

DRAWING LIST	TITLE	REVISION
SHEET 5588.01	TITLE SHEET	B
SHEET 5588.02	GENERAL NOTES	B
SHEET 5588.03	GENERAL ARRANGEMENT	B
SHEET 5588.04	TEMPORARY CROSSING DETAILS	B
SHEET 5588.05	EROSION & SEDIMENT CONTROL PLAN	B
SHEET 5588.06	BRIDGE PLAN & ELEVATIONS	B
SHEET 5588.07	ROAD DETAILS	B
SHEET 5588.08	BRIDGE DETAILS	B
SHEET 5588.09	MSKT DETAILS	B
SHEET 5588.10	THRIE BEAM TRANSITION	B
SHEET 5588.11	BRIDGE SET OUT PLAN	B
SHEET 5588.12	HYDRAULICS	B

ISSUE 1 – 80% DESIGN

4/7/2024

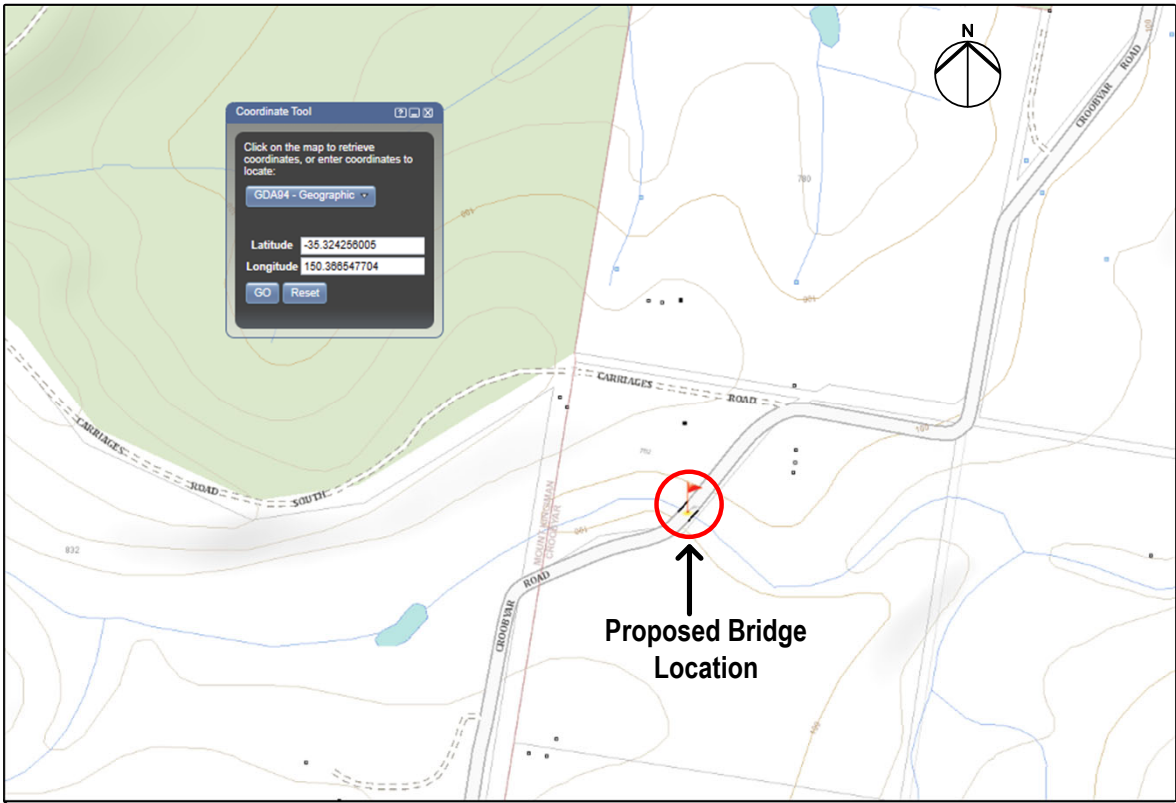
ISSUE 2 – 100% DESIGN

29/7/2024

CLIENT : SHOALHAVEN CITY COUNCIL

LOCATION : CROOBYAR ROAD, CROOBYAR NSW

Location Plan



DESIGNED BY



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Stephen Debeck

(BEng,MIEaust, NER 2903991 (Civil, Structural))

MODULAR BRIDGE SYSTEM NOTES

- Modular design and drawings to be read in conjunction with site specific drawings and design includes ;
- A) Abutments and Headstocks (for single span bridges)
- B) Decks
- C) Guardrails
- D) Bearings and Expansion Joints – Integral Abutment Single Span Bridges do not have Bearings or Expansion Joints

GENERAL NOTES

1. All Dimensions on these plans should be checked on site by the builder and verified on site and by using other other contract documents. Discrepancies should be referred to the Engineer.
2. It is not implied or guaranteed that all structural designs and details shown in these plans are complete. The scope of work has been determined by the engineer based on the information supplied by the client or the clients consultants. Further designs may be required.
3. Do not Scale from these plans
4. Design loads in accordance with AS 1170 and AS5100-2017 Bridge Design Code
5. Roadways W80/A160/S1600/M1600 vehicular loadings

BRIDGE DESIGN LOADING & CONSTRUCTION NOTES

- 1 – SM1600 as per AS5100.2 incl. Impact @ 100km/h
 - 2 – Barrier performance is low as per AS5100.2-2017
 - 3 – Earthquake loading Design Category = BEDC-1 (EQ analyses not req'd)
 - 4 – WindLoading as per AS5100.2-2017 section 17
- Wind Region=A3, Terrain Category=2, Average Recurrence Interval (1:2000 for ULS), Average Recurrence Interval (1:20 for SLS permanent effects only), Design Windspeed = 41m/s in conjunction with Traffic loads (see previous)
- Net Pressure Coefficient as per APP D2 of AS1170
- 5 – Flood Data (as bridge relates to watercourse)
- | | | | | |
|--------|--------------|----------|------------------|------------------------------|
| AEP | Flow Q(m3/s) | Vel(m/s) | Debris Height(m) | |
| 1:20 | 37 | 2.70 | 3.0 | SLS case scour & deflection |
| 1:100 | 59 | 1.78 | 3.0 | |
| 1:2000 | 135 | 2.07 | 3.0 | ULS case structural strength |

EXCAVATIONS FOR EXTERNAL CONSTRUCTIONS

- excavate and/or fill as required for external area slabs and footings
- consolidate ground under all paths, pads or paved areas.

EXISTING FOOTINGS

Maintain support to existing footings as required to ensure integrity of existing buildings.

CERTIFICATE

Provide a practising civil or structural Engineer's Certificate for bearing pressure of foundation material.

SOIL AND WATER MANAGEMENT

Ensure that soils from the site are not transported beyond the boundaries. Site clearing and soil retention measures must comply with the Act. Refer to PRELIMINARIES: Environmental Protection – Soil and Water Management

GROUND WORKS

Benchmark

Relate all levels to the survey benchmark

Foundation Test Pits/Bore logs

Where foundation test pits/bore logs have been carried out

- re-excavate pits found under footings, slabs or pavements or within the “zone of influence”
- angle of zone of influence below horizontal:
- 30º for sand foundation material
- 45º for clay foundation material
- replace the backfill material in compacted layers. (SEE COMPACTION)

SUPERVISION AND TESTING

Arrange for the site filling and compacting to be supervised by a qualified geotechnical engineer: .

- tests to be undertaken by a NATA registered laboratory
- provide 2 copies of test results to the Superintendent.

rejection:

- if compacting is not up to the standard specified: carry out further compacting uniformly over the whole area until the specified standard is achieved and provide a further series of tests.

-Provide certificate from practising soil laboratory or engineer for compaction of fill.

SITE CLEARING

GENERAL

- clear and remove all stumps & other impediments and retain good ground cover where possible
- remove old pavings, footings, rubbish and debris from the whole of the site

noxious plants :

- eradicate from whole of the site blackberries, onion &oxalis weeds, nut grass & any other plant classified by Pastures Protection Board for the area as a “Proclaimed Noxious Plant or Weed”
- remove by grubbing out roots and/or by poison spray if such treatment is approved as effective

removal of trees and stumps: remove trees only as noted on the drawings and grub all stumps including those of trees previously removed

TOPSOIL, STORAGE AND REMOVAL

- remove topsoil from those areas of the site to be built upon and/or excavated including buildings, carparks, driveways, driving areas, paving and stockpile on site ready for re-spreading. Protect stockpile from contamination
- remove 100mm minimum depth of the surface layer of the natural ground
- remove from site and replace any contaminated topsoil. Refer to PRELIMINARIES:

Environmental Protection Disposal of Contaminants and Refuse :

- remove surplus excavated material on completion

SITE SPECIFIC BRIDGE DESIGN AND DRAWINGS NOTES

- Site Specific design and drawings includes items not covered by the modular bridge system supplier. These items include;
- A) foundations (site specific geotech information has been gleaned from visual inspections and geotech sheets only)
- B) geometry (no site survey has been supplied so information shown has been taken from site measurements)
- C) hydraulics (no site survey has been supplied so information shown has been taken from site measurements)
- D) all abutment and deck beam components are to be designed and supplied to contractor on site

SITE EXCAVATIONS

GENERAL

- Excavate in material “as found”. No variation to the contract will be allowed with respect to the type of material excavated
- backfill excavations taken below contract depth with concrete of equivalent strength to work immediately above at no variation to the contract
 - remove surplus excavated material from the site
 - provide a minimum clearance of 400mm to the underside of timber floor structures
- rock excavation :** where rock or shale is encountered scabble surface to level and solid bearing. Remove loose boulders and treat holes as above in backfilling
- trenches :** provide and maintain all necessary planking and strutting to excavations in sand or any other loose formation:
- where bearing capacity is affected by the removal of tree stumps, fence posts, rock floaters, etc. , excavate to solid bearing and backfill with concrete.

