DELIVERING FOR QUEENSLAND

Drafting and Design Presentation Standards

Volume 3: Structural Drafting Standards
Chapter 5 - Other structures drawings

January 2026

Queensland Government

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Contents

1 General

All project drawings shall be completed to the standards of detailing, accuracy, and completeness set out in this manual and that a thorough check of all drawings shall be carried out to determine that they completely, accurately, and unambiguously convey all the information necessary to enable construction of the works.

Transport and Main Roads expects uniformity in appearance and detailing on the drawings across all similar structural projects.

This chapter is new in this edition of the volume and contains material for structures (other than bridges) produced for departmental projects and is set out to align with the content and format of the DCBoS.

AS 1100 should also be used for guidance.

Chapter 4 contains the material for bridge drawings produced for the department.

2 Cover sheet and General Notes drawings

2.1 Cover sheet for other structures drawings

As demonstrated in example drawings, the first sheet in a set of structural engineering drawings has:

- the full name of the project, the name of the associated structure package, and any package number if part of a large project
- locality plan
- scheme submitted and financial approval box as per DDPSM Volume 1 Sections 1.6.2.2 and 3, and
- a drawing index.

When the drawing index exceeds more than 40 drawings, it can be made into the next drawing in the set.

A project spanning a long length of road corridor or a complex layout denoting several work sites can result in a larger detailed locality plan that requires its own sheet, which would be made into the next or third drawing in the set after the drawing index and before the General Notes drawings.

2.2 Consistency in presentation and detail

As stated in the DCBoS, all the content on the drawings shall be consistent across the set without change, and the drawings shall be completed to the standards of detailing, accuracy, and completeness set out in this volume. Figure 2.2 is an example cover sheet drawing

Table 2.2 – Cover sheet drawings minimum content

Requirement	Drawing or element description	Figure reference
Project name	The name of the structure and any package number if that structure is part of a large project. This structure name is usually then used for the first title line in the title block.	Figure 2.2
Locality plan	High quality resolution map that clearly shows the work site, road name and ID, the nearby towns or road direction arrows naming those towns if out of view, the waterway named for structures linking into or crossing a waterway, north point.	Figure 2.2
Scheme submitted and financial approval box	As per Figure 1.6.2.3 of DDPSM Volume 1, AutoCAD block available from the plan sheets of *TMR AutoCAD Customisation*, and edited to show the information, signatures, and date signed, of the consultant or departmental business unit submitting the drawings, and the departmental Regional Director or delegate's approval, signatures, and date signed.	Figure 2.2
Drawing index	Table matching the information in the title block of each drawing within the set, including: • drawing number; a unique departmental number as supplied by Transport and Main Roads region's Plan Room • revision letter • date; for Revision A, this is usually the date the drawing was signed by RPEQ, and reissue dates for subsequent revisions • series number, as described in Clause 3.4 of Chapter 2 and unique within the set, and • drawing description.	Figure 2.2

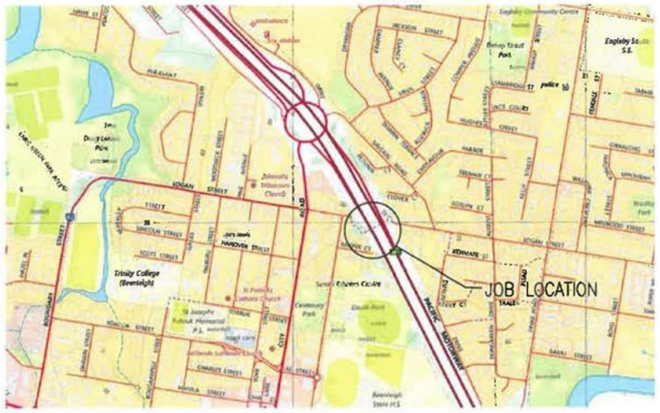
Figure 2.2 – Example cover sheet – other structures – Sheet 1

Department of Transport and Main Roads MRTB_Detail (08/21)

LOGAN STREET PEDESTRIAN OVERBRIDGE
SECURITY SCREENS

PROJECT SCOPE:
The intent of this design is to enhance the security of the structure and the motorway by providing barriers that restrict or prevent pedestrian access to the outside of the structure and to the Motorway.

Aspects of this design include
- extend the existing Security Screens on the bridge.
- provide security style fencing at Abutment A and Pier 3
- enhance existing chain wire fencing at Abutment B



LOCALITY MAP – CITY OF BEENLEIGH

SCHEME SUBMITTED *(Engineering and Technology – Structures Planning and Delivery)*:
In the effect of Section 115 of the Professional Engineers Act 2002, I certify that the professional engineering services in the areas of engineering required for this project have been carried out by or under the supervision of registered professional engineers who are registered under the Act in respect of the areas of engineering.
I also certify that the design meets the requirements of all relevant Department of Transport and Main Roads Qld – Policies, References, Standards, Planners and Designers Instructions, Codes of Practice, Guidelines, and Brief/Functional Specification/s.
By the signing of this statement I have deemed to certify all drawings in this contract as listed on this drawing index.

SIGNED: TITLE:

RPEQ No.: DATE:

SCHEME APPROVED: *(Regional Director or Delegate)*:
I hereby certify that the scheme complies with the intent of the relevant project on the Roads Program and the scheme is approved for release in accordance with that program.

SIGNED: TITLE: DATE:

DRAWING INDEX

Drawing Number	Revision	Date	Series Number	Drawing Description
951701	A	15/11/24	BR1–DI–01 of 01	DRAWING INDEX, LOCALITY MAP, SCHEME APPROVAL
951702	A	15/11/24	BR1–GA–01 of 02	GENERAL ARRANGEMENT – SHEET 1
951703	A	15/11/24	BR1–GA–02 of 02	GENERAL ARRANGEMENT – SHEET 2
951704	A	15/11/24	BR1–MD–01 of 06	ASSEMBLY DETAILS
951705	A	15/11/24	BR1–MD–02 of 06	SCREEN SUPPORT POSTS AND TRIM PLATES
951706	A	15/11/24	BR1–MD–03 of 06	SCREEN PANELS
951707	A	15/11/24	BR1–MD–04 of 06	HANDRAIL EXTENSIONS AND TRIM PLATE LOCATIONS
951972	A	15/11/24	BR1–MD–05 of 06	ABUTMENT A SECURITY FENCES
951973	A	15/11/24	BR1–MD–06 of 06	PIER 3 SECURITY FENCES

GENERAL NOTES
1. These drawings shall be read in conjunction with all reference drawings and specifications, including the existing bridge drawings, Main Roads Technical Specifications and with such other written instructions that may be issued during the course of the contract. All discrepancies shall be referred to the Administrator for decision before proceeding with work.
2. DIMENSIONS
   - All dimensions are in millimetres.
   - Dimensions shall not be scaled from the drawings.
   - All dimensions are based on existing drawings.
   - Dimensions shall be verified on site before commencement of fabrication or construction.
3. FOR DETAILS OF EXISTING STRUCTURE
   - Refer to Existing Bridge Drawing No's 298361 to 298378.

DESIGN NOTES
1. The design loads for the anti–throw barriers are based on the following design assumptions and operational limitations:
   a. Dimensions taken from the existing bridge drawings
   b. Wind loading: Importance Level = 3
      Region B

Wind Speed, V20	38m/s
Wind Speed, V1000	60m/s
Wind direction multiplier, Md	1.0
Terrain Category	2.5
Terrain / Height Multiplier, Mz,cat	0.915
Shielding Multiplier, Ms	1.0
Topgraphic Multiplier, Mt	1.0

   c. Earthquake load: Not applicable
   d. Barrier Loads
      0.75 kN/m acting on the handrails longitudinally and vertically simultaneously
      1 kPa acting transversely on the total barrier between kerb and rail
      A single load of 0.6 kN acting over an area of 100mm x 100mm in a transverse direction anywhere on the barrier.

SERVICES
1. All services must be located, identified and protected, including overhead restrictions, before works are carried out in the vicinity of the bridge.

STEELWORK NOTES
1. Steelwork shall be fabricated to MRTS78 Fabrication of Structural Steelwork.
2. Steel plate shall be Grade 350 to AS/NZS 3678 UNO.
3. All hot rolled sections shall be Grade 300 to AS/NZS 3679.1 UNO.
4. CHS to be Grade C250L0 to AS/NZS 1163. (Bicycle safety rail)
5. All hollow section material manufactured to AS/NZS 1163 will require abrasive blasting to develop a surface profile of 50µm prior to hot dip galvanizing.
6. Bolts and Threaded Rod Class 8.8 to AS/NZS 1252, nuts Class 8 to AS 1252, washers for Class 8.8 bolts to AS 1252.
7. Stainless Steel Button Head Bolts to be Grade 316 to AS 4291.
8. Material for couplers for anchor bolts to AS 1444. Threads for couplers to AS 1275.
9. All steel work shall be hot dipped galvanised to AS/NZS 4680 unless noted otherwise. Prior to galvanising, all splatter and welding slag shall be removed.

WELDING NOTES
1. Welding symbols to AS 1101.3.
2. Structural steel
   a. All welding to AS/NZS 1554.1.
   b. All welds, except location tack welds, shall be category SP.
   c. Welding consumables to be controlled hydrogen type G49X to AS/NZS ISO 14341–B or T49X to AS/NZS ISO 17632–B unless shown otherwise.

ABBREVIATIONS
1. Abbreviations used are in accordance with AS 1100.101 and TMR 'Drafting and Design Presentation Standards Manual'.
2. Unless noted otherwise, additional abbreviations used throughout the set are as follows:

galv	–	Hot dip galvanised
MRTS	–	Queensland Government Department of Transport and Main Roads Technical Specification
NTS	–	Not to scale
TMR	–	Queensland Government Department of Transport and Main Roads

SID No. 23285

G			
F			
E			
D			
C			
B			
A	Issued For Construction		
	Revisions/Descriptions	Signatory: – RPEQ Full Name, Eng. Area and RPEQ No. or – Full Name and Position Title	Date

CAD FILES

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS1170, AS5100 DESIGN LOADING: DESIGN SPEED: km/h EARTHQUAKE DESIGN CATEGORY: N/A BARRIER PERFORMANCE LEVEL: N/A BRIDGE TYPE: Girder

Scales: NOT TO SCALE
Dimensions shown in millimetres except where shown otherwise

LOGAN SHIRE COUNCIL
CTL CHGE
Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

Drawn | Checked | Designed No. | Verified No.
Design Reviews (RPEQ) No. Date.

LOGAN STREET PEDESTRIAN OVERBRIDGE
SECURITY SCREENS
DRAWING INDEX, LOCALITY MAP AND SCHEME APPROVAL
ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	SIGNATORY FULL NAME	No.	DATE
STRUCTURAL			

Queensland Government

Job No.
Contract No.
Drawing No. 951701 A
Series Number BR1–DI–1 of 1
BR Drg 1 of 09

2.3 Notes for Other structures drawings

As stated in Section 5 of Chapter 2 of this volume, the notes specific to a drawing sub-set that may be given to a sub-contractor shall have those notes specific to that element or activity shown on the drawings. For structural engineering drawings, this is for, but not limited to:

- earthwork drawings critical to the structure
- pile / foundation drawings
- ground reinforcement
- construction sequence, installation or erection notes critical to a sub-set of drawings, and
- fabrication drawings for pre-cast concrete and steelwork.

The remainder of the notes specific to the structure and general in nature to the entire set may be compiled together into a sub-set of dedicated General Notes drawings at the front of the drawings. All notations shall be presented consistently across all sets of drawings within a package without change.

Where there are multiple structures within a package with identical General Notes for each structure, the package can be configured with either:

- a sub-set of General Notes for each structure, which allows for future amendment as required to suit the individual structure, or
- a sub-set of General Notes for the entire package

Where a sub-set of General Notes drawings for the entire package is used, the General Notes drawings should include a table listing each structure, its SID, and the drawing or series number for its cover sheet or first drawing in each set, to provide linkage.

Traditionally, notes were shown on their relevant drawing, and this is the recommended practice for structural engineering drawings.

If using a sub-set of General Notes drawings, the following categories are usually shown, but not limited to:

- General Notes
- Referenced departmental Standard Drawings (in a table or list)
- Abbreviations
- Services

- Materials, such as:
  - concrete
  - shotcrete
  - reinforcing steel
  - steelwork
  - bolts, and
  - welding.
- Construction activities, such as:
  - monitoring
  - widening, strengthening, and rehabilitation, and
  - temporary slope face protection and ground improvement.
- Design criteria, such as:
  - design loads
  - hydraulics, where applicable, and
  - concrete and durability requirements.

3 Foundation drawings for other structures

Foundation drawings for other structures are to be similar in requirements to Section 4.2 of Chapter 4 and the associated example drawings. Depending on the complexity of the structure, some content may not be applicable.

4 Transport stations and ancillary structures

4.1 General

Project-specific drawings are required for transport stations and ancillary structures, as described in Section 3 of the SIM, and in the DCBoS Part D, Chapter 6.

The minimum detailing requirements for these structures are set out below here, and applies to, but not limited to, the following structure types:

- busway stations
- light rail stations, and
- any structures ancillary to the provision of bus or light rail public transport required to augment or support public transport functions that are not already detailed within Standard Drawings.

The structures shall be fully detailed in the design engineering drawings.

This volume does not provide guidance specific to railway stations, nor their associated ancillary structures.

4.2 Typical drawing set for transport and ancillary structures

Your attention is drawn to the *Public Transport Infrastructure Manual* as the overriding document controlling public transport infrastructure.

Ample previous projects exist for use in the development of any future bus station designs. Bus station drawings contain a significant number of drawings, and examples therefore are not provided in this volume.

It is recommended to utilise the following drawing set arrangement:

- Cover sheets
- General Notes
- General Arrangement plans
- General Arrangement elevations
- General Arrangement sections
- Foundations details
- Slab details
- Concrete columns and beams
- Lift, stairs, vertical transport
- Steelwork details, and
- Other details.

4.3 Reinforcement details for transport and ancillary structures

All concrete shall be fully reinforced in the design engineering drawings. It is recommended that all reinforcement detailing should follow the Transport and Main Roads reinforcing bar identification in Section 16.2 of Chapter 2. However, the department recognises that industry practice for detailing ancillary / building structures reinforcement differs from the department's standards and is deemed acceptable upon confirmation with the asset owner.

4.4 Typical content required on the drawings

The following table lists the content specific to transport and ancillary structures drawings, particularly bus stations. Example drawings are not included in this manual and may be found in the *Public Transport Infrastructure Manual*.

Table 4.4 – Transport stations and ancillary structures project drawings content

Requirement	Drawing or element description
Notes	Notes to suit the element, along with design criteria, lifting, and handling notes.
General Arrangement plans	A plan that depicts the arrangement, including, but not limited to: • Slabs, roof framing, reinforcing, stressing plans etc. • Member schedules to be included on plans.
Structure elevations	Overall elevations, concrete / masonry elevations, pre-cast elevations.
Structure sections	Overall building sections showing several elements.
Foundation details	All details required for foundations.
Slab details	"Slab on grade" details. Floor slab details / sections.
Concrete column schedules	Schedules, elevations, detailed sections of concrete columns.
Concrete beam schedules	Schedules, elevations, detailed sections of concrete beams.
Lifts, stairs, vertical transport	Plans, elevations, schedules, details of any element rising through floor levels
Steel details	All details required for steel.

5 Gantries and support structures for signage, lighting and ITS

5.1 General

Project-specific drawings are required for gantries and support structures as described in Section 3 of the SIM, and in the DCBoS Part D, Chapter 7.

The minimum detailing requirements for these structures are set out below here, and applies to, but is not limited to, the following structure types:

- above road gantry structures
- above road cantilever structures
- tolling structures on carriageway and side of the road
- sign supports on the side of the road for signs greater than 7.5 m wide or 8 m high or 40 m² sign face area, and
- traffic, road lighting or ITS poles that exceed the parameters given in MRTS92 *Footings for Road Lighting, Traffic Signal and Roadside Equipment Mounting Structures*, MRTS94 *Road Lighting* and MRTS97 *Mounting Structures for Roadside Equipment*.

The structures shall be fully detailed in the design engineering drawings.

5.2 Typical drawing set for gantries and support structures

The following is an example of a drawing set

- Site plan and drawing index (refer to Section 2.1)
- General Notes (refer to Section 2.3)
- General ArrangementS
- Foundation details (refer to Section 5.4)
- Steel design details (refer to Section 5.5)
- Construction sequencing details
- Access and maintenance details, and
- Miscellaneous details.

The drawings in this list would be condensed into a smaller number of drawings for simple projects.

5.3 General Arrangement drawings

General Arrangement (GA) drawings show the overall representation of the structure to be constructed.

GA drawings for sign structures are typically less complex than for a bridge; they should follow a similar pattern displaying similar information consistently.

Transport and Main Roads GA drawings usually have the following:

- plan, elevation and end elevation of the structure on the first sheet
- pre-camber / installation pre-set diagram (if applicable to the structure)
- a legend explaining the symbols on the plan and elevation, such as foundation boreholes, services, road furniture, and other critical features, and
- any notes are usually shown at the bottom right-hand side of the drawing.

5.4 Foundation details

Foundation details shall be accordance with Section 7.10 of the DCBoS and follow the examples supplied in Figure 5.6.1(a) to Figure 5.6.1(g) and information set out in Section 4.2 of Chapter 4 of this volume.

The most common types of foundations used in sign structure construction are:

- cast-in-place piles
- driven steel tubular piles, and
- spread footings.

For gantries and some roadside advertising signage structures, as stated in the DCBoS, the geotechnical features of the site and the foundation details are to be on discrete drawings, in such a manner that the geotechnical engineer is able to provide the relevant RPEQ certification for the foundations, separate to those other details provided for the remainder of the gantry or support structure.

5.5 Structural steel detailing

As stated in Section 17 of Chapter 2 of this volume, engineering structural steelwork drawings shall show sufficient detail for the complete fabrication of a particular item or sufficient detail to enable the fabricator to prepare detailed shop drawings for the particular item.

For complex or large structures, a steelwork marking plan may be developed to show the arrangement of members diagrammatically, as single lines to represent each element, in plan and elevation views.

Fabrication drawings are to contain all the relevant information for the fabrication of structural steelwork, including welding, member sizes, dimensions, material grades, and surface treatments.

5.6 Sign connection straps

Sign connection strap details are to comply with SD1364 *Traffic Sign – Connection Strap and Erection Cleat Details*.

5.7 Typical content required on the sign structure drawings

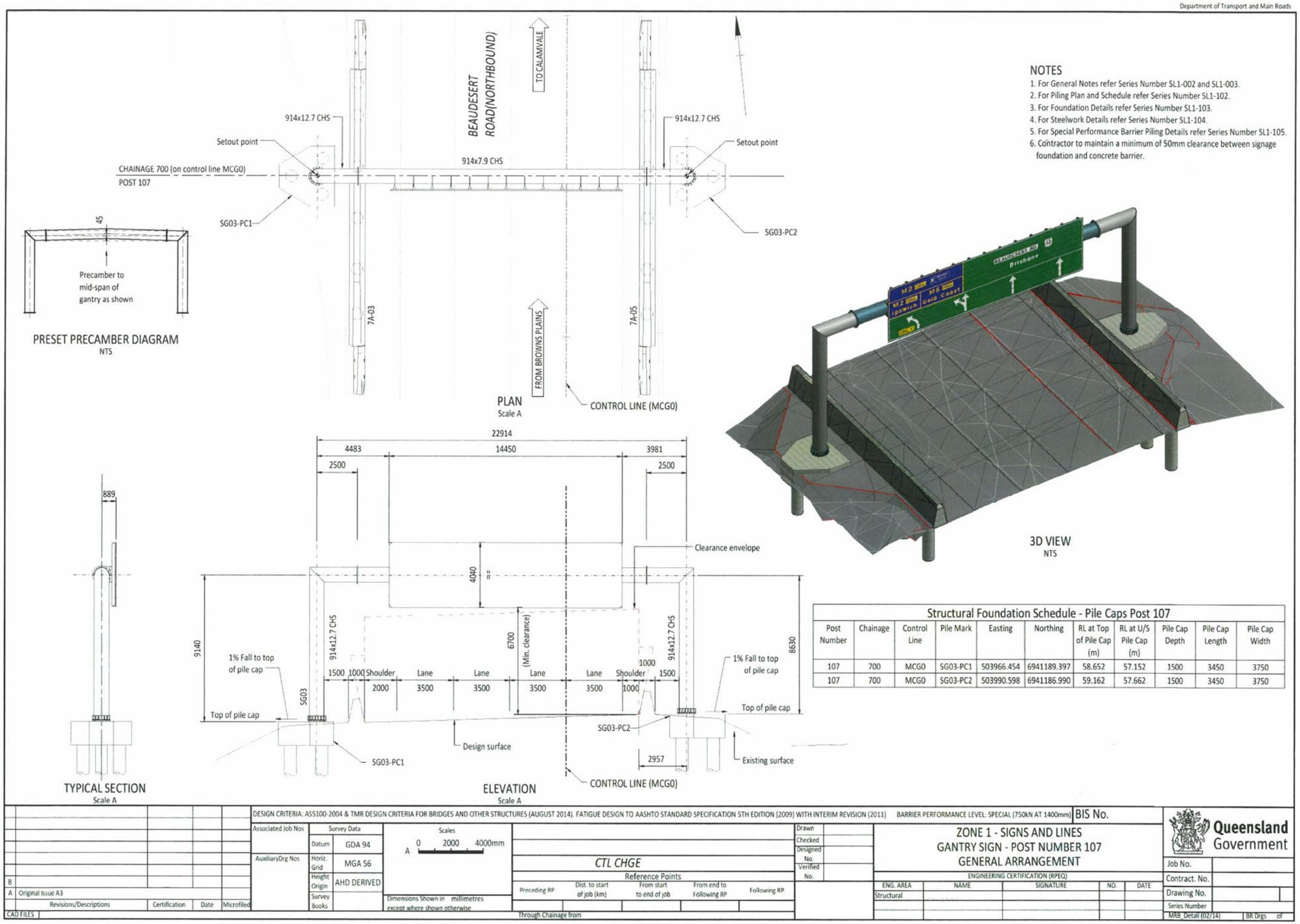
The following table lists the content specific to, but not limited to, typical sign structure drawings.

Table 5.7 – Sign structures – specific drawing content

Requirement	Drawing or element description	Figure reference
General Notes	Notes to suit the element, along with design criteria, lifting and handling notes, construction sequencing, steelwork, and welding.	Figure 5.7(a) Figure 5.7(e)

Requirement	Drawing or element description	Figure reference
General Arrangements	General Arrangements as a minimum should contain a plan, elevation, and end elevation that depicts: • the arrangement of the sign structure showing road profile, road names, and roadway carriageway dimensions, including future carriageways • services, including numbers, sizes and locations, and minimum clearance of services to footings or noted approximate locations with a note the actual locations are to be determined on site prior to commencement of work. • set out (road chainage of sign location, sign total height and length, including any traffic sign dimensions on the structure, and labelling major components) • existing or proposed barriers and types (to protect sign structure from vehicle impact and associated failure risks) • minimum vertical and/or horizontal clearance to sign or structure • relevant traffic sign IDs • foundation heights (Ht's) • pre-camber / installation pre-set diagram (if applicable to the structure), and • grout thickness for baseplates.	Figure 5.7(a) Figure 5.7(e)
Foundation details	All details required for foundations, including any pile caps, if required.	Figure 5.7(b) Figure 5.7(c) Figure 5.7(e)
Steel detailing	Steel detailing should contain, as a minimum: • the set out of the structural steel, drawn to scale, with dimensions • location of splices, and lifting points • set out of chords and diagonals • marking of steel members • details of all connections, end plates, splices, baseplates, vent and/or drainage hole sizes, numbers, and locations • details of sign connection straps • welds, and • details of all major components not sufficiently detailed on the other views.	Figure 5.7(a) Figure 5.7(d) Figure 5.7(g)

Figure 5.7(a) – Circular Hollow Section (CHS) overhead sign – Sheet 1



Structural Foundation Schedule - Pile Caps Post 107

Post Number	Chainage	Control Line	Pile Mark	Easting	Northing	RL at Top of Pile Cap (m)	RL at U/S Pile Cap (m)	Pile Cap Depth	Pile Cap Length	Pile Cap Width
107	700	MCG0	SG03-PC1	503966.454	6941189.397	58.652	57.152	1500	3450	3750
107	700	MCG0	SG03-PC2	503990.598	6941186.990	59.162	57.662	1500	3450	3750

DESIGN CRITERIA: AS5100-2004 & TMR DESIGN CRITERIA FOR BRIDGES AND OTHER STRUCTURES (AUGUST 2014). FATIGUE DESIGN TO AASHTO STANDARD SPECIFICATION 5TH EDITION (2009) WITH INTERIM REVISION (2011) BARRIER PERFORMANCE LEVEL: SPECIAL (750kN AT 1400mm) BIS No.

Associated Job Nos | Survey Data: Datum GDA 94; Horiz. Grid MGA 56; Height Origin AHD DERIVED; Survey Books | Scales: A 0 2000 4000mm | Dimensions Shown in millimetres except where shown otherwise

AuxiliaryDrg Nos

CTL CHGE

Reference Points: Preceding RP | Dist. to start of job (km) | From start to end of job | From end to Following RP | Following RP

Through Chainage from

Drawn | Checked | Designed No. | Verified No.

ZONE 1 - SIGNS AND LINES
GANTRY SIGN - POST NUMBER 107
GENERAL ARRANGEMENT

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	NO.	DATE
Structural				

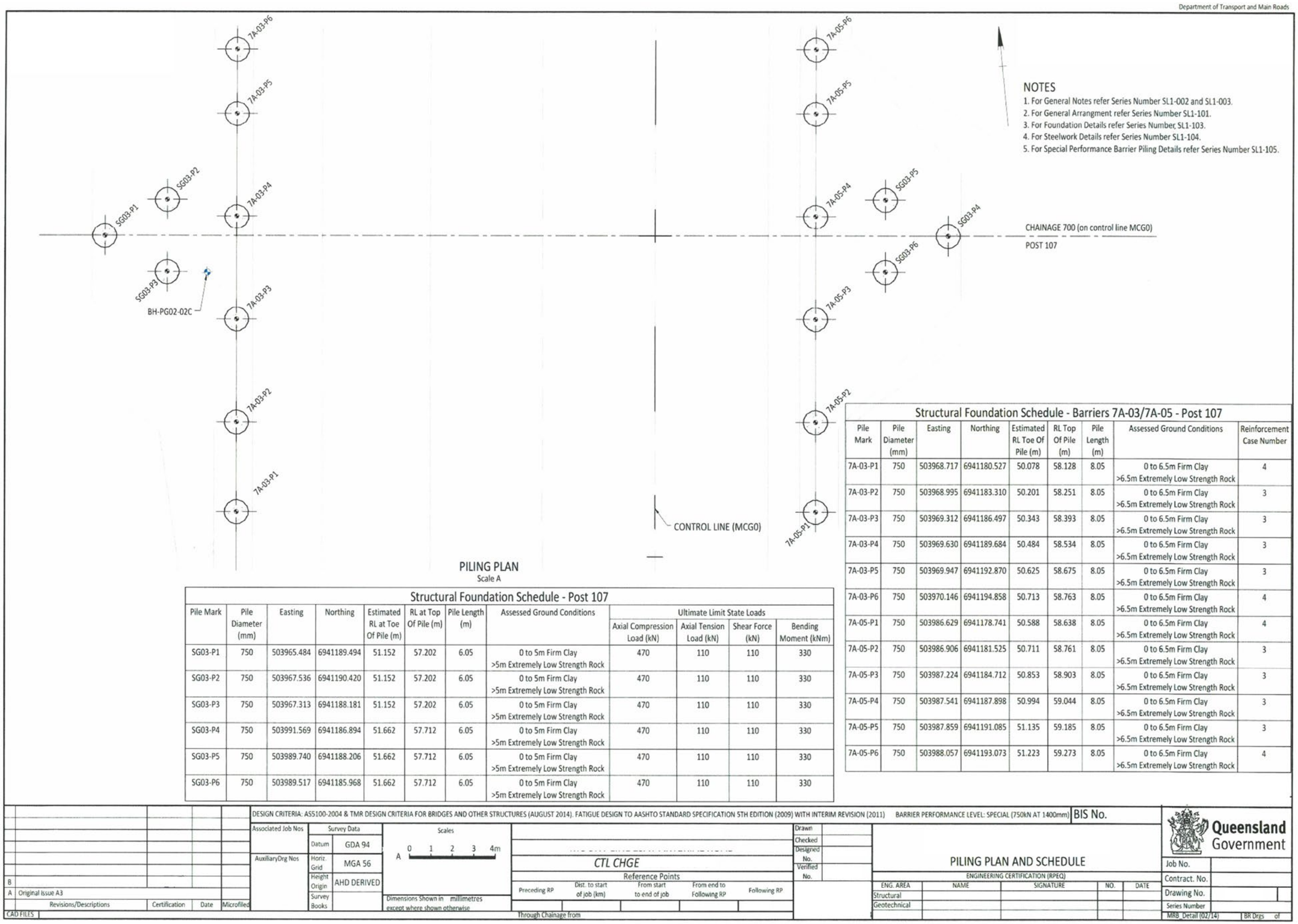
Queensland Government

Job No. | Contract. No. | Drawing No. | Series Number | MRB Detail (02/14) | BR Drgs of

	Revisions/Descriptions	Certification	Date	Microfiled
B				
A	Original Issue A3			

CAD FILES

Figure 5.7(b) – Circular Hollow Section (CHS) overhead sign – Sheet 2



PILING PLAN
Scale A

Structural Foundation Schedule - Post 107

Pile Mark	Pile Diameter (mm)	Easting	Northing	Estimated RL at Toe Of Pile (m)	RL at Top Of Pile (m)	Pile Length (m)	Assessed Ground Conditions	Ultimate Limit State Loads			
								Axial Compression Load (kN)	Axial Tension Load (kN)	Shear Force (kN)	Bending Moment (kNm)
SG03-P1	750	503965.484	6941189.494	51.152	57.202	6.05	0 to 5m Firm Clay >5m Extremely Low Strength Rock	470	110	110	330
SG03-P2	750	503967.536	6941190.420	51.152	57.202	6.05	0 to 5m Firm Clay >5m Extremely Low Strength Rock	470	110	110	330
SG03-P3	750	503967.313	6941188.181	51.152	57.202	6.05	0 to 5m Firm Clay >5m Extremely Low Strength Rock	470	110	110	330
SG03-P4	750	503991.569	6941186.894	51.662	57.712	6.05	0 to 5m Firm Clay >5m Extremely Low Strength Rock	470	110	110	330
SG03-P5	750	503989.740	6941188.206	51.662	57.712	6.05	0 to 5m Firm Clay >5m Extremely Low Strength Rock	470	110	110	330
SG03-P6	750	503989.517	6941185.968	51.662	57.712	6.05	0 to 5m Firm Clay >5m Extremely Low Strength Rock	470	110	110	330

Structural Foundation Schedule - Barriers 7A-03/7A-05 - Post 107

Pile Mark	Pile Diameter (mm)	Easting	Northing	Estimated RL Toe Of Pile (m)	RL Top Of Pile (m)	Pile Length (m)	Assessed Ground Conditions	Reinforcement Case Number
7A-03-P1	750	503968.717	6941180.527	50.078	58.128	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	4
7A-03-P2	750	503968.995	6941183.310	50.201	58.251	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	3
7A-03-P3	750	503969.312	6941186.497	50.343	58.393	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	3
7A-03-P4	750	503969.630	6941189.684	50.484	58.534	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	3
7A-03-P5	750	503969.947	6941192.870	50.625	58.675	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	3
7A-03-P6	750	503970.146	6941194.858	50.713	58.763	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	4
7A-05-P1	750	503986.629	6941178.741	50.588	58.638	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	4
7A-05-P2	750	503986.906	6941181.525	50.711	58.761	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	3
7A-05-P3	750	503987.224	6941184.712	50.853	58.903	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	3
7A-05-P4	750	503987.541	6941187.898	50.994	59.044	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	3
7A-05-P5	750	503987.859	6941191.085	51.135	59.185	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	3
7A-05-P6	750	503988.057	6941193.073	51.223	59.273	8.05	0 to 6.5m Firm Clay >6.5m Extremely Low Strength Rock	4

DESIGN CRITERIA: AS5100-2004 & TMR DESIGN CRITERIA FOR BRIDGES AND OTHER STRUCTURES (AUGUST 2014). FATIGUE DESIGN TO AASHTO STANDARD SPECIFICATION 5TH EDITION (2009) WITH INTERIM REVISION (2011) BARRIER PERFORMANCE LEVEL: SPECIAL (750kN AT 1400mm)

BIS No.

