Conybeare Morrison

Berry Bypass Urban Design Strategy

Berry Bridge and Northern Interchange Precinct
Concept Design Summary Report - 80% Issue

May 2012

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Revision	Date	Description	By	Chk	App
01	02/05/12	First Draft for Comment	DA	EC	DA
02	02/05/12	Client Comments - 80% Issue	DA		

Glossary

Carriageway
Road surface used by vehicles, including both traffic lanes and shoulders.

CLD
Context Landscape Design

CRG
Community Reference Group.

CPTED
Crime Prevention Through Environmental Design - the design of the built environment which can lead to a reduction in fear of crime and incidence of crime.

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Cycle Path
A path dedicated for cyclist use.

DDA
Disability Discrimination Act, 1992.

DEC
Department of Environment and Conservation

EIS
Environmental Impact Statement.

ESD
Environmentally Sustainable Design.

EP&A Act
Environmental Planning and Assessment Act, 1979.

Footpath
Pavement for use by pedestrians and the disabled.

Footway
Zone between road kerb and road reservation boundary, typically incorporating a footpath and/or nature strip.

GA
General Arrangement

LEP
Local Environmental Plan.

LGA
Local Government Area.

On-road Cycleway
A dedicated lane near the shoulder of the road for the use of commuter cyclists only.

Parapet
Traffic crash barrier at the edge of a bridge, viaduct or tunnel portal structure.

REF
Review of Environmental Factors

Road Reservation
Corridor for road carriageway, footways, batter slopes, etc.

RMS

Roads and Maritime Services, NSW

SCC
Shoalhaven City Council

Shared Path
Pathway shared by both pedestrians and cyclists.

Shoulder
The portion of a carriageway beyond the traffic lanes adjacent to, and flush with, the pavement surface.

Soffit
The underside of an elevated structure, such as a bridge or viaduct.

The Proposal
Works associated with the proposed Foxground and Berry Bypass, including associated parks, local road, pedestrian and cyclist facilities.

Type F Barrier
Tapered, redirective, concrete traffic safety barrier.

Undercroft
Area under a bridge without access to direct sunlight and rain.

Verge
Part of a road formation, not sealed, with a carriageway, footpath or cycleway.

Visual Catchment
The area from which an object is viewed.

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Figure 1: North berry bypass route study precincts.

1.0 Introduction

1.1 Purpose

This report describes the Urban Design Strategy for the Berry Bridge and Northern Interchange Precinct of the Foxground and Berry Bypass project.

1.2 Study objectives

The study objectives are to:

- Develop an Urban Design Strategy and Report.
- Participate in a process of meetings and workshops that engages the community and key stakeholders.
- Identify mitigation measures, ideas and opportunities for project structures including the Kangaroo Valley Road Interchange, Berry Bridge and the Northern Interchange.
- Develop urban design concepts for adjoining Berry streets, public recreational spaces and for pedestrian and cycle movement.
- Prepare a Concept Design Summary Report for inclusion in the EIS.
- Prepare a detailed Urban Design Report and 'Reference Design' to inform future construction contract works.

1.3 Scope

The study focuses on the approximately 2.5km section of the Foxground and Berry Bypass (FBB) route that is proposed to the north of Berry, in the vicinity of the township, extending from the Northern Interchange to the northeast of Berry, to the Kangaroo Valley Road Interchange to the west.

The study area includes the Berry Bridge, the North Street precinct and all associated works required to integrate the project with the local street network, property access, pedestrian and cyclist connections, and includes the urban and landscape design of 'residual land parcels' that will be utilised for the agistment of stock or for public open space.

1.4 Consultation – a collaborative design process

The development of the Urban Design Strategy has involved an iterative working process - identifying urban design opportunities, developing concept design options, and testing these through 3D modeling and photomontage.

The urban design process has benefited from the feedback provided from a community engagement process commenced in 2011 and followed by a series of community workshops held in Berry in 2012. Also from meetings with key stakeholders such as Shoalhaven City Council (SCC) and through the review of fellow design professionals - a collaborative design process, working with the RMS Project Design Team, including the RMS Project Manager, Environmental Assessment (EA) Manager and Urban Design Manager, including the design engineers at Aecom and the specialist Bridge Designers of the Aurecon Group.

1.5 Study precincts

The Berry Bypass Urban Design Strategy encompasses three interconnected study precincts:

- Berry Bridge and Northern Interchange Precinct
- North Street Precinct
- Kangaroo Valley Road Interchange and Victoria Street Precinct

This report and the associated community consultation groups are structured, based on these three interconnected precincts.

2.0 Holistic design approach

The urban design approach has been one that pursues an integrated outcome. We understand there needs to be an overall urban design 'vision' for the future development of Berry (i.e. not simply a focus on the Bypass corridor in isolation). The design approach has been holistic in outlook, considering the urban design of the Berry Bypass in relationship to the urban structure, character and evolution of the Berry township as a whole. We seek an integrated urban planning outcome that will be forward looking, and serve Berry in the long term, benefiting future generations.

2.1 Urban design analysis - key constraints

During the analysis phase of the project the following bypass urban design constraints were identified:

Flooding, drainage & water table

Drainage issues, due to the high water table, limit the potential for the bypass to be significantly depressed.

Homestead curtilage & farm viability

The bypass alignment and footprint has in part been guided by the need to establish a reasonable visual curtilage of the existing homestead and garden (to the north of North Street), to provide alternate vehicular access, and sufficient flood-free high ground for regular pastureland for a viable diary farm.

Berry township urban integrity and legibility

The Berry township street grid and development blocks should be retained wherever possible and the alignment of the Berry Bypass should respect the existing street and development pattern.

North Street streetscape integrity

The integrity of the North Street streetscape should be retained and strengthened through urban and landscape design improvements.

Bypass user safety (engineering geometry standards)

A safe Bypass roadway at 100km/hr speed limit is a mandatory design requirement. This includes ensuring minimum radius road curvatures and a horizontal rise and fall necessary to achieve sightline and safety requirements.

Construction factors

There would be a significant increase in road construction cost if the bypass alignment was to encroach north of Bundewallah Creek into flood prone areas.

Berry sports field

Berry sports field provides an important recreational facility for the Berry community. The field and surrounding landscape backdrop to the north should be protected.

Maintain escarpment views

The height of the Bypass road level and associated noise mitigation devices should be minimised, in order to maximise views from North Street to the Cambewarra Escarpment.

CRG agreed major road alignments

The bypass alignment, as agreed with the Community Reference Group in 2011, is now established.

Noise attenuation requirements

Noise attenuation barriers will be necessary at various locations along the bypass alignment and will require additional overall corridor footprint and width to be accommodated.

2.2 Urban design analysis - opportunities

The following bypass urban design opportunities have been identified:

Township street grid and North Street integrity

Preserve existing street corridor and improve streetscape definition and amenity through the design of recreational green space and street trees.

Berry north-south streets

Provide a fitting northern, physical and visual, resolution of the Berry township north-south oriented streets: George, Edward, Albany, Alexandra and Prince Alfred Street.

Maximise views to the Cambewarra Escarpment

Lower the alignment as much as drainage requirements will allow and explore noise mitigation measures that maximise views to the escarpment.

Recreational green space

Provide an 'arc' of connected recreational green spaces along the south edge of the bypass, extending from Berry sports field in the east to Mark Radium Park and potentially further to the southwest.

Celebrate Berry arrival/departure

Kangaroo Valley Road Interchange (and Queen Street, west) and the Northern Interchange are opportunities to incorporate special feature planting and high quality overbridge design to mark the arrival to Berry.

Minimise the visual prominence of the bypass and noise mitigation barriers

Incorporate 'Ha Ha' landforms and landscaped mounds to integrate noise mitigation devices in the landscape, and to screen the bypass roadway from view - retaining escarpment views.

A new pedestrian/cycle circuit

There is an opportunity to establish a new walking/cycle route along the bypass corridor, extending from Mark Radium Park and Kangaroo Valley Road in the west along North Street to Berry sports field in the east.

