Drafting and Design Presentation Standards
Volume 3: Structural Drafting Standards

Chapter 19: Bridge Barriers

November 2011

Queensland Government

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Chapter 19 Amendments

Revision register

Issue/Rev No.	Reference Section	Description of Revision	Authorised by	Date
1	–	First Issue.	Manager (Structural Drafting)	April 2011
2	–	Document name change.	Manager (Structural Drafting)	Nov 2011
	–	Bridge traffic rails replaced with bridge traffic barrier.		
	19.3	Add section on barrier height transition one on 10.		
	19.4	Gaps at fixed and continuous joints shall be 20 mm nominal at 25°C. Maximum rail length shall be 8.2 m. Maximum post spacing for bridges with a concrete deck shall be 2.45 m.		
	19.5	Gaps at fixed and continuous joints shall be 20 mm nominal at 25°C. Maximum rail length shall be 8.2 m.		
	19.6	Balusters spaced at 125 mm clear gap max.		

Contents

19 Bridge Barriers

19.1 Glossary of terms

For a complete glossary of terms refer Chapter 1 – *Introduction.*

19.2 Figures and examples shown in this volume

The figures and examples shown in this volume are for presentation purposes only, and may contain some details that are now superseded. These details have been included for ease of reference, to illustrate typical solutions, and to show the required standard of drafting presentation. The details are not to be used without an engineering check and certification by a Structural RPEQ to confirm that the details are appropriate for the specific project.

19.3 General

All barriers on new bridges are designed to the requirements of AS 5100 *Bridge Design*. Additional information may be found in *TMR Road Planning and Design Manual, 8.2.7 Bridge Barriers and Transitions*.

The most common barrier types on bridges used by the Department of Transport and Main Roads are as follows:

- Bridge traffic barriers (aluminium or steel)
- Bridge safety rails (aluminium or steel) – including bicycle safety rails where needed
- Balustrades (aluminium or steel) – including bicycle safety rails where needed
- Single slope reinforced concrete barriers.

On bridges with a footway, the type of barriers used either side of it is dependent on what the footway is used for. Where the footway is expected to carry a large number of cyclists, the footway shall be referred to as a bikeway and bicycle safety rails will be required. Agreement on the need for bicycle safety rails shall be made with the relevant departmental region before the bridge design begins because the bridge will be wider if bicycle safety rails are needed. Bicycle safety rails are required to prevent cyclists from snagging their handlebars or pedals on the bridge barriers. For minimum footway and bikeway widths refer *TMR Design Criteria for Bridges and other Structures*.

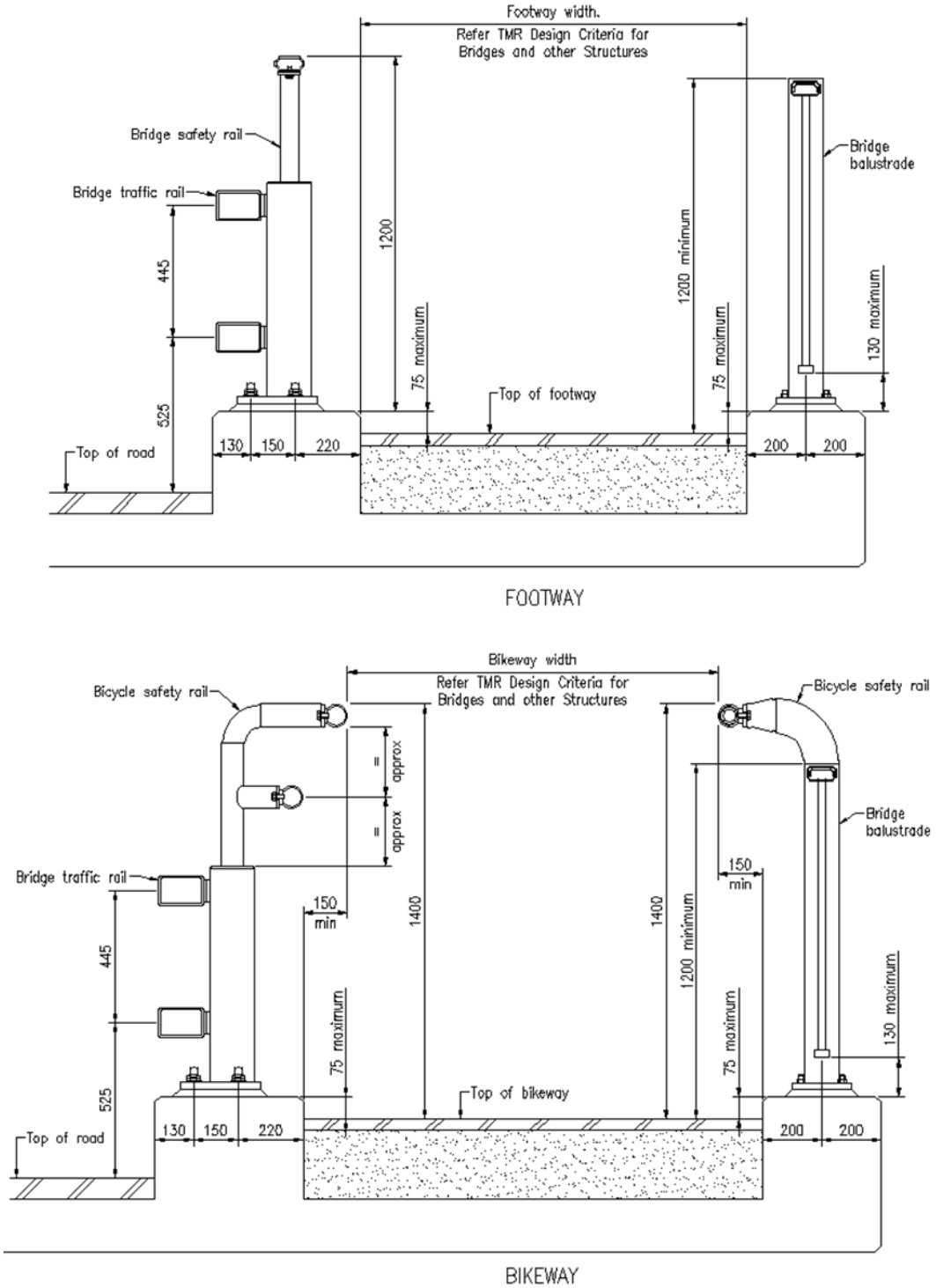
Figure 19.3-1 *Barrier Types* illustrates the various barrier types and their height requirements.

Additional consideration shall be given to the *Crime Prevention through Environmental Design Guidelines for Queensland*, *The Building Code of Australia* and AS 1428 *Design for Access and Mobility* for topics including, but not limited to:

- Wheelchair access
- Landings and additional rails for longitudinal grades > 3%.

Transitions in barrier height shall be at a maximum steepness of one vertical to 10 horizontal. This is to reduce the chance of a vehicle snagging on the barrier, or it being launched into the air because the barrier acts as a ramp. TMR Standard Drawing 1486 *Single Slope Concrete Barrier* and some other similar standard drawings will be amended shortly to show the correct transition slope. Details that are copied from these standard drawings onto project specific drawings shall be modified to show the correct transition.

Figure 19.3-1 Barrier Types



19.4 Aluminium or Steel Bridge Traffic Barriers

Bridge traffic barriers are manufactured from either aluminium or steel. They shall be designed to the requirements of AS 5100. Their performance level can be low, regular, or medium. The performance level required is determined my many factors, including, but not limited to:

- The type of vehicles to be contained
- Total traffic volumes and volumes of vehicles relevant to alternative performance levels

- Road alignment and operating speed
- Bridge width and offset from the traffic lanes to the barrier
- Divided, undivided and one way roads
- The cost of providing and maintaining a bridge barrier and bridge approach barrier system of specified performance level(s)
- The consequences of a vehicle penetrating or vaulting the barrier.

Aluminium traffic barriers are used in special circumstances only such as in tidal splash zones, or for aesthetic purposes. The department does not have an approved product or Standard Drawing for this type of barrier; therefore details must be developed on a project specific basis. Manufacturers such as 'Tollfab' may have standard rail types which could be suitable, however it must be demonstrated to the department that the barrier design is in accordance with AS 5100. Refer *Appendix A Example Aluminum Bridge Traffic Barrier Drawing*.

Refer to TMR Standard Drawings 1508, 1509 and 1510 for standard details and design criteria for regular performance level, steel bridge traffic barriers. Refer *Appendix B Example Steel Bridge Traffic Barrier Drawings*.

Design Criteria (Regular performance Level, Steel Bridge Traffic Barrier Only)

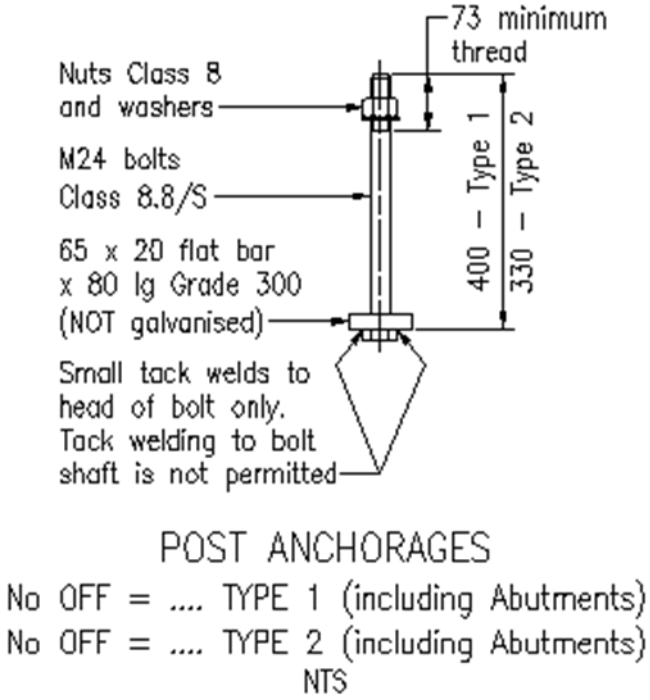
The following criteria must be met when designing the rail types and post spacing:

- Deck unit bridges with cast insitu kerbs – Spacing of intermediate posts shall be 2.05 m maximum, except over the pier and abutment centrelines, where there may be a single spacing of up to 2.8 m
- Bridges with a concrete deck – Spacing of intermediate posts shall be 2.45 m maximum
- Spacing of an end post and its adjacent intermediate post shall be 1.2 m maximum
- The spacing between three adjacent posts shall not exceed 4.9 m; that is, an average of 2.45 m
- The joint between rails shall be 20 mm nominal at fixed joints and 40 mm nominal at expansion joints
- Only one joint is allowed between successive posts
- Each rail must be supported by at least two posts
- One joint shall be provided at each abutment and pier location
- The barrier shall transition to full height at one on 10 from the top of the approach guardrail to the top of the bridge traffic rail
- Rail lengths shall be 8.2 m maximum.

Post Anchorages (Regular performance Level, Steel Bridge Traffic Barrier Only)

Post anchorage details shall be shown on the Bridge Traffic Barrier drawings because they are fabricated with the barrier. In the cost estimate they shall be bundled together into one item. Refer Figure 19.4-1 *Post Anchorage* for standard details.

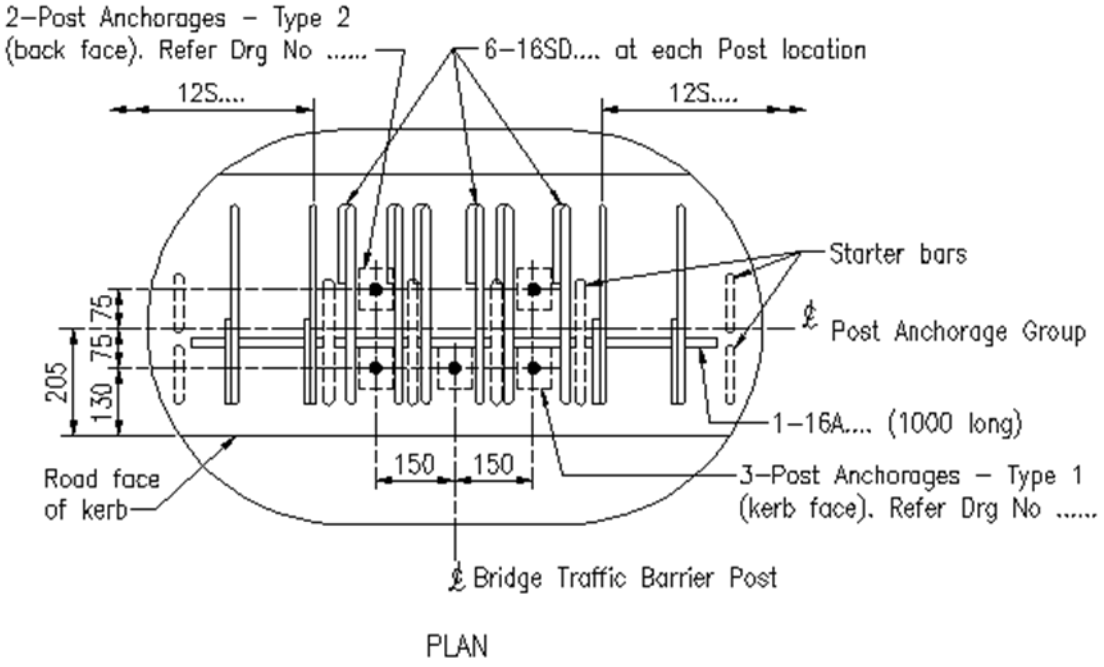
Figure 19.4-1 Post Anchorage Detail (Regular Performance)

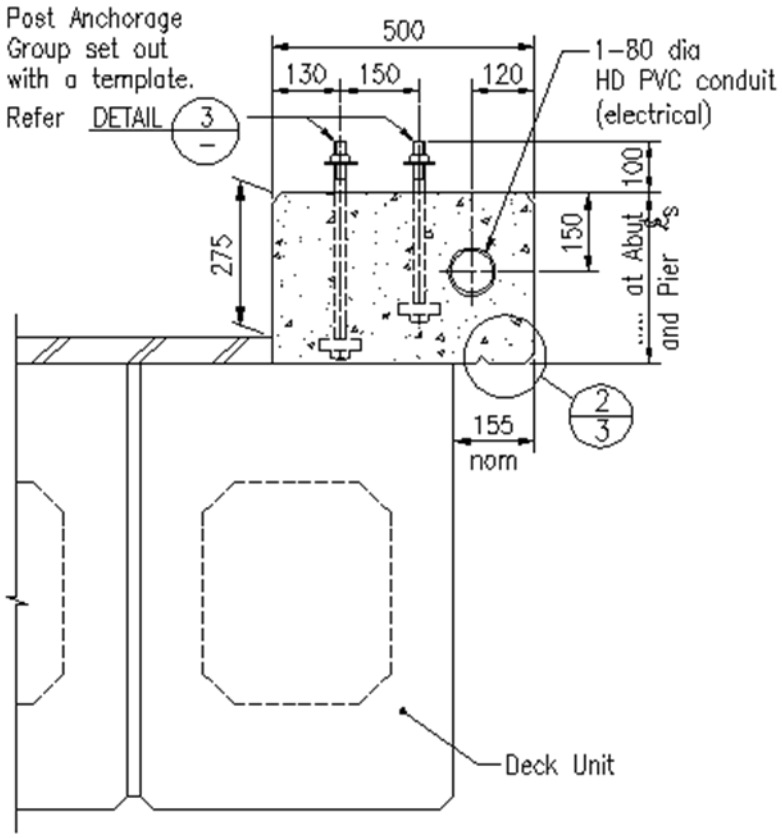


The setting out details for the anchorages shall be shown on the Cast Insitu Kerb/Deck drawings. It is important to show that the anchorage with three 400 mm long bolts (Type 1) is placed closest to the road face of the kerbs and wingwalls and the anchorage with two 330 mm long bolts (Type 2) is placed at the back. To ensure that the bridge traffic rails line up within tolerance to the front face of the kerb, the anchorages must be set back 130 mm and 280 mm from the road face of the kerbs and wingwalls. The anchorages shall protrude 100 mm. On bridges with a concrete deck and scuppers, the anchorages (and hence the posts) shall avoid the scupper recesses. Refer Figure 19.4-2 *Bridge Traffic Barrier Post Anchorage Setting Out Detail*.

330 mm long bolts are specified at the back of the post. These bolts are used because fabricators have large quantities that have been bought and tested. Once these stockpiles have been reduced, 400 mm long bolts will be specified at both the front and back of the post.

Figure 19.4-2 Bridge Traffic Barrier Post Anchorage Setting Out Detail (Regular Performance)



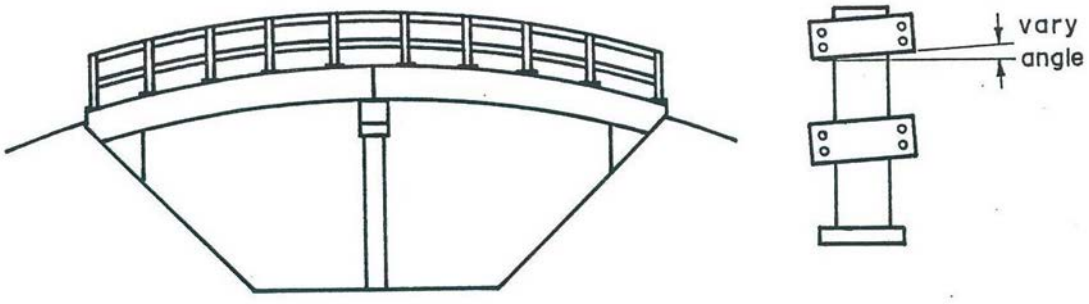


Orientation of Posts

In the longitudinal direction, posts are to be set normal to the grade of the bridge, except on small radius vertical curves where the posts may need to be vertical. On small radius curves the fitment of

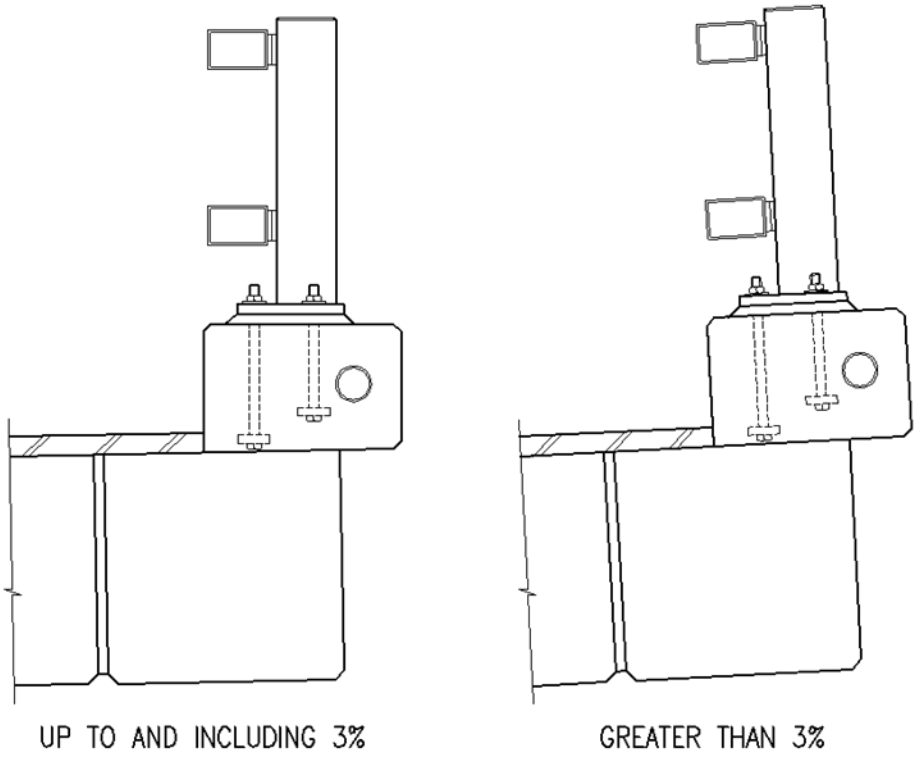
the bolts and holes must be thoroughly checked to determine if the posts need to be vertical. Refer Figure 19.4-3 *Post Orientation on Small Radius VC*.