Associated Job Nos | Survey Data: Datum GDA 94; Horiz. Grid MGA 56; Height Origin AHD DERIVED; Survey Books

AuxiliaryDrg Nos

Scales: A 0 1 2 3 4m

Dimensions Shown in millimetres except where shown otherwise

CTL CHGE

Reference Points: Preceding RP | Dist. to start of job (km) | From start to end of job | From end to Following RP | Following RP

Through Chainage from

Drawn | Checked | Designed No. | Verified No.

PILING PLAN AND SCHEDULE

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	NO.	DATE
Structural				
Geotechnical				

Queensland Government

Job No. | Contract. No. | Drawing No. | Series Number | MRB_Detail (02/14) | BR Drgs of

	Revisions/Descriptions	Certification	Date	Microfiled
B				
A	Original Issue A3			

CAD FILES

Figure 5.7(c) – Circular Hollow Section (CHS) overhead sign – Sheet 3

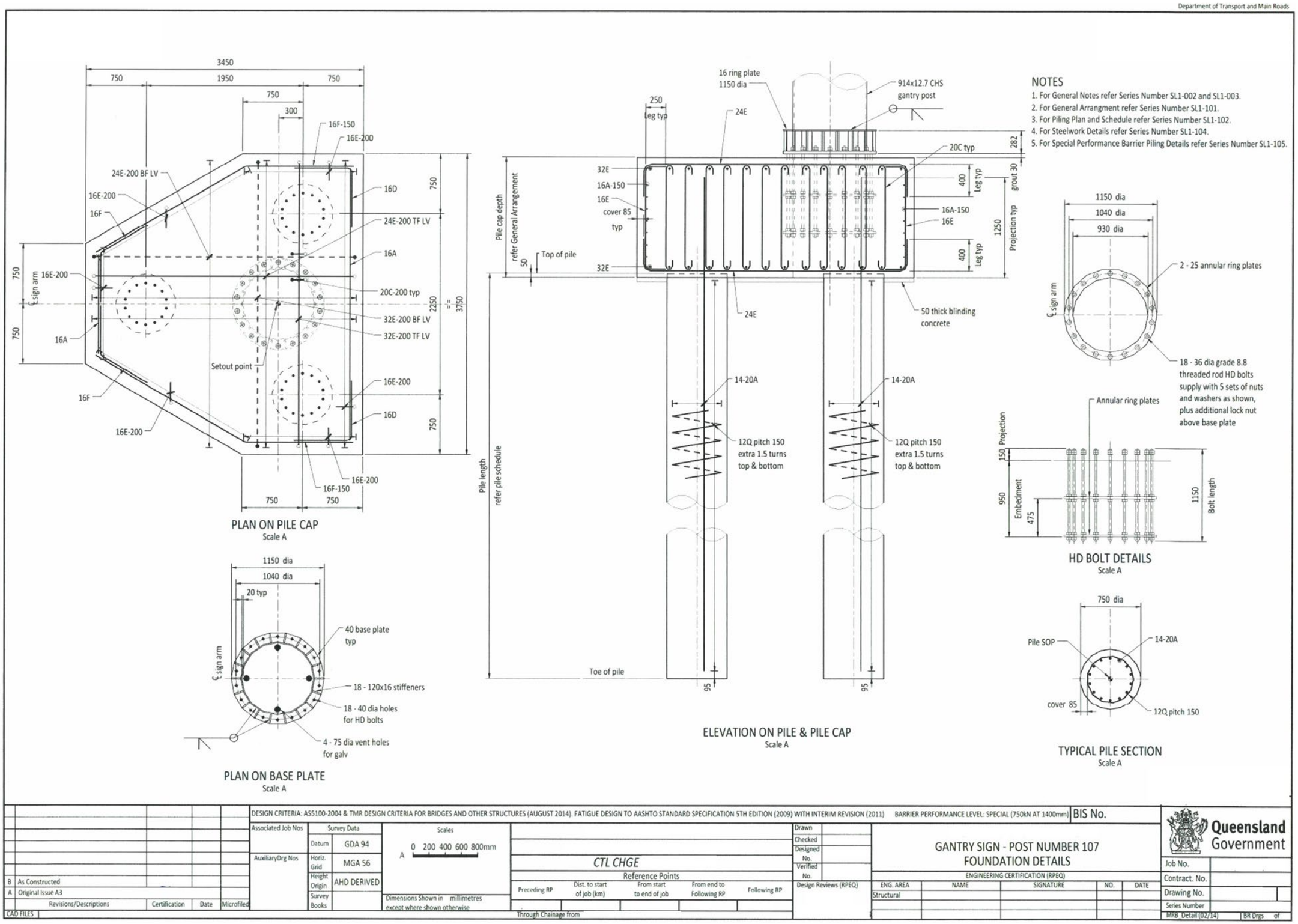


Figure 5.7(d) – Circular Hollow Section (CHS) overhead sign – Sheet 4

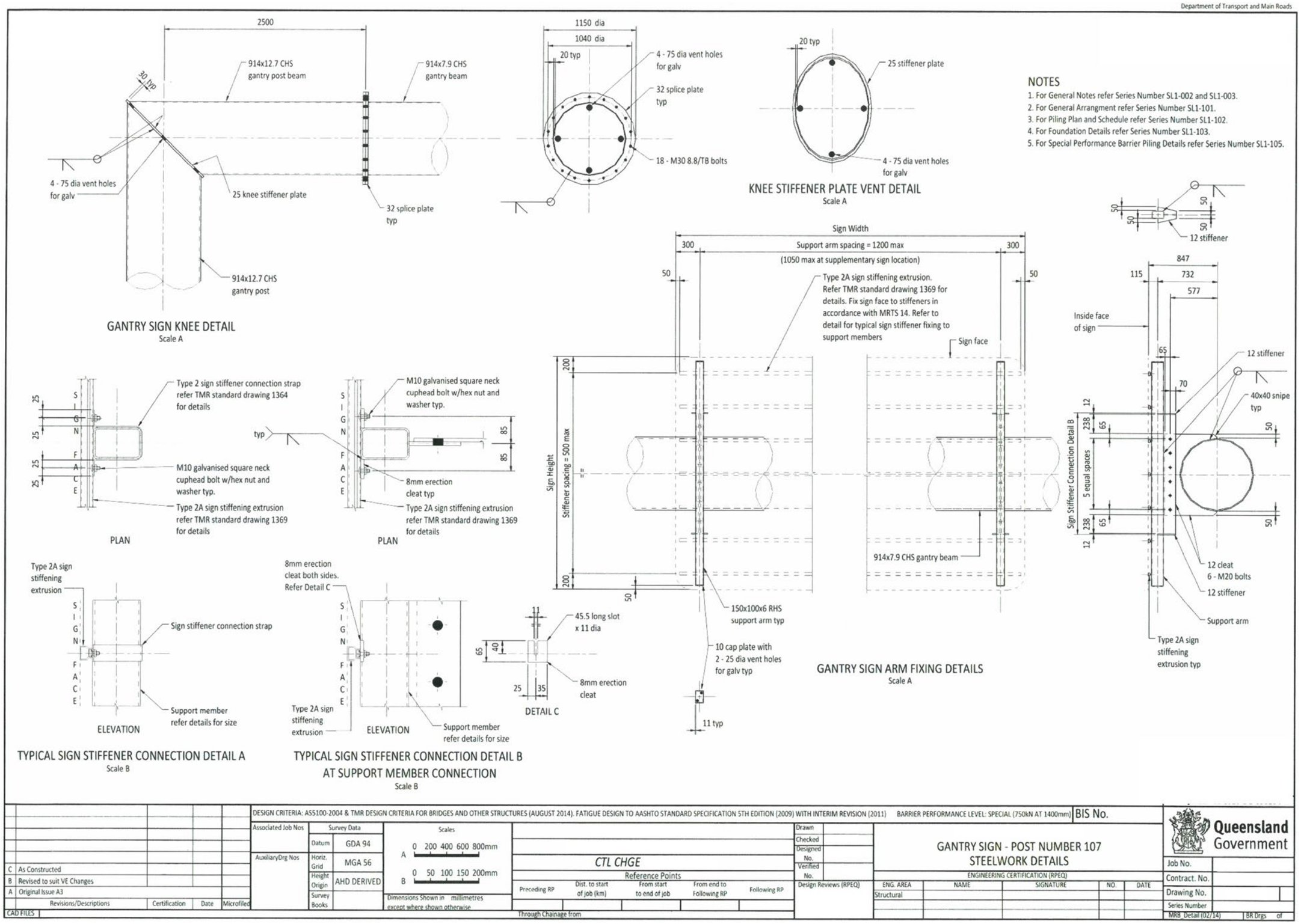
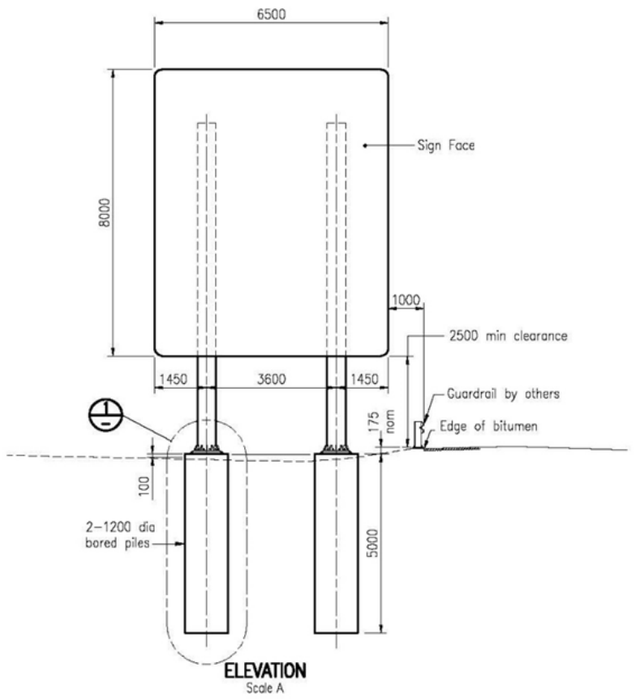
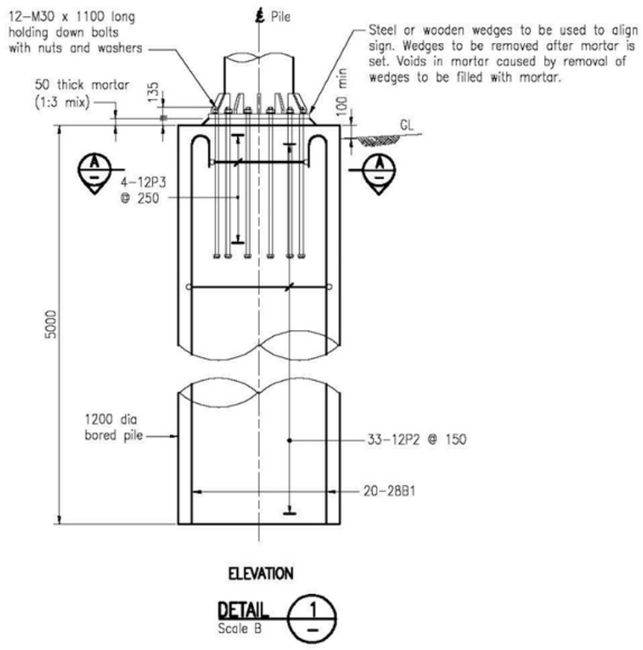
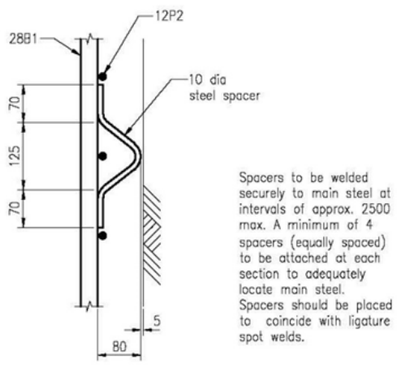


Figure 5.7(e) – Traffic sign – Sheet 1

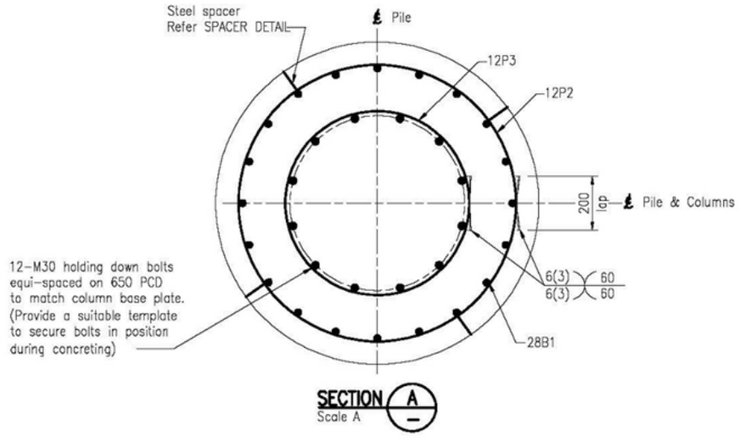






SPACER DETAIL
NTS

Spacers to be welded securely to main steel at intervals of approx. 2500 max. A minimum of 4 spacers (equally spaced) to be attached at each section to adequately locate main steel. Spacers should be placed to coincide with ligature spot welds.



NOTES

1. CONCRETE class to be S40/20
   Exposure classification B2
2. STEEL REINFORCEMENT to be read in conjunction with Standard Drawings 1043 and 1044
   Cover to reinforcing steel to be 75 unless shown otherwise
3. STEELWORK to be fabricated to the requirements of MRS 11.78 Fabrication of Structural Steelwork
   RHS and CHS tube to be Grade C350L0 to AS 1163.
   All plate to be Grade 350 to AS/NZS 3678 unless shown otherwise.
   PFC to be Grade 300 to AS/NZS 3679.1
   Bolts Class 8.8, nuts Class 8 and washers for Class 8.8 bolts to AS/NZS 1252
   All bolts and nuts to be hot dip galvanised to AS 1214. All other steelwork to be hot dip galvanised to AS/NZS 4680 unless shown otherwise. Prior to galvanising all weld splatter and welding slag is to be removed.
4. WELDING symbols conform to AS 1101.3.
   Structural Steel
   All welding to AS/NZS 1554.1.
   All welds to be SP category.
   Welding consumables for C350L0 RHS and SHS to be controlled hydrogen type: E48XX or W503.
   Welding consumables for all other structural steel shall be controlled hydrogen type: E48XX or W50X unless shown otherwise.
   Reinforcing Steel
   Welding of bar splices to AS/NZS 1554.3.
   All welds, except location tack welds to be SP category.
   Tack welding for location purposes to conform to AS/NZS 1554.3 – Clauses 3.3.1 & 3.3.2.
   Welding consumables to be E4816, E4818 or W50X.
   Welding shall not be carried out within 75 of any bent portion of the bar.
5. STIFFENER rails shall be manufactured from an extruded aluminium section alloy type 6061 or 6063 and temper T6, refer MRS11.14 and Standard Drawing No. 1369.
6. CONTACT surfaces between aluminium and galvanised steel components shall be insulated with separator tape or fibre washers.
7. RE–TIGHTEN sign anchorage nuts 14 days after sign posts have been installed
8. For sign location refer to 'LOCALITY PLAN' in scheme documents.

WIND LOADING : AS/NZS 1170 . PART 2 DESIGN WIND SPEED = 60 m/s EARTHQUAKE ZONE: BEDC–1

Revisions	Verified	Date	Microfiled
A Original Issue A3			
CAD FILES			

Associated Job Nos

Auxiliary Drg Nos

Survey Data: Horiz. Datum; Azimuth Datum; Height Datum; Survey Books; District:

Scales: A 0 1 2 3 4m; B 0 500 1000mm; C 0 200 400mm

DIMENSIONS IN MILLIMETRES UNLESS SHOWN OTHERWISE

STRUCTURES DIVISION

CHAINAGE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage From

SIGN GANTRY – SHEET 1

Drawing Checked	Design Verified	Design Review	Engineering Certification RPEQ No.	For scheme approval status refer Drg. No.

Queensland Government Department of Main Roads

Job No.

Contract No.

Drawing No.

Series Number

MRB_Detail (11/05)

Figure 5.7(f) – Traffic sign – Sheet 2

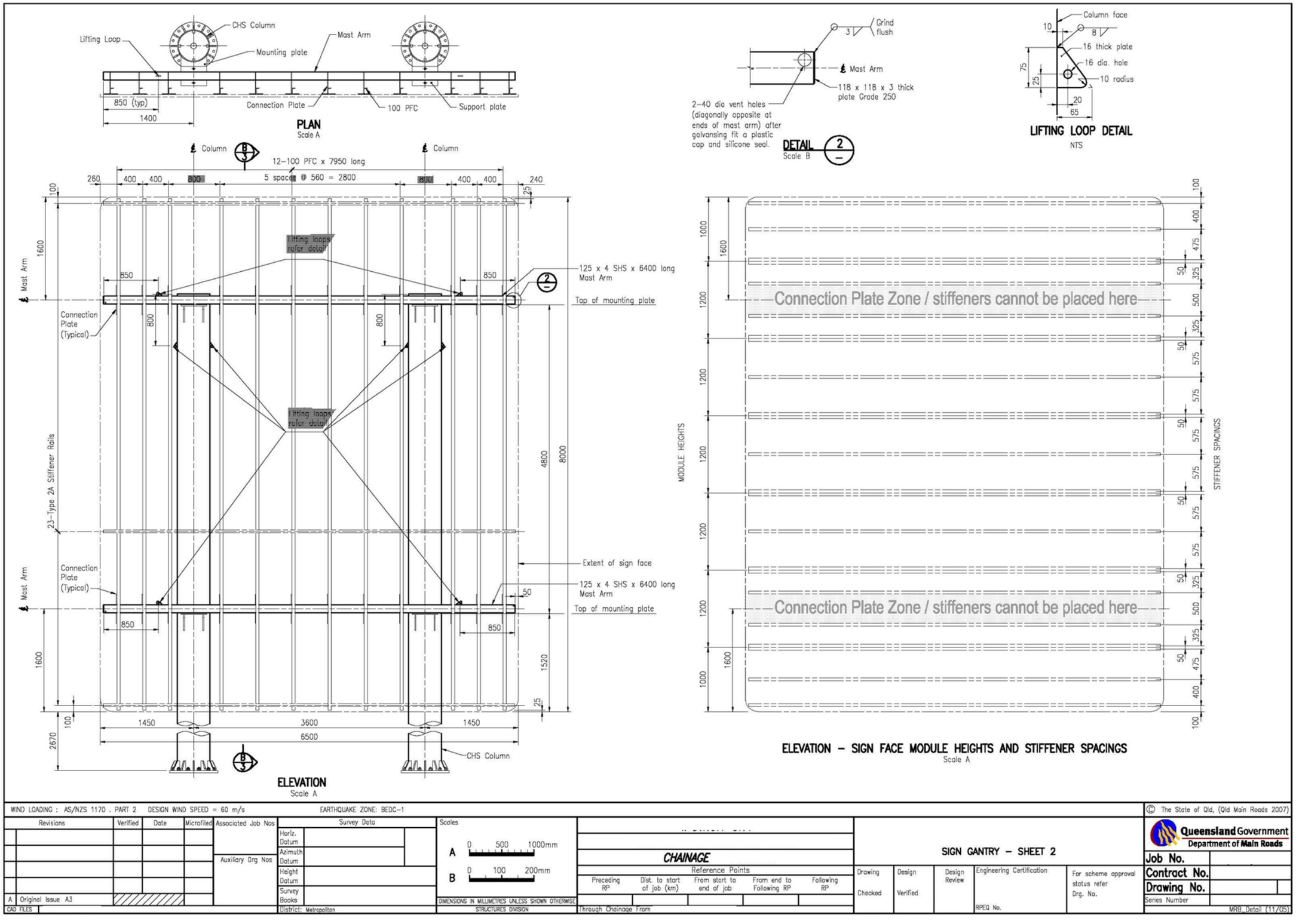
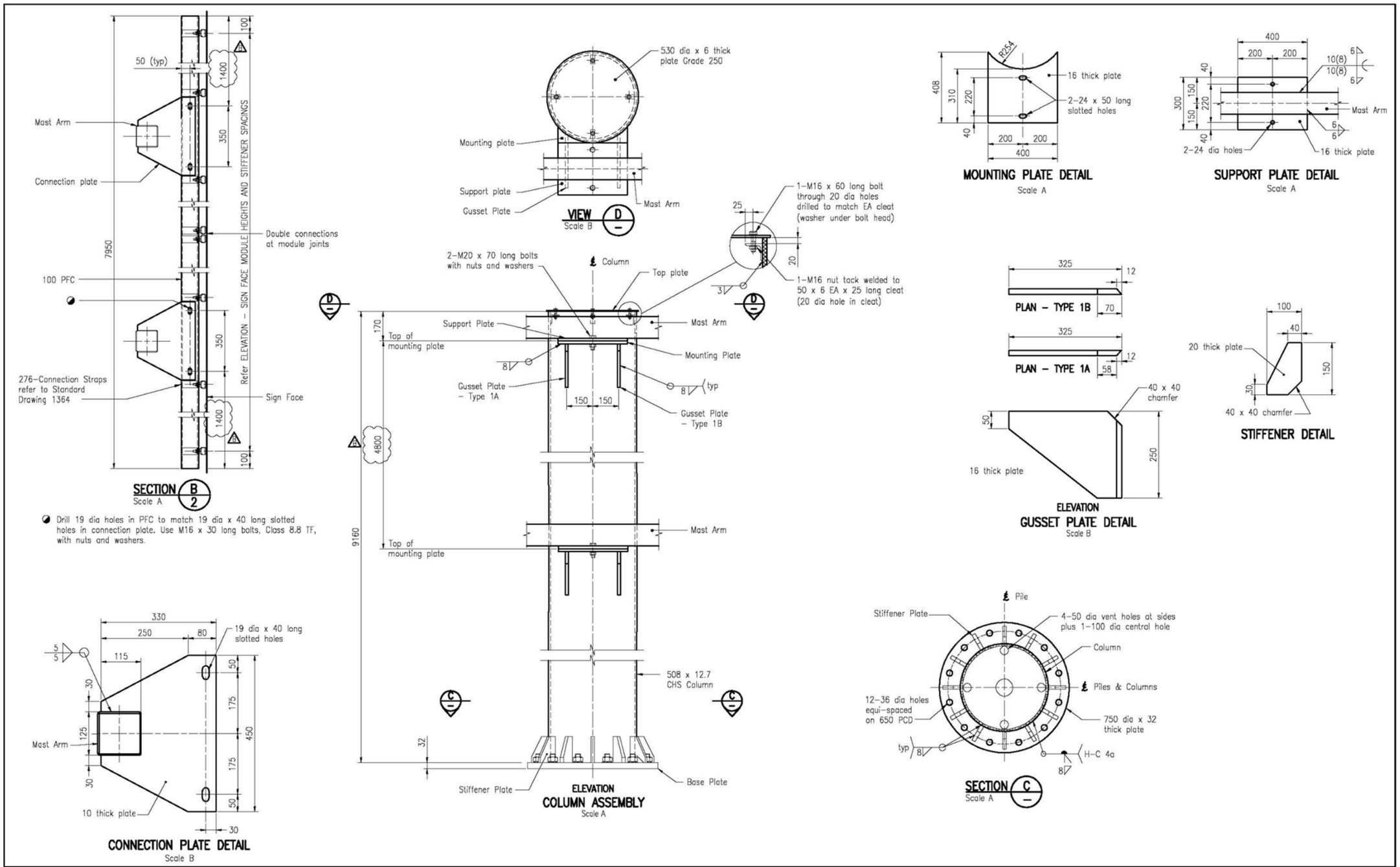


Figure 5.7(g) – Traffic sign – Sheet 3



WIND LOADING : AS/NZS 1170 . PART 2 DESIGN WIND SPEED = 60 m/s EARTHQUAKE ZONE: BEDC–1

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Revisions	Verified	Date	Microfiled
B Dimensions			
A Original Issue A3			
CAD FILES			

Associated Job Nos

Auxiliary Drg Nos

Survey Data: Horiz. Datum; Azimuth Datum; Height Datum; Survey Books; District:

Scales: A 0 200 400mm; B 0 100 200mm; C 0 50 100mm

DIMENSIONS IN MILLIMETRES UNLESS SHOWN OTHERWISE

STRUCTURES DIVISION

CHAINAGE

Reference Points: Preceding RP | Dist. to start of job (km) | From start to end of job | From end to Following RP | Following RP

Through Chainage From

SIGN GANTRY – SHEET 3

Drawing Checked | Design Verified | Design Review | Engineering Certification RPEQ No. | For scheme approval status refer Drg. No.

Queensland Government Department of Main Roads

Job No.

Contract No.

Drawing No.

Series Number

MRB_Detail (11/05)

6 Retaining structures

6.1 General

Project specific drawings may be required for retaining structures that are not part of a departmental bridge, tunnel, culvert, or other structure, as described in Section 3 of the SIM, and in Part D, Chapter 10 of the DCBoS.

The structures shall be fully detailed in the design engineering drawings.

The minimum detailing requirements for retaining structures are set out below here.

6.2 Typical drawing set for retaining structures

The following is an example of retaining structure drawing sets, but not limited to:

- Coversheet, where required
- Site plan and drawing index (refer to Section 2.1)
- General Notes (refer to Section 2.3)
- General Arrangement
- Foundation details (refer to Section 3 and Section 4.2 of Chapter 4)
- Soil nail arrangement (required for soil nail walls only)
- Concrete details, and
- Reinforcement details.

All walls shall be elevated.

The drawings in this list would be condensed into a smaller number of drawings for simple projects.

6.3 General Arrangement drawings

General Arrangement (GA) drawings show the overall representation of the structure to be constructed. GA drawings for structures other than bridges, while typically less complex than for a bridge, should follow a similar pattern, displaying similar information consistently.

Transport and Main Roads retaining structure GA drawings usually have the following, but are not limited to:

- plan and elevation on the first sheet, continuing onto subsequent sheets for long structures

- a legend explaining the symbols on the plan and elevation, such as foundation boreholes, services, road furniture, and other critical features, and
- set out of the structure (for example, retaining wall control line, and eastings and northings).

Any Notes are typically shown at the bottom right-hand side of the drawing.

6.4 Foundation details

Foundation details shall be accordance with the DCBoS requirements for retaining walls and follow the information set out in Section 3 and Section 4.2 of Chapter 4 of this volume.

The most common types of foundations used in retaining structures construction are:

- cast-in-place / secant piles
- driven steel tubular piles, and
- spread footings.

6.5 Ground reinforcement details

Ground reinforcement systems shall be fully detailed in the drawings so that the sub-contractor has a full appreciation of the contract requirements.

Soil nailing, passive rock dowels, and active rock bolting are some of the usual systems.

These drawings should contain, at a minimum, the set out of the system in elevation and section, with adequate details to verify that the anchors, such as soil nails, at acute corners do not clash, and indicate clearances and minimum tolerances to services or structures behind the wall. It is recommended to use symbols where reinforcement geometry differs from the typical vertical or horizontal inclinations.

Ground reinforcement details usually contain the following, but are not limited to:

- a long-section arrangement of the set out for the ground reinforcement system
- an additional separated long-section may be required for clarity where ground reinforcement contains covering façade panels
- sub-horizontal drainage arrangement and set out
- waler beams
- working load schedules
- arrangement definition table, and
- details of the ground reinforcement system.

6.6 Concrete details

Concrete details for retaining walls should detail, as a minimum, the set out of the retaining wall concrete geometry. Departmental retaining wall concrete details usually contain the following, but are not limited to:

- dimensions of the concrete section
- tabulated information containing wall design heights, key depths, footing widths, and so on
- backfill requirements
- infill requirements (for example, fill between walls and back of barriers)
- capping beam details
- concrete joint details
- safety rail arrangements
- concrete strength and minimum cover, and
- blinding concrete details.

6.7 Reinforcement details

All concrete retaining walls shall be fully reinforced in the design engineering drawings. All reinforcement should follow the department's reinforcing bar identification in Section 16.2 of Chapter 2. Where reinforcement detailing becomes congested or complex, bar sequence numbers as stated in Section 16.3 of Chapter 2 is recommended to be used to improve detailing clarity.

6.8 Typical content required on the drawings

The following table lists the content specific to retaining wall drawings.