Facilitate viable diary farming

Maintain conditions for viable diary farming - maintaining sufficient flood free high ground and general pastureland to the north of the bypass alignment.

Preserve existing stands of trees

Consolidate existing trees to north of Berry sports field (along Connolly's Creek), at the Queen Street and Kangaroo Valley Road intersection and at Mark Radium Park.

Improve Town Creek environment

Restore the upper reaches of Town Creek (to the south of the bypass), as the beginnings of a potential new recreational green space following the creekline.

2.3 Overall urban design objective – Berry Bridge and Northern Interchange

The following overall urban design objective has guided the Urban Design Strategy:

To integrate the Berry Bridge and Northern Interchange structures and earthworks within the picturesque rural landscape of northeast Berry.

2.4 Coordinated project elements

The Urban Design Strategy seeks to realise a design outcome where all project elements are fully coordinated, and contribute towards the overall project 'vision'. Project elements include:

- Interchanges, bridges & throw screens.
- Cut and fill batters, retaining walls, noise walls/mounds.
- Lighting, township place making signage.
- Corridor endemic and cultural landscape.

Figure 2: Urban design opportunities.

Figure 3: Berry Bridge - in context.

3.0 Berry Bridge

Berry Bridge is located approximately 350m to the northeast of North Street (the northern edge of the township). Berry Bridge is viaduct-like in character and traverses the rural floodplain. At it's north, the bridge springs from a local ridgeline, sweeping down into the floodplain, crossing Broughton Mill Creek, Woodhill Mountain Road, and, descending to just below the tee canopy level, to then run just above the floodplain, still descending, crossing over Connollys Creek, until, at its southern extent it culminates on a raised embankment.

3.1 Berry Bridge design process

In late 2011, the Roads and Maritime Services engaged a number of industry specialists to critically review the concept design for the Berry Bridge and a number of community suggestions relating to the form and alignment of the bridge. The outcome of this review established the current concept design alignment for the Northern Route including the Berry Bridge. The most significant change was the re-alignment of the northern section of the bridge by some 90m away from the township at Woodhill Mountain Road and the lowering of the bridge by up to 6.4m.

Since February 2012, the design of the Berry Bridge has been further developed through a collaborative process with the Berry community. Conybeare Morrison and Aurecon were engaged by RMS to work with the community, RMS and AECOM to review in more detail the following aspects of the bridge:

- Overall appearance of the bridge in its urban design context including development of options for the pier and traffic barrier form
- Pier spacing and orientation
- Bridge deck depth and height

3.2 Setting and vantage points

The bridge traverses, on the whole, a rural landscape of pastureland, turf farming, rural residential homesteads and properties, densely vegetated creek lines and to the south the Berry sports field, recreational precinct and Camp Quality.

Apart from those driving over the bridge, Berry Bridge would only ever be seen in parts. There is no single vantage point where one would overview the whole of the bridge. This is due to the existing landforms and landscape (that will be retained), that would break potential views of the bridge into smaller part views.

The main vantage points are from Woodhill Mountain Road: looking north from Bundewallah Creek and looking south to Bundewallah Creek. It would also be seen in part from a limited number of adjoining rural properties, in-part by northbound on-ramp users, and the south abutment would be seen up close by pedestrians utilising the parkland.

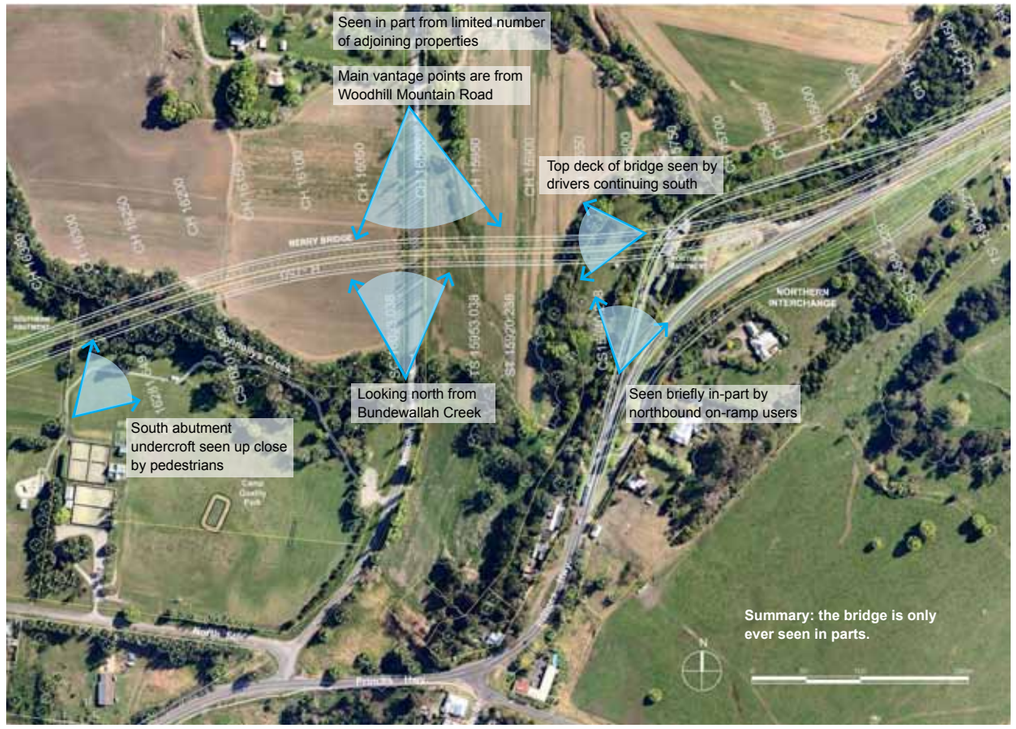


Figure 4: Vantage points.

Figure 5: Berry Bridge - Aerial view from northeast.

3.3 Design philosophy

The following urban design philosophy has guided the design of Berry Bridge:

- The bridge should be appropriate to its place – the picturesque rural setting.
- In scale with the township, landforms and existing landscape
- Not draw attention to itself – a grand statement is inappropriate.
- The emphasis should remain on the picturesque setting: the dramatic backdrop of escarpment, the attractive pastoral valley/floodplain and creek-line vegetation.
- There should be no 'tack-on' decoration.
- The bridge should have clean lines and neat detailing – should not be fussy or cluttered.
- The architectural expression of the bridge should be one of simplicity and of straightforward structural expression: of spanning elements and support structures.
- The design should respond to the creek and floodplain environment.
- The bridge is 'naturally' viaduct-like in character – a rhythm of piers/columns (not a forest) is an appropriate response.
- The design of the columns/piers needs to consider how they pick up the natural light and shadow – reading as an appropriate built form in the landscape.
- The bridge should age and weather well - minimising maintenance. Design for self cleaning surfaces, and design-out opportunities for graffiti or vagrancy.
- Get the details right: articulation of surfaces, considering the bridge 'architecture' of light and shade to provide articulation of form.

3.4 Urban design principles

The following urban design principles have guided the bridge design:

- Develop bridge architecture that complements the pastoral setting.
- Maximise retention of existing screen landscape.
- Minimise bridge piers and elevation profile.
- Keep undercroft areas open, ventilated and with access to light.
- Maintain a consistent bridge profile without awkward junctions, steps or faceting.
- Explore opportunities to reflect the unique character of Berry and the Shoalhaven.
- Utilise locally sourced stone for abutment linings and scour protection.

3.5 Cultural and heritage response

In the design of Berry Bridge the following principles have guided the response to the important physical and cultural heritage of Berry and its rural setting:

- The bridge alignment has been relocated further north, away from the township to respect the town's heritage curtilage.
- The new bridge will be screened from Berry by the existing vegetation that follows Bundewallah Creek.
- The Alexander/David Berry Memorial is relocated to a suitable new setting accessible to residents and visitors.
- Mark the turn off into Berry with appropriate signage.
- Draw inspiration for the project finishes palette from locally available materials – such as stone and timber.
- Incorporate endemic landscape themes and cultural plantings.