SERVICE TRENCHES

Excavate trenches to required depths to allow regulation cover over service lines:

- maintain sides of excavations vertical
- generally maintain straight runs between access holes, inspection points, and the like
- grade bottoms of trenches to provide uniform bearing. Dig bell holes after grading trench bottom
- keep trench base free of objects greater than 75mm
- keep main runs 600mm minimum clear of footings and concrete paths.

sewer and stormwater drainage:

Refer to PLUMBING AND SANITARY PLUMBING and DRAINAGE.

underground electrical mains: Refer to ELECTRICAL WORKS.

underground water mains and gas lines: Refer to DRAINAGE and GAS SERVICE.FILLING MATERIALS

GENERAL

Provide filling free from organic matter, from soil recovered from the site excavations or imported onto the site from an approved source. Filling must be in accordance with Engineer's drawings.

FILLING TYPES

hardcore fill: Fill with hardcore, made up of broken brick or stone, not larger than 75mm gauge.

crushed rock fill: Fill with crushed igneous rock, not larger than 40mm gauge with a minimum clay content.

granular fill: Fill with loose granular fill with minimum clay content.

SITE PREPARATION AND BULK FILLING

AREAS UNDER CONSTRUCTION WORKS

Where cut and fill is required under the building areas, carparks, driveways and pavings:

- carry out filling in accordance with Engineer's drawings
- grade area to solid and undisturbed bearing before filling
- fill in layers not exceeding 200mm loose thickness and each layer compacted.

AREAS OTHER THAN THOSE UNDER CONSTRUCTION WORKS

Filling is to be clean sandy loam fill taken from site excavations, and clean imported fill.

imported fill:

- is to be a friable, sandy loam
- comprise not less than 65% sand and not more than 15% silt and clay
- to have a pH between 5.5 to 6.5.

GRADES AND FALLS

Carry out grading and filling of site to finished levels on drawings:

- grade site to fall from buildings & paths, having a fall of 1:100 at least one metre from building
- maximum slope for grassed areas is 1:4 (25%) and mowable.

backfilling: backfill as required and consolidate to level of surrounding area.

batters: cut and fill as required to banks and retaining walls to form batter.

FINISHED TOPSOIL AREAS

Fill in with approved topsoil. Refer to LANDSCAPE WORKS -Materials.

FINISH LEVELS

Grade site so that grassed and planting areas finish flush with paths and paving, or as detailed.

COMPACTION

GENERAL

- provide compaction to filled areas in accordance with Engineer's drawings
- under buildings, roads, carparks, driveways and paving and within zone of influence of footings (except for loose granular filling used as formwork) to 98% minimum dry density ratio
- In areas where excessive settlements create tripping hazards or result in the formation of differential levels (such as backfill around manholes, at back of kerbs and against other minor concrete structures (i.e., pits, headwalls, retaining walls, etc) or places where the extent of differential settlements justifies future maintenance by topping up backfill (sewer and drainage trenches), compact to 95% dry density ratio.
- over other areas including loose granular filling used as formwork to 85% minimum dry density ratio.

BITUMINOUS PAVINGS

Where bituminous pavings are required, all work must be carried out in accordance with an approved construction specification

CONSTRUCTION HOLD POINTS

(for inspection as per Specification requirements)

- A) Pile sets verification
- B) Pre-concrete pour check on tie bar reinforcement in decks
- C) Abutment Backfilling & Road approach construction (compaction & CBR tests per AS3798 earthworks code)
- D) Final (completion and certification) includes scour protection, guardrails, etc

FOUNDATIONS

1. If not otherwise specified footings design based on minimum allowable soil bearing pressure of 150KPa. See specific details in these plans where higher magnitude bearing pressures for certain structural elements are required.
2. The design only applies for ground and foundation levels as shown on the drawings
3. Backfill foundation walls so that the level of fill on one side of the wall is never more than 450 above the level on the other side except where detailed retaining walls are used

CONCRETE

1. All concrete work in accordance with AS 3600-2018 and all bridge/culvert construction work to be in accordance with AS5100-2017
2. Concrete to be formed as required by AS 3610 and compacted in accordance with AS 3600 and AS 3610 to achieve specified or relevant density durability and strength
3. All reinforcing fabric to be lapped one mesh panel minimum and reinforcement bars lapped 40 bar diameters U.N.O.
4. Provide concrete strengths below to relevant structural items (B1 Classification)

Pad Footings	f _c = 40 MPa	Strip footings	f _c = 40 MPa
Ground Slab	f _c = 40 MPa	Slabs Beams and Columns	f _c = 40 MPa
Maximum slump of	75mm	Maximum aggregate size	20mm
5. Sizes of concrete elements do not include thickness of applied finishes
6. Do not make any construction joints, holes or chases in the concrete elements unless shown or approved by the Engineer
7. Do not place pipes or conduits within the concrete cover to reinforcement
8. Reinforcement notation

N = Grade 500 deformed bar to AS 4671	T = Top of element	TM = Trench Mesh
R = Grade 250 plain round bar to AS 4671	B = Bottom of element	EW = Each Way
SL = Grade 500 square mesh to AS 4671	UNO = Unless Noted Otherwise	
CTS = Centres	C/S = Courses	
RL = Grade 500 rectangular mesh to AS 46	L = Grade 500 trench mesh to AS 4671	

eg 8 N16 @ 200T = 8 deformed bars 16 diameter at 200 centres placed at top of element
9. Provide clear concrete cover to reinforcement as follows: UNO

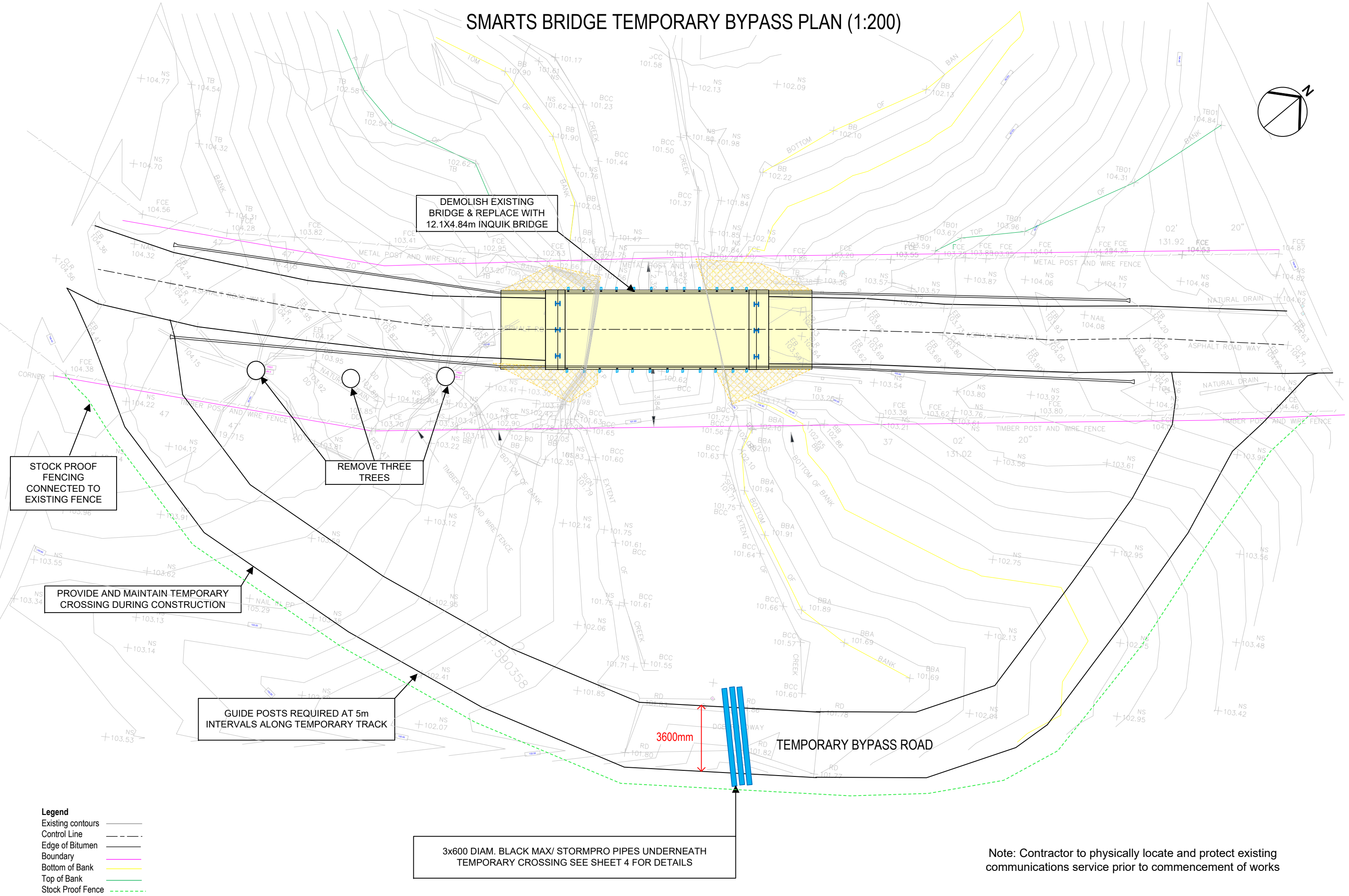
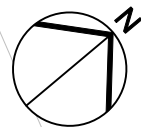
ELEMENT	INTERIOR	EXTERIOR	EXTERIOR(against ground)
Footings	NA	NA	45mm
Columns, Pedestals	30mm	50mm	45mm
Slabs, Walls	30mm	50mm	45mm
Beams	25mm	50mm	45mm
Block work	20mm from appropriate outside face		

10. Recommend using maximum bar chair spacing of 60 diameters for supporting bars and 75 diameters for fabric
11. Provide laps only at locations shown unless otherwise approved by the Engineer. Min.Lap length=40db UNO
12. For rectangular fabrics place top fabric main wires uppermost and bottom fabric main wires lowermost in direction of arrows
13. Supply and lay fabric in flat sheets., overlap 1st and 2nd cross wires of each sheet by 30mm at laps
14. Do not weld reinforcement unless shown or approved by the Engineer
15. Reinforcement is shown diagrammatically and not necessarily in true position
16. All concrete shall be placed and cured in accordance with Section 19 AS 3600. Where curing compound is used it must be applied (A) onto slabs within 2 hrs of finishing operation and (B) onto walls and columns immediately after removal of framework