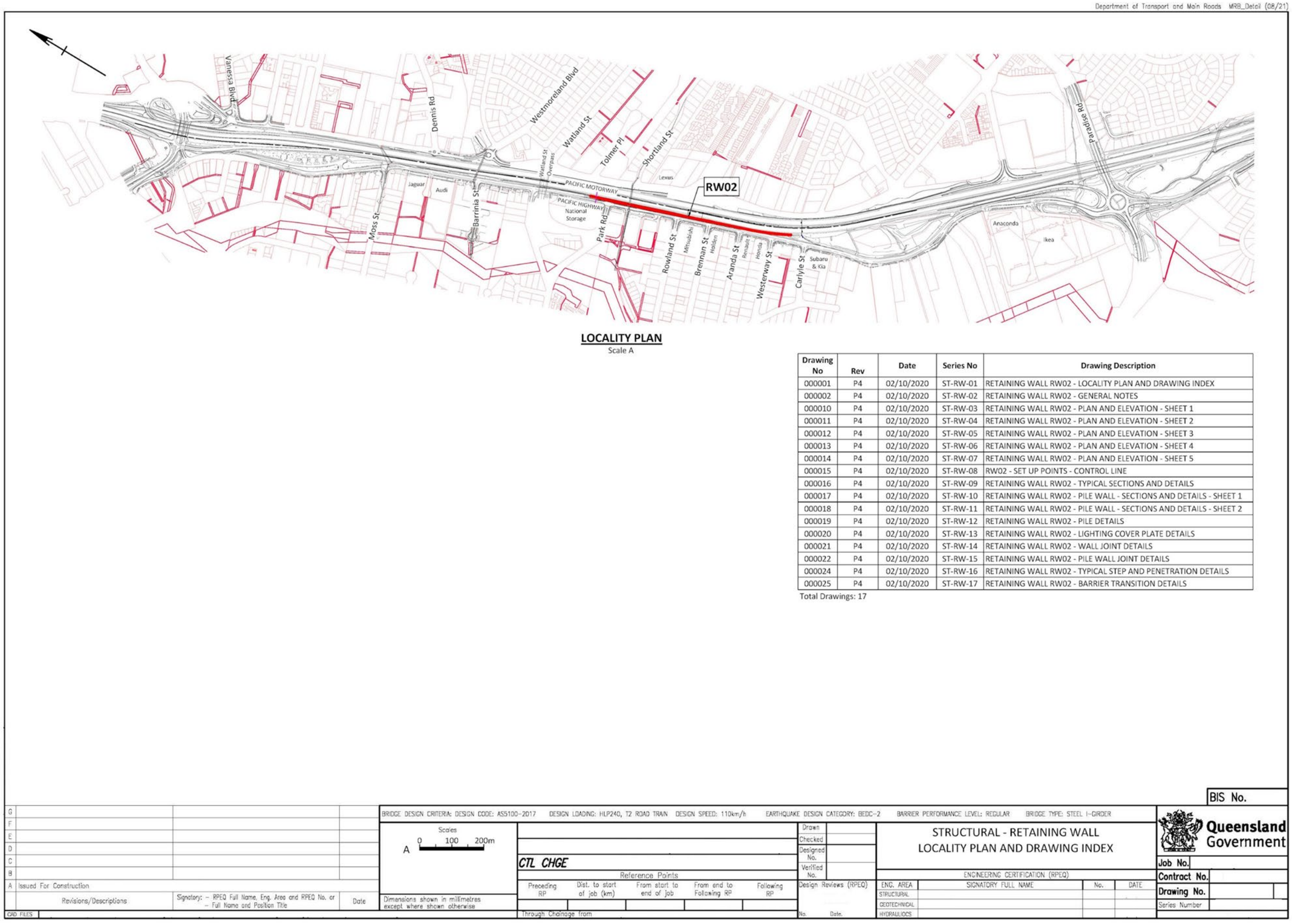
Table 6.8 – Retaining structures – specific drawings content

Requirement	Drawing or element description	Figure reference
Notes	Notes to suit the element, along with design criteria, lifting and handling notes.	Figure 6.8(b)
General Arrangement	A set of plan, elevation, and cross-sections that depicts the arrangement of the retaining walls, including, but not limited to: Plan and elevation set out, including: • retaining wall control line or wall set out using eastings and northings • corresponding road chainages (if applicable)	Figure 6.8(c) Figure 6.8(d)

Requirement	Drawing or element description	Figure reference
	• services, including numbers, sizes and locations, minimum clearance of services to footings or noted approximate locations with a note the actual locations are to be determined on site prior to commencement of work • critical structure heights (for example, top of wall and bottom of wall) • finished surfaces level heights (for example, finished surface level top and finished surface level bottom) • alignment information • chainages along wall control line or front face of wall, including changes in direction, design sections, heights, and steps, and • wall sections at key wall sections at design section changes and critical interfacing.	
Foundation details	• Typical foundation detail, and • •Foundation heights.	Figure 6.8(c) Figure 6.8(e)
Ground reinforcement details	• A long-section suitable for the installation of the ground reinforcement and sub-horizontal drain arrangement (where soil nails contain façade panels, a separated long-section may be required for clarity) • dimensional set out to key ground reinforcement from key set out points • sub-contractor specific notes for ground reinforcement • waler beam dimensions (if applicable) • working load schedules • ground reinforcement arrangement definition table, including, but not limited to: ground reinforcement type, lengths, horizontal and vertical spacing, chainage range, inclinations, and hole diameters in millimetres • ground reinforcement system details • sub-horizontal drain arrangement definition table, including minimum length, number of rows, row spacing, installation angle, diameter in millimetres, and • sub-horizontal drain details.	Figure 6.8(c)
Concrete details	• All walls are to be elevated • Backfill requirements • Infill requirements, for example, fill between walls and back of barriers • Capping beam details	Figure 6.8(e) Figure 6.8(f)

Requirement	Drawing or element description	Figure reference
	• Concrete joint details, and • Safety rail arrangements (if required).	
Reinforcement details	• All walls are to be elevated • Capping beam reinforcement details • Typical reinforcement sections • Reinforcement at critical areas for example, steps, penetrations, plan and elevation cranks and congested areas.	Figure 6.8(e)

Figure 6.8(a) – Example retaining structures – Sheet 1



Drawing No	Rev	Date	Series No	Drawing Description
000001	P4	02/10/2020	ST-RW-01	RETAINING WALL RW02 - LOCALITY PLAN AND DRAWING INDEX
000002	P4	02/10/2020	ST-RW-02	RETAINING WALL RW02 - GENERAL NOTES
000010	P4	02/10/2020	ST-RW-03	RETAINING WALL RW02 - PLAN AND ELEVATION - SHEET 1
000011	P4	02/10/2020	ST-RW-04	RETAINING WALL RW02 - PLAN AND ELEVATION - SHEET 2
000012	P4	02/10/2020	ST-RW-05	RETAINING WALL RW02 - PLAN AND ELEVATION - SHEET 3
000013	P4	02/10/2020	ST-RW-06	RETAINING WALL RW02 - PLAN AND ELEVATION - SHEET 4
000014	P4	02/10/2020	ST-RW-07	RETAINING WALL RW02 - PLAN AND ELEVATION - SHEET 5
000015	P4	02/10/2020	ST-RW-08	RW02 - SET UP POINTS - CONTROL LINE
000016	P4	02/10/2020	ST-RW-09	RETAINING WALL RW02 - TYPICAL SECTIONS AND DETAILS
000017	P4	02/10/2020	ST-RW-10	RETAINING WALL RW02 - PILE WALL - SECTIONS AND DETAILS - SHEET 1
000018	P4	02/10/2020	ST-RW-11	RETAINING WALL RW02 - PILE WALL - SECTIONS AND DETAILS - SHEET 2
000019	P4	02/10/2020	ST-RW-12	RETAINING WALL RW02 - PILE DETAILS
000020	P4	02/10/2020	ST-RW-13	RETAINING WALL RW02 - LIGHTING COVER PLATE DETAILS
000021	P4	02/10/2020	ST-RW-14	RETAINING WALL RW02 - WALL JOINT DETAILS
000022	P4	02/10/2020	ST-RW-15	RETAINING WALL RW02 - PILE WALL JOINT DETAILS
000024	P4	02/10/2020	ST-RW-16	RETAINING WALL RW02 - TYPICAL STEP AND PENETRATION DETAILS
000025	P4	02/10/2020	ST-RW-17	RETAINING WALL RW02 - BARRIER TRANSITION DETAILS

Total Drawings: 17

BIS No.

G			
F			
E			
D			
C			
B			
A	Issued For Construction		
	Revisions/Descriptions	Signatory: – RPEQ Full Name, Eng. Area and RPEQ No. or – Full Name and Position Title	Date

CAD FILES

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS5100-2017 DESIGN LOADING: HLP240, T2 ROAD TRAIN DESIGN SPEED: 110km/h EARTHQUAKE DESIGN CATEGORY: BEDC-2 BARRIER PERFORMANCE LEVEL: REGULAR BRIDGE TYPE: STEEL I-GIRDER

Scales
0 100 200m
A

Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

Drawn	
Checked	
Designed No.	
Verified No.	

Design Reviews (RPEQ)
No. Date.

STRUCTURAL - RETAINING WALL
LOCALITY PLAN AND DRAWING INDEX

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	SIGNATORY FULL NAME	No.	DATE
STRUCTURAL			
GEOTECHNICAL			
HYDRAULICS			

Queensland Government

Job No.	
Contract No.	
Drawing No.	
Series Number	

Figure 6.8(b) – Example retaining structures – Sheet 2

Department of Transport and Main Roads MRB_Detail (08/21)

GENERAL NOTES

1. TRADE NAMES have been used for a particular product requirement, equivalent products may be submitted to the Administrator for approval.
2. The Project, Geotechnical Design Report is included in the scheme documents. Tenderers are able to view the core samples, if available, by arrangement with the Regional Director.
3. The structures in this package shall be constructed in accordance with TMR Technical Specifications

DESIGN NOTES

1. Retaining walls designed in accordance with:-
   a) AS 5100-2017;
   b) Queensland Department of Transport and Main Roads - Structures: Design Criteria For Bridges and Other Structures - Dated February 2018.
   c) Queensland Department of Transport and Main Roads - Geotechnical Design Standard - Minimum requirements - Dated February 2015
2. DESIGN LOADS
   a) Concrete unit weight: 25 kN/m³ (in-situ) including steel reinforcement
   b) Geotechnical Parameters: Unit weight of soil = 22 kN/m³
      Soil internal friction angle = 30°
      Internal friction angle for CSS = 39°
      Coefficient of Friction =
      0.4 (concrete on soil)
      Geotechnical strength reduction factor =
      0.5 (bearing)
      0.55 (sliding, overturning)
   c) Live load surcharge: RW02 = 22 kPa
   d) Design wind: Region B
      Terrain Category 2
      V_{20} = 38 m/s; V_{2000} = 63 m/s
   e) Earthquake Design: Earthquake Design Category = B_{er} (AS4678-2002)
   f) Barrier:

Location	Performance Level	Design Load
RW02	Medium	600 kN outward force at 1.250 m effective height

SERVICES NOTES

1. All services must be located, identified and protected before works are carried out in vicinity of retaining wall works or rock cuttings.

DIMENSION/HEIGHT NOTES

1. Heights, Chainages and Co-ordinates are all in metres.
2. All other dimensions are in millimetres, UNO.
3. All Heights are to Australian Height Datum (Based on PM85201).
4. All co-ordinates are to MGA94 Zone 56.
5. Dimensions shall not be scaled from drawings.

WELDING NOTES

1. Welding symbols to AS 1101.3-2005.
2. Structural steel
   a. All welding to AS/NZS 1554.1-2014.
   b. All welds, except location tack welds, to be category SP.
   c. Welding consumables to be controlled hydrogen type G493 to AS/NZS ISO 14341-B-2012 or T493 to AS/NZS ISO 17632-B-2006 UNO.
3. Reinforcing steel
   a. Tack welding for location purposes to AS/NZS 1554.3-2014.
   b. Welding consumables to be controlled hydrogen type G49X to AS/NZS ISO 14341-B-2012 or T49X to AS/NZS ISO 17632-B-2006 UNO.

CONCRETE NOTES

1. Concrete to be in accordance with MRTS70 Concrete and M1 North Phase 1 - Loganlea Road to Logan Road bridges Supplementary Specifications
2. Exposure classification, grade of concrete and reinforcement cover for each element shall be as follows, unless shown otherwise:

ELEMENT	Exposure classification	Grade of concrete	Reinforcement cover
Blinding concrete	N/A	N20/20	N/A
Cast-in-place piles	B2	S40/20	90
Capping Beams	B2	S40/20	60
All other Cast-in-place concrete (Cast against ground)	B2	S40/20	90
All other Cast-in-place concrete (Elsewhere)	B2	S40/20	60

3. The class designation specifies the required Class and Grade to AS 1379-2007 and the nominal maximum aggregate size (mm).
4. All exposed edges having a contained angle of less than 120° to have 19 x 19 chamfers unless shown otherwise.
5. CONSTRUCTION JOINTS shall be used only as shown on the drawings. No construction joint shown on the drawings shall be omitted without the written approval of the designer.

GEOTECHNICAL NOTES

1. All foundations are to be founded on soil with minimum allowable bearing capacity of 150 kPa.
2. Prior to base slab construction a RPEQ Geotechnical engineer shall inspect the foundation and perform DCP testing to verify the required bearing capacity is achieved.
3. Excavation, backfilling and compaction operations shall be carried out in accordance with the provisions of MRTS04 General Earthworks and MRTS Annexure 04.1
4. Procedures and processes for the identification, removal and replacement of any unsuitable materials shall comply with the provisions of MRTS04 clause 9.
5. The constructor shall be responsible for maintaining the excavation in a stable condition during construction.
6. The constructor shall exercise caution when backfilling, concreting or compacting and shall consider the need for additional temporary supports for sensitive construction activities.
7. Backfilling against the front of retaining walls may be required to ensure minimum embedment of footing is achieved.
8. Cement stabilised sand (cement content 5%) back fill material to be used where specified in the long section.

RETAINING WALL NOTES

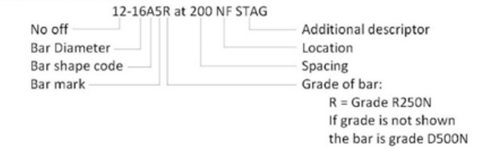
1. Concrete retaining walls shall be constructed in accordance with MRTS03 Drainage, Retaining Structures and Protective Treatments
2. Expansion joints at 24 m minimum and 30m maximum centres and vertical contraction joints at 6 m maximum centres. The nearest expansion joints/ vertical contraction joints shall follow 1.5m from centre of light pole UNO. Nearest Expansion joint from the start / end of the wall is at 20m after transition.

REINFORCING STEEL NOTES

1. Reinforcing steel to be in accordance with AS/NZS 4671-2001 and MRTS71 Reinforcing Steel.
2. Deformed bars Grade D500N, round bars Grade R250N.
3. All carbon reinforcing steel to be Australasian Certification Authority for Reinforcing Steel (ACRS) certified.
4. Additional reinforcement details not covered by these notes shall be in accordance with MRSD 1044 (04/16)
5. Reinforcing steel bar shapes shall be as detailed on MRSD 1043 (04/16). Standard reinforcement abbreviations used on these drawings:

ABR	-	Alternate bar reversed	LV	-	Length varies
ADD	-	Additional	NF	-	Near face
ALT	-	Alternate	NSOE	-	Not shown on elevation
B	-	Bottom face	NSOP	-	Not shown on plan
EF	-	Each face	T	-	Top face
ES	-	Equally spaced	STAG	-	Staggered
FF	-	Far face			

6. Reinforcement notation



8. Spacing of ligatures in pile caps may be altered slightly, if necessary, to clear pile starter bars.
9. Reinforcement to be hot dip galvanised to AS/NZS 4680-2006 where shown.
10. Laps and other splices in reinforcing steel shall only be made at the positions shown on the drawings unless alternative or extra locations are approved in writing by the Administrator.
11. Minimum development and splice lengths to AS 5100:2017+A1 are as follows:

Bar Size	N12	N16	N20	N24	N28	N32	N36	N40
Development length	400	550	750	900	1100	1300	1500	1750
Splice length	500	700	900	1100	1350	1600	1850	2150

Development and splice lengths are based on:
- Minimum 40 MPa concrete characteristic compressive strength
- Minimum clear distance of 40 mm between reinforcement bars (incl. at splice locations).
- Maximum number of bars in a bundle: 2
- More than 50% of the reinforcement at a section is spliced

Splice lengths are for non-staggered anchorages and splices. If no more than half the reinforcement is spliced at a section, then the splice length may be reduced to equal the development length.
For horizontal bars with more than 300 mm of concrete cast below the bar the splice lengths shall be 1.3 times the values shown in the above table.

12. Reinforcement is shown diagrammatically on these drawings and therefore does not depict the precise positions of bars.

UTILITY LEGEND

	Existing	Proposed/ Modified	Decommissioned /Abandoned
Drainage			
Sewer			
Electrical			
Telstra			
Water			
Gas			

STEELWORK NOTES

1. Steelwork to be fabricated to MRTS78 Fabrication of Structural Steelwork.
2. RHS and SHS sections to be Grade C450L0 to AS/NZS 1163-2016 UNO.
3. CHS sections to be Grade C250L0 to AS/NZS 1163-2016 UNO.
4. Steel plate shall be Grade 350 to AS/NZS 3678-2016 UNO.
5. Hot rolled steel bars and sections shall be Grade 300 to AS/NZS 3679.1-2016.
6. Flats shall be Grade 300 to AS/NZS 1594-2002.
7. Stainless steel sheet and plate to ASTM A240.
8. Stainless steel flat bar and round bar to ASTM A276.
9. Bolts:
   - Class 4.6 to AS 1111.1-2015, nuts Class 5 to AS 1112.3-2015, washers for Class 4.6 bolts to AS1237.1-2002.
   - Class 8.8, nuts Class 8 and washers for Class 8.8 bolts to AS/NZS 1252-2016.
   - Thin nuts Class 4 and 5 to AS 1112.4-2015.
10. All bolts and nuts to be hot dip galvanised to AS/NZS 1214-2016.
    - All other steelwork to be hot dip galvanised after fabrication to AS/NZS 4680-2006 unless shown otherwise. Prior to galvanising, all weld splatter and welding slag is to be removed.
11. Tapped holes to be tapped in accordance with Table 1 of AS/NZS 1214-2016.
12. All hollow section material manufactured to AS/NZS 1163-2016 will require abrasive blasting to develop a surface profile of 50 µm prior to hot dip galvanising.
13. All plate material manufactured to AS/NZS 3678-2016 will require abrasive blasting to develop a surface profile of 50 µm prior to hot dip galvanising.

ABBREVIATIONS

1. Abbreviations used are in accordance with AS1100.101 1992 and TMR 'Drafting and Design Presentation Standards'.
2. Additional abbreviations used throughout the set are as follows: -

ALT	-	Alternate
BF	-	Bottom face
CJ	-	Construction joint
crs	-	Centres
CSS	-	Cement Stabilised Sand
DN	-	Nominal diameter
DWS	-	Deck wearing surface
EF	-	Each face
EGL	-	Approximate existing ground level
EJ	-	Expansion joint
ES	-	Equal spaces
FF	-	Far face
FSL	-	Finished surface level
galv	-	Hot dip galvanised
Ht	-	Height or reduced levels to Australian Height Datum
MRTS	-	Queensland Government Department of Transport and Main Roads Technical Standard
MRSD	-	Queensland Government Department of Transport and Main Roads Standard Drawing
NF	-	Near face
PSC	-	Pre-stressed concrete
R	-	Radius
RC	-	Reinforced concrete
SOP	-	Setout point
SS	-	Stainless steel
TF	-	Top face
UG	-	Underground
UNO	-	Unless noted otherwise
VC	-	Vertical Curve
VJ	-	Vertical contraction joint

G			
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A	Issued For Construction		
	Revisions/Descriptions	Signatory: – RPEQ Full Name, Eng. Area and RPEQ No. or – Full Name and Position Title	Date

CAD FILES

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS5100-2017 DESIGN LOADING: HLP240, T2 ROAD TRAIN DESIGN SPEED: 110km/h EARTHQUAKE DESIGN CATEGORY: BEDC-2 BARRIER PERFORMANCE LEVEL: REGULAR BRIDGE TYPE: STEEL I-GIRDER

Scales

Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

Drawn | Checked | Designed No. | Verified No.

Design Reviews (RPEQ) No. Date.

STRUCTURAL - RETAINING WALL GENERAL NOTES

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	SIGNATORY FULL NAME	No.	DATE
STRUCTURAL			
GEOTECHNICAL			
HYDRAULICS			

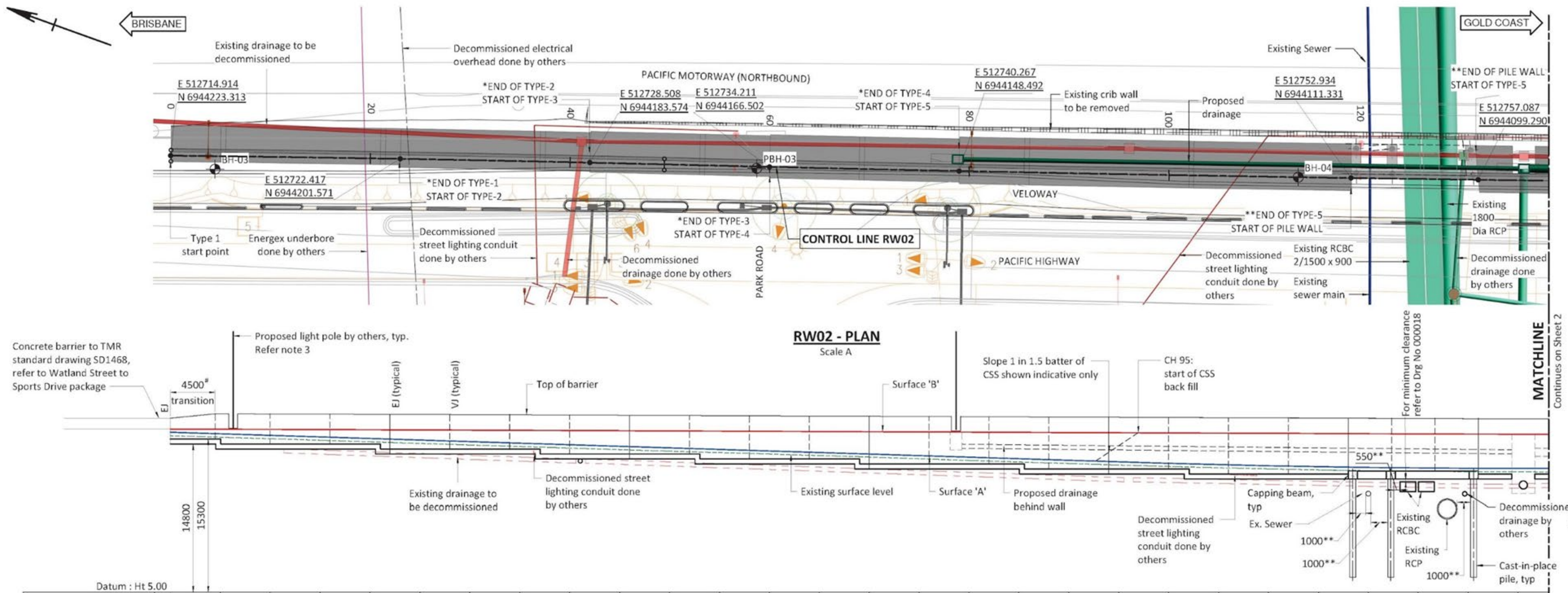
BIS No.

Queensland Government

Job No.
Contract No.
Drawing No.
Series Number

Figure 6.8(c) – Example retaining structures – Sheet 3

Department of Transport and Main Roads MRB_Detail (08/21)



SURFACE 'B'	21.282	21.271	21.259	21.244	21.228	21.210	21.190	21.170	21.150	21.130	21.110	21.090	21.070	21.050
SURFACE 'A'	20.982	20.825	20.669	20.513	20.357	20.200	20.044	19.887	19.731	19.574	19.417	19.261	19.104	18.948
TOP OF FOOTING/ CAPPING BEAM	20.300	20.300	19.800	19.800	19.800	19.300	19.300	19.300	18.800	18.800	18.800	18.300	18.300	18.300
WALL HEIGHT 'H'	0.300	0.446	0.590	0.731	0.871	1.010	1.146	1.283	1.419	1.556	1.693	1.829	1.966	2.102
EXISTING SURFACE LEVELS	20.626	20.480	20.332	20.174	20.017	19.859	19.702	19.546	19.390	19.232	19.080	18.937	18.797	18.644
CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000

SURFACE 'B'	21.030	21.010	20.990	20.970	20.950	20.930	20.910	20.891	20.871	20.851	20.831	20.811	20.792	20.776
SURFACE 'A'	18.792	18.637	18.481	18.326	18.172	18.019	17.867	17.742	17.618	17.534	17.451	17.409	17.368	17.368
TOP OF FOOTING/ CAPPING BEAM	17.800	17.800	17.800	17.800	17.300	17.300	17.300	16.800	16.800	16.800	17.300	17.300	17.300	16.800
WALL HEIGHT 'H'	2.238	2.373	2.509	2.644	2.778	2.911	3.043	3.149	3.253	3.317	3.380	3.402	3.424	3.408
EXISTING SURFACE LEVELS	18.493	18.321	18.155	17.996	17.848	17.691	17.550	17.424	17.306	17.209	17.128	17.070	17.029	17.011
CHAINAGE	70.000	75.000	80.000	85.000	90.000	95.000	100.000	105.000	110.000	115.000	120.000	125.000	130.000	135.000

CSS backfill

RW02 - ELEVATION
Scale A

NOTES

1. For GENERAL NOTES, refer Drg No 000002
2. For pile Details refer to Drg No 000019
3. Light pole and barrier void locations to be confirmed with Pacific Motorway design drawings prior to construction
4. Pacific Motorway drainage and design levels to be confirmed with Pacific Motorway design drawings prior to construction

**Piles SOP are given on Drg No 000019 and subject to minimum clearance from the existing utilities shown on Elevation (to be confirmed on site).

Outline of footing shown in grey (typical). Refer to Drg No 000016 for SOP.

Transition length may be reduced if 1:10 max slope is still achieved.

BIS No.

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS5100-2017 DESIGN LOADING: HLP240, T2 ROAD TRAIN DESIGN SPEED: 110km/h EARTHQUAKE DESIGN CATEGORY: BEDC-2 BARRIER PERFORMANCE LEVEL: REGULAR BRIDGE TYPE: STEEL I-GIRDER

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A Issued For Construction

Revisions/Descriptions | Signatory: – RPEQ Full Name, Eng. Area and RPEQ No. or – Full Name and Position Title | Date

CAD FILES

Scales
A 0 2 4 6 8 10m

Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points
Preceding RP | Dist. to start of job (km) | From start to end of job | From end to Following RP | Following RP

Through Chainage from

Drawn
Checked
Designed No.
Verified No.
Design Reviews (RPEQ)
No. Date.

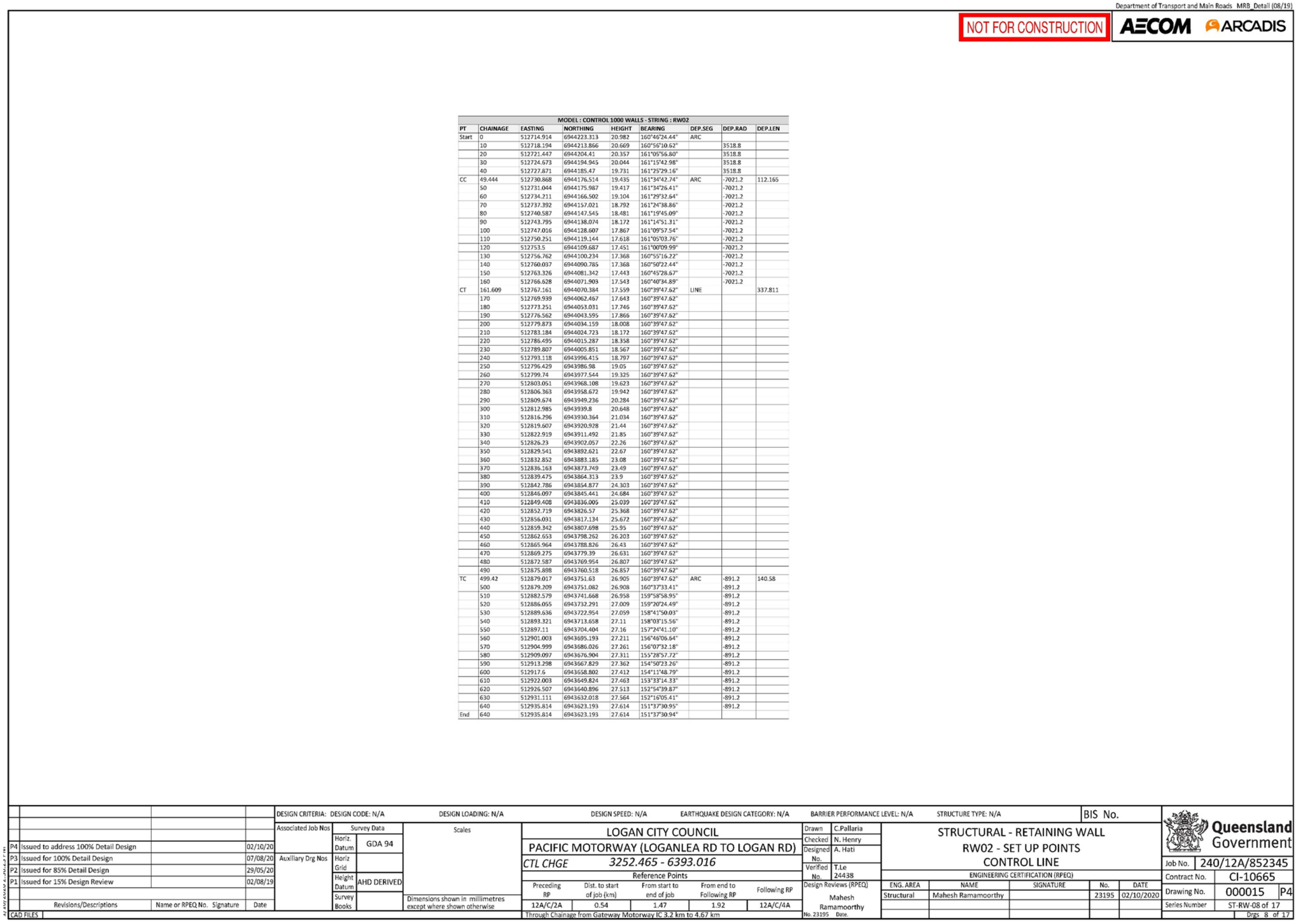
STRUCTURAL - RETAINING WALL
RW02 - PLAN AND ELEVATION
SHEET 1

ENGINEERING CERTIFICATION (RPEQ)
ENG. AREA | SIGNATORY FULL NAME | No. | DATE
STRUCTURAL
GEOTECHNICAL
HYDRAULICS

Queensland Government

Job No.
Contract No.
Drawing No.
Series Number

Figure 6.8(d) – Example retaining structures – Sheet 4



Department of Transport and Main Roads MRB_Detail (08/19)

NOT FOR CONSTRUCTION

AECOM ARCADIS

MODEL : CONTROL 1000 WALLS - STRING : RW02

PT	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING	DEP.SEG	DEP.RAD	DEP.LEN
Start	0	512714.914	6944223.313	20.982	160°46'24.44"	ARC		
	10	512718.194	6944213.866	20.669	160°56'10.62"		3518.8	
	20	512721.447	6944204.41	20.357	161°05'56.80"		3518.8	
	30	512724.673	6944194.945	20.044	161°15'42.98"		3518.8	
	40	512727.871	6944185.47	19.731	161°25'29.16"		3518.8	
CC	49.444	512730.868	6944176.514	19.435	161°34'42.74"	ARC	-7021.2	112.165
	50	512731.044	6944175.987	19.417	161°34'26.41"		-7021.2	
	60	512734.211	6944166.502	19.104	161°29'32.64"		-7021.2	
	70	512737.392	6944157.021	18.792	161°24'38.86"		-7021.2	
	80	512740.587	6944147.545	18.481	161°19'45.09"		-7021.2	
	90	512743.795	6944138.074	18.172	161°14'51.31"		-7021.2	
	100	512747.016	6944128.607	17.867	161°09'57.54"		-7021.2	
	110	512750.251	6944119.144	17.618	161°05'03.76"		-7021.2	
	120	512753.5	6944109.687	17.451	161°00'09.99"		-7021.2	
	130	512756.762	6944100.234	17.368	160°55'16.22"		-7021.2	
	140	512760.037	6944090.785	17.368	160°50'22.44"		-7021.2	
	150	512763.326	6944081.342	17.443	160°45'28.67"		-7021.2	
	160	512766.628	6944071.903	17.543	160°40'34.89"		-7021.2	
CT	161.609	512767.161	6944070.384	17.559	160°39'47.62"	LINE		337.811
	170	512769.939	6944062.467	17.643	160°39'47.62"			
	180	512773.251	6944053.031	17.746	160°39'47.62"			
	190	512776.562	6944043.595	17.866	160°39'47.62"			
	200	512779.873	6944034.159	18.008	160°39'47.62"			
	210	512783.184	6944024.723	18.172	160°39'47.62"			
	220	512786.495	6944015.287	18.358	160°39'47.62"			
	230	512789.807	6944005.851	18.567	160°39'47.62"			
	240	512793.118	6943996.415	18.797	160°39'47.62"			
	250	512796.429	6943986.98	19.05	160°39'47.62"			
	260	512799.74	6943977.544	19.325	160°39'47.62"			
	270	512803.051	6943968.108	19.623	160°39'47.62"			
	280	512806.363	6943958.672	19.942	160°39'47.62"			
	290	512809.674	6943949.236	20.284	160°39'47.62"			
	300	512812.985	6943939.8	20.648	160°39'47.62"			
	310	512816.296	6943930.364	21.034	160°39'47.62"			
	320	512819.607	6943920.928	21.44	160°39'47.62"			
	330	512822.919	6943911.492	21.85	160°39'47.62"			
	340	512826.23	6943902.057	22.26	160°39'47.62"			
	350	512829.541	6943892.621	22.67	160°39'47.62"			
	360	512832.852	6943883.185	23.08	160°39'47.62"			
	370	512836.163	6943873.749	23.49	160°39'47.62"			
	380	512839.475	6943864.313	23.9	160°39'47.62"			
	390	512842.786	6943854.877	24.303	160°39'47.62"			
	400	512846.097	6943845.441	24.684	160°39'47.62"			
	410	512849.408	6943836.005	25.039	160°39'47.62"			
	420	512852.719	6943826.57	25.368	160°39'47.62"			
	430	512856.031	6943817.134	25.672	160°39'47.62"			
	440	512859.342	6943807.698	25.95	160°39'47.62"			
	450	512862.653	6943798.262	26.203	160°39'47.62"			
	460	512865.964	6943788.826	26.43	160°39'47.62"			
	470	512869.275	6943779.39	26.631	160°39'47.62"			
	480	512872.587	6943769.954	26.807	160°39'47.62"			
	490	512875.898	6943760.518	26.857	160°39'47.62"			
TC	499.42	512879.017	6943751.63	26.905	160°39'47.62"	ARC	-891.2	140.58
	500	512879.209	6943751.082	26.908	160°37'33.41"		-891.2	
	510	512882.579	6943741.668	26.958	159°58'58.95"		-891.2	
	520	512886.055	6943732.291	27.009	159°20'24.49"		-891.2	
	530	512889.636	6943722.954	27.059	158°41'50.03"		-891.2	
	540	512893.321	6943713.658	27.11	158°03'15.56"		-891.2	
	550	512897.11	6943704.404	27.16	157°24'41.10"		-891.2	
	560	512901.003	6943695.193	27.211	156°46'06.64"		-891.2	
	570	512904.999	6943686.026	27.261	156°07'32.18"		-891.2	
	580	512909.097	6943676.904	27.311	155°28'57.72"		-891.2	
	590	512913.298	6943667.829	27.362	154°50'23.26"		-891.2	
	600	512917.6	6943658.802	27.412	154°11'48.79"		-891.2	
	610	512922.003	6943649.824	27.463	153°33'14.33"		-891.2	
	620	512926.507	6943640.896	27.513	152°54'39.87"		-891.2	
	630	512931.111	6943632.018	27.564	152°16'05.41"		-891.2	
	640	512935.814	6943623.193	27.614	151°37'30.95"		-891.2	
End	640	512935.814	6943623.193	27.614	151°37'30.94"			

	Revisions/Descriptions	Name or RPEQ No. Signature	Date
P4	Issued to address 100% Detail Design		02/10/20
P3	Issued for 100% Detail Design		07/08/20
P2	Issued for 85% Detail Design		29/05/20
P1	Issued for 15% Design Review		02/08/19

CAD FILES

DESIGN CRITERIA: DESIGN CODE: N/A | DESIGN LOADING: N/A | DESIGN SPEED: N/A | EARTHQUAKE DESIGN CATEGORY: N/A | BARRIER PERFORMANCE LEVEL: N/A | STRUCTURE TYPE: N/A | BIS No.