Figure 19.4-3 Post Orientation on Small Radius VC



In the transverse direction, posts are to be set vertical except on bridges where the deck super elevation/crossfall slope exceeds three per cent. In these cases posts are to be set normal to the super elevation/crossfall. Refer Figure 19.4-4 *Post Orientation in Transverse Direction*.

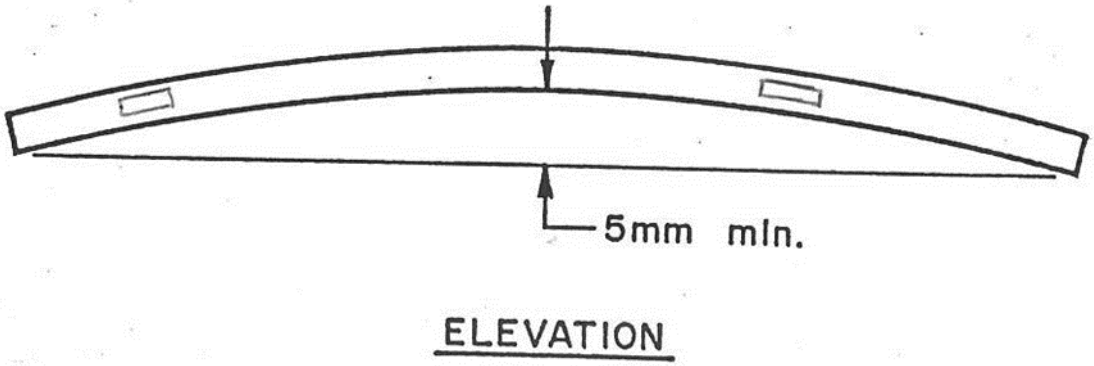
Figure 19.4-4 Post Orientation in Transverse Direction



Bending of Rails for Vertical Curves

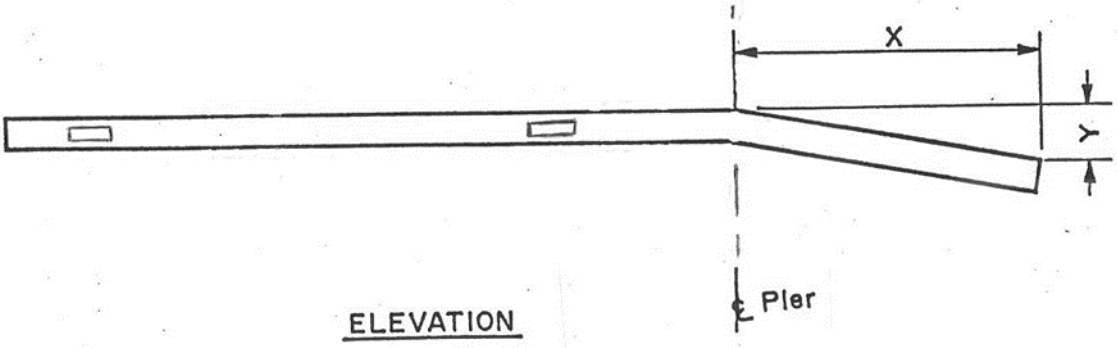
On bridges with a RC deck or cast insitu kerbs where the top face of the kerb follows the actual VC, rails shall be bent to match the curve when the mid-offset dimension exceeds 5 mm. Refer Figure 19.4-5 *Rail Bent for VC*.

Figure 19.4-5 Rail Bent for VC



On bridges with a VC or changing grade and with linear kerbs, rails shall be bent at the pier and abutment centrelines if necessary. Refer Figure 19.4-6 *Rail Bent for Linear Change of Grade Vertically*.

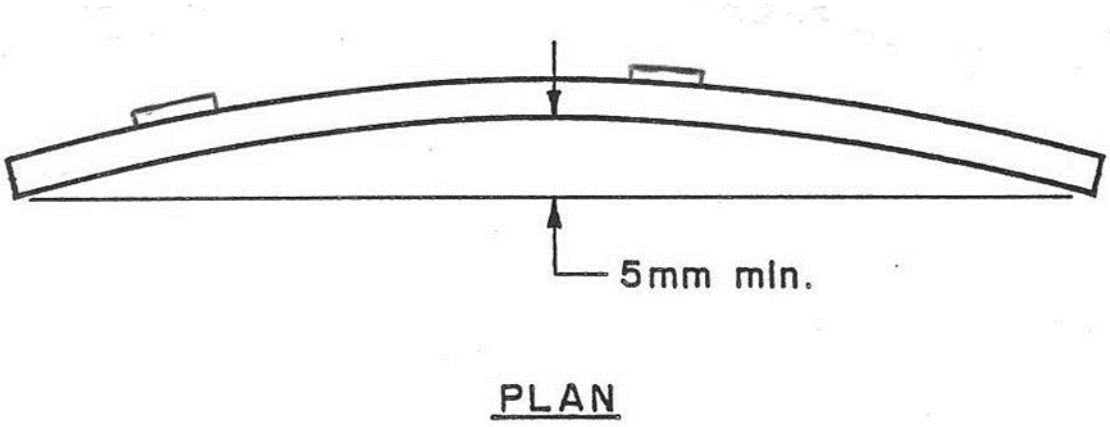
Figure 19.4-6 Rail Bent for Linear Change of Grade Vertically



Bending of Rails for Horizontal Curves

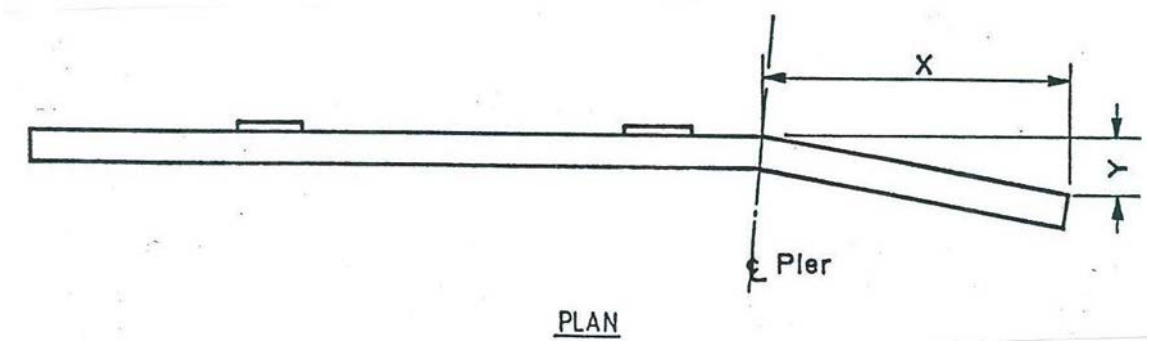
On bridges with a RC deck where the road face of the kerb follows the actual HC, rails shall be bent to match the curve where the mid-offset dimension exceeds 5 mm. Refer Figure 19.4-7 *Rail Bent for HC*.

Figure 19.4-7 Rail Bent for HC



On bridges with a HC and with linear kerbs, rails shall be bent at the pier and abutment centrelines if necessary. Refer Figure 19.4-8 *Rail Bent for linear change of Direction Horizontally*.

Figure 19.4-8 Rail Bent for linear change of Direction Horizontally



19.5 Bridge Safety Rails

Bridge safety rails are used to add additional height to the barrier which is positioned between a footway and a road. If the barrier is positioned between a bikeway and a road, the additional height shall be achieved with the addition of a bicycle safety rail, refer 19.7 *Bicycle Safety Rails*.

Bridge safety rails can be manufactured from aluminium or steel.

Aluminium bridge safety rails are used in special circumstances only e.g. in tidal splash zones, or for aesthetic purposes. They are used in conjunction with aluminium bridge traffic barriers or concrete barriers. The department does not have an approved product or Standard Drawing for this type of barrier; therefore details must be developed on a project specific basis. Refer *Appendix C Example Aluminium Bridge Safety Barrier Drawing*.

Steel bridge safety rails are used in conjunction with steel traffic barriers or concrete barriers. Refer to TMR Standard Drawing No 1511 for details of the standard steel bridge safety rail design for when it is attached to a steel bridge traffic barrier. Refer *Appendix D Example Steel Bridge Safety Barrier Drawing*.

Design Criteria

The following criteria must be met when designing the barrier types and post spacing:

- If the bridge safety rail is attached to concrete parapet the post spacing shall be 3 m maximum.
- If the bridge safety rail is attached to a bridge traffic barrier the post spacing shall match those of the bridge traffic barrier.
- The joint between rails shall be 20 mm nominal at 25°C at fixed and continuous joints and 40 mm at 25°C at expansion joints.
- Only one joint is allowed between successive posts.
- One joint shall be provided at each abutment and pier location.
- The bridge safety rail shall transition to full height at one on 10 from the top of the bridge traffic barrier to the top of the bridge safety rail.
- Rail lengths shall be 8.2 m maximum.
- The top of the bridge safety rail shall be 1.2 m above the top of kerb.

Orientation of Posts

Follow the theory for bridge traffic barriers, refer *19.4 Aluminium or Steel Bridge Traffic Barriers*.

Bending of Rails for Vertical Curves

Follow the theory for bridge traffic rails, refer *19.4 Aluminium or Steel Bridge Traffic Barriers*.

Bending of Rails for Horizontal Curves

Follow the theory for bridge traffic rails, refer *19.4 Aluminium or Steel Bridge Traffic Barriers*.

19.6 Bridge Balustrades

Bridge balustrades are used as the external barrier for footways. Balustrades for bikeways shall have a bicycle safety rail attached on top, refer *19.7 Bicycle Safety Rails*.

Bridge balustrades can be manufactured from aluminium or steel.

Aluminium balustrade is used in special circumstances only such as in tidal splash zones, or for aesthetic purposes. The department does not have a Standard Drawing for this type of barrier; therefore details must be developed on a project specific basis. Manufacturers such as 'Tollfab' may have standard rail types which may be suitable. Refer *Appendix E Example Aluminium Bridge Balustrade Drawing*.

Refer TMR Standard Drawing 1512 *Bridge Balustrade* for details of the standard steel balustrade design and *Appendix F Example Steel Bridge Balustrade Drawings*.

Design Criteria

The following criteria must be met when designing the balustrade panel types and post spacing:

- Spacing of posts shall be 2 m maximum.
- The joint between rails shall be 40 mm nominal.
- Only one joint is allowed between successive posts.
- One joint shall be provided at each abutment and pier location.
- Panel lengths shall be 4 m maximum.
- Balusters shall be spaced at 125 mm clear gap maximum.
- The top of the balustrade shall be 1.2 m minimum above the footway.

Orientation of Panels

In the longitudinal direction, the rails shall follow the grade while the balusters and posts are always vertical.

In the transverse direction the panels are to be set vertical.

Bending of Rails for Vertical and Horizontal Curves

Follow the theory for bridge traffic barriers, refer *19.4 Aluminium or Steel Bridge Traffic Barriers.*

19.7 Bicycle Safety Rails

Bicycle safety rails are required to prevent cyclists from snagging their handlebars or pedals on the bridge barriers.

Bicycle safety rails are manufactured from either aluminium or steel.

Aluminium bicycle safety rails are used in special circumstances only such as in tidal splash zones. The department does not have an approved product or Standard Drawing for this type of barrier; therefore details must be developed on a project specific basis.

The department is currently developing Standard Drawings for steel Bicycle Safety Rails.

Refer *Appendix G Example Steel Bridge Traffic Barrier with Bicycle Safety Rail Drawing*.

Design Criteria

The following criteria must be met when designing the bicycle safety rails:

- The rail is attached to either the bridge traffic barrier posts or the balustrade posts.
- The rail shall protrude 150 mm past the kerb face.
- The joint between rails shall be 40 mm nominal.
- Only one joint is allowed between successive posts.
- One joint shall be provided at each abutment and pier location.
- The bicycle safety rail shall transition to full height at one on 10 from the top of the bridge traffic barrier to the top of the bridge safety rail.
- Rail lengths shall be 6.5 m maximum.
- The top of the bicycle safety rail shall be 1.4 m above the top of the bikeway.

Bending of Rails for Vertical and Horizontal Curves

Follow the theory for bridge traffic barriers, refer *19.4 Aluminium or Steel Bridge Traffic Barriers*.

19.8 Re-railing Existing Bridges

To improve vehicle safety, old bridges are often fitted with new bridge traffic barriers. The department does not have a Standard Drawing for this type of barrier; therefore details must be developed on a project specific basis. An engineering design shall determine the attachment details and post spacing. If the Barrier Performance Level does not satisfy AS 5100, the actual level shall be noted in the title block, for example, '50% of AS 5100.1 *Low Performance Level*'.

The posts are usually attached to the bridge with bolts and/or chemical anchors. Refer Figure 19.8-1 *Example Re-railing (1)* and Figure 19.8-2 *Example Re-railing (2)* for two examples of attachment details.

Figure 19.8-1 Example Re-railing (1)

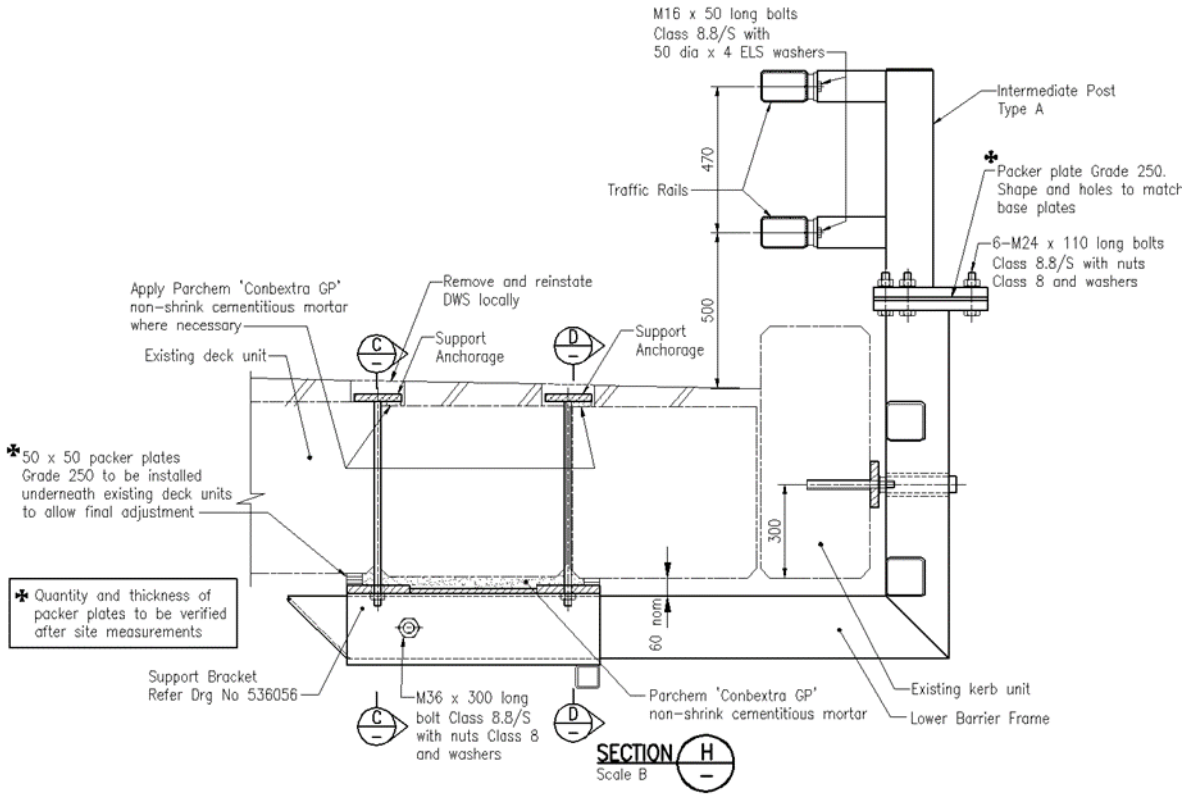
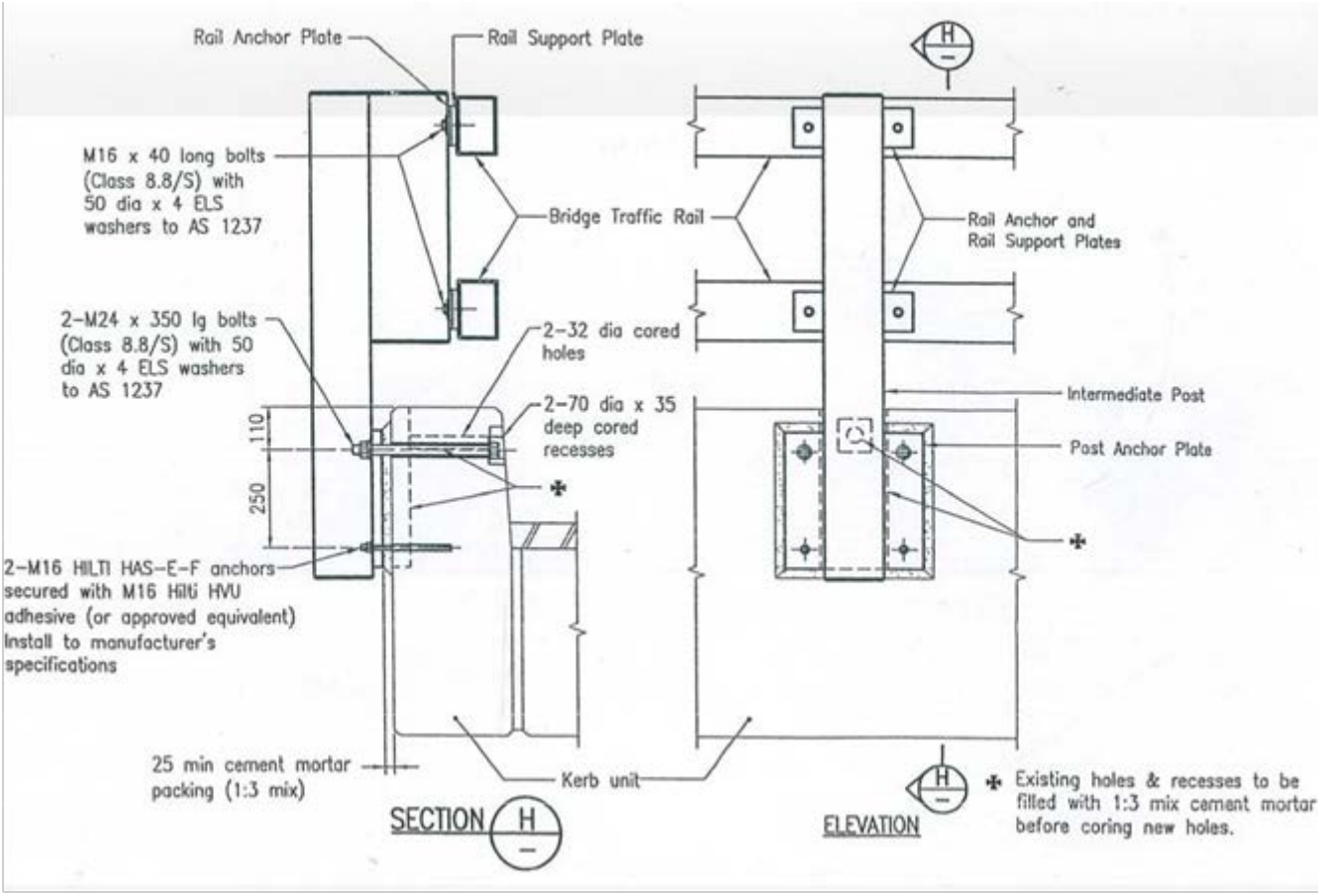
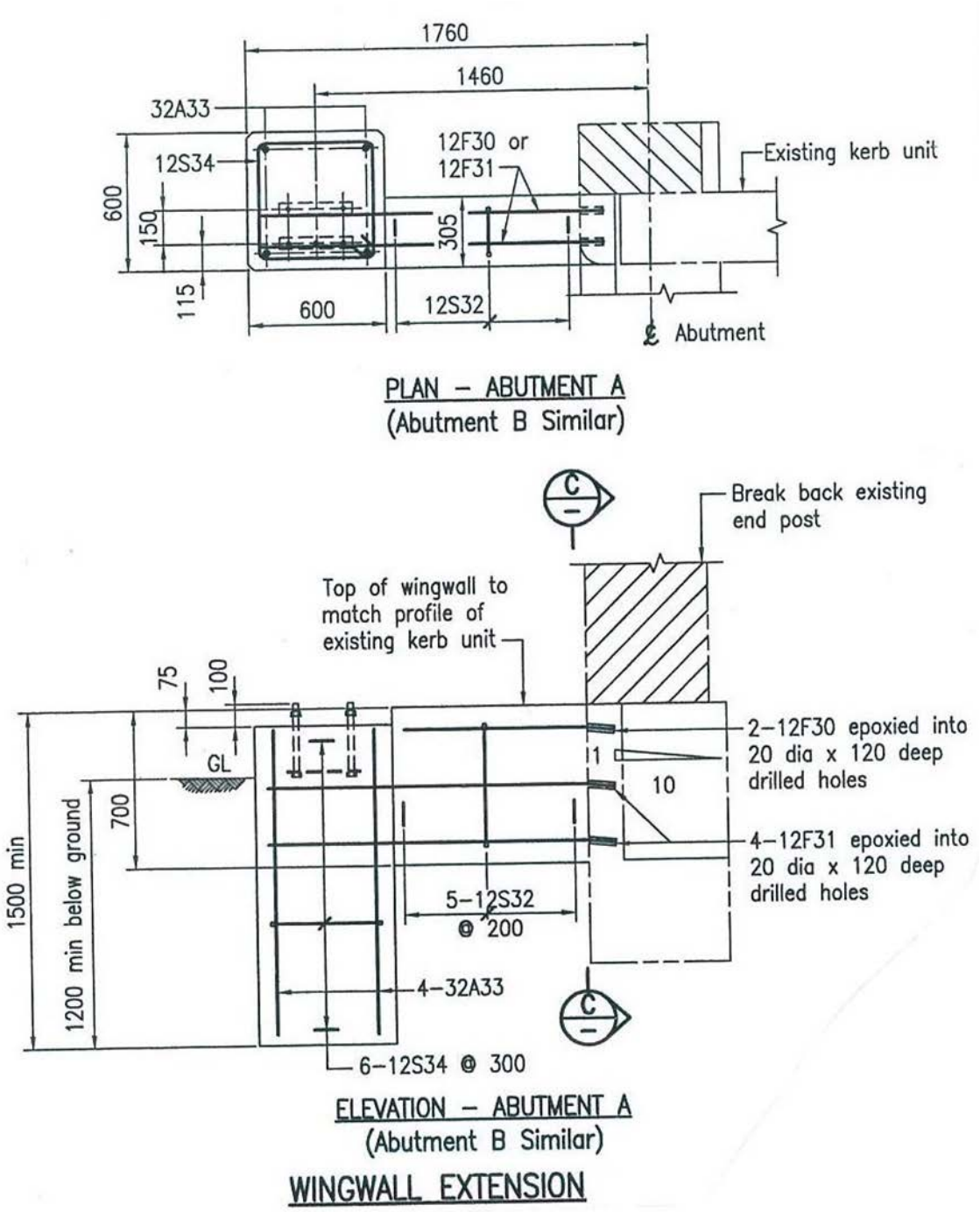


