	265.283	261.98
220.000	2.29	263.894	261.60
240.000	1.07	262.756	261.69
260.000	0.92	261.867	260.94
280.000	1.11	261.228	260.12
300.000	2.36	260.839	258.48
320.000	7.28	260.700	253.42
340.000	1.47	260.700	259.23
360.000	3.57	260.700	257.13
380.000	2.98	260.700	257.72
400.000	3.04	260.700	257.66
420.000	3.37	260.700	257.33
440.000	2.94	260.700	257.76
460.000	3.16	260.700	257.54
480.000	3.81	260.700	256.89
500.000	3.58	260.700	257.12
520.000	3.06	260.700	257.64
540.000	3.10	260.700	257.60
560.000	3.15	260.700	257.55
580.000	3.07	260.700	257.63
600.000	3.06	260.700	257.64
620.000	3.00	260.700	257.70
640.000	2.97	260.700	257.73
660.000	3.05	260.700	257.65
680.000	3.13	260.700	257.57
700.000	3.16	260.727	257.57
720.000	3.53	260.905	257.38
740.000	3.45	261.249	257.80
760.000	3.93	261.760	257.83
780.000	4.44	262.360	257.92
800.000	4.73	262.890	258.16
820.000	4.85	263.213	258.36
840.000	5.29	263.327	258.03
860.000	6.54	263.288	256.75
880.000	11.22	263.242	252.03
900.000	13.01	263.195	250.19
920.000	13.37	263.148	249.78
940.000	11.74	263.102	251.36
960.000	2.39	263.055	260.66
980.000	2.20	262.987	260.79
1000.000	2.24	262.762	260.52
1020.000	1.84	262.354	260.51
1040.000	1.32	261.782	260.46
1060.000	0.79	261.235	260.44
1080.000	0.24	260.845	260.60
1100.000	0.30	260.616	260.31
1120.000	0.05	260.543	260.49
1140.000	0.05	260.526	260.47
1160.000	0.07	260.508	260.44
1180.000	0.21	260.490	260.29
1200.000	0.15	260.473	260.32
1220.000	0.15	260.455	260.30
1240.000	0.29	260.437	260.15
1260.000	0.14	260.420	260.28
1280.000	-0.05	260.402	260.45
1300.000	-0.09	260.384	260.47
1320.000	0.04	260.336	260.30
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1360.000	0.39	260.099	259.71
1380.000	0.22	259.935	259.72
1400.000	-0.06	259.772	259.84
1420.000	0.21	259.608	259.40
1440.000	0.06	259.444	259.38
1454.220	0.24	259.328	259.08

LONGITUDINAL SECTION - ROAD 02

HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
A	DRAFT ALIGNMENTS FOR DISCUSSION				11.02.20

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 50 100 150m
SCALE 1:5000 AT ORIGINAL SIZE

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Drafting Check | Design Check
Approved (Project Director)
Date
Scale AS SHOWN
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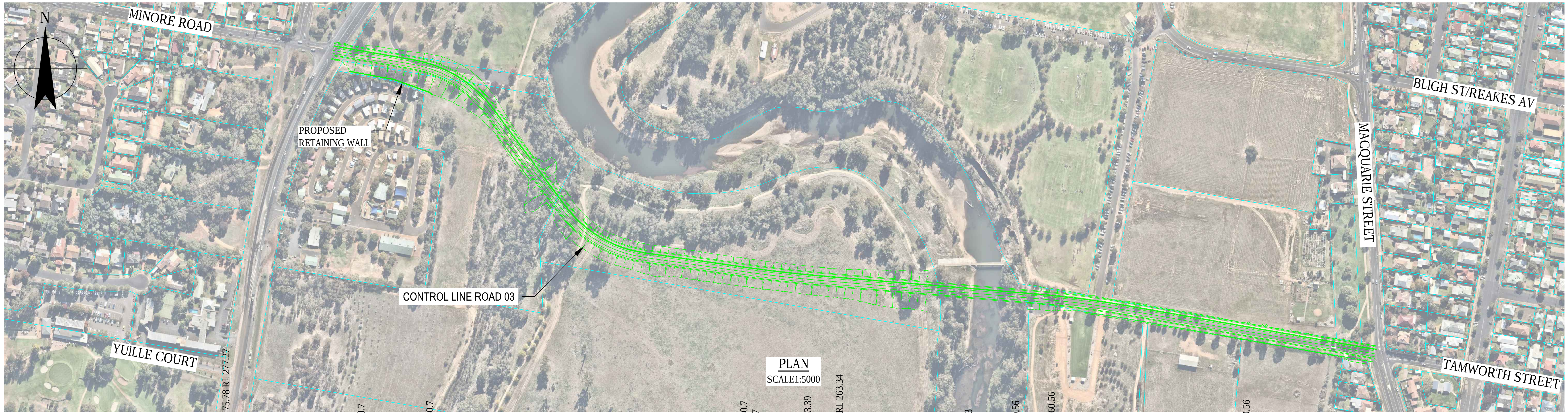
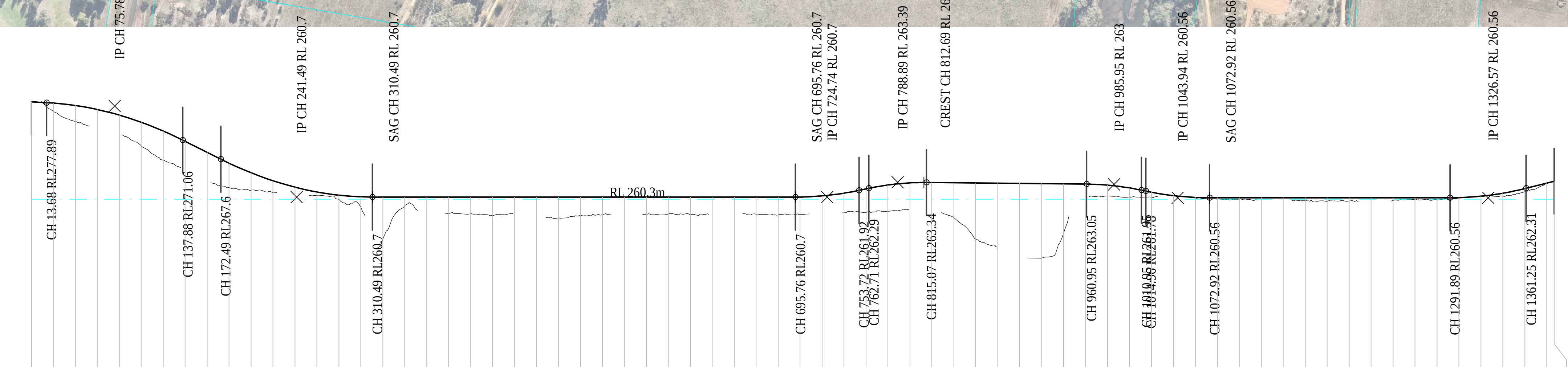
Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **STRATEGIC CONCEPT OPTIONS OPTION B - ROAD 02**

Original Size A3 | Drawing No: **22-12511689-SK006** | Rev: **A**

Plot Date: 11 June 2020 - 4:50 PM   Plotted By: Blake Drew   Cad File No: G:\22\12511689\CADD\Drawings\22-12511689-SK006.dwg



PLAN
SCALE1:5000



DATUM RL. 229.00

VERTICAL ALIGNMENT: L=13.68m, G=-1%; K=13.8, L=124.2m; L=34.6m, G=-10%; K=13.8, L=138m; L=385.28m, G=0%; K=13.8, L=57.96m; L=8.99m, G=4.2%; K=11.9, L=52.36m; L=145.88m, G=-0.2%; K=12.5, L=50m; L=4.01m, G=-4.2%; K=13.8, L=57.96m; L=218.97m, G=0%; K=13.8, L=69.36m; L=25.5m, G=5.03%

HORIZONTAL ALIGNMENT: L=98.97m; L=114.06m R=150.00m; L=148.14m; L=118.59m R=-150.00m; L=123.58m; L=102.06m R=-1750.00m; L=259.89m; L=113.04m R=1250.00m; L=308.42m

CHAINAGE	LEVEL DIFFERENCE CUT - / FILL +	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
0.000	0.00	278.028	278.03
20.000	1.50	277.814	276.32
40.000	2.91	277.377	274.47
60.000	3.19	276.651	273.46
80.000	3.29	275.635	272.34
100.000	4.32	274.329	270.00
120.000	5.32	272.733	267.42
140.000	5.16	270.849	265.69
160.000	5.31	268.849	263.54
180.000	4.45	266.869	262.42
200.000	3.17	265.123	261.95
220.000	2.10	263.666	261.57
240.000	0.71	262.500	261.79
260.000	0.65	261.623	260.97
280.000	0.76	261.037	260.27
300.000	1.93	260.740	258.81
320.000	7.65	260.700	253.05
340.000	1.58	260.700	259.12
360.000	3.55	260.700	257.15
380.000	3.03	260.700	257.67
400.000	3.05	260.700	257.65
420.000	3.36	260.700	257.34
440.000	2.92	260.700	257.78
460.000	3.30	260.700	257.40
480.000	3.80	260.700	256.90
500.000	3.42	260.700	257.28
520.000	3.20	260.700	257.50
540.000	3.04	260.700	257.66
560.000	3.21	260.700	257.49
580.000	3.10	260.700	257.60
600.000	3.26	260.700	257.44
620.000	3.07	260.700	257.63
640.000	3.08	260.700	257.62
660.000	3.19	260.700	257.51
680.000	3.29	260.700	257.41
700.000	3.20	260.707	257.50
720.000	3.09	260.913	257.82
740.000	3.49	261.409	257.92
760.000	4.31	262.181	257.87
780.000	4.84	262.895	258.05
800.000	4.84	263.276	258.43
820.000	5.11	263.332	258.22
840.000	6.33	263.292	256.96
860.000	10.30	263.252	252.95
880.000	11.73	263.212	251.48
900.000	13.54	263.172	249.63
920.000	13.57	263.132	249.57
940.000	8.96	263.092	254.13
960.000	2.19	263.052	260.87
980.000	1.96	262.867	260.90
1000.000	1.68	262.362	260.68
1020.000	0.92	261.579	260.65
1040.000	0.28	260.957	260.68
1060.000	0.12	260.625	260.50
1080.000	0.23	260.564	260.33
1100.000	0.28	260.564	260.28
1120.000	0.46	260.564	260.11
1140.000	0.42	260.564	260.15
1160.000	0.48	260.564	260.09
1180.000	0.64	260.564	259.93
1200.000	0.57	260.564	260.00
1220.000	0.59	260.564	259.98
1240.000	0.50	260.564	260.06
1260.000	0.35	260.564	260.21
1280.000	0.34	260.564	260.22
1300.000	0.14	260.588	260.45
1320.000	0.32	260.851	260.53
1340.000	0.54	261.403	260.86
1360.000	0.56	262.245	261.69
1380.000	-0.02	263.250	263.27
1386.748	-0.00	263.589	263.59

LONGITUDINAL SECTION - ROAD 03

HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
B	UPDATED ALIGNMENT				16.10.19
A	DRAFT ALIGNMENTS FOR DISCUSSION				30.07.19

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 50 100 150m
SCALE 1:5000 AT ORIGINAL SIZE

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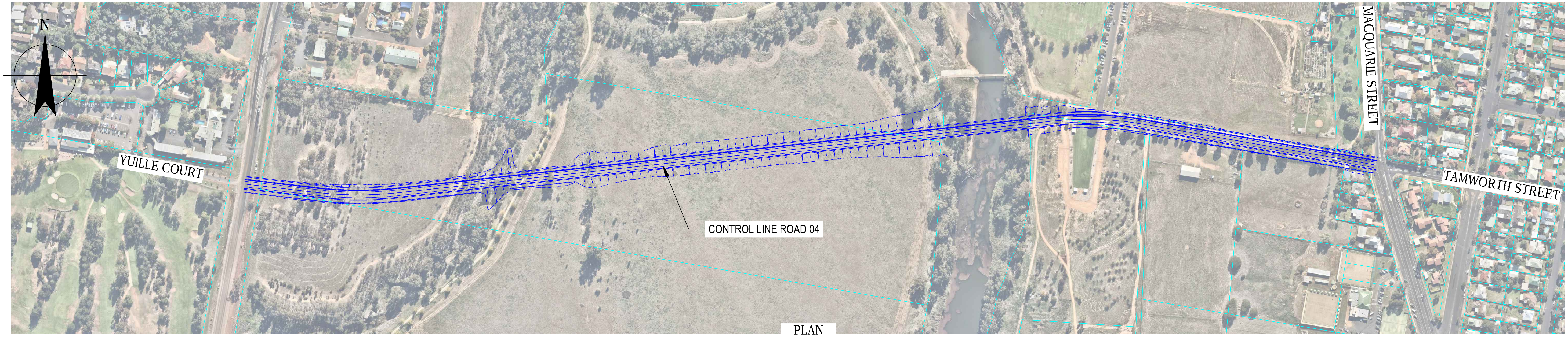
Drawn L.SCHNEIDER | Designer L.SCHNEIDER
Drafting Check | Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **STRATEGIC CONCEPT OPTIONS OPTION C - ROAD 03**

Original Size A3 | Drawing No: 22-12511689-SK003 | Rev: B

Plot Date: 11 June 2020 - 4:47 PM | Plotted By: Blake Drew | Cad File No: G:\22\12511689\CADD\Drawings\22-12511689-SK003.dwg



PLAN
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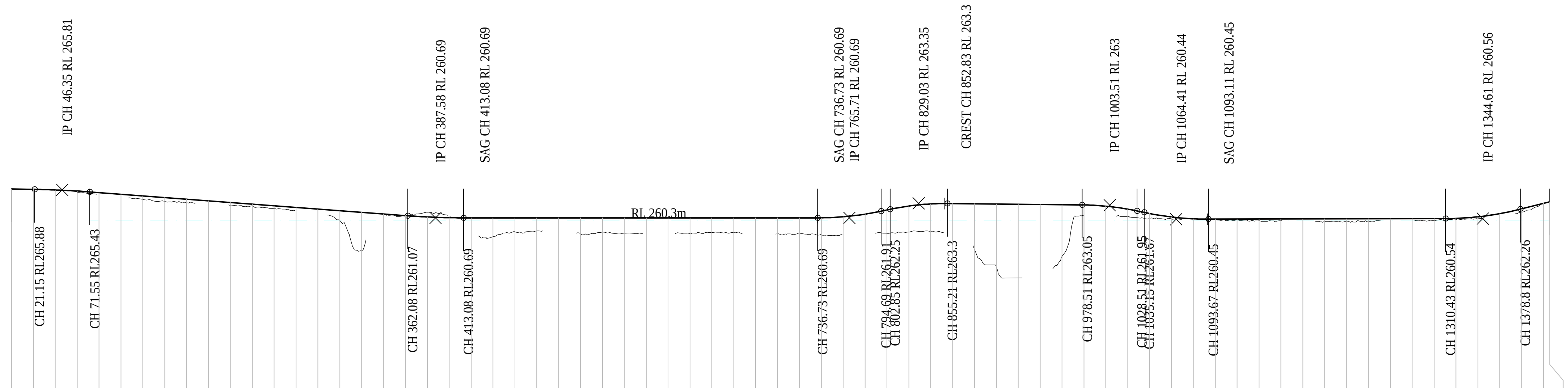

DATUM RL. 229.00

VERTICAL ALIGNMENT: L=21.15m; K=42, L=50.4m; G=-0.3%; L=290.53m, G=-1.5%; K=34, L=51m; L=323.65m, G=0%; K=13.8, L=57.96m; L=8.16m; K=11.9, L=52.36m; G=4.2%; L=123.29m, G=-0.2%; K=12.5, L=50m; L=6.64m; K=13.8, L=58.52m; G=-4.2%; L=216.76m, G=0.04%; K=13.8, L=68.37m; L=26.54m; G=5%

HORIZONTAL ALIGNMENT: L=89.01m; L=101.96m R=-450.00m; L=808.83m; L=113.38m R=400.00m; L=292.15m