Associated Job Nos | Auxiliary Drg Nos

Survey Data: Horiz. Datum GDA 94; Horiz Grid; Height Datum AHD DERIVED; Survey Books

Scales: Dimensions shown in millimetres except where shown otherwise

LOGAN CITY COUNCIL

PACIFIC MOTORWAY (LOGANLEA RD TO LOGAN RD)

CTL CHGE 3252.465 - 6393.016

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP
12A/C/2A	0.54	1.47	1.92	12A/C/4A

Through Chainage from Gateway Motorway IC 3.2 km to 4.67 km

Drawn	C.Pallaria
Checked	N. Henry
Designed No.	A. Hati
Verified No.	T.Le 24438

Design Reviews (RPEQ): Mahesh Ramamoorthy No. 23195 Date.

STRUCTURAL - RETAINING WALL
RW02 - SET UP POINTS
CONTROL LINE

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	No.	DATE
Structural	Mahesh Ramamoorthy		23195	02/10/2020

Queensland Government

Job No.	240/12A/852345
Contract No.	CI-10665
Drawing No.	000015 P4
Series Number	ST-RW-08 of 17
	Drgs 8 of 17

Figure 6.8(e) – Example retaining structures – Sheet 5

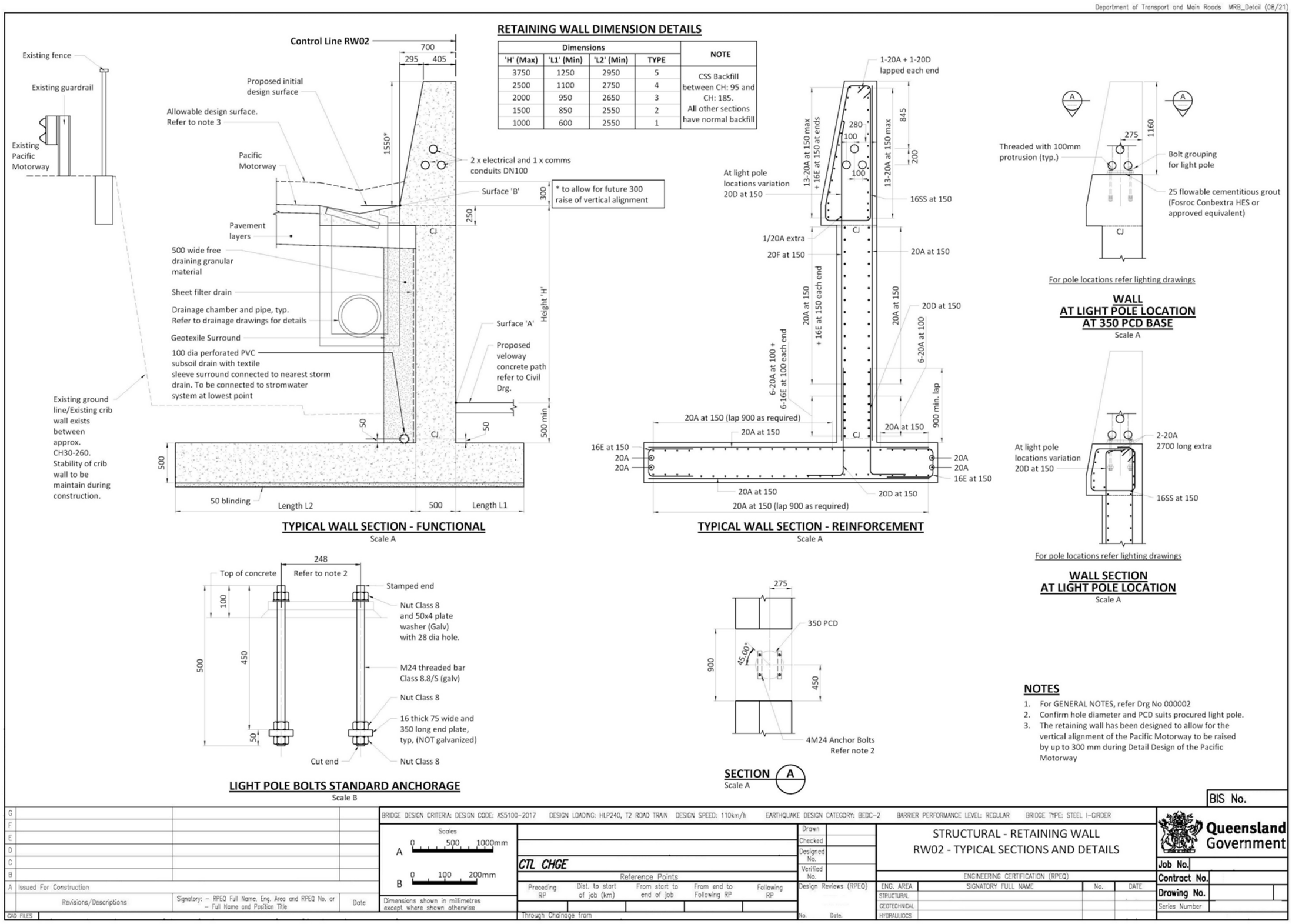
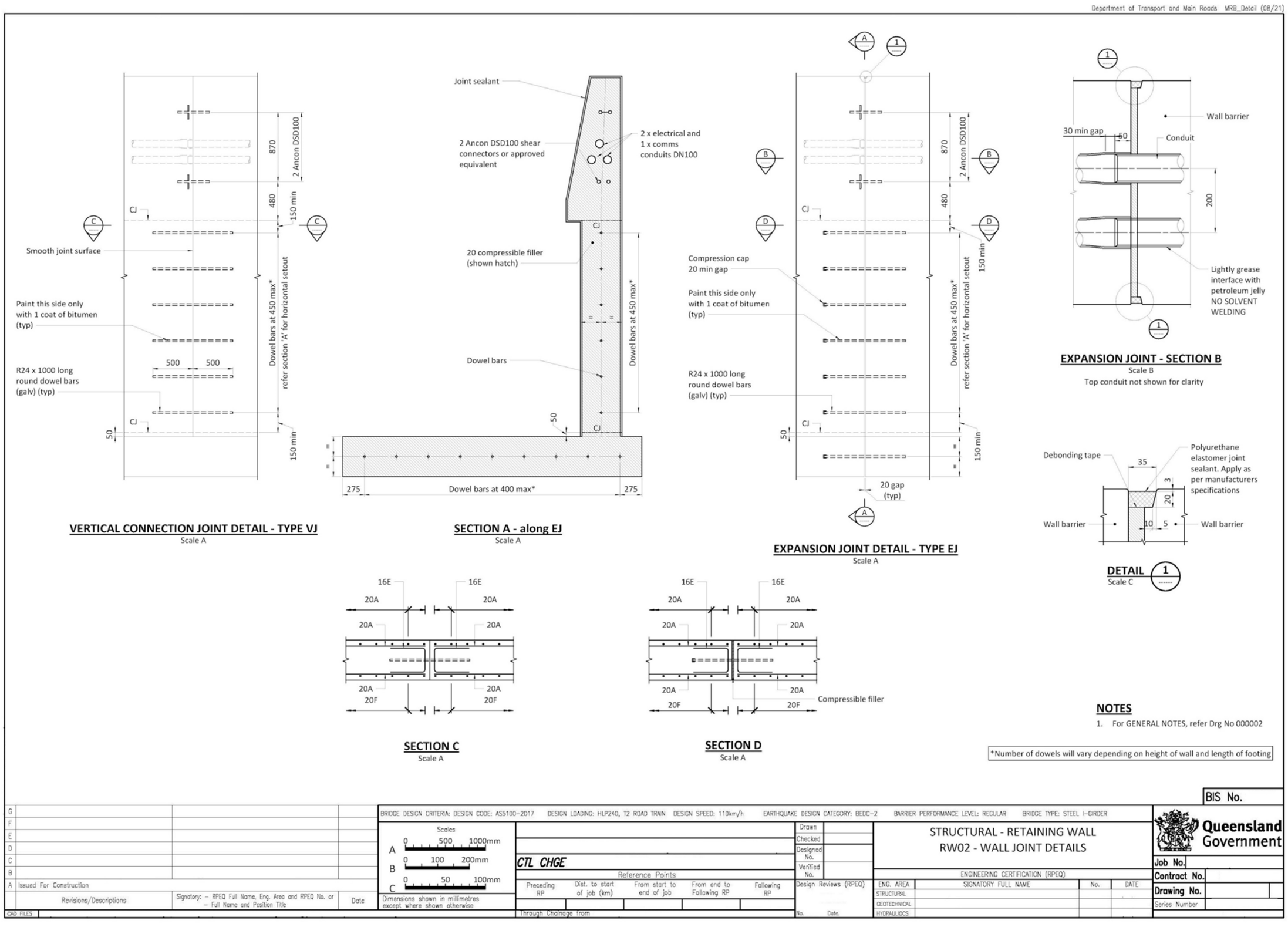


Figure 6.8(f) – Example retaining structures – Sheet 6



7 Culvert and drainage structures

7.1 General

Project specific drawings may be required for culverts that are outside the scope of the department's standard culverts, as described in Section 3 of the SIM, and in Part D, Chapter 12 of the DCBoS.

The minimum detailing requirements for these structures are set out below here, and apply to, but are not limited to, the following 'major' culverts and drainage structures meeting the following criteria:

- pipes with at least one barrel (cell) with diameter ≥ 1.8 m, or
- rectangular / oval / arch culverts at least one barrel (cell) with span > 1.8 m and height > 1.5 m
- stock and pedestrian underpasses, and
- large non-standard reinforced chambers and pits.

All of the cast-insitu elements shall be fully detailed in the design engineering drawings.

7.2 Typical drawing set for non-standard culverts and drainage structures

The following is an example of a non-standard culvert drawing set:

- Site plan and drawing index (refer to Section 2.1)
- General Notes (refer to Section 2.3)
- General Arrangement
- Foundation details
- Concrete details for culverts, including set out of headwalls, wing wall, base slab and apron slabs, and jointing arrangements
- Concrete details for other drainage structures, and
- Reinforcement details.

All walls shall be elevated so that all penetrations can be demonstrated, and all invert levels noted.

The drawings in this list would be condensed into a smaller number of drawings for simple projects.

7.3 Drawings for other drainage structures

Where structural engineering drawings are to be provided for other drainage structures, such as access chambers, the information within this section of the manual may be modified to suit.

7.4 General Arrangement drawings for culverts

GA drawings show the overall representation of the structure to be constructed.
GA drawings for culverts are typically less complex than for a bridge; they should follow a similar pattern displaying similar information consistently.

Transport and Main Roads culvert GA drawings usually have the following:

- plan and elevation on the first sheet, continuing onto subsequent sheets for long structures
- a legend explaining the symbols on the plan and elevation, such as foundation boreholes, services, road furniture, and other critical features
- set out of the culvert (for example, eastings and northings at the inlet and outlet)
- number of and nominal size of culvert pre-cast units
- total length of base slab
- nominal gap between pre-cast units
- inlet and outlet invert levels (ILs) of the culvert base slab in Australian Height Datum (AHD)
- flow directions, and
- any notes are usually shown at the bottom right-hand side of the drawing.

7.5 Concrete details for culverts

Transport and Main Roads culvert concrete details shall contain the following:

- headwall, wing wall, and apron slab heights
- invert levels
- backfill requirements
- apron slab fall directions
- concrete joint details
- headwall and wing wall drainage, if required (for example, weepholes and strip filter drains), and
- safety rail arrangements (if required).

7.6 Reinforcement details for culverts

All headwalls, wing walls and apron slabs should be fully reinforced in the design engineering drawings. All reinforcement should follow the department's reinforcing bar identification in Section 16.2 of Chapter 2. Where reinforcement detailing becomes congested or complex, bar sequence numbers as stated in Section 16.3 of Chapter 2 is recommended to be used to improve detailing clarity.

7.7 Typical content required on the drawings

The following table lists the content specific to, but is not limited to, typical culvert drawings.

Table 7.7 – Culvert structures – specific drawings content

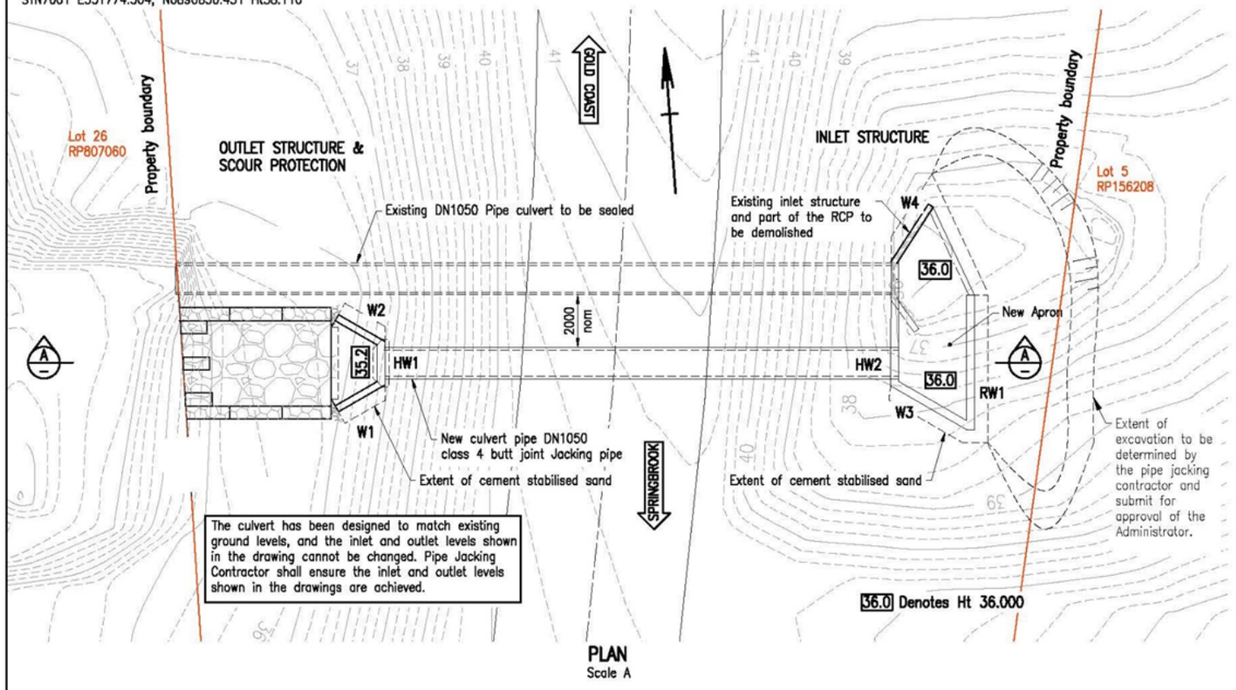
Requirement	Drawing or element description	Figure reference
Notes	Notes to suit the element, along with design criteria, lifting and handling notes.	Figure 7.7(a)
General Arrangement	A plan and elevation that depicts the arrangement of the culvert, including: • Set-out (eastings and northings of the element centreline) and any additional set out points • total length of culvert • total length of base slab • number of and nominal size of pre-cast units • nominal gap between pre-cast units, longitudinally and transversely • direction of stream flow • upstream and downstream base slab invert levels • headwall arrangement and wing wall labels, and • scour protection, as required.	Figure 7.7(a) Figure 7.7(h)
Foundation details	All details required for foundations.	Figure 7.7(a) to Figure 7.7(g)
Concrete details	• Headwall, wing wall and apron slab heights • Invert levels • Backfill requirements • Apron slab fall direction • Concrete joint details • Headwall and wing wall joint arrangements • Headwall and wing wall drainage, if required (for example, weepholes and strip filter drains), and	Figure 7.7(b) to Figure 7.7(f)

Requirement	Drawing or element description	Figure reference
	• Safety rail arrangements (if required).	
Reinforcement details	• Headwall and wing wall reinforcement details in elevation and section • Apron slab reinforcement in section, and • Base slab reinforcement section.	Figure 7.7(c) to Figure 7.7(g)

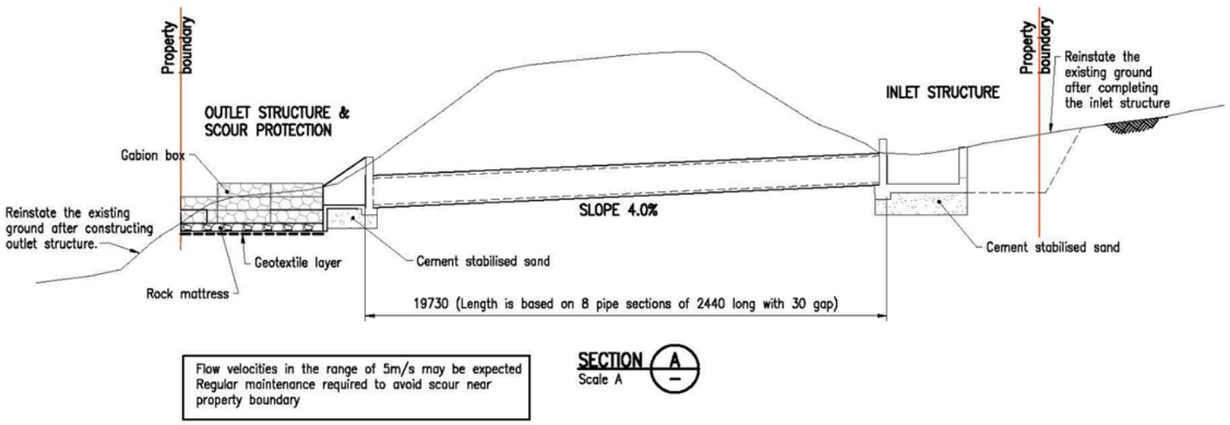
Figure 7.7(a) – Pipe culvert – Sheet 1

Department of Transport and Main Roads MRB_Detail (08/19)

PM185215 E531810.250, N6891656.377 Ht 43.376
PM190935 E387187.658, N6890989.006 Ht 46.596
STN7000 E531801.350, N6891005.324 Ht 48.243
STN7001 E531774.504, N6890830.451 Ht38.110



PLAN
Scale A



Flow velocities in the range of 5m/s may be expected
Regular maintenance required to avoid scour near property boundary

SECTION A
Scale A

NOTES

1. Dimensions and levels are based on survey data supplied and shall be verified on site before commencement of work. Any discrepancies shall be reported to the designer before construction.
2. New culvert construction shall conform to MRTS03.
   The new pipe culvert shall be installed using the jacking method specified in Clause 13 of MRTS03 & MRTS141.
   Pipe construction methodology including Risk and Contingency Plans, Remediation of disturbed area & Tolerances, shall be comply with clauses 7.4, 7.12 & 8 of MRTS141.
   The Contractor shall forward the pipe jacking procedure including construction methodology, material specifications and any required certifications for review and approval by Administrator 21 days prior to commencement of work.
3. Construction of new wingwalls, headwalls and aprons shall be carried out after the pipe jacking is completed.
4. Concrete for inlet & outlet structures to be:–
   (i) In accordance with MRTS70
   (ii) N20/20 (blinding concrete)
   (iii) S40/20 (all other concrete)
   (iv) Exposure classification B2.
   (v) 60 minimum concrete cover
5. Reinforcing steel shall be read in conjunction with Standard Drawings 1043 and 1044 and shall be in accordance with MRTS71 and AS/NZS 4671.
   Deformed bars grade D500N. Round bars Grade R250N. Mesh Grade D500L.
   Tack welding of reinforcement for welding purposes to AS/NZS 1554.3.
6. After the installation of new culvert is completed, the void of the existing pipe culvert is to be filled with flowable lean mix concrete.
7. Due to site access constraints, limited geotechnical investigation has been carried out in the vicinity of the culvert location. The results are presented in the TMR Geotechnical Report R21029. The pipe jacking contractor shall carry out additional geotechnical investigation, if required.
8. Bedrock is encountered at the culvert location at shallow depths. (Refer to the geotechnical report R21029)

CONSTRUCTION PROCEDURE FOR INLET AND OUTLET STRUCTURES

1. Demolish existing inlet structure.
2. Remove existing material as shown in the drawing and fill with cement stabilised sand at inlet and outlet locations. Stabilised sand shall conform to Clause 19.2.10 of MRTS04.
   Minimum foundation bearing capacity to be 150 kPa ($\phi_f R_{bg}$).
3. Excavate embankment and ground to suit the construction of inlet and outlet structures.
4. Construct inlet and outlet structure. Refer relevant drawings.
5. Make ground profile to match original ground profile. All fill material where applicable to form the ground profile shall be Class A1 in accordance with Clause 14.2.2 of MRTS04. Backfill material behind the strip filter drain should be free draining granular material in accordance with Clause 19.2.4 of MRT04.
6. Construct rock mattress and gabion protection at outlet as shown in drawings. Gabions and rock mattress shall be in accordance with Clause 36 and 37 in MRTS03.

PROCEDURE FOR FILLING THE EXISTING REINFORCED CONCRETE PIPE CULVERT

1. After the installation of new culvert is completed, the void of the existing pipe culvert is to be filled with flowable lean mix concrete.
2. Close inlet and outlet of existing culvert to prevent leaking of flowable lean concrete mix (provide concrete end plugs as per Clause 9.3 of MRTS03).
3. Drill down 200mm dia hole from the road surface and batter slopes at approx. 5m spacing. Ensure one hole at mid length and one hole at each end of the culvert.
4. Insert PVC pipe into the hole (within road pavement only) to provide lateral restraint to the road base around the holes.
5. Pump the flowable lean concrete mix from holes starting at lower end and continuing towards the higher end. Ensure the mix overflows through nearby holes, then seal them. Concrete for filling existing RCP to be:– Flowable lean mix concrete – in accordance with Clause 19.2.12 of MRTS04 with a slump of 200mm or greater (to allow placement without vibration)
6. Reinstate the road surface at hole locations after completion.

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D			
C			
B			
A	Issued For Construction		
	Revisions/Descriptions	Name or RPEQ No. Signature	Date

CAD FILES

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS5100:2017 DESIGN LOADING: SM1600 and HLP400 DESIGN SPEED: 70km/h EARTHQUAKE DESIGN CATEGORY: N/A BARRIER PERFORMANCE LEVEL: N/A BRIDGE TYPE: CULVERT

BIS No.

Associated Job Nos
Auxiliary Drg Nos
Survey Data: Horiz. Datum; Horiz. Grid: GDA2020 MGA Zone 56; Height Datum: AHDD; Survey Books
Scales: A 0 1 2 3 4 5m
Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

Drawn
Checked
Designed No.
Verified No.
Design Reviews (RPEQ)

CULVERT ID
NEW REINFORCED CONCRETE PIPE CULVERT
GENERAL ARRANGEMENT

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	No.	DATE
STRUCTURAL				
HYDRAULICS				
GEOTECHNICAL				