Figure 19.8-2 Example Re-railing (2)



Usually the existing wingwalls need to be extended to provide an anchorage for the bridge traffic barrier end posts to be attached. Refer Figure 19.8-3 *Example Wingwall Extension* for typical details.

Figure 19.8-3 Example Wingwall Extension



19.9 Single Sloped Concrete Barriers

This section shall be read in conjunction with Chapter 17 – *Cast Insitu Kerbs and Decks*.

Overpass bridges crossing roads or railway have concrete barriers rather than steel bridge traffic barrier. This is to help prevent debris falling off the bridge onto traffic below. Bridges on major roads and those on small horizontal radius curves may also be required to have concrete barriers.

To decrease construction time and road/railway closures, precast barrier panels are often used on overpass bridges. The precast panels must be more than 100 mm thick. The cast insitu portion of the barrier must be wide enough to allow for vibration of the concrete. The back face of the barrier is precast, and then erected on the bridge deck. The front face of the barrier is then cast insitu. The precast barrier brackets must allow for height adjustment while providing secure attachment to the deck. Many different systems may be used, an example is shown in Figure 19.9-1 *Precast Barrier Panel*, and another example is shown in *Appendix H Example Precast Barrier Panel and Deck Drawings*.

To reduce cracking in concrete barriers, contraction joints are usually placed approximately every 4 m. Refer Figure 19.9-2 *Contraction Joint*.

Often a concrete barrier will transition to a concrete barrier off the bridge. For details of concrete barriers refer to TMR Standard Drawing Nos 1460 to 1473 inclusive.

Figure 19.9-1 Precast Barrier Panel

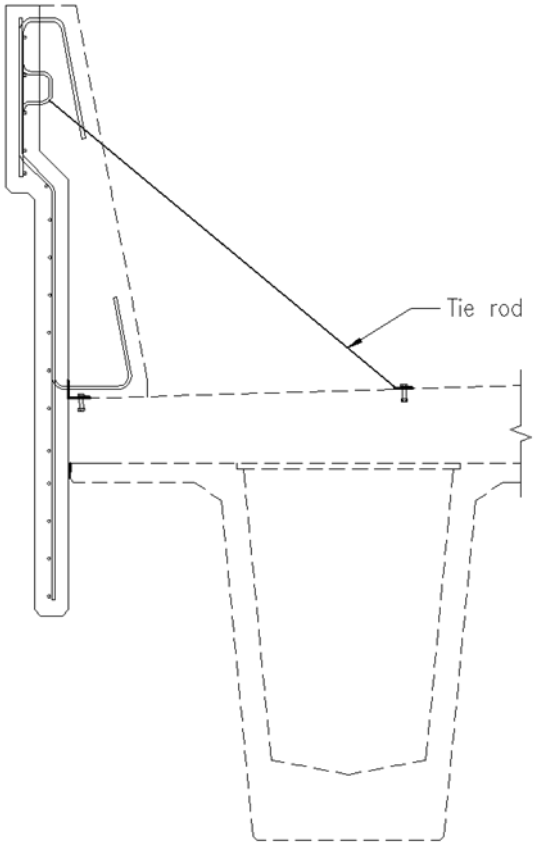
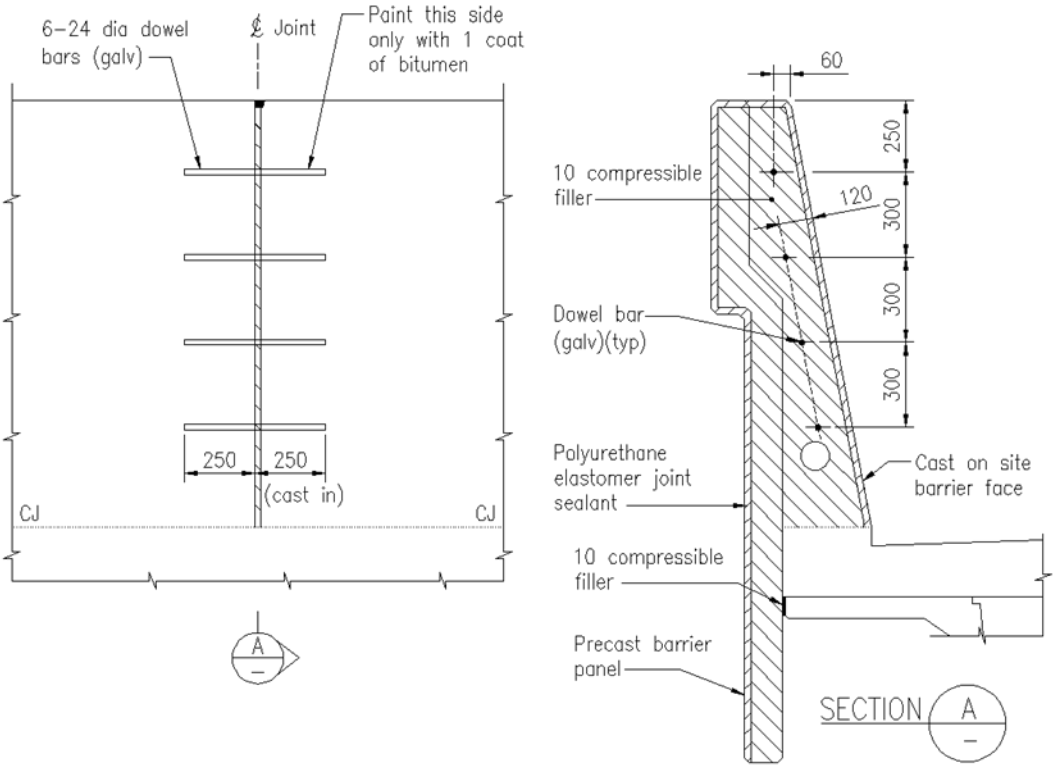


Figure 19.9-2 Contraction Joint



19.10 Protection Screens

Overpass bridges may require protection screens. For requirements refer to AS 5100, *TMR Technical Guidelines for the Treatment of Overhead Structures – Objects Thrown or Dropped* and the departmental policy *Reduction of Risk from Objects Thrown from Overpass Structures onto Roads*.

Protection screens shall be positioned behind a plane parallel to the barrier face or a minimum of the working width behind the barrier.

The designer must do a risk assessment to determine their necessity. Important factors to consider include:

- the design speed of the underpass road
- the volume of traffic on the underpass
- the volume of vehicle traffic on the overpass and more importantly, the volume of pedestrian traffic on the overpass
- if the bridge is for pedestrians only
- if the bridge is near a school, park or playground
- the lighting of the bridge
- the presence of vandalism or gangs near the bridge.

Refer *Appendix I – Example Protection Screen Drawings*.

19.11 Railway Overbridge Barriers

In addition to AS 5100, bridges over QR railways shall be designed in accordance with the following relevant QR Standard Drawings and the following QR documents:

- MCE-SR-001 Queensland Railways – *Requirements for the Design of Road Overbridges*
- MCE-SR-006 Queensland Railways – *Requirements for the Design of Footbridges*
- MCE-SR-007 Queensland Railways – *Design and Selection Criteria for Road/Rail Interface Barriers*
- MCE-SR-012 Queensland Railways – *Railway Track Clearances*
- MCE-SR-015 Queensland Railways – *Protection of Supporting Elements Adjacent to Railways.*

In regards to barrier design, MCE-SR-007 is the overriding document.

After determining the rail status and road class, use MCE-SR-007, Table 5 – *Road Bridge over Railway Barrier Selection* to select the appropriate barrier type and height.

The barrier must also comply with MCE-SR-007, *Appendix 3 Barrier Transitions Road Bridge over Railway Corridor*.

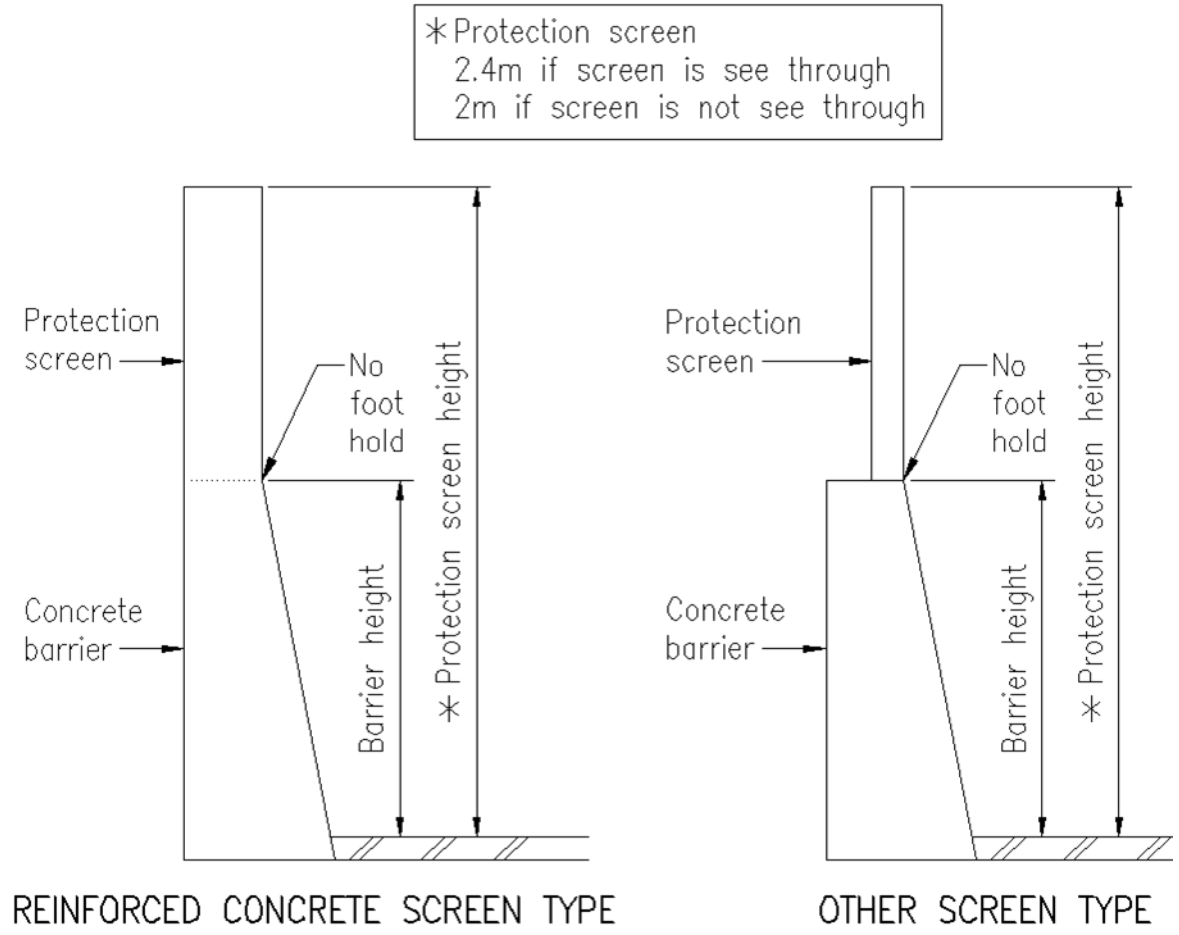
Design Criteria for Barriers on Bridges over QR Railway that are not Electrified

Some important design criteria include the following:

- Bridge barrier type must be concrete barrier to prevent debris falling into the rail corridor.
- The concrete barrier will be 1.1 m or 1.5 m high depending on the performance level. The barrier shall transition to full height at one on 10.
- Protection screens are required on top of the concrete barrier.
- If the protection screen is not see through, the top of the screen shall be 2 m minimum above the road surface. The screen can be either additional concrete cast on top of the barrier or steel made from an approved product such as plate, welded wire mesh, perforated sheet of louvre mesh. Note that louvre mesh is considered see through and shall be orientated so that a person standing on the bridge looking through the openings will see the sky rather than the ground.
- If the protection screen is see through, the top of the screen shall be 2.4 m minimum above the road surface. The screen can be either additional concrete cast on top of the barrier or steel plate.
- The concrete barrier and protection screen shall be smooth faced so as not to be readily climbable.
- The protection screen shall extend at full height for a minimum of 3 m (horizontally) either side of the track centre line on both sides of the bridge.