CHAINAGE	LEVEL DIFFERENCE CUT - / FILL +	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
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20.000		265.887	
40.000		265.785	
60.000	0.16	265.587	265.43
80.000	0.35	265.303	264.95
100.000	0.54	265.003	264.47
120.000	0.64	264.703	264.06
140.000	0.71	264.403	263.70
160.000	0.64	264.103	263.47
180.000	0.69	263.803	263.12
200.000	0.56	263.503	262.94
220.000	0.34	263.203	262.87
240.000	0.51	262.903	262.39
260.000	0.57	262.603	262.03
280.000	0.91	262.303	261.40
300.000	1.81	262.003	260.20
320.000	6.97	261.703	254.73
340.000	0.35	261.403	261.05
360.000	0.04	261.103	261.06
380.000	-0.76	260.850	261.61
400.000	-0.32	260.715	261.04
420.000	2.96	260.690	257.73
440.000	3.43	260.690	257.26
460.000	2.56	260.690	258.13
480.000	2.37	260.690	258.32
500.000	2.23	260.690	258.46
520.000	2.89	260.690	257.80
540.000	2.61	260.690	258.08
560.000	2.87	260.690	257.82
580.000	2.83	260.690	257.86
600.000	2.80	260.690	257.89
620.000	2.91	260.690	257.78
640.000	2.69	260.690	258.00
660.000	2.71	260.690	257.98
680.000	3.02	260.690	257.67
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720.000	2.80	260.690	257.89
740.000	3.09	260.693	257.61
760.000	3.32	260.886	257.57
780.000	3.49	261.368	257.87
800.000	4.28	262.130	257.85
820.000	4.75	262.846	258.10
840.000	5.04	263.230	258.19
860.000	5.33	263.287	257.96
880.000	8.32	263.247	254.93
900.000	11.44	263.207	251.77
920.000	13.48	263.167	249.69
940.000	13.12	263.127	250.01
960.000	9.48	263.087	253.61
980.000	1.89	263.046	261.15
1000.000	1.80	262.822	261.02
1020.000	1.36	262.278	260.92
1040.000	0.90	261.476	260.58
1060.000	0.35	260.851	260.50
1080.000	0.10	260.516	260.42
1100.000	0.14	260.457	260.32
1120.000	0.12	260.465	260.34
1140.000	0.33	260.473	260.14
1160.000	0.32	260.481	260.16
1180.000	0.46	260.489	260.03
1200.000	0.46	260.497	260.04
1220.000	0.49	260.506	260.01
1240.000	0.52	260.514	259.99
1260.000	0.39	260.522	260.13
1280.000	0.27	260.530	260.26
1300.000	0.36	260.538	260.18
1320.000	0.25	260.580	260.33
1340.000	0.34	260.872	260.53
1360.000	0.62	261.453	260.83
1380.000	0.59	262.324	261.73
1400.000	-0.02	263.323	263.35
1405.340	-0.00	263.590	263.59

LONGITUDINAL SECTION - ROAD 04

HORIZONTAL SCALE 1:5000
VERTICAL SCALE 1:1000

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date
B	UPDATED ALIGNMENT				16.10.19
A	DRAFT ALIGNMENTS FOR DISCUSSION				30.07.19

Note: * indicates signatures on original issue of drawing or last revision of drawing

0 50 100 150m
SCALE 1:5000 AT ORIGINAL SIZE

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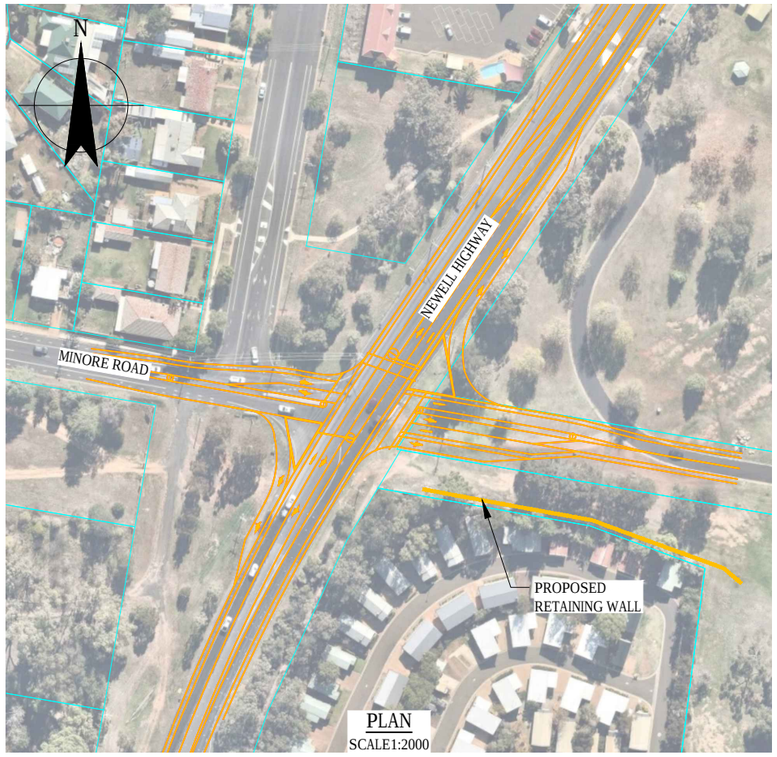
DO NOT SCALE

Drawn L.SCHNEIDER | Designer L.SCHNEIDER
Drafting Check | Design Check
Approved (Project Director) | Date
Scale AS SHOWN | This Drawing must not be used for Construction unless signed as Approved

Client: DUBBO REGIONAL COUNCIL
Project: DUBBO SOUTH BRIDGE
Title: STRATEGIC CONCEPT OPTIONS
OPTION D - ROAD 04

Original Size A3 | Drawing No: 22-12511689-SK004 | Rev: B

Plot Date: 11 June 2020 - 4:49 PM Plotted By: Blake Drew Cad File No: G:\22\12511689\CADD\Drawings\22-12511689-SK004.dwg



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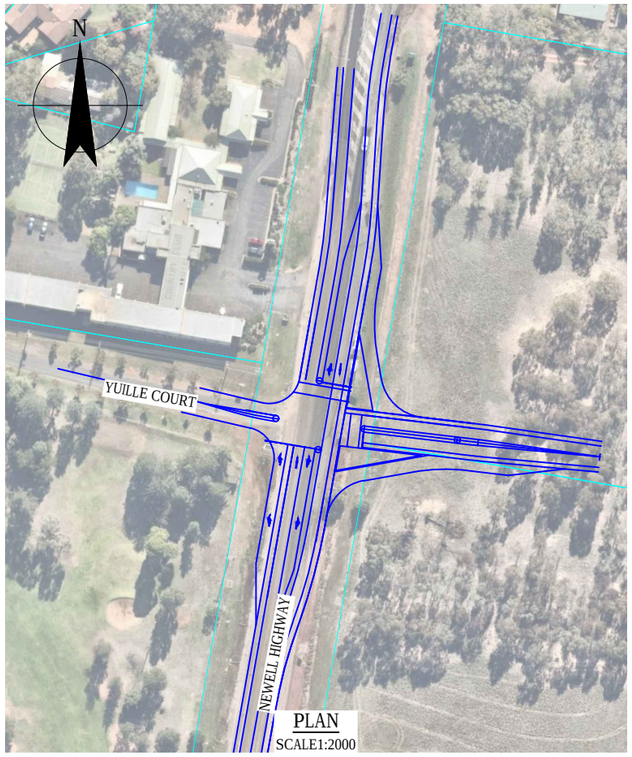
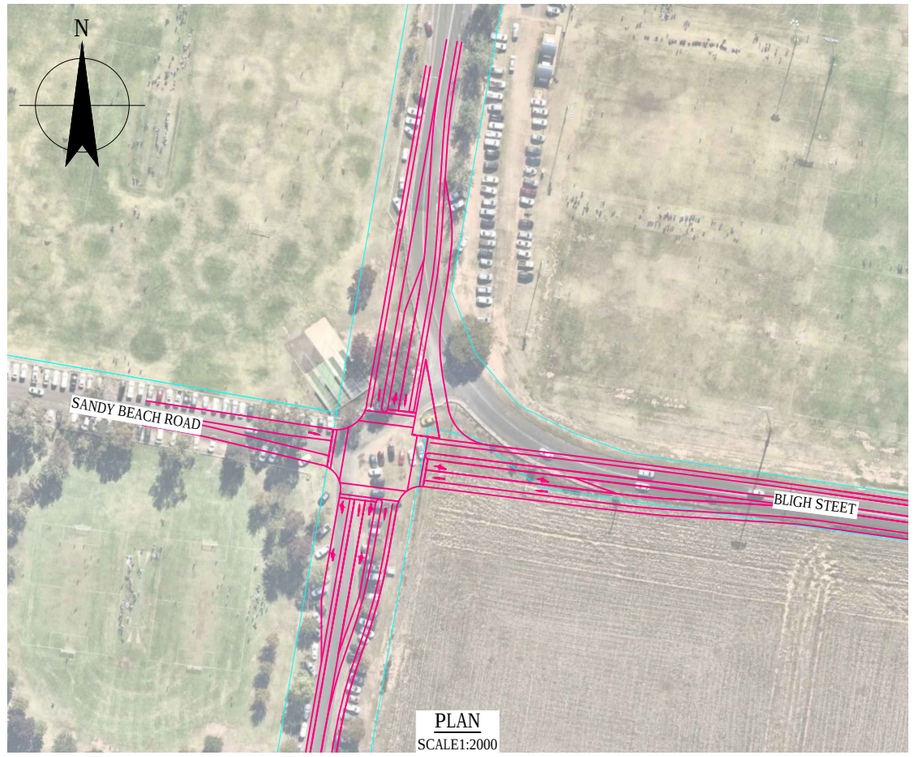


PLAN
SCALE1:2000



PLAN
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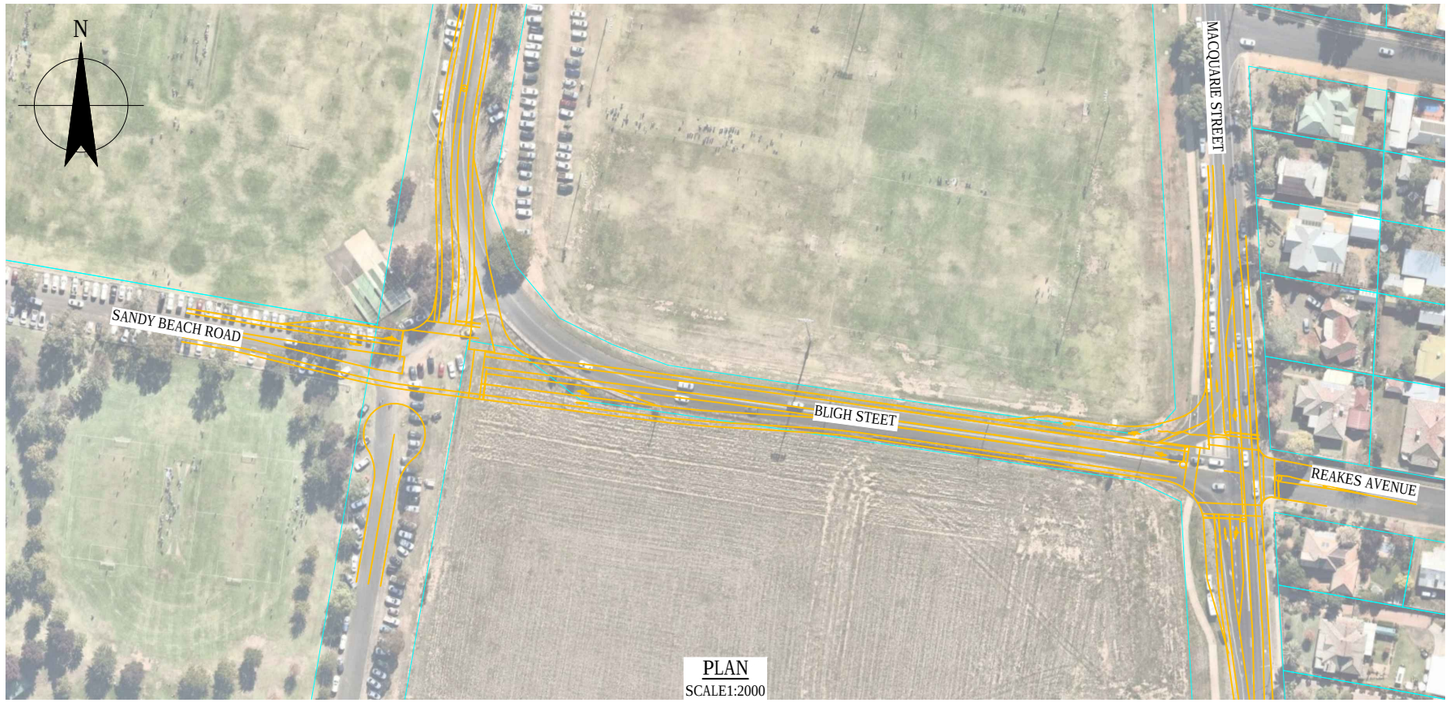

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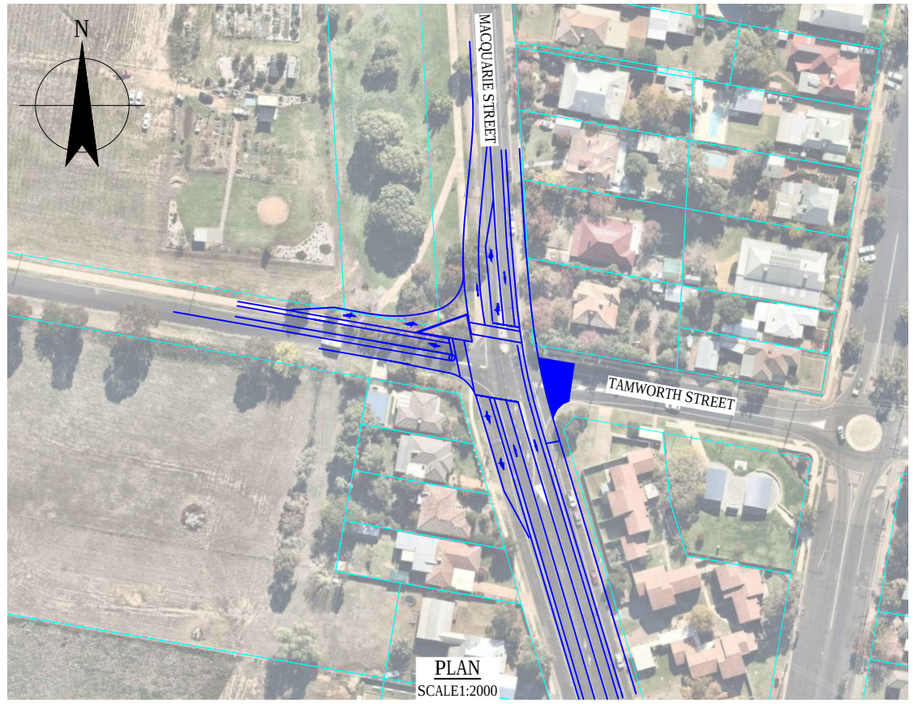

PLAN
SCALE1:2000

PRELIMINARY

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
A						11.02.20

0 20 40 60m
SCALE 1:2000 AT ORIGINAL SIZE

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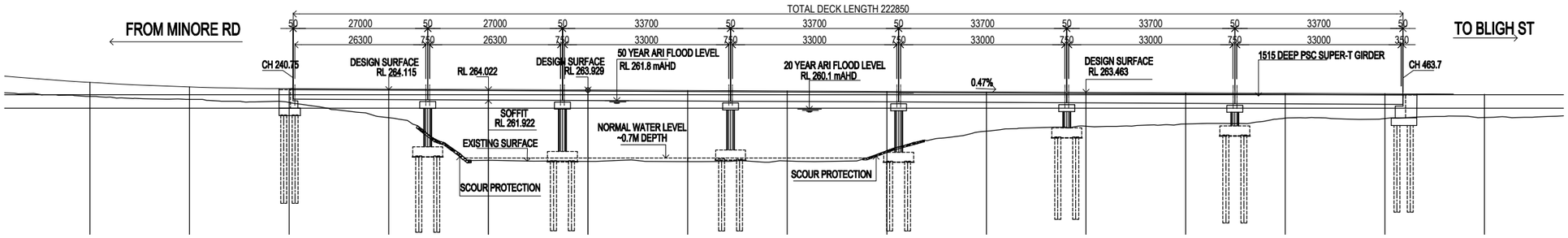
Drawn L.SCHNEIDER | Designer L.SCHNEIDER
Drafting Check | Design Check
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **STRATEGIC CONCEPT OPTIONS PRELIMINARY INTERSECTION LAYOUTS**