Queensland Government

Job No.
Contract No.
Drawing No. A
Series Number MD–GA–01 of 01
BR Dras 2 of 6

Figure 7.7(b) – Pipe culvert – Sheet 2

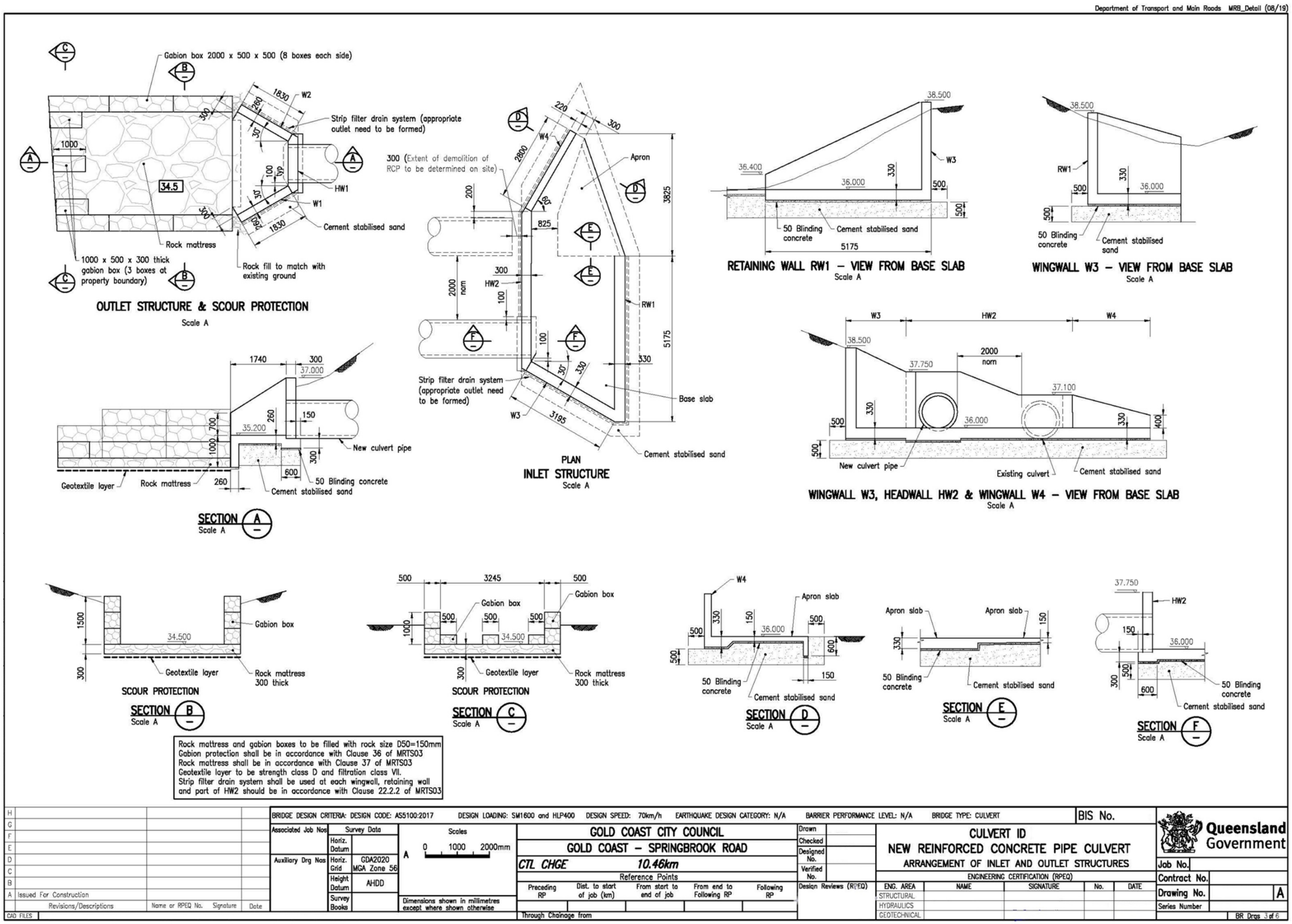


Figure 7.7(c) – Pipe culvert – Sheet 3

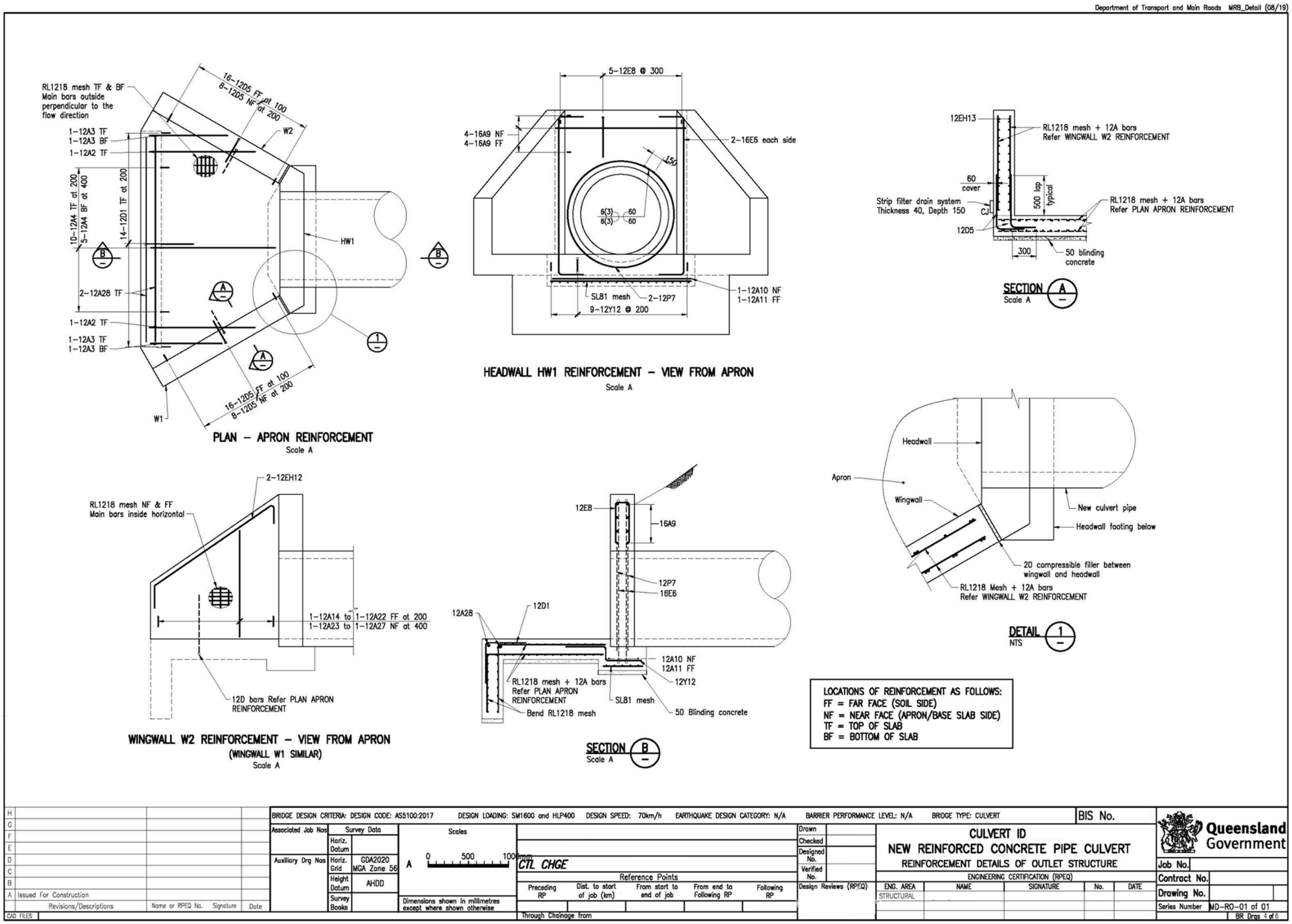


Figure 7.7(d) – Pipe culvert – Sheet 4

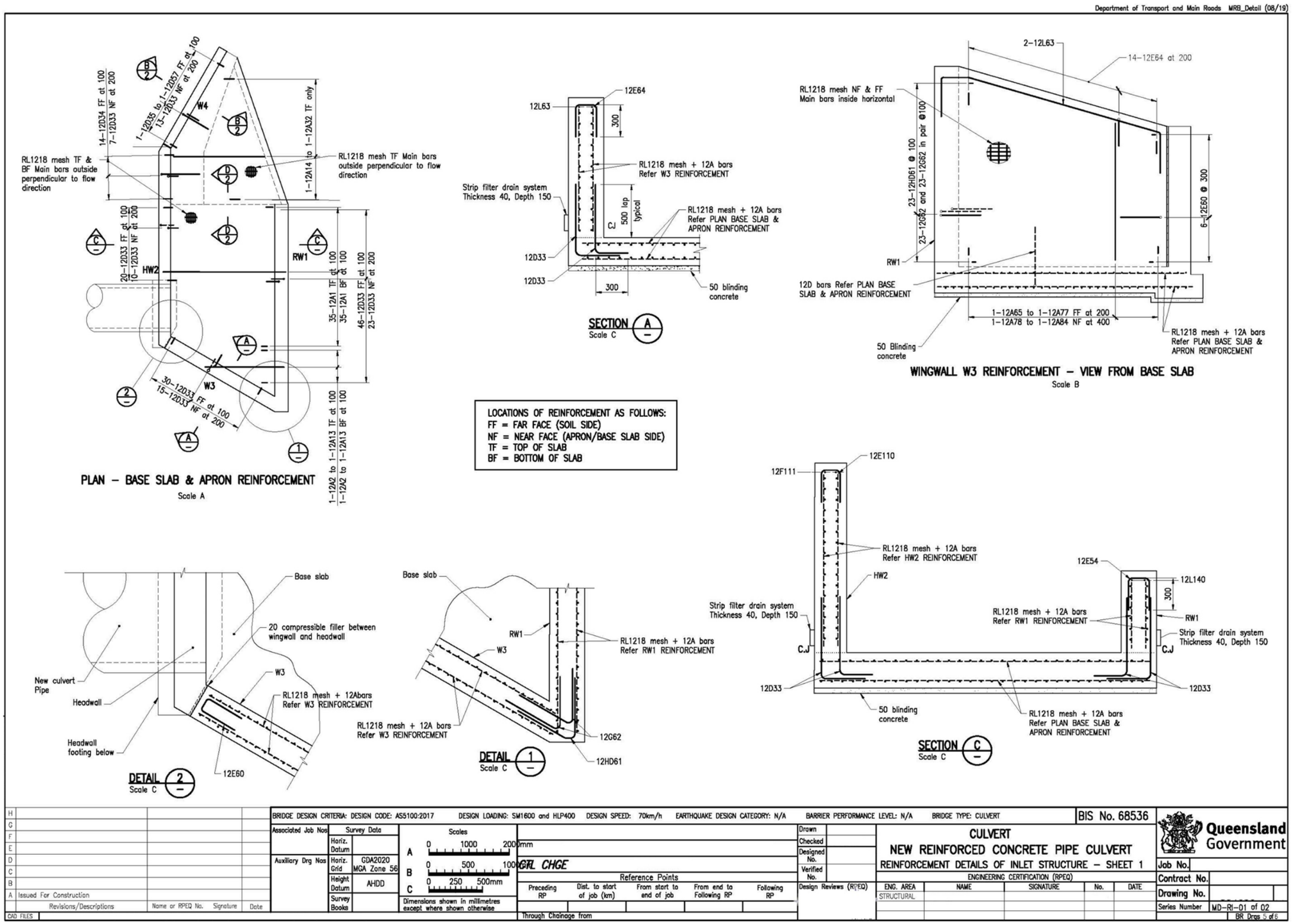


Figure 7.7(e) – Pipe culvert – Sheet 5

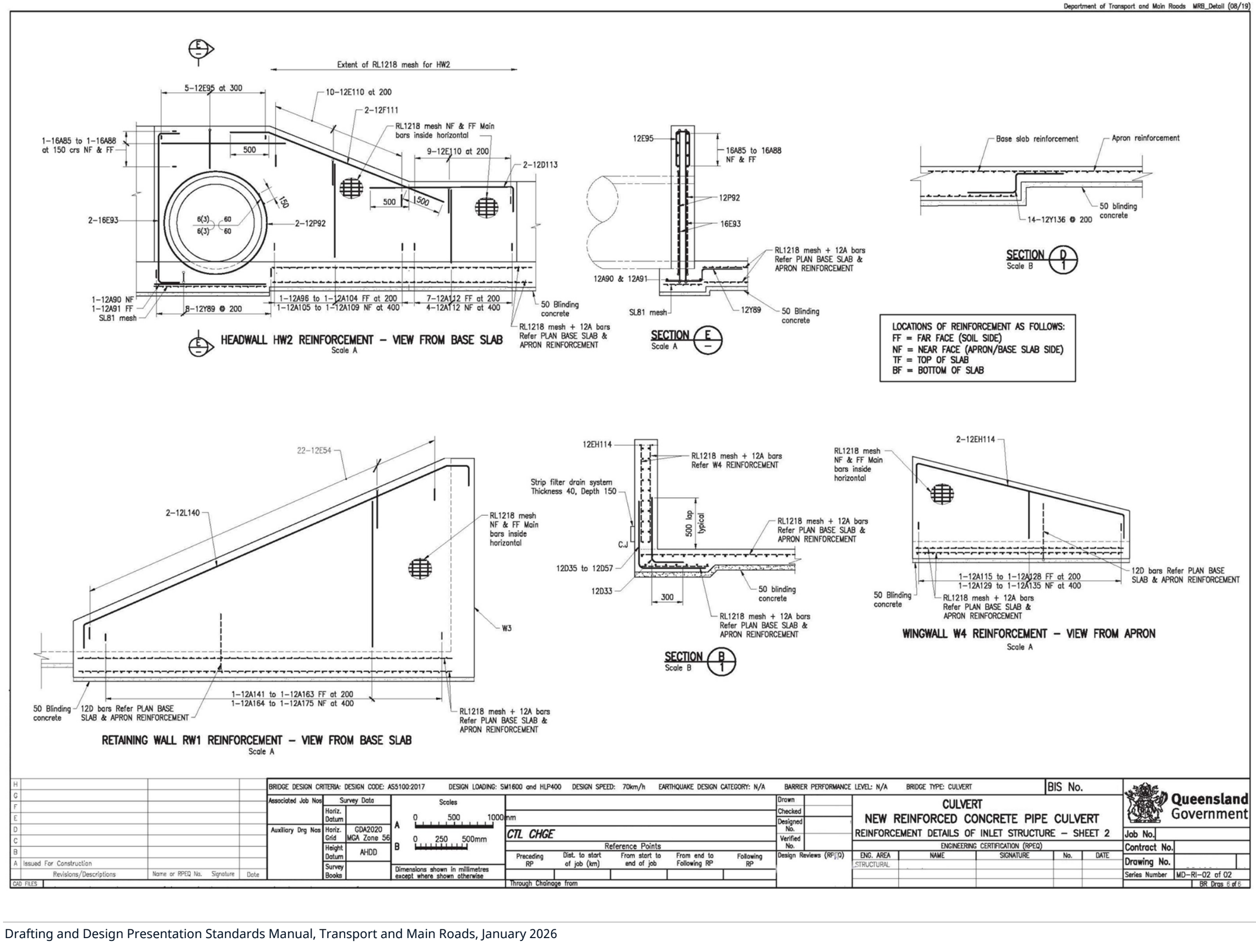


Figure 7.7(f) – Reinforced Concrete Box Culvert (RCBC) – Sheet 1

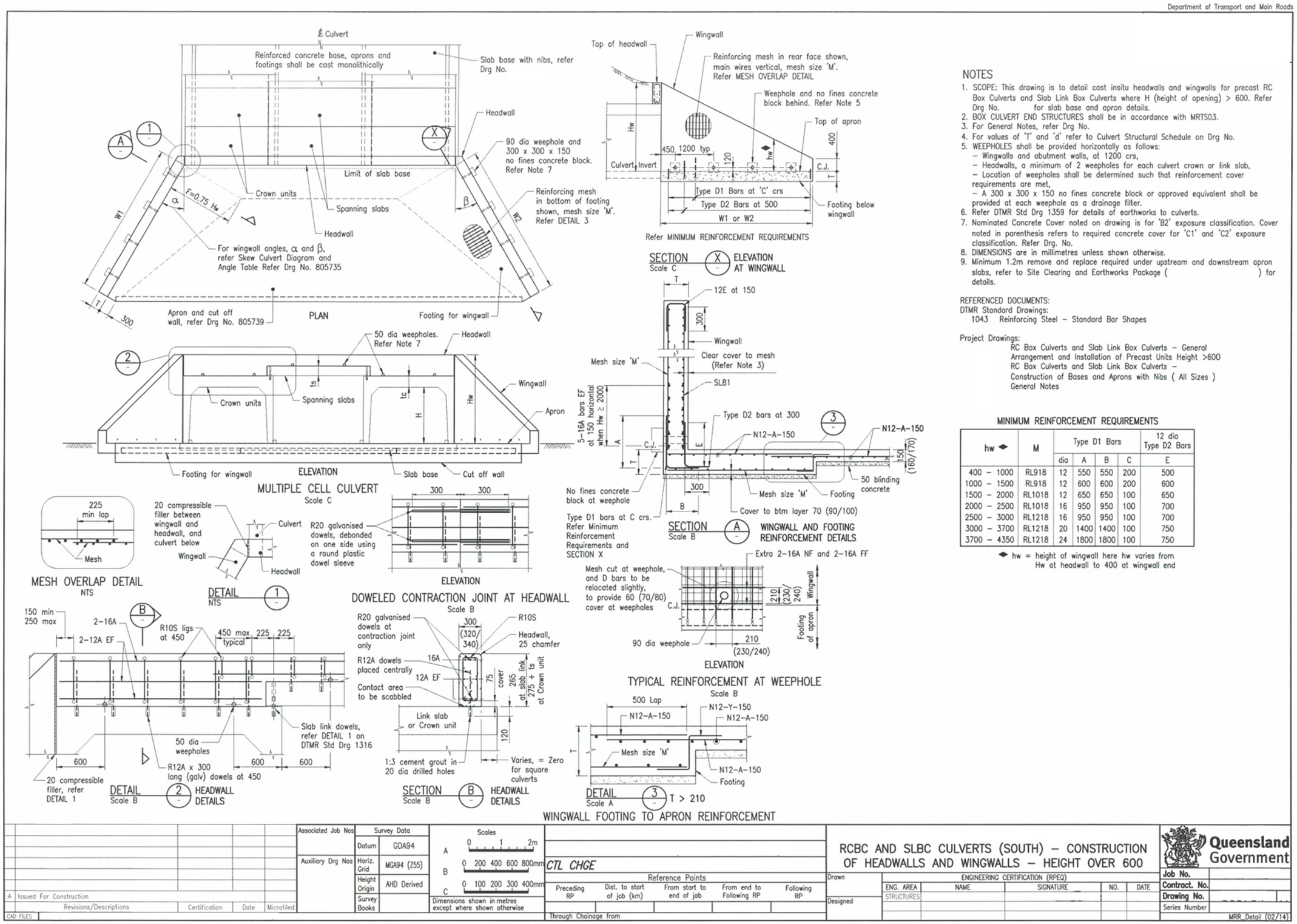
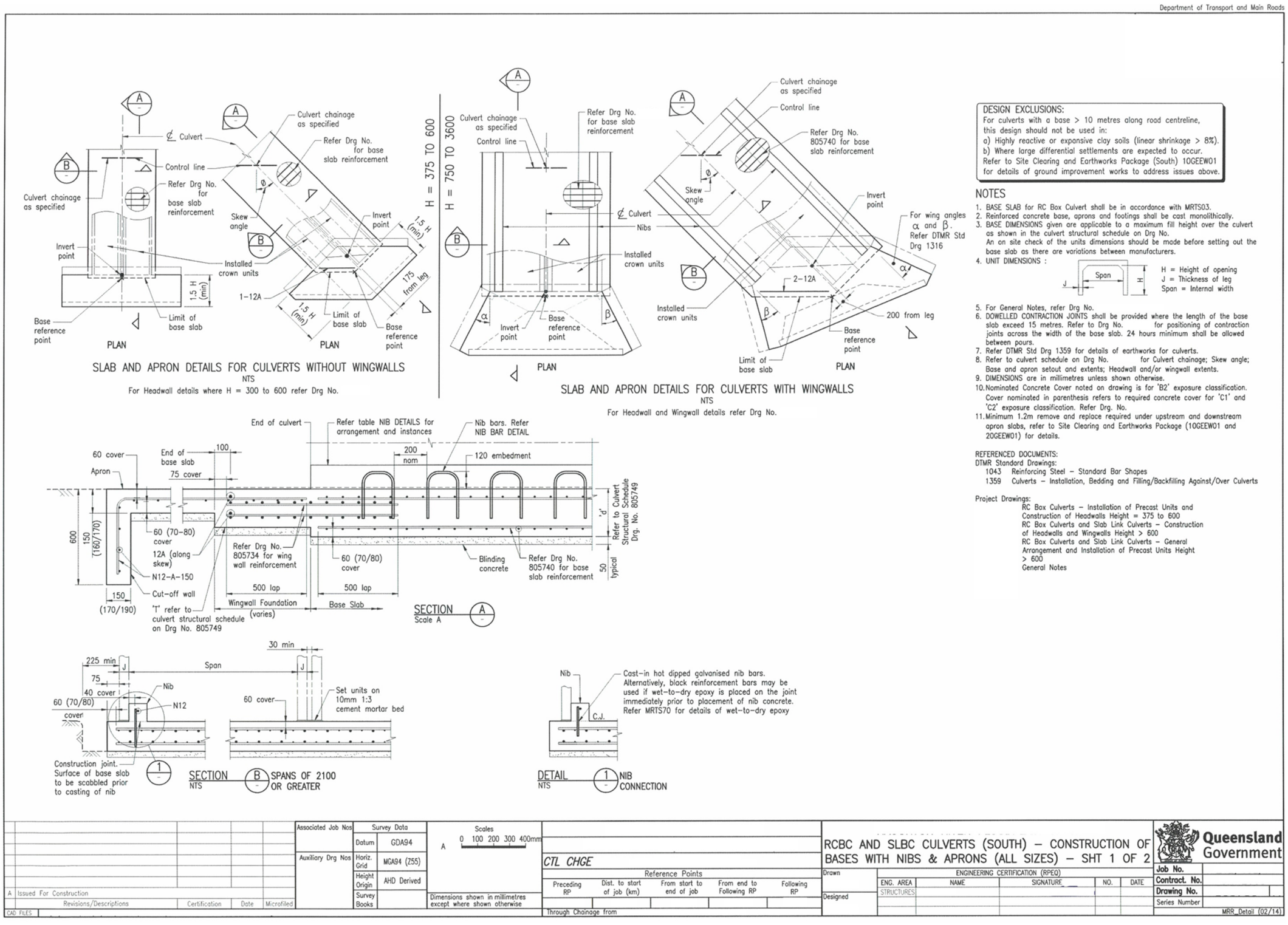


Figure 7.7(g) Reinforced Concrete Box Culvert (RCBC) – Sheet 2

Department of Transport and Main Roads



A	Issued For Construction						
	Revisions/Descriptions	Certification	Date	Microfiled			
CAD FILES							

Associated Job Nos	Survey Data		
	Datum	GDA94	
Auxiliary Drg Nos	Horiz. Grid	MGA94 (Z55)	
	Height Origin	AHD Derived	
	Survey Books		

Scales: A — 0 100 200 300 400mm
Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points				
Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

RCBC AND SLBC CULVERTS (SOUTH) – CONSTRUCTION OF BASES WITH NIBS & APRONS (ALL SIZES) – SHT 1 OF 2

Drawn
Designed

ENGINEERING CERTIFICATION (RPEQ)				
ENG. AREA	NAME	SIGNATURE	NO.	DATE
STRUCTURES				

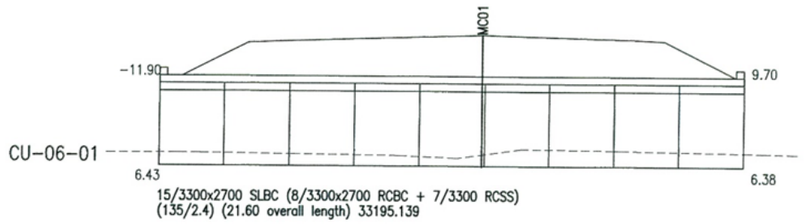
Queensland Government

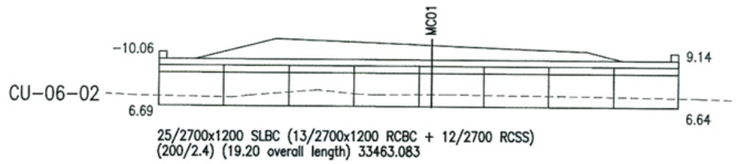
Job No.	
Contract. No.	
Drawing No.	
Series Number	

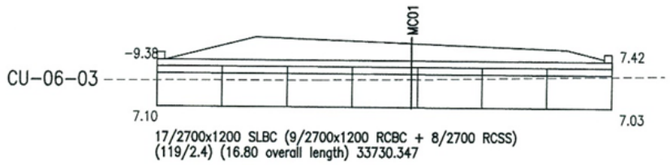
MRR_Detail (02/14)

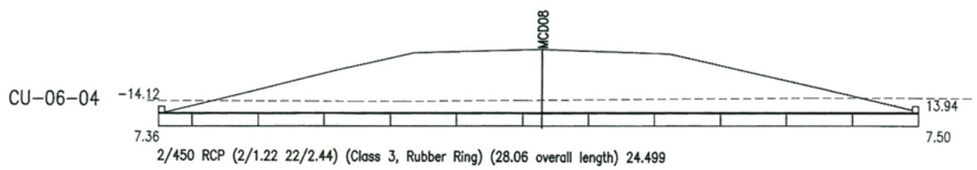
Figure 7.7(h) – Reinforced Concrete Box Culvert (RCBC) – Sheet 3

Department of Transport and Main Roads









NOTE
1. Culvert sizes are shown in millimetres.
2. Where culvert extends past the road batter, locally flatten the batter to tie in with culvert end wall.
3. Batter earthworks at the back of headwalls to be rounded as per DTMR Std Drg 1304.
4. Refer to Drg No. for culvert rock protection schedule.
5. Refer to Drg No. to Drg No. for culvert headwall, wingwalls, apron and base slab details.
6. Refer to 12d Model, channel schedule (Drg No.) and channel setout (Drg No.) for culvert inlet and outlet channel details.

A	Issued For Construction			
	Revisions/Descriptions	Certification	Date	Microfiled
CAD FILES				

Associated Job Nos
Auxiliary Drg Nos

Survey Data: Datum GDA94; Horiz. Grid MGA94 (Z55); Height Origin AHD Derived; Survey Books

Scales 0 1 2 3 4m

Dimensions shown in metres except where shown otherwise

CTL CHGE

Reference Points: Preceding RP | Dist. to start of job (km) | From start to end of job | From end to Following RP | Following RP

Through Chainage from

CULVERT CROSS SECTIONS (SOUTH)
SHEET 3 OF 5

Drawn
Designed

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	NO.	DATE
DRAINAGE				

Queensland Government

Job No.
Contract. No.
Drawing No.
Series Number

MRR_Detail (02/14)

8 Noise barriers

8.1 General

Project specific drawings may be required for noise barriers, as described in Section 3 of the SIM, and in Part D, Chapter 14 of the DCBoS.

The minimum detailing requirements for these structures are set out below, for the following:

- noise barrier attached to a bridge, tunnel, or other structure, and
- stand-alone noise barrier.

All of the elements of the barrier shall be fully detailed in the design engineering drawings.

8.2 Typical drawing set for noise barriers

The following is an example of noise barrier drawing sets, but not limited to:

- Site plan and drawing index (refer to Section 2.1)
- General Notes (refer to Section 2.3)
- General Arrangement
- Typical cross-sections of all barrier types utilised
- Foundation details (refer to Section 7.3)
- Post details
- Panel details, and
- Connection details for any noise barrier attached directly to a structure.

8.3 General Arrangement drawings

GA drawings show the overall representation of the structure to be constructed.
GA drawings for structures other than bridges are typically less complex than for a bridge; they should follow a similar pattern displaying similar information consistently. Transport and Main Roads noise barrier GA drawings typically have the following:

- plan and elevation on the first sheet, continuing onto subsequent sheets for long structures
- a legend explaining the symbols on the plan and elevation, such as foundation boreholes, services, road furniture, and other critical features
- set out of the noise barrier (for example, noise barrier control line, and eastings and northings)

- any notes are usually shown at the bottom right-hand side of the drawing, and
- references to respective noise model maps.

8.4 Foundation details

Foundation details on the noise barrier drawings shall follow the information set out in Section 3 and Section 4.2 of Chapter 4 of this volume.

Noise barriers can often have a variety of footing arrangements depending on the location or geometry. The most common types of foundations used in noise barrier construction are:

- cast-in-place piles
- cast-in-place piles with bridging structure, where required, and
- spread footings.

8.5 Post set out and details

Post details for noise barriers should contain information required to position the post in relation to the control line, footing, and noise barrier panel. Post details should detail, as a minimum:

- plan view detailing the arrangement of posts, panels, and set out location
- notation highlighting the orientation of the element being detailed, for example, traffic side
- plan details for post arrangement at changes in direction
- weld symbols where not specified in General Notes
- elevations of post arrangements
- structure fixing details
- connection details for any noise barrier attached directly to a structure
- interfacing details, and
- drainage provisions.

8.6 Panel details

Noise barrier panels can be made from a variety of different materials (refer to Clause 5 of MRTS15 *Noise Fences* for details on pre-approved proprietary products. The most common panel types are, but not limited to:

- plywood
- concrete
- steel
- aluminium, and
- transparent.

Noise barriers should have a top profile that is level or visually parallel to the road surface, with horizontal panel joints at a constant height, as stated in Clause 6.4 of MRTS15 *Noise Fences*. This can be achieved through the use of consistent panel sizes, variable height sill beams, burying the base of panels below ground level, and adding extra panel height to achieve the desired profile.

Panel details should, at a minimum, include:

- layouts of different panel arrangements
- panel dimensions and details
- joints and panel seating / levelling details
- details of urban design treatments to the panels
- lifting notes and details, and
- reinforcement details.

8.7 Typical content required on the drawings

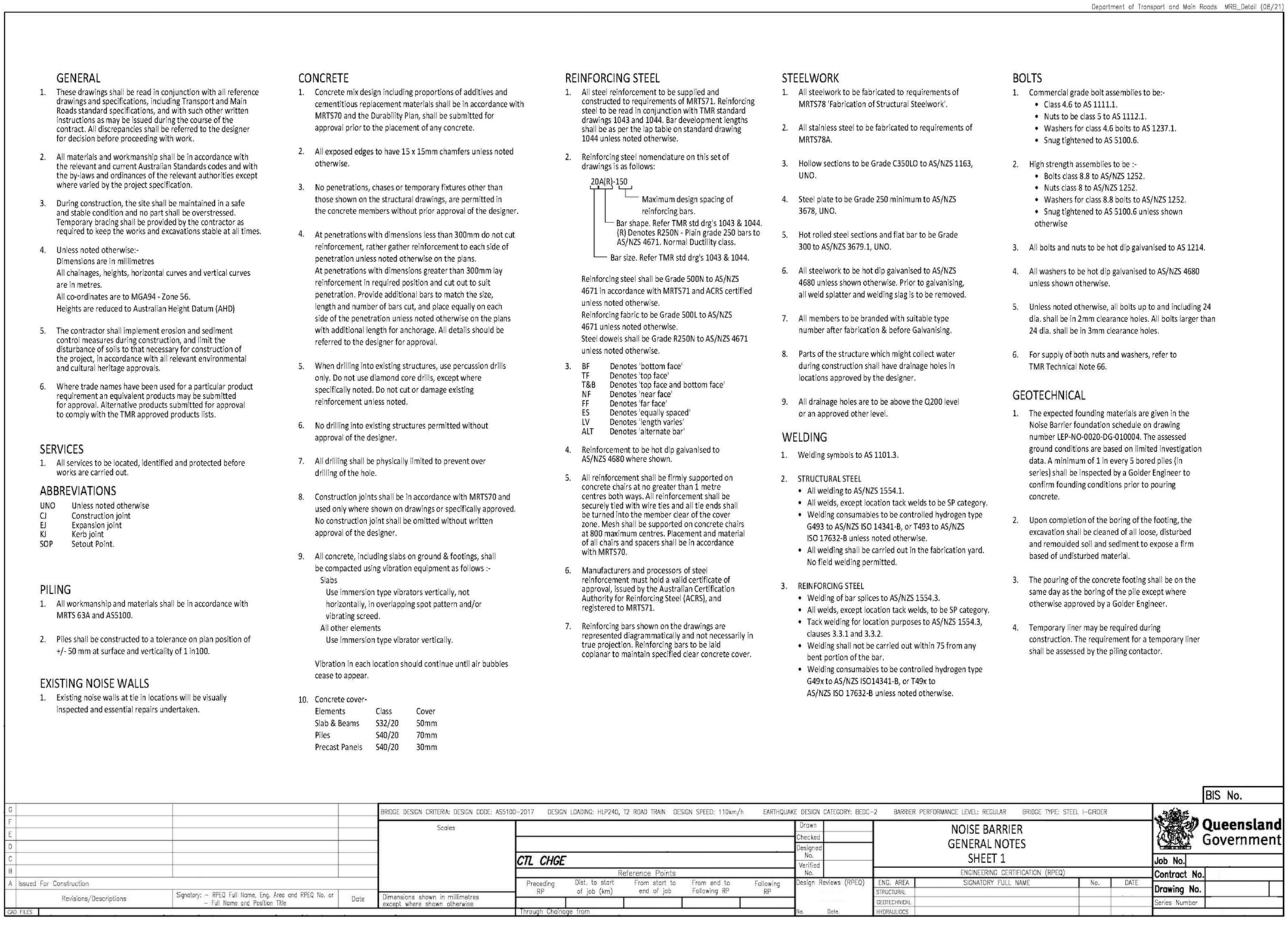
The following table lists the content specific to, but is not limited to, typical noise barrier drawings.

Table 8.7 – Noise barriers – specific drawings content

Requirement	Drawing or element description	Figure reference
Notes	Notes to suit the element, along with design criteria, lifting and handling notes.	Figure 8.7(a)
General Arrangement	A set of plan, elevation, and cross-sections that depicts the arrangement of the noise barriers, including, but not limited to: Plan and elevation set out, including: • noise barrier control line or set out using eastings and northings • corresponding road chainages, if applicable • services, including numbers, sizes and locations, minimum clearance of services to footings or noted approximate locations with a note the actual locations are to be determined on site prior to commencement of work • critical structure heights, for example, top of panel and bottom of panel • finished surfaces level heights, for example, finished surface level bottom • chainages along wall control line, including at changes in direction, heights, and steps, and • wall sections at key wall sections at design section changes and critical interfacing.	Figure.8.7(c) and Figure 8.7(k)
Foundation details	All details required for foundations.	Figures 8.7(c), Figures 8.7(d), Figures 8.7(e), Figures 8.7(f), Figures 8.7(i), and Figures 8.7(j)
Post set out and details	• Plan detailing post arrangements, panels and set out location, including at changes in direction • Notation to clearly show the orientation of the element being detailed, for example, traffic side • Weld symbols where not specified in General Notes • Elevations of post arrangements • Fixing details of panels and posts, and • Connection details for any noise barrier attached directly to a structure, if applicable.	Figure 8.7(d) Figure 8.7(i) Figure 8.7(k)

Requirement	Drawing or element description	Figure reference
Panel details	• Layouts of different panel arrangements • Panel dimensions and details • Joints and panel seating / levelling details • Details of urban design treatments to the panels • Lifting notes and details, and • Reinforcement details.	Figure8.7(g) Figure 8.7(h)

Figure 8.7(a) – Noise barriers – Sheet 1



Department of Transport and Main Roads MRB_Detail (08/21)

GENERAL

1. These drawings shall be read in conjunction with all reference drawings and specifications, including Transport and Main Roads standard specifications, and with such other written instructions as may be issued during the course of the contract. All discrepancies shall be referred to the designer for decision before proceeding with work.
2. All materials and workmanship shall be in accordance with the relevant and current Australian Standards codes and with the by-laws and ordinances of the relevant authorities except where varied by the project specification.
3. During construction, the site shall be maintained in a safe and stable condition and no part shall be overstressed. Temporary bracing shall be provided by the contractor as required to keep the works and excavations stable at all times.
4. Unless noted otherwise:-
   Dimensions are in millimetres
   All chainages, heights, horizontal curves and vertical curves are in metres.
   All co-ordinates are to MGA94 - Zone 56.
   Heights are reduced to Australian Height Datum (AHD)
5. The contractor shall implement erosion and sediment control measures during construction, and limit the disturbance of soils to that necessary for construction of the project, in accordance with all relevant environmental and cultural heritage approvals.
6. Where trade names have been used for a particular product requirement an equivalent products may be submitted for approval. Alternative products submitted for approval to comply with the TMR approved products lists.

SERVICES

1. All services to be located, identified and protected before works are carried out.

ABBREVIATIONS

UNO	Unless noted otherwise
CJ	Construction joint
EJ	Expansion joint
KJ	Kerb joint
SOP	Setout Point.

PILING

1. All workmanship and materials shall be in accordance with MRTS 63A and AS5100.
2. Piles shall be constructed to a tolerance on plan position of +/- 50 mm at surface and verticality of 1 in100.

EXISTING NOISE WALLS

1. Existing noise walls at tie in locations will be visually inspected and essential repairs undertaken.

CONCRETE

1. Concrete mix design including proportions of additives and cementitious replacement materials shall be in accordance with MRTS70 and the Durability Plan, shall be submitted for approval prior to the placement of any concrete.
2. All exposed edges to have 15 x 15mm chamfers unless noted otherwise.
3. No penetrations, chases or temporary fixtures other than those shown on the structural drawings, are permitted in the concrete members without prior approval of the designer.
4. At penetrations with dimensions less than 300mm do not cut reinforcement, rather gather reinforcement to each side of penetration unless noted otherwise on the plans.
   At penetrations with dimensions greater than 300mm lay reinforcement in required position and cut out to suit penetration. Provide additional bars to match the size, length and number of bars cut, and place equally on each side of the penetration unless noted otherwise on the plans with additional length for anchorage. All details should be referred to the designer for approval.
5. When drilling into existing structures, use percussion drills only. Do not use diamond core drills, except where specifically noted. Do not cut or damage existing reinforcement unless noted.
6. No drilling into existing structures permitted without approval of the designer.
7. All drilling shall be physically limited to prevent over drilling of the hole.
8. Construction joints shall be in accordance with MRTS70 and used only where shown on drawings or specifically approved. No construction joint shall be omitted without written approval of the designer.
9. All concrete, including slabs on ground & footings, shall be compacted using vibration equipment as follows :-
   Slabs
   Use immersion type vibrators vertically, not horizontally, in overlapping spot pattern and/or vibrating screed.
   All other elements
   Use immersion type vibrator vertically.
   Vibration in each location should continue until air bubbles cease to appear.
10. Concrete cover-

Elements	Class	Cover
Slab & Beams	S32/20	50mm
Piles	S40/20	70mm
Precast Panels	S40/20	30mm

REINFORCING STEEL

1. All steel reinforcement to be supplied and constructed to requirements of MRTS71. Reinforcing steel to be read in conjunction with TMR standard drawings 1043 and 1044. Bar development lengths shall be as per the lap table on standard drawing 1044 unless noted otherwise.
2. Reinforcing steel nomenclature on this set of drawings is as follows:

   20A(R)-150
   - 150 – Maximum design spacing of reinforcing bars.
   - A – Bar shape. Refer TMR std drg's 1043 & 1044.
   - (R) Denotes R250N - Plain grade 250 bars to AS/NZS 4671. Normal Ductility class.
   - 20 – Bar size. Refer TMR std drg's 1043 & 1044.

   Reinforcing steel shall be Grade 500N to AS/NZS 4671 in accordance with MRTS71 and ACRS certified unless noted otherwise.
   Reinforcing fabric to be Grade 500L to AS/NZS 4671 unless noted otherwise.
   Steel dowels shall be Grade R250N to AS/NZS 4671 unless noted otherwise.
3. BF Denotes 'bottom face'
   TF Denotes 'top face'
   T&B Denotes 'top face and bottom face'
   NF Denotes 'near face'
   FF Denotes 'far face'
   ES Denotes 'equally spaced'
   LV Denotes 'length varies'
   ALT Denotes 'alternate bar'
4. Reinforcement to be hot dip galvanised to AS/NZS 4680 where shown.
5. All reinforcement shall be firmly supported on concrete chairs at no greater than 1 metre centres both ways. All reinforcement shall be securely tied with wire ties and all tie ends shall be turned into the member clear of the cover zone. Mesh shall be supported on concrete chairs at 800 maximum centres. Placement and material of all chairs and spacers shall be in accordance with MRTS70.
6. Manufacturers and processors of steel reinforcement must hold a valid certificate of approval, issued by the Australian Certification Authority for Reinforcing Steel (ACRS), and registered to MRTS71.
7. Reinforcing bars shown on the drawings are represented diagrammatically and not necessarily in true projection. Reinforcing bars to be laid coplanar to maintain specified clear concrete cover.