DRAINAGE

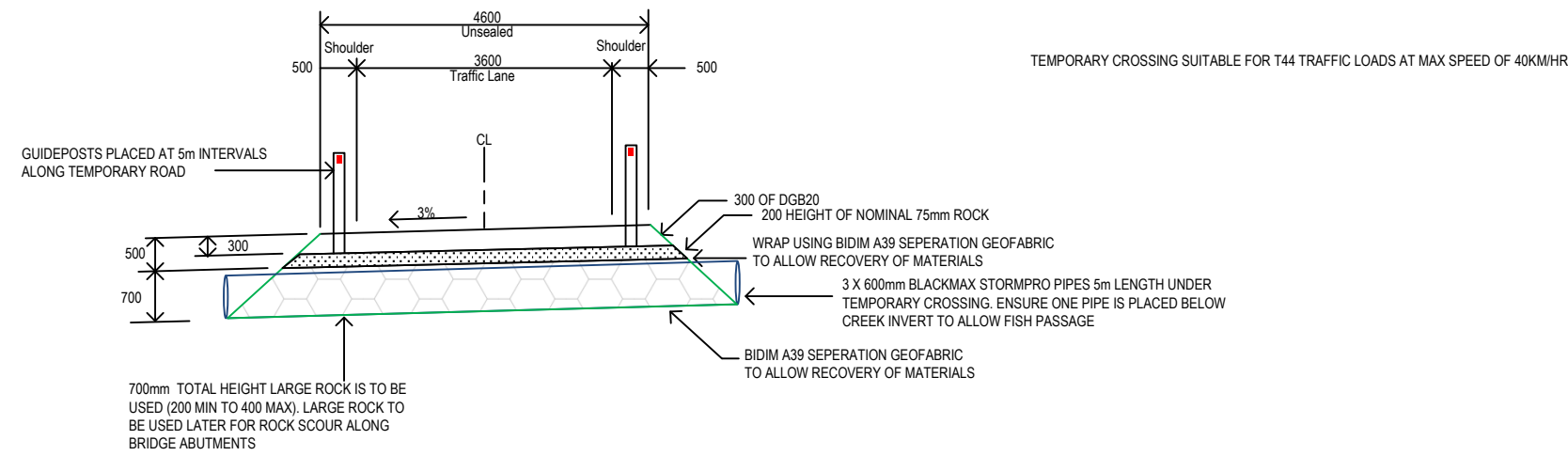
1. Cover Levels given are to be used as a guide only. Actual levels to be determined on site
2. All survey set out shall be undertaken by a qualified &appropriately experienced surveyor
3. The contractor shall not disturb any existing benchmarks
4. All existing and finished surface levels are to Australian Height Datum AHD UNO
5. Connection of new stormwater pipes to existing pipes and stormwater structures to be undertaken by the contractor
6. Where new work abuts existing work the contractor shall ensure that a smooth even profile free from abrupt changes is attained
7. All earthworks batters and trench lines in non paved areas are to be top soiled with 100mm site topsoil , dry land grassed and bitumen straw mulched
8. All reinforced concrete pipes shall be rubber ring jointed class 2 UNO
9. The contractor is required to liaise with affected lessees regarding any disruption to of vehicle access to their properties and to program the works in such a way as minimise the affects of disruptions however access for emergency vehicles should be maintained at all times
10. Sawcut through A.C. and Concrete surfaces where trenching is required
11. All abandoned stormwater, sewer and water supply pipes are to be sealed with 100mm minimum thickness concrete UNO
12. Allow for placement of heavy duty covers and seating rings for all structures in paved areas. Allow for standard covers and seating rings for all other structures UNO.

SMARTS BRIDGE TEMPORARY BYPASS PLAN (1:200)

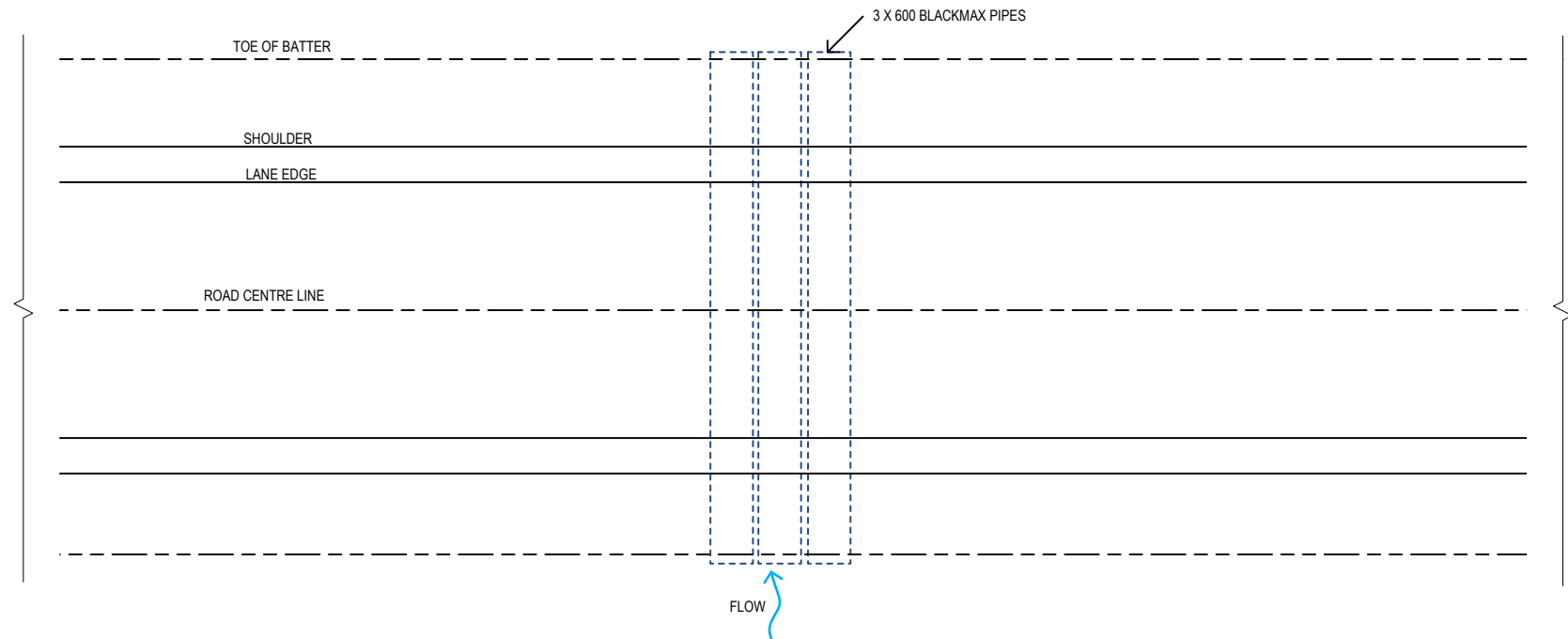


Note: Contractor to physically locate and protect existing communications service prior to commencement of works

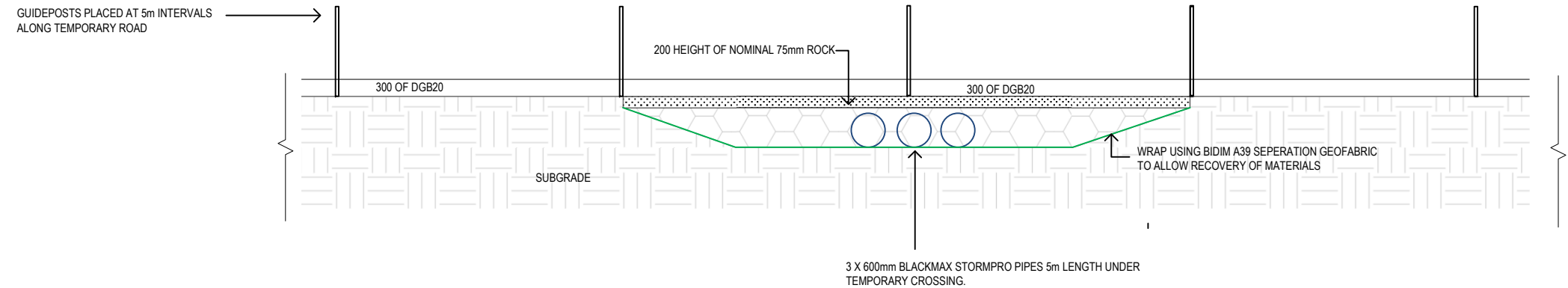
TEMPORARY CROSSING TYPICAL DETAIL (1:100)



TEMPORARY CROSSING PLAN (1:100)



TEMPORARY CROSSING ELEVATION (1:100)



SEDIMENT AND EROSION CONTROL PLAN (1:200)