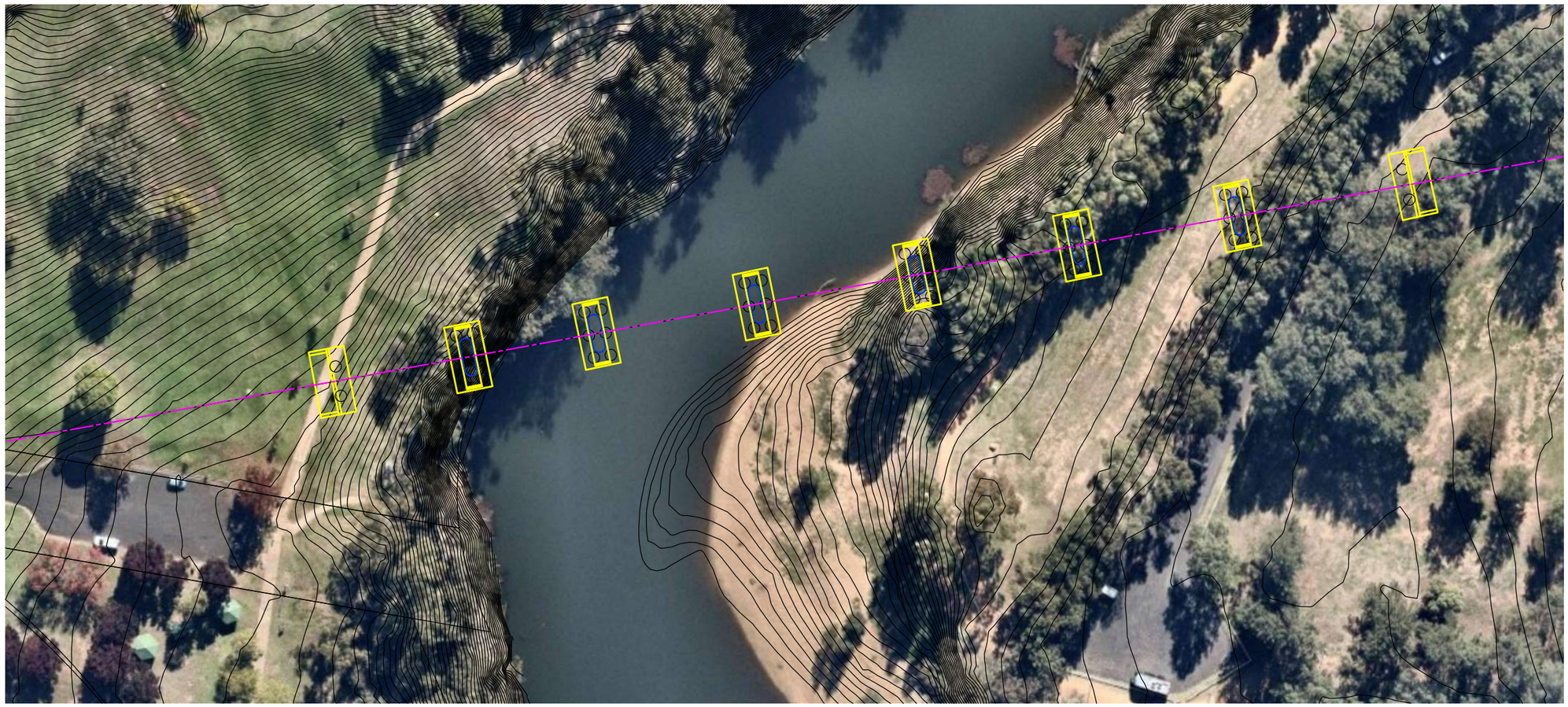
Original Size **A3**
Drawing No: **22-12511689-SK007**
Rev: **A**

Plot Date: 11 June 2020 - 4:51 PM
Plotted By: Blake Drew
Cad File No: G:\22\12511689\CADD\Drawings\22-12511689-SK007.dwg

Appendix B - Super T superstructure concept drawing



LONGITUDINAL SECTION (DO NOT SHOW BARRIER) - SCALE 1/500



PLAN - SCALE 1:500

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

Note: * indicates signatures on original issue of drawing or last revision of drawing

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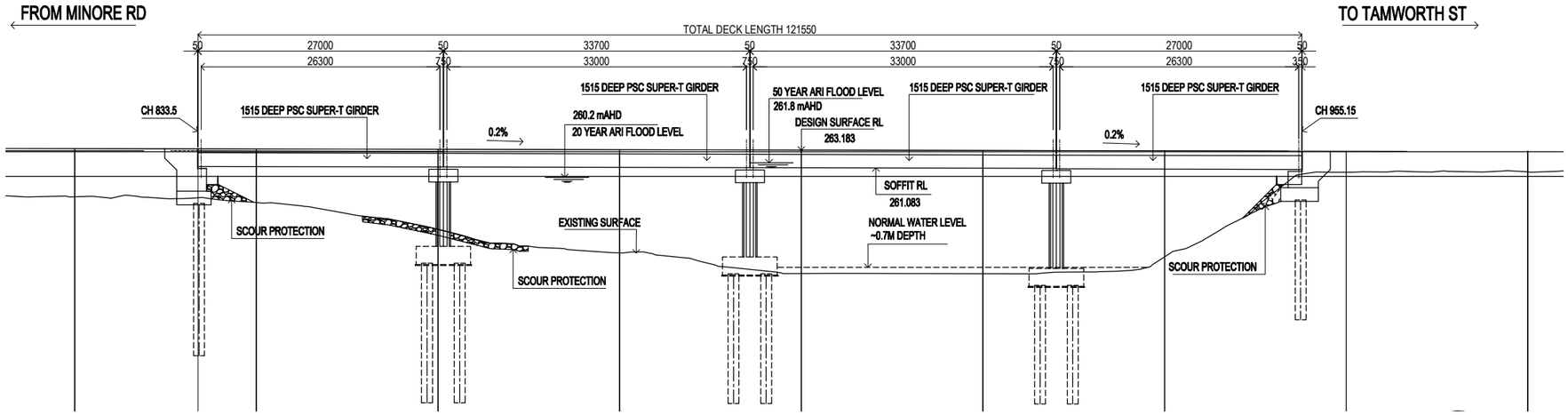
DO NOT SCALE

Drawn	N.VU	Designer	N.VU
Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **BRIDGE STRATEGIC CONCEPT OPTIONS ROAD A - OPTION 1, SUPER-T GIRDER**

Original Size **A1** **Drawing No: 22-12511689-SK100** **Rev: A**

Plot Date: 12 March 2020 - 4:33 PM Plotted by: Nam Vu Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



LONGITUDINAL SECTION (DO NOT SHOW BARRIER) - SCALE 1/300

PLAN - SCALE 1:300

PRELIMINARY

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION		NV	SF	DM	13.03.20		

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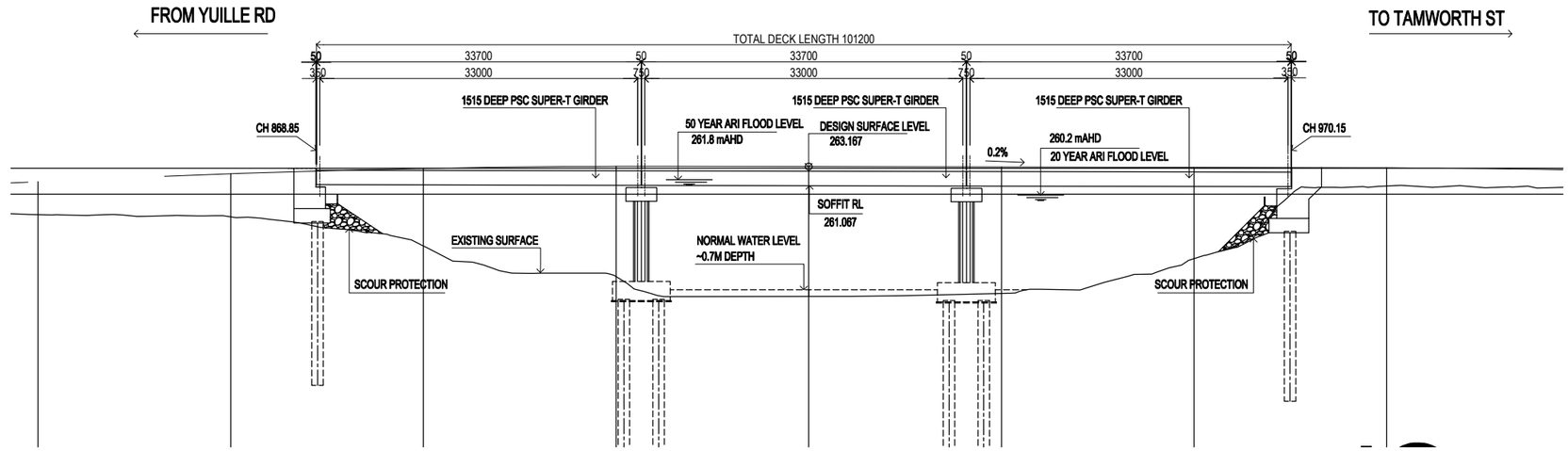
Drawn N.VU		Designer N.VU	
Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale AS SHOWN	This Drawing must not be used for Construction unless signed as Approved		

Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **BRIDGE STRATEGIC CONCEPT OPTIONS ROAD C - OPTION 1, SUPER - T GIRDER**

Original Size **A1** **Drawing No: 22-12511689-SK101** **Rev: A**

Plot Date: 12 March 2020 - 4:33 PM Plotted by: Nam Vu Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



LONGITUDINAL SECTION (DO NOT SHOW BARRIER) - SCALE 1/300

PLAN - SCALE 1:300

PRELIMINARY

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

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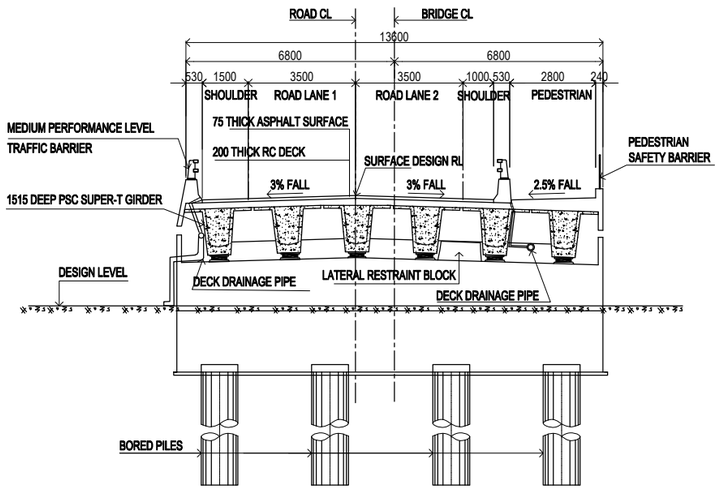
Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **BRIDGE STRATEGIC CONCEPT OPTIONS ROAD D - OPTION 1, SUPER - T GIRDER**

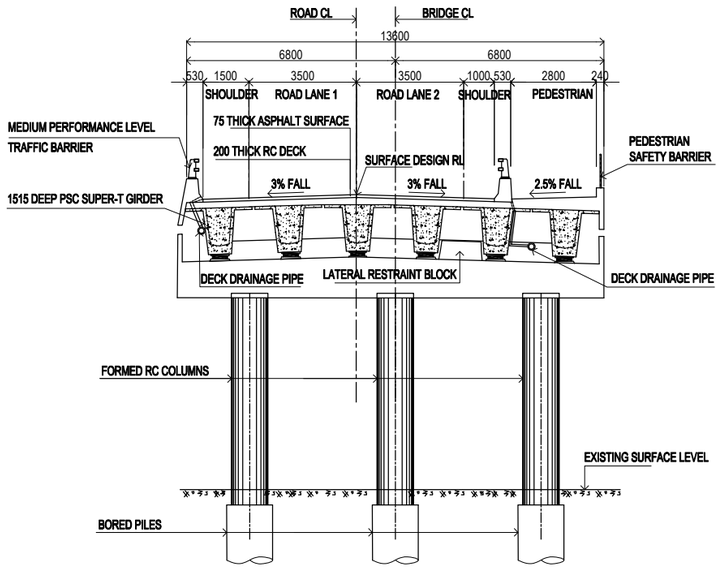
Original Size **A1** **Drawing No: 22-12511689-SK102** **Rev: A**

Plot Date: 12 March 2020 - 4:34 PM Plotted by: Nam Vu

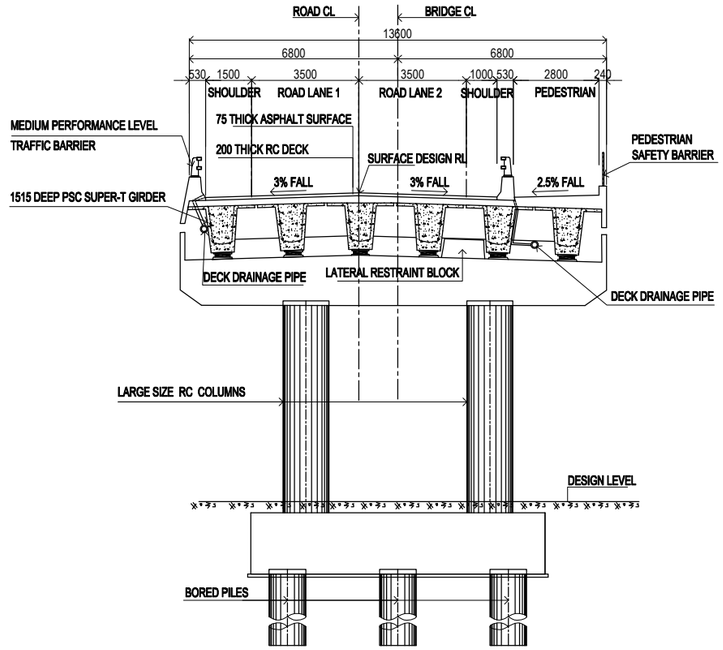
Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



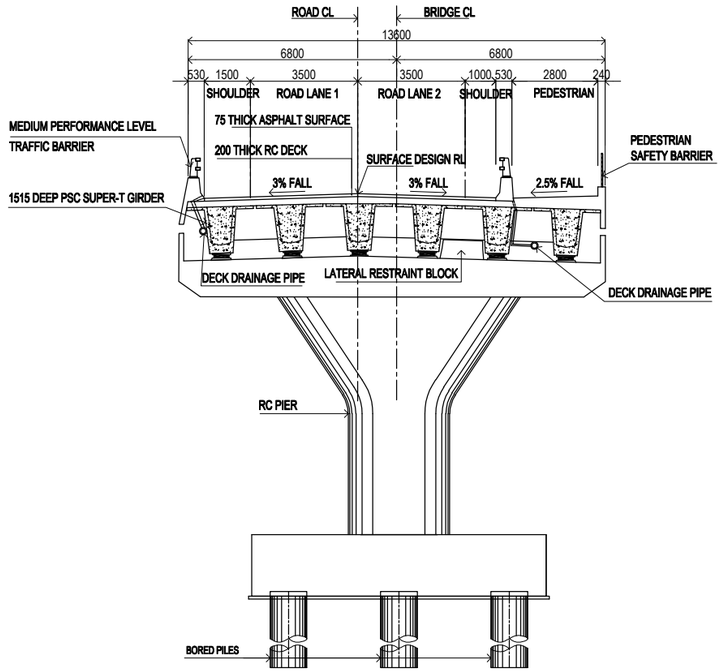
CROSS SECTION AT ABUTMENT - SCALE 1/100



CROSS SECTION AT PIER - TYPE 1 - SCALE 1/100



CROSS SECTION AT PIER - TYPE 2 - SCALE 1/100



CROSS SECTION AT PIER - TYPE 3 - SCALE 1/100

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

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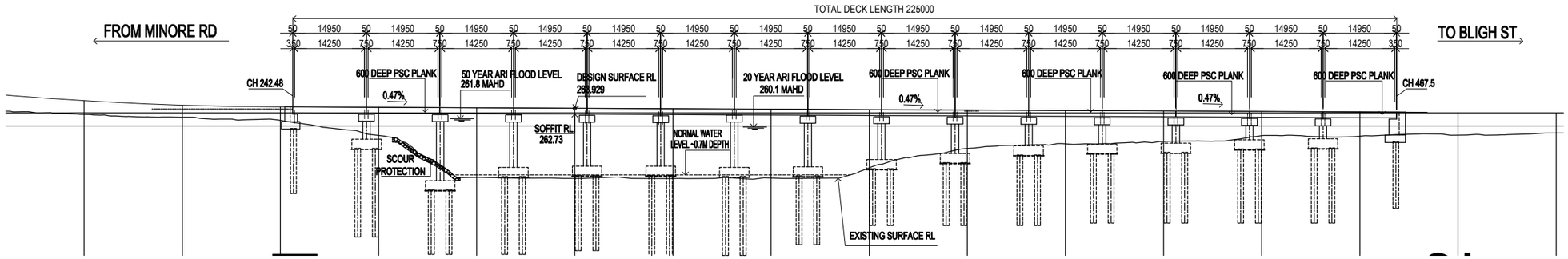
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client DUBBO REGIONAL COUNCIL
Project DUBBO SOUTH BRIDGE
Title BRIDGE STRATEGIC CONCEPT OPTIONS
CROSS SECTION OF BRIDGE ON ROAD A, C & D