3.6 Bridge design overview

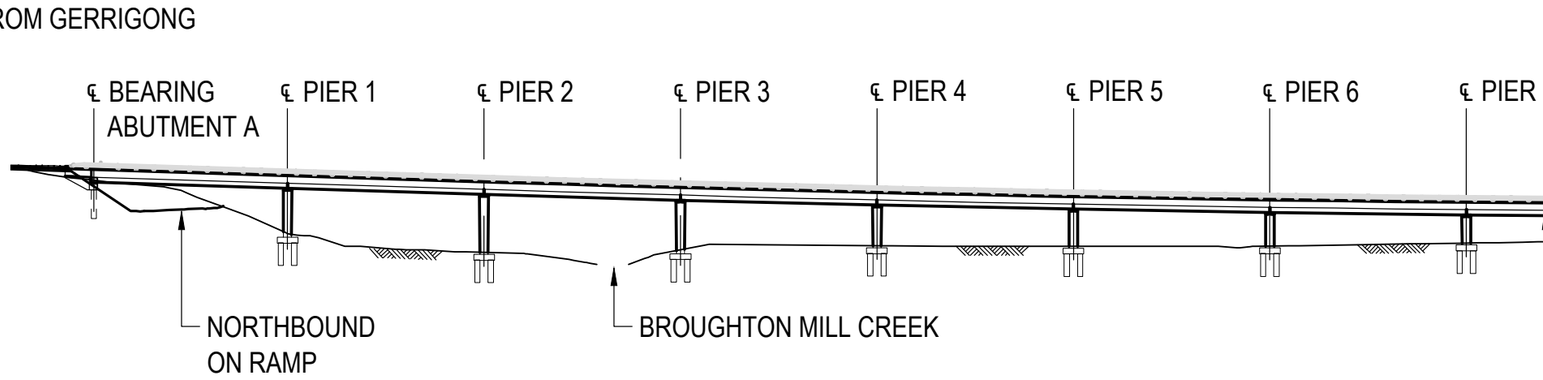
Berry Bridge is characterised by its overall gently sweeping, serpentine form. The bridge sweeps down off the ridgeline to then run almost parallel to the floodplain. The Super T primary structure provides a pleasing span and deck profile, leading to a sense of openness beneath the bridge, in keeping with the generally open pastureland along Woodhill Mountain Road.

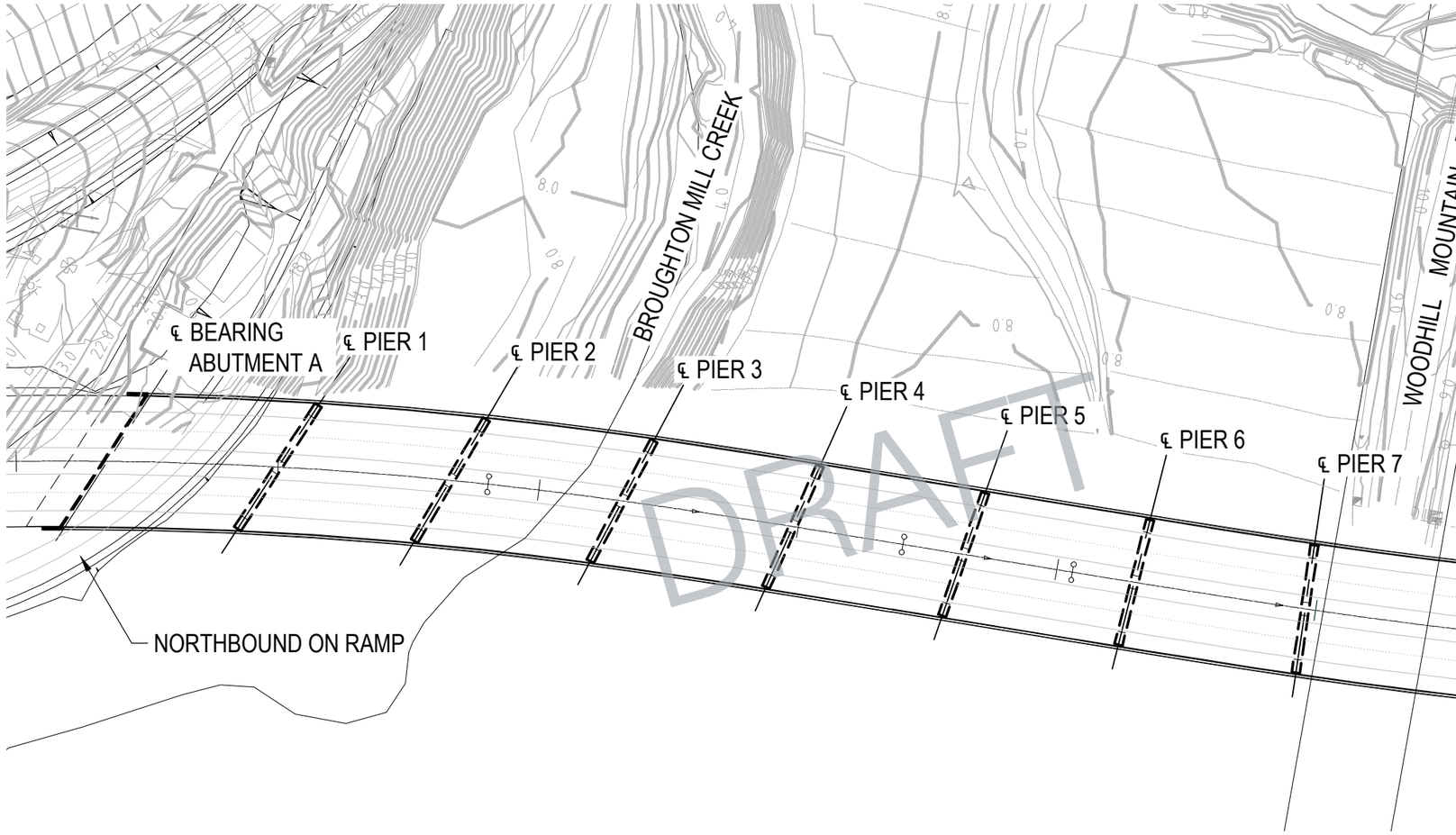
The regular rhythm of support piers will provide a measured and refined architectural expression suited to the rural, floodplain context. The piers and abutments progressively vary in alignment to provide a comfortable relationship to the alignment of the northbound on-ramp, to Woodhill Mountain Road, and to the creeks and tributaries the bridge crosses. This 'fanning' effect should provide an attractive elevation when viewed from Woodhill Mountain Road, and a sense of openness when travelling beneath the bridge at the north abutment.

3.7 Technical criteria

The bridge is defined by the following structural engineering criteria:

- 600m long and 26.5m wide.
- Has an 'S' shaped double curvature in plan.
- Results in super-elevation one way then the other.
- Varying horizontal alignment – coming off the ridge high (at north abutment) and then sweeps down quickly to become very low (at south abutment/Connelly's Creek).
- Bridge clearance varies between high of 11.7m and low of 2.6m.
- Super 'T' beam structure.
- Most efficient structure with least columns.
- 33m spans, 1.5m deep beam.