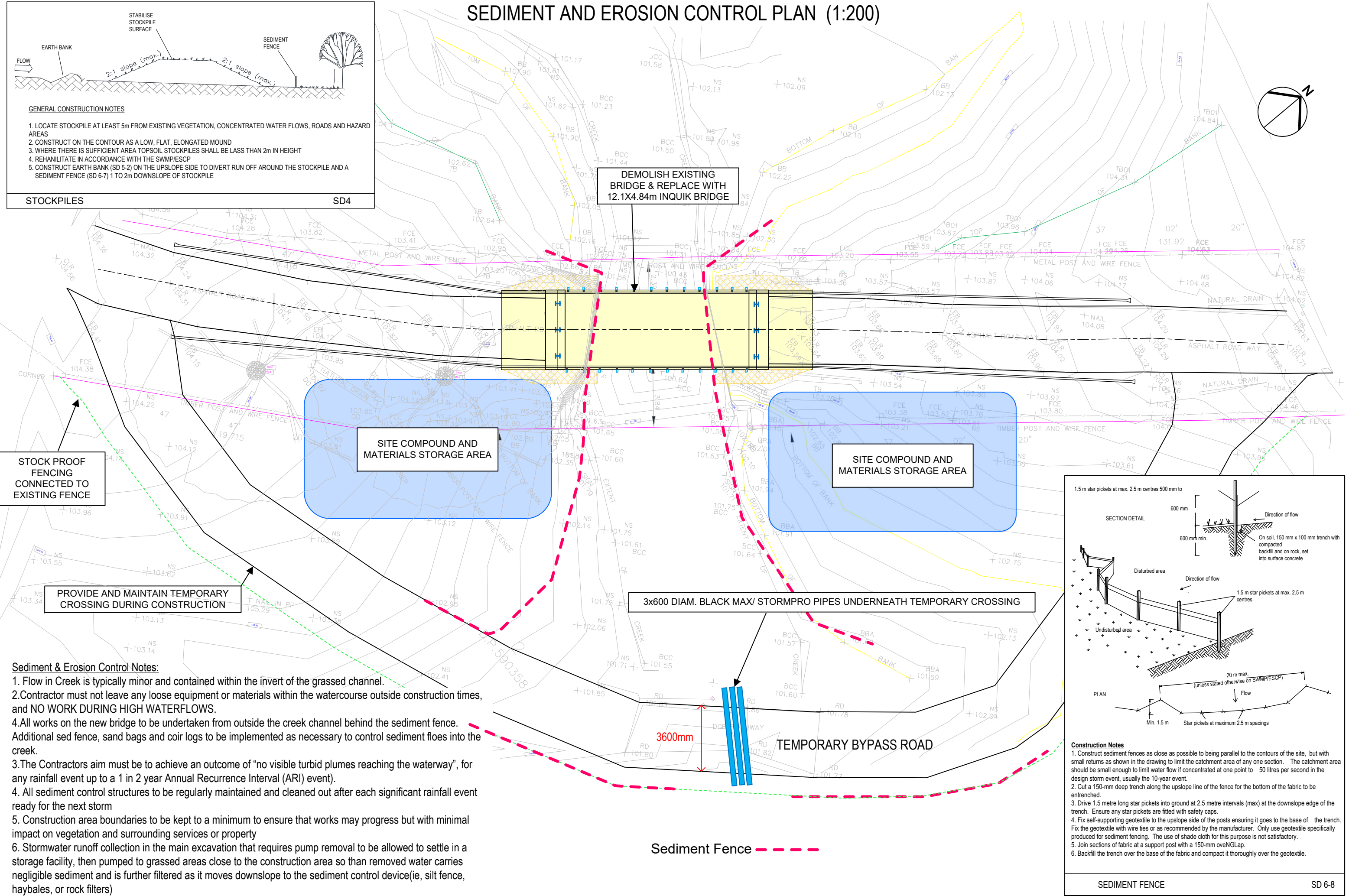


Diagram illustrating the construction of a stockpile. It shows an earth bank on the left, a stabilized stockpile surface in the middle, and a sediment fence on the right. The slopes are labeled '2:1 slope (max.)'. A north arrow is located to the right of the diagram.

GENERAL CONSTRUCTION NOTES

1. LOCATE STOCKPILE AT LEAST 5m FROM EXISTING VEGETATION, CONCENTRATED WATER FLOWS, ROADS AND HAZARD AREAS
2. CONSTRUCT ON THE CONTOUR AS A LOW, FLAT, ELONGATED MOUND
3. WHERE THERE IS SUFFICIENT AREA TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT
4. REHABILITATE IN ACCORDANCE WITH THE SWMP/ESCP
5. CONSTRUCT EARTH BANK (SD 5-2) ON THE UPSLOPE SIDE TO DIVERT RUN OFF AROUND THE STOCKPILE AND A SEDIMENT FENCE (SD 6-7) 1 TO 2m DOWNSLOPE OF STOCKPILE

STOCKPILES **SD4**

- Sediment & Erosion Control Notes:**
1. Flow in Creek is typically minor and contained within the invert of the grassed channel.
 2. Contractor must not leave any loose equipment or materials within the watercourse outside construction times, and NO WORK DURING HIGH WATERFLOWS.
 4. All works on the new bridge to be undertaken from outside the creek channel behind the sediment fence. Additional sed fence, sand bags and coir logs to be implemented as necessary to control sediment flows into the creek.
 3. The Contractors aim must be to achieve an outcome of “no visible turbid plumes reaching the waterway”, for any rainfall event up to a 1 in 2 year Annual Recurrence Interval (ARI) event).
 4. All sediment control structures to be regularly maintained and cleaned out after each significant rainfall event ready for the next storm
 5. Construction area boundaries to be kept to a minimum to ensure that works may progress but with minimal impact on vegetation and surrounding services or property
 6. Stormwater runoff collection in the main excavation that requires pump removal to be allowed to settle in a storage facility, then pumped to grassed areas close to the construction area so than removed water carries negligible sediment and is further filtered as it moves downslope to the sediment control device(ie, silt fence, haybales, or rock filters)
 7. Areas of native vegetation that will be disturbed must be rehabilitated to the managing authorities approval

1.5 m star pickets at max. 2.5 m centres 500 mm to

SECTION DETAIL

600 mm

600 mm min.

Direction of flow

On soil, 150 mm x 100 mm trench with compacted backfill and on rock, set into surface concrete

PLAN

Disturbed area

Undisturbed area

Direction of flow

1.5 m star pickets at max. 2.5 m centres

20 m max. (unless stated otherwise on SWMP/ESCP)

Flow

Min. 1.5 m

Star pickets at maximum 2.5 m spacings

Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE **SD 6-8**

Plan view of the bridge deck showing the InQuik Deck System, control line, and approach roads. The diagram includes dimensions (3000, 750, 12,100, 750, 3000) and a total length of 13,600. It shows the SOUTH APPROACH and NORTH APPROACH, with a central section labeled 'Control Line - Crooybar Road'. The InQuik Deck System is shown with a -2% slope and a 2% slope. The diagram also indicates the location of bridge guardrails, side-mounted low performance barrier fixings, and rock scour protection. A blue arrow indicates the flow direction.

Note 1 - The placement of the bridge in relation to the centreline of the creek should be such that the major flow path of the flood water is located approximately central between abutments.

Note 2 - Compacted road gravel fill to bridge approaches to be phased into existing road surface using an acceptable safe approved vertical alignment

The diagram illustrates a cross-section of a bridge structure. The bridge deck is shown with a 0.05% AEP Flood level RL 104.22 (velocity 2.7m/s) and a 1% AEP Flood level RL 103.51 (velocity 3.7m/s). The deck is supported by two abutments, Abutment A and Abutment B. The deck is labeled "InQuik Deck". The bridge is flanked by "SOUTH APPROACH" and "NORTH APPROACH". The bridge guardrails transition to W Beams then MSKT end terminals. The bridge is supported by "Side-mounted low performance barrier fixings at 1.0m spacings and Thrie beam barrier components". The bridge is supported by "310UC118 Driven Pile". The bridge is supported by "Gravelly sand soil with low to medium plasticity and stiff to very stiff strength". The bridge is supported by "Weathered Sandstone Low to Med Strength". The bridge is supported by "Rock Scour Protection to sides of abutment, use larger boulders or gabion baskets as required to retain batter". The bridge is supported by "Existing Bank Profile" and "Proposed bank profile". The bridge is supported by "Depth to weathered granite bedrock ~ 4500".

Side-mounted low performance barrier fixings at 1.0m spacings and Thrie beam barrier components

InQuik Abutment

Batters 1V:2H stabilised

Rock Scour Protection

4840

4411

CL

2%

RL 103.63

2%

50

700

1950

Pile Cut off level RL 102.48

1200

RL 101.68

1600 CTS

Extend driven piles through upper alluvial soil into Weathered Bedrock materials until adequate pile set is achieved. Estimated depths based on a geotechnical reduction factor of 0.75

Steel piles 310UC118 driven into underlying material to required set up.

Gravelly sand soil with low to medium plasticity and stiff to very stiff strength