Original Size A1 **Drawing No:** 22-12511689-SK103 **Rev:** A

Plot Date: 12 March 2020 - 4:34 PM Plotted by: Nam Vu

Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



LONGITUDINAL SECTION (DO NOT SHOW BARRIER) - SCALE 1/500

PLAN - SCALE 1:500

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

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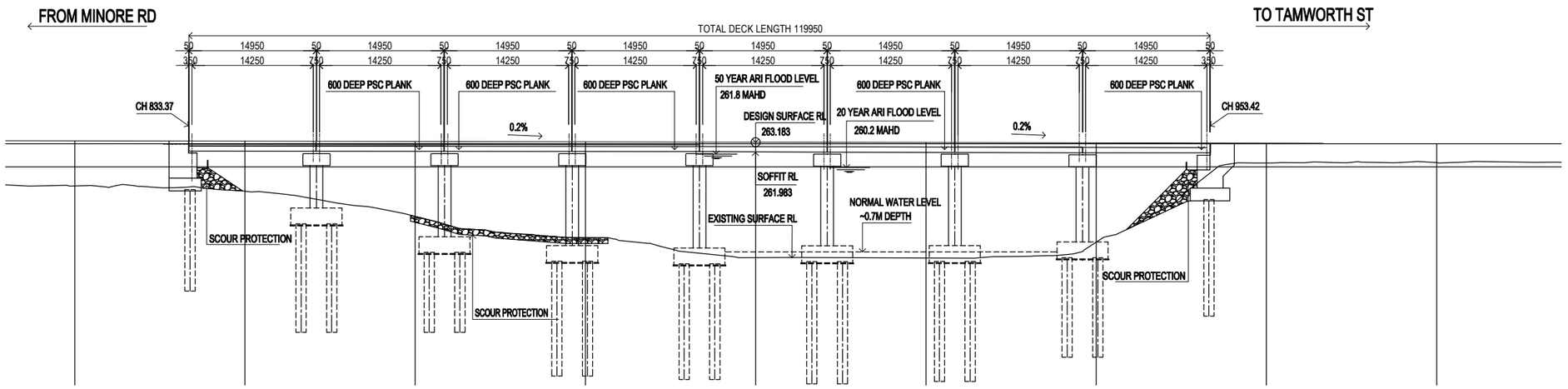
Date
Scale AS SHOWN

This Drawing must not be used for Construction unless signed as Approved

Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **BRIDGE STRATEGIC CONCEPT OPTIONS ROAD A - OPTION 2, VOIDED PLANK**

Original Size **A1**
Drawing No: 22-12511689-SK104
Rev: A

Plot Date: 12 March 2020 - 4:35 PM Plotted by: Nam Vu
Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



LONGITUDINAL SECTION (DO NOT SHOW BARRIER) - SCALE 1/300

PLAN - SCALE 1:300

PRELIMINARY

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

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Date			
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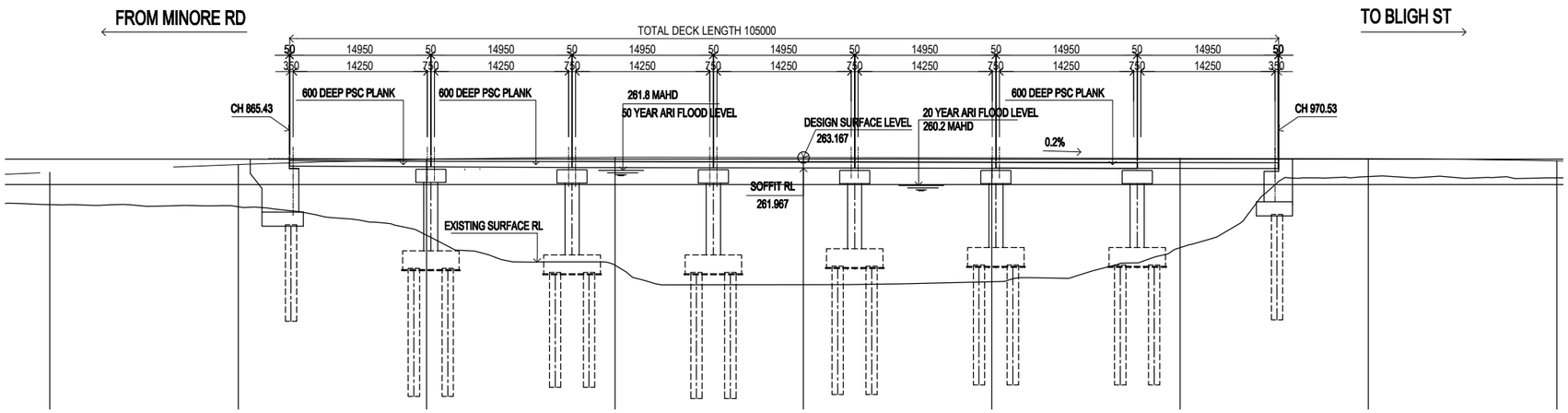
Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **BRIDGE STRATEGIC CONCEPT OPTIONS ROAD C - OPTION 2, VOIDED PLANK**

Original Size **A1** **Drawing No: 22-12511689-SK105** **Rev: A**

Plot Date: 12 March 2020 - 4:35 PM Plotted by: Nam Vu Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



LONGITUDINAL SECTION (DO NOT SHOW BARRIER) - SCALE 1/300

PLAN - SCALE 1:300

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

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Approved (Project Director)
Date
Scale AS SHOWN
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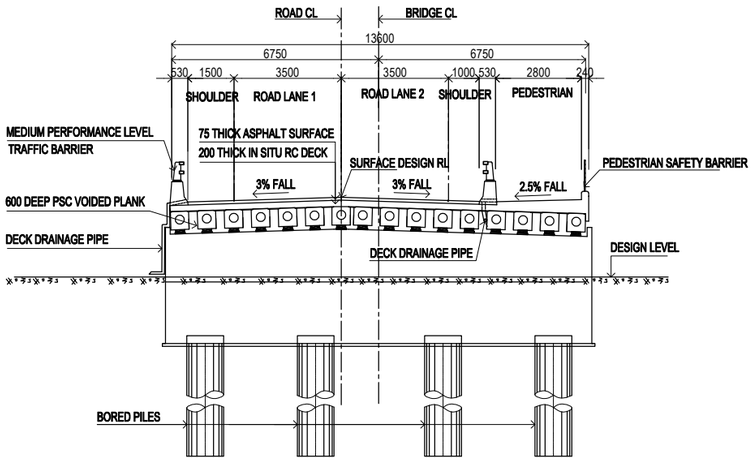
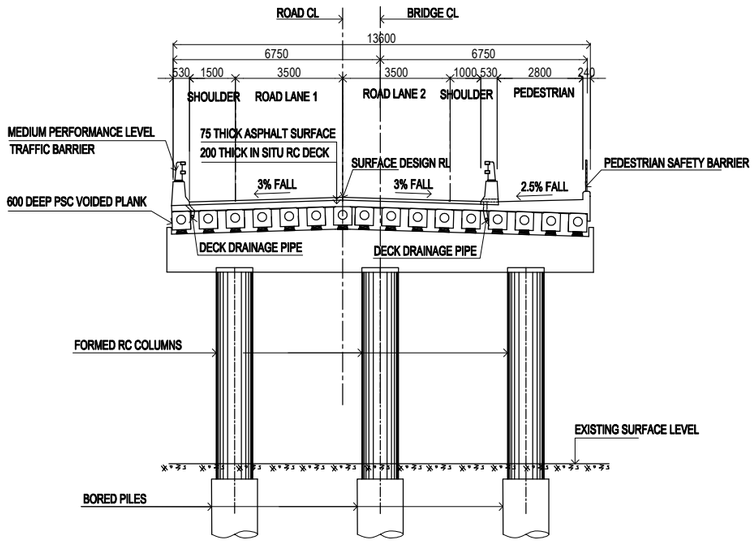
Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **BRIDGE STRATEGIC CONCEPT OPTIONS ROAD D - OPTION 2, VOIDED PLANK**

Original Size **A1**
Drawing No: 22-12511689-SK106
Rev: A

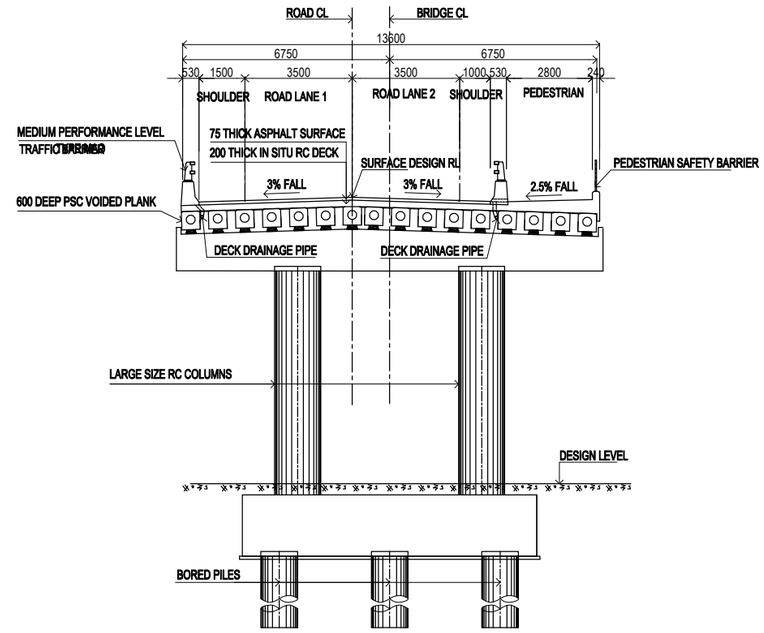
Plot Date: 12 March 2020 - 4:36 PM Plotted by: Nam Vu
Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



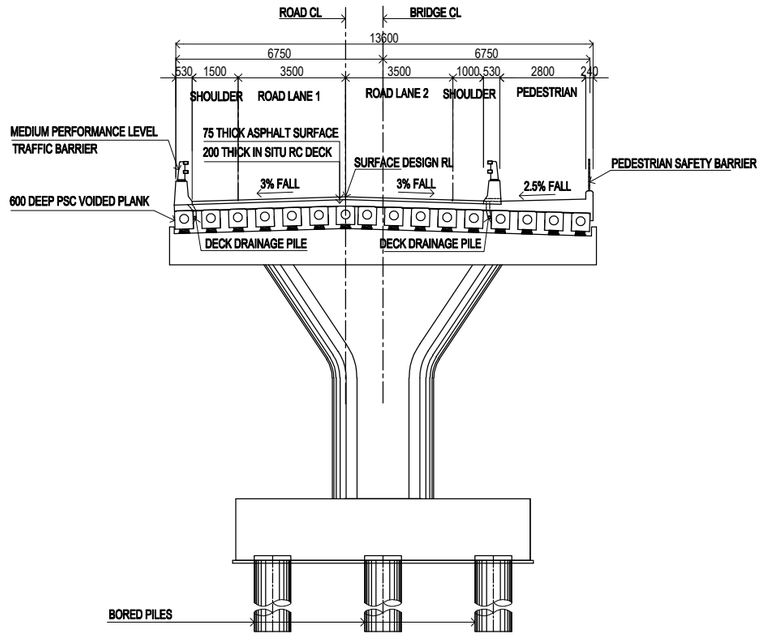
CROSS SECTION AT ABUTMENT - SCALE 1/100



CROSS SECTION AT PIER - TYPE 1 - SCALE 1/100



CROSS SECTION AT PIER - TYPE 2 - SCALE 1/100



CROSS SECTION AT PIER - TYPE 3 - SCALE 1/100

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

Note: * indicates signatures on original issue of drawing or last revision of drawing

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Approved (Project Director)
Date
Scale AS SHOWN
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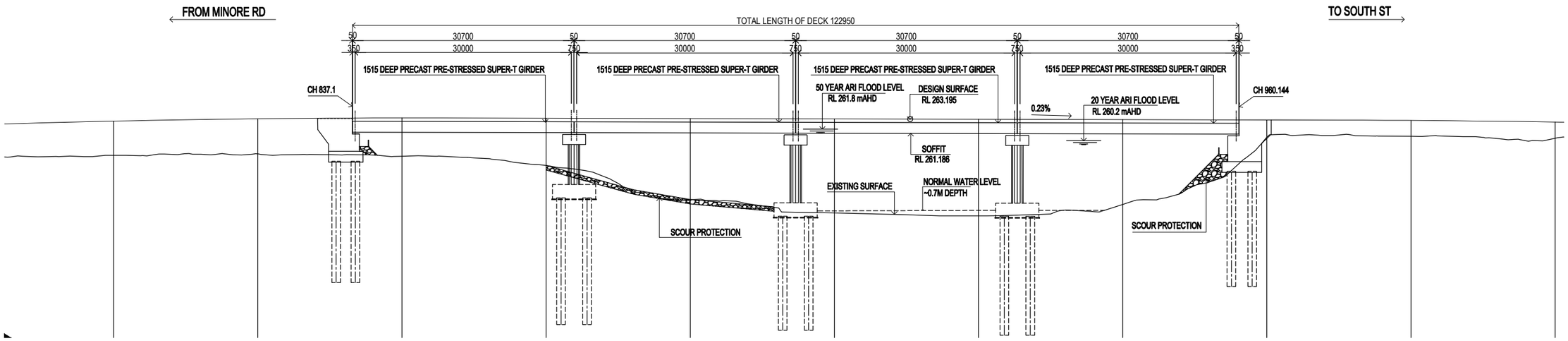
Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **BRIDGE STRATEGIC CONCEPT OPTIONS**
CROSS SECTION OF BRIDGE ON ROAD A, C & D

Original Size **A1**
Drawing No: 22-12511689-SK107
Rev: A

Plot Date: 12 March 2020 - 4:36 PM
Plotted by: Nam Vu
Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



LONGITUDINAL SECTION AT BRIDGE'S CENTRE LINE (DO NOT SHOW BARRIER) - SCALE 1/300

PLAN - SCALE 1:300

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

Note: * indicates signatures on original issue of drawing or last revision of drawing

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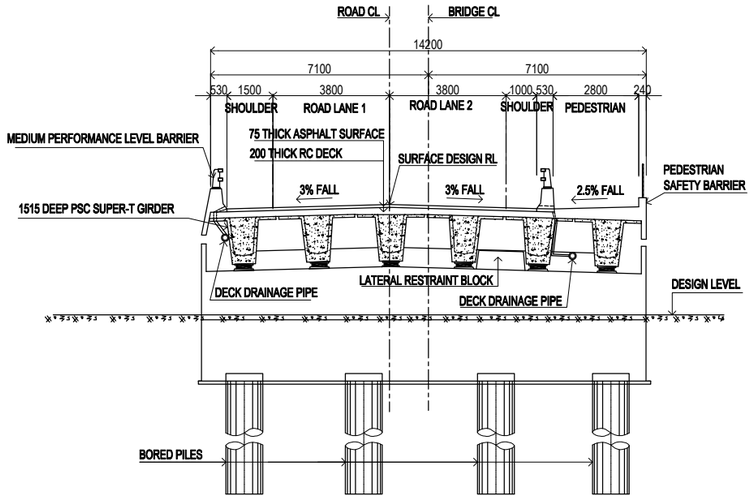
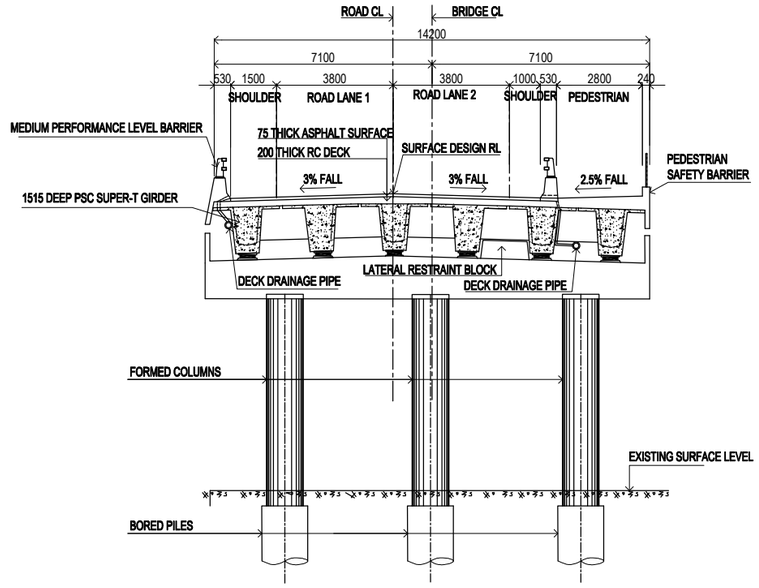
Drawn N.VU	Designer N.VU	Client	DUBBO REGIONAL COUNCIL
Drafting Check	Design Check	Project	DUBBO SOUTH BRIDGE
Approved (Project Director)		Title	BRIDGE STRATEGIC CONCEPT OPTIONS ROAD B - OPTION 1, SUPER - T GIRDER
Date			
Scale AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	Original Size A1	Drawing No: 22-12511689-SK108 Rev: A