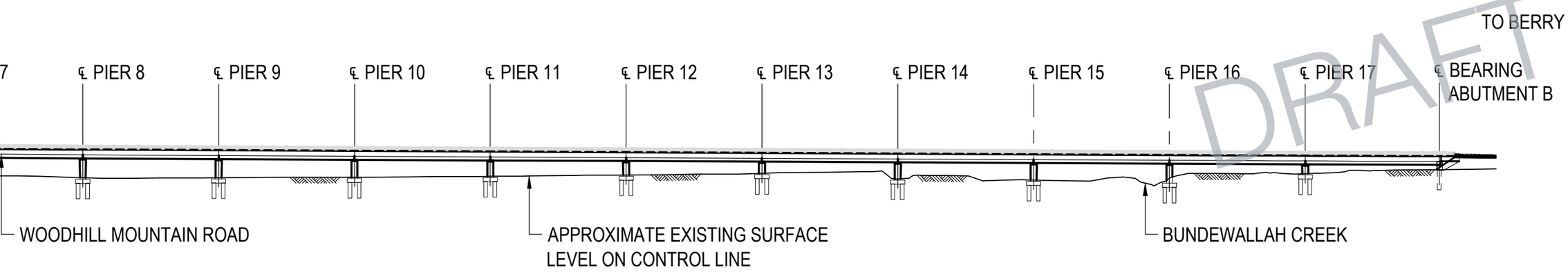


Figure 6: General arrangement/Source: Aurecon

Bridge Design Criteria	Parameter	Notes
Bridge length	600m	Primary driver for the bridge length is to provide sufficient waterway opening in the event of a flood.
Overall bridge width	26.5m	This width includes two traffic lanes for the Northbound and Southbound carriageways with provision to upgrade the bridge to carry three lanes in the future.
Bridge height from ground level to underside of bridge deck	5.3m at Northern end 4.6m at Woodhill Mountain Road 1.8m to underside of deck	Driven by a 5.3m clearance to the Bypass on-ramp that travels under the end span of the bridge. Minimum required road clearance to bridge structures. Minimum required clearance for maintenance
Distance between piers	33m	This is a nominal dimension that changes across the length of the bridge to account for creek and road crossings. Maximising the spacing between piers creates a more open feel to the bridge structure. The 33m bridge spans are also economical with regard to the supply and delivery costs of the Super-T girders.
Orientation of piers		Generally the piers are perpendicular to the road centreline, however in some locations the bridge piers are orientated parallel to the creeks and roads that pass beneath them.
Bridge deck type	Super-T girders	Super-T girders are precast bridge beams that are commonly used in Australia and provide a very high quality finish and durable product. A concrete deck slab is cast on top of the precast elements to enhance their strength.
Overall depth of bridge deck	1800mm	For the 33m span length,1500mm deep Super-T girders with a 225 concrete slab will be provided. The bridge will then be covered by a 75mm thick layer of asphaltic concrete.

Bridge Design Criteria	Parameter	Notes
Substructure type	Reinforced concrete pier elements	At the time of writing this document, four separate pier options have been presented to the community. Pier options that accommodate the changing height from existing ground level to the bridge deck without taking away from the aesthetic were chosen.
Foundations	Cast in-place concrete bored piles	The piers will be supported on cast in-place bored piles that will be socketed into rock. These piles will be buried in the ground.
No. of expansion joints	3 or 4	Expansion joints would be a finger joint type in order to minimise joints across the bridge length. Finger joints have a better noise performance compared with compression seal type joints. The exact number of expansion joints would be determined at the detailed design stage following a detailed structural analysis. Typically a large spacing between the bridge expansion joints will result in a larger bridge bearing footprint to account for movements of the bridge due to transient load effects such as temperature changes. Larger bridge bearings also influence the width of the piers.
Traffic barrier type	Concrete barrier with twin galvanised steel railing	Height from road surface = 1300mm Overall height of concrete when viewed from ground level = ~ 1800mm. The geometry of the traffic barrier is driven by road safety on the inside face and aesthetics on the outside face. The overall height of the barrier on the outside is set to hide the longitudinal drainage pipes that run along the bridge deck to collect rainfall run-off from the road surface. The Northbound and Southbound Carriageways will be separated by a 1100mm high reinforced concrete barrier.
Noise barriers	Nil	Noise modelling has shown that no noise walls are required across the bridge.

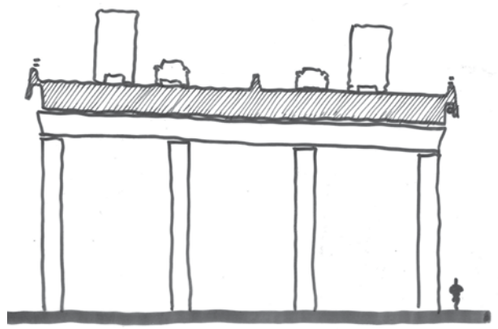
3.8 Bridge design elements

Berry Bridge is comprised of the following component elements:

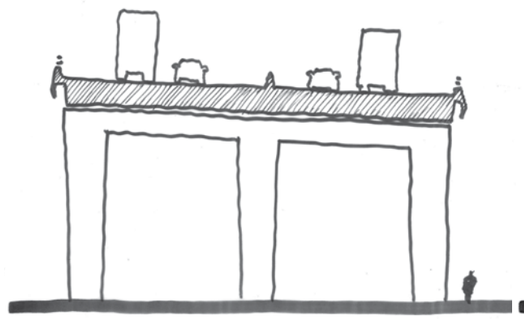
3.8.1 Pier design study

Initially six bridge pier support types were investigated to establish the most appropriate pier design for the bridge. The pier design had to be suited to the varying height of the bridge above ground along its length, had to be practical in terms of constructability, cost and long term maintenance. The six pier types investigated were:

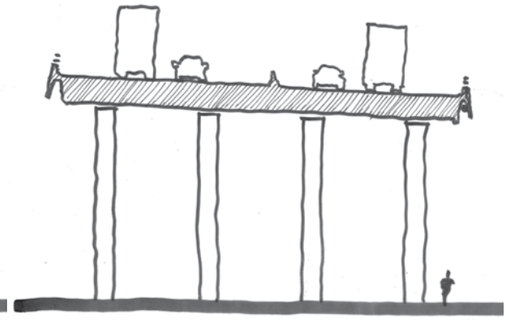
- Circular columns – integrated headstock
- Portal Frame (‘M’ shaped) – integrated headstock
- Circular columns – recessed cross beam
- Circular columns – exposed/expressed headstock
- Double ‘V’ shaped piers
- Double ‘T’ shaped piers



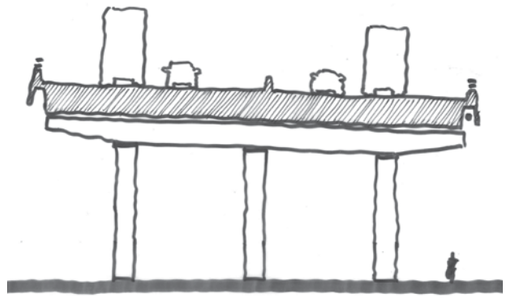
Circular columns -integrated headstock.



Portal Frame – integrated headstock.

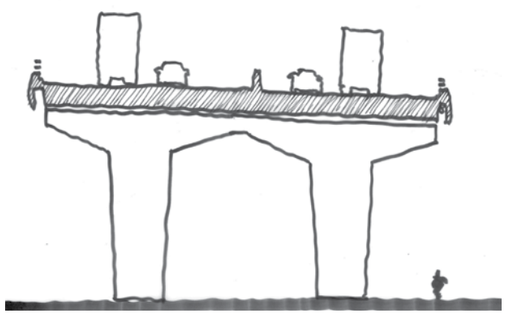


Circular columns – recessed headstock.



Circular columns -expressed headstock.

Double ‘V’ shaped piers.



Double ‘T’ shaped piers.

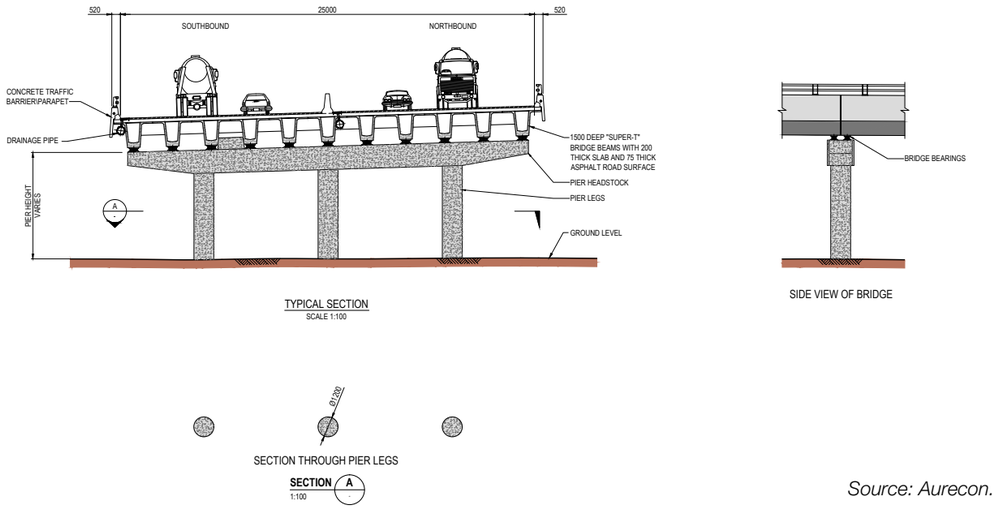
Figure 7: Generic pier types.