Refer Figure 19.11-1 *Typical Barriers (Non Electrified Railway).*

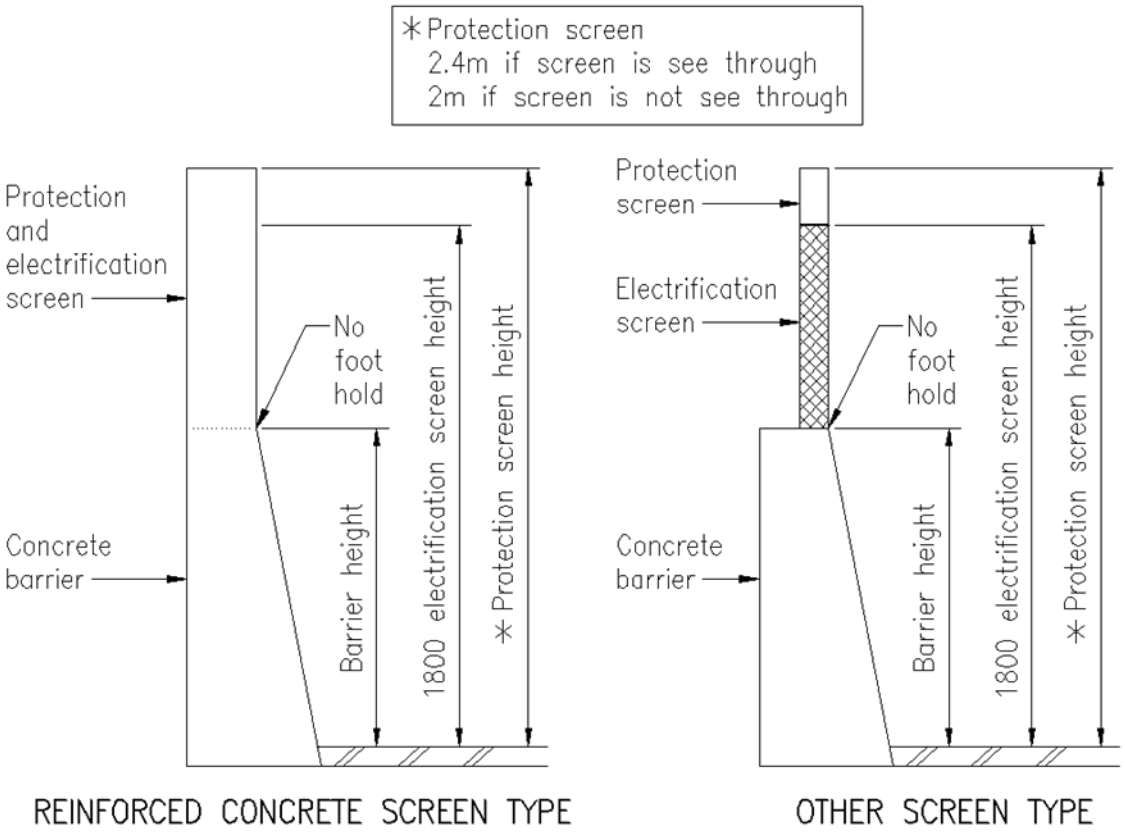
Figure 19.11-1 Typical Barriers (Non Electrified Railway)



Additional Design Criteria for Barriers on Bridges over QR Railway that is Electrified

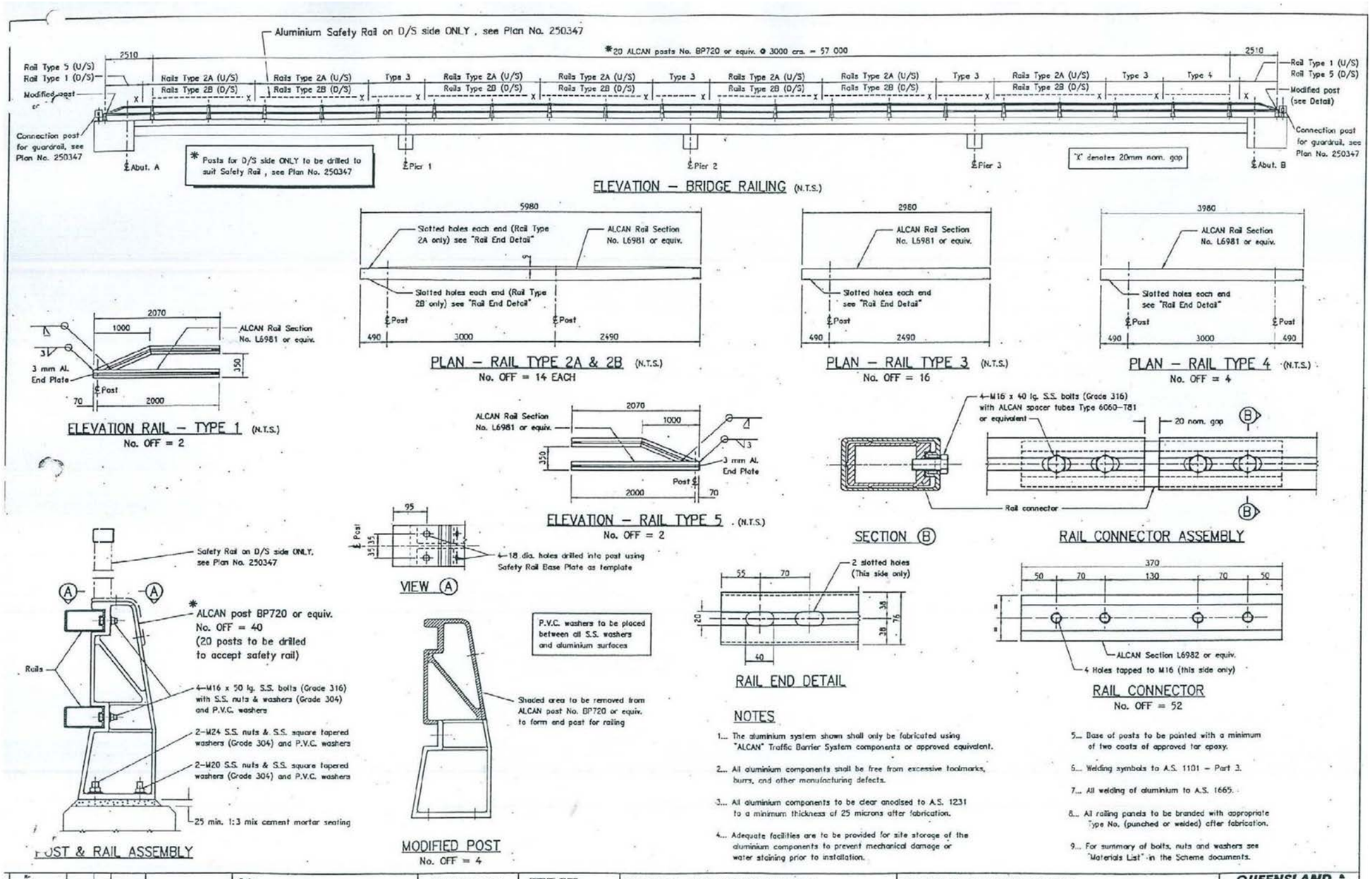
Railway that is electrified requires special electrification screening 1.8 m minimum in height. Electrification screening has smaller allowable openings than protection screening. The electrification screen shall extend at full height for a minimum of 3 m (horizontally) either side of the track centre line and/or overhead line equipment on both sides of the bridge. Refer Figure 19.11-2 *Typical Barriers (Electrified Railway).*

Figure 19.11-2 Typical Barriers (Electrified Railway)



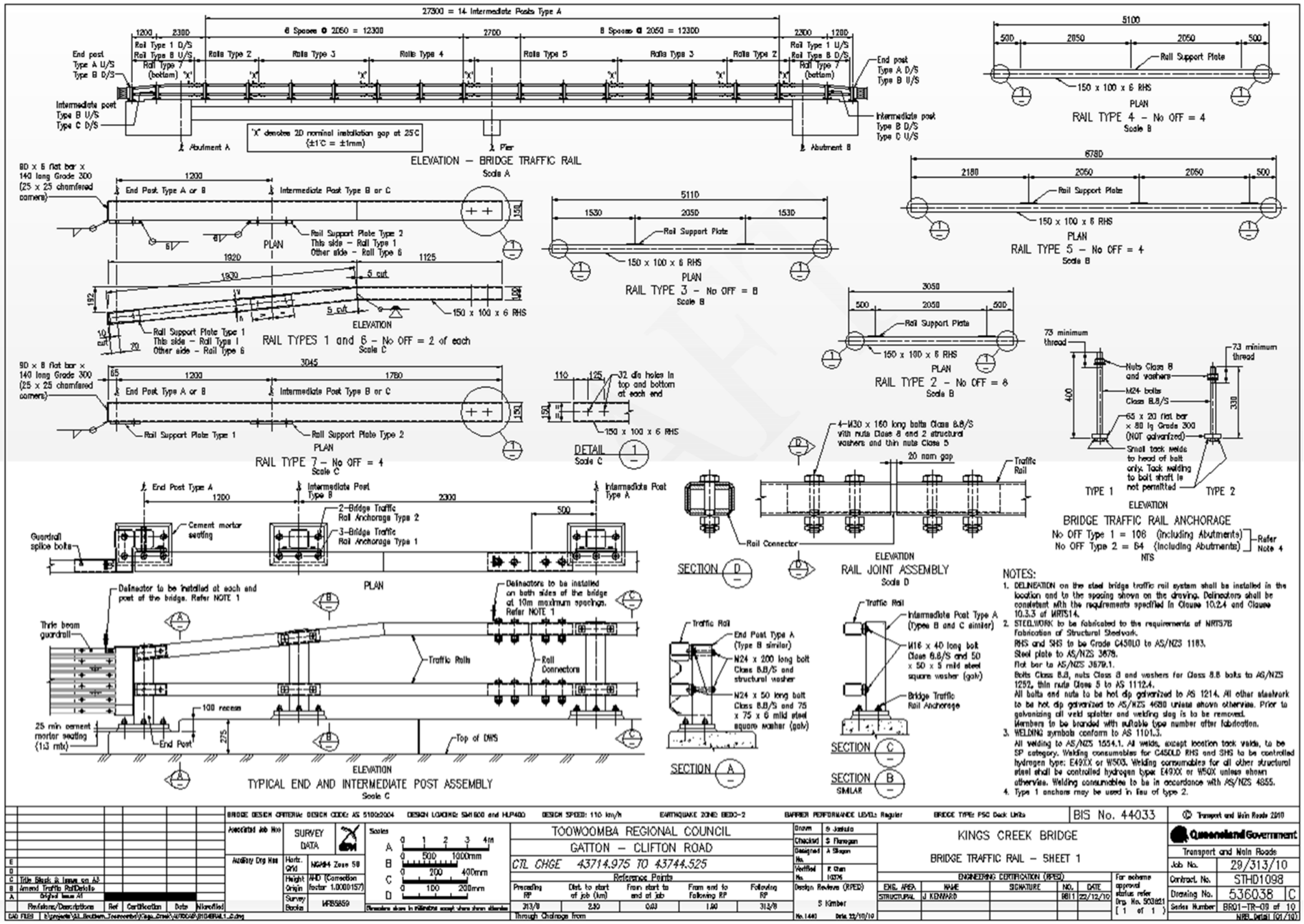
Appendix A – Example Aluminum Bridge Traffic Barrier Drawing

Appendix A – Example Aluminum Bridge Traffic Barrier Drawing

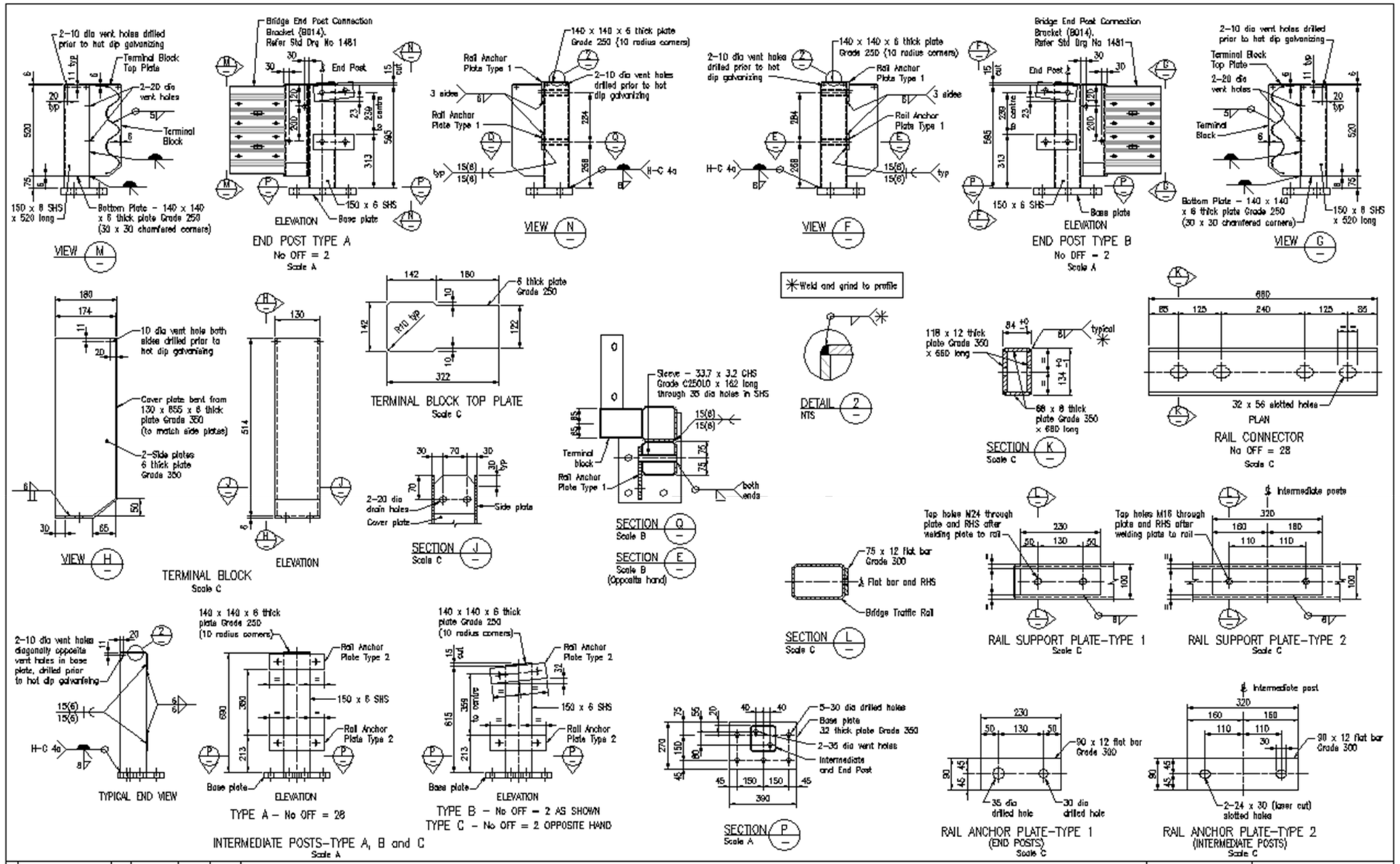


Appendix B – Example Steel Bridge Traffic Barrier Drawings

Appendix B – Example Steel Bridge Traffic Barrier Drawings – Sheet 1



Appendix B – Steel Bridge Traffic Barrier – Sheet 2



BRIDGE DESIGN CRITERIA: DESIGN CODE: AS 5100:2004 DESIGN LOADING: SM1600 and HLP400 DESIGN SPEED: 110 km/h EARTHQUAKE ZONE: BEDC-2 BARRIER PERFORMANCE LEVEL: Regular BRIDGE TYPE: PSC Deck Units

BIS No. 44033

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Rev	Revisions/Descriptions	Ref	Certification	Date	Microfilm
E					
D					
C	Title Block & Issue on A3				
B	Amend traffic Rail Details				
A	Drafted Issue A1				

CAD FILES: D:\projects\Q1_Southern_Toowoomba\Kings_Creek\AUTOCAD\B104BRAIL1.CDW

Accredited Job Nos: SURVEY DATA

Auxiliary Org Nos: Horiz. Grid: MGA94 Zone 56; Height Origin: AHD (Correction factor 1.0000157); Survey Books: MRB5659

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

Dimensions given in millimetres except where shown otherwise

TOOWOOMBA REGIONAL COUNCIL

GATTON – CLIFTON ROAD

CTL CHGE 43714.975 TO 43744.525

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP
313/5	2.80	0.05	1.90	313/8

Through Chainage from

Drawn: S Jenkins; Checked: S Flanagan; Designed: A Shipen; No.: ; Verified: R Chee; No.: 19279; Design Reviewer (RPEQ): S Kimber; No.1449; Date: 22/10/10

KINGS CREEK BRIDGE

BRIDGE TRAFFIC RAIL – SHEET 2

ENGINEERING CERTIFICATION (RPEQ)

END. AREA	NAME	SIGNATURE	NO.	DATE
STRUCTURAL	J KENNARD		9811	22/12/10

For scheme approval status refer Drg. No. SC0821 (1 of 1)

Queensland Government

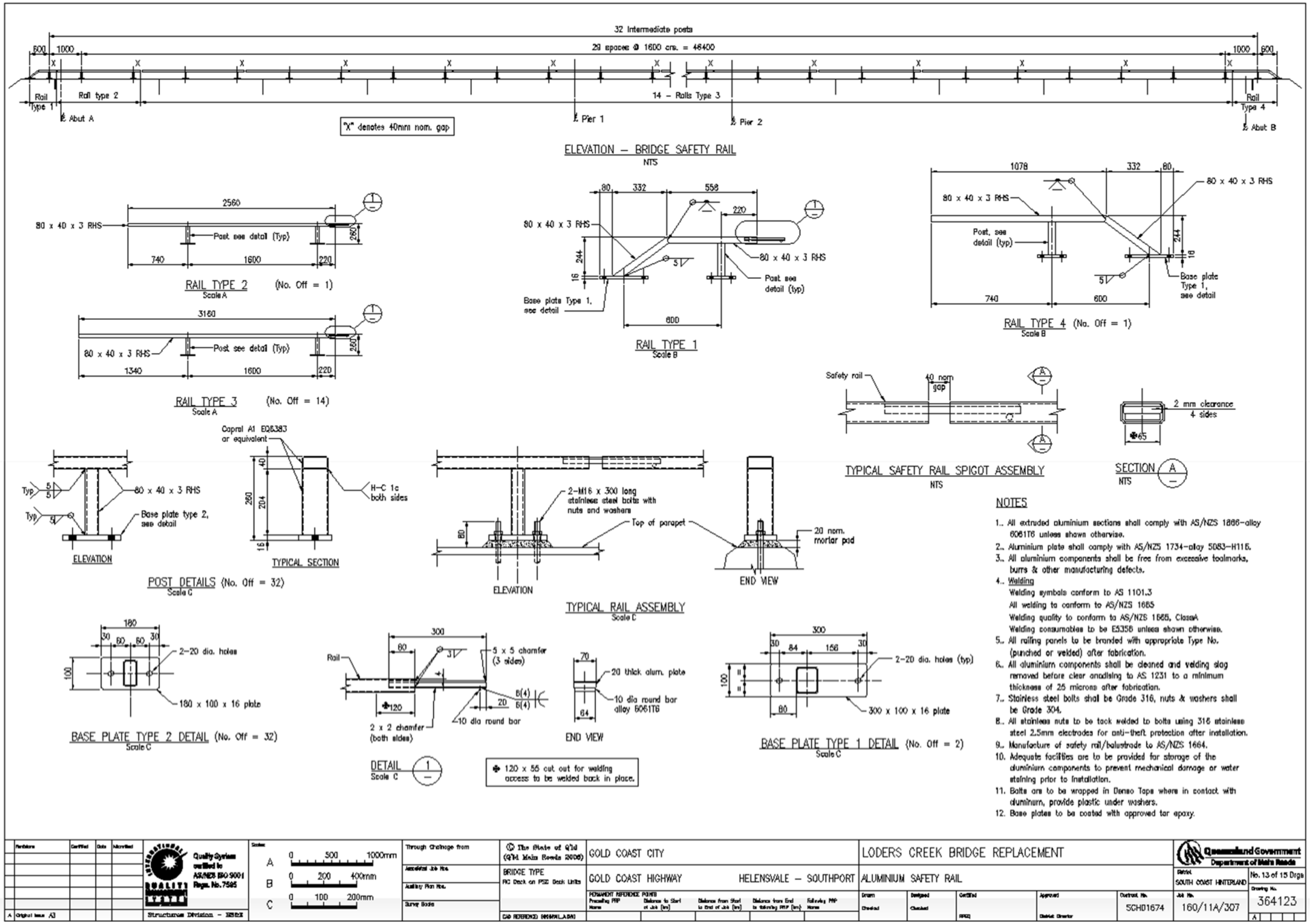
Transport and Main Roads

Job No.	29/313/10
Contract. No.	STHD1098
Drawing No.	536039 C
Series Number	BR01–TR–10 of 10

MRB_Detail (01/10)

