

Drafting and Design Presentation Standards Volume 2: Road Design Concept and Development Presentation

Part 2: Development Phase Drawings (Preliminary and Detailed Design Phase Stages)

July 2024



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Amendment Register

Issue / Rev no.	Reference section	Description of revision	Authorised by	Date
1	-	Initial Release	Director (Road Design) Geospatial, Design and Capability (E&T)	Sep 2015
2	2.13, 2.23, 3.24	Updates to Roadway Lighting, and Roadway Safety Barrier System sections	Director (Road Design) Hydraulics, Design and Spatial (E&T)	Sep 2022
3	All	General textual refinements, amendments and inclusion of registered drawing examples	Director (Road Design) Hydraulics, Design and Spatial (E&T)	March 2024
4	2.15	New section in Intelligent Transport Systems (ITS)	Executive Director (Operational Technologies) State Network Operations (SNO)	July 2024

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2 Urban road design drawings – (preliminary / detailed design phase stages)

2.1 General

Urban road design generally involves 'brownfield' drawing presentation. A brownfield site is one where existing infrastructure has been in place for some time, such as:

- road pavements
- structures, for example buildings, bridges, culverts, etc.
- utilities, for example power lines, telecommunication lines, water and sewer services, etc.
- drainage systems
- vegetation
- urban intersections, and
- access to abutting or nearby properties.

A further constraint on a brownfield site may be the need to retain all or part of the road in service during the course of the works. These requirements can then place limitations or constraints on the design.

The department's *Road Planning and Design Manual* provides a guide for designers and engineers in this type of design.

Projects may vary from, simple alterations to existing pavement markings and signage, to a multi-lane arterial road reconstruction.

The presentation of urban road design drawings will be dependent on the complexity of the project. Some projects will only require a layout plan and notes, whereas more complex projects will require the full suite of drawings as depicted in the typical drawing list below.

The major test for the reasonableness of a standard adopted for a particular project is that of fitness for purpose. The approach of this manual is to define the presentation standards that will provide appropriate levels of fitness for purpose.

2.2 Typical drawing list

A typical drawing list for a complex urban road design project is:

- locality plan and drawing list (Section 2.3)
- typical cross sections (Section 2.4)
- existing features (Section 2.5)
- control line and set-out details (Section 2.6)
- construction details (Section 2.7)
- intersection details (Section 2.8)
- longitudinal section (Section 2.9)
- pavement details (Section 2.10)
- drainage layout (Section 2.11.1)

- drainage longitudinal sections (Section 2.11.2)
- drainage details (Section 2.11.3)
- drainage catchments (Section 2.11.4)
- pavement markings and signage (Section 2.12)
- roadway lighting (Section 2.13)
- traffic signals (Section 2.14)
- Intelligent Transport Systems (ITS) (Section 2.15)
- landscaping (Section 2.16)
- noise barriers (Section 2.17)
- special treatment details (as required) (Section 2.18)
- annotated cross sections (Section 2.19)
- construction staging (Section 2.20)
- erosion and sediment control (Section 2.21)
- extended design domain (Section 2.22)
- as constructed (Section 2.23)
- road safety barrier system (Section 2.24)

2.3 Locality plan and drawing list

This drawing is the 'cover sheet' for the drawing set and provides a locality plan, drawing list and the submitted and approval signature block. For large drawings sets, the locality plan and drawing list will need to be placed on separate drawings to ensure that there is adequate space available for the locality plan.

Considerations

Locality plan

- Scale select scale to show project site relative to landmarks
- Use background map that adequately shows extent of project and its relationship to local area, for example Cadastral Boundaries (if not available then use DCDB), photo mosaic, etc.
- Orientate the locality plan to match the project plans (where possible)
- Add names of streets, creeks, local landmarks and so on
- Include north point

Drawing list

- Add drawing list attribute to standard sheet
- Include all drawings in the scheme
- Continue on additional sheet(s) if necessary

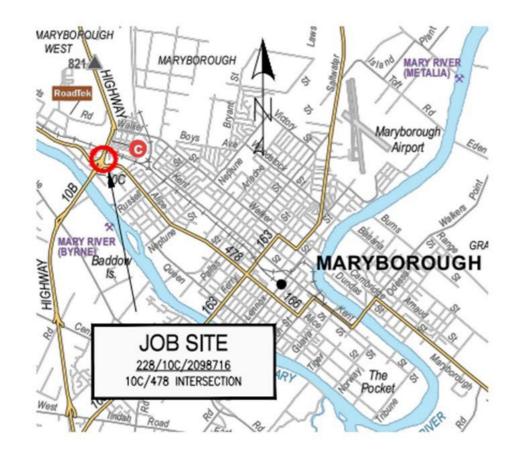
Submission and approval

Add approvals attribute to standard sheet – refer to the department's *Drafting and Design Presentation Standards Manual*, Volume 1, Chapter 1 Figure 1.6.3.1(a).

Figure 2.3(a) - Locality plan - registered example 1

Department of Transport and Wain Roads MRR_Detail (03/21)

BRUCE HWY ON RAMP N/B FROM ALMA ST VAS SIGNAGE INSTALLATION



DRAWING INDEX

Drawing Number	Revision	Series Number	Drawing Description
868258	A	1 of 2	LOCALITY PLAN
868259	A	2 of 2	WORKING PLAN

Total Number of Drawings = 2

TRAFFIC DATA

AAOT		9817 VPD
% Heavy Vehicles		22.34%
Date of Count	-	2020

SCHEME SUBMITTED (External Consultants or Internal Business Unit):

This design meets the requirements of all relevant Australian Standards, Austroads Guidelines and Transport and Main Roads — Policies. References, Standards, Planning and Design Instructions, Guidelines and the requirements of the project brief functional specifications.

CNED: Mark Morris TITLE: Principal Desi

Organisation: Transport and Main Roads

SCHEME SCOPE AND FINANCIAL APPROVAL: (Regional Director or Delegate):

I hereby certify that this scheme complies with the intent of the scope and financial limits of the relevant project on QTRIP and the scheme is approved for release in accordance with that

propositi

TITL

DATE:

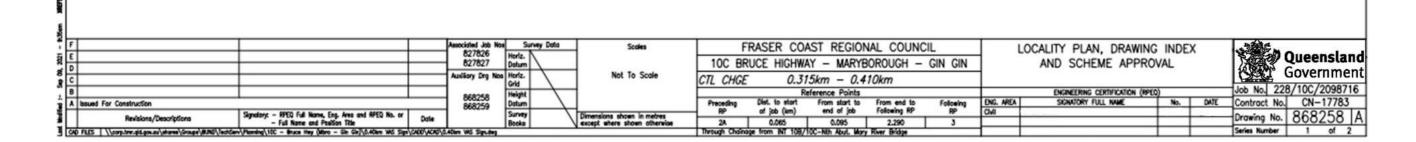


Figure 2.3(b) – Locality plan – registered example 2

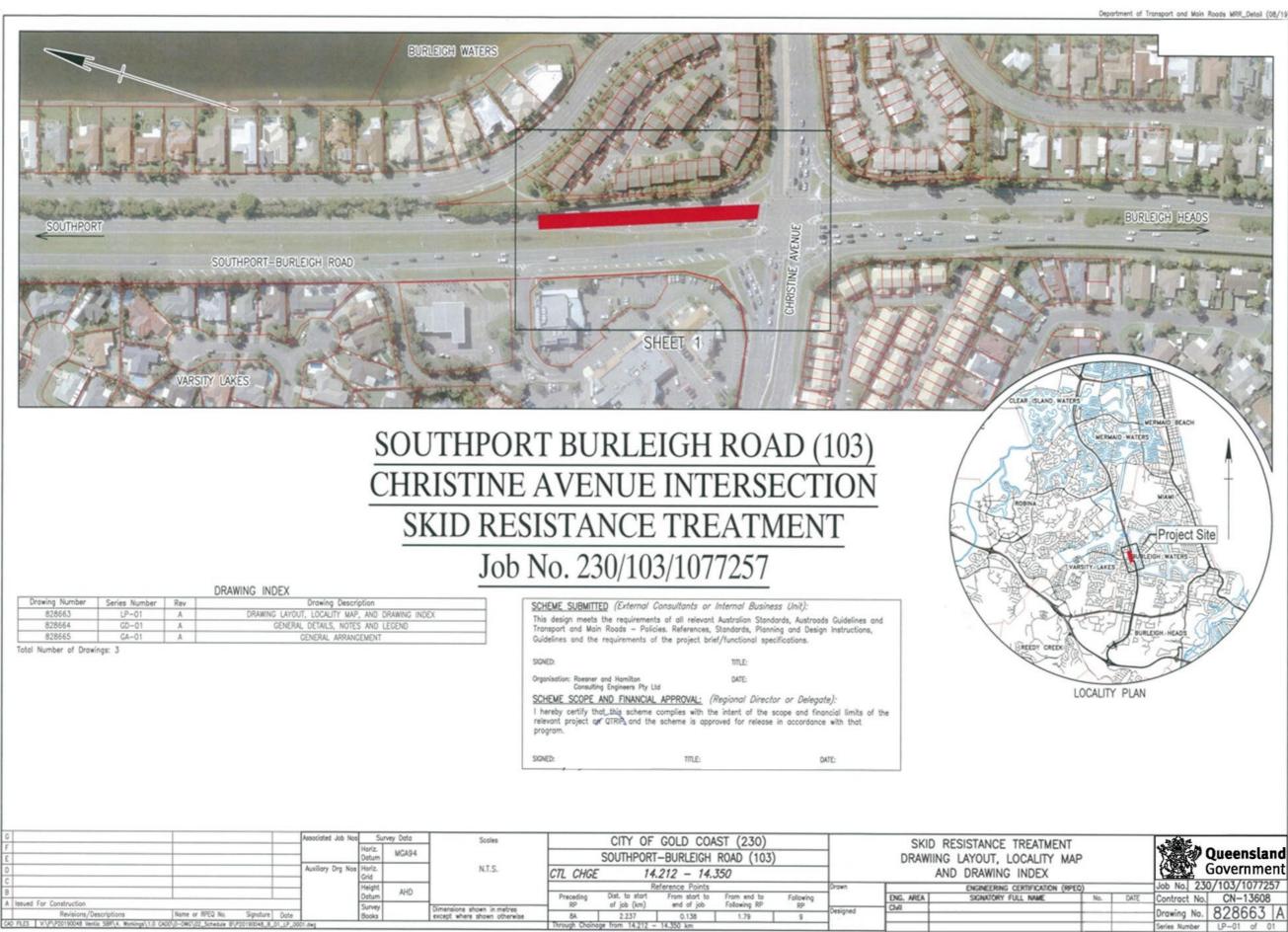
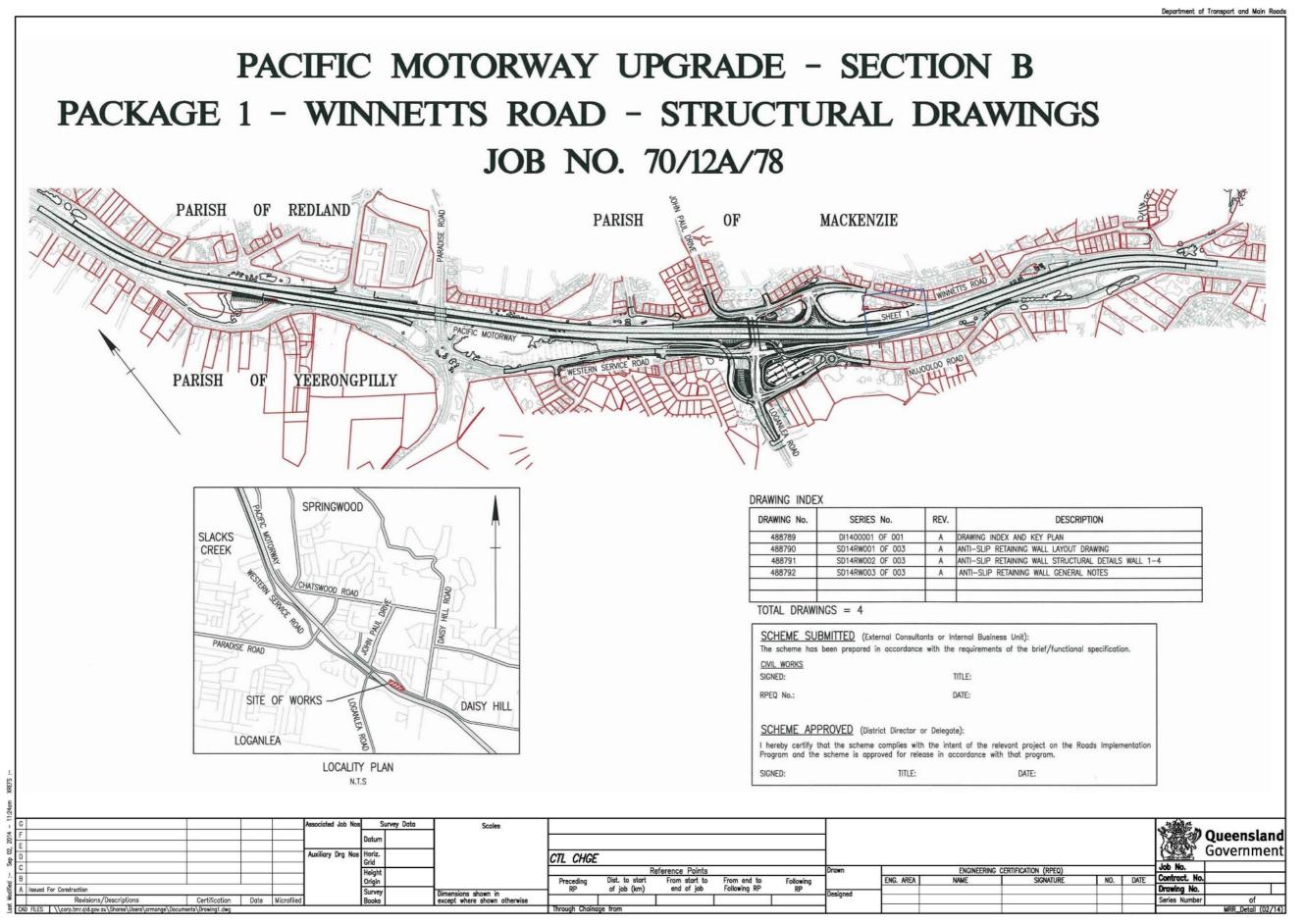