3.8.2 Short-listed bridge pier options

The following four pier types were short-listed for further consideration:

The short-listed bridge pier options were presented to the CRG for comment and were loaded onto the RMS website to provide an opportunity for further community feedback.

A - Original Pier Option – Refined



Source: Aurecon.

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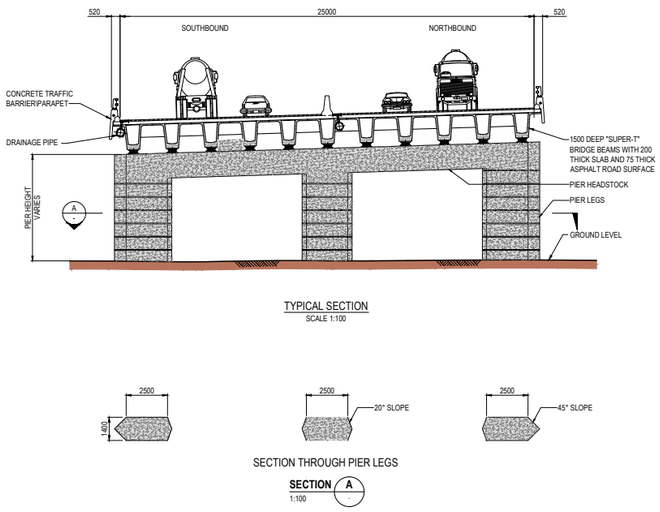
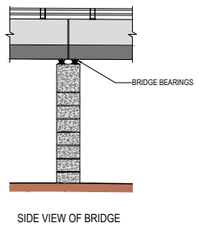
B - Flood Plain/Expressed Coursing





Source: Aurecon.

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Third Hunter River Crossing, Maitland.

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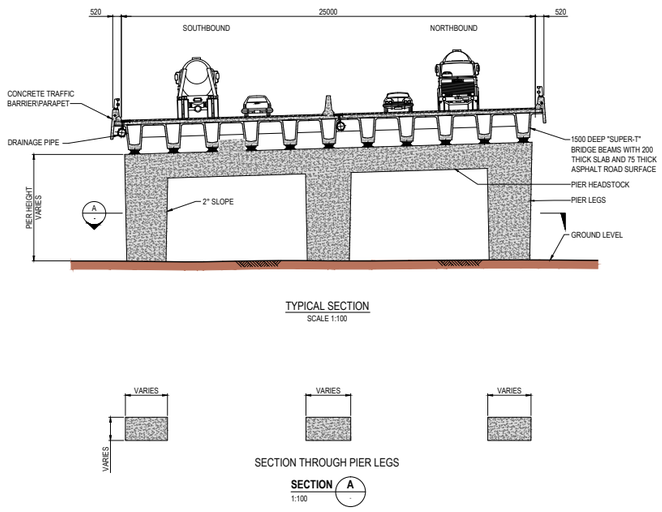
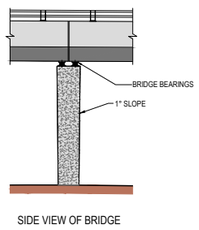
C - Contemporary Portal Frame





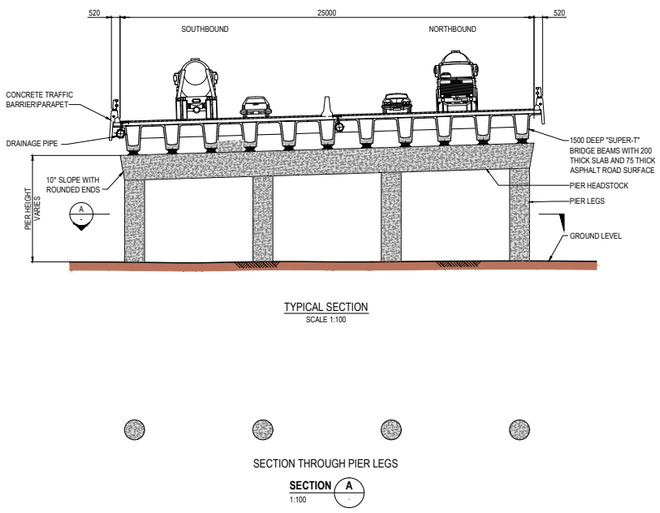
Source: Aurecon.

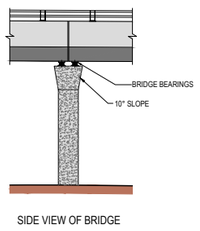
CM+ 2012

Mehi River Bridge, Moree.

CM+ 2012

D - Flared Capital/Integrated Headstock





Source: Aurecon.

CM+ 2012

Pacific Highway, Bonville.

CM+ 2012

3.8.3 Parapet options

Three parapet types were investigated. From a construction point of view, the selection of parapet type is independent of pier type. However, some parapet types tend to suit the pier architecture more than others. The three pier types investigated were:

1. Straight Sloped Face

This option provides a simple, clean, modern expression.

2. Angled Face

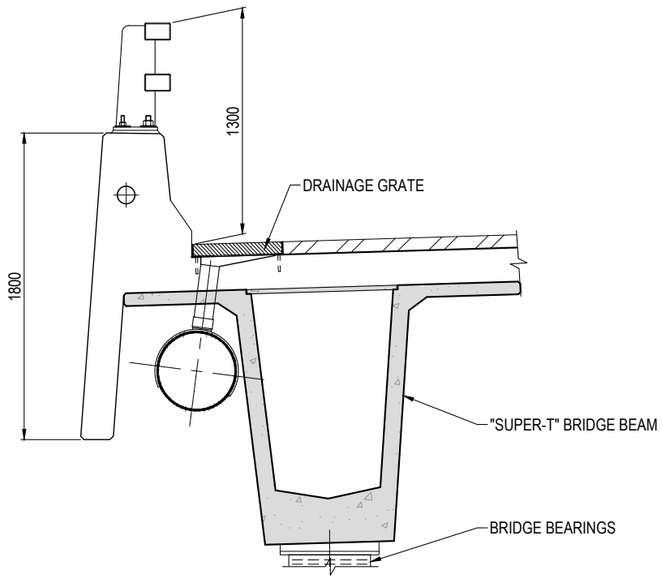
An angled parapet profile works well in conjunction with angled piers below.

3. Grooved Face

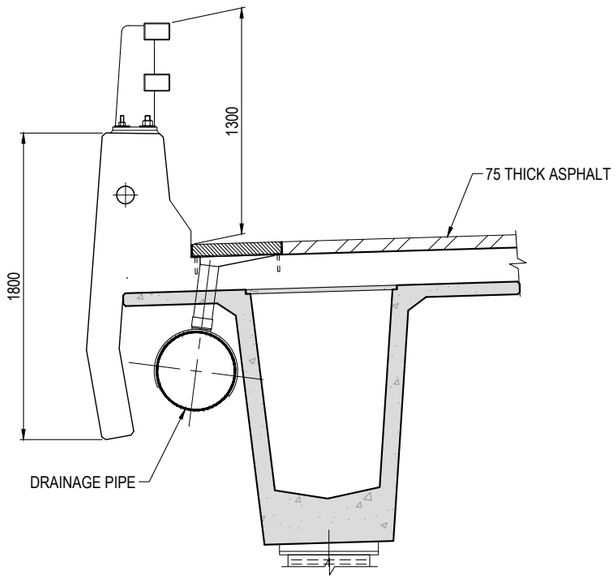
A horizontal groove introduces a 'false joint' shadow line, adding additional detail into the parapet panels.