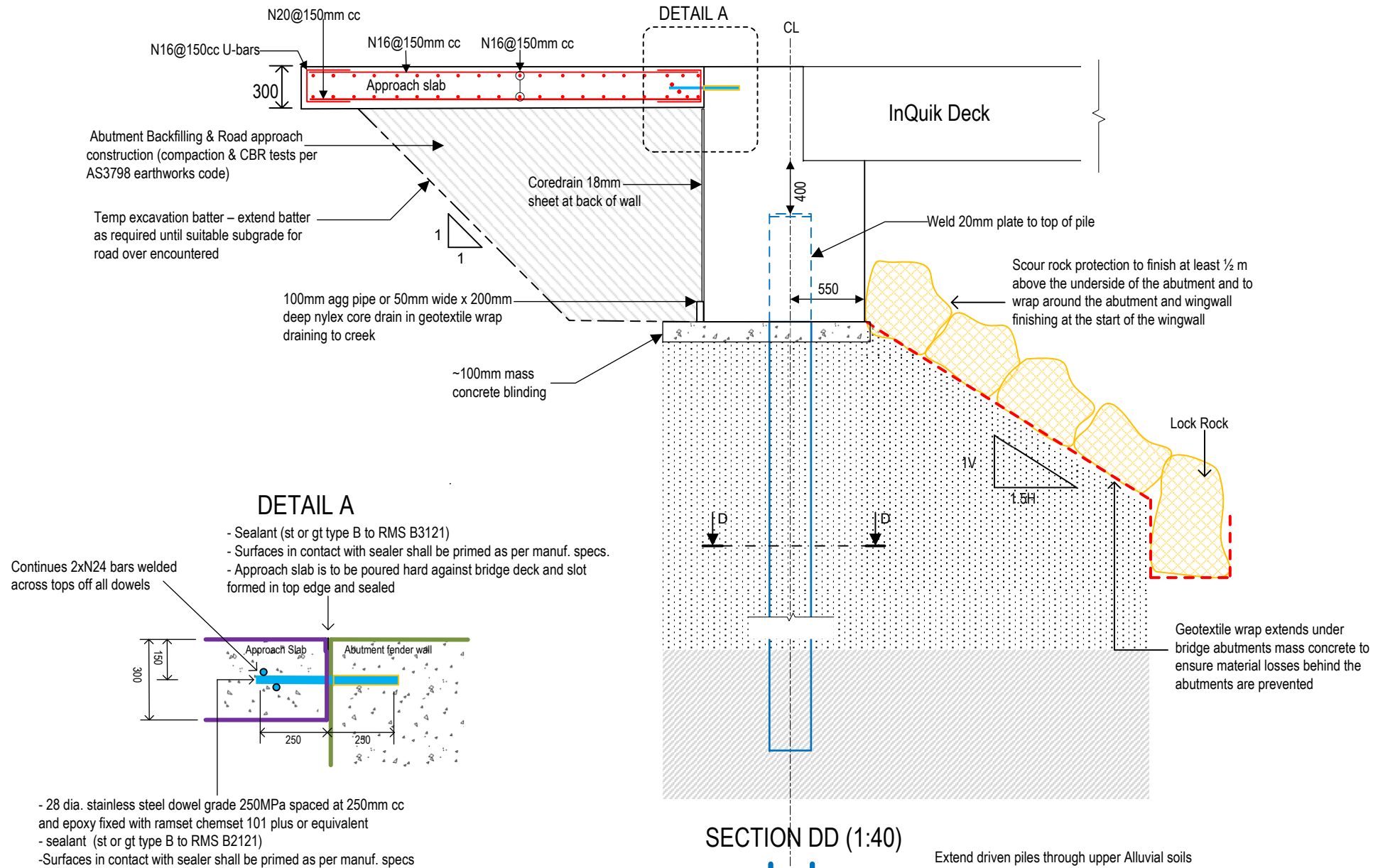
Weathered Sandstone Low to Med Strength

-6000

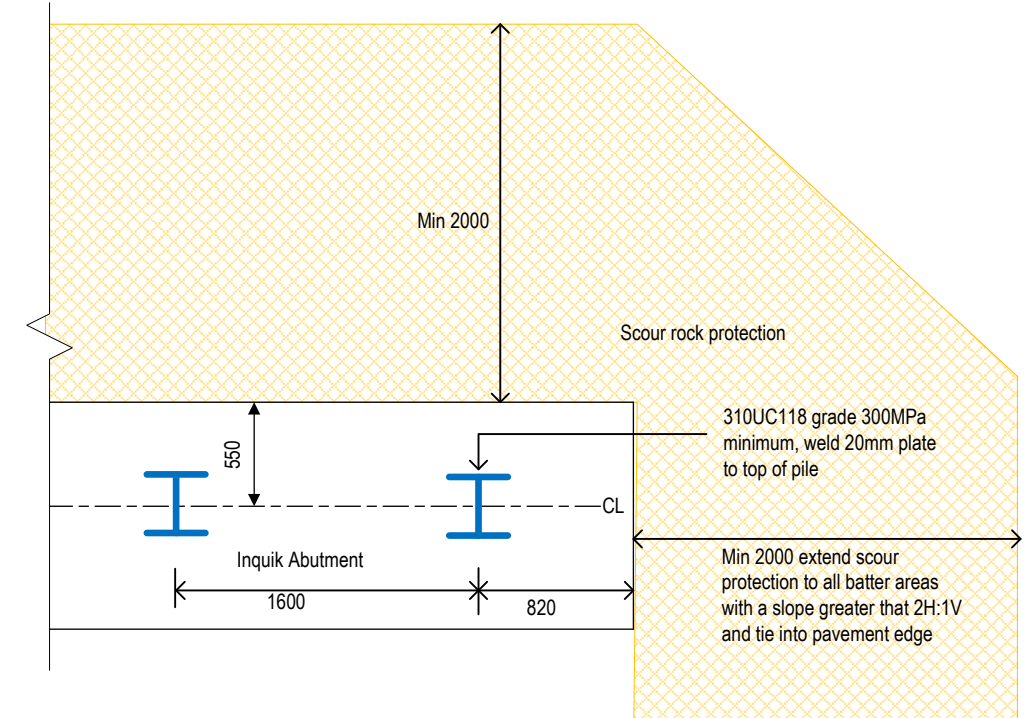
-When pouring bridge deck form crown on longitudinal centre line to facilitate 2% crossfall

-Place Sheet of SL82 mesh in additional depth of concrete for crack control, position to maintain 50mm clear cover at all edges

SECTION BB - ABUTMENT DETAIL (1:40)



PART PLAN VIEW OF ABUTMENT A & WINGWALL

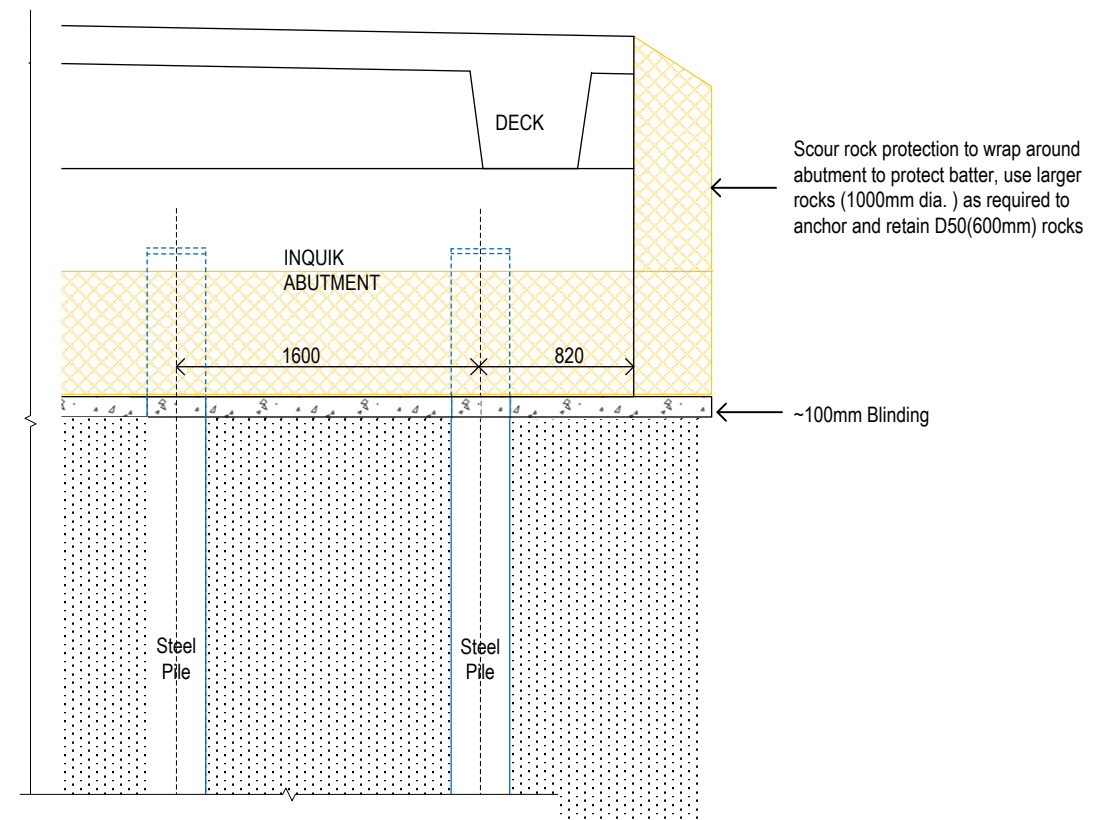


SCOUR PROTECTION

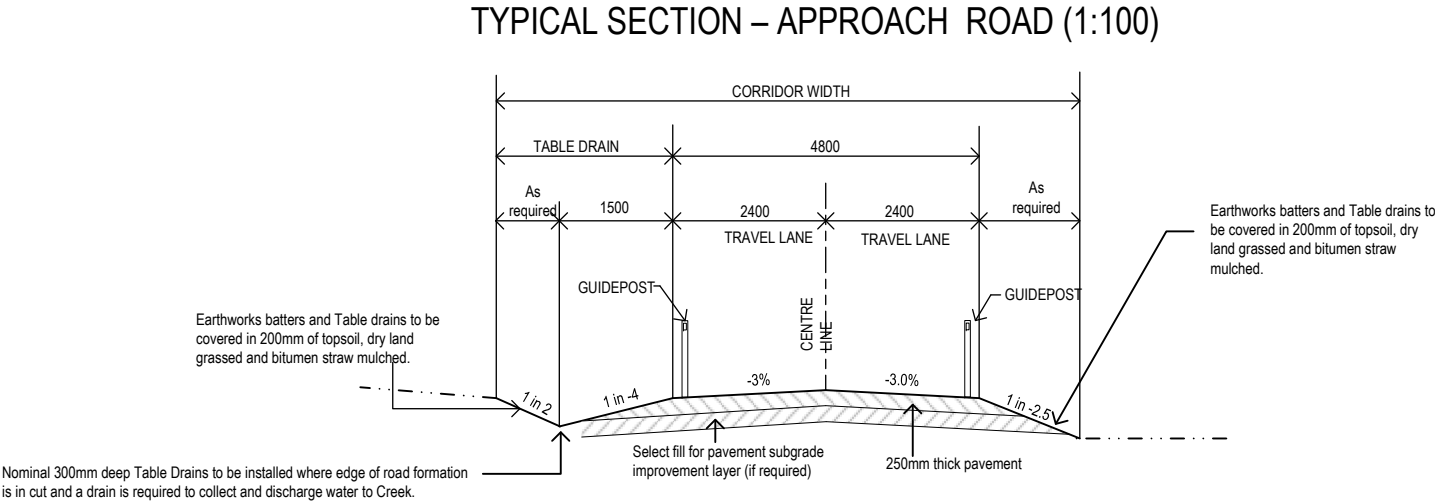
It is the Contractors responsibility to ensure that sufficient scour protection is placed and anchored around the reinforced concrete abutments to ensure these are not undermined by flood events or critical flow events exacerbated by waterway blockages. Rock placed as scour protection to abutments for flood flow velocities in excess of 2.7m/s. This requires the use of heavy duty geotextile (grab strength=1400N, Tear Strength=500N, G rating=3000) layed and anchored over earth filled batters and weighted down with solid rocks which are sized D50 (600mm). D50 = nominal rock size (diameter) of which 50% of the rocks are smaller (i.e. the mean rock size). The minimum thickness of the rock scour shall be 1000mm, rocks to be durable igneous or metamorphic rocks.