Figure 2.3(c) – Drawing list – generic example

DWG NO.	REV	SERIES NO.	DRAWING DESCRIPTION					2			
529451	A	1 of 120	Locality Map and Scheme Approval	529511	A		Drainage Layout - System E (6 of 8)	529571 -	A	52 Plans	Annototed Cross Sections - Control Line MCBH1
529452	A	2 of 120	Drawing Index	529512	A		Droinage Layout - System F (7 of 8)	529622	^	UZ FIGHS	ALLOWING CLOSS SECTIONS — COULDS FINE WORLD
529453	A	3 of 120	Typical Cross Sections (1 of 9)	529513	A		Drainage Layout - System C (8 of 8)	529623 -	A	9 Plans	Annotated Cross Sections - Control Line MCBH2
529454	A	4 of 120	Typical Cross Sections (2 of 9)	529514	A		Gully Pit Drainage Tables (1 of 2)	529631	"	a rivits	(Roundabout and Approaches Only)
529455	A	5 of 120	Typical Cross Sections (3 of 9)	529515	A		Gully Pit Drainage Tables (2 of 2) Stormwater Drainage Outlet Tables	529632 -	A	1 Plon	Annotated Cross Sections - Control Line MCTL1
529456 529457	A	6 of 120 7 of 120	Typical Cross Sections (4 of 9) Typical Cross Sections (5 of 9)	529516 529517	A		Pipe Setout at Gully Pits (1 of 3)	529632		1 1 100	Allowated cross Sections - Control Line Mole:
529458	A	8 of 120	Typical Cross Sections (6 of 9)	529518	A		Pipe Setout at Gully Pits (2 of 3)	529633 -	Α.	2 Plans	Annotated Cross Sections - Control Line MCTL2
529459	A	9 of 120	Typical Cross Sections (7 of 9)	529519	A		Pipe Setout at Gully Pits (3 of 3)	529634	"	E 110010	Principles Gross Sections - Soliton Fire World
529460	A	10 of 120	Typical Cross Sections (8 of 9)	529520	A		Bro-pit Details	529635 -	A	2 Plans	Annotated Cross Sections - Control Line WCMS1
529461	A	11 of 120	Typical Cross Sections (9 of 9)	529521	A	71 of 120		529636	n	2 11013	Principles cross Seconds - Control Circ WORST
529462	A	12 of 120	Control Line Setout (1 of 4)	529522	A	72 of 120		529637 -	A	5 Plans	Annotated Cross Sections - Control Line MCSR1
529463	A	13 of 120	Control Line Setout (2 of 4)	529523	A	73 of 120	Toble Drain Outlet Protection 148753.5 MCBH1 (RHS)	529641	ि	J Pidis	Armototed cross Sections - Control time WCSK1
529464	A	14 of 120	Control Line Setout (3 of 4)	529524	A	74 of 120	Roundabout Western RCBC Endwalls (1 of 2)	529642 -	A	4 Plans	Annotated Cross Sections - Control Line MCSR2
529465	A	15 of 120	Control Line Setout (4 of 4)	529525	A	75 of 120	Roundobout Western RCBC Endwalls (2 of 2)	529645	^	4 Pigns	Armototed cross Sections - Control Line WCSN2
529466	A	16 of 120	Working Plan - Control Line MCBH1 (1 of 4)	529528	A	76 of 120	Roundabout Eastern RCBC Endwalls (1 of 2)	529646 -	A	2 Diago	Annototed Cross Sections - Control Line MCSR3
529467	A	17 of 120	Working Plan - Control Line MCBH1 (2 of 4)	529527	A	77 of 120	Roundabout Eastern RCBC Endwalls (2 of 2)	529647	^	2 Plans	Annotated Crass Sections - Control Line MCSKS
529468	A	18 of 120	Working Plan - Control Line MCBH1 (3 of 4)	529528	A		RC Culvert Details (1 of 2)	529648 -		0.0	
529469	A	19 of 120	Working Plan - Control Line MCBH1 (4 of 4)	529529	A		RC Culvert Details (2 of 2)	529649	A	2 Plans	Annotated Crass Sections - Control Line MCSR4
529470	A	20 of 120	Working Plan - Control Line MCBH2 (1 of 4)	529530	A	80 of 120	Drainage Inlet/Outlet Schedule	529650 -			1-11-10-0-1-0-1-1-1-1-1-1-1-1-1-1-1-1-1
529471	A	21 of 120	Working Plan - Control Line MCBH2 (2 of 4)	529531	A		Kerb and Channel Termination and Subsoil Drainage Details	529660	A	11 Plans	Annotated Cross Sections - Control Line MCRB1
529472	A	22 of 120	Working Plan - Control Line MCBH2 (3 of 4)	529532	A		Subsoil Drainage (1 of 4)				
529473	A	23 of 120	Working Plan - Control Line MCBH2 (4 of 4)	529533	A		Subsoil Drainage (2 of 4)				
529474 529475	A	24 of 120	Working Plan - Control Lines MCTL1, MCTL2 and MCMS1 Working Plan - Control Lines MCSR1 and MCSR2	529534	A		Subseil Drainage (3 of 4) Subseil Drainage (4 of 4)				
529475	A	25 of 120 26 of 120	Working Plan - Control Lines MCRB1, MCSR3 and MCSR4	529535 529536	A		Traffic Signal Installation — Operations and Electrical				
529476	A	26 of 120 27 of 120	Povement Detail (1 of 4)	529537	A		Traffic Signal Installation - Pits, Conduits and Footings				
529477	A	28 of 120	Povement Detail (2 of 4)	529538	A	88 of 120	Rood Lighting - Street Lighting Layout and Schedule (1 of 8)				
529479	A	29 of 120	Povement Detail (3 of 4)	529538	A	89 of 120					
529480	A	30 of 120	Povement Detail (4 of 4)	529540	A	90 of 120					
529481	A	31 of 120	Temples Lane Intersection - General Arrangement	529541	A	91 of 120	Rood Lighting - Street Lighting Layout and Schedule (4 of 8)				
529482	A	32 of 120	Temples Lane Intersection — Setout Detail	529542	A	92 of 120					
529483	A	33 of 120	Temples Lone Intersection - Footpath Detail (South West Corner)	529543	A		Rood Lighting - Street Lighting Layout and Schedule (6 of 8)				
529484	A	34 of 120	Temples Lane Intersection - Footpath Detail (South East Corner)	529544	A	94 of 120					
529485	A	35 of 120	Main Street Intersection - General Arrangement	529545	A	95 of 120					
529486	A	36 of 120	Main Street Intersection - Setout Detail	529546	A	96 of 120					
529487	Α	37 of 120	Stockroute Road Roundabout - General Arrangement	529547	A	97 of 120	Rood Lighting - Rate 3 Street Lighting Reticulation				
529488	A	38 of 120	Stockroute Road Roundabout - Design Surface Contours	529548	A	98 of 120	Rood Lighting - Rate 3 Street Lighting Reticulation				
529489	Α	39 of 120	Islands and Medians Setout Detail (1 of 2)	529549	A	99 of 120	Rood Lighting - Rate 3 Street Lighting Reticulation				
529490	A	40 of 120	Islands and Medians Setout Detail (2 of 2)	529550	A	100 of 120					
529491	Α	41 of 120	Depressed Medians Detail	529551	A	101 of 120					
529492	A	42 of 120	Private Entrances (1 of 6)	529552	A		Rood Lighting - Rate 3 Street Lighting Reticulation				
529493	A	43 of 120	Private Entrances (2 of 6)	529553	A		Rood Lighting - Rote 3 Street Lighting Reticulation				
529494	A	44 of 120	Private Enfrances (3 of 6)	529554	A		Road Lighting - Rate 3 Street Lighting Reticulation				
529495	A		Private Entrances (4 of 6)	529555	A		Rood Lighting - Rote 3 Street Lighting Reticulation				
529496	A	46 of 120	Private Entrances (5 of 6) Private Entrances (6 of 6)	529556	A		Rood Lighting - Rote 3 Street Lighting Reticulation				
529497	A	47 of 120 48 of 120	Guardrail Detail (1 of 3)	529557	A		Rood Lighting - Rate 3 Street Lighting Reticulation Rood Lighting - Rate 3 Street Lighting Reticulation				
529498 529499	A	48 of 120 49 of 120	Guardrali Detail (1 of 3) Guardrali Detail (2 of 3)	529558 529559	A		Rood Lighting - Rate 3 Street Lighting Reticulation				
529499	A	50 of 120		529560	A		Rood Lighting - Rate 3 Street Lighting Reticulation				
529500	A	50 of 120 51 of 120	Povement Marking and Signage (1 of 5)	529560	A		Rood Lighting - Rate 3 Street Lighting Reticulation				
529502	A	52 of 120	Povement Marking and Signage (2 of 5)	529562	A		Rood Lighting - Rate 3 Street Lighting Reticulation				
529502	A	53 of 120	Pavement Marking and Signage (2 of 5)	529563	A		Rood Lighting - Rate 3 Street Lighting Reticulation				
529504	A	54 of 120	Pavement Marking and Signage (4 of 5)	529564	A		Rood Lighting - Rate 3 Street Lighting Reticulation				
529505	A	55 of 120	Pavement Marking and Signage (5 of 5)	529585	A		Rood Lighting - Rate 3 Street Lighting Reticulation				
529506	A	56 of 120	Drainage Layout (1 of 8)	529566	A		Road Lighting - Rate 3 Street Lighting Reticulation				
529507	A	57 of 120	Drainage Layout - System A (2 of 8)	529567	A		Existing Services (1 of 2)				
529508	A		Drainage Layout - System B (3 of 8)	529568	A		Existing Services (2 of 2)				
529509	A	59 of 120	Drainage Layout - System C (4 of 8)	529569	A		Environmental Detail and Records (1 of 2)				
529510	A	60 of 120	Drainage Layout - System D (5 of 8)	529570	A	120 of 120	Environmental Detail and Records (2 of 2)				
			Associated Job Nos Survey Data	Scoles		1	Т				. and c
			Datum								Que
			Auxiliary Drg Nos Heriz. Crid			CTL CHG	E				Gove
			Height				Reference Points Oroan		~0.00.	ENGINEER	NG CERTIFICATION (RPED) Job No.
he offer			Origin			Preceding go	Dist. to start From start to From end to Following of job (km) end of job Following RP RP	ENG. A	REA	NAME	SIGNATURE NO. DATE Contract. No.
truction				ensions shown in ept where shown of	hervise	No.	or job (km) end or job i rollowing No. No. Desig	ned			Drawing No. Series Number
Revisions/D	Description	75									

Figure 2.3(d) – Locality plan and drawing list – generic example



2.4 Typical cross sections / type cross sections

Typical cross sections are actual project cross sections representing design details to be adopted at particular locations. These drawings identify the project extents in cross section form. The typical cross section drawings may contain additional details which are relevant to the cross section profile, for example pavement tie-ins, kerb details and so on. Typical cross section drawings are generally produced for complex projects where there are considerable cross sectional changes throughout the job and where individual interval annotated cross sections are needed to construct the project works (regardless of if the job is built from the three dimensional 12D design model of from individual annotated cross sections).

Type Cross Sections are used for less complex projects such as disaster recovery works. A type cross section details the nominal cross section profile of the road (it represents the standard on a straight and delivers consistency of profile). A project may have more than one type cross section to cover different requirements, for example: "A - Roadway Excavation and Embankment", "B - Floodway Formation". There may also be more than one Roadway Excavation and Embankment type in a project, for example: "A - Roadway Excavation and Embankment" and "B - Roadway Excavation and Embankment". Type cross sections may be representative of a range over the length of the project used for construction rather than having to produce annotated cross sections supplemented by typical cross sections that are intended to help gain an appreciation of the complexity of the works.

Considerations

Typical / type cross sections

- Scale Select scale to adequately show detail and fit page
- Show fully dimensioned typical / type cross sections
- Label traffic lanes, cycle lanes, parking, shoulders, footpaths and so on
- Show edge drainage treatments K&C, table drains, swales, and so on
- Show median treatments
- Show roadside barrier treatments
- Show verge rounding
- Show fencing location boundary fence, noise barriers
- Identify existing and proposed boundaries
- Show cut / fill slopes
- Identify subsoil pavement drainage
- Show relative location of control lines
- Use various typical / type sections as necessary to cover alternative treatments throughout the project
- Identify the specific location or extent over which each typical / type cross section applies
- Identify proposed 'vegetation treatment' extents, with cross-reference to landscape drawings, using either the generic description 'vegetation treatment' or the specified treatment description shown on the landscape drawings

Pavement details

For small projects where the full set of drawings for the job does not include a separate set of drawings for pavements (i.e., specific pavement design drawings package is not provided), then show the following on the first Typical / Type Cross Section sheet:

- 1. show traffic data and projected Equivalent Standard Axles (ESAs) for design year
- 2. show California Bearing Ratio (CBR) of subgrade used in the pavement design
- 3. identify details of pavement layers (if not shown elsewhere).

Generally, the majority of pavement details should be shown in a separate set of pavement drawings (refer Section 2.10 *Pavement Details*) and the above requirements should be applied to those pavement drawings in preference to typical / type cross sections in order to keep all relevant pavement information together.

Notes

 Include notes and legends as necessary to clearly explain all details necessary to ensure correct interpretation of the design.

Figure 2.4(a) – Typical cross sections – generic example

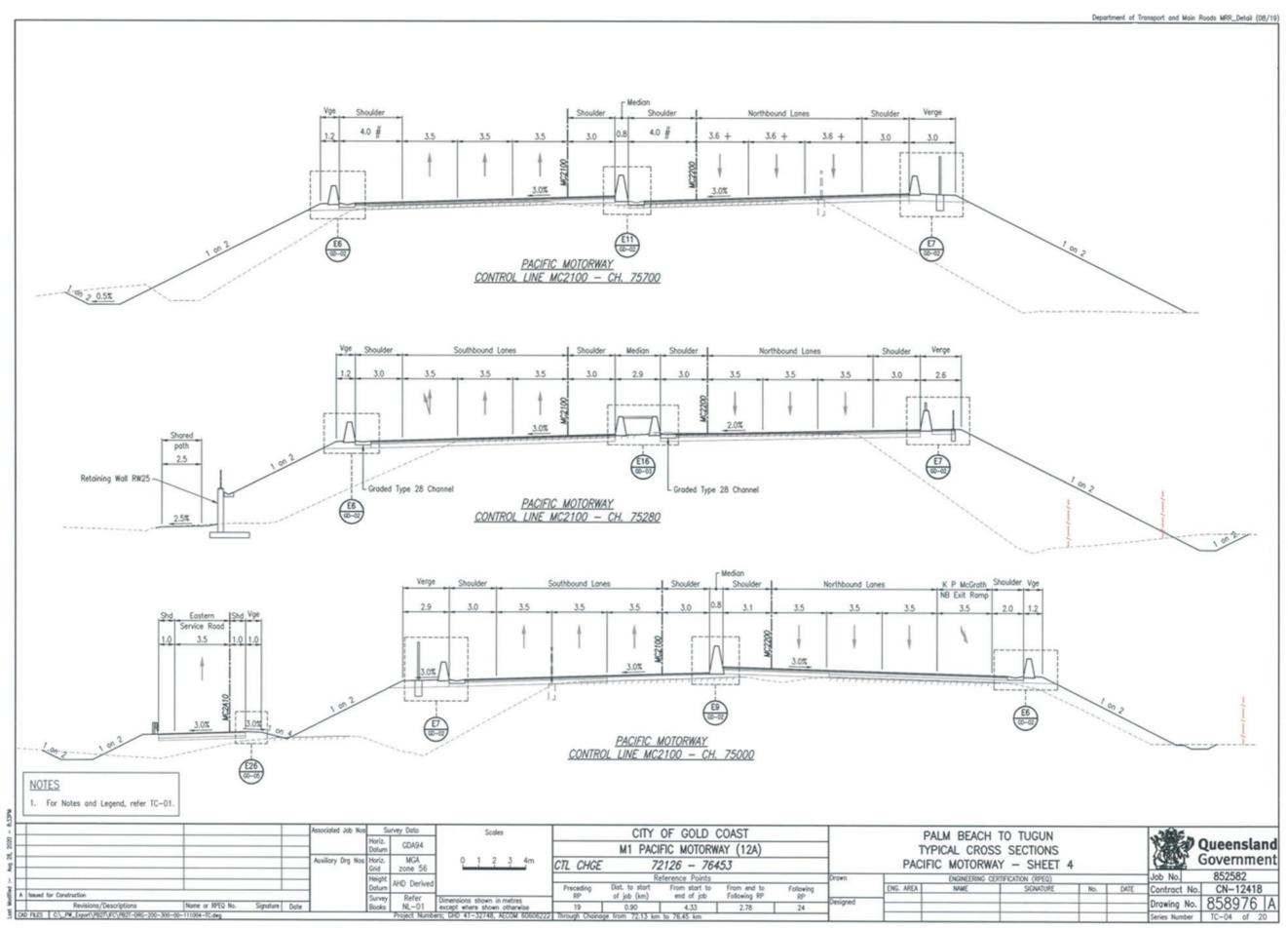


Figure 2.4(b) – Type cross sections – generic example

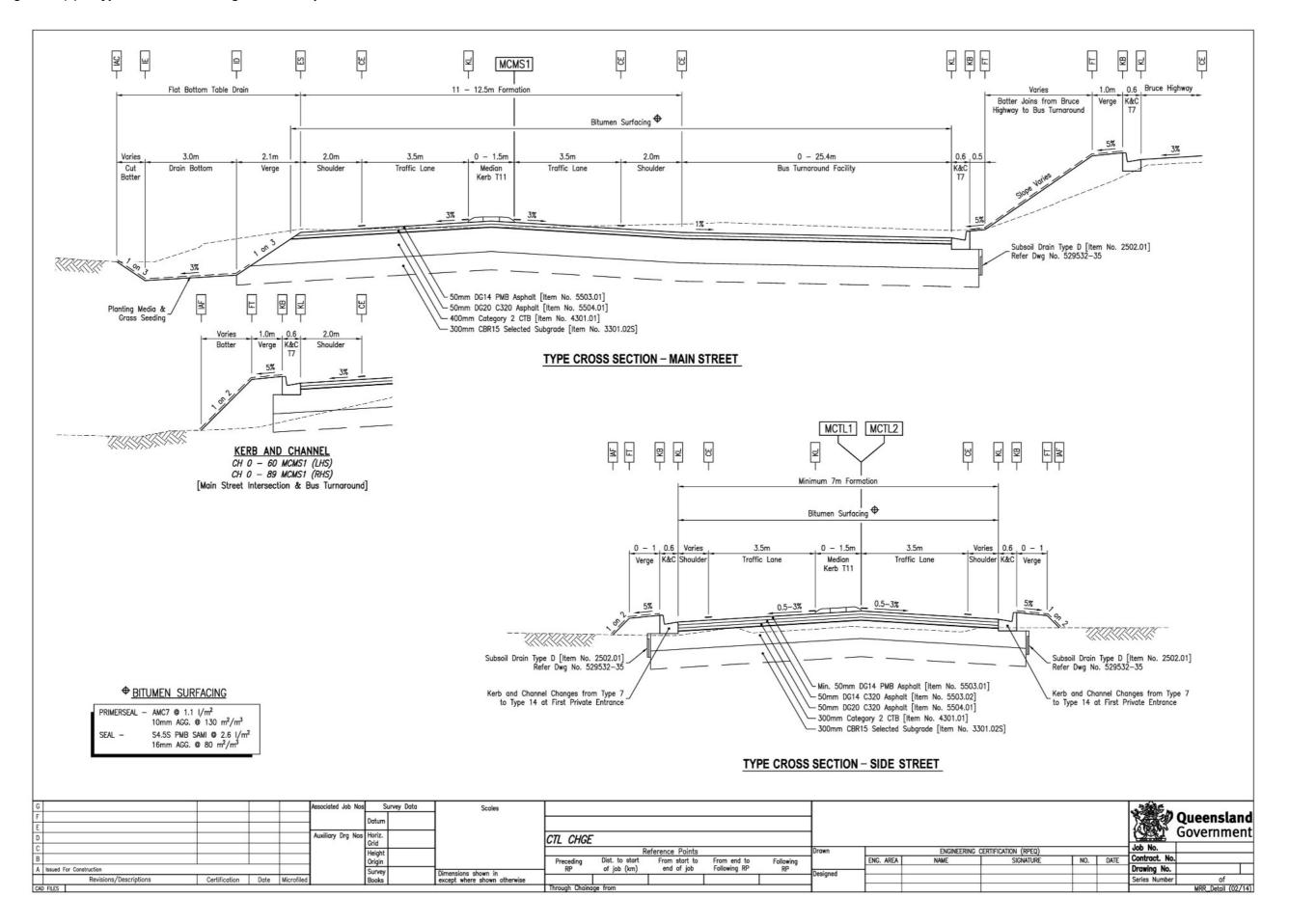
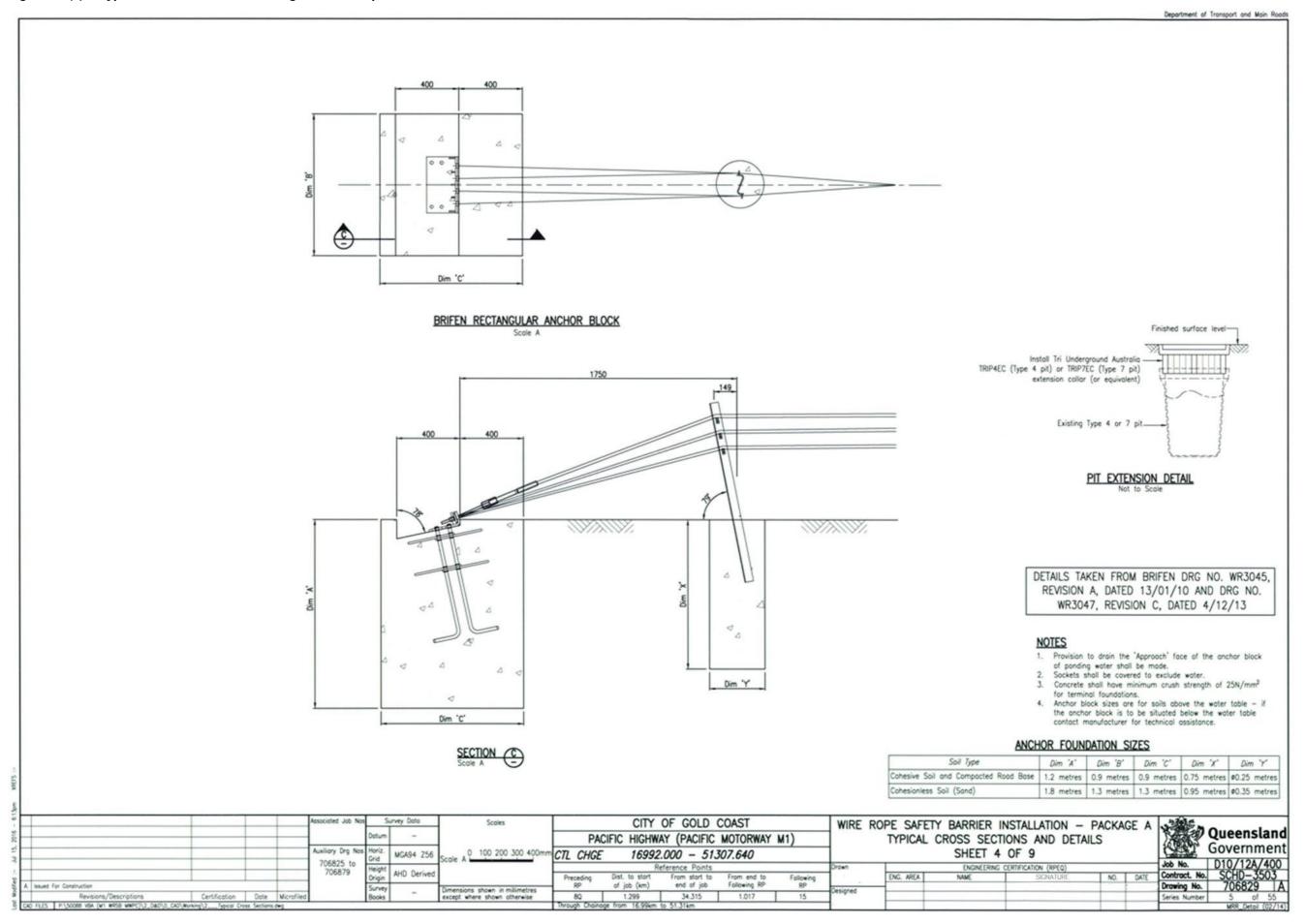