All parapet types extend down the same length, on both north and south elevations, to screen the bridge drainage pipes when viewed from the side. They all incorporate twin rail safety barriers, provide an angled surface profile to catch the light and the top of the parapets slope away from the parapet face to avoid staining.

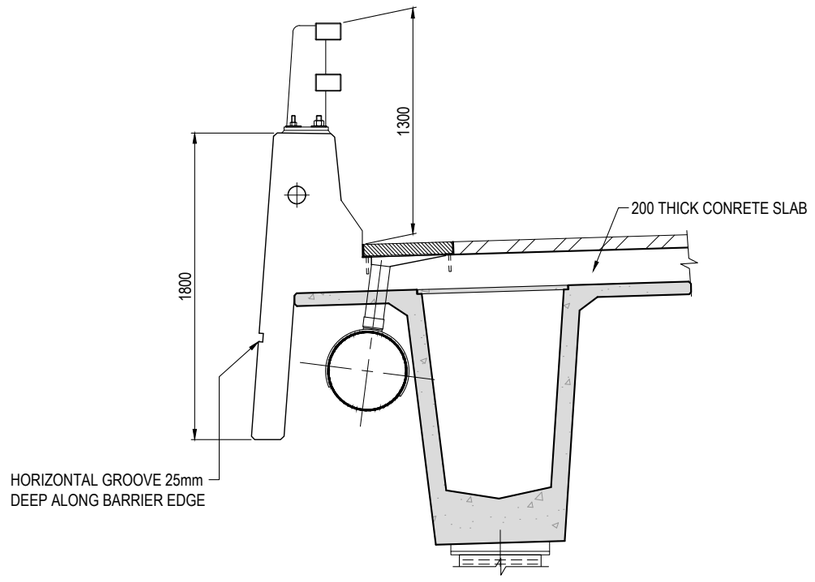
The three bridge parapet options were presented to the community working group for comment and were loaded onto the RMS website to provide an opportunity for further community feedback.



BRIDGE BARRIER - OPTION 1



BRIDGE BARRIER - OPTION 2



BRIDGE BARRIER - OPTION 3

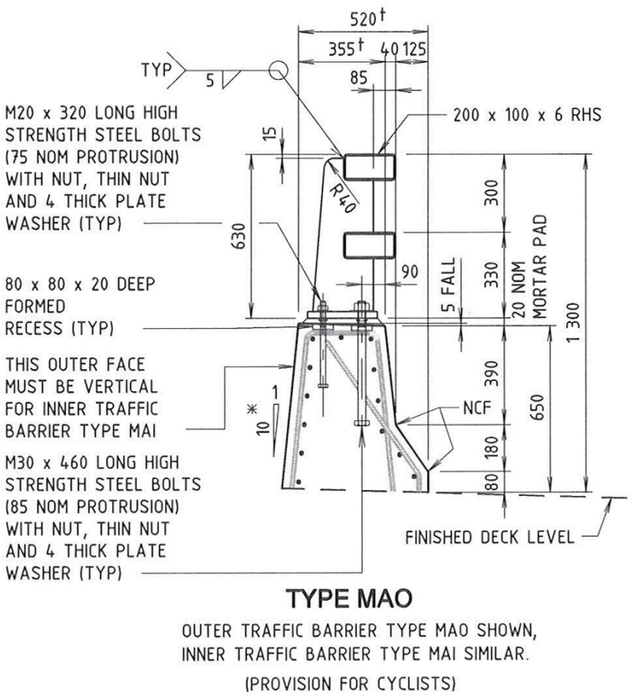
Source: Aurecon.

3.8.4 Traffic barriers

Twin rail type safety barriers with modified Type F concrete upturn arc proposed for the outside edges of Berry Bridge. This traffic barrier type:

- Reduces unnecessary parapet depth & heaviness.
- Provides a lighter and contrasting top profile.
- Emphasizes the bridge's streamlining and horizontal lines.
- Provides a sense of openness and permits views.

An example of this barrier type in use, can be seen in the Sea Cliff Bridge, located at Stanwell Park/Coal Cliff.



TYPE MAO

OUTER TRAFFIC BARRIER TYPE MAO SHOWN,
INNER TRAFFIC BARRIER TYPE MAI SIMILAR.

(PROVISION FOR CYCLISTS)

3.8.5 North abutment

The northern bridge abutment:

- Is a spill through type (this abutment type comprises a sloped embankment rather than a vertical wall).
- Is seen up close from the northbound on-ramp.
- Continues as a 2H:1V (a slope of the proportion two horizontal to one vertical) cut batter within the Northern Interchange.
- Will be rock faced in the bridge undercroft area (locally sourced stone).
- Will integrate maintenance access stair and landing in the abutment design.

Figure 7: Stone faced abutment.

Figure 8: View of north abutment from north bound on-ramp.

3.8.6 South abutment

The southern bridge abutment:

- Is a spill through type.
- Is seen close up by pedestrians using the adjoining sports/recreation precinct.
- Is angled to follow the creek alignment.
- Incorporates scour protection on embankment slopes (locally sourced stone).
- Will be rock faced in the bridge undercroft area (locally sourced stone).
- Will integrate maintenance access in the abutment design.

The southernmost bridge spans will maintain a clearance of 3.0m, wherever possible, to:

- Deter graffiti.
- Deter vagrancy.
- Maximise light and rain penetration to undercroft and Connollys Creek.
- Properly ventilate.

If flood modelling necessitates the setbacks of the south bridge abutment from Connollys Creek, then bridge clearances may be achieved through local excavation, subject to an assessment of undercroft drainage levels.

Figure 9 : Stone faced abutment - showing maintenance access stair.

Figure 10: Aerial view of south abutment.

3.8.7 Lighting strategy

No lighting on Berry Bridge is currently envisaged. The overhead power supply along Woodhill Mountain Road will need to be re-routed and local road lighting reassessed as the proposed alignment will interfere with the current service. Existing park lighting for the sport/recreation precinct to the south of the Berry Bridge alignment may need to be reassessed in light of the need to ensure pedestrian safety.

3.9 Landscape design strategy

Where the bridge crosses over existing creeks, suitable riparian vegetation will need to be re-established, following the completion of bridge construction, in order to maximise the continuity of the creek ecology and habitat.

The historic Woodhill Mountain Road avenue of Poplar trees could be strengthened through the replacement of lopped trees and the inter-planting of gaps in the avenue, with new trees. The localised realignment of the power supply would prevent future lopping of trees by power supply utilities.

The 26.5m wide bridge deck, combined with the lower height sections of the bridge (as low as 3.0m) will result in an undercroft middle-zone that will not support pasture grasses – due to the rain shadow and lack of sunlight. Careful selection of planting suited to this micro-climate will be an important consideration in order to avoid a ‘dead zone’ beneath these lower southern sections of the bridge.

Figure 11: Northern Interchange - setting.

4.0 Northern interchange

The Berry Northern Interchange is located approximately 500m to the northeast of the township, and connects into the Princes Highway continuing north to Sydney. The existing Princes Highway sweeps to the southwest, crossing Broughton Mill Creek before heading into town. The northbound on-ramp and the southbound off-ramp connect into this existing road that leads to the Main Street (Queen Street) of Berry. The bypass alignment sweeps westwards down across the floodplain, becoming Berry Bridge.

4.1 Setting

A series of rural residential homesteads are located to the southeast and northeast of the interchange and nestle within the bush vegetation of the ridgeline. A new driveway will maintain vehicular access to these properties, passing beneath the bypass carriageways at its northern extent to provide access to properties located west of the alignment.

4.2 Urban design principles

The following urban design principles have guided the interchange design:

- Minimise the visual presence of interchange structures.
- Minimise impacts on existing properties and access.
- Minimise the interchange footprint.
- Retain mature trees along the highway.
- Consider the sequential views on the northern approach to Berry.
- Contribute to the township arrival/departure experience and to legibility.
- Develop Berry township entry signage strategy.
- Frame rural and township views from elevated vantage points.
- Relocate Berry Memorial sculptures.