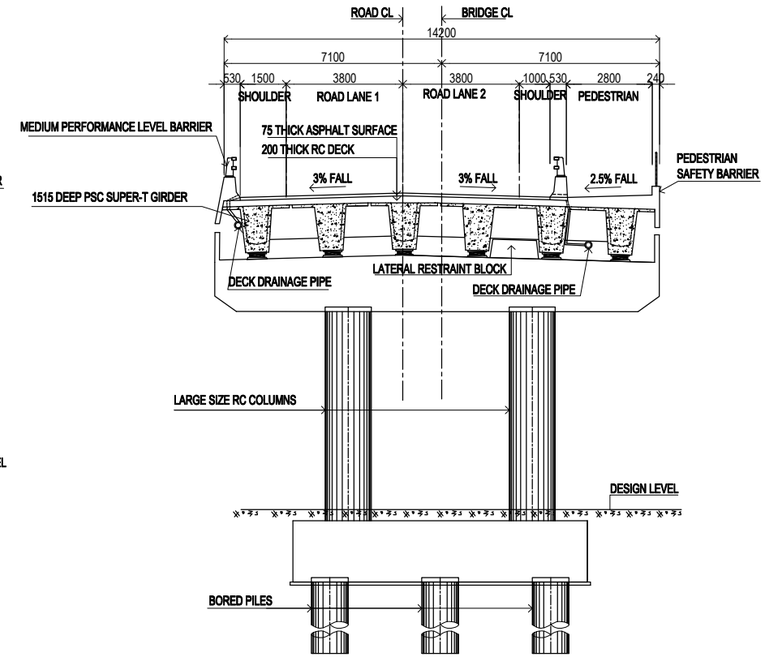
Plot Date: 12 March 2020 - 4:37 PM Plotted by: Nam Vu Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



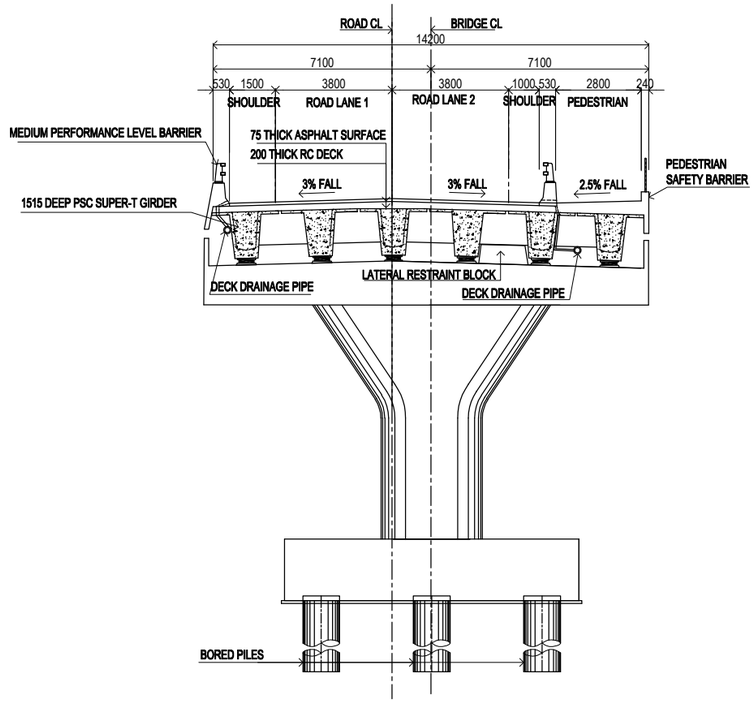
CROSS SECTION AT ABUTMENT - SCALE 1/100



CROSS SECTION AT PIER - TYPE 1 - SCALE 1/100



CROSS SECTION AT PIER - TYPE 2 - SCALE 1/100



CROSS SECTION AT PIER - TYPE 3 - SCALE 1/100

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

Note: * indicates signatures on original issue of drawing or last revision of drawing

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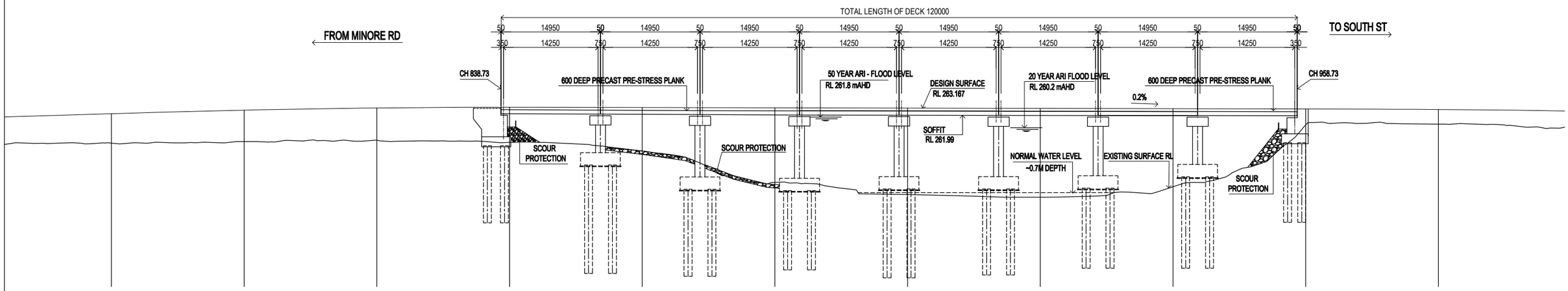
DO NOT SCALE

Drawn	N.VU	Designer	N.VU
Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client DUBBO REGIONAL COUNCIL
Project DUBBO SOUTH BRIDGE
Title BRIDGE STRATEGIC CONCEPT OPTIONS
CROSS SECTION OF BRIDGE ON ROAD B

Original Size A1 **Drawing No: 22-12511689-SK109** **Rev: A**

Plot Date: 12 March 2020 - 4:37 PM Plotted by: Nam Vu Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



LONGITUDINAL SECTION (DO NOT SHOW BARRIER) - SCALE 1/300

PLAN - SCALE 1:300

PRELIMINARY

A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		
No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.

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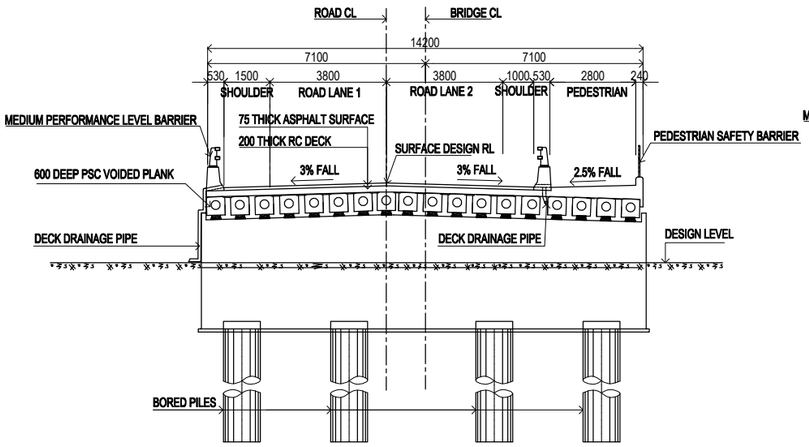
Drawn	N.VU	Designer	N.VU
Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

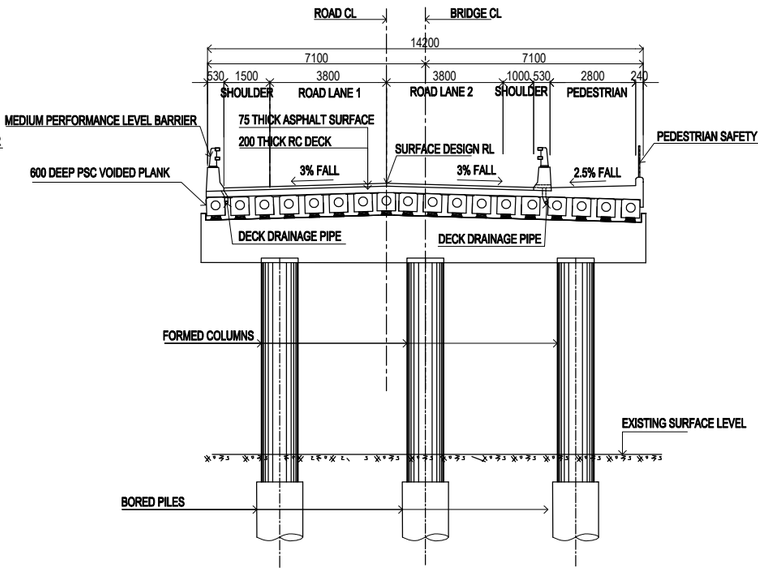
Client DUBBO REGIONAL COUNCIL
Project DUBBO SOUTH BRIDGE
Title BRIDGE STRATEGIC CONCEPT OPTIONS
ROAD B - OPTION 2, VOIDED PLANK

Original Size A1 **Drawing No: 22-12511689-SK110** **Rev: A**

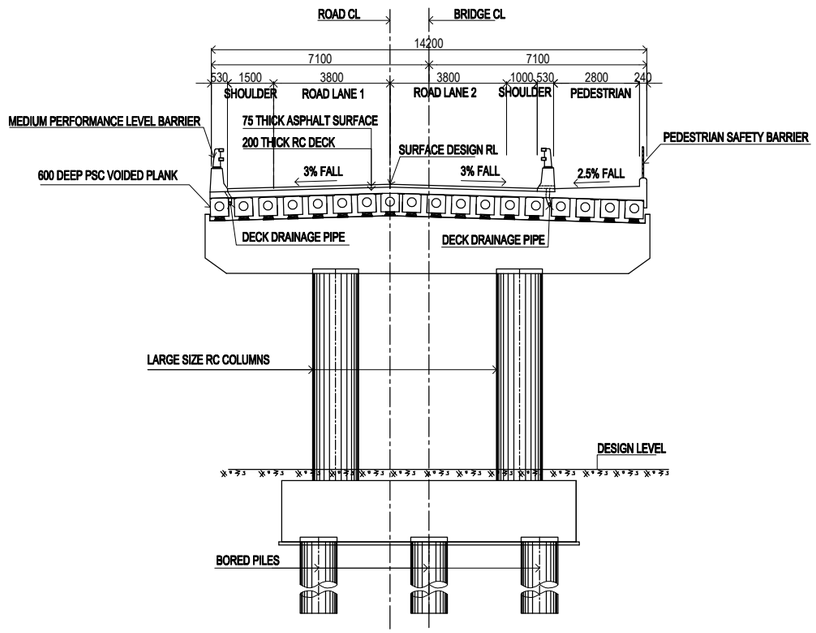
Plot Date: 12 March 2020 - 4:38 PM Plotted by: Nam Vu Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg



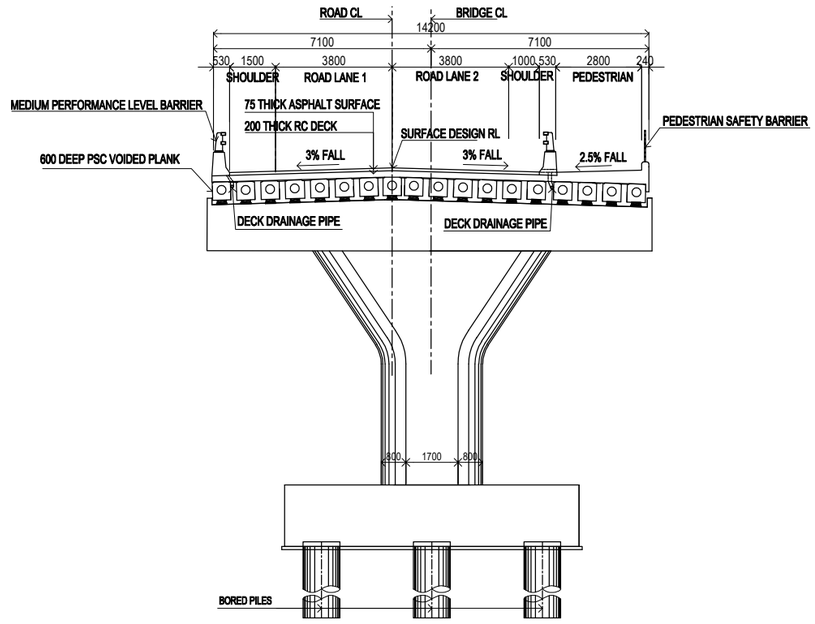
CROSS SECTION AT ABUTMENT - SCALE 1/100



CROSS SECTION AT PIER - TYPE 1 - SCALE 1/100



CROSS SECTION AT PIER - TYPE 2 - SCALE 1/100



CROSS SECTION AT PIER - TYPE 3 - SCALE 1/100

PRELIMINARY

No	Revision	Drawn	Job Manager	Project Director	Date	Reference Drawing Title	Drawing No.
A	DRAFT ALIGNMENTS FOR DISCUSSION	NV	SF	DM	13.03.20		

No Revision Note: * indicates signatures on original issue of drawing or last revision of drawing

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DO NOT SCALE

Drawn N.VU		Designer N.VU	
Drafting Check		Design Check	
Approved (Project Director)			
Date			
Scale AS SHOWN	This Drawing must not be used for Construction unless signed as Approved		

Client **DUBBO REGIONAL COUNCIL**
Project **DUBBO SOUTH BRIDGE**
Title **BRIDGE STRATEGIC CONCEPT OPTIONS**
CROSS SECTION OF BRIDGE ON ROAD B

Original Size **A1** Drawing No: **22-12511689-SK111** Rev: **A**

Plot Date: 12 March 2020 - 4:40 PM Plotted by: Nam Vu Cad File No: G:\22\12511689\Tech\Design\Structures\10 Sketches\22-12511689- Raised AI- Structure opts-N.dwg

No		Structure	Bridge total width	Bridge total length of deck	Total deck surface area	Number of spans	Total number of beams	Number of Piers	Number of Abutments
			m	m	m2	EA	EA	EA	EA
1	**Road A**								
1.1	Option 1	Simple supported Super T -type 4 girders (Precast prestressed concrete-1515mm deep), In-situ Column Piers with bored piles	13.5	222.85	3008.48	7	42	6	2
2	Option 2	Simple supported Precast prestressed 600 deep Void planks, , In-situ Column Piers with bored piles	13.5	225.0	3037.50	15	240	14	2
2	**Road B**								
1	Option 1	Simple supported Super T -type 4 girders (Precast prestressed concrete-1515mm deep), , In-situ Column Piers with bored piles	14.1	122.95	1733.60	4	24	3	2
2	Option 2	Simple supported Precast prestressed 600 deep Void planks, In-situ Column Piers with bored piles	14.1	120.0	1692.00	8	144	7	2
3	**Road C**								
1	Option 1	Simple supported Super T -type 4 girders (Precast prestressed concrete-1515mm deep), In-situ Column Piers with bored piles	13.5	121.55	1640.93	4	24	3	2
2.2	Option 2	Simple supported Precast prestressed 600 deep Void planks, In-situ Column Piers with bored piles	13.5	119.95	1619.33	8	128	7	2
4	**Road D**								
1	Option 1	Simple supported Super T -type 4 girders (Precast prestressed concrete-1515mm deep), , In-situ Column Piers with bored piles	13.5	101.2	1366.20	3	18	2	2
2	Option 2	Simple supported Precast prestressed 600 deep Void planks, In-situ Column Piers with bored piles	13.5	105.0	1417.50	7	112	6	2

Appendix C - TUFLOW flood modelling results

Flood level (mAHD)						
1.1 Macquarie River	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.1	
10%	-	261.1	-	259.7	-	
20%	-	-	260.0	-	-	

Flood level (mAHD)						
2.1 West Tributary	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.1	
10%	-	261.1	-	259.7	-	
20%	-	-	260.0	-	-	

Flood level (mAHD)						
4.1 West Tributary	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.1	
10%	-	261.1	-	259.7	-	
20%	-	-	260.0	-	-	

Flood level (mAHD)						
1.2 Eastern Overbank	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.7	-	
5%	262.1	-	-	-	260.1	
10%	-	261.1	-	259.7	-	
20%	-	-	260.0	-	-	

Flood level (mAHD)						
2.2 West Overbank	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.2	
10%	-	261.1	-	259.7	-	
20%	-	-	260.0	-	-	

Flood level (mAHD)						
4.2 West Overbank	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.2	
10%	-	261.1	-	259.7	-	
20%	-	-	260	-	-	

1.1						
1.3 Eastern Breakout	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.1	
10%	-	261.1	-	(no flood)	-	
20%	-	-	(no flood)	-	-	

Flood level (mAHD)						
2.3 Macquarie River	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.2	
10%	-	261.1	-	259.8	-	
20%	-	-	260	-	-	

Flood level (mAHD)						
4.3 Macquarie River	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.2	
10%	-	261.1	-	259.8	-	
20%	-	-	260	-	-	

Note that in the above diagram and tables flood levels correspond for following Road locations:

Location 2.1 and 3.1

Location 2.2 and 3.2

Location 2.3 and 3.3

Flood level (mAHD)						
4.4 Eastern Breakout	Talbragar River AEP					
Macquarie River AEP	1%	2%	5%	10%	20%	
1%	-	-	-	-	-	
2%	-	-	-	261.8	-	
5%	262.1	-	-	-	260.3	
10%	-	261.1	-	(no flood)	-	
20%	-	-	(no flood)	-	-	

The TUFLOW results are from modelling undertaken on behalf of RMS by Cardno Pty Ltd.
No modifications to this model have been undertaken.
It is noted that there are potential errors in the underlying DEM at the boundary between the 1D and 2D domains.
Whilst these errors are likely to be inconsequential for the purposes of the RMS modelling further refinement of this model may be required to improve the local accuracy of the terrain model within the vicinity of the proposed South Bridge.