Figure 2.4(c) – Typical cross section details – generic example



2.5 Existing Features / Public Utility Plant (PUP)

The existing features drawing shows features such as the existing survey and topography, buildings, roadway infrastructure, and PUP. This is overlaid with the proposed roadway layout to assist in wholistically representing the project

For complex projects where there are substantial potential service conflicts and relocation of services are likely to be convoluted then a separate set of PUP drawings will be required. This is typically the case in confined brownfield and/or urban situations.

2.5.1 Existing Features

Considerations

Scale

1:250 at A1/1:500 at A3, or 1:500 at A1/1:1000 at A3

Background

 Surveyed features showing existing roadway, accesses, buildings, accesses and public utility services

Drawing

- Show proposed roadway layout including K&C, medians, islands, footpaths, and so on
- Show tie-in details to the existing road infrastructure
- Show property boundaries (red)

Services

- Show existing public utility plant services, if not too complex with excessive detail at scale, otherwise show separate drawings. The positions of services are generally shown for guidance only and locations may not be accurately represented on the drawings as other services may be present on site that are not yet located. Therefore, designers should note on the drawings that it is the responsibility of the contractor / constructor to verify the additional and actual positions of all services on site.
- Show PUP potholing information (actual / collected) if available refer Figures 3.5(a), 3.5(b) and 3.5(c) in DDPSM Volume 2, Part 2, Chapter 3 *Rural Road design Drawings*.
- If proposed PUP is not too complex then it may be appropriate to include proposed relocation of services on this drawing, otherwise show on a separate drawing.