4.3 3D study

A 3D computer generated model was prepared of the Northern Interchange to develop a better understanding of the experience of driving through the interchange from various directions, including the arrival sequence from the north into Berry and also for continuing south on the bypass travelling on Berry Bridge. The 3D visualisations have proved a useful tool in the development of the interchange urban and landscape design. Six views are illustrated with accompanying view location key plans.

View 1- View from Berry Bypass South Bound

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View 2- View from Berry Bypass South Bound Exit Lane

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View 3- View from Berry Bypass South Bound Exit Lane looking West

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View 4 - View from Berry Bypass North Bound Entry Lane Looking North

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View 5- View from Berry Bridge South Bound Lane at Ch 15800

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View 6- View from Berry Bridge South Bound Lane at Ch 15925

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Dwg. No: 12001-SK032

4.4 Interchange design elements

The Northern Interchange is comprised of the following component elements.

4.4.1 Cut and fill batters

The interchange sits atop a local ridgeline, the main alignment cutting into the ridge to the south, extending the existing cut batter of yellow-orange coloured exposed rock face. A further cut batter is required to the east of the northbound on-ramp. This batter is at a slope of 1V:2H and can therefore be planted out with suitable grasses, shrubs and scattered trees.

4.4.2 Retaining wall

Although most of the interchange main alignment and ramps follow the contours of the ridge landform, the levels are such that to the north of the interchange the northbound on-ramp necessitates a significant fill embankment. To prevent the toe of this embankment impinging upon the Turf Farm operation below, an approximately 100m long retaining wall structure is proposed.

4.4.3 Lighting

Sections of the interchange roadway will need to be illuminated to ensure compliance with road safety standards. The final light pole design is yet to be confirmed.

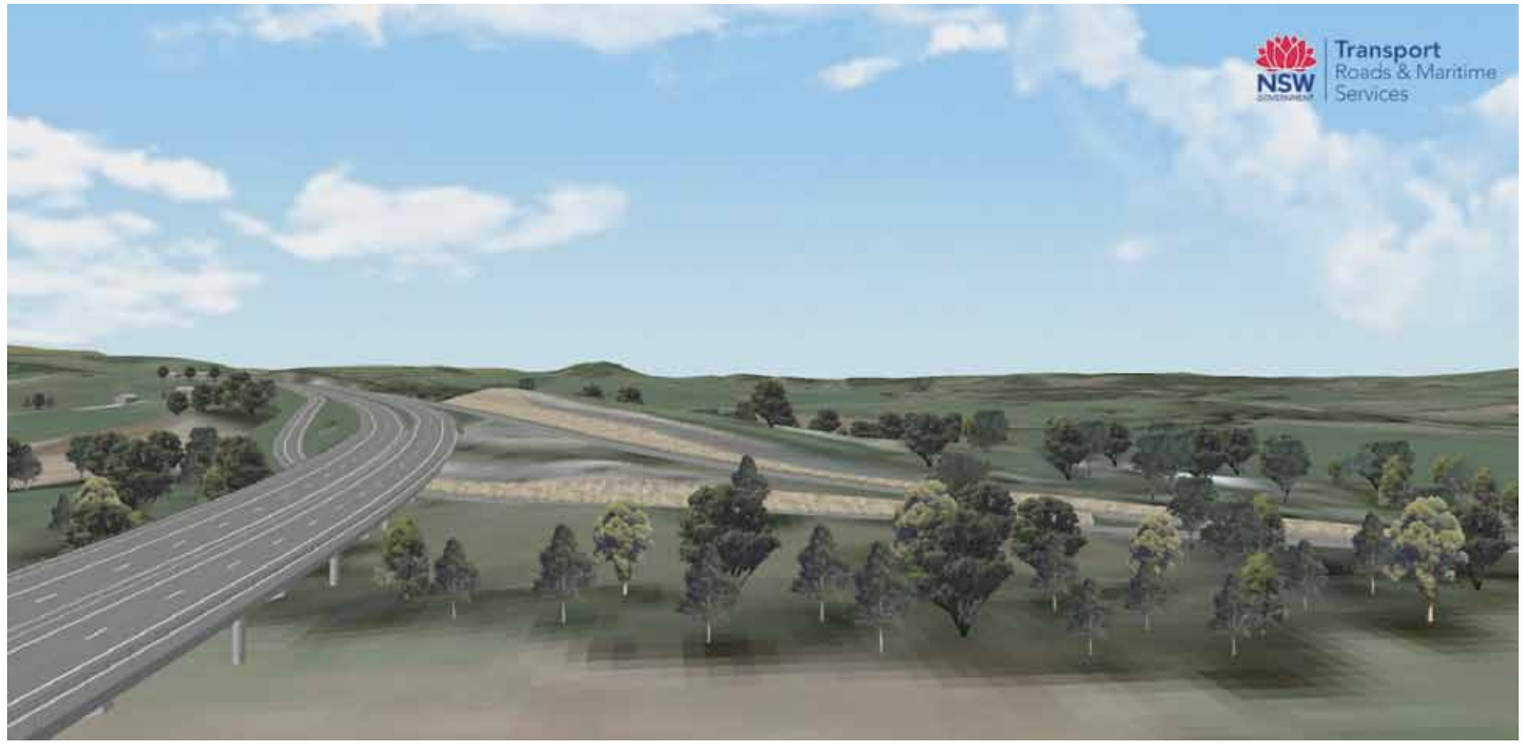


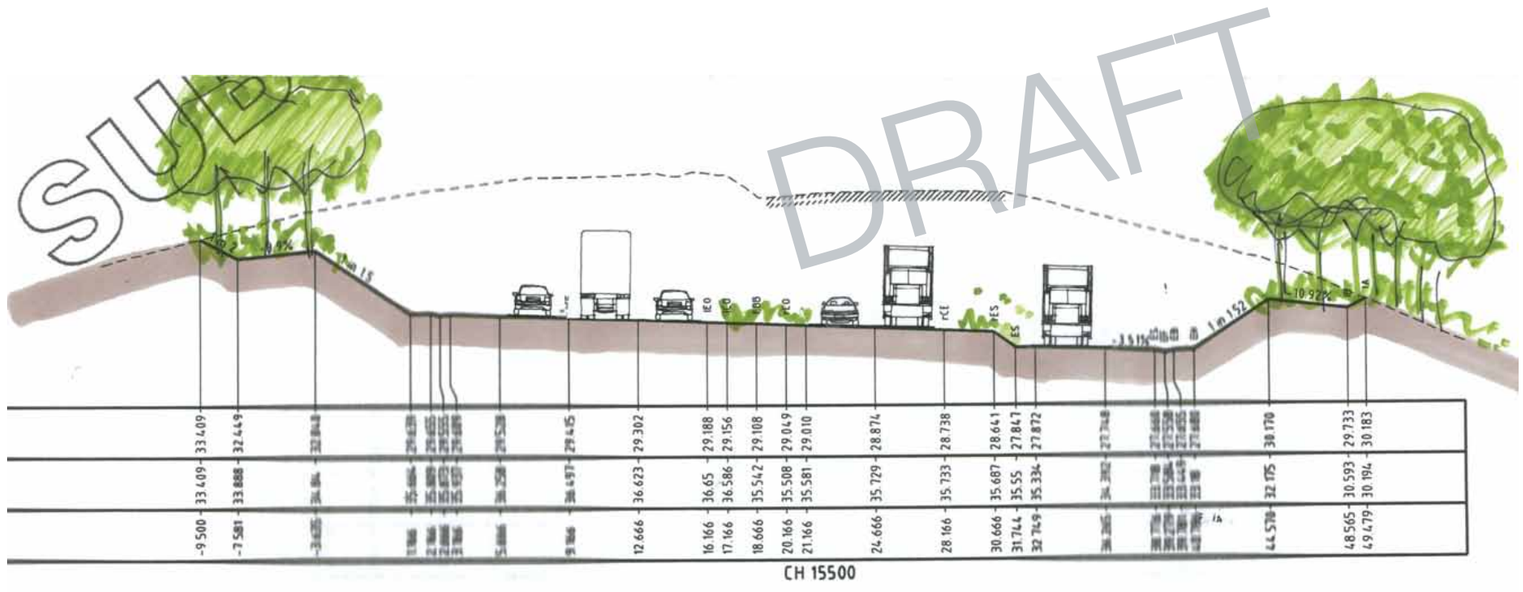
Figure 12: Northern Interchange - Aerial view from the west.