Flood velocity (m/s)

1.1 Macquarie River	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	1.112	-
5%	1.139	-	-	-	1.439
10%	-	0.859	-	1.004	-
20%	-	-	0.6	-	-

Flood velocity (m/s)

2.1 West Tributary	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	0.956	-
5%	0.892	-	-	-	0.845
10%	-	0.838	-	0.834	-
20%	-	-	0.8	-	-

Flood velocity (m/s)

4.1 West Tributary	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	1.469	-
5%	1.393	-	-	-	1.378
10%	-	1.193	-	1.199	-
20%	-	-	0.9	-	-

Flood velocity (m/s)

1.2 Eastern Overbank	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	1.561	-
5%	1.507	-	-	-	0.703
10%	-	1.381	-	0.339	-
20%	-	-	0.2	-	-

Flood velocity (m/s)

2.2 West Overbank	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	0.747	-
5%	0.586	-	-	-	0.594
10%	-	0.388	-	0.354	-
20%	-	-	0.2	-	-

Flood velocity (m/s)

4.2 West Overbank	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	0.733	-
5%	0.561	-	-	-	0.568
10%	-	0.376	-	0.349	-
20%	-	-	0.219	-	-

Flood velocity (m/s)

1.3 Eastern Breakout	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	0.638	-
5%	0.544	-	-	-	0.4
10%	-	0.406	-	(no flood)	-
20%	-	-	(no flood)	-	-

Flood velocity (m/s)

2.3 Macquarie River	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	0.956	-
5%	0.721	-	-	-	0.934
10%	-	0.779	-	0.967	-
20%	-	-	0.616	-	-

Flood velocity (m/s)

4.3 Macquarie River	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	1.012	-
5%	0.758	-	-	-	0.98
10%	-	0.789	-	0.977	-
20%	-	-	0.615	-	-

Note that in the above diagram and tables velocities correspond for following Road locations:

Location 2.1 and 3.1

Location 2.2 and 3.2

Location 2.3 and 3.3

Flood velocity (m/s)

4.4 Eastern Breakout	Talbragar River AEP 1%	2%	5%	10%	20%
Macquarie River AEP 1%	-	-	-	-	-
2%	-	-	-	0.748	-
5%	0.952	-	-	-	0.237
10%	-	0.784	-	(no flood)	-
20%	-	-	(no flood)	-	-

The TUFLOW results are from modelling undertaken on behalf of RMS by Cardno Pty Ltd.
No modifications to this model have been undertaken.
It is noted that there are potential errors in the underlying DEM at the boundary between the 1D and 2D domains.
Whilst these errors are likely to be inconsequential for the purposes of the RMS modelling further refinement of this model may be required to improve the local accuracy of the terrain model within the vicinity of the proposed South Bridge.

Appendix D - Cost estimate

goeldnerconsulting
construction cost consultants

GHD

Dubbo South Bridge

Basis of Capital Cost Estimate

10207-BOE-001

11 June 2020

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SYNOPSIS

This document has been prepared to support the development of the Capital Cost Estimate for the Dubbo South Bridge.

Disclaimer

This report has been prepared on behalf of and for the exclusive use of GHD, and is subject to and issued in accordance with the agreement between GHD and Goeldner Consulting Pty Ltd. Goeldner Consulting Pty Ltd accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party. Copying this plan without the permission of GHD and Goeldner Consulting Pty Ltd is not permitted.

REV	DESCRIPTION	ORIG	APPROVER	DATE	CLIENT APPROVAL	DATE
A	Issued for use	D Simone	C Goeldner	06-12-19		
B	Revised Issue	D Simone	C Goeldner	04/03/20		
C	Revised Issue	C Goeldner	C Goeldner	11/06/20		

CONTENTS

Appendices

1 INTRODUCTION

1.1 Executive Summary

This document has been prepared to support the development of the Capital Cost Estimate for the Dubbo South Bridge as defined by the scope of work documents supplied by GHD. The basis of the estimate in terms of methodology and process in determining the capital cost value are the prime areas of focus of this document. This document provides a cost estimate for the following design options:

- Option 1 – Bligh St/Reakes Ave to Minore Rd
- Option 2 – South St to Minore Rd
- Option 3 – Tamworth St to Minore Rd
- Option 4 – Tamworth St to Yuille Court

1.2 Evaluation and Summary of the Estimate

The total P50 estimated cost of the overall project for each option as detailed in this document is summarised in Table 1-1 on the following page.

These amounts are based on March-2020 AUD dollars at a 50/50 probability of overrun/underrun (excludes, market forces, escalation and currency hedging).

Table 1-1. Cost Estimate Summary

DUBBO REGIONAL COUNCIL Dubbo South Bridge	Job No.	10207
	Date:	11 Jun 2020
	Revision:	C

Code	Description	Option 1		Option 2		Option 3		Option 4	
		$AUD	% TIC	$AUD	% TIC	$AUD	% TIC	$AUD	% TIC
	Total Cost	**$29,879,004**		**$31,448,368**		**$27,806,414**		**$21,648,607**	
	PRELIMINARIES	**$ 2,846,790**	**9.5%**	**$ 2,955,408**	**9.4%**	**$ 2,693,447**	**9.7%**	**$ 2,106,901**	**9.7%**
G1	CONTRACTOR PRELIMINARIES	$ 2,462,555	8.2%	$ 2,591,898	8.2%	$ 2,291,737	8.2%	$ 1,784,226	8.2%
G7	UTILITY ADJUSTMENT	$ 352,360	1.2%	$ 322,860	1.0%	$ 300,310	1.1%	$ 239,125	1.1%
G40	CLEARING AND GRUBBING	$ 31,875	0.1%	$ 40,650	0.1%	$ 101,400	0.4%	$ 83,550	0.4%
	ROADWORKS	**$ 7,320,169**	**24.5%**	**$ 13,709,054**	**43.6%**	**$ 11,549,712**	**41.5%**	**$ 8,851,874**	**40.9%**
R11	STORMWATER DRAINAGE	$ 384,410	1.3%	$ 1,601,328	5.1%	$ 1,110,990	4.0%	$ 1,086,873	5.0%
R15	KERBS AND GUTTERS	$ 160,965	0.5%	$ 256,545	0.8%	$ 122,610	0.4%	$ 100,140	0.5%
R33	TRENCH DRAINS	$ 276,256	0.9%	$ 192,674	0.6%	$ 192,674	0.7%	$ 162,731	0.8%
R44	EARTHWORKS	$ 3,811,732	12.8%	$ 6,907,171	22.0%	$ 6,738,441	24.2%	$ 4,478,823	20.7%
R71	CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE	$ 719,231	2.4%	$ 1,609,833	5.1%	$ 740,354	2.7%	$ 820,987	3.8%
R101	COLD MILLING OF ROAD PAVEMENT MATERIALS	$ 89,900	0.3%	$ 60,450	0.2%	$ 80,600	0.3%	$ 51,150	0.2%
R116	HEAVY DUTY DENSE GRADED ASPHALT	$ 587,502	2.0%	$ 941,263	3.0%	$ 547,410	2.0%	$ 538,030	2.5%
R131	GUIDE POSTS	$ 4,942	0.0%	$ 5,245	0.0%	$ 5,144	0.0%	$ 5,245	0.0%
R132	SAFETY BARRIER SYSTEMS	$ 100,925	0.3%	$ 142,525	0.5%	$ 136,000	0.5%	$ 156,520	0.7%
R141	PAVEMENT MARKING	$ 11,263	0.0%	$ 17,993	0.1%	$ 11,225	0.0%	$ 10,749	0.0%
R142	RETROREFLECTIVE RAISED PAVEMENT MARKERS	$ 1,293	0.0%	$ 2,477	0.0%	$ 1,414	0.0%	$ 1,426	0.0%
R143	SIGNPOSTING	$ 27,500	0.1%	$ 27,500	0.1%	$ 27,500	0.1%	$ 27,500	0.1%
R173	GENERAL CONCRETE PAVING	$ 609,450	2.0%	$ 569,700	1.8%	$ 546,850	2.0%	$ 412,600	1.9%
R178	VEGETATION	$ 84,800	0.3%	$ 116,600	0.4%	$ 106,000	0.4%	$ 116,600	0.5%
R201	FENCING		0.0%	$ 17,750	0.1%	$ 17,500	0.1%	$ 42,500	0.2%
R204	PROPERTY ADJUSTMENTS		0.0%	$ 940,000	3.0%	$ 865,000	3.1%	$ 540,000	2.5%
TS101	TRAFFIC CONTROL SIGNALS	$ 450,000	1.5%	$ 300,000	1.0%	$ 300,000	1.1%	$ 300,000	1.4%
	BRIDGE	**$ 12,816,890**	**42.9%**	**$ 7,526,590**	**23.9%**	**$ 7,146,390**	**25.7%**	**$ 5,694,000**	**26.3%**
B1	BRIDGE CONSTRUCTION	$ 12,289,890	41.1%	$ 7,077,090	22.5%	$ 6,727,890	24.2%	$ 5,508,000	25.4%
B2	BRIDGE SCOUR PROTECTION	$ 527,000	1.8%	$ 449,500	1.4%	$ 418,500	1.5%	$ 186,000	0.9%
	CONTINGENCY								
	Contingency at 30%	**$ 6,895,155**	**23.1%**	**$ 7,257,316**	**23.1%**	**$ 6,416,865**	**23.1%**	**$ 4,995,832**	**23.1%**
	OWNERS COSTS								
	Excluded	**$ -**	**0.0%**	**$ -**	**0.0%**	**$ -**	**0.0%**	**$ -**	**0.0%**

Notes to Table 1.1

1. All costs exclude GST
2. Market forces, escalation and currency hedging have been excluded from the cost estimate.

2 BASIS OF ESTIMATE

2.1 Purpose and Objective

The Cost Estimate was prepared by Goeldner Consulting to produce a Capital Cost Estimate with a target accuracy of ± 30% for each option of the Dubbo South Bridge project.

2.2 Extent of the Estimate

Goeldner Consulting has based the capital cost estimate on the engineering details, including material take-offs and historic data from similar projects.

2.3 Qualifications and Assumptions

The following qualifications and assumptions were noted when preparing the Capital Cost Estimate:

- Estimate base date is March 2020.
- The estimate has been developed based on a single civil contractor being appointed to execute the entire scope of work.
- A nominal 50hr working week has been assumed.
- No allowance for construction of temporary diversions. It is assumed diversions will utilise existing roads.
- No provision for delay costs with regard to permitting (e.g. excavation permits, confined space permits etc.) beyond what would be reasonably expected.
- The weather conditions are not of extreme proportions that may disrupt the continuance of safe work. No provision of 'force majeure' occurrences such as storms and resultant flooding or earthquakes are included in the cost estimate.
- All standards and procedures are in accordance with Australian Standards and codes of practice, together with good engineering practices.
- Estimate reflects material take offs supplied by GHD. Where this does not exist, allowances and provisions have been included.

2.4 Exclusions

- Project development costs including Route/Concept/EIS studies
- Investigation and Design costs
- Public utility adjustments
- Compensation of residents impacted by the works/diversions
- Compensation of emergency services/authorities impacted by the works/diversions
- Credit for salvaged materials

- Treatment and/or removal of contaminated soil/pavement materials.
- Escalation beyond March 2020
- The impact of related concurrent projects which may affect the availability of skilled construction labour has not been assessed.
- Changes to labour or industrial relations laws.
- Impact of market forces on commodity pricing (e.g. concrete supply, oil price variation).
- No allowance for additional costs due to abnormal weather such as El Niño events.
- No allowance for improvements to existing infrastructure or services outside the battery limits of the project.
- No allowance has been included for extended periods of industrial unrest.
- Finance and interest charges for project duration.
- GST.
- Any environmental requirement not identified in this estimate.
- No allowance for sunk costs (e.g. Cost of this and previous studies etc.).

3 QUANTITY AND COST BASIS

3.1 Quantity Basis

All quantities used in the estimate have been based on preliminary material take-offs provided by GHD.

3.2 Material Pricing

Rates for construction materials have been generally based on pricing from similar projects in Goeldner Consulting's database.

3.3 Bridge Pricing

Pricing for the concrete bridge is based on a per m2 rate due to the preliminary stage of the project. The following rates have been applied based on historic information and verbal advise from contractors.

a) Dual lane bridge $4,000/m2

3.4 Property Adjustments

An allowance for property adjustments has been included based on $10/m2

3.5 Labour

The manual labour rate is based on a nominal 50 hour work week. The direct labour manhours for the works have been based on Goeldner Consulting's database of similar projects and assessed according to current construction techniques, methodology and productivity of trades.

3.6 Preliminary Costs

An allowance for head contractor preliminary costs has been included based on 12% of construction costs. Preliminary costs include items such as contractor mobilisation/demoblisation, site facilities, temporary services, temporary construction works, traffic control, surveying, project plans and documentation

3.7 Escalation

No allowance has been included for escalation beyond the estimate base date.

3.8 Contingency

An allowance has been included based on 30% of the project cost.

3.9 Owners Costs

No allowance has been included for Owners costs. Owners costs may include, but are not limited to:

- Finance and capitalised interest for project duration.
- The Owners project team costs during the execution phase which includes travel and accommodation, miscellaneous business related costs.
- Cost of obtaining statutory and regulatory approvals for construction.
- Owners insurances, including those during construction (e.g. public liability, contractor's all-risks, workers compensation, public and professional liability).
- 3rd Party Consulting costs when engaged directly with the Principal.
- Industrial Relations consultant.
- Sunk Costs
- Local community compensation.