Figure 2.5.1(a) – Existing features – generic example 1

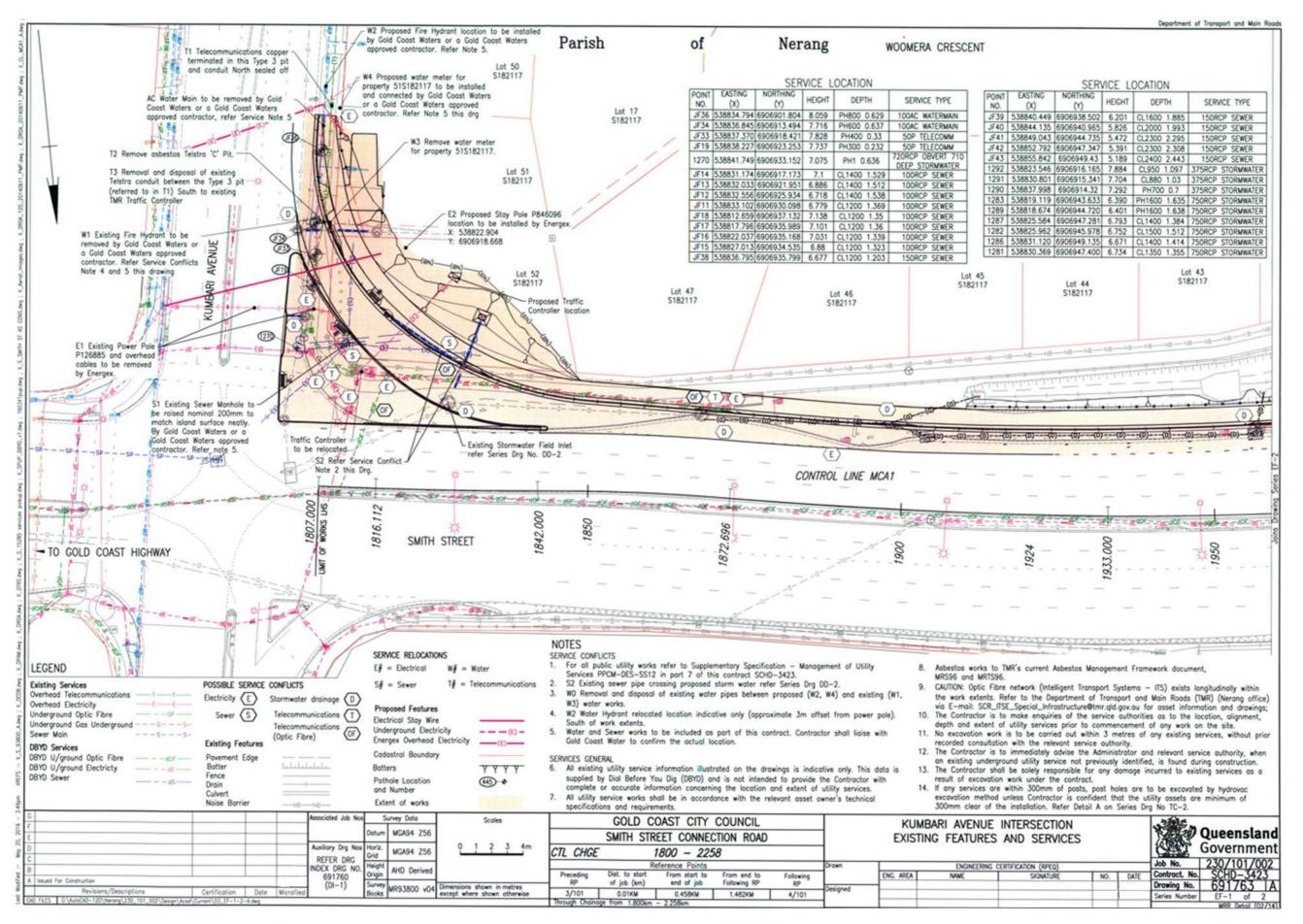


Figure 2.5.1(b) – Existing features – generic example 2

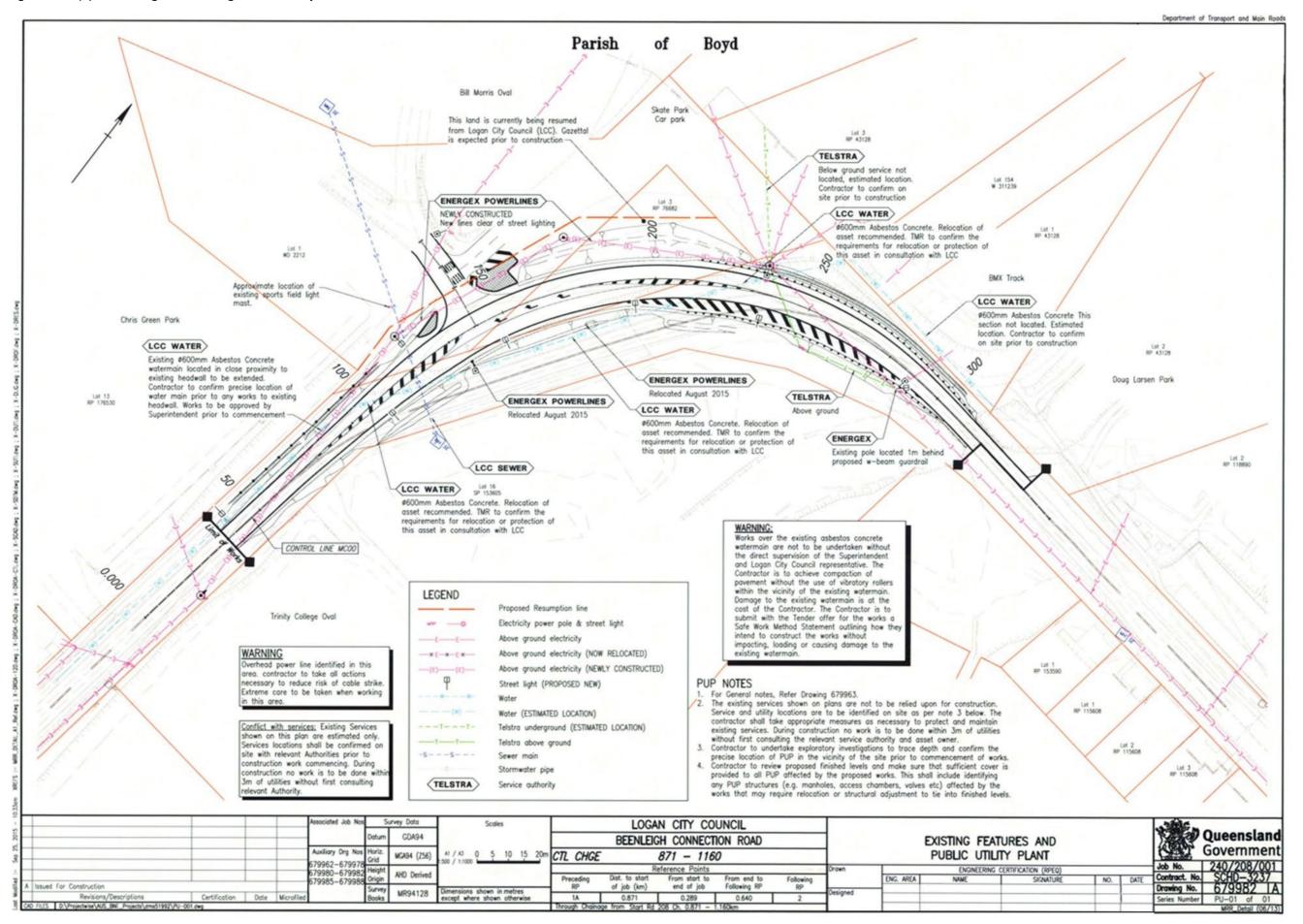


Figure 2.5.1(c) – Existing features – generic example 3

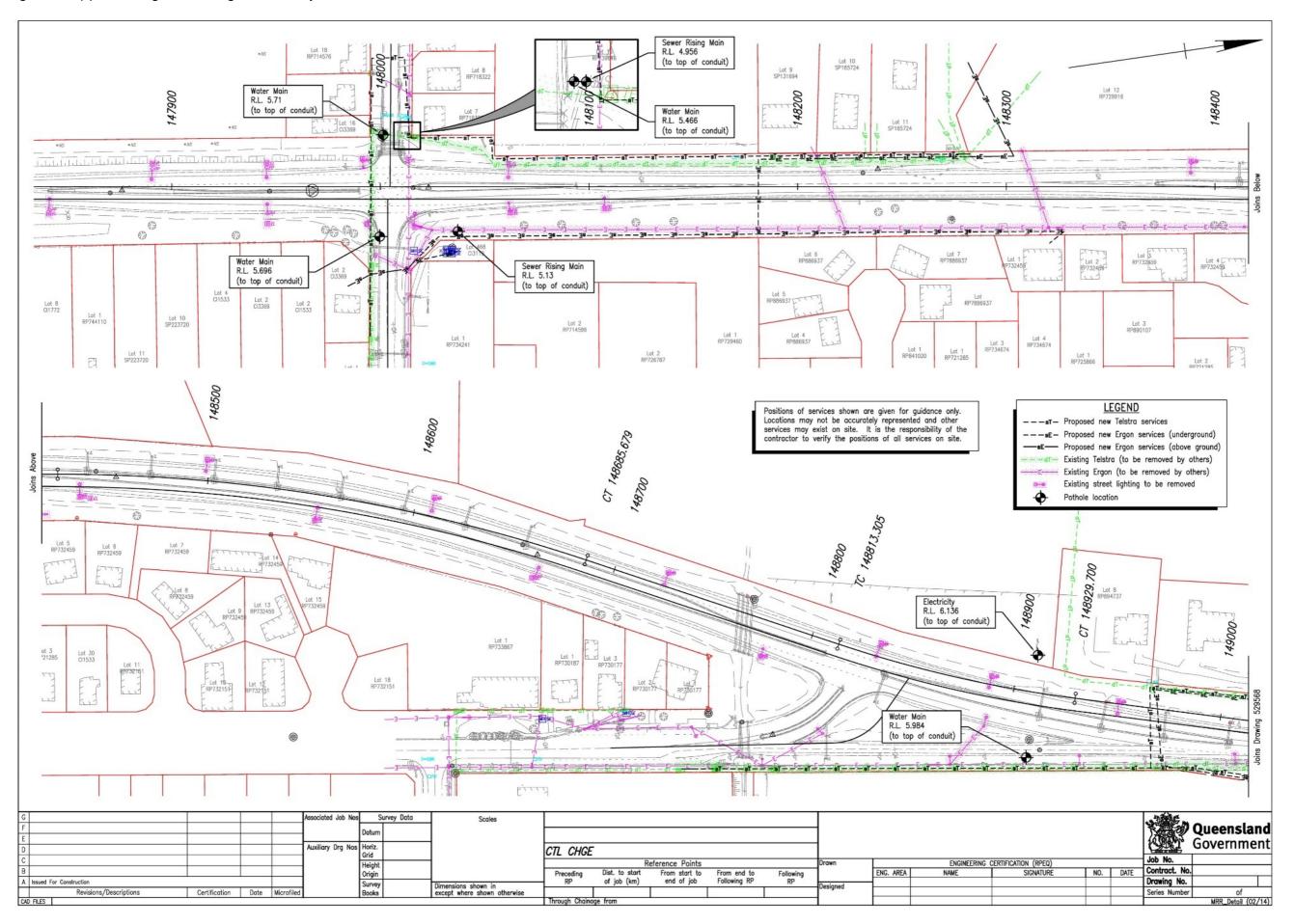


Figure 2.5.1(d) - Existing features - registered example 1

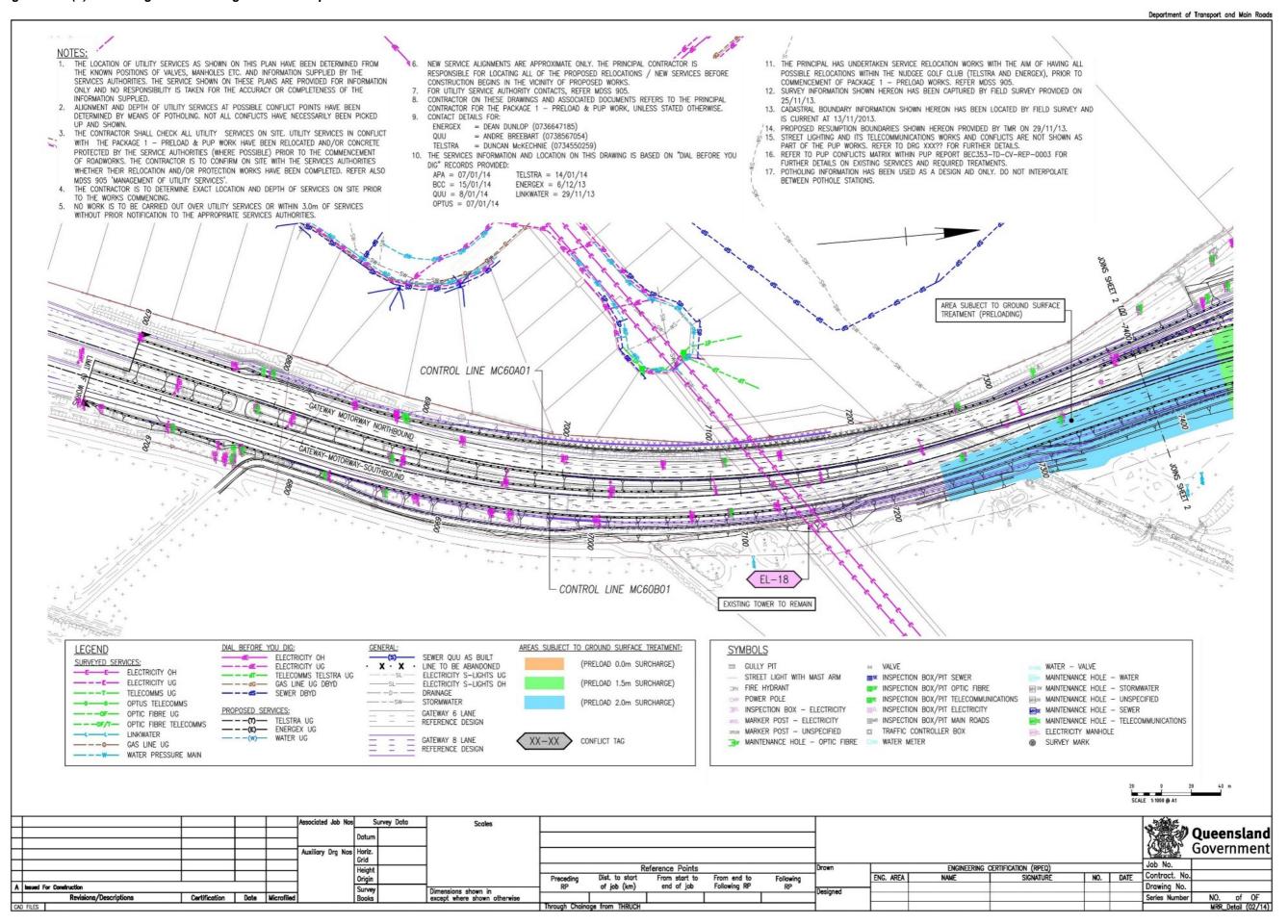
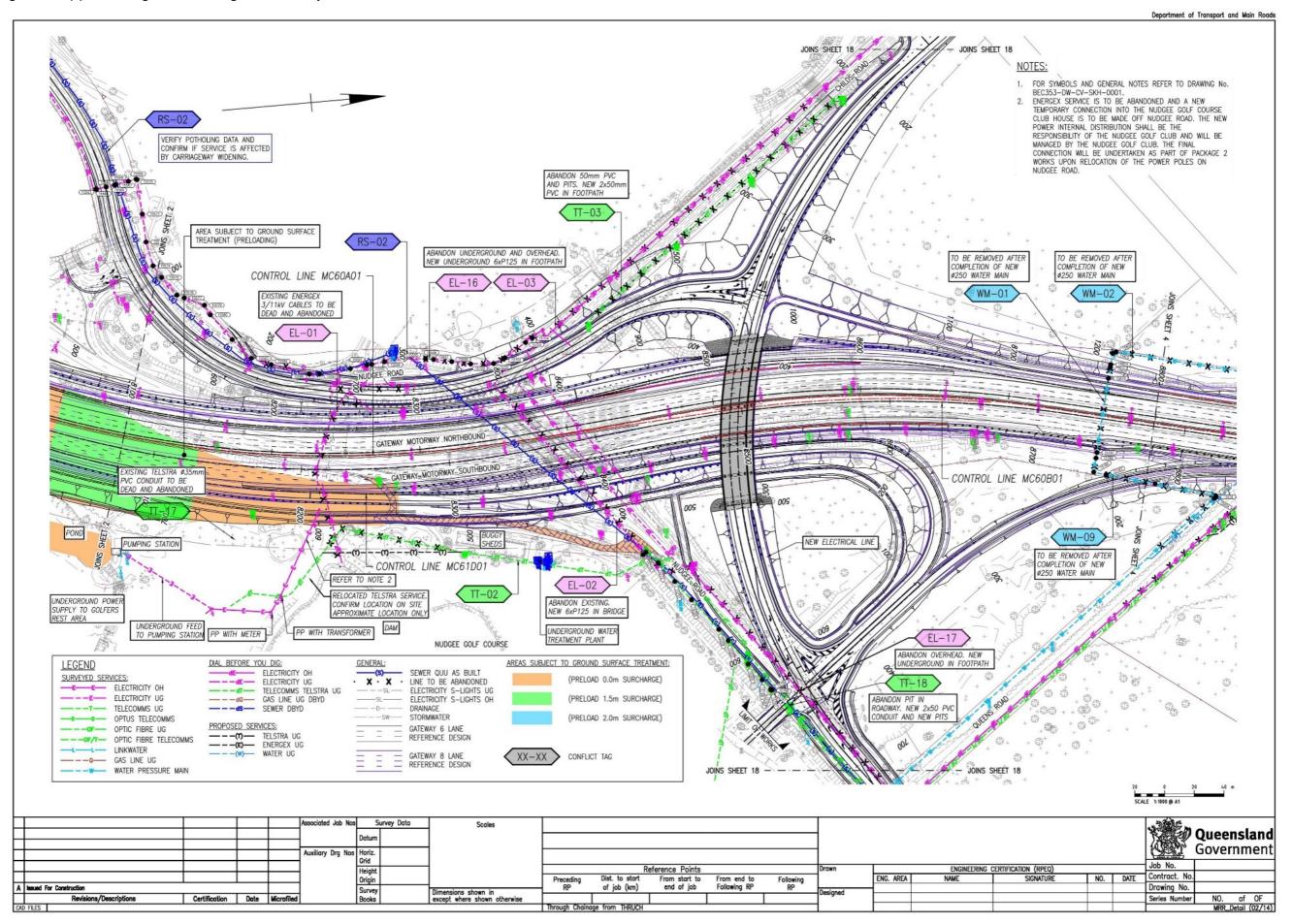


Figure 2.5.1(e) – Existing features – registered example 2



2.5.2 Public Utility Plant (PUP) - Conflicts, Potholing and Field Investigation

These drawings show the location of the existing public utility plant services in relation to the proposed road layout. This information is generally plotted from Before You Dig Australia (BYDA) information and other service authority data. If there are potential other services suspected, and not identified by service authorities, within close proximity of proposed works they may be shown in approximate locations and highlighted for awareness only subject to further investigation during construction.

Where survey is available the location of the PUP should match the surveyed location.

The preliminary design drawings must identify potential service conflicts which require further investigation before detailed design. PUP conflict plans are required for discussions with utility service providers.

Field investigation drawings (potholing and cable locating) are required at preliminary design or detailed design. These types of drawings will assist utility service stakeholders with conflict resolution and finalisation of the relocation plans and construction drawings.

Depending on the complexity of each project, PUP conflicts, potholing and field Investigation drawings may be complemented with schedule tables or field investigation registers containing the specific investigation details; these tables can be presented within the set of drawings as per Figure 3.6(c) in DDPSM Volume 2, Part 1 – *Concept Phase Drawings*, or alternatively the schedule tables or field investigation registers can be produced as spreadsheets which must be submitted together with the drawings – refer to Figure 2.5.2(c) and Figure 2.5.2(d) below.

Considerations

Scale

• Typically, 1:250 at A1/1:500 at A3, or 1:500 at A1/1:1000 at A3 to clearly enable visualisation without excessive clutter which may introduce misinterpretation of content.

Background

Surveyed features showing existing roadway, accesses, buildings, accesses, etc.

Drawing

- Show proposed roadway alignment including K&C, medians, islands, footpaths, batters
- Show cadastral boundaries in red colour (if not available then use DCDB)
- Show all existing PUP with possible services conflicts. If there are extensive conflicts then
 drawings can become convoluted with too much information, then consider producing a set of
 conflict / field investigation plans for each public utility service (e.g., telecommunications,
 water, electricity, etc.). This will also facilitate discussions with separate utility service
 stakeholders.
- If proposed PUP potholing and field investigations are extensive then it may be appropriate to include PUP investigation schedule tables.
- Shows PUP notes and legend as appropriate either on layout plans or separate drawings as required.

Figure 2.5.2(a) - Public utility plant - Conflict Plans generic example - Sheet 1 of 2

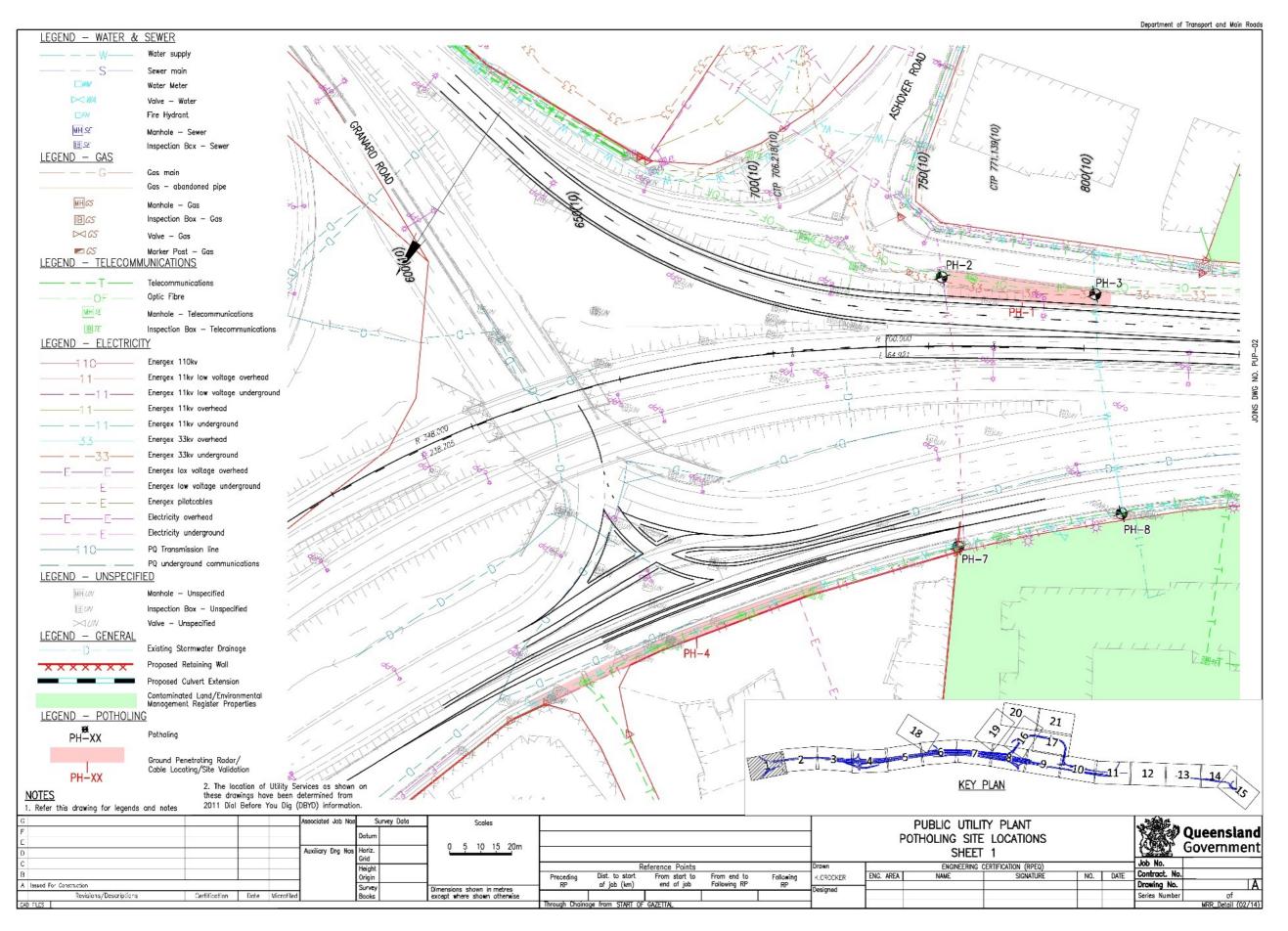


Figure 2.5.2(b) – Public utility plant – Conflict Plans generic example – Sheet 2 of 2

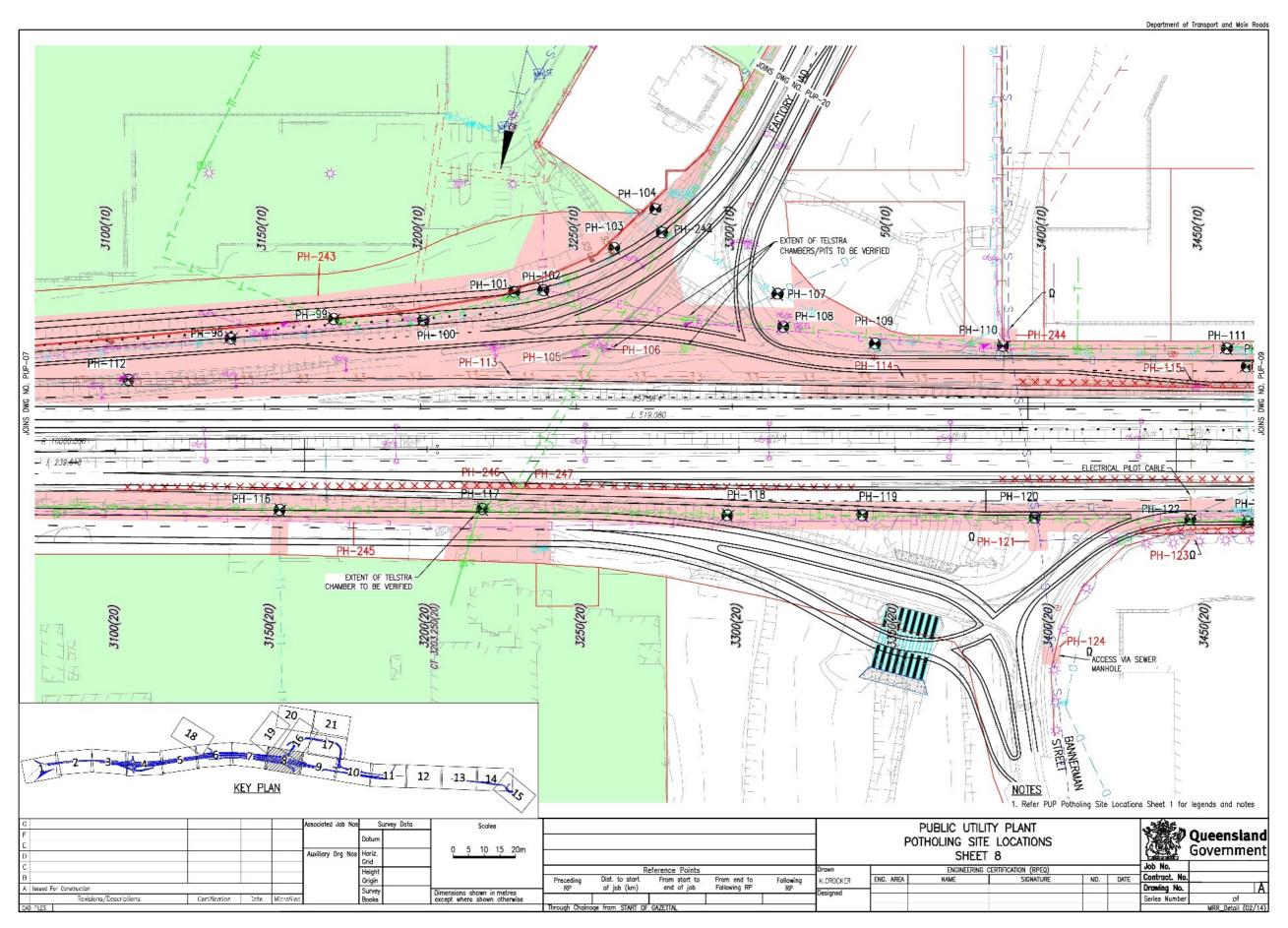


Figure 2.5.2(c) – PUP Potholing and Field Investigation Plans generic example – Sheet 1 of 4

PUP POTHOLE AND SITE INVESTIGATION SCHEDULE										
Queensland Governme	ent		TOT TOTHOLE AND SHE	THE STREET						
	I									
General Notes:										
1. All utility services potholing (PH) requests are based on TMR's PUP Pothole Plans dated (18/02/2015 and 19/02/2015).										
2. Prior to any site investigation and potholing activities, it is recommended for all utility services information shown on TMR's PUP Pothole Plans dated (18/02/2015) to be cross checked against current Dial Before You Dig (DBYD)										
information and	d services identified on site. All PUI	P's need to be identified and recorde	d.							
3. All exposed	utility services need to be recorded	in xyz format based on IPSWICH MO	OTORWAY DATUM and AHDD (height	origin), with photos and sketches.						
				involve lifting inspection lids / manhole covers to determine the depth, class and size of the service.						
				exposure/excavation of the service at time of potholing.						
		that are co-located within other serv	•							
		pavements without prior agreement								
				watermains and other underground infrastructure, only within the areas of planned road widening works.						
			isposed to designated approved sites							
		Creek and other known environmen								
			eotechnical Investigations and Other							
				d road widening works. Contact Mark Dunphy - Shared Assets Manager 3664 4462 markdunphy@energex.com.au						
13. The location	or utility Services as detailed in th	is schedule have been determined fr	om 2011 Dial Before You Dig (DBYD)	Information.						
Logon de										
Legend:										
PH-XX	Ground penetrating radar/cable lo	cating/site validation								
PH-XX	Potholing									
F11-AA	Potrioling									
Plan Ref.	PH No.	Location	Utility Services Impact	PH Requirements over Utility Services/Purpose						
rian kei.	THEO.	Location	Other Services impact	Trinequilents over outry services/r urpose						
		Granard Rd & Ashover Rd								
		intersection, Ch 750 to South side	Electricity, Telecommunications,	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
Sheet 1	PH-1, PH-2, PH-3	of motorway, approx. Ch 800	Water	Identify existing services crossing the motorway. Only PUP in vicinity of planned road widening.						
		North side of motorway, approx. Ch		Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
		600 to Ch 800 & Crossing	Electricity, Water,	Identify existing services from kerb to property boundary and services crossing the motorway. Only PUP in the vicinity of						
Sheet 1	PH-4, PH-7, PH-8	Motorway	Telecommunications, Gas	planned road widening.						
	==	North side of motorway, approx. Ch								
		870 to Ch 950 & Crossing		Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
Sheet 2	PH-9, PH-10, PH-11	Motorway.	Telecommunications, Gas	Identify existing services crossing the motorway.						
		South side of motorway, approx. Ch	The state of the s							
		860 to Ch 910 & Crossing		Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
Sheet 2	PH-5, PH-12, PH-13	Motorway.	Gas	Identify existing services crossing the motorway.						
\$554 PS 8554		Crossing Motorway from North to		Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
Sheet 3	PH-14, PH-15	South, approx. Ch 1270.	Telecommunications	Identify existing services crossing the motorway.						
		North side of motorway, approx. Ch								
2.000000000		1510 to Ch 1580 & crossing	Water and other services as	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
Sheet 3	PH-17	motorway.	identified	Identify existing services within limits of proposed works.						
		South side of motorway, approx. Ch		Validate and a superior described described and a superior of the superior of						
Charta	DU 10 DU 10	1490 to Ch 1560 & crossing	Stantisity, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
Sheet 3	PH-18, PH-19		Electricity, Water	Identify existing services crossing the motorway.						
		North side of motorway and		Validate asset owner location class size (dia), death, number of conduits alignment of will be asset.						
Shoot 4		crossing Suscatand Street, approx.	Tolocommunications Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
Sheet 4	PH-21, PH-24	Ch 1580 to 1670 North side of motorway and	Telecommunications, Water	Identify existing services within limits of proposed works.						
		crossing Suscatand Street, approx.		Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service.						
Shoot 4	PH-38, PH-320	Ch 1625 to 1825	Telecommunications	Identify existing services within limits of proposed works.						
Sheet 4		North side of motorway along	reseconnitionications	identity existing services within limits of proposed works.						
		Suscatand Street Exit Ramp,	Electricity, Telecommunications,	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service.						
Sheet 4	PH-39, PH-40, PH-237, PH-239	approx. Ch 1760 to 1875	Water	Identify existing services within limits of proposed works and at culvert extensions.						
Silvera		South side of motorway to the east		wertery existing services within mines of proposed works and at current extensions.						
	PH-29, PH-30, PH-31, PH-234, PH-		Electricity, Telecommunications,	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service						
Sheet 4		Ch 1600 to Ch 1650	Water	Identify existing services within extent of proposed works.						
	57.57.57			,						