STEELWORK

1. All steelwork to be fabricated to requirements of MRTS78 'Fabrication of Structural Steelwork'.
2. All stainless steel to be fabricated to requirements of MRTS78A.
3. Hollow sections to be Grade C350LO to AS/NZS 1163, UNO.
4. Steel plate to be Grade 250 minimum to AS/NZS 3678, UNO.
5. Hot rolled steel sections and flat bar to be Grade 300 to AS/NZS 3679.1, UNO.
6. All steelwork to be hot dip galvanised to AS/NZS 4680 unless shown otherwise. Prior to galvanising, all weld splatter and welding slag is to be removed.
7. All members to be branded with suitable type number after fabrication & before Galvanising.
8. Parts of the structure which might collect water during construction shall have drainage holes in locations approved by the designer.
9. All drainage holes are to be above the Q200 level or an approved other level.

WELDING

1. Welding symbols to AS 1101.3.
2. STRUCTURAL STEEL
   - All welding to AS/NZS 1554.1.
   - All welds, except location tack welds to be SP category.
   - Welding consumables to be controlled hydrogen type G493 to AS/NZS ISO 14341-B, or T493 to AS/NZS ISO 17632-B unless noted otherwise.
   - All welding shall be carried out in the fabrication yard. No field welding permitted.
3. REINFORCING STEEL
   - Welding of bar splices to AS/NZS 1554.3.
   - All welds, except location tack welds, to be SP category.
   - Tack welding for location purposes to AS/NZS 1554.3, clauses 3.3.1 and 3.3.2.
   - Welding shall not be carried out within 75 from any bent portion of the bar.
   - Welding consumables to be controlled hydrogen type G49x to AS/NZS ISO14341-B, or T49x to AS/NZS ISO 17632-B unless noted otherwise.

BOLTS

1. Commercial grade bolt assemblies to be:-
   - Class 4.6 to AS 1111.1.
   - Nuts to be class 5 to AS 1112.1.
   - Washers for class 4.6 bolts to AS 1237.1.
   - Snug tightened to AS 5100.6.
2. High strength assemblies to be :-
   - Bolts class 8.8 to AS/NZS 1252.
   - Nuts class 8 to AS/NZS 1252.
   - Washers for class 8.8 bolts to AS/NZS 1252.
   - Snug tightened to AS 5100.6 unless shown otherwise
3. All bolts and nuts to be hot dip galvanised to AS 1214.
4. All washers to be hot dip galvanised to AS/NZS 4680 unless shown otherwise.
5. Unless noted otherwise, all bolts up to and including 24 dia. shall be in 2mm clearance holes. All bolts larger than 24 dia. shall be in 3mm clearance holes.
6. For supply of both nuts and washers, refer to TMR Technical Note 66.

GEOTECHNICAL

1. The expected founding materials are given in the Noise Barrier foundation schedule on drawing number LEP-NO-0020-DG-010004. The assessed ground conditions are based on limited investigation data. A minimum of 1 in every 5 bored piles (in series) shall be inspected by a Golder Engineer to confirm founding conditions prior to pouring concrete.
2. Upon completion of the boring of the footing, the excavation shall be cleaned of all loose, disturbed and remoulded soil and sediment to expose a firm based of undisturbed material.
3. The pouring of the concrete footing shall be on the same day as the boring of the pile except where otherwise approved by a Golder Engineer.
4. Temporary liner may be required during construction. The requirement for a temporary liner shall be assessed by the piling contactor.

G			
F			
E			
D			
C			
B			
A	Issued For Construction		
	Revisions/Descriptions	Signatory: – RPEQ Full Name, Eng. Area and RPEQ No. or – Full Name and Position Title	Date

CAD FILES

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS5100-2017 DESIGN LOADING: HLP240, T2 ROAD TRAIN DESIGN SPEED: 110km/h EARTHQUAKE DESIGN CATEGORY: BEDC-2 BARRIER PERFORMANCE LEVEL: REGULAR BRIDGE TYPE: STEEL I-GIRDER

Scales

Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

Drawn
Checked
Designed No.
Verified No.

Design Reviews (RPEQ)

No. Date.

NOISE BARRIER
GENERAL NOTES
SHEET 1

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	SIGNATORY FULL NAME	No.	DATE
STRUCTURAL			
GEOTECHNICAL			
HYDRAULICS			

BIS No.

Queensland Government

Job No.
Contract No.
Drawing No.
Series Number

Figure 8.7(b) – Noise barriers – Sheet 2

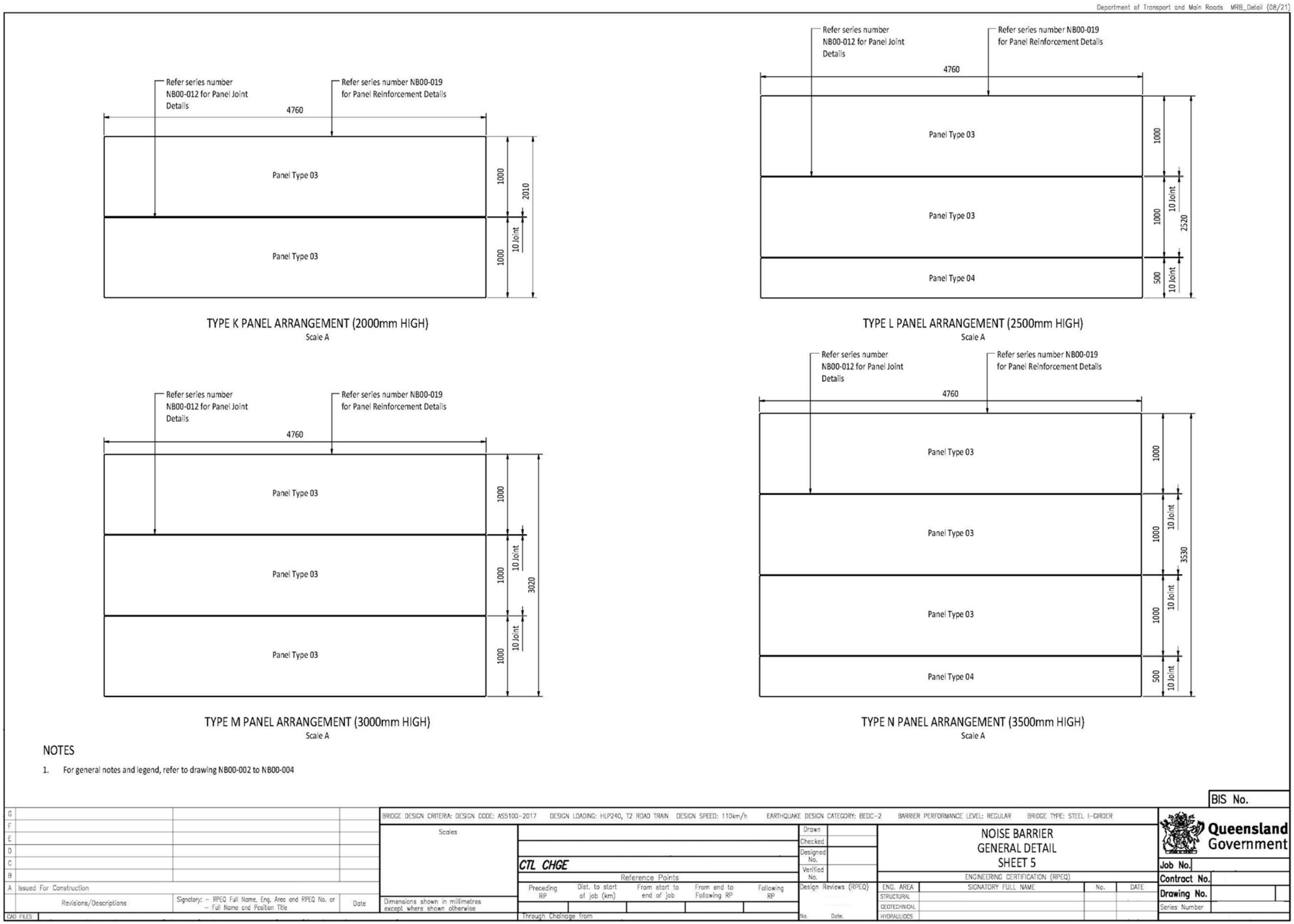


Figure 8.7(c) – Noise barriers – Sheet 3

Department of Transport and Main Roads MRB_Detail (08/21)

Noise Barrier Foundation Schedule

Type of Noise Barrier (NB)	Control Line	Approximte Chainage From	Approximte Chainage To	Post Number From	Post Number To	Assessed Ground Model	Slope	Reference Borehole	Noise Wall Height (m)	Pile Length (m)	Assessed Founding Material
NB-A	MCG0	100	480	P61	P62	0 - 1.0 m: Fill 1.0 - 4.5 m: Rock EL	2H:1V	AH-06-06	6	4.8	EL Rock
				P63	P70				5.5	4.3	EL Rock
				P71	P114				5	4.3	EL Rock
				P115	P115				4.5	3.8	EL Rock
				P116	P116				4	3.3	EL Rock
				P117	P117				3.5	3.3	EL Rock
				P118	P118				3	3.3	EL Rock
				P119	P119				2.5	2.8	EL Rock
				P120	P120				2	2.8	EL Rock
				P121	P122				1.5	2.3	EL Rock
				P123	P123				2	2.8	EL Rock
				P124	P124				2.5	2.8	EL Rock
				P125	P153				3	3.3	EL Rock
				P154	P154				2.5	2.8	EL Rock
				P155	P155				2	2.8	EL Rock
				P156	P156				1.5	2.3	EL Rock
		480	660	P23	P37	0 - 0.75 m: Fill 0.75 - 3.5 m: Rock EL	Flat	AH-06-06	5.5	3.8	EL Rock
				P38	P60				6.0	3.8	EL Rock
		660	670	P20	P22	0 - 1.75 m: Fill 1.75 - 2.65 m: Firm Clay 2.65 m - 6.0 m: Rock EL	2H:1V	BH-PGE01-01	5.5	6.3	EL Rock
		670	715	P9	P9	0 - 3.4 m: Fill 3.4 - 4.3 m: Firm Clay 4.3 m - 6.5 m: Rock EL	2H:1V	BH-PGE01-01	Varies	6.0	EL Rock
				P10	P19				5.5	6.8	EL Rock
		715	730	P1	P1	0 - 4.3 m: Fill 4.3 - 5.2 m: Firm Clay 5.2 m - 5.5 m: Rock EL	2H:1V	BH-PGE01-01	1.5	2.8	Engineered Fill
				P2	P2				2.0	3.3	Engineered Fill
				P3	P3				2.5	3.8	Engineered Fill
				P4	P4				3.0	4.3	Engineered Fill
				P5	P5				3.5	5.3	Firm Clay
				P6	P6				Varies	6.0	EL Rock
NB-D	MC10	17270	17400	P1	P1	0 - 1.0 m: VSt to H Clay > 1.0 m: Rock EL	2H:1V	BH-C05-02	1.5	1.5	EL Rock
				P2	P2				2.0	1.8	EL Rock
				P3	P30				2.5	2.0	EL Rock
				P31	P31				2.0	1.8	EL Rock
				P32	P32				1.5	1.5	EL Rock
NB-E	MC10	18030	18080	P59	P59	0 - 4.0 m: Fill	2.6H:1V	BH3	1.5	2.5	Engineered fill
				P58	P58				2.0	3.0	Engineered fill
				P57	P57				2.5	3.5	Engineered fill
				P56	P46				3.0	4.0	Engineered fill
		18080	18120	P45	P38	0 - 4.0 m: Fill	2.1H:1V	BH12	3.0	4.0	Engineered fill
		18120	18210	P37	P19	0 - 3.5 m: Fill 3.5 - 4.0 m: VSt to H Clay	2H:1V	AH-VA2-11 AH-09-20	3.0	4.0	VSt to H Clay
		18210	18300	P18	P1	0 - 1.2 m: Fill 1.2 - 3.0 m: VSt to H Clay	2H:1V	AH-09-21	3.0	3.0	VSt to H Clay
NB-F	MC30	2010	2200	P1	P49	0 - 4.0 m: Fill	2H:1V	BH-BR04-01 BH-BR04-02A	2.5 3.0	3.5 4.0	Engineered fill Engineered fill
NB-G	MC30	2565	2660	P1	P1	0 - 0.7 m: Fill 0.7 - 1.7 m: Firm Clay 1.7 - 3.0 m: EL Rock	Flat	BH-VM03-01	1.5	2.0	EL Rock
				P2	P2				2.0	2.0	EL Rock
				P3	P3				2.5	2.5	EL Rock
				P4	P22				3.0	3.0	EL Rock
		2660	2720	P23	P35	0 - 2.0 m: Fill 2.0 - 3.0 m: Firm Clay 3.0 - 3.5 m: EL Rock	2H:1V	BH-VM03-01	3.0	3.5	EL Rock
		2720	2780	P36	P50	0 - 4.0 m: Fill	2H:1V	BH-VM03-01	3.0	4.0	Engineered fill
				P51	P51				2.5	3.5	Engineered fill
				P52	P52				2.0	3.0	Engineered fill
				P53	P53				1.5	2.5	Engineered fill

Noise Barrier Foundation Schedule

Type of Noise Barrier (NB)	Control Line	Approximte Chainage From	Approximte Chainage To	Post Number From	Post Number To	Assessed Ground Model	Slope	Reference Borehole	Noise Wall Height (m)	Pile Length (m)	Assessed Founding Material
NB-H	MC30	3080	3120	P1	P1	0 - 1.0 m: MD or D Sand 1.0 - 3.5 m: VD Sand	Flat	GWE-CU-02 AH-02-01	1.5	2	VD Sand
				P2	P2				2	2.5	VD Sand
				P3	P3				2.5	3	VD Sand
				P4	P12				3	3.5	VD Sand
		3120	3160	P13	P21	0 - 3.0 m: Fill 3.0 - 3.5 m: VD Sand	3H:1V	GWE-CU-02 AH-02-01	3	3.5	VD Sand
		3160	3210	P22	P34	0 - 4.0 m: Fill	2H:1V	B3-2	3	4	Fill
		3245	3280	P35	P43	0 - 4.0 m: Fill	2H:1V	B3-3 AH-02-05	3	4	Fill
		3280	3360	P44	P60	0 - 3.5 m: Fill 3.5 - 4.0 m: VSt to H Clay	2H:1V	AH-02-08	3	4	VSt to H Clay
		3360	3380	P61	P64	0 - 1.5 m: Fill 1.5 - 3.0 m: VSt to H Clay	2H:1V	AH-02-08 TP9	3	3.5	VSt to H Clay
		3380	3460	P65	P76	0 - 1.0 m:VSt to H Clay 1.0 - 2.5 m: EL Rock	2H:1V	TP9	3	2.5	EL Rock
		3460	3560	P77	P97	0 - 2.0 m: Fill 2.0 - 3.5 m: VL or L Sand	2H:1V	AH-02-09	3	3.5	VL or L Sand
		3560	3670	P98	P125	0 - 4.0 m: Fill	2H:1V	AH-02-09	3	4	Fill
		3670	3695	P126	P132	0 - 3.0 m: Fill 3.0 - 3.5 m: MD or D Sand	2H:1V	TP10	3	3.5	MD to D Sand
				P133	P133				2.5	3	
				P134	P134				2	2.5	
				P135	P135				1.5	2.5	
NB-I	MC30	5650	5690	P1	P1	0 - 2.5 m: Fill 2.5 - 4.5 m: Stiff Clay	Flat	GWE-BR-09 AH-01-08	1.5	2	Engineered fill
				P2	P2				2	2	Engineered fill
				P3	P3				2.5	2.5	Engineered fill
				P4	P4				3	3	St Clay
				P5	P11				3.5	3.5	St Clay
		5690	5740	P12	P26		2H:1V	GWE-BR-09 AH-01-08	3.5	4.5	St Clay
				P27	P27				3	4	
				P28	P28				2.5	3.5	
				P29	P29				2	3	
				P30	P30				1.5	2.5	Engineered fill
NB-K	MC10	17100	17280	P53	P53	0 - 0.2 m: Fill 0.2 - 0.55 m: VSt to H Clay 0.55 - 2.0 m: EL Rock	1.5H:1V	BH-C05-03	1.5	1.5	EL Rock
				P52	P11				2	1.5	EL Rock
									2.5	2	EL Rock
									3	2	EL Rock
		17280	17320	P1	P1	0 - 0.4 m: Fill 0.4 - 2.5 m: VSt to H Clay	1.5H:1V	BH-C05-04	1.5	1.5	VSt to H Clay
				P10	P2				2	2	VSt to H Clay
									2.5	2	VSt to H Clay
									3	2.5	VSt to H Clay
NB-J	MCC0	155	235	P1	P1	0 - 0.6 m: VSt to H Clay 0.6 - 2.0 m: EL Rock	4H:1V	AH-01-06	2	1.5	EL Rock
				P2	P2				2.5	2	EL Rock
				P3	P3				3	2	EL Rock
				P4	P14				3.5	2.5	EL Rock
				P15	P20				4	2.5	EL Rock
		235	280	P21	P34	0 - 3.0 m: Fill 3.0 - 3.5 m: VL to L Sand 3.5 - 4 m: St Clay	4H:1V	GWE-CU-01	4	4	St Clay
		280	380	P35	P54	0 - 3.5 m: VSt to H Clay	2H:1V	BH-TG01-01	4	3.5	VSt to H Clay

NOTES

1. Pile Length for NB-A, excluding P006 & P009, is inclusive of up to 300mm above finished ground level.
2. Pile length for NB-A P006 and P009 is measured from the soffit of the bridging beam.

BIS No.

G			
F			
E			
D			
C			
B			
A	Issued For Construction		
	Revisions/Descriptions	Signatory: – RPEQ Full Name, Eng. Area and RPEQ No. or – Full Name and Position Title	Date

CAD FILES

BRIDGE DESIGN CRITERIA: DESIGN CODE: DESIGN LOADING: DESIGN SPEED: EARTHQUAKE DESIGN CATEGORY: BEDC–2 BARRIER PERFORMANCE LEVEL: BRIDGE TYPE:

Scales

Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

Drawn | Checked | Designed No. | Verified No.

Design Reviews (RPEQ) No. Date.

NOISE BARRIER GENERAL NOTES SHEET 3

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	SIGNATORY FULL NAME	No.	DATE
STRUCTURAL			
GEOTECHNICAL			
HYDRAULICS			

Queensland Government

Job No.
Contract No.
Drawing No.
Series Number

Figure 8.7(d) – Noise barriers – Sheet 4

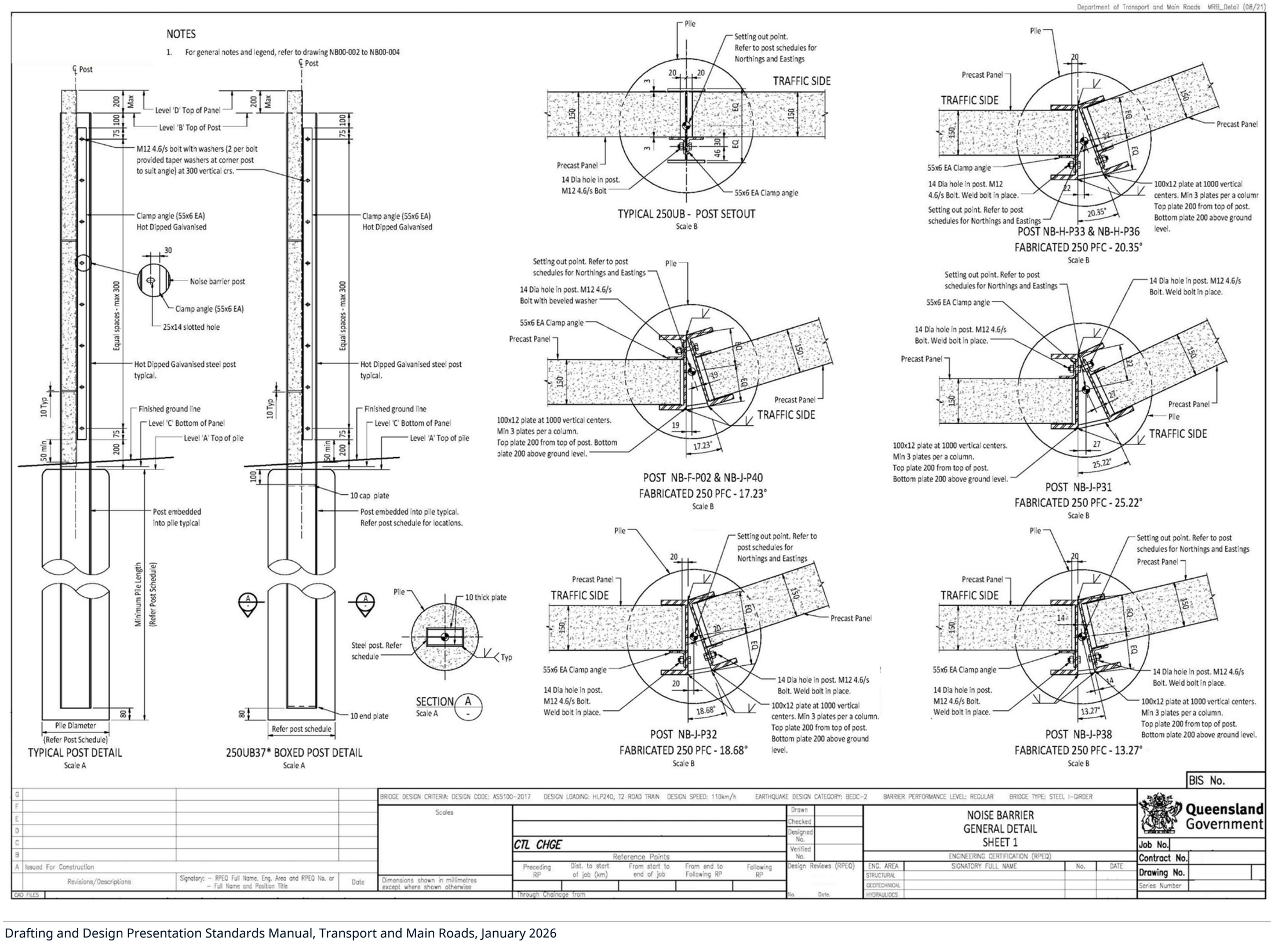


Figure 8.7(e) – Noise barriers – Sheet 5

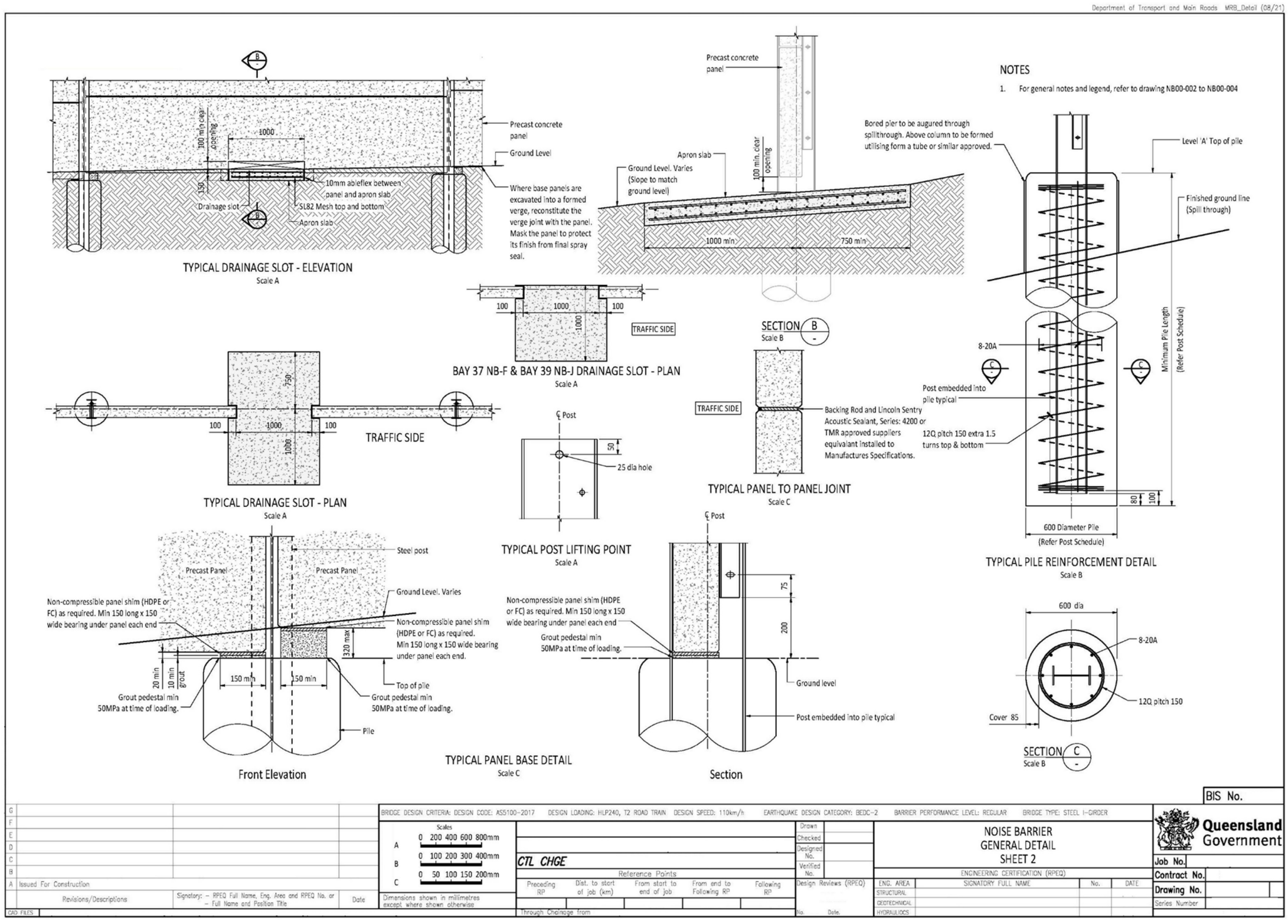
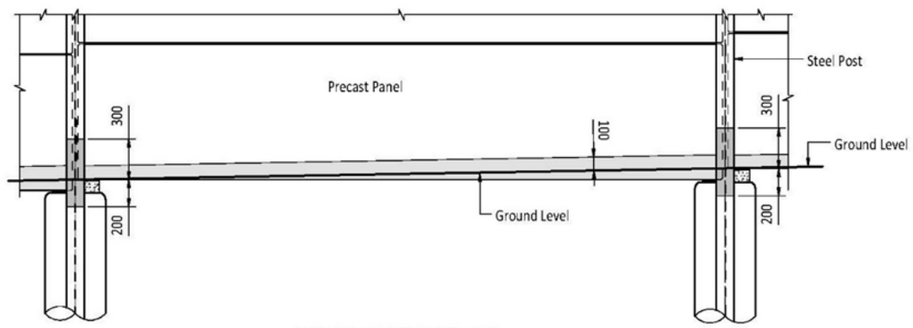


Figure 8.7(f) – Noise barriers – Sheet 6

Department of Transport and Main Roads MRB_Detail (08/21)



DURABILITY PROTECTION
Scale A

STEEL POST PROTECTION

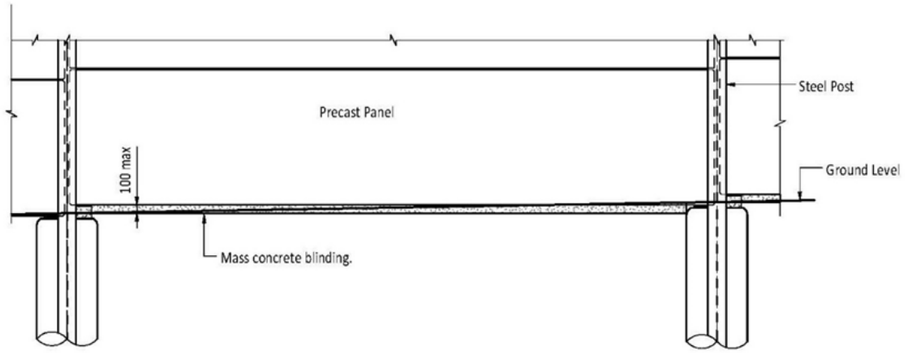
1. All posts shall be hot dip galvanised to a minimum thickness of 600g/sq m.
2. At the post base, from 200 below top of concrete pile to 300 above finished ground line, post shall be painted with 2 coats of 200 micron dry film thickness of Jotacote 605.
3. Prepare galvanised surface by whip blasting or nylon scouring.

CONCRETE PRECAST PANEL PROTECTION

1. Wall A, K & E do not require treatment.
2. Wall F, G, H, J & I, coat panel below ground and minimum 100mm above ground with 2 x 200 microns dry fil thickness of Jotacote 605 or approved equivalent.
3. Concrete to be min 28 days old with less than 5% moisture content before coating.
4. Prepare surface with low pressure water blast to produce a roughened laitance free clean substrate. Panel to be dry prior to application.

NOTES

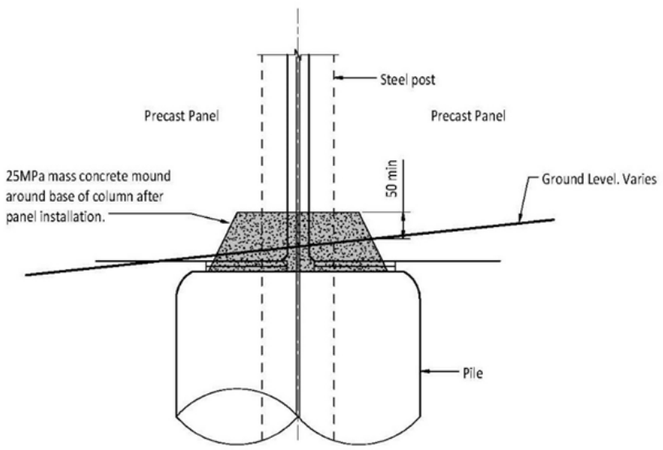
1. For general notes and legend, refer to drawing NB00-002 to NB00-004



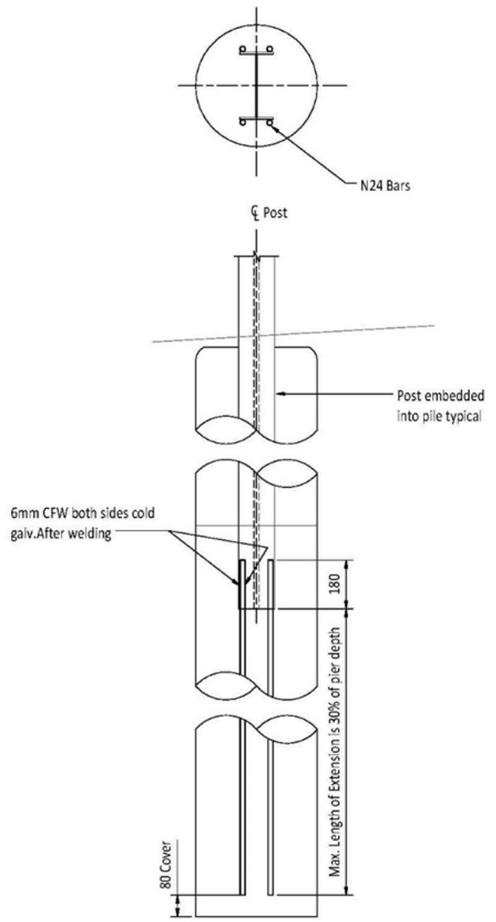
PANEL LEVELING
Scale A

CONCRETE BLINDING FILL UNDER PANEL

1. Subject to site conditions 100mm max mass concrete blinding may be placed under panel to ensure no acoustic gap occurs or to ensure level ground for bottom panel.
2. All panels shall be placed level. The finished ground level may be required to be locally excavated or mounded prior to instalation of panels.



STEEL POST BASE PROTECTION
Scale B



POST EXTENSION DETAIL - MAX 310UB POST
Scale C

BIS No.

G			
F			
E			
D			
C			
B			
A	Issued For Construction		
	Revisions/Descriptions	Signatory: – RPEQ Full Name, Eng. Area and RPEQ No. or – Full Name and Position Title	Date

CAD FILES

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS5100–2017 DESIGN LOADING: HLP240, T2 ROAD TRAIN DESIGN SPEED: 110km/h EARTHQUAKE DESIGN CATEGORY: BEDC–2 BARRIER PERFORMANCE LEVEL: REGULAR BRIDGE TYPE: STEEL I–GIRDER

Scales
A 0 200 400 600 800mm
B 0 50 100 150 200mm
C 0 100 200 300 400mm
Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

Drawn
Checked
Designed No.
Verified No.
Design Reviews (RPEQ) No. Date.