The voids between the larger rocks should be filled with smaller rocks or concrete. Shape batters to no steeper than 1V to 2H and lay heavy duty geotextile over batters (Bidim A39 min. strength grade or similar)

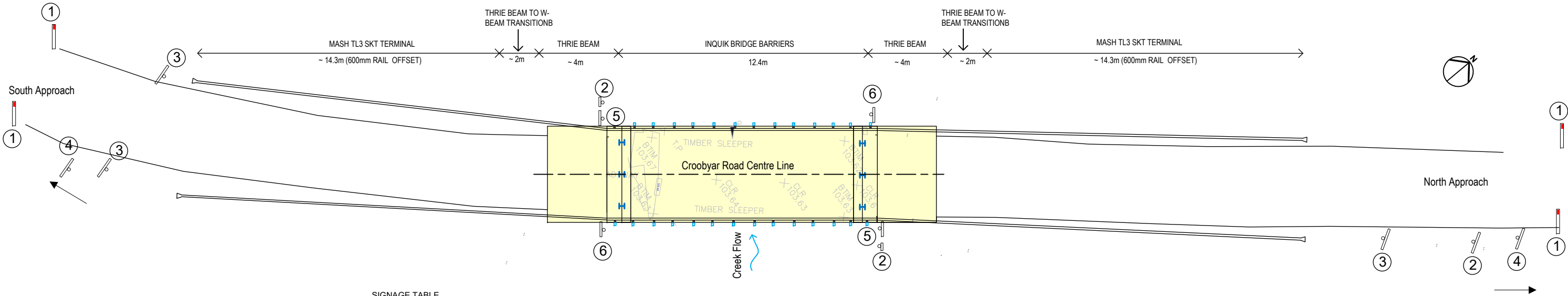
SECTION CC - (1:40)



PAVEMENT DETAILS			
Pavement Layer Thickness		Material Requirements	Compaction Required
Seal	14mm	14/7 DD	NA
Base Course	125mm	DGB20	100% Standard
Sub Base Course	125mm	DGB40	98% Standard
Select Fill	125mm	CBR>10, PI<15, Max particle Size 100mm with no less than 50% passing 19mm sieve	98% Standard
Earth Fill	Varies (300mm max layers)	Suitable cut or borrow material as agreed with Council or the Engineer	98% Standard

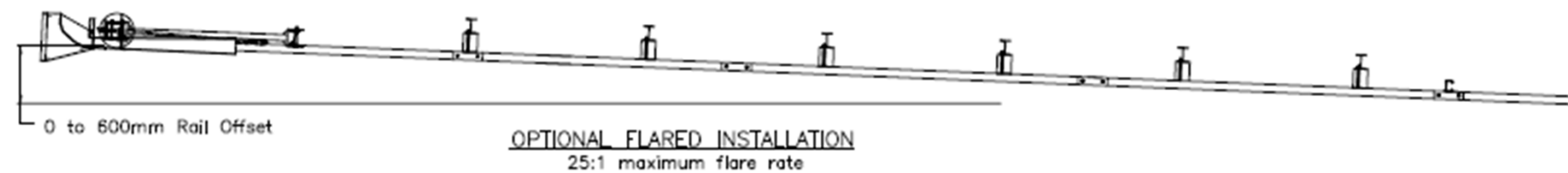
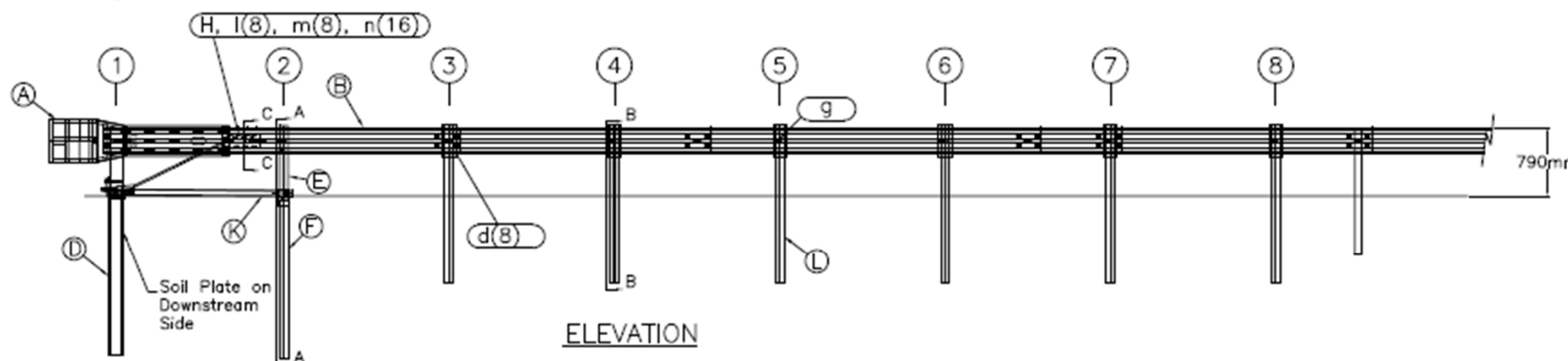
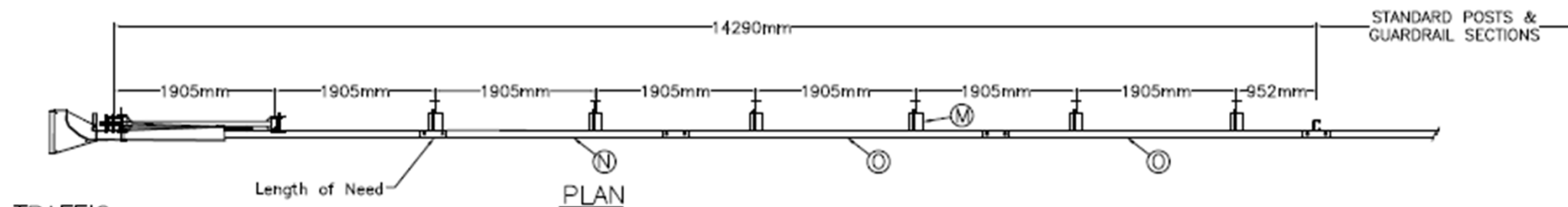


CROOBYAR ROAD BRIDGE BARRIER AND SIGNAGE PLAN LAYOUT (1:200)



SIGNAGE TABLE				
DWG ID	CODE	DESCRIPTION	DISTANCE FROM ABUTMENTS	DISTANCE OFFSET FROM EDGE OF LANE
1	N/A	FLEXIBLE GUIDEPOSTS WITH DELINEATORS	10m DISTANCE BETWEEN TWO GUIDEPOSTS	500mm
2	G9-22-2	DEPTH INDICATOR	0 TO 5m FROM BOTH ENDS OF BRIDGE	1200mm to 3000mm
3	R6-1	NO OVERTAKING OR PASSING	20 TO 30m FROM BOTH ENDS OF BRIDGE	2000mm to 5000mm
4	W8-16	ONE LANE CROSSING WARNING SIGN	80 TO 120m FROM BOTH ENDS OF BRIDGE	2000mm to 5000mm
5	D4-3(L)	WIDTH MARKER	0 TO 5m FROM BOTH ENDS OF BRIDGE	500mm
6	D4-3(R)	WIDTH MARKER	0 TO 5m FROM BOTH ENDS OF BRIDGE	500mm

NOTES:
- ALL SIGNAGE SHOULD BER LOCATED ACCORDING TO FACING ORIENTATION, LATERAL CLEARANCE AND MOUNTING HEIGHT AS DEFINED IN AS1742.2 AND IIN ACORDANCE WITH SPECIFICATIONS
-GUIDE POSTS TO BE PLACED IN ACCPRDANCE WITH AS1742.2 PART 2 SECTION 4.2.4
-REFLECTORS ARE TO BE MOUNTED ON THE BRIDGE BARRIER AS PER THE COLOUR AND SPACING OF THE GUIDEPOSTS IMMEDIATELY BEFORE AND AFTER THE BRIDGE BARRIER

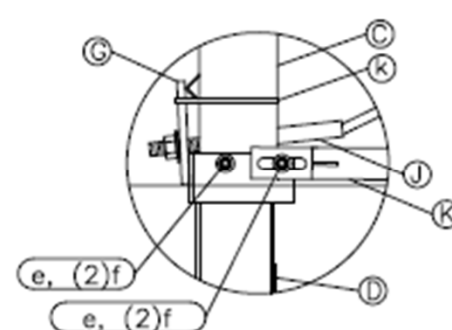


ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	SKT IMPACT HEAD	GE-EF-MX-3333-BG
B	1	SLOTTED ANCHOR RAIL 3810	GE-WB-SR-3810-BG
C	1	TOP POST 1	GE-PG-IS-0650-CG
D	1	BOTTOM POST 1	GE-PG-IS-1900-CG
E	1	TOP POST 2	GE-PG-IS-0860-AG
F	1	BOTTOM POST 2	GE-PG-IS-1950-AG
G	1	BEARING PLATE	GE-EF-MX-0011-AG
H	1	ANCHOR CABLE BRACKET	GE-EF-MX-0015-AG
J	1	CABLE ASSEMBLY	GE-EF-MX-2000-AG
K	1	GROUND STRUT	GE-EF-MX-4020-BG
L	6	STEEL LINE POST	GE-PG-IS-1830-CG
M	6	COMPOSITE BLOCK	GE-BL-SS-0310-AS
N	1	W-BEAM GUARDRAIL 2860mm	GE-WB-SR-2860-AG
O	2	W-BEAM GUARDRAIL 3810mm	GE-WB-SR-3810-CG

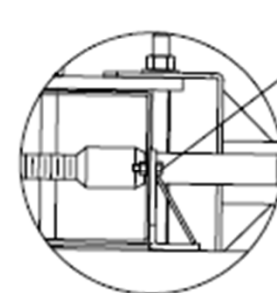
HARDWARE			
a	2	M8 x 25mm HEX BOLT	GE-FS-08-0025-HG
b	4	M8 WASHER	GE-FS-08-0000-AG
c	2	M8 NUT	GE-FS-08-0000-HG
d	33	M16 x 32mm SPLICE BOLT/NUT	GR-FS-16-0032-MG
e	2	M16 x 220mm BOLT / NUT	GE-FS-16-0220-HG
f	4	M16 WASHER	GE-FS-16-0000-CG
g	6	5/8" x 10" POST BOLT / NUT	GE-FS-58-0010-MG
h	1	M20 x 220mm BOLT / NUT	GE-FS-20-0220-HG
j	1	M20 WASHER	GE-FS-20-0000-BG
k	1	BEARING PLATE RETAINER TIE	GE-MX-MX-0011-AS
l	8	1/2" x 1 1/4" SHOULDER BOLT	GE-FS-12-0114-HG
m	8	1/2" SHOULDER BOLT NUT	GE-FS-12-0000-HG
n	16	1/2" SHOULDER BOLT WASHER	GE-FS-12-0000-AG

NOTES:

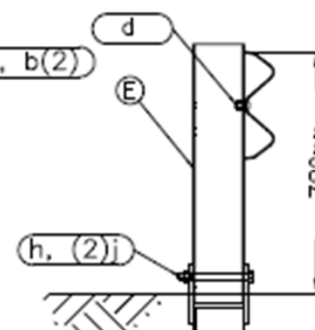
1. THE LOWER SECTIONS OF POSTS 1 & 2 SHALL NOT PROTRUDE MORE THAN 100mm ABOVE GROUND.
2. THE CABLE ASSEMBLY MUST BE TAUT.