Figure 2.5.2(d) – PUP Potholing and Field Investigation Plans generic example – Sheet 2 of 4

Plan Ref.	PH No.	Location	Utility Services Impact	PH Requirements over Utility Services/Purpose
r idir iteri	11110.	South side of motorway to the west	Canty Services impact	Threquirements over outing services/rurpose
	PH-32, PH-33, PH-34, PH-35, PH-	of Randolph St, approx. Ch 1660 to	Electricity, Telecommunications,	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
Sheet 4	317	Ch 1740	Water, Sewer	Identify existing services within extent of proposed works and at culvert extensions.
Jiicct 4	527	G112740	Water, sewer	The training services within execution proposed works and at earlier execusions.
		Crossing motorway, approx. Ch		Validate asset owner, location, class, size (dia), depth, alignment of utility service via access to the sewer manholes.
Sheet 4	PH-25, PH-36, PH-236	1690.	Sewer	Identify existing service within limits of proposed works crossing motorway and at culvert extensions.
Sheet	111 23,111 30,111 230	South side of motorway, approx. Ch	Server	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
Sheet 4	PH-37	1850 to Ch 1965	Electricity	Identify existing service within limits of proposed works.
Silect 4	11137	South side of motorway crossing	Licentercy	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
		Banting Street, approx. Ch 1950 to		Identify existing services within extent of proposed works. Track 33kV possibly located beneath service road, visible evidence of
Sheet 5	PH-42	Ch 2350	Electricity	trenching exists.
Sheet 5	111-12	Crossing the Motorway at approx.	Licetricity	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service.
Sheet 5	PH-240, PH-241, PH-41, PH-47	Ch 2200 and Ch 2220	Electricity, Water	Identify existing services crossing the motorway and service roads.
Silecto	111-240, 111-241, 111-41, 111-47	CIT 2200 BIIG CIT 2220	Liectricity, water	Identity existing services crossing the motorway and service roads.
				Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
	PH-49 PH-321 PH-59 PH-61 PH-	South side of motorway, approx. Ch		Identify existing services within extent of proposed works. Track 33kV UG, possibly located beneath service road, visible
Sheet 6	62, PH-63, PH-64	2330 to Ch 2700	Electricity	evidence of trenching exists and also creek crossing. New service road proposed between Boundary Road and Factory Road.
Silecto	02, F11-03, F11-04	South side of motorway and	Liectricity	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
	PH-51, PH-52, PH-53, PH-54, PH-	crossing Boundary Road, approx.		Identify existing services within extents of proposed works. PH-53 full extents of large chamber required. PH-55 & 56 Both
Sheet 6	55, PH-56	Ch 2400 to Ch 2500	Telecommunications, Water	watermain and Telecommunications crossings required.
Silecto	33, FN-30	Boundary Road and crossing	refeccififications, water	Validate asset owner, location, class, size (dia), depth, alignment of utility service
Shoot 6	PH-57, PH-58, PH-73	motorway at approx. Ch 2560	Gas, Water	Identify existing services within extents of proposed works and crossing the motorway.
Sheet 6	FH-37, FH-38, FH-73	Illotor way at approx. Cli 2300	Gas, water	Identity existing services within extents of proposed works and crossing the motorway.
				Validate asset owner, location, class, size (dia), depth, alignment of utility service via access to the sewer manholes.
Sheet 6	PH-322, PH-323	Crossing Boundary Road	Sewer	Identify existing service within limits of proposed works crossing Boundary Road.
Sileet 6	FH-322, FH-323	Crossing Boundary Road	Jewei	Identity existing service within minits of proposed works crossing boundary road.
		Crossing Motorway, approx. Ch		Validate asset owner, location, class, size (dia), depth, alignment of utility service via access to the sewer manholes.
Sheet 6	PH-76, PH-77, PH-315, PH-316	2630	Sewer	Identify existing service within limits of proposed works crossing motorway.
Silecto	11-70, 11-77, 11-313, 11-310	South side of motorway crossing	Sewei	literatify existing service within minits of proposed works crossing motorway.
		Oxley Creek, approx. Ch 2610 to		Validate asset owner, location, class, size (dia), depth, alignment of utility service
Sheet 6	PH-60, PH-65, PH-67	2710	Gas	Identify existing services within limits of proposed works.
Silecto	11-00, 11-03, 11-07	South side of motorway crossing	063	Validate asset owner, location, class, size (dia), depth, alignment of utility service
		Oxley Creek, approx. Ch 2610 to		Identify existing services within limits of proposed works and Bridge widening across Oxley Creek. New service road proposed
Sheet 6	PH-66	2710	Water	between Boundary Road and Factory Road.
Silecto	111-00	North side of motorway and	Water	between boundary noad and ractory noad.
	PH-50, PH-69, PH-70, PH-71, PH-	crossing Oxley Creek, approx. Ch	Electricity, Telecommunications,	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
Sheet 6		2430 to Ch 2710	Water, Gas	Identify existing services within extents of proposed works.
Silecto	72,11174,11175,11176,11175	Crossing Motorway, approx. Ch	Tracer, ous	Validate asset owner, location, class, size (dia), depth, alignment of utility service
Sheet 6	PH-64, PH-79	2700	Water	Identify existing water main crossing the motorway including thrust blocks.
	PH-68, PH-87, PH-88, PH-89, PH-			Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
	90, PH-91, PH-93, PH-94, PH-95,	South side of motorway, approx. Ch		Identify existing services within extents of proposed works including culvert extensions/bridge construction for services road.
Sheet 7	PH-96, PH-97	2720 to Ch 3060	Electricity, Water, Gas	Note PH-68 to track gas mains and other PUPs.
5.1.0017				
	PH-80, PH-81, PH-82, PH-83, PH-	North side of motorway, approx. Ch		Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
Sheet 7	84, PH-85, PH-86	2720 to Ch 3060	Telecommunications	Identify existing services within extents of proposed works including culvert extensions/bridge construction for service road.
		South side of motorway and along		, 9
	PH-98, PH-99, PH-100, PH-101,	Factory Road, approx. Ch 3090 to	Electricity, Telecommunications,	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
Sheet 8		Ch 3300	Water, Gas	Identify existing services within extents of proposed works.
		South side of motorway, approx. Ch	,	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
Sheet 8	PH-243	3090 to Ch 3460	Electricity	Identify 33kV cable within extents of proposed works.
		South side of motorway crossing		
		Factory Road, approx. Ch 3275 to		Validate asset owner, location, class, size (dia), depth, alignment of utility service
Sheet 8	PH-242, PH-107, PH-109	Ch 3350	Water	Identify existing services within extents of proposed works crossing Factory Road.
		South side of motorway crossing		, , , , , , , , , , , , , , , , , , , ,
	PH-101, PH-108, PH-109. PH-110.	Factory Road, approx. Ch 3230 to	Electricity, Telecommunications,	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
Sheet 8	PH-111, PH-243	Ch 3460	Water	Identify existing services within extents of proposed works.
	PH-105, PH-106, PH-246, PH-247,	Crossing Motorway, approx. Ch		Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service
Sheet 8	PH-243	3230 to Ch 3270	Telecommunications	Identify Telecommunications crossing motorway within extents of proposed works.
				, , , , , , , , , , , , , , , , , , , ,

Department of Transport and Main Road

Water Reticulation Construction

- 1. Before construction of water main works commence, a joint pre-start meeting must be held of the construction site, between the following representatives:
 - i.The Principal or Principal's Representative
 - II. The Administrator's Rep and/or the Administrator
 - ii. Principal Contractor,
 - iv. Sub-Contractor (if not the Principal Contractor) responsible for the construction of the water main works:
 - v. Unitywater officer/inspector; and
 - vi. Contractor's Superintendent responsible for supervision of works.

The Contractor is responsible for the taking and distribution of the minutes of the pre-start meeting to the Administrator, Unitywater officer/inspector and the Principal's representative.

- 2. All water main pipes, materials and sizes are specified in the drawings
- 3. All work and materials shall be in occordance with the current requirements of Unitywater and the South East Queensland Water Supply and Sewerage Design and Construction Code (SEQ
- 4. Only products and materials approved for use, as listed in the Unitywater column of the SEQ Code Infrastructure Products and Noterials List (IPAM List) are to be used in the construction of Unitywater water mains and associated services, unless specific concession is obtained, in writing, from Unitywater.
- 5. The position and depth of underground services, surface obstructions and other existing features shown in the drawings are to be considered approximate only. It is the responsibility of the Contractor to verify the actual location of all services prior to construction. The Contractor shall bear the cost of any rectification works required as a result of services damaged during or as a result of construction.
- 6. Unless noted otherwise, embedment and trenching of water mains to be undertaken in accordance with standard drawings SEQ-WAT-1200-2, SEQ-WAT-1201-1, SEQ-WAT-1202-1, SEQ-WAT-1203-1, SED-WAT-1204-1,
- The Contractor shall undertake compaction and preparation for the trench floor to provide a flat firm base to support bedding motorial and minimise the potential for pipeline settlement.
- 8. Where the trench floor/foundation does not achieve a minimum bearing capacity of 50kPa. adopt Type E, F, G or H support as required. The Contractor shall obtain agreement from the Superintendent for the type of support to be adopted, including the proposed extents.
- 9. Concrete thrust blocks are to be placed at all bends (horizontal and vertical), tees, plugs, caps, reducers and other locations where there is an unbalanced hydraulic load/thrust. Thrust blocks are to be designed and constructed in accordance with the SEQ Code including SEQ Code standard drawings SEQ-WAT-1205-1, SEQ-WAT-1206-1, SEQ-WAT-1207-1.
- 10. Thrust blocks are to be designed and constructed to suit native soil conditions. All thrust blocks are to be cast against undisturbed ground that is free of loose or deleterious
- 11. Minimum cover to watermains shall be provided as follows:
- 11.1. Where water main is \$ 200mm NB
- 11.1.1. 600mm cover under verges and footpaths
- 11.1.2. 750mm cover under local/urbon roads
- 11.1.3. 1200mm cover under State Controlled Roods
- 11.2. Where woter main is > 200mm NB
- 11.2.1. 1000mm cover under verges and footpaths
- 11.2.2. 1000mm cover under local/urban roads
- 11.2.3. 1200mm cover under State Controlled Roads
- 12. Notwithstanding the cover requirements outlined above, minimum cover for the temporary 00250mm PE100 watermain shall be 600mm where not under a roadway or in road reserve.
- 13. Detectable marking tope shall be laid above all buried water mains in accordance with Unitywater requirements
- 14. Winimum clearances to existing and new services are to be in accordance with the SEQ Code, unless otherwise shown.
- 15. Where connecting to existing or original pipework, the location, level, diameter and material type of the existing pipework and/or fittings shall be confirmed by the Contractor prior to construction and ordering of pipes and fittings.
- 16. Joint deflections are to be in accordance with manufacturer's specifications.
- 17. PE pipe bends are to be in accordance with relevant Australian Standards and the specification WSA PS-208 Plastics Moulded Fittings for Pressure Applications with PE Pipe -

- 18. PE pipe may be cold bent to a maximum radius as specified in PPA Industry Guidelines <u>Testing and Commissioning of Water Mains</u> POP202. Stakes or other sources of point loads shall not be used to assist in bending the pipe.
- 19. The Contractor is to ensure that valve and hydrant surrounds, surface boxes and lids are constructed to trafficable or non-trafficable standards as applicable to teir location. Surrounds are to be adjusted to suit final surface levels and are to be adjusted should surface levels be altered.
- 20. Marker posts are to be installed in accordance with standard drawing SEQ-WAT-1300-2 to the satisfaction of local authorities
- 21. Watermain road and pavement markers are to be installed in accordance with SEQ-WAT-1300-1.
- 22. PE pipe shall be PE100 SDR11 PN16 with blue stripe and comply with AS4130. PE fittings shall comply with AS4129.
- 23. An accredited pipe layer shall be on site while pipes are being laid and bedded and all pige laying shall be supervised by persons having adequate experience in laying the relevant pipe
- 24. The Contractor shall make allowance during construction for expansion and contraction of PE pipe due to temperature changes and pressurisation
- 25. PE pipes and fittings shall be joined in accordance with the Unitywater specification PR9904 - Specification for Pressure Pipe Construction, AS2033, SEQ Code, MSA 01 Polyethylene Pipeline Code and PIPA Technical Guidelines.
- 26. Butt fusion jointing is Unitywater's preferred method of joining PE pipes. Flange jointing shall only be used for connecting flanged PE pipe ends to flanged fittings. Dectrofusion fittings and Gripper type jointing is to be avoided where possible, however, if required, must be approved by Unitywater. Butt welding in trenches is not permitted.
- 27. Refer standard drawings SEQ-WAT-1102-1 and SEQ-WAT-1409-1 for typical PE arrangements.
- 28. PE sleeving is required on all DI pipes and fittings applied in accordance with AS3681. Two thickness required between fittings and thrust black. Reinstate any damaged sleeving as per manufacturers specifications.
- 29. All DI fittings are to be FBE cooted and lined. Care should be exercised during maneuvering and placement of fittings to avoid damage to the coating.
- 30. All Valves are to be restrained in occordance with SEQ Code Standard Drawing SEQ-WAT-1206-1 to prevent shear loads from being transferred to pipe.

Inspection and Testing Requirements

- 31. Acceptance testing and inspections of water mains shall be undertaken in accordance with the relevant Unitywater Specifications and SEQ Code requirements. The Contractor shall ensure that the appropriate inspections and testing are carried out for all aspects of the project.
- 32. An inspection and testing plan is to be prepared and presented to the Administrator and Unitywater for review and acceptance prior to the commencement of works. The completed inspection & testing plan will be required to be submitted to the Administrator and Unitywater prior to Practical Completion. Where relevant, test results may be required to be submitted prior to hold point inspections.
- 33. All testing must be carried out by persons or companies accredited by the National Association of Testing Authorities Australia (NATA).
- 34. The Contractor shall make allowance for liaison and co-ordination of work with Administrator and Unitywater including scheduling of and attendance at meetings and
- 35. The construction of the water reliculation network must be supervised and certified by an engineer who has RPEQ registration. Works not complying with this requirement will not be permitted to connect to the existing water network.