Appendix 1 Estimate Details – Option 1

ESTIMATE DETAILS
Dubbo South Bridge - Option 1

Pay Item	Description	Unit	Quantity	Rate	Total
	DIRECT COSTS				
G1	**PRELIMINARIES**				
G1P2	Allowance for contractor preliminaries including mobilisation/demoblisation, site facilities, temporary works, traffic control, surveying, project plans/documentation etc.	Lsum	1	2,462,555.28	2,462,555
G1	**PRELIMINARIES**				**2,462,555**
G7	**UTILITY ADJUSTMENT**				
G7P5.1	Electrical pole relocation x 1 poles	no	1	30,000.00	30,000
G7P6.1	Street lighting relocation - 7 x timber pole, OH feed	no	7	5,000.00	35,000
G7P6.2	Street lighting relocation - 1 x steel pole, UG feed	no	1	6,500.00	6,500
G7P8.1	Water main relocation	m	190	125.00	23,750
G7P8.2	Water main protection	m	9	365.00	3,285
G7P9.1	Sewer main adjustments	m	190	550.00	104,500
G7P9.2	Sewer main protection	m	173	525.00	90,825
G7P9.3	Telstra Adjustments - 250m conduit	m	250	90.00	22,500
G7P9.4	NBN Adjustments - 250m conduit	m	250	90.00	22,500
G7P9.5	Nextgen Adjustments - 150m conduit	m	150	90.00	13,500
G7	**UTILITY ADJUSTMENT**				**352,360**
G40	**CLEARING AND GRUBBING**				
G40P1	Clearing and Grubbing	m2	18,350	1.50	27,525
G4P03.2	Demolition of existing median island	m2	58	75.00	4,350
G40	**CLEARING AND GRUBBING**				**31,875**
R11	**STORMWATER DRAINAGE**				
R11P5	*Precast Concrete and Fibre-reinforced Concrete Pipes*				
R11P5.1	450mm Class 4 - RRJ RCP	m	780	291.50	227,370
R11P7	*Drainage Structures Other Than Pipes and Box Culverts*				
R11P7.1	Pit Type SA2	ea	52	3,020.00	157,040
R11	**STORMWATER DRAINAGE**				**384,410**
R15	**KERBS AND GUTTERS**				
R15P1.1	Type SA Kerb	m	2,090	45.00	94,050
R15P1.2	Type SF Kerb	m	1,915	33.00	63,195
R15P6	Removal of Kerbs and Gutter	m	248	15.00	3,720
R15	**KERBS AND GUTTERS**				**160,965**
R33	**TRENCH DRAINS**				
R33P2.1	100 mm dia Corrugated Perforated Plastic Drainage Pipe	m	2,890	18.00	52,020
R33P3.2	No Fines Concrete	m3	520	305.00	158,600
R33P4	Supply and Installation of Geotextile	m2	6,069	5.50	33,380
R33P6	Flat Batter Outlet	ea	42	768.00	32,256
R33	**TRENCH DRAINS**				**276,256**
R44	**EARTHWORKS**				
R44P1.1	Removal and Stockpiling of Non-contaminated Topsoil (Stockpile Volumes)	m3	3,050	18.50	56,425

ESTIMATE DETAILS
Dubbo South Bridge - Option 1

Pay Item	Description	Unit	Quantity	Rate	Total
R44P2.1	General Earthworks (Cut/Fill)	m3	4,210	24.02	101,124
R44P3	Imported or Borrowed Material (other than Selected Material, Verge Material and Foundation Treatment Material)	m3	38,000	82.00	3,116,000
R44P4	Unsuitable Material (Item with Provisional Quantity)	m3	200	95.02	19,004
R44P5.2	Selected Material Zone - Imported Material	m3	5,772	82.00	473,304
R44P7.1	Treatment Type E1 - Loosen and Recompact	m2	18,350	2.50	45,875
R44	**EARTHWORKS**				**3,811,732**
R71	**CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE**				
R71P1	Supply and Place Sub Base	m3	3,609	109.00	393,381
R71P2	Supply and Place Base	m3	2,450	133.00	325,850
R71	**CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE**				**719,231**
R101	**COLD MILLING OF ROAD PAVEMENT MATERIALS**				
R101P1	Milling to Specified Depth of Cut	m2	5,800	15.50	89,900
R101	**COLD MILLING OF ROAD PAVEMENT MATERIALS**				**89,900**
R116	**HEAVY DUTY DENSE GRADED ASPHALT**				
R116P1	Supply and Application of Tack Coat (Including Preparation of Surface)	m2	22,860		Included
R116P4....	14 mm Nominal Size, 50mm thick	m2	22,860	25.70	587,502
R116	**HEAVY DUTY DENSE GRADED ASPHALT**				**587,502**
R131	**GUIDE POSTS**				
R131P1	Supply and Installation of Guide Posts	ea	98	50.43	4,942
R131	**GUIDE POSTS**				**4,942**
R132	**SAFETY BARRIER SYSTEMS**				
R132P1	Removal of Safety Barriers	m	225	45.00	10,125
R132P3	*Construction of Post and Rail Safety Barriers*				
R132P3.1	Near side (single sided) post and rail barriers	m	360	180.00	64,800
R132P8	*Construction of End Treatments*				
R131P8.1	ET2000	ea	4	5,000.00	20,000
R131P9	*Construction of Transitions*				
R131P9.1	W Beam to Thrie Beam transition	ea	4	1,500.00	6,000
R132	**SAFETY BARRIER SYSTEMS**				**100,925**
R141	**PAVEMENT MARKING**				
R141P3	*Non-profile Thermoplastic Pavement Marking Material - Longitudinal Lines*				
R141P3.1	Line BB	m	1,280	2.60	3,328
R141P3.4	Line E1	m	2,560	1.95	4,992
R141P4	*Screeded or Sprayed Non-profile Thermoplastic Pavement Marking Material - Transverse Lines and Other Markings*				
R141P4.2	Line TB	m2	18	55.00	990
R141P4.3	Line PCW	m2	35.5	55.00	1,953
R141	**PAVEMENT MARKING**				**11,263**

ESTIMATE DETAILS
Dubbo South Bridge - Option 1

Pay Item	Description	Unit	Quantity	Rate	Total
R142	**RETROREFLECTIVE RAISED PAVEMENT MARKERS**				
R142P2	Installation of Retroreflective Raised Pavement Markers	ea	213	6.07	1,293
R142	**RETROREFLECTIVE RAISED PAVEMENT MARKERS**				**1,293**
R143	**SIGNPOSTING**				
R143P2.1	General regulatory signs	ea	50	550.00	27,500
R143	**SIGNPOSTING**				**27,500**
R173	**GENERAL CONCRETE PAVING**				
R173P1	*Concrete Paving*				
R173P1.1	125mm thick Concrete with SL82 Mesh - Footpath	m2	5,220	85.00	443,700
R173P1.2	150mm thick concrete with SL82 Mesh - Median	m2	1,105	150.00	165,750
R173	**GENERAL CONCRETE PAVING**				**609,450**
R178	**VEGETATION**				
R178P2.2	Areas steeper than 5 to 1 except stepped batters.	m2	16,000	3.80	60,800
R178P8	Hydromulching and organic fibre mesh (jute mesh)	m2	16,000	1.50	24,000
R178	**VEGETATION**				**84,800**
	TRAFFIC CONTROLS				
TS101	*TRAFFIC CONTROL SIGNALS*				
TS101P1.1	Construction of Traffic Signals (21 x signal post & lanterns, 3 x controller box)	Lsum	1	450,000.00	450,000
	TRAFFIC CONTROLS				**450,000**
	BRIDGES				
B	*BRIDGE*				
C	Construction of Bridge - 13.5m wide Super-T construction	m	225	54,000.00	12,150,000
D	Construction of Retaining Walls -1.5m high	m	120	1,165.75	139,890
B1	*Bridge Scour Protection*				
B1.1	Bridge abutments scour protection	m2	2,800	155.00	434,000
B1.2	Bridge piers x 6 (assume 100m2 per pier)	m2	600	155.00	93,000
	BRIDGES				**12,816,890**
	DIRECT COSTS				**22,983,849**
	CONTINGENCY				
B1.3	Allowance for contingency 30%	Lsum	1	6,895,154.78	6,895,155
	CONTINGENCY				**6,895,155**
	TOTAL				**29,879,004**

Appendix 2 Estimate Details – Option 2

ESTIMATE DETAILS
Dubbo South Bridge - Option 2

Pay Item	Description	Unit	Quantity	Rate	Total
	DIRECT COSTS				
G1	**PRELIMINARIES**				
1	Allowance for contractor preliminaries including mobilisation/demoblisation, site facilities, temporary works, traffic control, surveying, project plans/documentation etc.	Lsum	1	2,591,898.48	2,591,898
G1	**PRELIMINARIES**				**2,591,898**
G7	**UTILITY ADJUSTMENT**				
G7P5.1	Electrical pole relocation x 3 poles	no	3	30,000.00	90,000
G7P6.1	Street lighting relocation - 7 x timber pole, OH feed	no	7	5,000.00	35,000
G7P6.2	Street lighting relocation - 1 x steel pole, UG feed	no	1	6,500.00	6,500
G7P8.1	Water main relocation	m	190	125.00	23,750
G7P8.2	Water main protection	m	9	365.00	3,285
G7P9.1	Sewer main adjustments	m	165	550.00	90,750
G7P9.2	Sewer main protection	m	63	525.00	33,075
G7P10.1	Telstra Adjustments	m	150	90.00	13,500
G7P10.2	NBN Adjustments	m	150	90.00	13,500
G7P10.3	Nextgen Adjustments	m	150	90.00	13,500
G7	**UTILITY ADJUSTMENT**				**322,860**
G40	**CLEARING AND GRUBBING**				
G40P1	Clearing and Grubbing	m2	24,600	1.50	36,900
G4P03.2	Demolition of existing median island	m2	50	75.00	3,750
G40	**CLEARING AND GRUBBING**				**40,650**
R11	**STORMWATER DRAINAGE**				
R11P5	*Precast Concrete and Fibre-reinforced Concrete Pipes*				
R11P5.1	450mm Class 4 - RRJ RCP	m	1,665	291.50	485,348
R11P6	*Precast Concrete Box Culvert Structures*				
R11P6.1	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.2	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.3	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.4	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.5	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.6	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.7	3 Cell 3600mm x 3600mm x 55m RCBC	m	55	7,380.00	405,900
R11P7	*Drainage Structures Other Than Pipes and Box Culverts*				
R11P7.1	Pit Type SA2	ea	110	3,020.00	332,200
R11P7	*Headwall Inlet and outlet scour portection*				
R11P7.2	Rock scour protection placed of geotextile	m2	180	155.00	27,900
R11	**STORMWATER DRAINAGE**				**1,601,328**
R15	**KERBS AND GUTTERS**				
R15P1.1	Type SA Kerb	m	4,457	45.00	200,565
R15P1.2	Type SF Kerb	m	1,620	33.00	53,460

Pay Item	Description	Unit	Quantity	Rate	Total
R15P6	Removal of Kerbs and Gutter	m	168	15.00	2,520
R15	**KERBS AND GUTTERS**				**256,545**
R33	**TRENCH DRAINS**				
R33P2.1	100 mm dia Corrugated Perforated Plastic Drainage Pipe	m	1,925	18.00	34,650
R33P3.2	No Fines Concrete	m2	347	305.00	105,835
R33P4	Supply and Installation of Geotextile	m3	4,043	5.50	22,237
R33P6	Flat Batter Outlet	ea	39	768.00	29,952
R33	**TRENCH DRAINS**				**192,674**
R44	**EARTHWORKS**				
R44P1.1	Removal and Stockpiling of Non-contaminated Topsoil (Stockpile Volumes)	m3	4,330	20.00	86,600
R44P3	Imported or Borrowed Material (other than Selected Material, Verge Material and Foundation Treatment Material)	m3	68,285	82.00	5,599,370
R44P4	Unsuitable Material (Item with Provisional Quantity)	m3	1,560	95.02	148,231
R44P5.2	Selected Material Zone - Imported Material	m3	12,335	82.00	1,011,470
R44P7.1	Treatment Type E1 - Loosen and Recompact	m2	24,600	2.50	61,500
R44	**EARTHWORKS**				**6,907,171**
R71	**CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE**				
R71P1	Supply and Place Sub Base	m3	7,919	109.00	863,171
R71P2	Supply and Place Base	m3	5,614	133.00	746,662
R71	**CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE**				**1,609,833**
R101	**COLD MILLING OF ROAD PAVEMENT MATERIALS**				
R101P1	Milling to Specified Depth of Cut	m2	3,900	15.50	60,450
R101	**COLD MILLING OF ROAD PAVEMENT MATERIALS**				**60,450**
R116	**HEAVY DUTY DENSE GRADED ASPHALT**				
R116P1	Supply and Application of Tack Coat (Including Preparation of Surface)	m2	36,625		Included
R116P4....	14 mm Nominal Size, 50mm thick	m2	36,625	25.70	941,263
R116	**HEAVY DUTY DENSE GRADED ASPHALT**				**941,263**
R131	**GUIDE POSTS**				
R131P1	Supply and Installation of Guide Posts	ea	104	50.43	5,245
R131	**GUIDE POSTS**				**5,245**
R132	**SAFETY BARRIER SYSTEMS**				
R132P1	Removal of Safety Barriers	m	225	45.00	10,125
R132P3	*Construction of Post and Rail Safety Barriers*				
R132P3.1	Near side (single sided) post and rail barriers	m	480	180.00	86,400
R132P8	*Construction of End Treatments*				
R132P8.1	ET2000	ea	8	5,000.00	40,000
R132P9	*Construction of Transitions*				
R132P9.1	W Beam to Thrie Beam transition	ea	4	1,500.00	6,000

ESTIMATE DETAILS
Dubbo South Bridge - Option 2

Pay Item	Description	Unit	Quantity	Rate	Total
R132	**SAFETY BARRIER SYSTEMS**				**142,525**
R141	**PAVEMENT MARKING**				
R141P3	*Non-profile Thermoplastic Pavement Marking Material - Longitudinal Lines*				
R141P3.1	Line BB	m	2,450	2.60	6,370
R141P3.4	Line E1	m	4,900	1.95	9,555
R141P4	*Screeded or Sprayed Non-profile Thermoplastic Pavement Marking Material - Transverse Lines and Other Markings*				
R141P4.2	Line TB	m2	11	55.00	605
R141P4.3	Line PCW	m2	26.6	55.00	1,463
R141	**PAVEMENT MARKING**				**17,993**
R142	**RETROREFLECTIVE RAISED PAVEMENT MARKERS**				
R142P2	Installation of Retroreflective Raised Pavement Markers	ea	408	6.07	2,477
R142	**RETROREFLECTIVE RAISED PAVEMENT MARKERS**				**2,477**
R143	**SIGNPOSTING**				
R143P2.1	General regulatory signs	ea	50	550.00	27,500
R143	**SIGNPOSTING**				**27,500**
R173	**GENERAL CONCRETE PAVING**				
R173P1	*Concrete Paving*				
R173P1.1	125mm thick Concrete with SL82 Mesh - Footpath	m2	5,820	85.00	494,700
R173P1.2	150mm thick concrete with SL82 Mesh - Median	m2	500	150.00	75,000
R173	**GENERAL CONCRETE PAVING**				**569,700**
R178	**VEGETATION**				
R178P2.2	Areas steeper than 5 to 1 except stepped batters.	m2	22,000	3.80	83,600
R178P8	Hydromulching and organic fibre mesh (jute mesh)	m2	22,000	1.50	33,000
R178	**VEGETATION**				**116,600**
R201	**FENCING**				
R201P1	Rural Fencing - Wire	m	710	25.00	17,750
R201	**FENCING**				**17,750**
R204	**PROPERTY ADJUSTMENTS**				
R204P1	Property Adjustments	m2	94,000	10.00	940,000
R204	**PROPERTY ADJUSTMENTS**				**940,000**
	TRAFFIC CONTROLS				
TS101	*TRAFFIC CONTROL SIGNALS*				
TS101P1.1	Construction of Traffic Signals (14 x signal post & lanterns, 2 x controller box)	Lsum	1	300,000.00	300,000
	TRAFFIC CONTROLS				**300,000**
	BRIDGES				
B	*BRIDGE*				
G2	Construction of Bridge - 123m	m	123	56,400.00	6,937,200
B1.3	Reinforced concrete retaining wall - average height 1.5m	m	120	1,165.75	139,890

ESTIMATE DETAILS
Dubbo South Bridge - Option 2

Pay Item	Description	Unit	Quantity	Rate	Total
B1	*Bridge Scour Protection*				
B1.1	Bridge abutments scour protection	m2	2,500	155.00	387,500
B1.2	Bridge piers x 4 (assume 100m2 per pier)	m2	400	155.00	62,000
	BRIDGES				**7,526,590**
	DIRECT COSTS				**24,191,052**
	CONTINGENCY				
B1.3	Allowance for contingency 30%	Lsum	1	7,257,315.74	7,257,316
	CONTINGENCY				**7,257,316**
	TOTAL				**31,448,368**

Appendix 3 Estimate Details – Option 3

ESTIMATE DETAILS
Dubbo South Bridge - Option 3

Pay Item	Description	Unit	Quantity	Rate	Total
	DIRECT COSTS				
	PRELIMINARIES				
1	Allowance for contractor preliminaries including mobilisation/demoblisation, site facilities, temporary works, traffic control, surveying, project plans/documentation etc.	Lsum	1	2,291,737.44	2,291,737
	PRELIMINARIES				**2,291,737**
	UTILITY ADJUSTMENT				
G7P5.1	Electrical pole relocation x 3 poles	no	3	30,000.00	90,000
G7P6.1	Street lighting relocation - 2 x timber pole, OH feed	no	2	5,000.00	10,000
G7P8.1	Water main relocation	m	350	125.00	43,750
G7P8.2	Water main protection	m	9	365.00	3,285
G7P9.1	Sewer main adjustments	m	110	550.00	60,500
G7P9.2	Sewer main protection	m	31	525.00	16,275
G7P10.1	Telstra Adjustments - 500m conduit	m	500	90.00	45,000
G7P10.2	NBN Adjustments - 200m conduit	m	200	90.00	18,000
G7P10.3	Nextgen Adjustments - 150m conduit	m	150	90.00	13,500
	UTILITY ADJUSTMENT				**300,310**
G40	**CLEARING AND GRUBBING**				
G40P1	Clearing and Grubbing	m2	24,000	1.50	36,000
G4P03.1	Demolition of existing footpath	m2	850	75.00	63,750
G4P03.2	Demolition of existing median island	m2	22	75.00	1,650
G40	**CLEARING AND GRUBBING**				**101,400**
R11	**STORMWATER DRAINAGE**				
R11P5	*Precast Concrete and Fibre-reinforced Concrete Pipes*				
R11P5.1	450mm Class 4 - RRJ RCP	m	720	291.50	209,880
R11P6	*Precast Concrete Box Culvert Structures*				
R11P6.1	1 Cell 1200mm x 1200mm x 35m RCBC	m	35	1,535.00	53,725
R11P6.2	1 Cell 1200mm x 1200mm x 35m RCBC	m	35	1,535.00	53,725
R11P6.3	1 Cell 1200mm x 1200mm x 35m RCBC	m	35	1,535.00	53,725
R11P6.4	1 Cell 1200mm x 1200mm x 35m RCBC	m	35	1,535.00	53,725
R11P6.5	1 Cell 1200mm x 1200mm x 35m RCBC	m	35	1,535.00	53,725
R11P6.6	1 Cell 1200mm x 1200mm x 35m RCBC	m	35	1,535.00	53,725
R11P6.7	3 Cell 3600mm x 3600mm x 55m RCBC	m	55	7,380.00	405,900
R11P7	*Drainage Structures Other Than Pipes and Box Culverts*				
R11P7.1	Pit Type SA2	ea	48	3,020.00	144,960
R11P?	*Headwall Inlet and outlet scour portection*				
R11P?.?	Rock scour protection placed of geotextile	m2	180	155.00	27,900
R11	**STORMWATER DRAINAGE**				**1,110,990**
R15	**KERBS AND GUTTERS**				
R15P1.1	Type SA Kerb	m	1,925	45.00	86,625
R15P1.2	Type SF Kerb	m	1,015	33.00	33,495