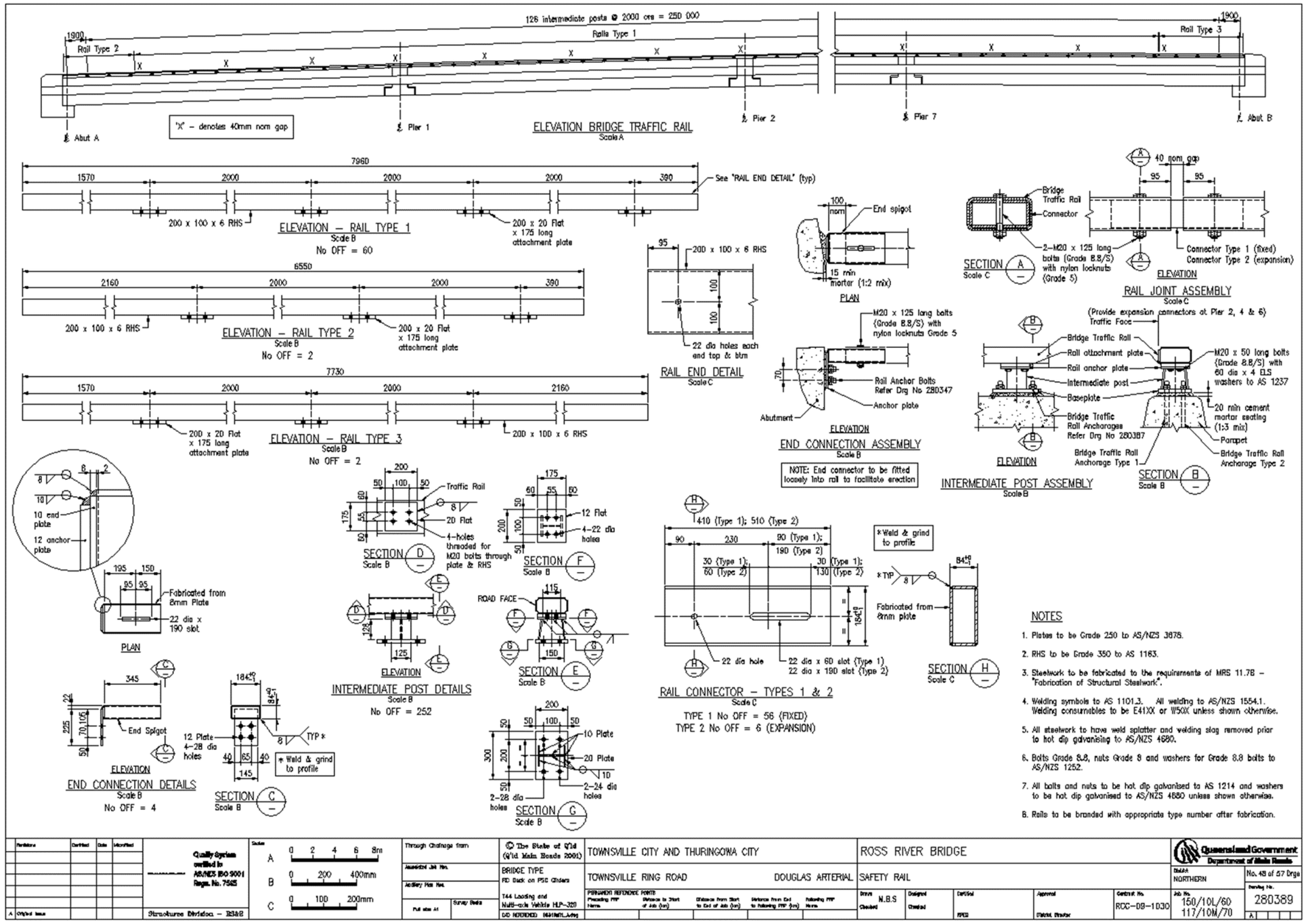
Appendix C – Example Aluminium Bridge Safety Barrier Drawing

Appendix C – Aluminium Bridge Safety Barrier Drawing



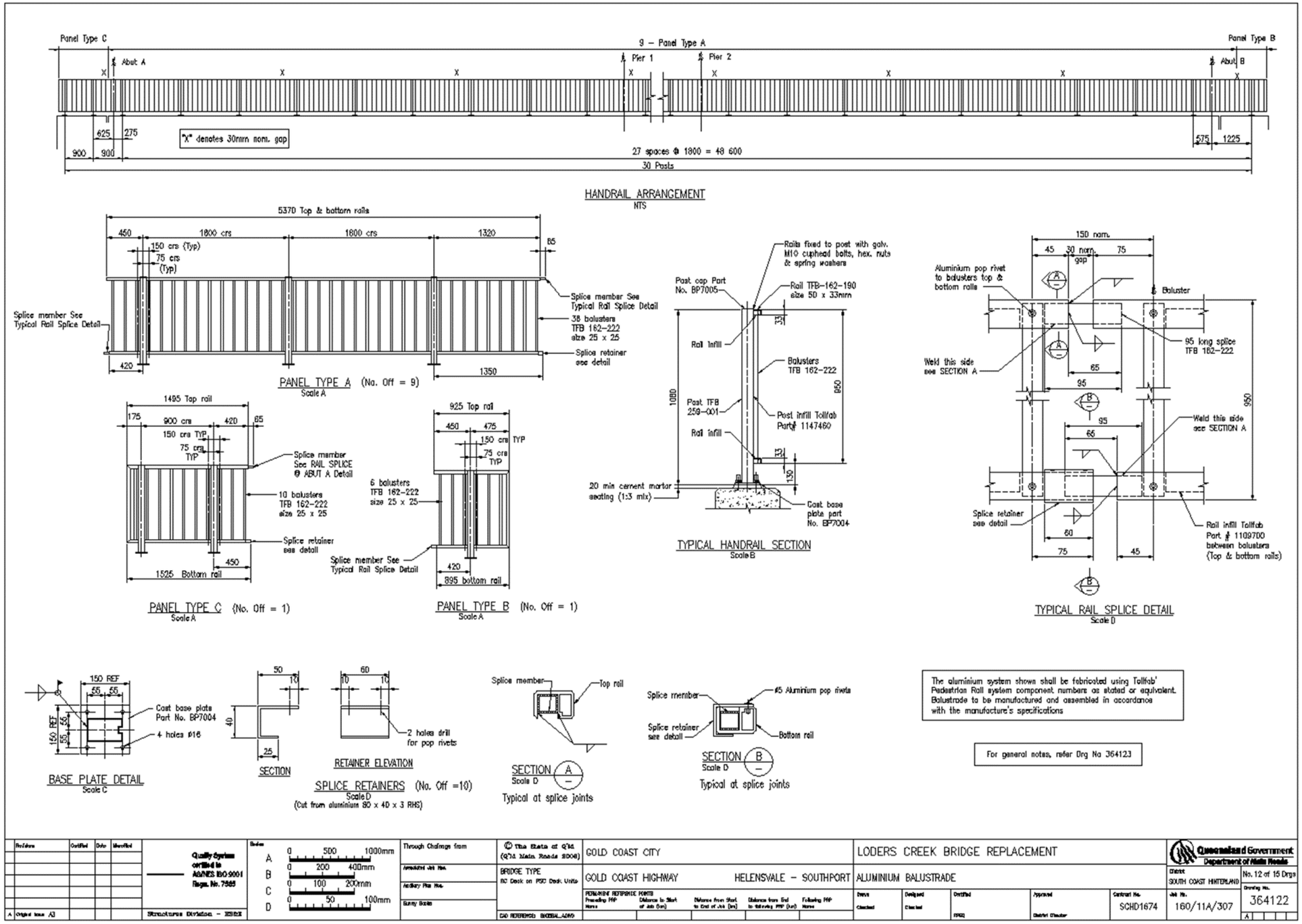
Appendix D – Example Steel Bridge Safety Barrier Drawing

Appendix D – Example Steel Bridge Safety Barrier Drawing



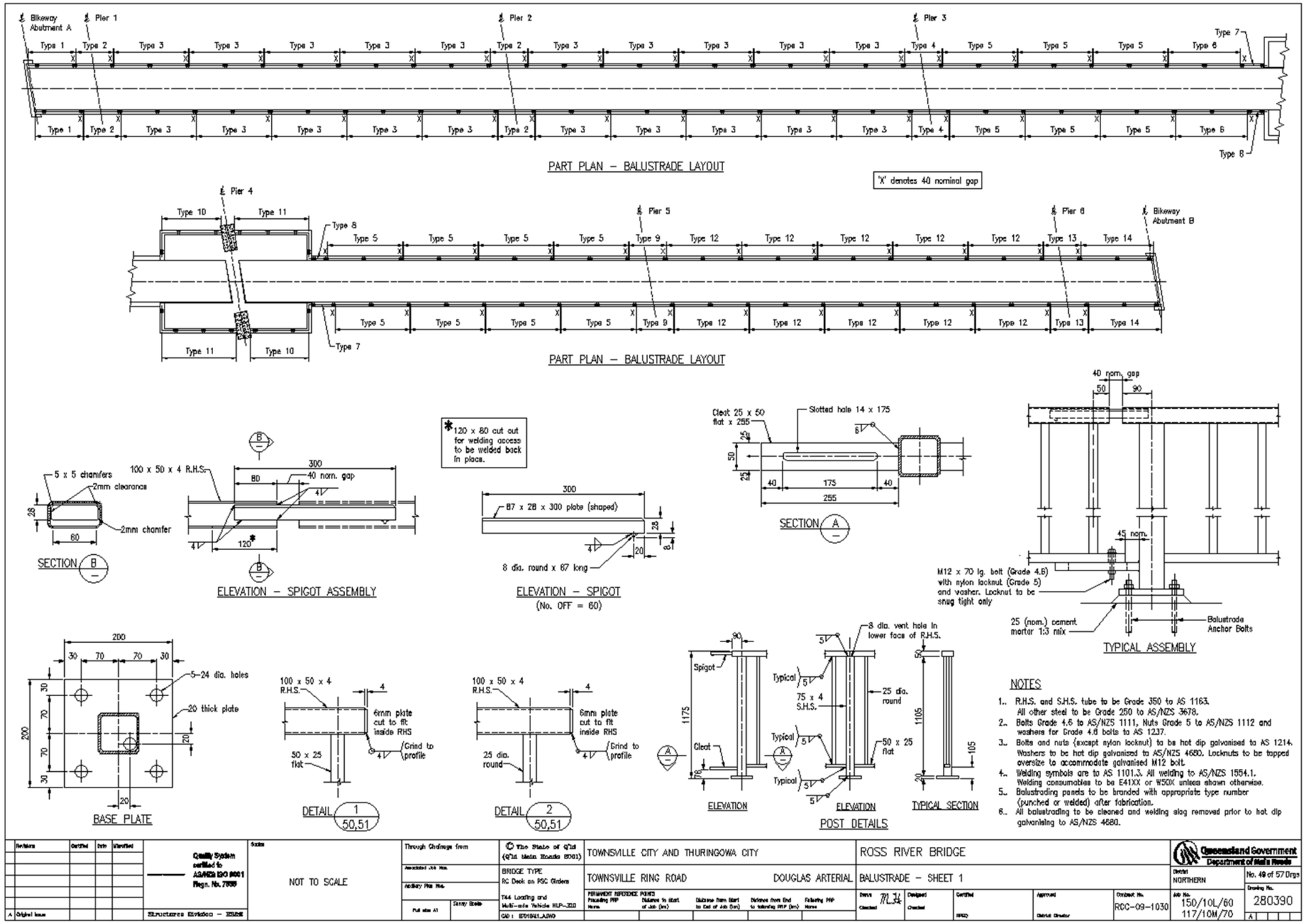
Appendix E – Example Aluminium Bridge Balustrade Drawing

Appendix E – Example Aluminium Bridge Balustrade Drawing

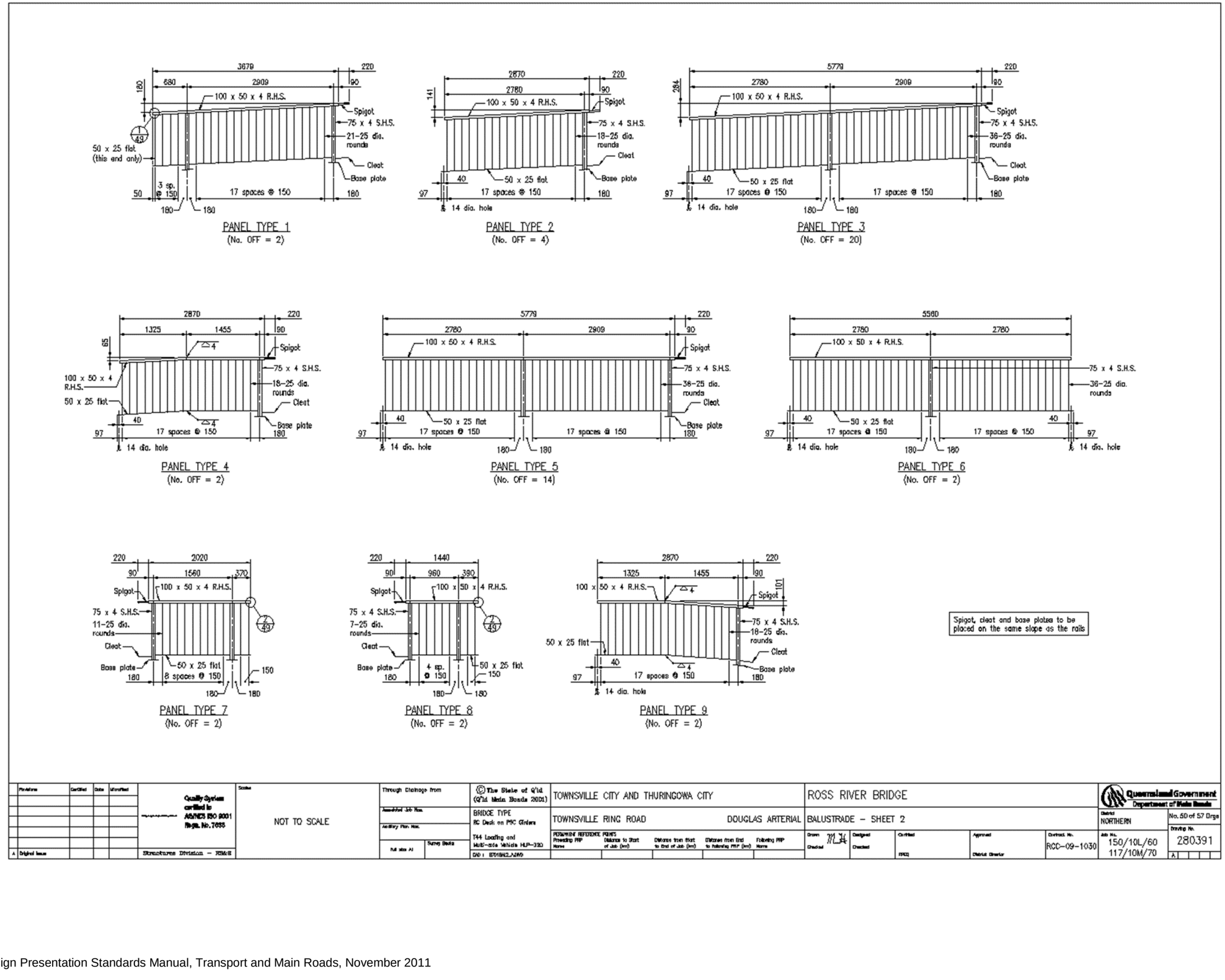


Appendix F – Example Steel Bridge Balustrade Drawing

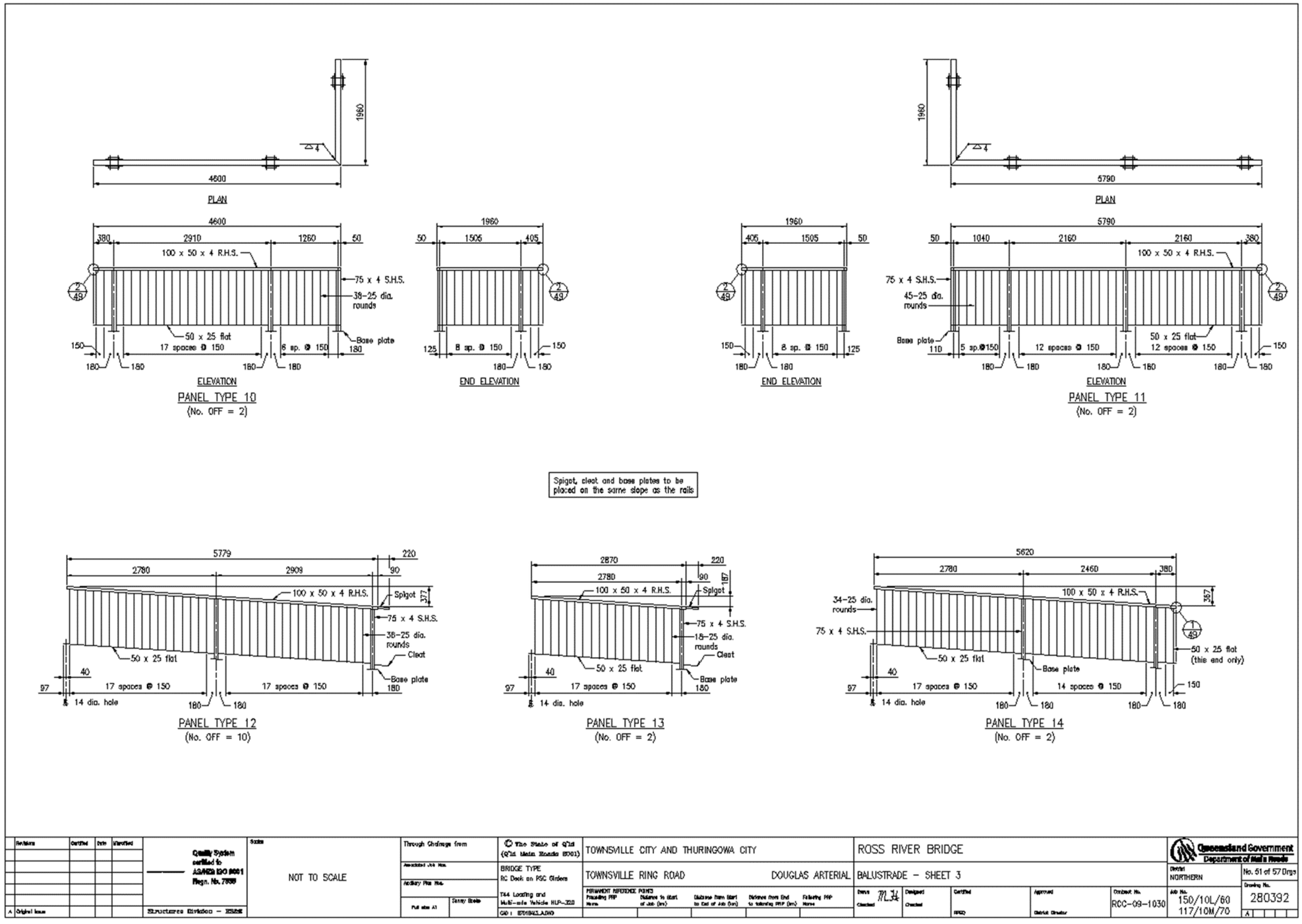
Appendix F – Example Steel Bridge Balustrade Drawing – Sheet 1