As Constructed Information

- 36. The Contractor shall ensure that constructed works are progressively surveyed to ensure that thorough and accurate as constructed data is available for the preparation of as constructed documentation. As-constructed survey is to be undertaken by a registered and suitably qualified surveyor in accordance with Unitywater requirements.
- 37. As constructed documentation for all water supply infrastructure constructed and/or altered under this contract shall be prepared in accordance with Unitywater and SED Code requirements including but not limited to the SEQ Code Asset Information Specification.
- 38. The as constructed package is to be submitted to the Administrator and Unitywater for review and approval. "Practical Completion" will not be granted to the Contractor until the as constructed pockage has been submitted to the satisfaction of the Administrator and

- 39. Commissioning of water mains shall be undertaken strictly in accordance with the requirements of Unitywater and the SEQ Code, including Unitywater Specification Pr8871 -Specification for Commissioning of Network Project Assets.
- 40. Commissioning of water mains typically includes the following activities:
 - i.Completion and submission of as-constructed package and relevant test results to the Administrator and Unitywater for review and acceptance;
 - ii. On-maintenance inspection and acceptance of constructed works by Administrator and Unitywater representative/s;
 - iii. Pressure testing of water mains;
 - iv. Disinfection (super chlorination and purging of pressure test water);
 - v. Flushing (purging of disinfection water);
 - wi. Water quality acceptance testing:
 - vii. Submission of completed inspection and test plan to Administrator and Unitywater for review and acceptance;
 - viii. Submission of signed and completed F10045 Water Quality Mains Commissioning
 - ix. Where a planned network intervention is required as part of the connection works (i.e. where connection works impact on the ordinary operations, continuity or quality of water supply), the Contractor or Sub Contractor is required to complete a Planned Network Intervention Application for submission to Unitywater Network Operations for assessment and approval at least 5 business days prior to the planned network intervention; and
 - x. Bringing pipe/main into service through construction of final connections;
- 40. Mains must not be connected to Unitywater's network until testing has been completed and Unitywater has provided written authorisation for the connection to take place. Connections to Unitywater's network must be undertaken by Unitywater, or by a Unitywater approved Contractor or Sub-Contractor. If the connection is not being undertaken by Unitywater, the Contractor or Sub-Contractor must arrange for the connection works to be supervised by

	STANDARD DRAWINGS
SEQ-WAT-1102-1	Typical Mains Construction Reticulation Main Arrangements
SEQ-WAT-1105-1	Typical PE Water Main Details
SEQ-MAT-1105-2	Typical Connection to Existing Mains
SEQ-MAT-1200-1	Typical Sail Classification Guidelines and Allowable Bearing Pressures for Anchors & Thrust Blocks
SEQ-MAT-1200-2	Embedment & Trenchfill Typical Arrangement
SEQ-MAT-1201-1	Standard Embedment - Typical Flexible & Rigid Pipes
SEQ-MAT-1202-1	Typical Special Embedment - Inadequate Foundations Requiring over Excavation & Replacement
SEQ-WAT-1204-1	Typical Trench and Bedding Details within Existing Roads - Type K to N
SEQ-RS170	Pavement extension trenching & widering
SEQ-WAT-1205-1	Typical Thrust Block Details - Mass Concrete
SEQ-WAT-1206-1	Typical Thrust and Anchar Blocks for Valves
SEQ-WAT-1208-1	Typical Restrained Joint System DN100 to DN375 DI Mains
SEQ-WAT-1209-1	Typical Trench Orainage - Bulkheads and Trenchstops
SEQ-WAT-1300-1	Typical Valve, Hydrant and Water Main Road Crossing - Road and Pavement Markers
SEQ-WAT-1300-2	Typical Valve and Hydrant - Identification Marker Posts
SEQ-WAT-1301-1	Typical Valve and Hydrant Installation — Valve Arrangement
SEQ-WAT-1302-1	Typical Valve and Hydrant Installation - Hydrant Arrangement
SEQ-WAT-1303-1	Typical Valve and Hydrant Installation - Future Extension Installation
SEQ-WAT-1304-1	Typical Air Valve Installation - For Trunk Main
SEQ-WAY-1305-1	Typical Surface Fitting Installation Valve and Hydrant Surface Baxes - Trafficable and Non-Trafficable
SEQ-WAT-1306-1	Typical Surface Fitting Installation Valve and Hydrant Surface Baxes - Support and Surround Details
SEQ-WAT-1307-3	Typical Appurtenance Installation - Scour Arrangements
SEQ-WAT-1313-1	Floriged Joints - Typical Balting Details
SEQ-WAT-1409-1	Hydrant Installation Fittings - Typical PE Assemblies Nomenclature





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8					Auxiliary Drg Nos	Horiz. Grid	MGA94 Zone56	Not to Scale	CTL CHGE	TL CHGE 69423 - 73900 (MCS1BNO)							Governing Governing					
1						Height	AHD Derived		Reference Points			Drawn	ENGINEERING CERTIFICATION (RPEQ)					Job No. 280_10A_23441		34413		
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Figure 2.5.2(f) - PUP Potholing and Field Investigation Plans generic example - Sheet 4 of 4

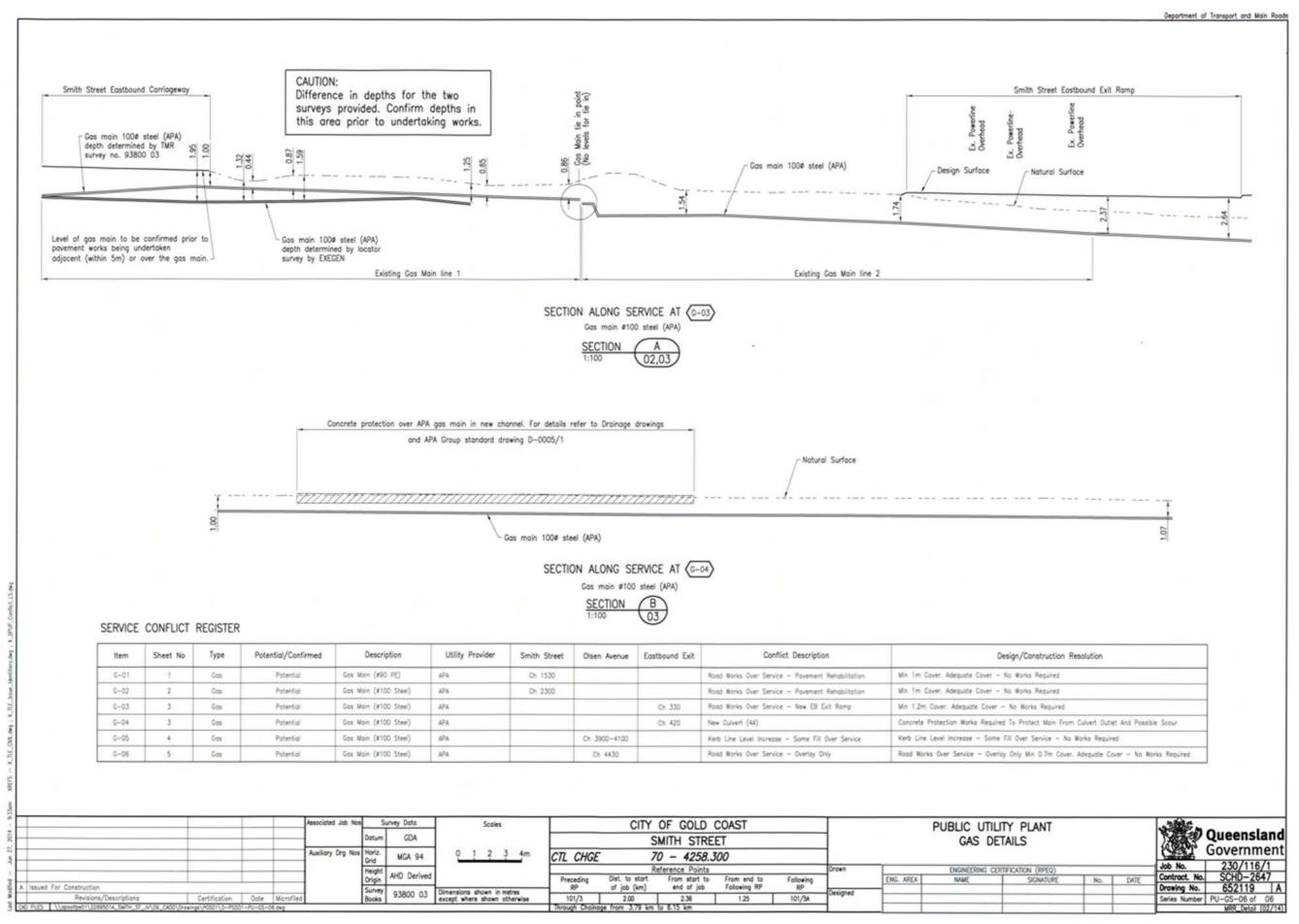


Figure 2.5.2(g) – PUP Notes and Legend generic example

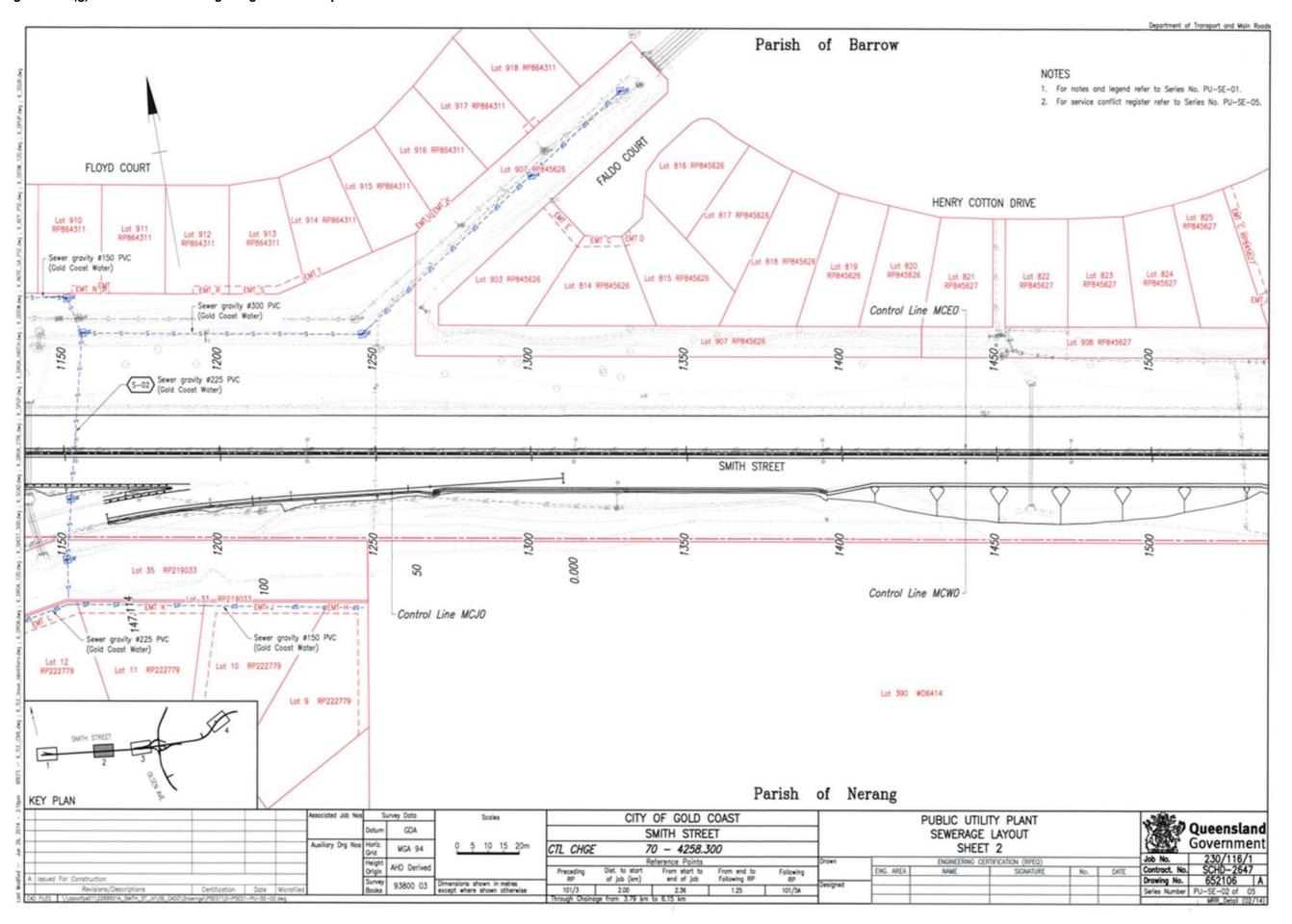


Figure 2.5.2(h) – PUP Service Details generic example

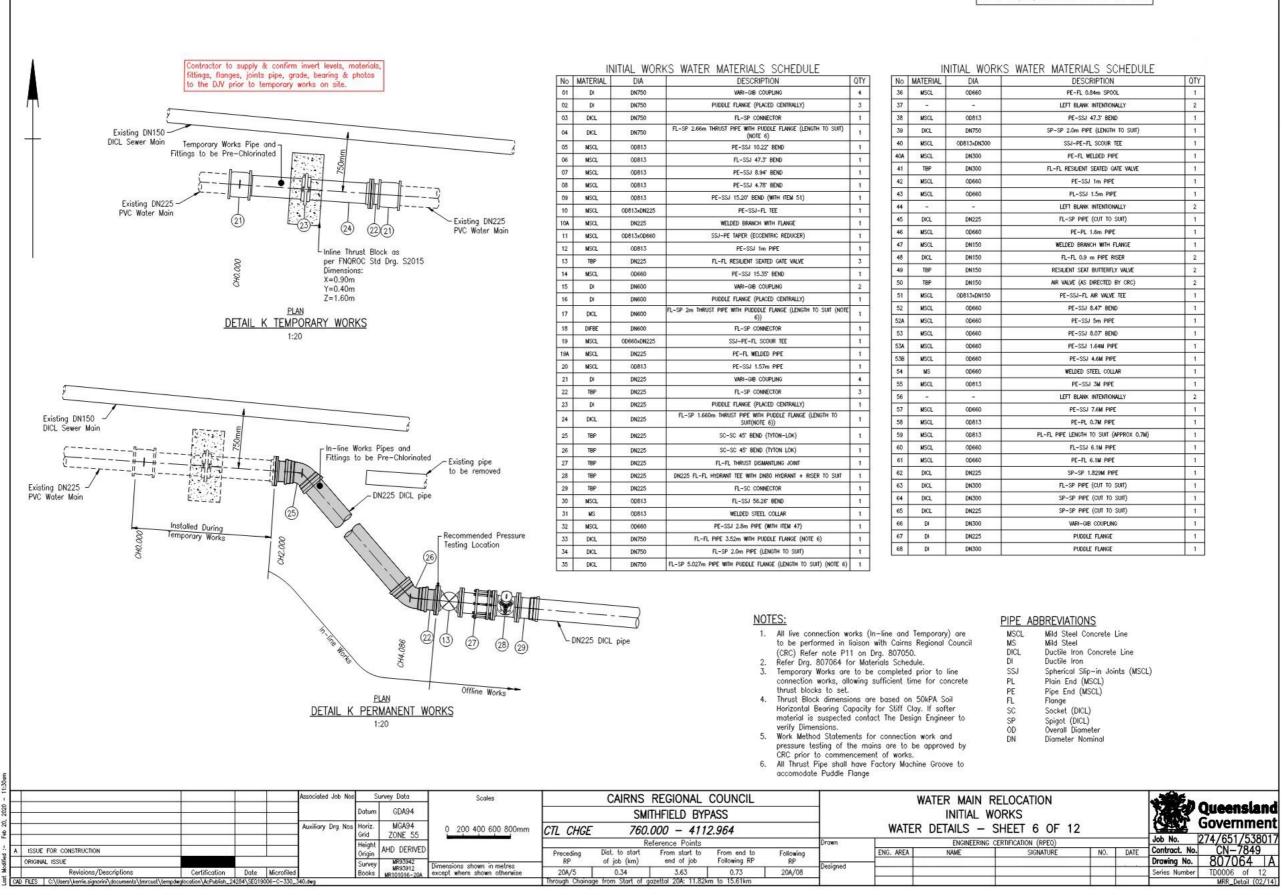
Department of Transport and Main Roads MRR_Detail (08/19) Doc. No. 538017-DES-00PUWA00-DRG-LS0001 WM02 SETOUT CO-ORDINATES CHAINAGE EASTING NORTHING 361114.487 8136824.132 5.643 361119.727 8136822.03 Notes: 82.283 361190.894 8136793.597 83.820 361192.321 8136793.026 For general notes refer to Drg. 807609. 84.820 361193.250 8136792.655 provings to be read in conjunction with Acid Sulfate Soil management plan provided by Envirofin. Refer to Document no. 538017—CON-00ENCLOO-PLN-000001. Additional Trench Treatment may be required for P.A.S.S. and A.S.S. profiles. Refer to Document no. 538017—CON-00ENCLOO-PLN-000001. BYPASS 111.923 361220.228 8136790.059 115.822 361223.668 8136788.222 118.422 361226.258 8136788.000 SMITHFIELD Trench base minimum bearing pressure to be 50kPa.
 As per FNQROC Drg. S2016B note 6 Trench type 2 or equivalent may be required in place of type 1. Seek advice from site Geotechnical Engineer for Bedding All DICL pipe to have protective coating or approved equivalent, Refer ECP Notes on Drg. 807609. Bend direction as follows; Bend Bend to (V)=Vertical (H)=Horizontal Existing Surface)=Compound (H+V) The maximum allowable joint deflection for DICL is;
 DN250 and below: 3.5*, U.N.O by manufacturer Potential Receival DN300 and above: 2.5', U.N.O by manufacturer

8. Where AC pipes are encountered, length of new pipe to suit distance to AC collar. Connection to existing AC pipe only to occur at AC collars, AC pipe is not Pit Location be cut. This may affect start/end chainages. note 8 DN450 RCP Class 4 Enveloper Refer Plan E1 on Drg 807623 note 8 9. All reasonable skill and care has been taken in the interpolation of the existing service data source. However, the contractor shall confirm all existing Minimum 200mm maintained to existing conduits services within the trench extent of the design services prior to opening the trench, to avoid Potential Thrust damaging any services that are to remain. Minimum 200mm cover to be maintained-#1 Refer FNQROC Std Drg S2016B to proposed DN600 Drainage line #2 HS2 Support (Refer DTMR Std Drg SD1359) ADDITIONAL INFORMATION DN200 DICL PN35 (TYTON-LOK) DN200 DICL PN3 PIPE MATERIAL #2 Type 1 #1 PIPE EMBEDMENT 0.50% 0.55% VERTICAL GRADE -0.13% 3.00% VERTICAL GRADE LENGTH L=76.6m L=27.1m L=5.6m L=1.5m L=3.9m L=1.0m L=2.6m -Datum R.L. -9.00 DESIGN SURFACE DEPTH TO INVERT DESIGN SURFACE EXISTING SURFACE DEPTH TO INVERT EXISTING SURFACE INVERT LEVEL 3D CHAINAGE 15.822 CHAINAGE WM02 - DN200 WATER MAIN LONGITUDINAL SECTION Survey Data CAIRNS REGIONAL COUNCIL WATERMAIN RELOCATION Scales Queensland Government GDA94 SMITHFIELD BYPASS MAIN LINE WORKS 5 10 15 20m MGA94 ZONE 55 WATER LONGITUDINAL SECTIONS - SHEET 1 OF 4 CTL CHGE 760.000 - 4112.964 Job No. 274/651/538017 Height AHD DERIVE ENGINEERING CERTIFICATION (RPE Reference Points From start to end of job Contract No. CN-7849 Following RP A Issued For Construction of job (km) Drawing No. 807614 A 20A/5 20A/08 age from Start of gazettal 20A: 11.82km to 15.61km CAD FILES | C:\Users\syah.ibrahim\Documents\TMRCust\TempDwgLocation\AcPublish_23640\SEQ19006-C-120_12

Figure 2.5.2(i) – PUP Details generic example

Department of Transport and Main Roads

Doc. No. 274/651/538017-DES-10PUWA00-DRG-TD0006



2.6 Control line and set-out details

This drawing details the control line configuration and the set-out tables for the proposed master alignments and sub-alignments.