4.5 Landscape design strategy

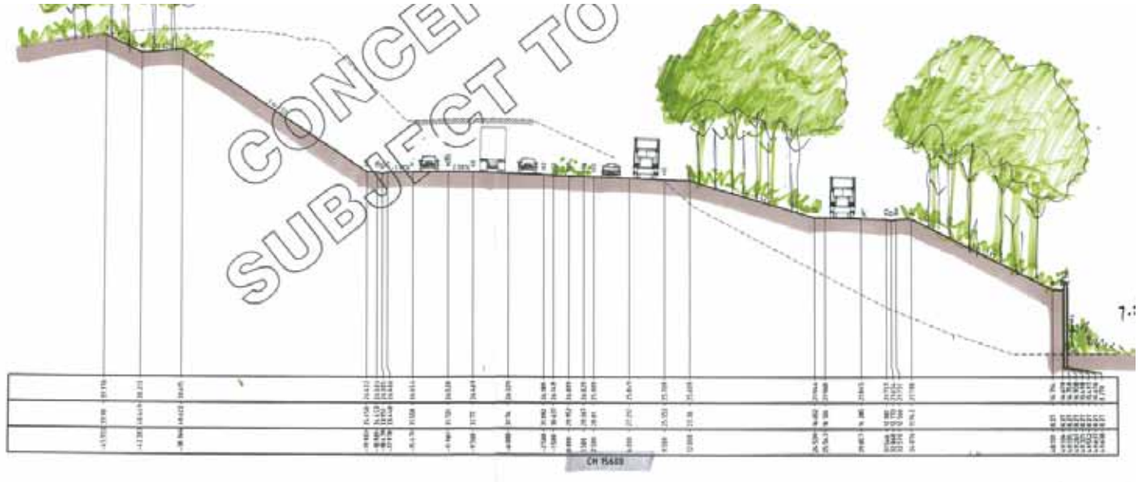
The landscape design of the interchange and northern approach to Berry will choreograph the arrival sequence into Berry township. The landscape design will capitalise upon the potentially expansive views that will be possible from the elevated location atop the ridge, looking south and west across the rural valley landscape and new Berry Bridge and to the escarpment beyond.

4.5.1 Typical cross sections

Three cross sections illustrate the new landform profile compared to the existing, and illustrate the opportunities for landscaping of the corridor to frame views along the highway and then across the valley to provide a fitting arrival experience to Berry.



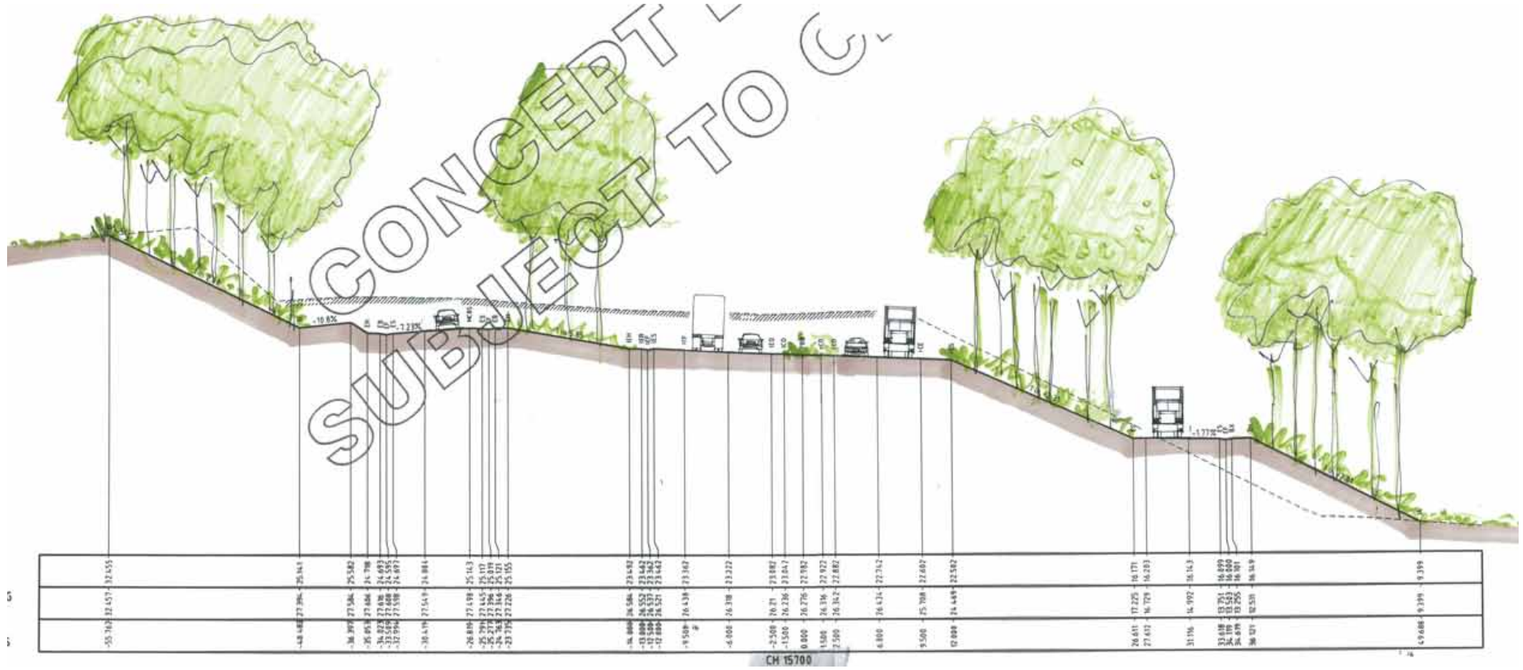
Section A



Section B

4.5.2 Typical planting selections

Plantings that are endemic to the region are proposed that will suit the climate, soils and provide appropriate fauna habitat. The planting palette will be selected with the objective of achieving a low establishment and maintenance regime.



Section C

5.0 Materials, finishes and colour strategy

A project-wide coordinated palette of materials, colours, finishes is envisaged that will be consistently applied and will integrate well with the adjoining sections of upgraded Princes Highway roadscape.

5.1 Philosophy

The following urban design philosophy has guided the selection of the project materials and finishes palette:

- Taking a low-key approach.
- Complementing the natural environment.
- 'Natural' finishes preferred rather than applied.
- Utilising locally sourced stone and timber.
- Selecting finishes that weather and age well.
- Detailing that minimises staining and is self-cleaning.

5.2 Finishes selections

The adjoining sample photos illustrate the proposed approach - including utilising local stone and timber when appropriate, and in the selection of materials and finishes that are generally low-key, robust and that weather well.

5.3 Graffiti strategy

The approach to deterring graffiti is to wherever possible 'design-out' situations where the potential for walls or surfaces that could be defaced are removed. Maximising the opportunity for passive surveillance through creating places that are attractive to people will deter and minimise the occurrence of graffiti.

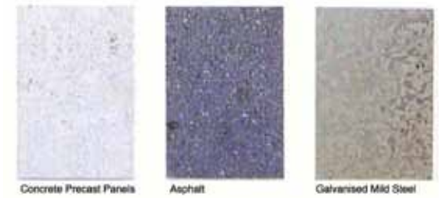
Local stone.

Feature signage.

Berry memorial.

Estate signage.

Local timber.



Stone faced retaining wall.

Complementing the natural contours of the region.

Appendices

Appendix A - Meeting Notes Workshop 1-TBC

Appendix B - Meeting Notes Workshop 2-TBC

May 2012