Appendix F – Example Steel Bridge Balustrade Drawing – Sheet 2



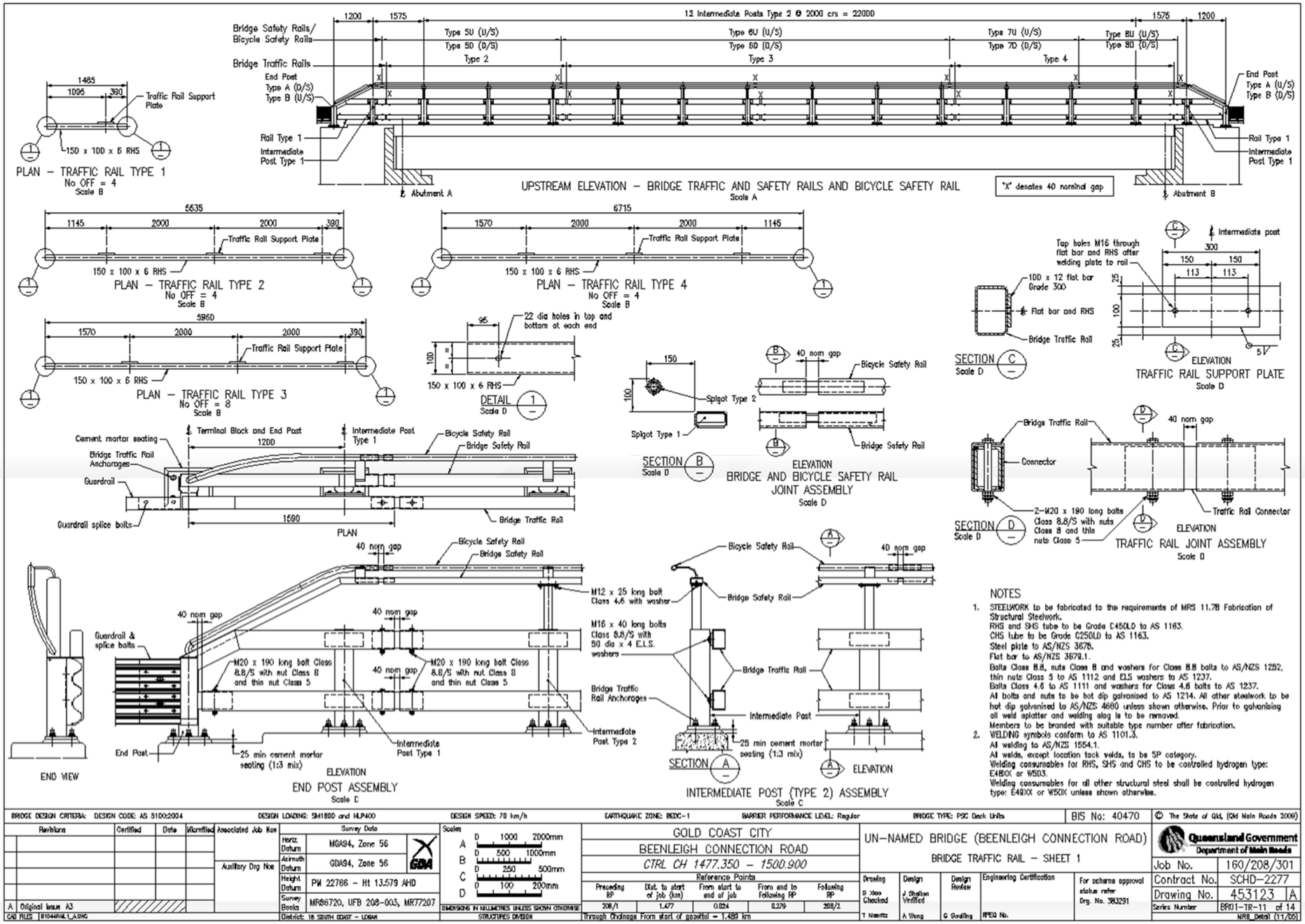
Appendix F – Example Steel Bridge Balustrade Drawing – Sheet 3



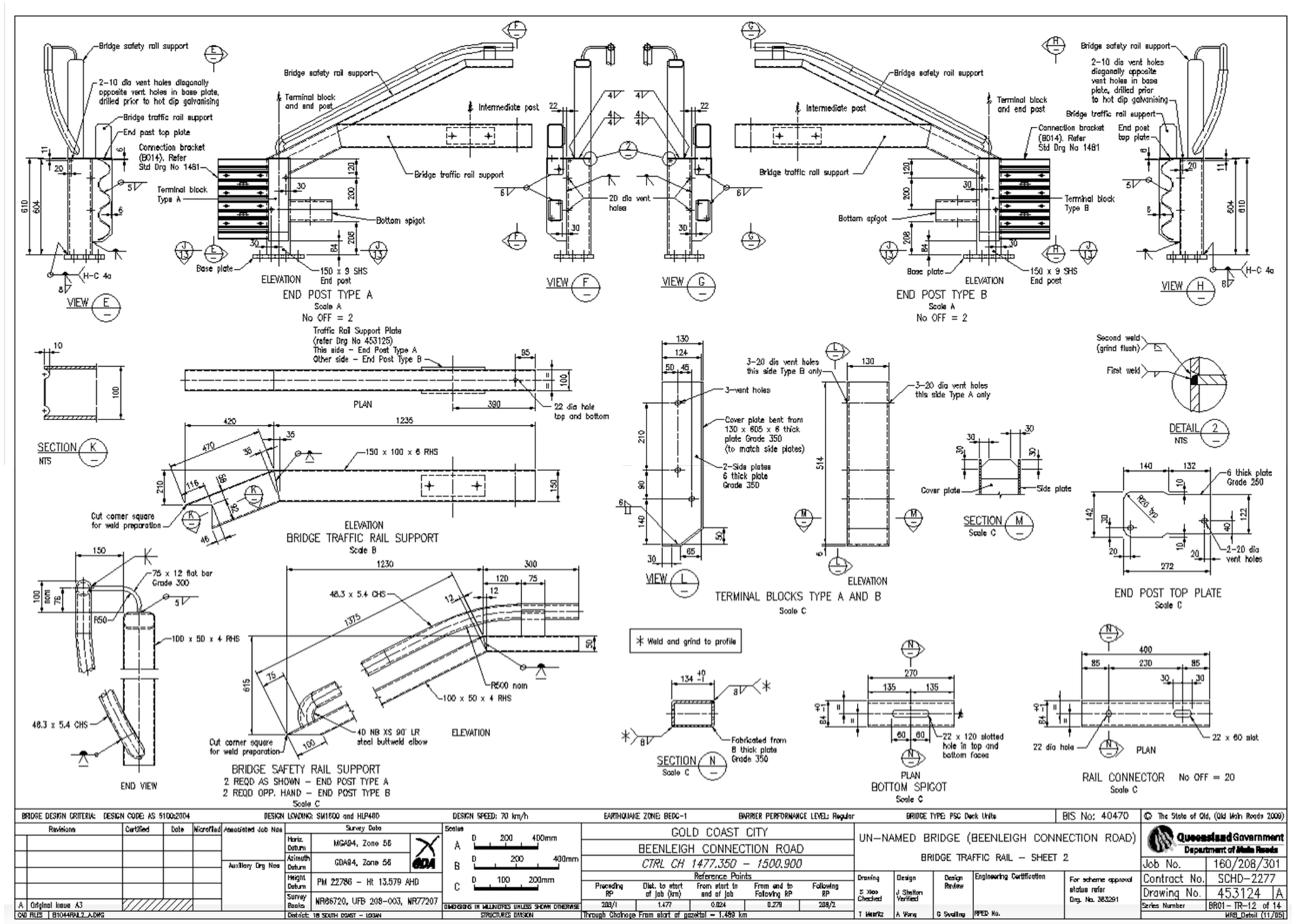
Revisions	Certified	Date	Verified	Quality System certified to AS/NZS ISO 9001 Regn. No. 7958	Scale	Through Chainage from	© The State of Q'ld (Q'ld Main Roads 2001)	TOWNSVILLE CITY AND THURINGOWA CITY	ROSS RIVER BRIDGE					Queensland Government Department of Main Roads			
					NOT TO SCALE	Associated Job Nos.	BRIDGE TYPE RC Deck on RSC Girders	TOWNSVILLE RING ROAD DOUGLAS ARTERIAL	BALUSTRADE – SHEET 3					District NORTHERN		No. 51 of 57 Drgs	
						Ancillary Plan Nos.	T44 Loading and Multi-axle Vehicle HLP-320	PERMANENT REFERENCE POINTS Preceding PRP Name / Distance to start of Job (km) / Distance from start to End of Job (km) / Distance from End to following PRP (km) / Following PRP Name	Drawn ML	Designed	Certified	Approved	Contract No. RCC-09-1030	Job No. 150/10L/60 117/10M/70		Drawing No. 280392	
A	Original Issue			Structures Division – RSDS		Full size A1 / Survey Books	CAD : STDBALS.A3W		Checked	Checked	RPEQ	District Director				A	

Appendix G – Example Steel Bridge Traffic Barrier with Bicycle Safety Rail Drawing

Appendix G – Example Steel Bridge Traffic Barrier with Bicycle Safety Rail Drawing – Sheet 1



Appendix G – Example Steel Bridge Traffic Barrier with Bicycle Safety Rail Drawing – Sheet 2



BRIDGE DESIGN CRITERIA: DESIGN CODE: AS 5100:2004 | DESIGN LOADING: SM1600 and HLP400 | DESIGN SPEED: 70 km/h | EARTHQUAKE ZONE: BEDC-1 | BARRIER PERFORMANCE LEVEL: Regular | BRIDGE TYPE: PSC Deck Units | BIS No: 40470

© The State of Qld, (Qld Main Roads 2009)

Revisions	Certified	Date	Microfilm
A Original Issue A3			

Associated Job Nos

Auxiliary Drg Nos

CAD FILES | B1044RAL2_A.DWG

Survey Data

Horiz. Datum	MGA94, Zone 56
Azimuth Datum	GDA94, Zone 56
Height Datum	PM 22786 – Ht 13.579 AHD
Survey Books	NR86720, UFB 208–003, NR77207

District: 18 SOUTH COAST – LOGAN

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

DIMENSIONS IN MILLIMETRES UNLESS SHOWN OTHERWISE

STRUCTURES DIVISION

GOLD COAST CITY

BEENLEIGH CONNECTION ROAD

CTRL CH 1477.350 – 1500.900

Reference Points

Preceding RP	Dist. to start of Job (km)	From start to end of Job	From end to Following RP	Following RP
208/1	1.477	0.024	0.279	208/2

Through Chainage From start of gazettal = 1.459 km

UN–NAMED BRIDGE (BEENLEIGH CONNECTION ROAD)

BRIDGE TRAFFIC RAIL – SHEET 2

Drawing	Design	Design Review	Engineering Certification
S Joss Checked	J Shelton Verified		
T Heartz	A Wong	G Swalling	RPEQ No.

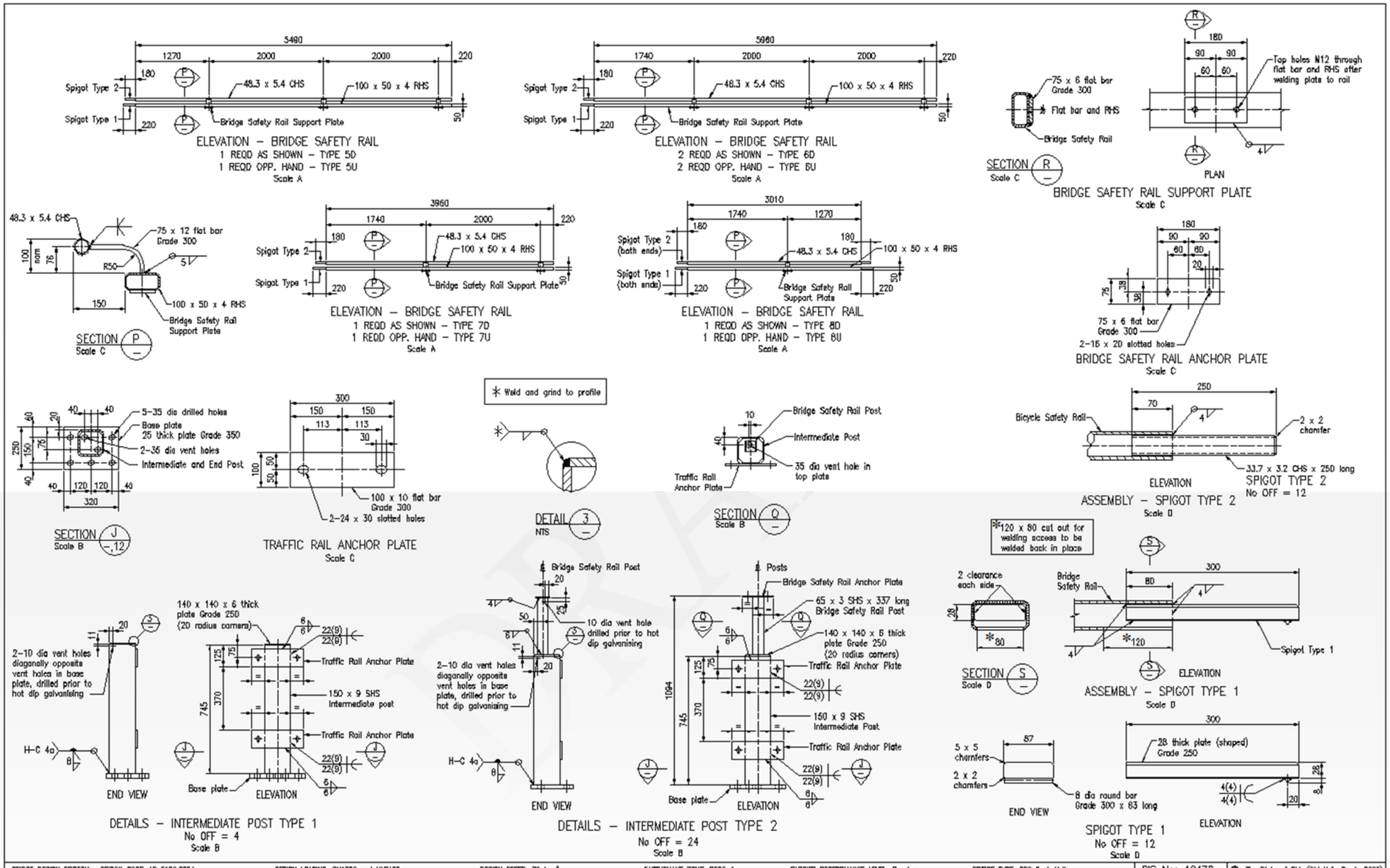
For scheme approval status refer Drg. No. 383291

Queensland Government Department of Main Roads

Job No.	160/208/301
Contract No.	SCHD–2277
Drawing No.	453124 A
Series Number	BR01 – TR–12 of 14

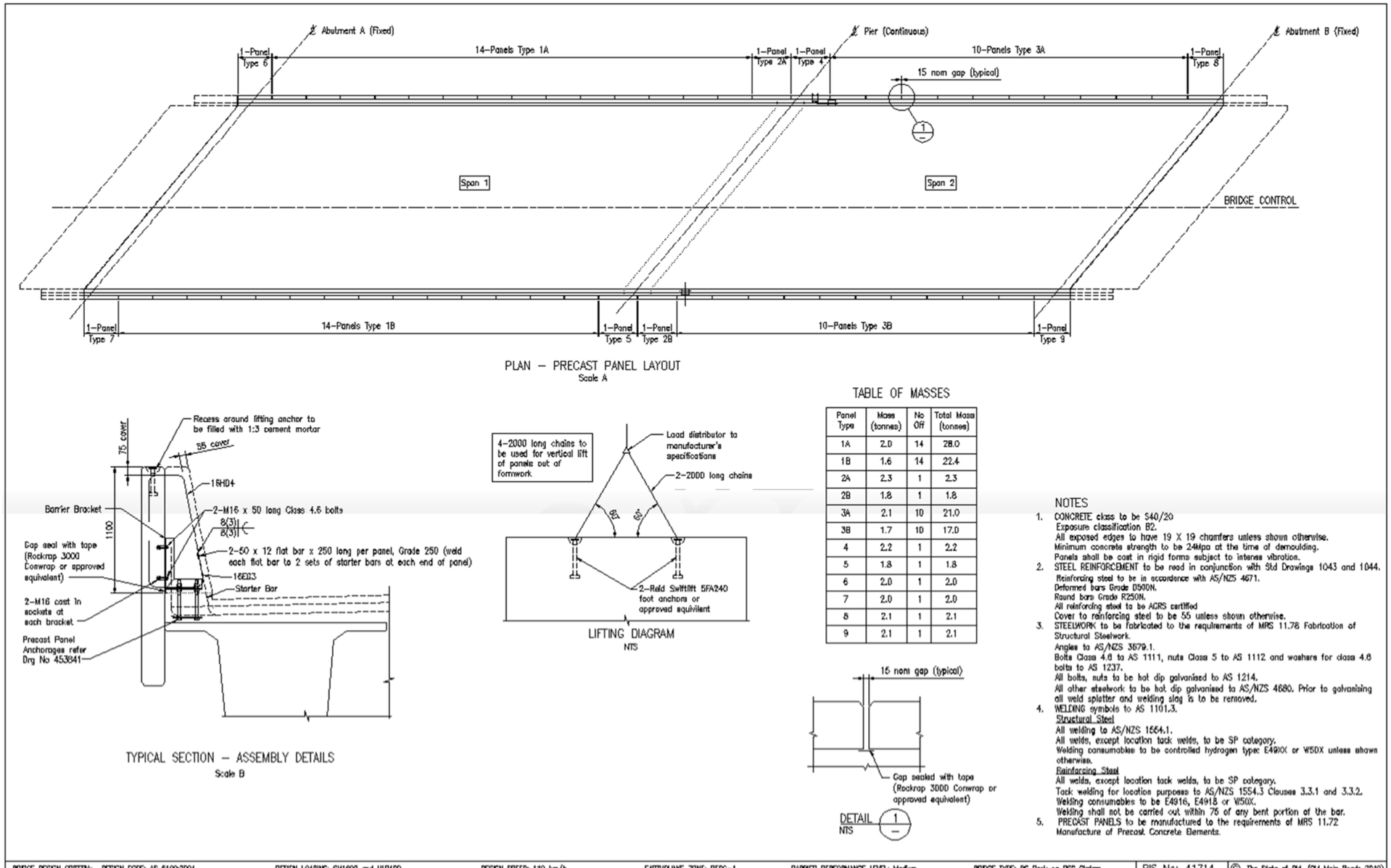
MRB_Detail (11/05)

Appendix G – Example Steel Bridge Traffic Barrier with Bicycle Safety Rail Drawing – Sheet 3