Considerations

Scale

 Select to allow representation of survey and control lines (consider 1:250 at A1/1:500 at A3 if high degree of detail)

Survey

- Show benchmarks and Permanent Survey Marks (PSMs)
- Show survey stations and survey line (full) connecting stations
- Show recovery marks (offset pegs) if warranted
- Show property boundaries (red)

- Draw all control lines to be used for setting out of the construction
- Annotate control lines with the name, start and end chainages, bearings and radii
- Tabulate coordinates of points necessary to set-out the control lines on site (start, end, TPs, IPs or centre of curve)
- Show the control line chainages on the drawing
- Where possible set-out control line tables on the same sheet of the referenced control line to avoid cross referencing between sheets.

Figure 2.6(a) - Control line and set-out details - generic example 1

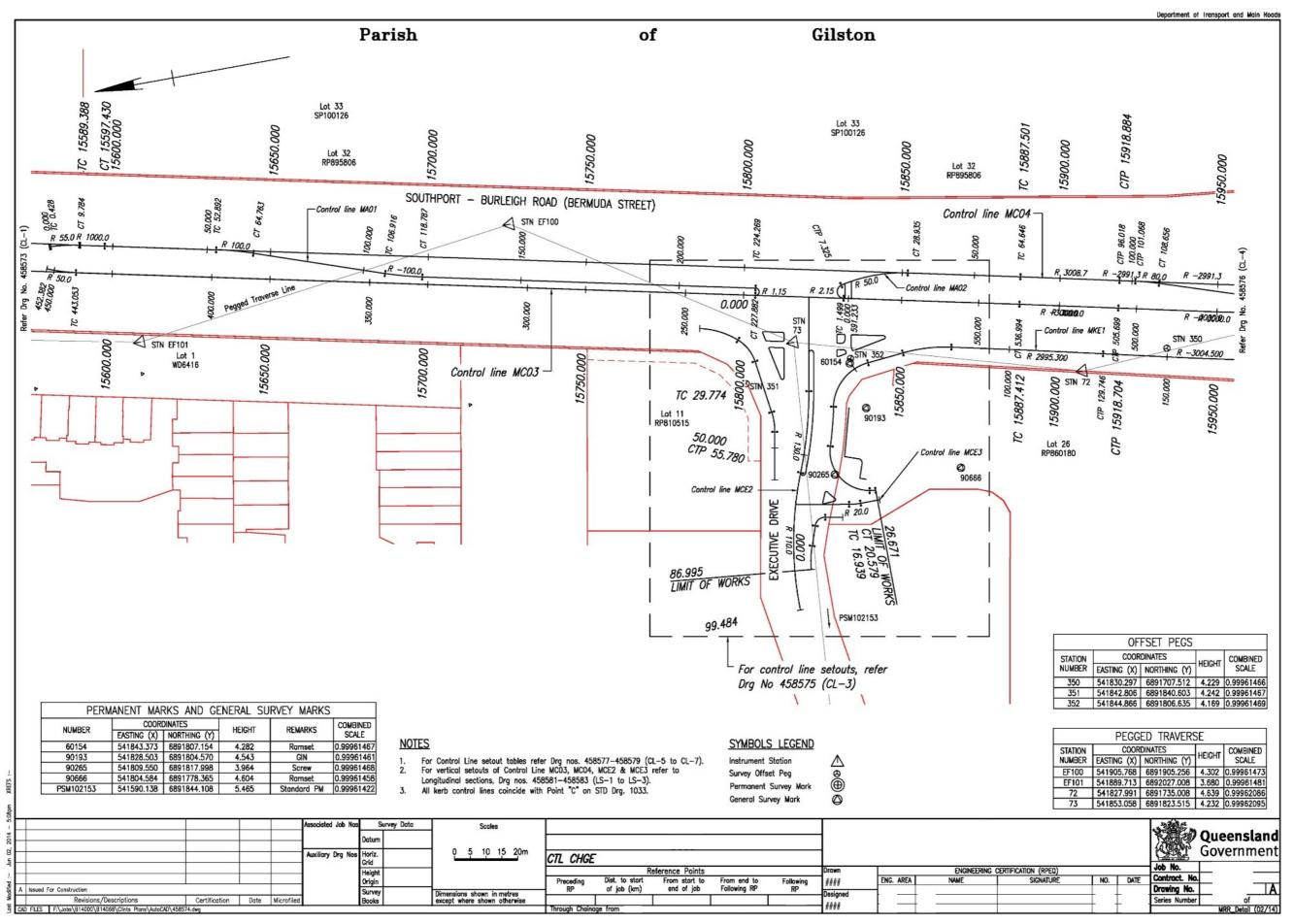


Figure 2.6(b) – Control line and set-out details – generic example 2

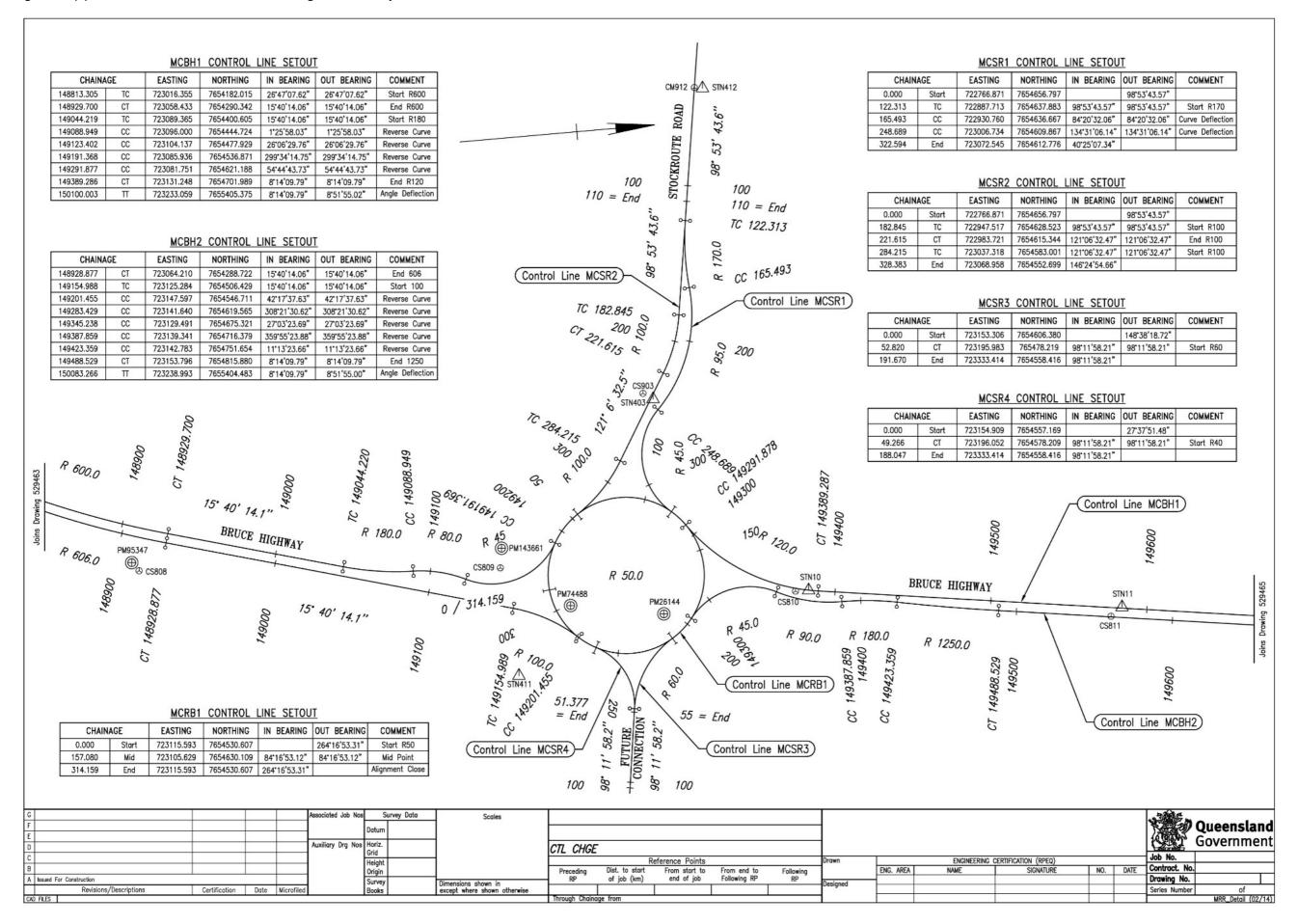
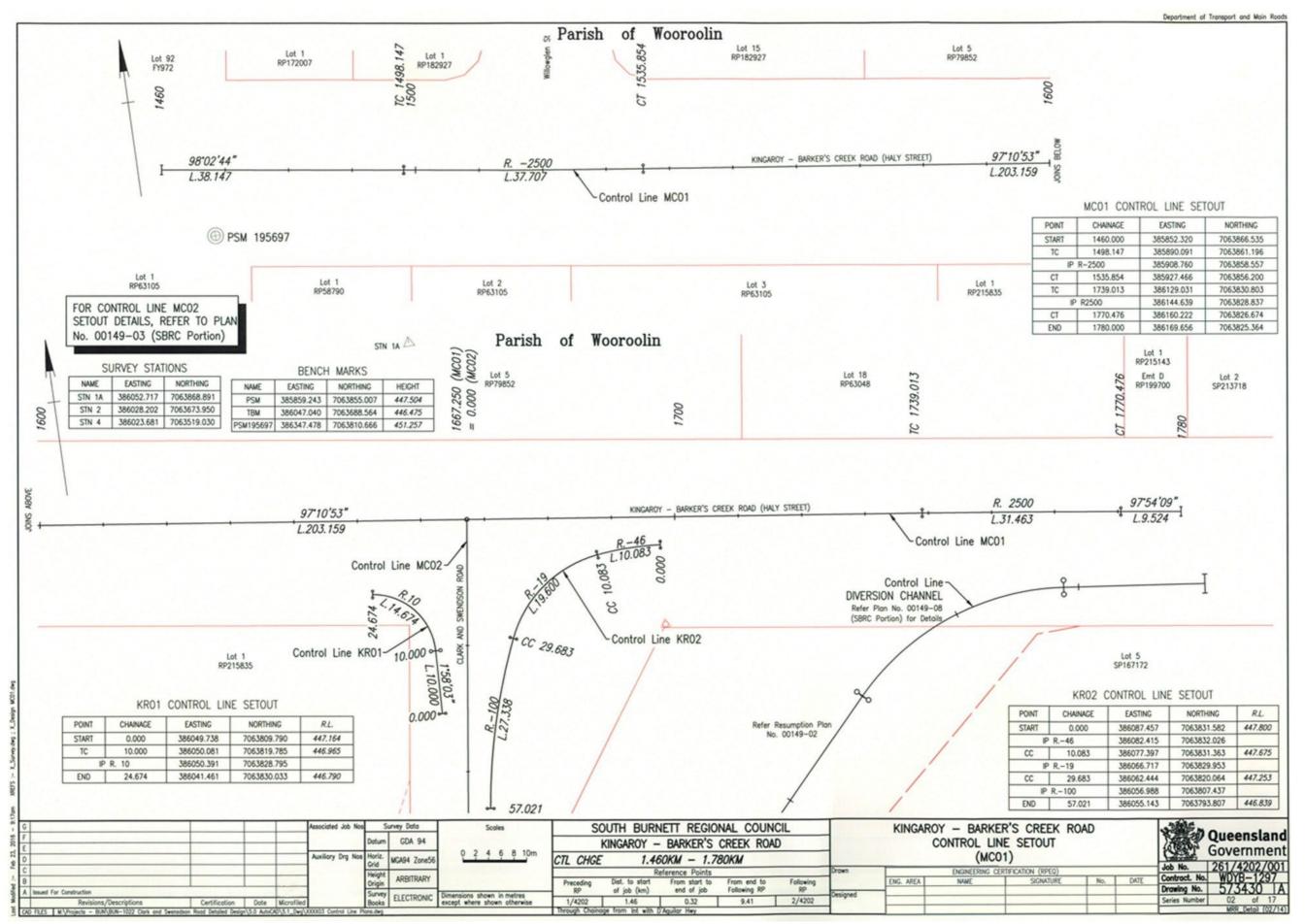


Figure 2.6(c) – Control line and set-out details – generic example 3



2.7 Construction details / General arrangement

Construction details drawings are prepared to convey details of the configuration and location of significant items of the proposed construction works all the way through the extents of the project.

General arrangement plans detail the proposed construction works for the entire road alignment and intersection layouts.

It may be appropriate to prepare two separate set of drawings for both "Construction Details" and "General Arrangement" for complex projects where there are substantial construction works and drawings are likely to be convoluted with too much information.

For less complex projects, either a set of "Construction Details" or "General Arrangement" drawings may be sufficient.

Considerations

Scale

- Usually 1:500 at A1/1:1000 at A3 (consider 1:250 at A1/1:500 at A3 if high degree of detail)
- Large scale may be appropriate for complex intersections

Background

- Topographical survey
- Property boundaries and descriptions
- Existing roadway beyond new roadwork (connection to existing construction)

- Show proposed roadway layout including K&C, medians, islands, footpaths, share paths, accesses, etc.
- Show control lines to be used for construction
- Detail change points (widths, chainages and crossfall) of proposed traffic and parking lanes, shoulders, bicycle lanes, bus lanes, bus bays, footpath, accesses, and so on
- Detail the location and extents of new guardrail, concrete barriers, crash terminals, retaining walls, noise walls, etc.
- Show proposed connection details to existing guardrail, concrete barriers, footpaths, etc.
- Show proposed bridges, abutments, culverts, headwalls, etc.
- Detail construction activities and construction requirements
- Show other features as necessary