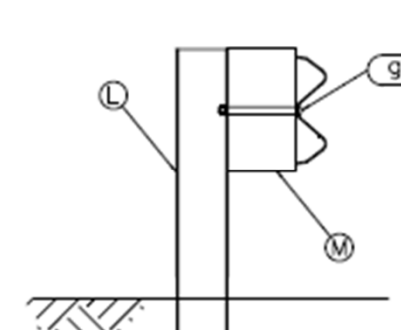
Post #1 Connection Detail



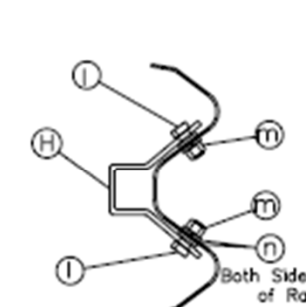
Impact Head Connection Detail



SECTION A-A
Post #2



SECTION B-B
Posts #3 thru #8



SECTION C-C
Anchor Bracket

REV	DATE	DESCRIPTION	DRAWN	APPROD.	REV	DATE	DESCRIPTION	DRAWN	APPROD.
A	21.08.17	INITIAL ISSUE	HS	TC					



DRAWING
DESCRIPTION

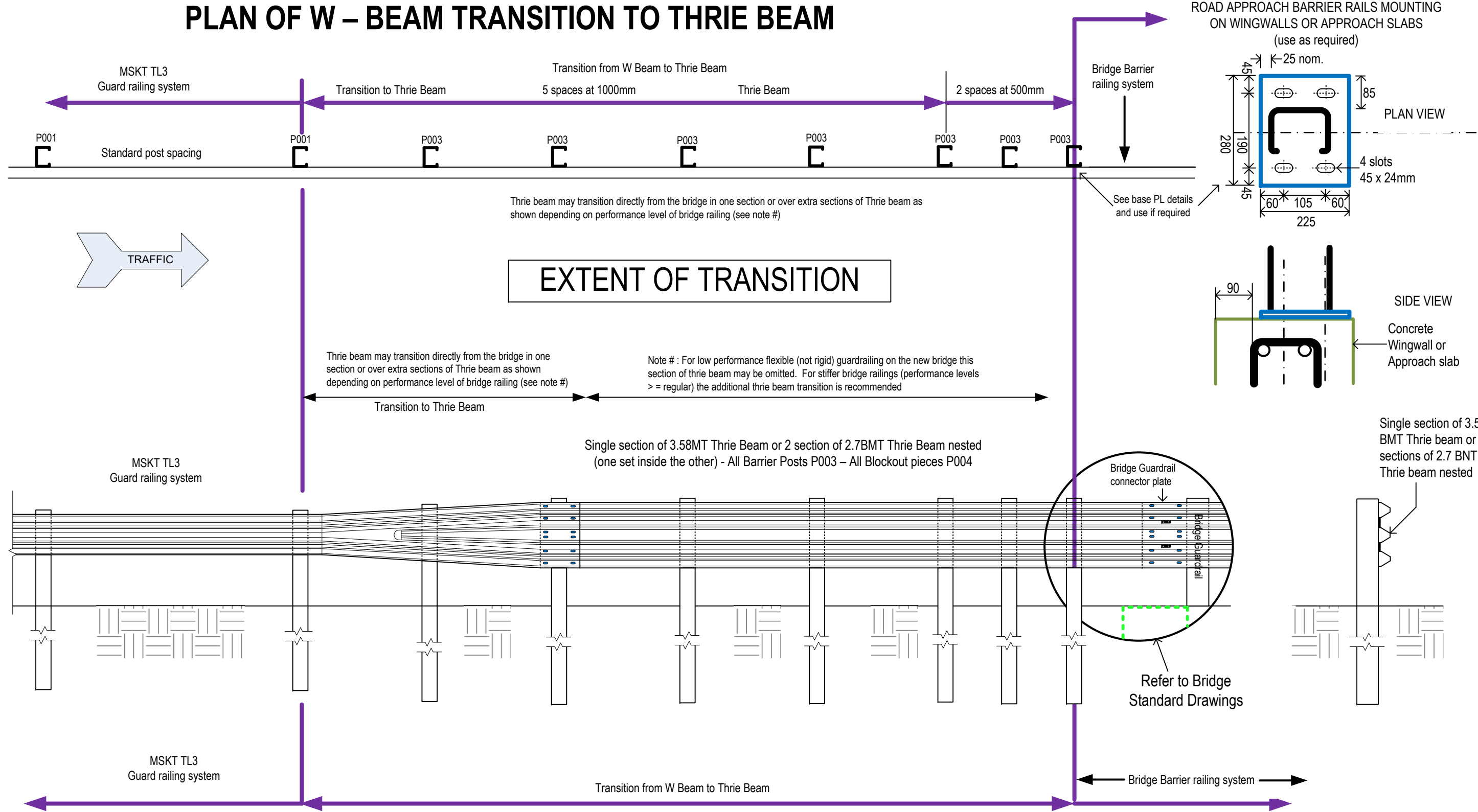
MASH TL3 SKT TERMINAL (MSKT)

DRAWING
REFERENCE

K-MSKT TL3

DRAWN BY	M. SEAL	DIMENSIONS	mm
CHECKED	H. WALLACE	SCALE	NTS
APPROVED	T. COLOUHOON		

PLAN OF W – BEAM TRANSITION TO THRIE BEAM

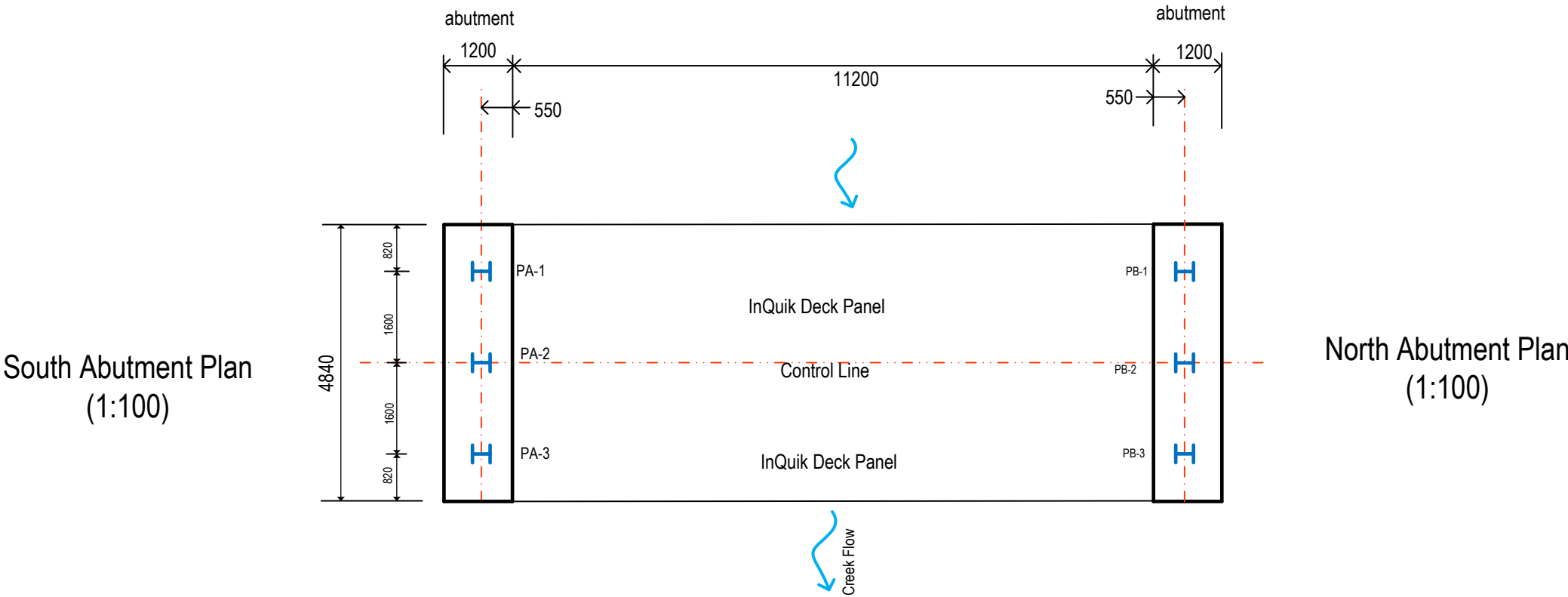


ELEVATION OF W – BEAM TRANSITION TO THRIE BEAM

SECTION

- Notes
1. These drawings should be read in conjunction with standard drawing TfNSW – Semi Rigid Series R0710-01 to R0710-25
 2. Bridge Railing System must be of Adequate strength to accept full impact loading
 3. Notched blockout piece P006/P007 not to be used in this transition

BRIDGE SET OUT PLAN (1:100)



PILE SCHEDULE

PILE	MEMBER SIZE	EASTING	NORTHING	ULTIMATE DESIGN LOADS					CUTO OFF LEVEL (RL)	ANTICIPATED TOE LEVEL (RL)	PILE TOTAL LENGTH (m)
				AXIAL (KN)	SHEAR (KN)		BENDING (KNm)				
					LONGITUDINAL	LATERAL	LONGITUDINAL	LATERAL			
PA-1	310UC118	260614.343	6087813.924	607	155	137	165	164	102.48	95.68	6.8
PA-2	310UC118	260615.639	6087812.983	607	155	137	165	164	102.48	95.68	6.8
PA-3	310UC118	260616.935	6087812.042	607	155	137	165	164	102.48	95.68	6.8
PB-1	310UC118	260622.002	6087823.547	607	155	137	165	164	102.48	95.68	6.8
PB-2	310UC118	260623.298	6087822.606	607	155	137	165	164	102.48	95.68	6.8
PB-3	310UC118	260624.594	6087821.665	607	155	137	165	164	102.48	95.68	6.8