Pay Item	Description	Unit	Quantity	Rate	Total
R15P6	Removal of Kerbs and Gutter	m	166	15.00	2,490
R15	**KERBS AND GUTTERS**				**122,610**
R33	**TRENCH DRAINS**				
R33P2.1	100 mm dia Corrugated Perforated Plastic Drainage Pipe	m	1,925	18.00	34,650
R33P3.2	No Fines Concrete	m2	347	305.00	105,835
R33P4	Supply and Installation of Geotextile	m3	4,043	5.50	22,237
R33P6	Flat Batter Outlet	ea	39	768.00	29,952
R33	**TRENCH DRAINS**				**192,674**
R44	**EARTHWORKS**				
R44P1.1	Removal and Stockpiling of Non-contaminated Topsoil (Stockpile Volumes)	m3	4,140	20.00	82,800
R44P3	Imported or Borrowed Material (other than Selected Material, Verge Material and Foundation Treatment Material)	m3	72,720	82.00	5,963,040
R44P4	Unsuitable Material (Item with Provisional Quantity)	m3	1,440	95.02	136,829
R44P5.2	Selected Material Zone - Imported Material	m3	6,046	82.00	495,772
R44P7.1	Treatment Type E1 - Loosen and Recompact	m2	24,000	2.50	60,000
R44	**EARTHWORKS**				**6,738,441**
R71	**CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE**				
R71P1	Supply and Place Sub Base	m3	3,743	109.00	407,987
R71P2	Supply and Place Base	m3	2,499	133.00	332,367
R71	**CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE**				**740,354**
R101	**COLD MILLING OF ROAD PAVEMENT MATERIALS**				
R101P1	Milling to Specified Depth of Cut	m2	5,200	15.50	80,600
R101	**COLD MILLING OF ROAD PAVEMENT MATERIALS**				**80,600**
R116	**HEAVY DUTY DENSE GRADED ASPHALT**				
R116P1	Supply and Application of Tack Coat (Including Preparation of Surface)	m2	21,300		Included
R116P4....	14 mm Nominal Size, 50mm thick	m2	21,300	25.70	547,410
R116	**HEAVY DUTY DENSE GRADED ASPHALT**				**547,410**
R131	**GUIDE POSTS**				
R131P1	Supply and Installation of Guide Posts	ea	102	50.43	5,144
R131	**GUIDE POSTS**				**5,144**
R132	**SAFETY BARRIER SYSTEMS**				
R132P1	Removal of Safety Barriers	m	80	45.00	3,600
R132P3	*Construction of Post and Rail Safety Barriers*				
R132P3.1	Near side (single sided) post and rail barriers	m	480	180.00	86,400
R132P8	*Construction of End Treatments*				
R132P8.1	ET2000	ea	8	5,000.00	40,000
R132P9	*Construction of Transitions*				
R132P9.1	W Beam to Thrie Beam transition	ea	4	1,500.00	6,000

ESTIMATE DETAILS
Dubbo South Bridge - Option 3

Pay Item	Description	Unit	Quantity	Rate	Total
R132	**SAFETY BARRIER SYSTEMS**				**136,000**
R141	**PAVEMENT MARKING**				
R141P3	*Non-profile Thermoplastic Pavement Marking Material - Longitudinal Lines*				
R141P3.1	Line BB	m	1,400	2.60	3,640
R141P3.4	Line E1	m	2,800	1.95	5,460
R141P4	*Screeded or Sprayed Non-profile Thermoplastic Pavement Marking Material - Transverse Lines and Other Markings*				
R141P4.2	Line TB	m2	12	55.00	660
R141P4.3	Line PCW	m2	26.63	55.00	1,465
R141	**PAVEMENT MARKING**				**11,225**
R142	**RETROREFLECTIVE RAISED PAVEMENT MARKERS**				
R142P2	Installation of Retroreflective Raised Pavement Markers	ea	233	6.07	1,414
R142	**RETROREFLECTIVE RAISED PAVEMENT MARKERS**				**1,414**
R143	**SIGNPOSTING**				
R143P2.1	General regulatory signs	ea	50	550.00	27,500
R143	**SIGNPOSTING**				**27,500**
R173	**GENERAL CONCRETE PAVING**				
R173P1	*Concrete Paving*				
R173P1.1	125mm thick Concrete with SL82 Mesh - Footpath	m2	4,810	85.00	408,850
R173P1.2	150mm thick concrete with SL82 Mesh - Median	m2	920	150.00	138,000
R173	**GENERAL CONCRETE PAVING**				**546,850**
R178	**VEGETATION**				
R178P2.2	Areas steeper than 5 to 1 except stepped batters.	m2	20,000	3.80	76,000
R178P8	Hydromulching and organic fibre mesh (jute mesh)	m2	20,000	1.50	30,000
R178	**VEGETATION**				**106,000**
R201	**FENCING**				
R201P1	Rural Fencing - Wire	m	700	25.00	17,500
R201	**FENCING**				**17,500**
R204	**PROPERTY ADJUSTMENTS**				
R204P1	Property Adjustments	m2	86,500	10.00	865,000
R204	**PROPERTY ADJUSTMENTS**				**865,000**
	TRAFFIC CONTROLS				
TS101	*TRAFFIC CONTROL SIGNALS*				
TS101P1.1	Construction of Traffic Signals (14 x signal post & lanterns, 2 x controller box)	Lsum	1	300,000.00	300,000
	TRAFFIC CONTROLS				**300,000**
	BRIDGES				
B	*BRIDGE*				
G2	Construction of Bridge - 122m	m	122	54,000.00	6,588,000
G3	Construction of Retaining Walls - 120m length average height 1.5m	m	120	1,165.75	139,890

ESTIMATE DETAILS
Dubbo South Bridge - Option 3

Pay Item	Description	Unit	Quantity	Rate	Total
B1	*Bridge Scour Protection*				
B1.1	Bridge abutments scour protection	m2	2,400	155.00	372,000
B1.2	Bridge piers x 3 (assume 100m2 per pier)	m2	300	155.00	46,500
	BRIDGES				**7,146,390**
	DIRECT COSTS				**21,389,549**
	CONTINGENCY				
B1.3	Allowance for contingency 30%	Lsum	1	6,416,864.83	6,416,865
	CONTINGENCY				**6,416,865**
	TOTAL				**27,806,414**

Appendix 4 Estimate Details – Option 4

ESTIMATE DETAILS
Dubbo South Bridge - Option 4

Pay Item	Description	Unit	Quantity	Rate	Total
	DIRECT COSTS				
G1	**PRELIMINARIES**				
1	Allowance for contractor preliminaries including mobilisation/demoblisation, site facilities, temporary works, traffic control, surveying, project plans/documentation etc.	Lsum	1	1,784,225.88	1,784,226
G1	**PRELIMINARIES**				**1,784,226**
G7	**UTILITY ADJUSTMENT**				
G7P5.1	Electrical pole relocation x 2 poles	no	2	30,000.00	60,000
G7P6.1	Street lighting relocation - 2 x timber pole, OH feed	no	2	5,000.00	10,000
G7P6.2	Street lighting relocation - 1 x steel pole, UG feed	no	1	6,500.00	6,500
G7P8.1	Water main relocation	m	305	125.00	38,125
G7P9.2	Sewer main protection	m	100	525.00	52,500
G7P10.1	Telstra Adjustments - 450m conduit	m	450	90.00	40,500
G7P10.2	NBN Adjustments - 200m conduit	m	200	90.00	18,000
G7P10.3	Nextgen Adjustments - 150m conduit	m	150	90.00	13,500
G7	**UTILITY ADJUSTMENT**				**239,125**
G40	**CLEARING AND GRUBBING**				
G40P1	Clearing and Grubbing	m2	11,850	1.50	17,775
G4P03.1	Demolition of existing footpath	m2	850	75.00	63,750
G4P03.2	Demolition of existing median island	m2	27	75.00	2,025
G40	**CLEARING AND GRUBBING**				**83,550**
R11	**STORMWATER DRAINAGE**				
R11P5	*Precast Concrete and Fibre-reinforced Concrete Pipes*				
R11P5.1	450mm Class 4 - RRJ RCP	m	615	291.50	179,273
R11P6	*Precast Concrete Box Culvert Structures*				
R11P6.1	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.2	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.3	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.4	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.5	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.6	1 Cell 1200mm x 1200mm x 38m RCBC	m	38	1,535.00	58,330
R11P6.7	3 Cell 3600mm x 3600mm x 55m RCBC	m	55	7,380.00	405,900
R11P7	*Drainage Structures Other Than Pipes and Box Culverts*				
R11P7.1	Pit Type SA2	ea	41	3,020.00	123,820
R11P7	*Headwall Inlet and outlet scour portection*				
R11P7.2	Rock scour protection placed of geotextile	m2	180	155.00	27,900
R11	**STORMWATER DRAINAGE**				**1,086,873**
R15	**KERBS AND GUTTERS**				
R15P1.1	Type SA Kerb	m	1,625	45.00	73,125
R15P1.2	Type SF Kerb	m	575	33.00	18,975
R15P6	Removal of Kerbs and Gutter	m	536	15.00	8,040

ESTIMATE DETAILS
Dubbo South Bridge - Option 4

Pay Item	Description	Unit	Quantity	Rate	Total
R15	**KERBS AND GUTTERS**				**100,140**
R33	**TRENCH DRAINS**				
R33P2.1	100 mm dia Corrugated Perforated Plastic Drainage Pipe	m	1,625	18.00	29,250
R33P3.2	No Fines Concrete	m2	293	305.00	89,365
R33P4	Supply and Installation of Geotextile	m3	3,413	5.50	18,772
R33P6	Flat Batter Outlet	ea	33	768.00	25,344
R33	**TRENCH DRAINS**				**162,731**
R44	**EARTHWORKS**				
R44P1.1	Removal and Stockpiling of Non-contaminated Topsoil (Stockpile Volumes)	m3	4,760	20.00	95,200
R44P3	Imported or Borrowed Material (other than Selected Material, Verge Material and Foundation Treatment Material)	m3	45,060	82.00	3,694,920
R44P4	Unsuitable Material (Item with Provisional Quantity)	m3	1,200	95.02	114,024
R44P5.2	Selected Material Zone - Imported Material	m3	6,647	82.00	545,054
R44P7.1	Treatment Type E1 - Loosen and Recompact	m2	11,850	2.50	29,625
R44	**EARTHWORKS**				**4,478,823**
R71	**CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE**				
R71P1	Supply and Place Sub Base	m3	4,135	109.00	450,715
R71P2	Supply and Place Base	m3	2,784	133.00	370,272
R71	**CONSTRUCTION OF UNBOUND AND MODIFIED PAVEMENT COURSE**				**820,987**
R101	**COLD MILLING OF ROAD PAVEMENT MATERIALS**				
R101P1	Milling to Specified Depth of Cut	m2	3,300	15.50	51,150
R101	**COLD MILLING OF ROAD PAVEMENT MATERIALS**				**51,150**
R116	**HEAVY DUTY DENSE GRADED ASPHALT**				
R116P1	Supply and Application of Tack Coat (Including Preparation of Surface)	m2	20,935		Included
R116P4....	14 mm Nominal Size, 50mm thick	m2	20,935	25.70	538,030
R116	**HEAVY DUTY DENSE GRADED ASPHALT**				**538,030**
R131	**GUIDE POSTS**				
R131P1	Supply and Installation of Guide Posts	ea	104	50.43	5,245
R131	**GUIDE POSTS**				**5,245**
R132	**SAFETY BARRIER SYSTEMS**				
R132P1	Removal of Safety Barriers	m	536	45.00	24,120
R132P3	*Construction of Post and Rail Safety Barriers*				
R132P3.1	Near side (single sided) post and rail barriers	m	480	180.00	86,400
R132P8	*Construction of End Treatments*				
R132P8.1	ET2000	ea	8	5,000.00	40,000
R132P9	*Construction of Transitions*				
R132P9.1	W Beam to Thrie Beam transition	ea	4	1,500.00	6,000
R132	**SAFETY BARRIER SYSTEMS**				**156,520**

ESTIMATE DETAILS
Dubbo South Bridge - Option 4

Pay Item	Description	Unit	Quantity	Rate	Total
R141	**PAVEMENT MARKING**				
R141P3	*Non-profile Thermoplastic Pavement Marking Material - Longitudinal Lines*				
R141P3.1	Line BB	m	1,410	2.60	3,666
R141P3.4	Line E1	m	2,820	1.95	5,499
R141P4	*Screeded or Sprayed Non-profile Thermoplastic Pavement Marking Material - Transverse Lines and Other Markings*				
R141P4.2	Line TB	m2	11	55.00	605
R141P4.3	Line PCW	m2	17.8	55.00	979
R141	**PAVEMENT MARKING**				**10,749**
R142	**RETROREFLECTIVE RAISED PAVEMENT MARKERS**				
R142P2	Installation of Retroreflective Raised Pavement Markers	ea	235	6.07	1,426
R142	**RETROREFLECTIVE RAISED PAVEMENT MARKERS**				**1,426**
R143	**SIGNPOSTING**				
R143P2.1	General regulatory signs	ea	50	550.00	27,500
R143	**SIGNPOSTING**				**27,500**
R173	**GENERAL CONCRETE PAVING**				
R173P1	*Concrete Paving*				
R173P1.1	125mm thick Concrete with SL82 Mesh - Footpath	m2	4,060	85.00	345,100
R173P1.2	150mm thick concrete with SL82 Mesh - Median	m2	450	150.00	67,500
R173	**GENERAL CONCRETE PAVING**				**412,600**
R178	**VEGETATION**				
R178P2.2	Areas steeper than 5 to 1 except stepped batters.	m2	22,000	3.80	83,600
R178P8	Hydromulching and organic fibre mesh (jute mesh)	m2	22,000	1.50	33,000
R178	**VEGETATION**				**116,600**
R201	**FENCING**				
R201P1	Rural Fencing - Wire	m	1,700	25.00	42,500
R201	**FENCING**				**42,500**
R204	**PROPERTY ADJUSTMENTS**				
R204P1	Property Adjustments	m2	54,000	10.00	540,000
R204	**PROPERTY ADJUSTMENTS**				**540,000**
	TRAFFIC CONTROLS				
TS101	*TRAFFIC CONTROL SIGNALS*				
TS101P1.1	Construction of Traffic Signals (14 x signal post & lanterns, 2 x controller box)	Lsum	1	300,000.00	300,000
	TRAFFIC CONTROLS				**300,000**
	BRIDGES				
B	*BRIDGE*				
G2	Construction of Bridge - 102m	m	102	54,000.00	5,508,000
B1	*Bridge Scour Protection*				

ESTIMATE DETAILS
Dubbo South Bridge - Option 4

Pay Item	Description	Unit	Quantity	Rate	Total
B1.1	Bridge abutments scour protection	m2	1,000	155.00	155,000
B1.2	Bridge piers x 2 (assume 100m2 per pier)	m2	200	155.00	31,000
	BRIDGES				**5,694,000**
	DIRECT COSTS				**16,652,775**
	CONTINGENCY				
B1.3	Allowance for contingency 30%	Lsum	1	4,995,832.46	4,995,832
	CONTINGENCY				**4,995,832**
	TOTAL				**21,648,607**

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12511689-85284/https://projectsportal.ghd.com/sites/pp01_04/drcsouthbridgeconcep/ProjectDocs/12511689-REP-Strategic Concept Options Report.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
1	L Schneider / E Mitchell / n Vu	S Farrell	SF*	D Mees	DM*	12/06/2020

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