NOISE BARRIER
GENERAL DETAIL
SHEET 3

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	SIGNATORY FULL NAME	No.	DATE
STRUCTURAL			
GEOTECHNICAL			
HYDRAULICS			

Queensland Government

Job No.
Contract No.
Drawing No.
Series Number

Figure 8.7(g) – Noise barriers – Sheet 7

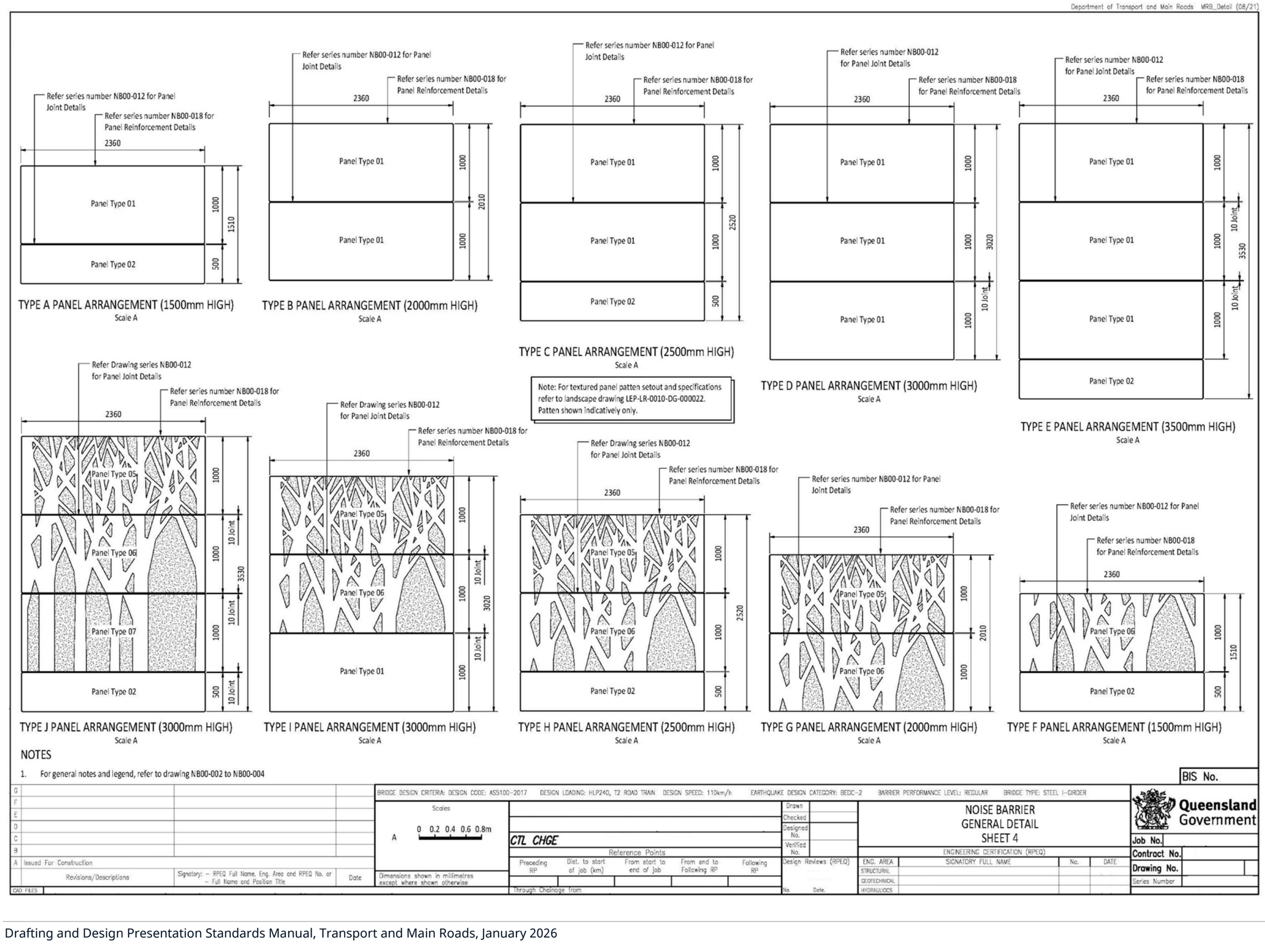


Figure 8.7(h) – Noise barriers – Sheet 8

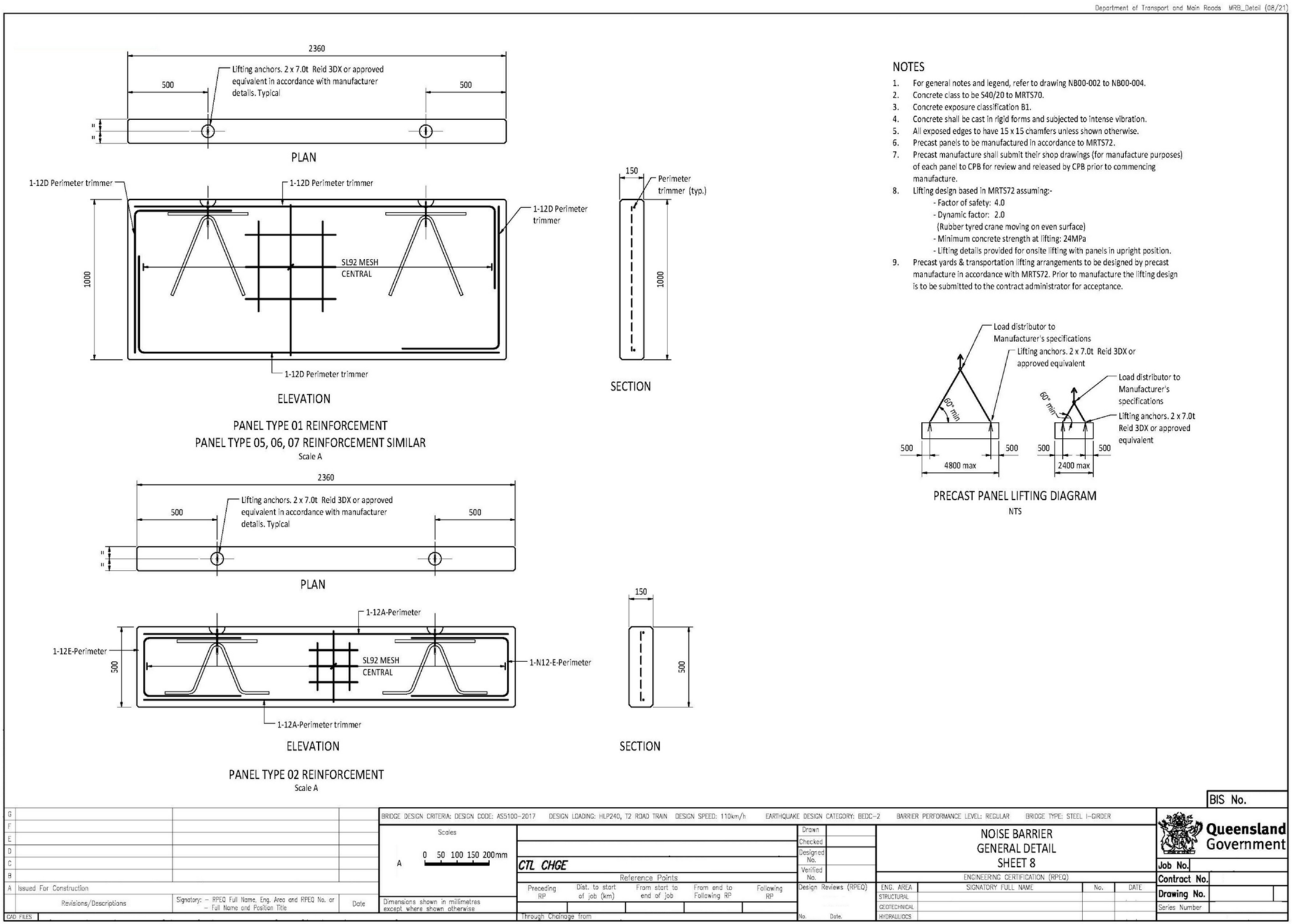


Figure 8.7(i) – Noise barriers – Sheet 9

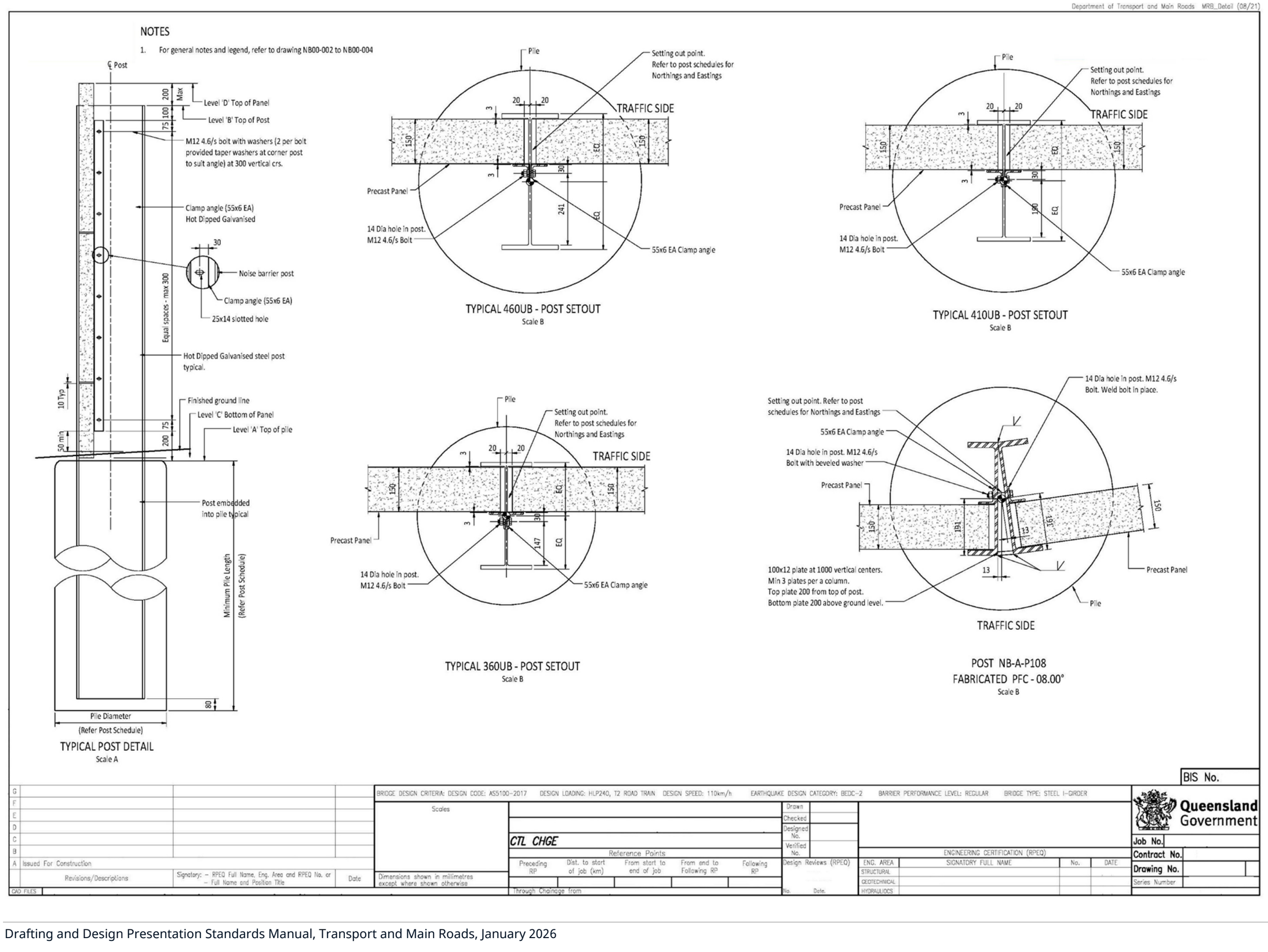


Figure 8.7(j) – Noise barriers – Sheet 10

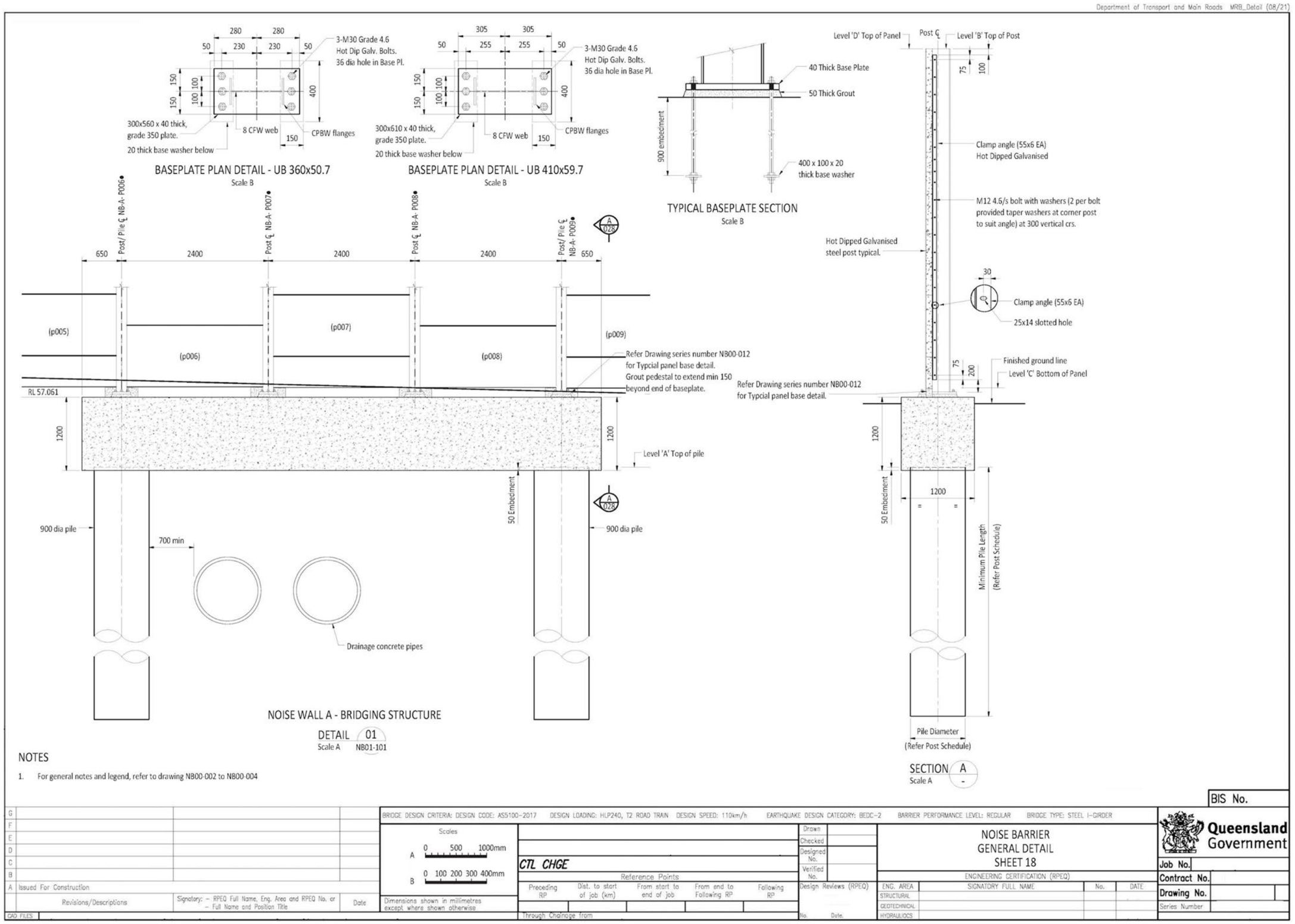


Figure 8.7(k) – Noise Barriers – Sheet 11

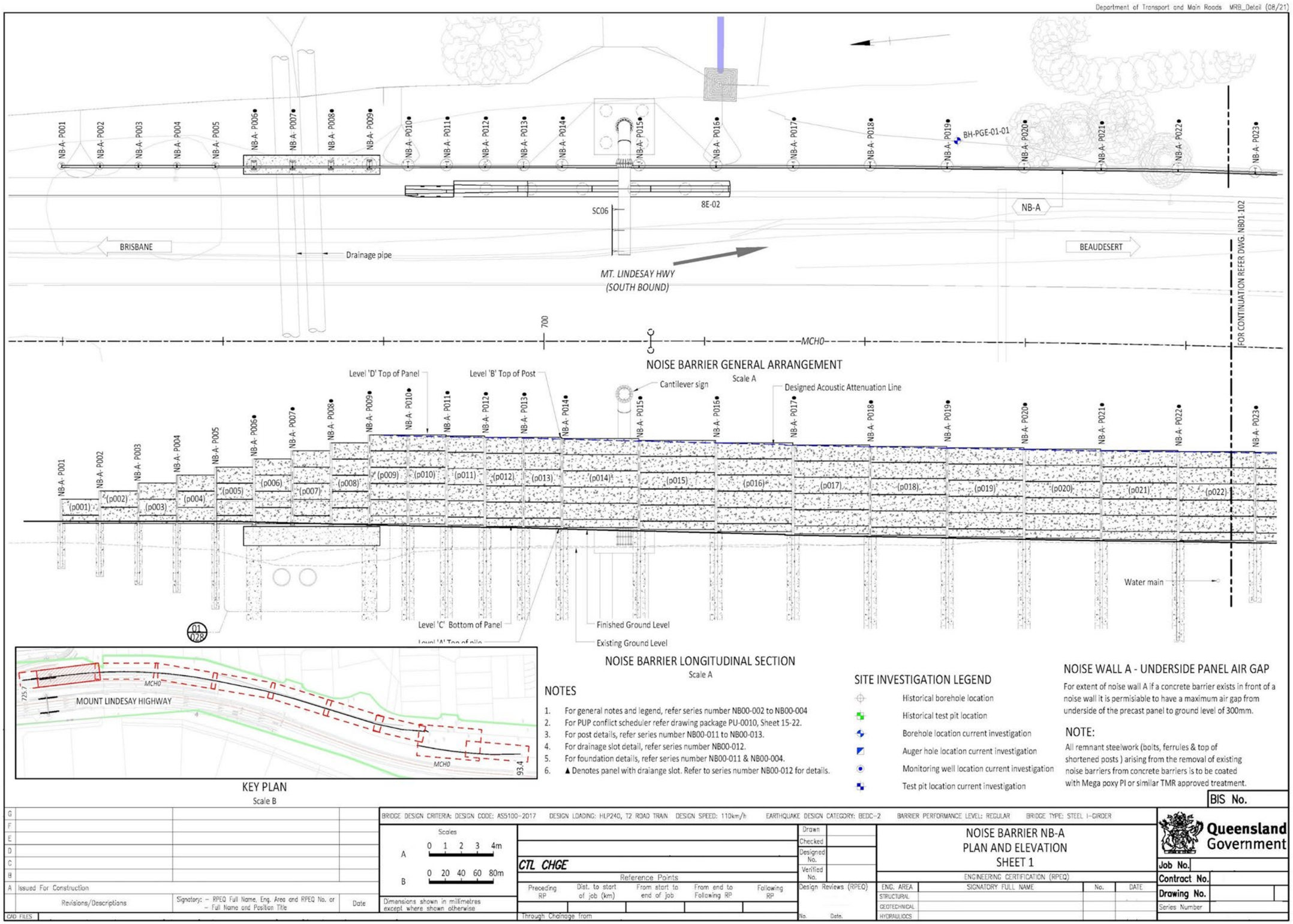
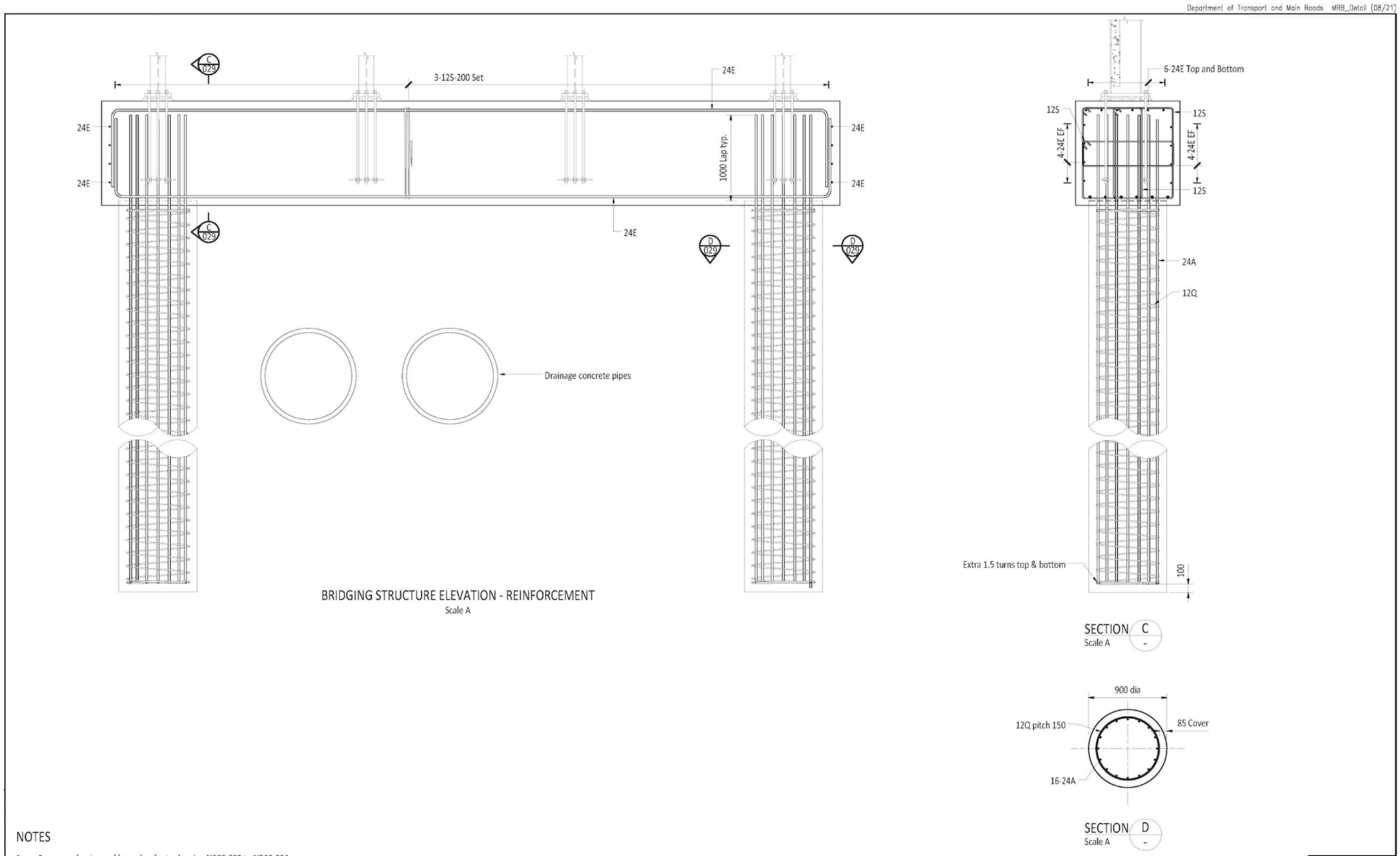


Figure 8.7(l) – Noise barriers – Sheet 12



9 Fauna crossings

9.1 General

Project-specific drawings are required for Fauna Crossings, as described in the *Fauna Sensitive Transport Infrastructure Delivery manual*, and in Part D, Chapter 15 of the DCBoS.

The minimum detailing requirements for these structures are set out below, for the following:

- Underpasses:
  - bridge underpass
  - culverts, and
  - fishways (refer to SD1270 *Fish Passage – RC Box Culverts in ADR Red Mapped Waterways (Drawing 1 of 2 to Drawing 2 of 2)* and SD1271 *Fish Passage – R C Box Culverts in ADR Amber Mapped Waterways*).
- Overpasses:
  - Vegetated land bridges
  - Rope-ladder canopy bridges
  - Glider poles, and
  - Canopy connectivity.

All of the elements of the fauna crossings shall be fully detailed in the design engineering drawings.

9.2 Typical drawing set for fauna crossings

The following is an example of a fauna crossing drawing sets, but not limited to:

- Site plan and drawing index
- General Notes (refer to Section 2.3)
- Foundation details, and
- Typical details.

9.3 Vegetated land bridges

Vegetated land bridges are overpasses designed to be topped with soil for planting with native vegetation and providing habitat for the local ecosystem. The structural engineering drawing requirements and contents depend on the structure type. Bridge and culvert drawings, which may form part of fauna crossing, details are discussed previously in this volume.

9.4 General Arrangement drawings

GA drawings show the overall representation of the structure to be constructed.GA drawings for fauna crossings are typically less complex than for a bridge; they should follow a similar pattern displaying similar information consistently.

Transport and Main Roads fauna crossing GA drawings usually have the following:

- plan and elevation on the first sheet, continuing onto subsequent sheets for long structures.
- a legend explaining the symbols on the plan and elevation, such as foundation bore holes, services, road furniture, road / street names and other critical features.
- horizontal and vertical alignment diagrams, land bridges only.
- set out of the fauna crossings (for example, control line, eastings and northings and road chainages, where applicable)
- clearance diagrams of all transport corridors and critical features
- indicative glider paths, where applicable
- fauna ladder sag dimensions
- tree set out and heights, where applicable, and
- any notes are usually shown at the bottom right-hand side of the drawing.

9.5 Foundation details

Fauna crossings can feature a variety of foundation types.

The most common types of foundations used in fauna crossing construction include:

- cast-in-place piles, reinforced and un-reinforced, and
- spread footings.

Anchor piles are most commonly used for the last poles in a timber fauna crossing that require fixing of stay cables.

9.6 Typical details

Fauna crossings require a wide variety of details, and the drawings should be organised to progressively detail each device type, starting with the overall arrangement and moving to more granular details. The typical details for fauna crossings should include, at a minimum:

- Overall arrangement:
  - typical plan and elevation, illustrating the arrangement of each component required.

- Detailed components:
  - rope and ladder support and attachment details
  - anti-climb device details, and
  - stay cable and anchor details.

9.7 Typical content required on the drawings

The following table lists some of the content specific to typical fauna crossing drawings.

Table 9.7 – Fauna crossings – typical drawing content

Requirement	Drawing or element description	Figure reference
Notes	Notes to suit the element, along with design criteria, lifting and handling notes.	Figure 9.7(a)
General Arrangement	A set of plan, elevation and cross-sections that depicts the arrangement of the fauna crossing, including, but not limited to: Plan and elevation set out, including: • fauna crossing control line and pole set out using eastings and northings • corresponding road chainages, if applicable • services, including numbers, sizes and locations, minimum clearance of services to footings or noted approximate locations with a note the actual locations are to be determined on site prior to commencement of work • critical structure heights, for example tree heights, minimum clearances, and ladder sags, and • dimensional set out along control line, including at changes in direction	Figure 9.7(a) Figure 9.7(e)
Typical details	• Elevations of fauna pole arrangements • Pre-cast arch panels and assembly details • Notation to clearly show the orientation of the element being detailed, for example, traffic side • Weld symbols where not specified in General Notes • Rope and ladder support and attachment details • Anti-climb device details • Stay cable and anchor details, and • Fixing details.	Figure 9.7(b) Figure 9.7(f) Figure 9.7(g) Figure 9.7(h)
Foundation details	All details required for foundations.	Figure 9.7(c)

Note: There is a wide and diverse number of fauna structure types. Examples and typical details shown are for 3 of the types.

Figure 9.7(a) – Rope ladder aerial fauna crossing – Sheet 1

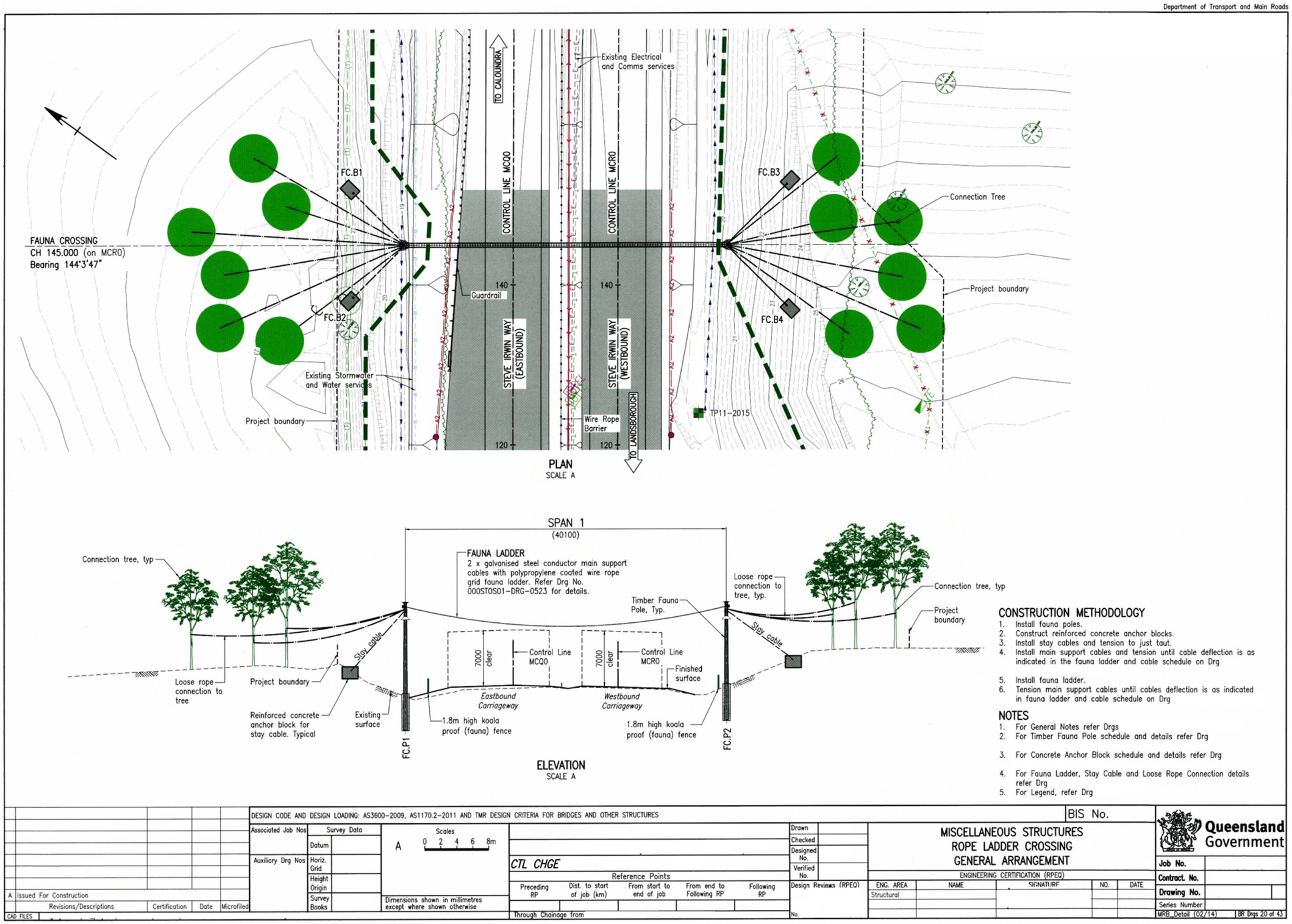
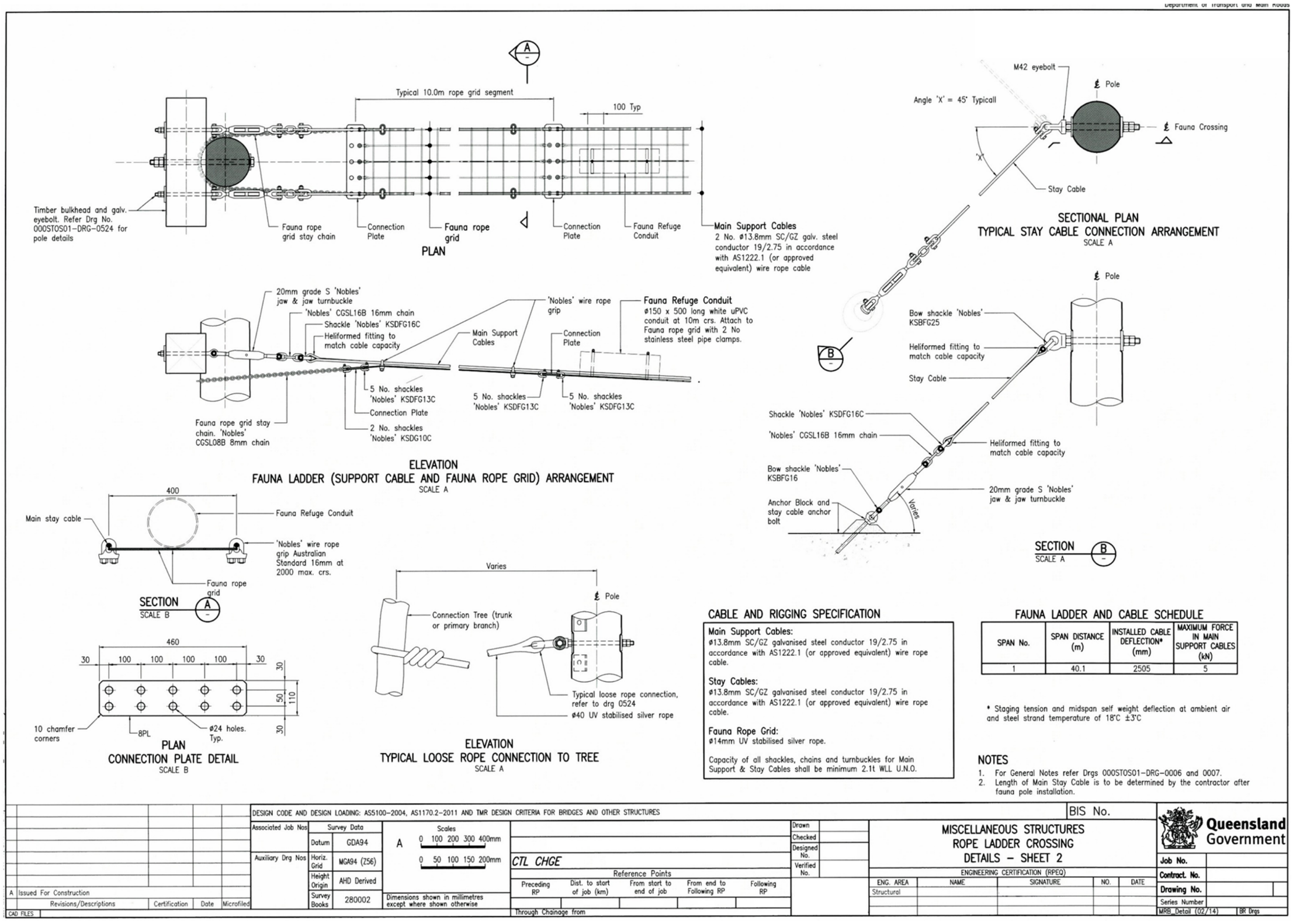


Figure 9.7(b) – Rope ladder aerial fauna crossing – Sheet 2



CABLE AND RIGGING SPECIFICATION

Main Support Cables:
ø13.8mm SC/GZ galvanised steel conductor 19/2.75 in accordance with AS1222.1 (or approved equivalent) wire rope cable.