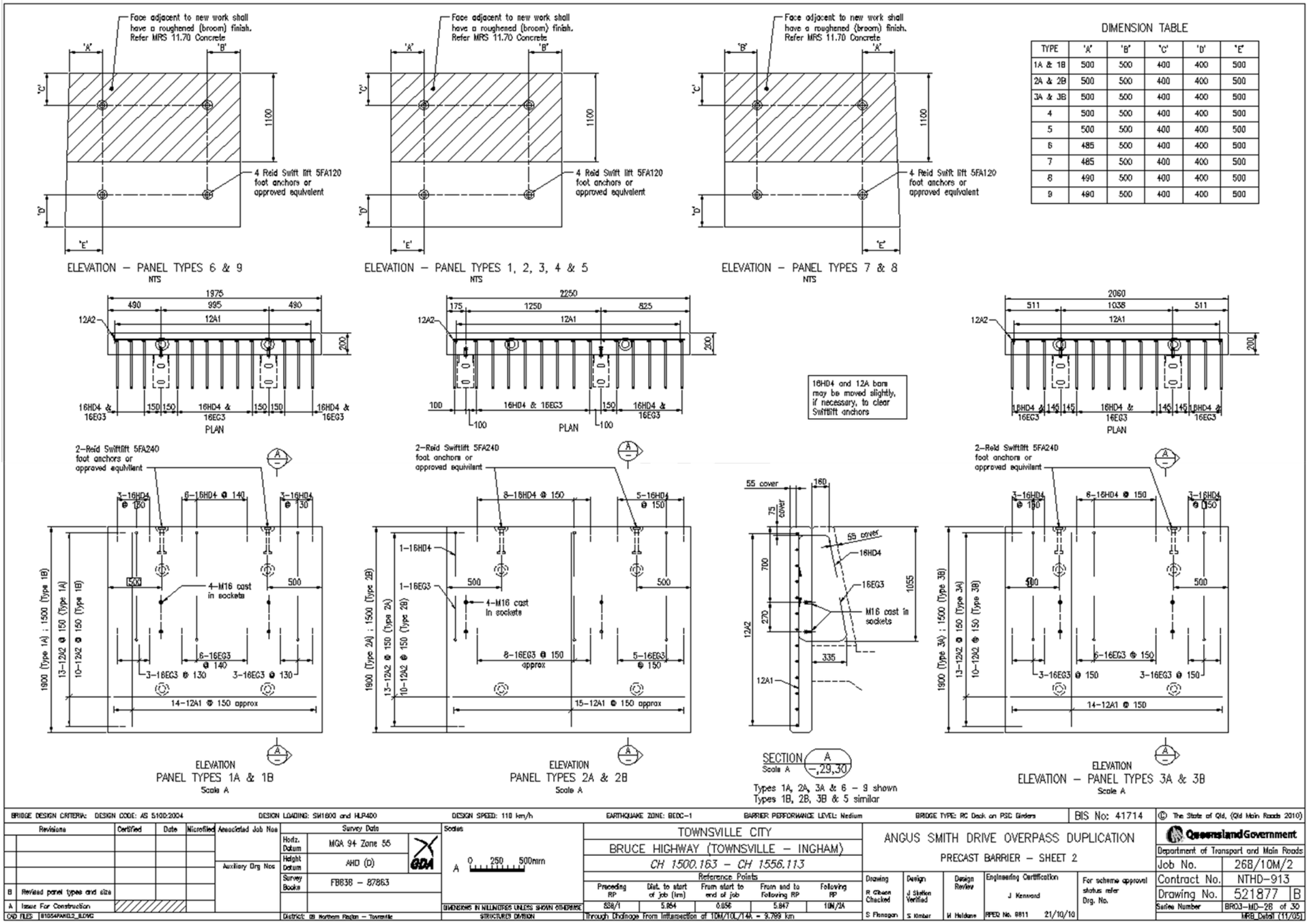


Appendix H – Example Precast Barrier Panel and Deck Drawings

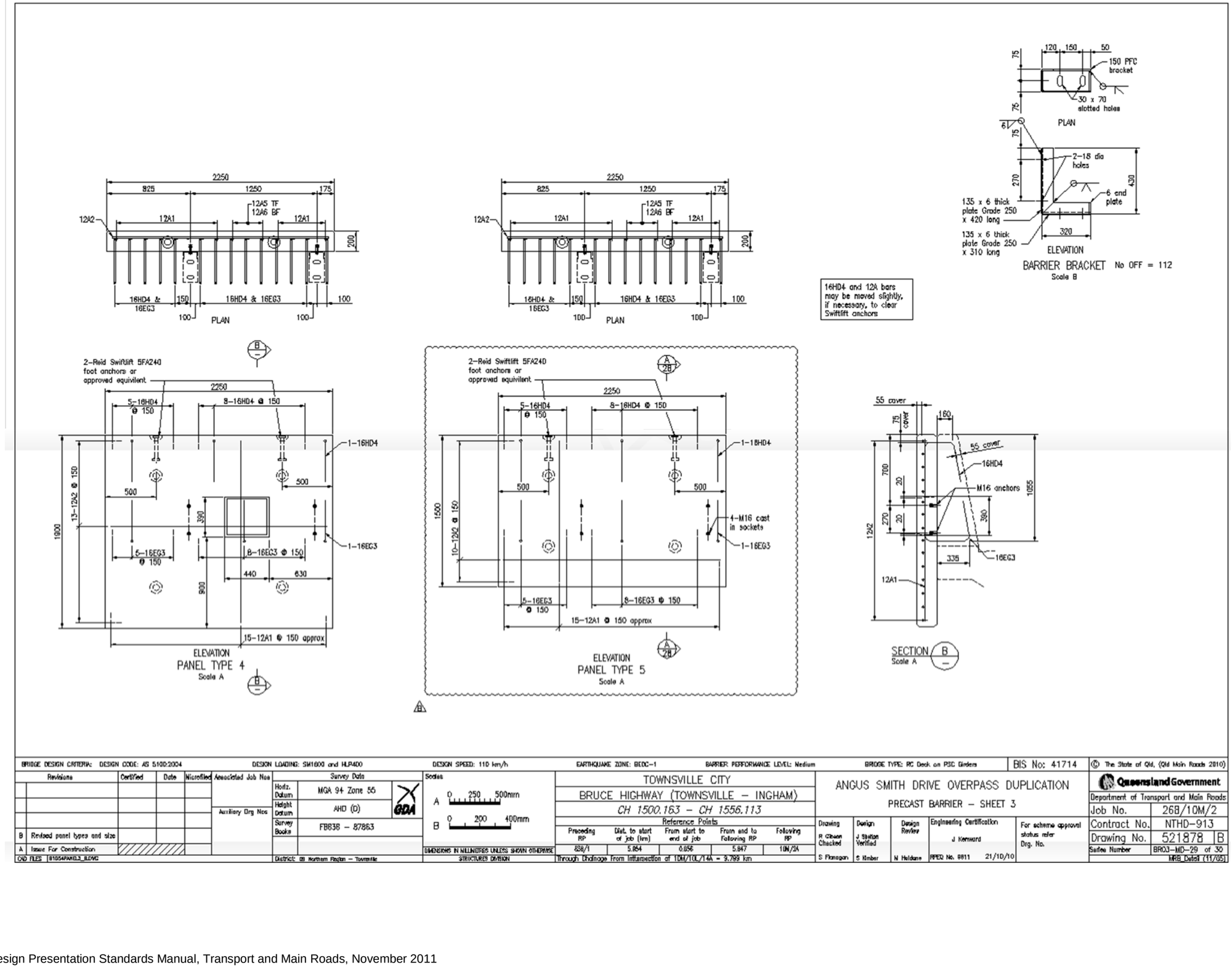
Appendix H – Example Precast Barrier Panel and Deck Drawings – Sheet 1



Appendix H – Example Precast Barrier Panel and Deck Drawings – Sheet 2



Appendix H – Example Precast Barrier Panel and Deck Drawings – Sheet 3



BRIDGE DESIGN CRITERIA: DESIGN CODE: AS 5100:2004 | DESIGN LOADING: SM1600 and HLP400 | DESIGN SPEED: 110 km/h | EARTHQUAKE ZONE: BEDC–1 | BARRIER PERFORMANCE LEVEL: Medium | BRIDGE TYPE: RC Deck on PSC Girders | BIS No: 41714

Revisions	Certified	Date	Microfiled
B Revised panel types and size			
A Issue For Construction			

Associated Job Nos | Auxiliary Drg Nos

Survey Data: Horiz. Datum: MGA 94 Zone 55 (GDA) | Height Datum: AHD (D) | Survey Books: FB838 – 87863

CAD FILES: B1054PANEL3_ELEVC | District: @ Northern Region – Townsville

Scales: A 0 250 500mm | B 0 200 400mm

DIMENSIONS IN MILLIMETRES UNLESS SHOWN OTHERWISE | STRUCTURES DIVISION

TOWNSVILLE CITY
BRUCE HIGHWAY (TOWNSVILLE – INGHAM)
CH 1500.163 – CH 1556.113

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP
638/1	5.854	0.056	5.847	10N/2A

Through Chainage From Intersection of 10M/10L/14A = 9.799 km

ANGUS SMITH DRIVE OVERPASS DUPLICATION
PRECAST BARRIER – SHEET 3

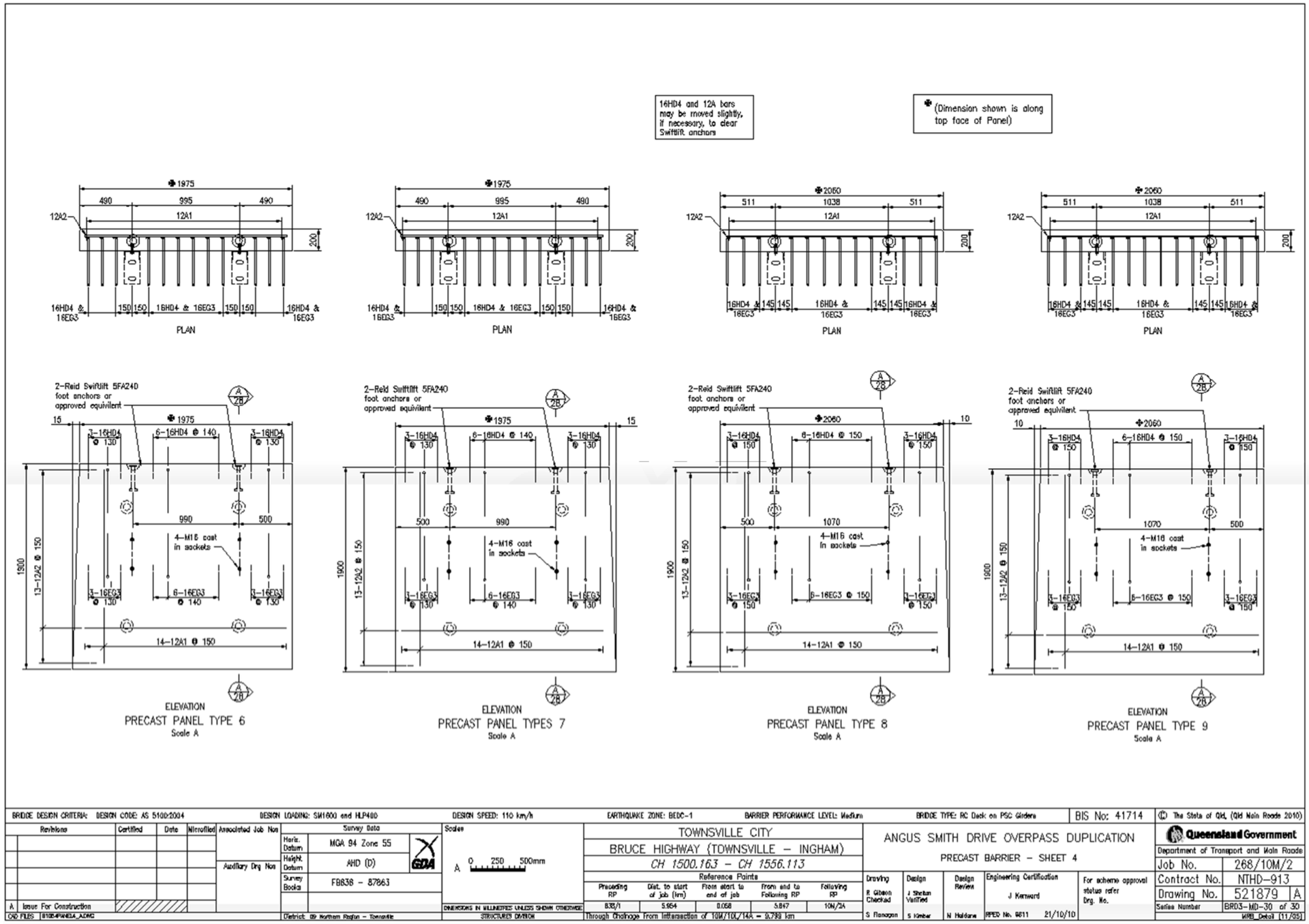
Drawing Checked	Design Verified	Design Review	Engineering Certification	For scheme approval status refer Drg. No.
R Gibson	J Station		J Kenward	
S Flanagan	S Kimber	N Haldane	RPEQ No. 9811 21/10/10	

Queensland Government
Department of Transport and Main Roads

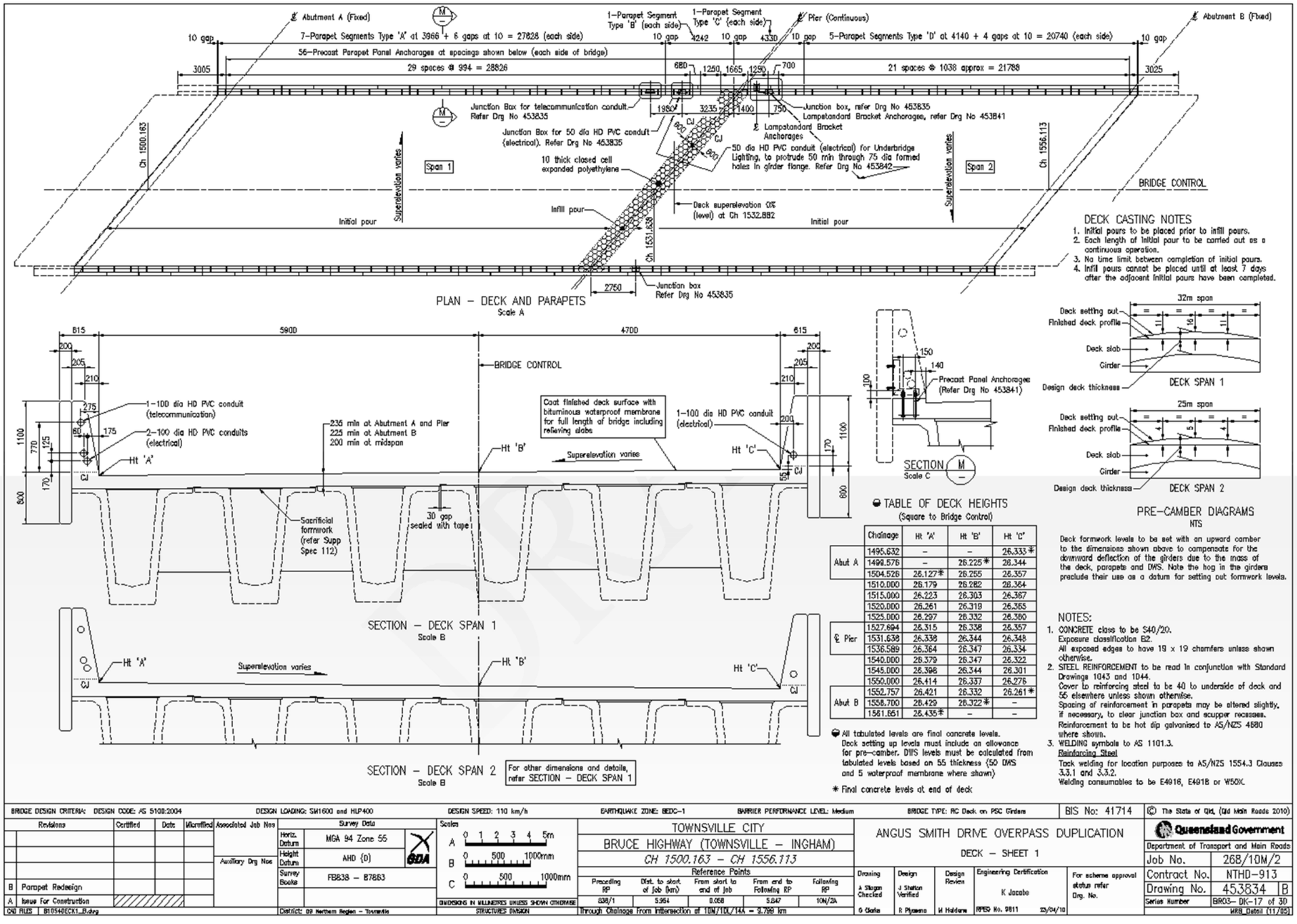
Job No.	268/10M/2
Contract No.	NTHD–913
Drawing No.	521878 B
Sheet Number	BR03–MD–29 of 30

MRB_Detail (11/05)