Geotechnical Investigation Report by Rapid Geo

Report Number: RG726-1-GR-1-1
Project Name: Site Investigation for Bridge Replacement
Site Location: Croobyar Road (Ch 8.043) "Smarts Bridge"- Croobyar, NSW
Rev 1 dated 27/3/2024

Survey

Detail survey plan by A.R.P Registered Surveyors
Ref No. 1910 dated 17/11/2023
Smarts Bridge Croobyar Road, Croobyar

InQuik Specifications

Modular Bridge System – SM1600 Bridge – Integrated
12.1mx4.84m x 1.2m Flat Side – No Wing walls Sheets 1 to 7
AU25001 - SMARTS BRIDGE

Hydraulic Assessment By JSA Engineering Solutions

Smarts Bridge Croobyar
Rev A Dated 26/7/24

Driven Pile Notes

- Exposure Classification : Steel Non-aggressive & Concrete Mild
- The base of the pile must bear within satisfactory base where the required setup is achieved.
- Pile length may vary based on set, ordered length of pile to be determined by Contractor to account for variability in driven lengths
- Pile set to be witnessed and certified by a structural or geotechnical engineer.
- The nominated loads and moments apply to the structure as designed. Any proposed changes to the piles and pile layout may significantly alter the behavior of the structure, as well as the pile loads and moments, and shall be submitted to the Engineer for approval.
- Driven piles must be founded in Slightly Weathered Granodiorite bedrock material.
- Estimated depths based on a geotechnical reduction factor of 0.75
- Adopted minimum ultimate capacities for bedrock material are low strength sandstone: 2.25MPa Ultimate end bearing

LOAD CALCULATIONS FOR ARI 1 in 100 EVENT (Critical)

BRIDGE HYDRAULIC ANALYSES (per AS5100 Bridge Code)

Bridge Spans

Span 1

Cd = 1.4

length

12.10

Pier shape = square

Bridge Width

4.84

circular 0.7

Superelevation (upstream face raised is +ve)

0.00

square 1.4

Highest Deck Level

103.63

wedge 0.8

Average Beams/Deck/Kerbs Depth

0.70

CL = 0.9

Average Height of Railings

0.80

Flow angle? <= 30 deg

Depth of Water Flow (over highest deck level)

-0.12

u/s deck RL = 102.93

Velocity of Water flow

3.70

top rail RL = 104.43

TWL = 103.51

Left Abutment Details

Left Abutment Ground Level

101.68

Ad = 2.196

deck AL = 29.28

Width

1.20

piers AL = 8.8572

Ldebris = 6.05

Height

1.83

deck As = 3.51

flow depth = 1.83

Right Abutment Details

Right Abutment Ground Level

101.68

Ad = 2.196

deck AL = 29.28

Width

1.20

piers AL = 8.8572

Ldebris = 6.05

Height

1.83

deck As = 3.51

flow depth = 1.83

Bed Level = 101.30

vert. dist from u/s girder to TWL = dwgs 0.58

Sr = dwgs/dsp = 1.00

wetted depth of Superstructure + railings = dsp 0.58

Pr = ygs/dss = 2.81

vert. dist from u/s girder to bed level = ygs 1.6

wetted depth of solid Superstructure = dss 0.58

average depth of flow = y 1.8

Note as per AS5100 cl 16.3.2

ULS to 1:2000 yr ARI flood

Load Factor applied = 1.3

HYDRAULIC FORCES SUMMARY

	Left	Right
1. Pier Drag Force (parallel to flow)		
Fd = 0.5.Cd.Vw2.Ad	21.0KN	21.0KN
2. Superstructure Drag Force (parallel to flow)		
Fd = 0.5.Cd.Vw2.As	40.8KN	40.8KN
Sum(1+2)=	80.4KN	80.4KN
3. Pier Side Force (perpendicular to flow)		
FL = 0.5.CL.Vw2.AL	54.6KN	54.6KN
	70.9KN	70.9KN
4. Superstructure UpLift Force		
FLu = 0.5.CL.Vw2.AL	20.0KN	20.0KN
	28.1KN	28.1KN
5. Superstructure Downwards Force		
	-400.9KN	-400.9KN
	-521KN	-521KN
6. Superstructure Moment		
Mgu = 0.5.Cm.Vw2.As.ds	41.8KNm	41.8KNm
	54.3KNm	54.3KNm
Uplift & Downwards =	22KN	22KN
7. Debris Loads to Piers (where flood level < u/s deck level+debris mat depth)		
Fdu=0.5.Cd.Vw2.Adeb		
Max. Debris Mat Length =	6.05	6.05
Debris Load		
CL below deck	Height	Load applied at mid hgt. of Debris mat
0.720	1.2	169.0KN
1.328	3.0	422.4KN
1.2m Debris Applicable <=	220	220
3.0m Debris Applicable <=	549	549
8. Debris Loads to superstructure (applies if TWL > RLu/s deck-0.6)		
Fdu = 0.5.Cd.Vw2.Adeb		
Debris Load		
CL below deck	Height	Load applied at mid hgt. of Debris mat
0.720	1.2	24.8KN
1.328	3.0	62.1KN
1.2m Debris Applicable <=	32	32
3.0m Debris Applicable <=	81	81

Table 2. Hydraulic Results at bridge location

Hydraulic information at bridge crossing							
	1/2000	1%	2%	5%	10%	20%	1EY
Flow Rate (m3/s)	104.612	62.649	51.055	35.97	27.75	21.979	7.046
Velocity (m/s)	2.7	3.7	3.5	3.1	2.9	2.7	2.2
depth (m)	2.892	2.182	2.002	1.722	1.562	1.432	0.832
Peak HGL	104.22	103.51	103.33	103.05	102.89	102.76	102.16

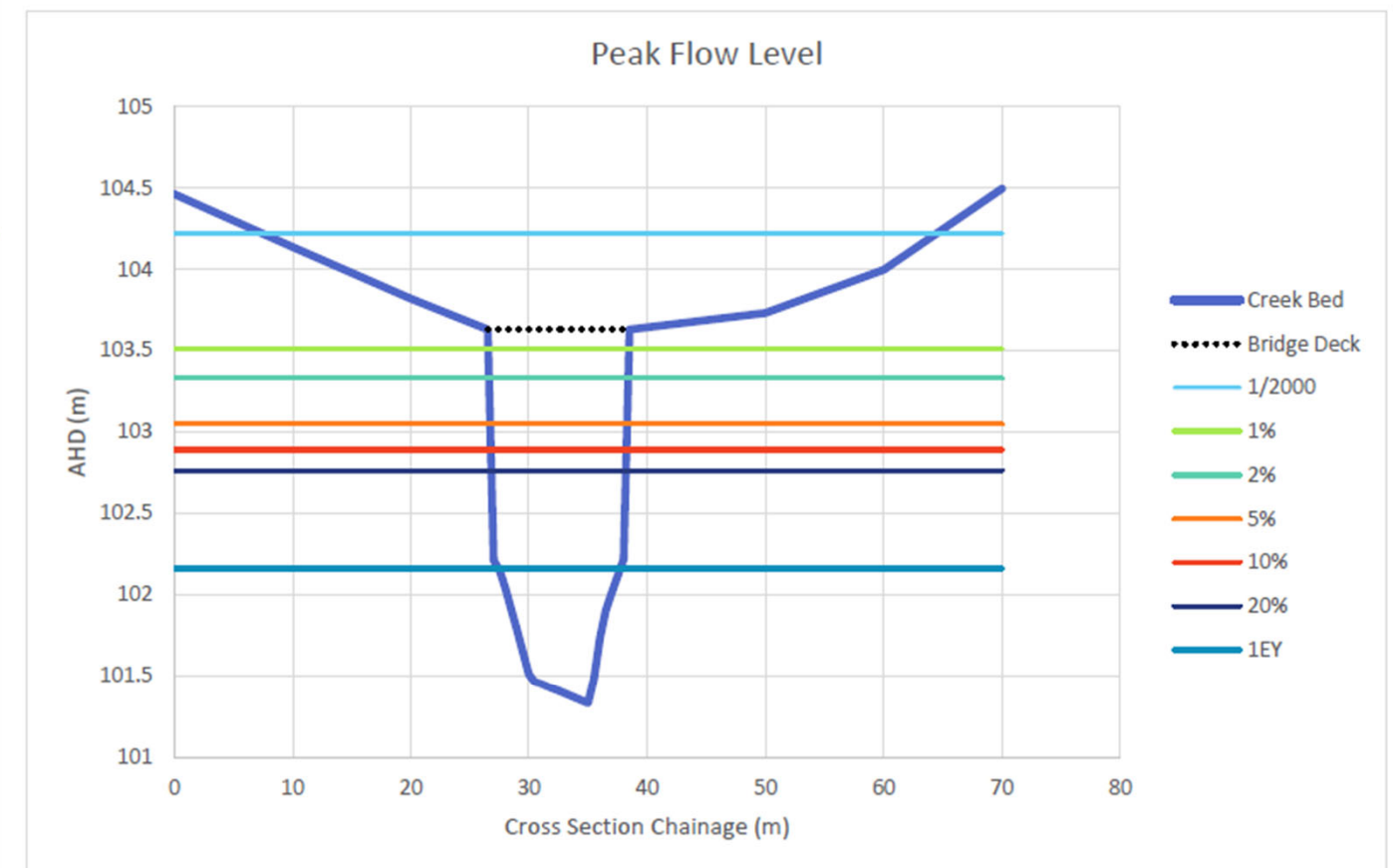


Figure 15. Graphical channel results

- 1 - Piers and Superstructure Drag Forces Fdu = 81KN Abutment Side Forces = 71 KN
- 2 - Lift Forces FLu = 22KN
- 3 - Debris Drag Force Piers = 630KN Log Impact = $m.vu^2 / 2.9.8.d = 20kn \times 3.7^2 / 2 \times 9.8 \times 0.075 = 187KN$

- Loads from Critical Hydraulic Water flow in channel
- Debris mat depth selected = 3.00m based on wooded catchment
- Use maximum of Drag or Debris Horizontal Forces = 630KN (abut)