Stay Cables:
ø13.8mm SC/GZ galvanised steel conductor 19/2.75 in accordance with AS1222.1 (or approved equivalent) wire rope cable.

Fauna Rope Grid:
ø14mm UV stabilised silver rope.

Capacity of all shackles, chains and turnbuckles for Main Support & Stay Cables shall be minimum 2.1t WLL U.N.O.

FAUNA LADDER AND CABLE SCHEDULE

SPAN No.	SPAN DISTANCE (m)	INSTALLED CABLE DEFLECTION* (mm)	MAXIMUM FORCE IN MAIN SUPPORT CABLES (kN)
1	40.1	2505	5

* Staging tension and midspan self weight deflection at ambient air and steel strand temperature of 18°C ±3°C

NOTES

1. For General Notes refer Drgs 000STOS01–DRG–0006 and 0007.
2. Length of Main Stay Cable is to be determined by the contractor after fauna pole installation.

DESIGN CODE AND DESIGN LOADING: AS5100–2004, AS1170.2–2011 AND TMR DESIGN CRITERIA FOR BRIDGES AND OTHER STRUCTURES

BIS No.

Associated Job Nos | Survey Data: Datum GDA94 | Auxiliary Drg Nos | Horiz. Grid MGA94 (Z56) | Height Origin AHD Derived | Survey Books 280002

Scales: A 0 100 200 300 400mm; 0 50 100 150 200mm

Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points: Preceding RP | Dist. to start of job (km) | From start to end of job | From end to Following RP | Following RP

Through Chainage from

Drawn | Checked | Designed No. | Verified No.

MISCELLANEOUS STRUCTURES
ROPE LADDER CROSSING
DETAILS – SHEET 2

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	NO.	DATE
Structural				

Queensland Government

Job No. | Contract. No. | Drawing No. | Series Number

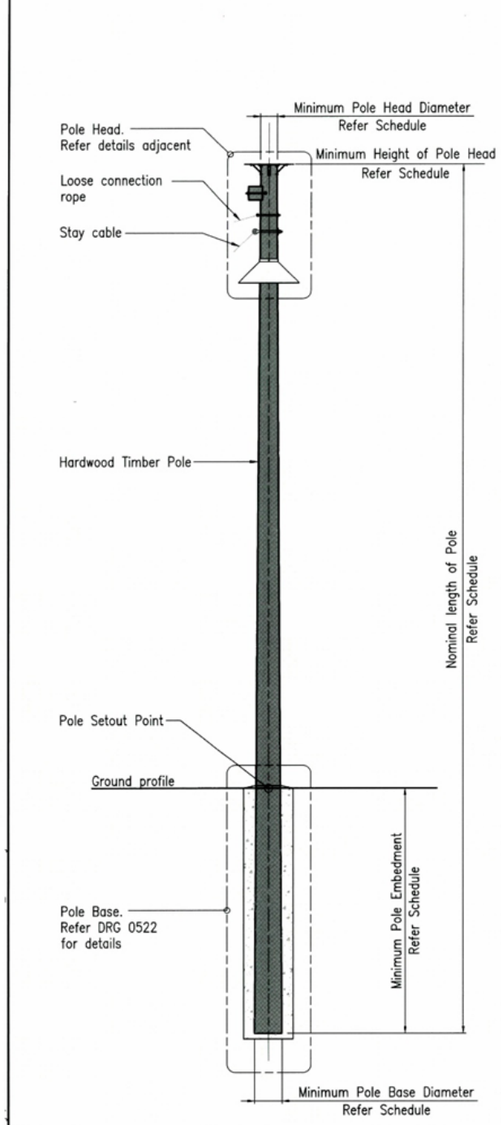
MRB_Detail (02/14) | BR Drgs

	Revisions/Descriptions	Certification	Date	Microfiled
A	Issued For Construction			

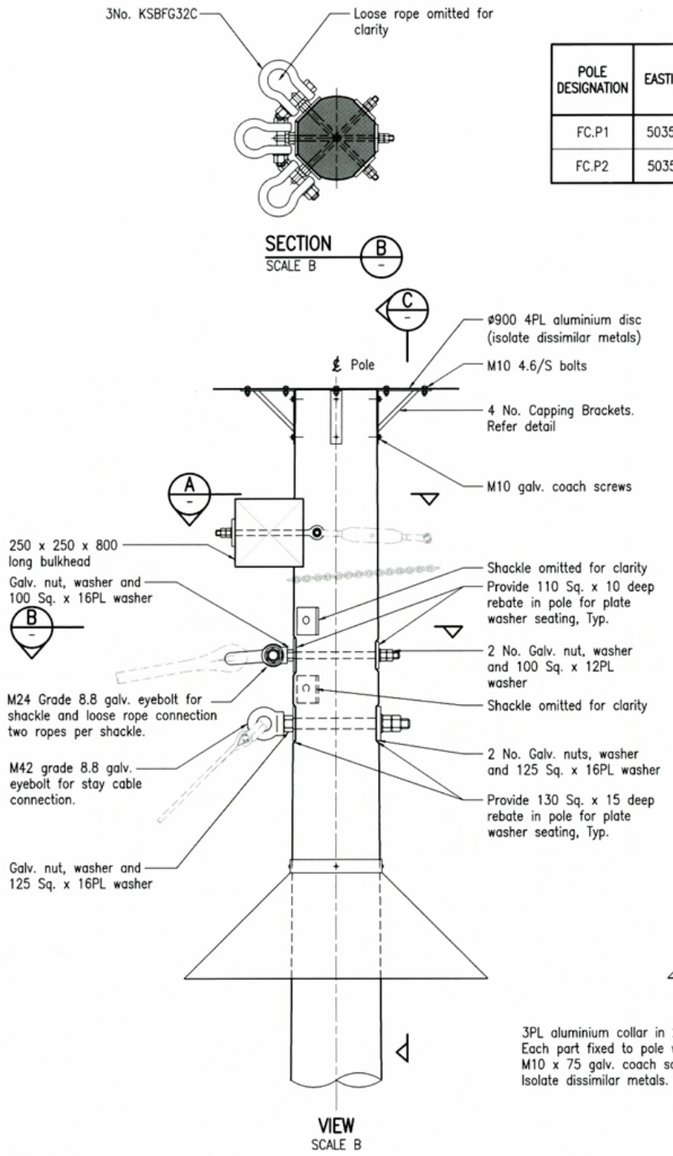
CAD FILES

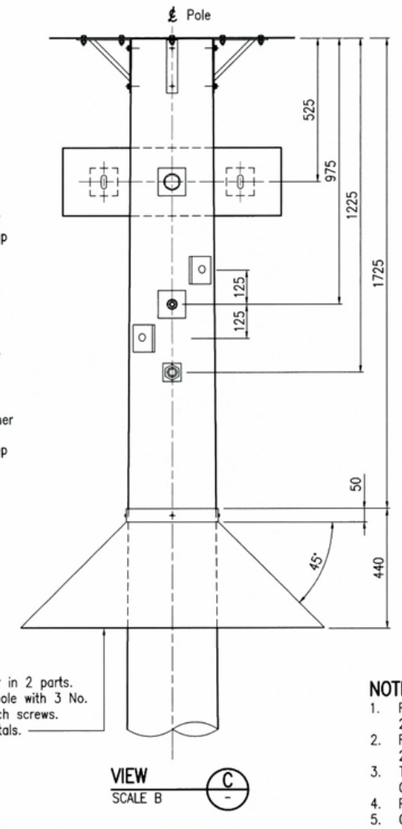
Figure 9.7(c) – Rope ladder aerial fauna crossing – Sheet 3

Department of Transport and Main Roads



ELEVATION
TYPICAL ARBOREAL FAUNA POLE
SCALE A

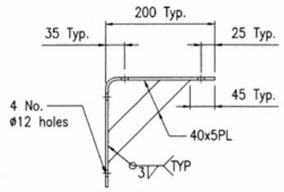




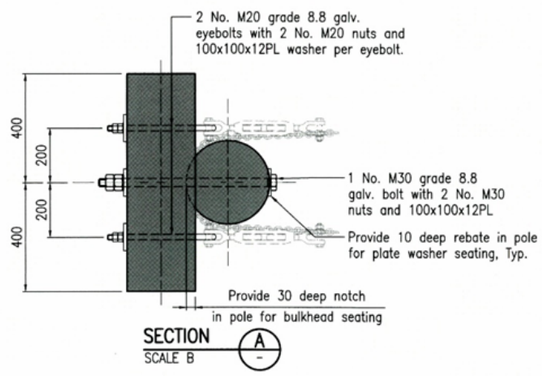
TYPICAL POLE HEAD DETAIL

FAUNA CROSSING POLE SCHEDULE

POLE DESIGNATION	EASTING (m)	NORTHING (m)	MINIMUM HEIGHT OF POLE HEAD (Ht)	MINIMUM POLE EMBEDMENT DEPTH (m)	NOMINAL LENGTH OF POLE (m)	MINIMUM POLE BASE DIAMETER	MINIMUM POLE HEAD DIAMETER	GROUND CONDITIONS
FC.P1	503527.986	7038455.637	28.740	3.0	14.925	450	290	Medium dense sand with friction angle of 32 degrees or greater as correlated by Dynamic Cone Penetrometer (DCP).
FC.P2	503551.521	7038423.170	28.740	3.0	13.750	450	290	



CAPPING BRACKET DETAIL
SCALE C



NOTES
1. For Drawing Index and General Notes refer Series No. 28010A1–DES–000STOS01–DRG–0002, 0006 and 0007 .
2. For timber properties and preservative treatment refer 28010A1–DES–000STOS01–DRG–0006.
3. Timber pole embedment depth and founding meterial shall be verified on site by the Geotechnical Assessor prior to placing poles in ground.
4. Paint all bolts and plate washers with one coat of bitument prior to installation.
5. Grease all bolts and holes prior to installation.
6. Final length of pole to be confirmed by Contractor to ensure minimum height of pole head is achieved.

DESIGN CODE AND DESIGN LOADING: AS5100–2004, AS1170.2–2011 AND TMR DESIGN CRITERIA FOR BRIDGES AND OTHER STRUCTURES

BIS No.

Revisions/Descriptions	Certification	Date	Microfiled
A Issued For Construction			

CAD FILES

Associated Job Nos | Survey Data: Datum | Auxiliary Drg Nos | Horiz. Grid | Height Origin | Survey Books

Scales: A 0 1000 2000mm; 0 100 200 300 400mm; 0 50 100 150 200mm
Dimensions shown in millimetres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

Drawn | Checked | Designed No. | Verified No.

MISCELLANEOUS STRUCTURES ROPE LADDER CROSSING DETAILS – SHEET 3

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	NO.	DATE
Structural				

Queensland Government

Job No. | Contract. No. | Drawing No. | Series Number

MRB_Detail (02/14) | BR Drgs

Figure 9.7(d) – Wooden beam in culvert fauna crossing

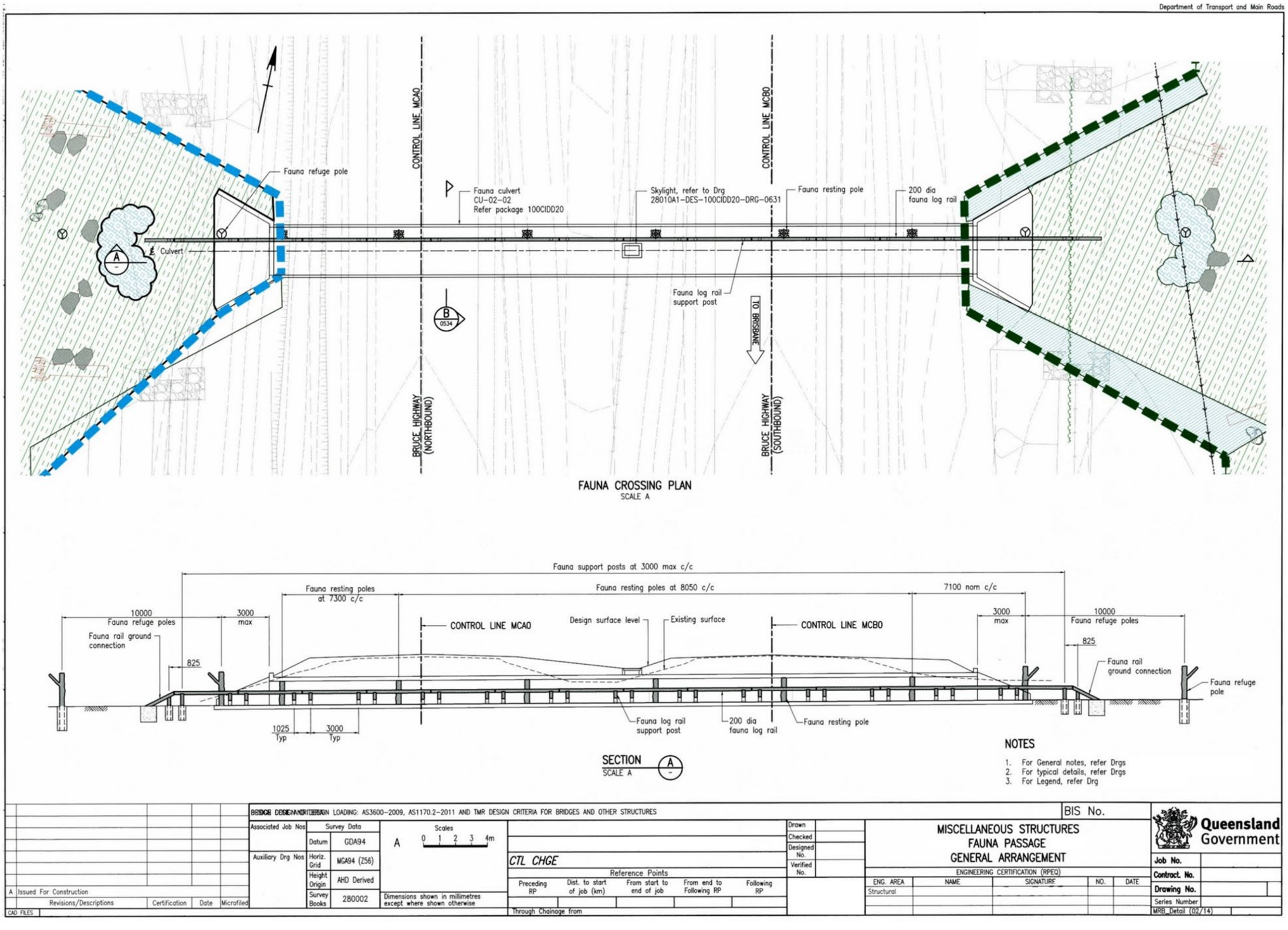


Figure 9.7(e) – Concrete arch fauna crossing – Sheet 1

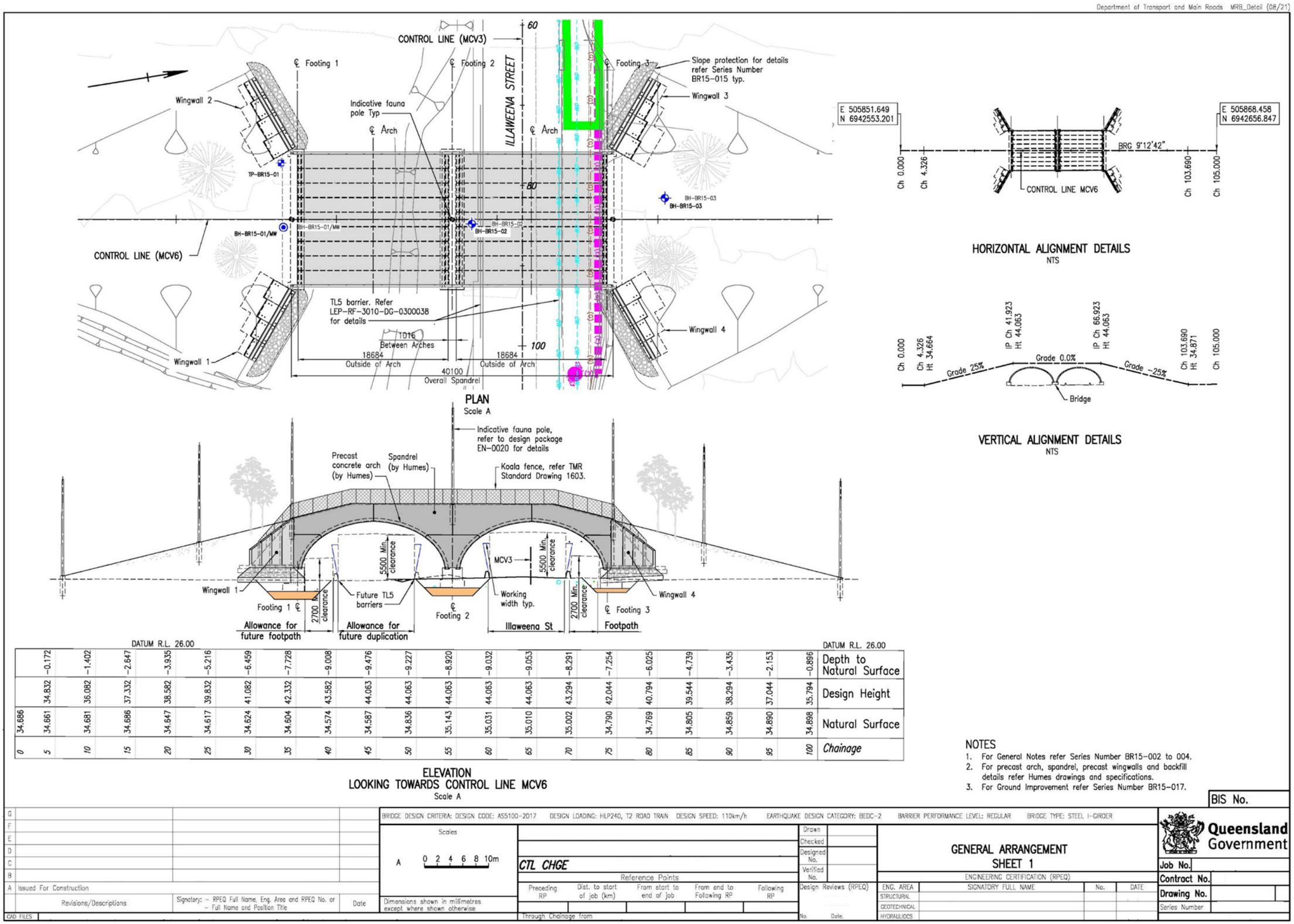


Figure 9.7(f) – Concrete arch fauna crossing – Sheet 2

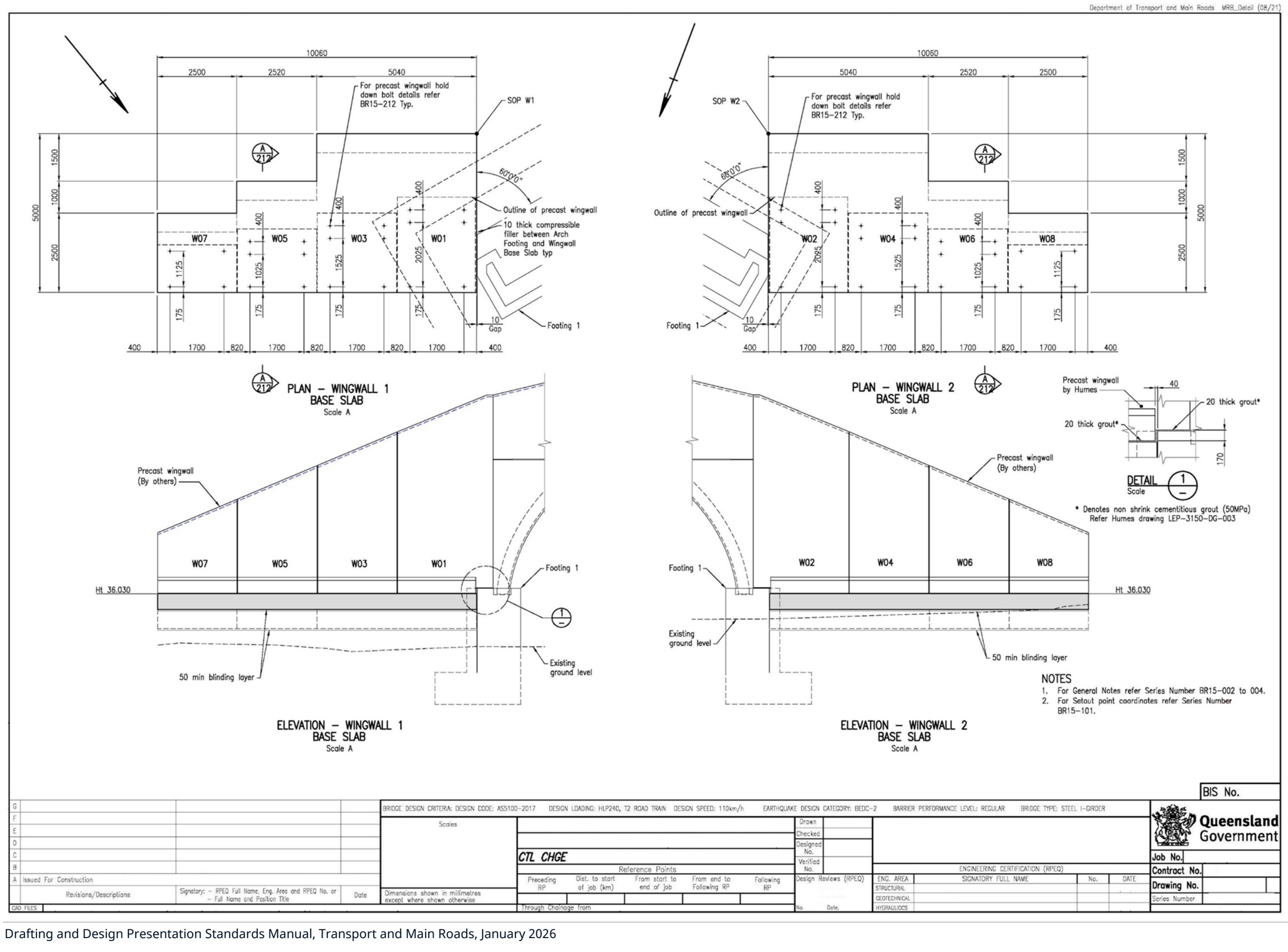


Figure 9.7(g) – Concrete arch fauna crossing – Sheet 3

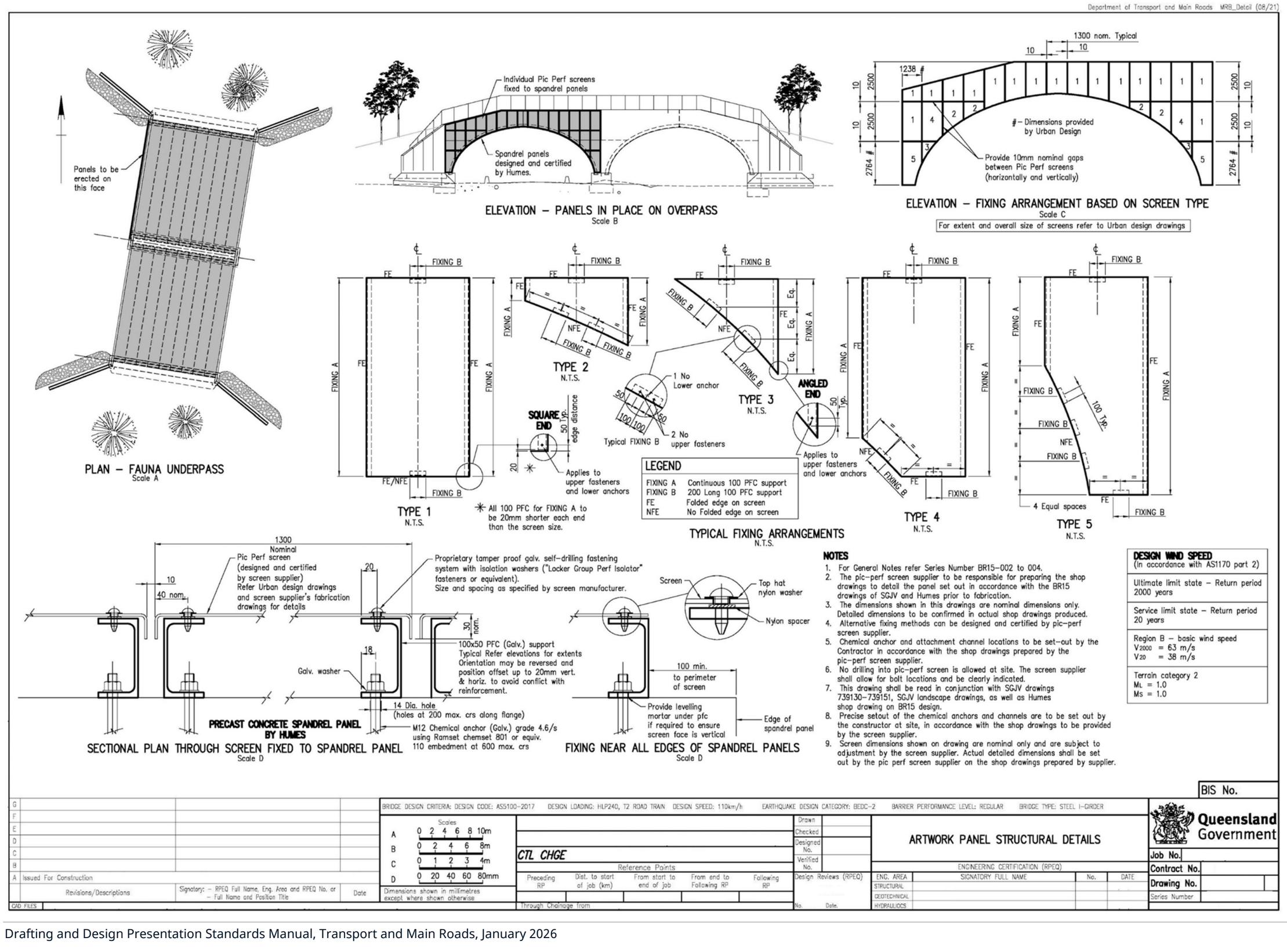
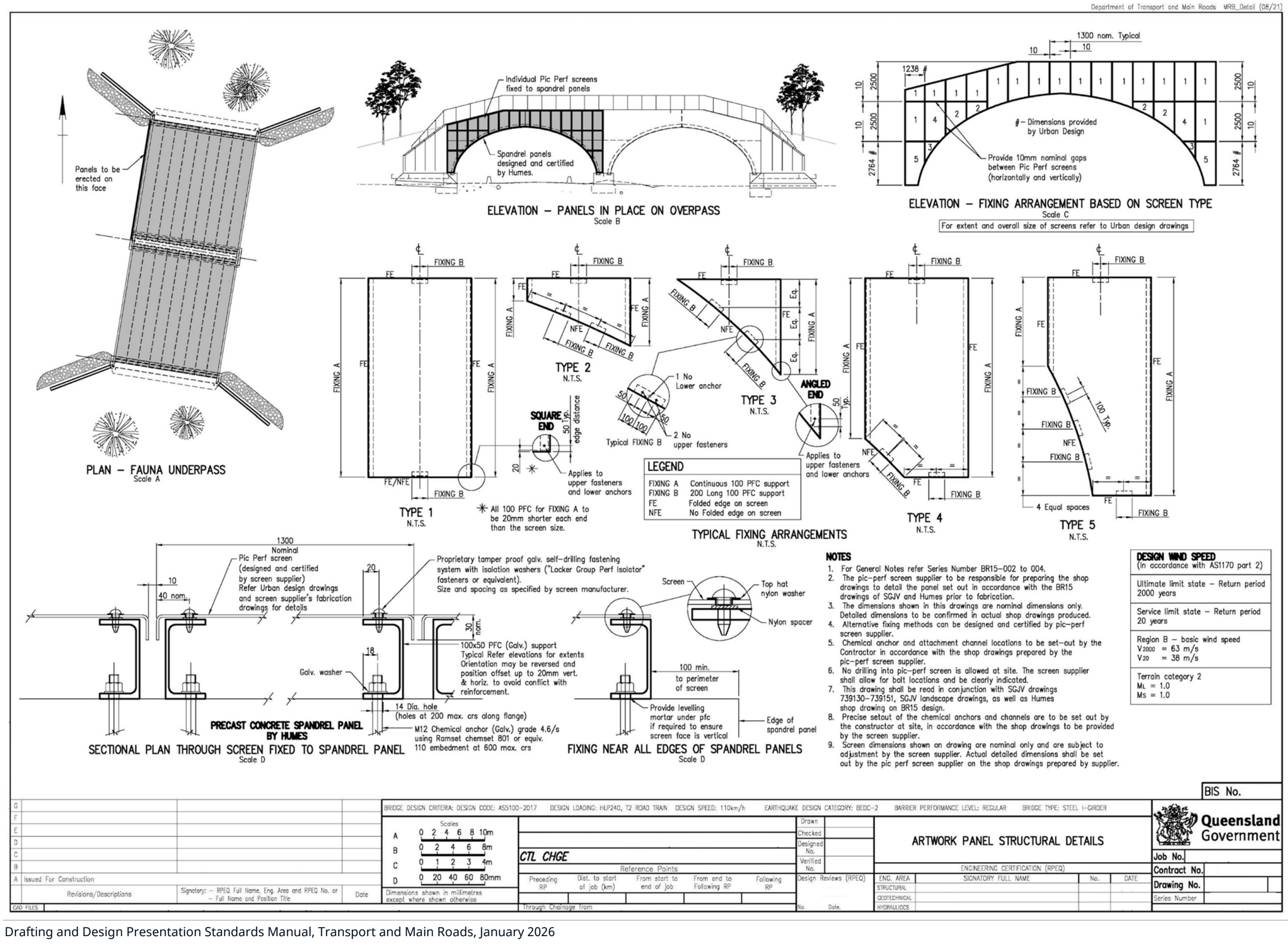


Figure 9.7(h) – Concrete arch fauna crossing – Sheet 4



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