Appendix H – Example Precast Barrier Panel and Deck Drawings – Sheet 4

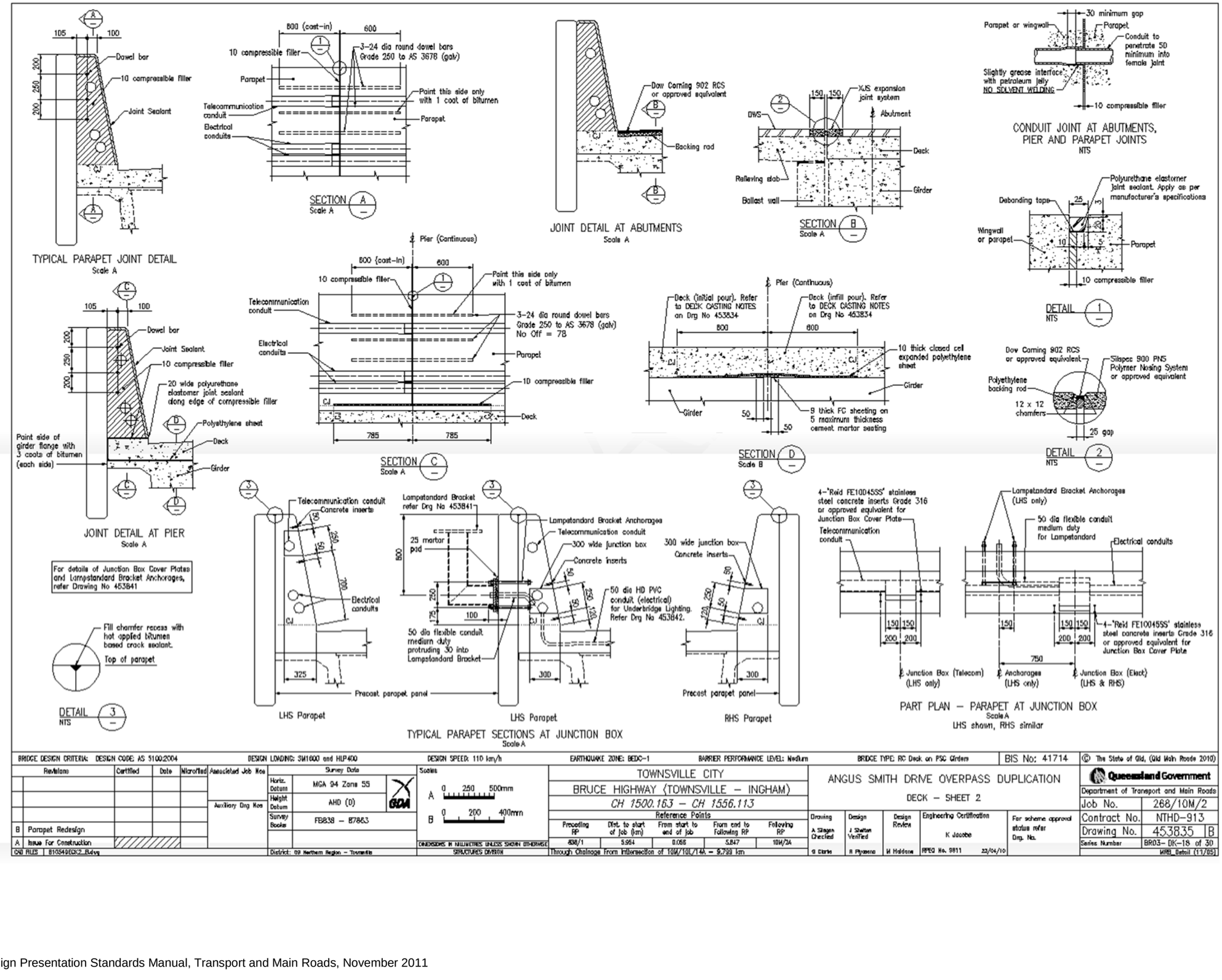


Appendix H – Example Precast Barrier Panel and Deck Drawings – Sheet 5

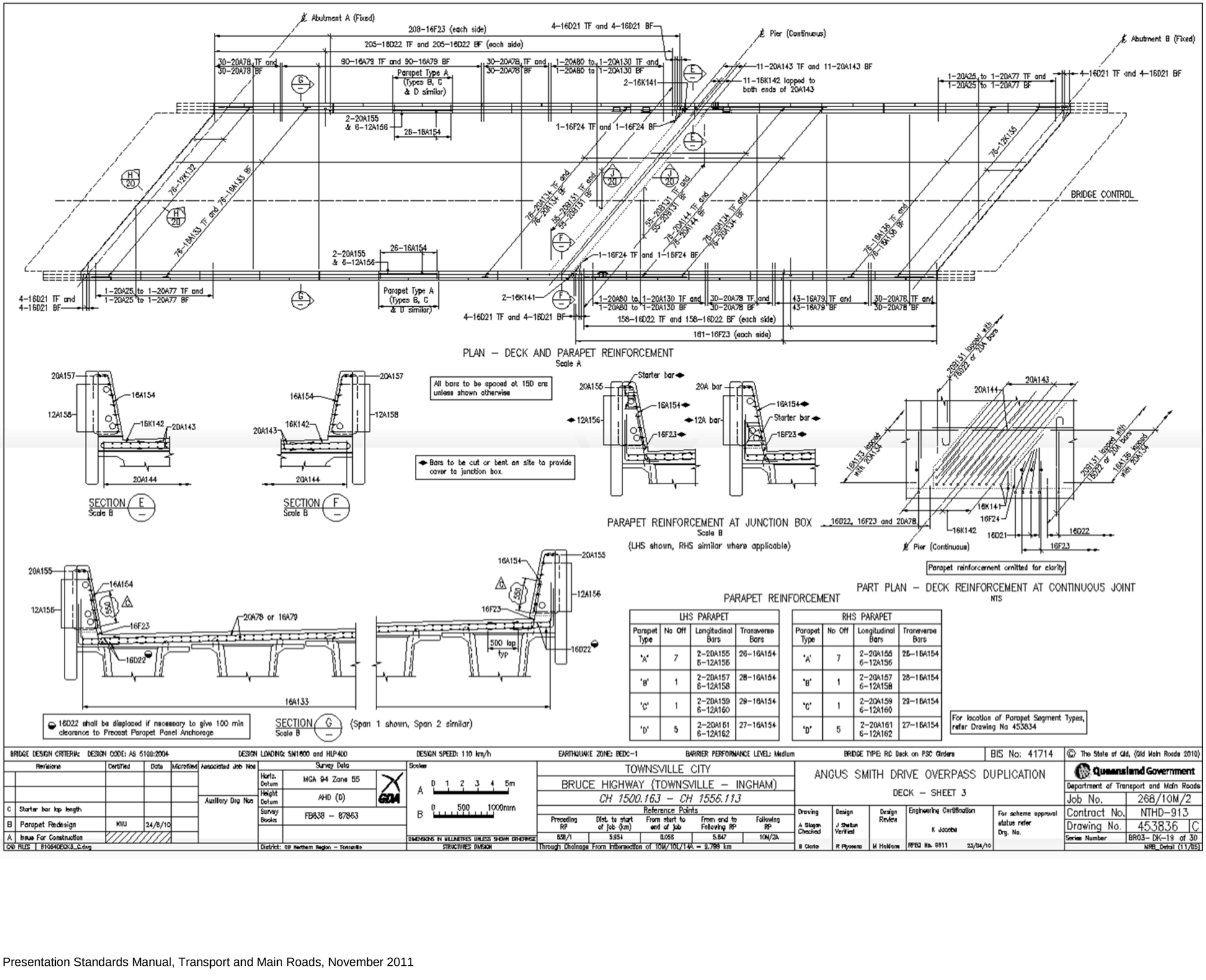


Chainage	Ht 'A'	Ht 'B'	Ht 'C'	
1495.632	–	–	26.333*	Abut A
1498.576	–	26.225*	26.344	
1504.526	26.127*	26.255	26.357	
1510.000	26.179	26.282	26.384	
1515.000	26.223	26.303	26.367	
1520.000	26.261	26.319	26.365	
1525.000	26.297	26.332	26.360	
1527.694	26.315	26.338	26.357	
1531.638	26.338	26.344	26.348	℄ Pier
1536.589	26.364	26.347	26.334	
1540.000	26.379	26.347	26.322	
1545.000	26.398	26.344	26.301	
1550.000	26.414	26.337	26.276	
1552.757	26.421	26.332	26.261*	Abut B
1558.700	26.429	26.322*	–	
1561.861	26.435*	–	–	

Appendix H – Example Precast Barrier Panel and Deck Drawings – Sheet 6



Appendix H – Example Precast Barrier Panel and Deck Drawings – Sheet 7



PARAPET REINFORCEMENT

LHS PARAPET			
Parapet Type	No Off	Longitudinal Bars	Transverse Bars
'A'	7	2–20A155 6–12A156	26–16A154
'B'	1	2–20A157 6–12A158	28–16A154
'C'	1	2–20A159 6–12A160	29–16A154
'D'	5	2–20A161 6–12A162	27–16A154

RHS PARAPET			
Parapet Type	No Off	Longitudinal Bars	Transverse Bars
'A'	7	2–20A155 6–12A156	26–16A154
'B'	1	2–20A157 6–12A158	28–16A154
'C'	1	2–20A159 6–12A160	29–16A154
'D'	5	2–20A161 6–12A162	27–16A154

For location of Parapet Segment Types, refer Drawing No 453834

BRIDGE DESIGN CRITERIA: DESIGN CODE: AS 5100:2004 DESIGN LOADING: SM1600 and HLP400 DESIGN SPEED: 110 km/h EARTHQUAKE ZONE: BEDC–1 BARRIER PERFORMANCE LEVEL: Medium BRIDGE TYPE: RC Deck on PSC Girders BIS No: 41714 © The State of Qld, (Qld Main Roads 2010)

Revisions		Certified	Date	Microfilmed
C	Starter bar lap length			
B	Parapet Redesign	KWJ	24/8/10	
A	Issue For Construction			

CAD FILES: B1054DECK3_C.dwg

Associated Job Nos:
Auxiliary Drg Nos:

Survey Data: Horiz. Datum: MGA 94 Zone 55; Height Datum: AHD (D); Survey Books: FB838 – 87863
District: QR Northern Region – Townsville

Scales: A 0 1 2 3 4 5m; B 0 500 1000mm
DIMENSIONS IN MILLIMETRES UNLESS SHOWN OTHERWISE
STRUCTURES DIVISION

TOWNSVILLE CITY
BRUCE HIGHWAY (TOWNSVILLE – INGHAM)
CH 1500.163 – CH 1556.113

Reference Points

Preceding RP	Dist. to start of Job (km)	From start to end of Job	From end to Following RP	Following RP
838/1	5.954	0.058	5.847	10N/2A

Through Chainage From Intersection of 10W/10L/14A = 9.799 km

ANGUS SMITH DRIVE OVERPASS DUPLICATION
DECK – SHEET 3

Drawing	Design	Design Review	Engineering Certification
A Slagen Checked	J Shelton Verified		K Jacobs
B Clarke	R Flowers	M Hoklans	RPEQ No. 8811 23/04/10

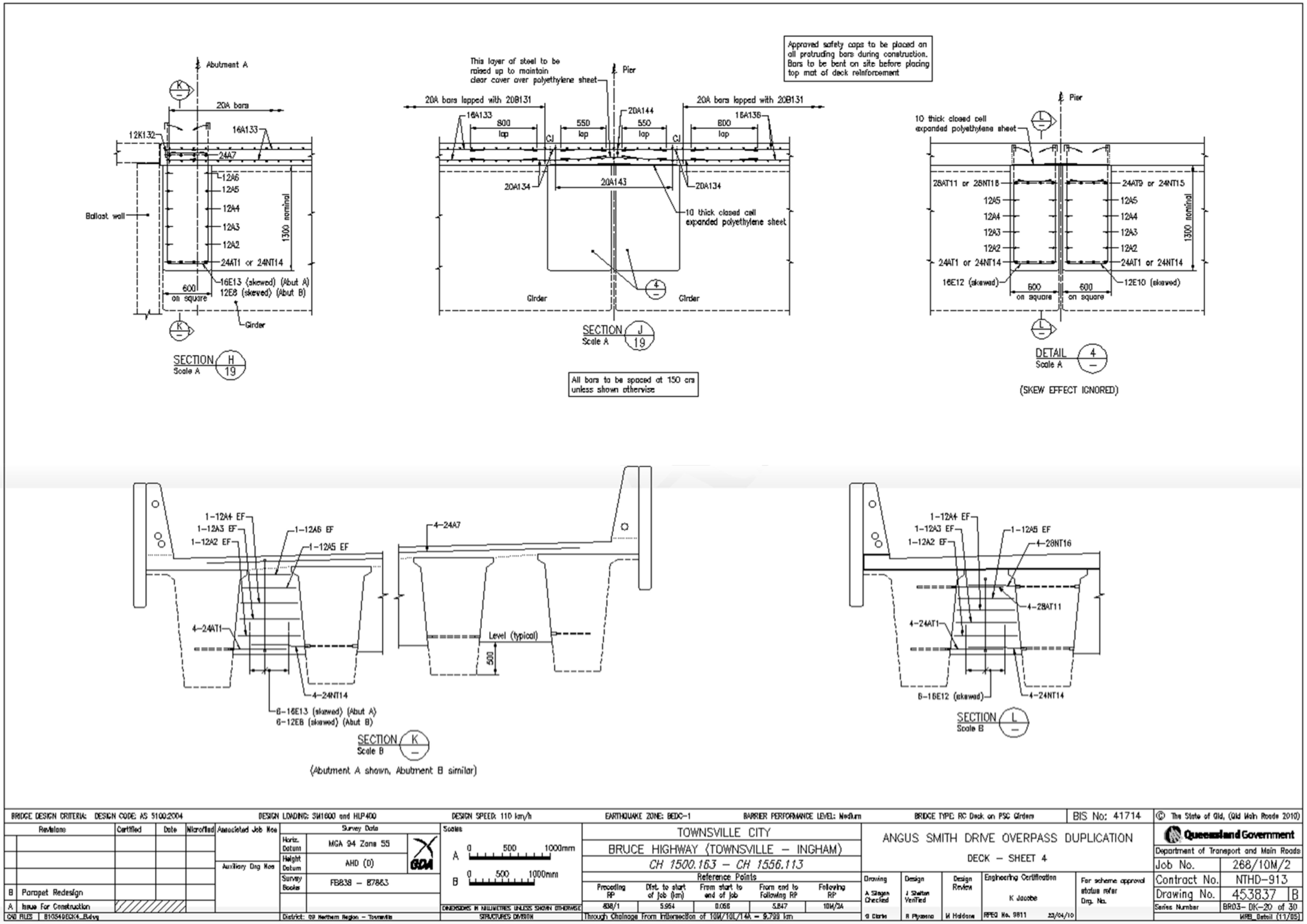
For scheme approval status refer Drg. No.

Queensland Government
Department of Transport and Main Roads

Job No.	268/10M/2
Contract No.	NTHD–913
Drawing No.	453836 C
Series Number	BR03– DK–19 of 30

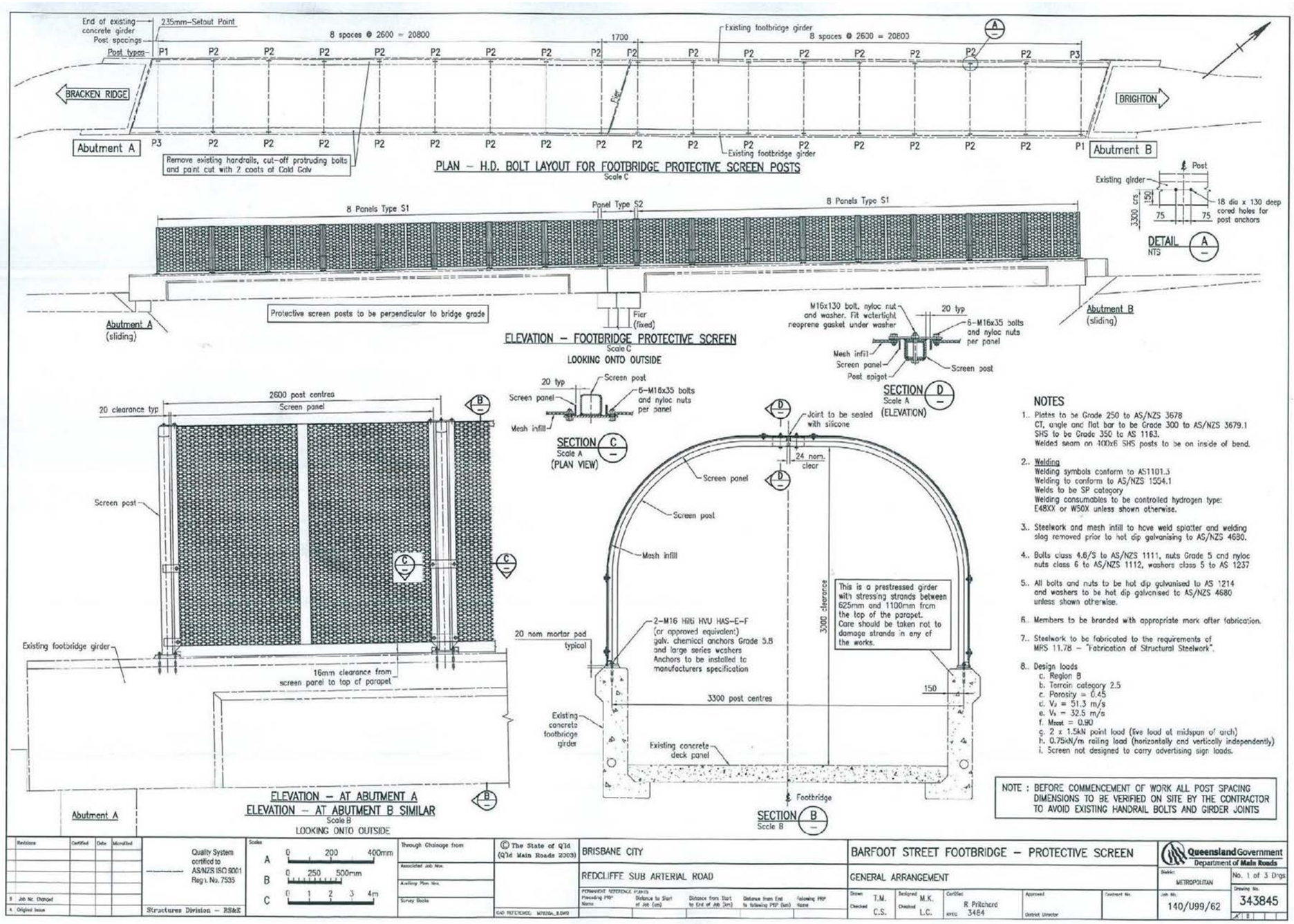
NREL_Detail (11/05)

Appendix H – Example Precast Barrier Panel and Deck Drawings – Sheet 8

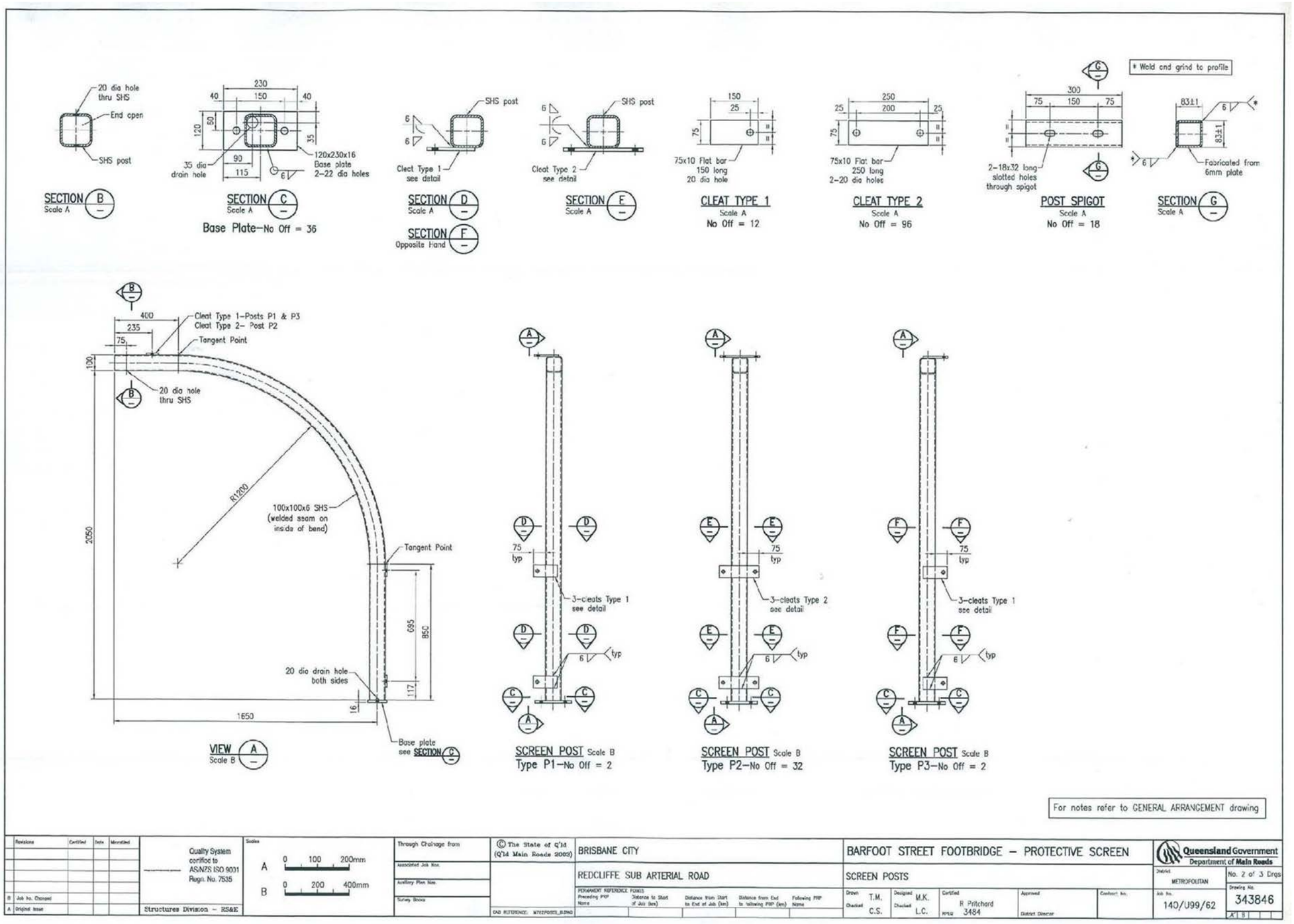


Appendix I – Example Protection Screen Drawings

Appendix I – Example Protection Screen Drawings – Sheet 1



Appendix I – Example Protection Screen Drawings – Sheet 2



Appendix I – Example Protection Screen Drawings – Sheet 3