Figure 2.7(a) – Construction details – generic example 1

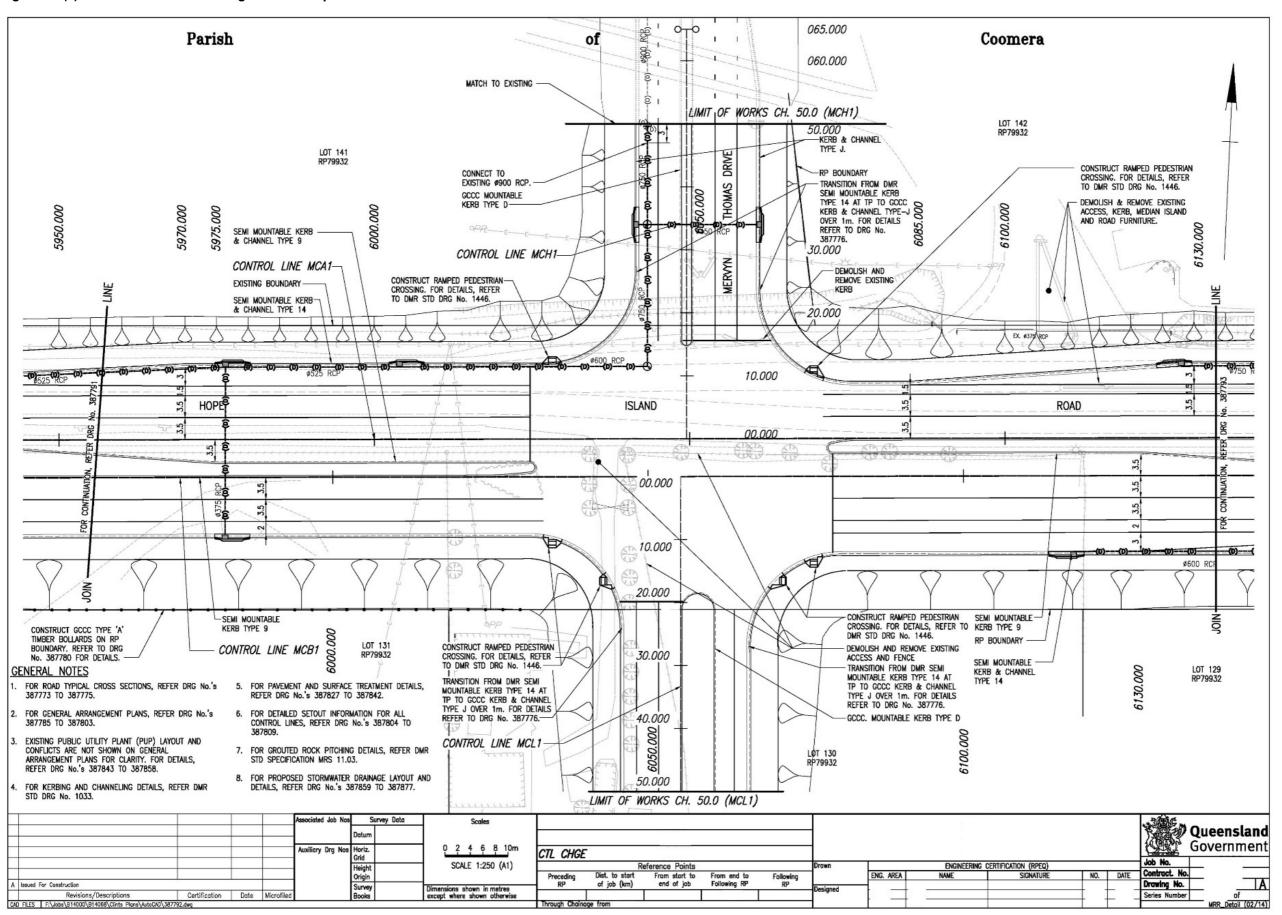


Figure 2.7(b) – Construction details – generic example 2

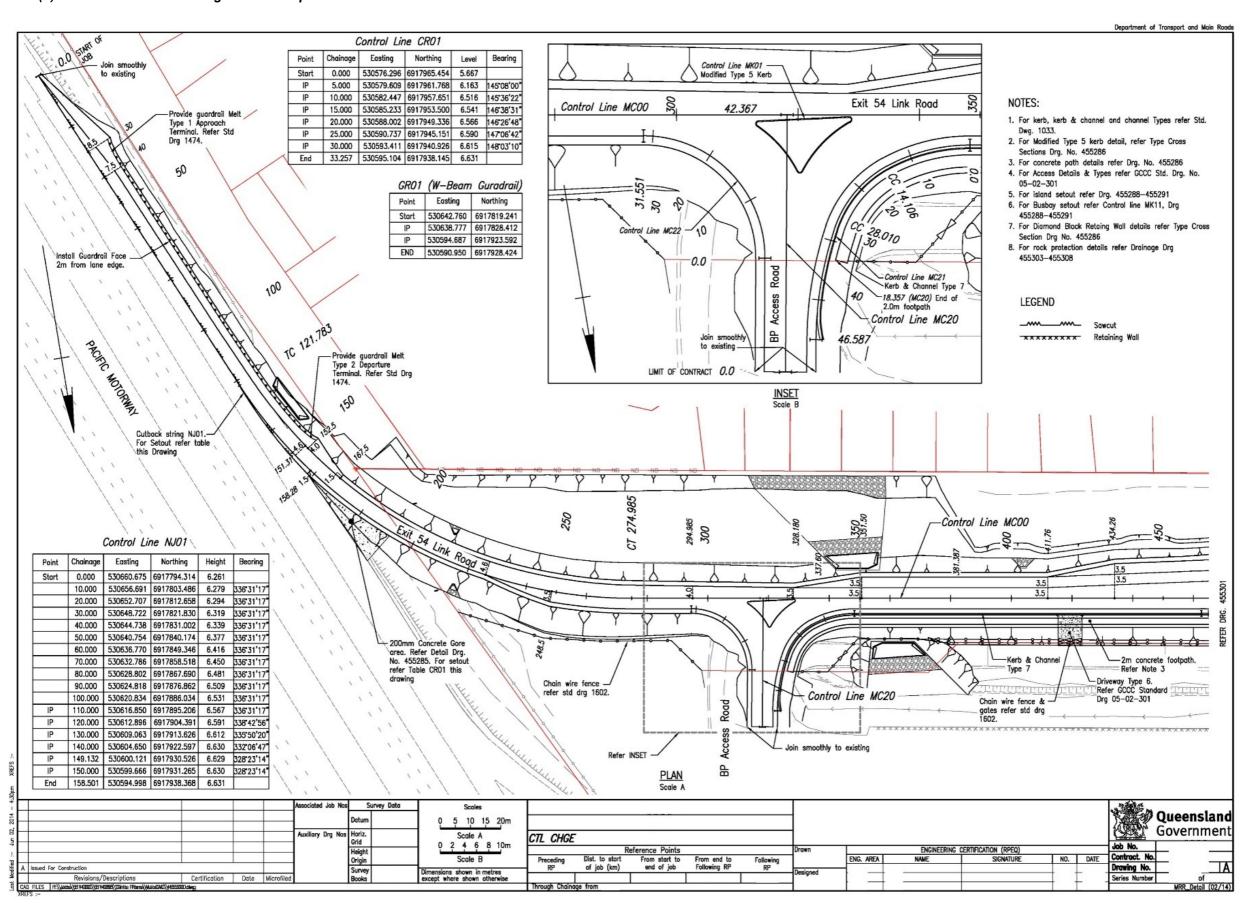


Figure 2.7(c) – Construction details – generic example 3

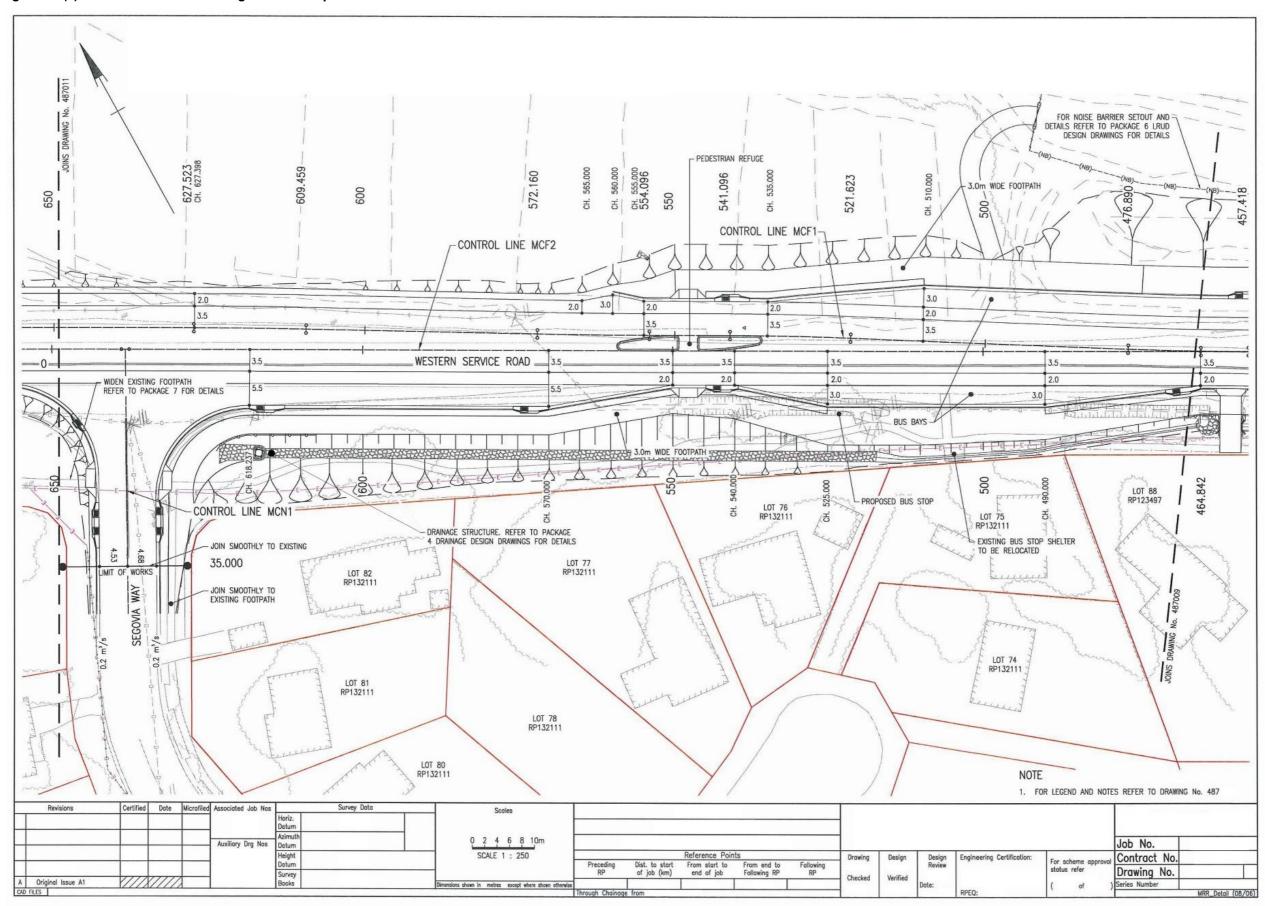


Figure 2.7(d) – General arrangement – generic example 1

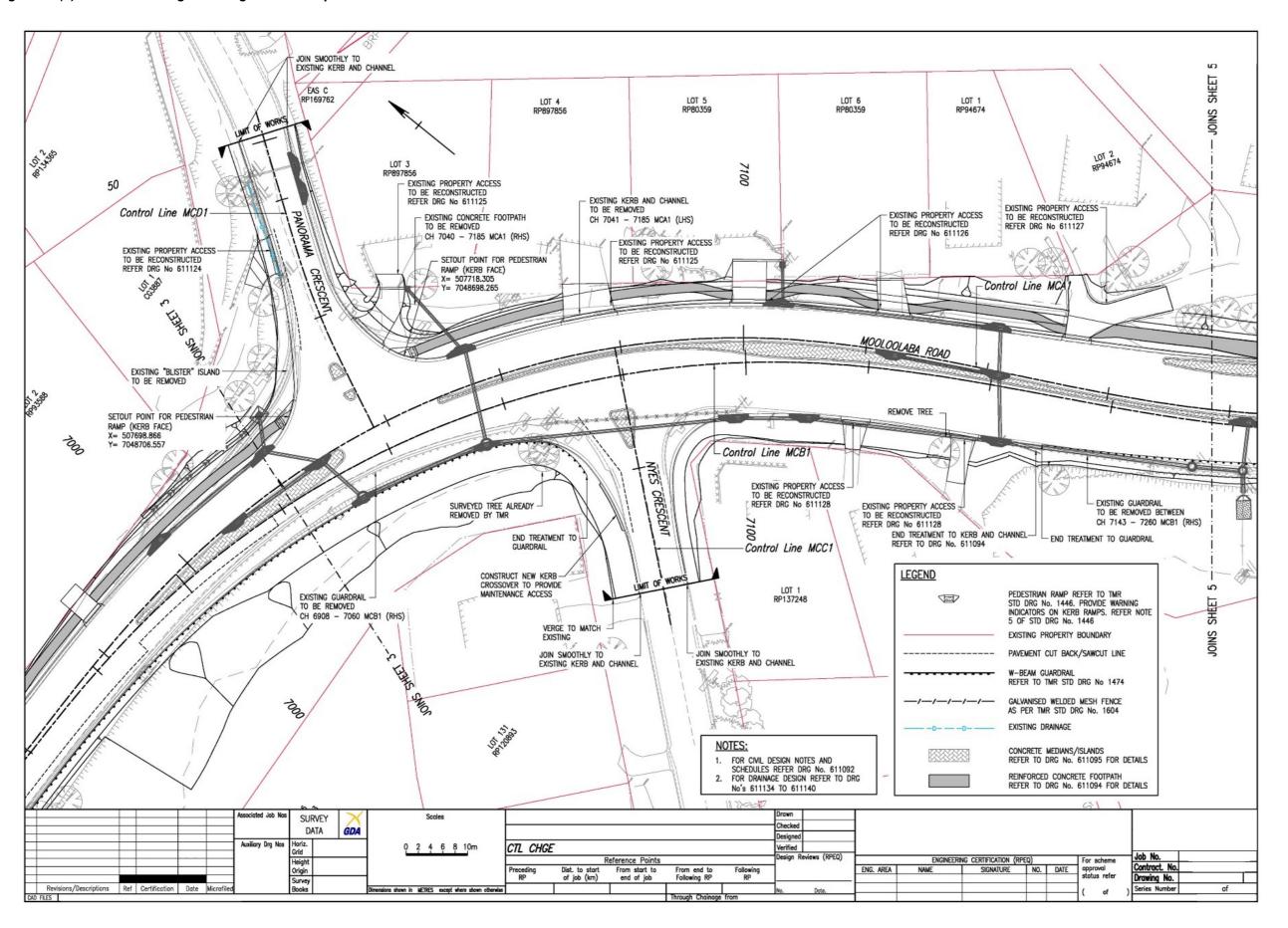


Figure 2.7(e) – General arrangement – generic example 2

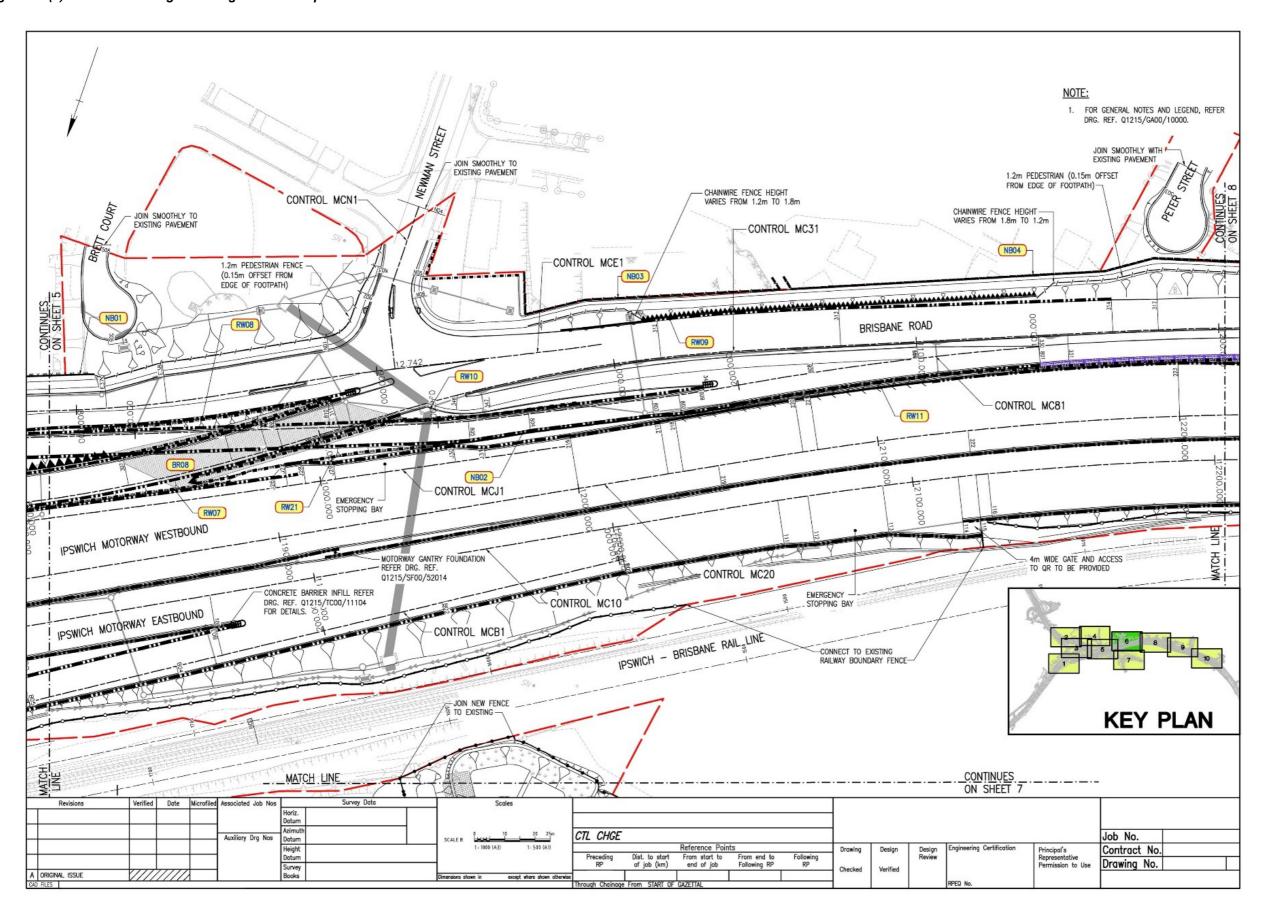


Figure 2.7(f) - General arrangement - registered example 1

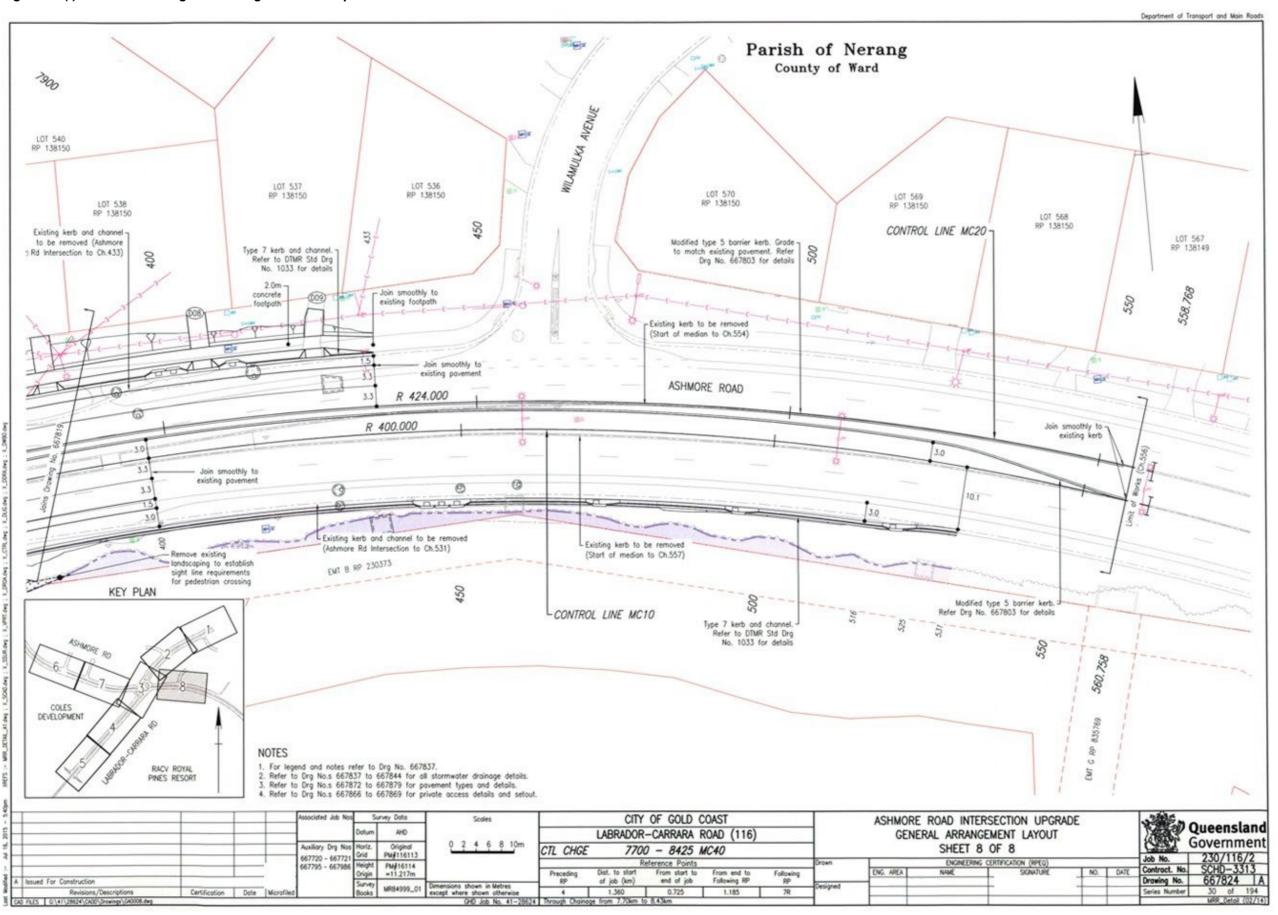
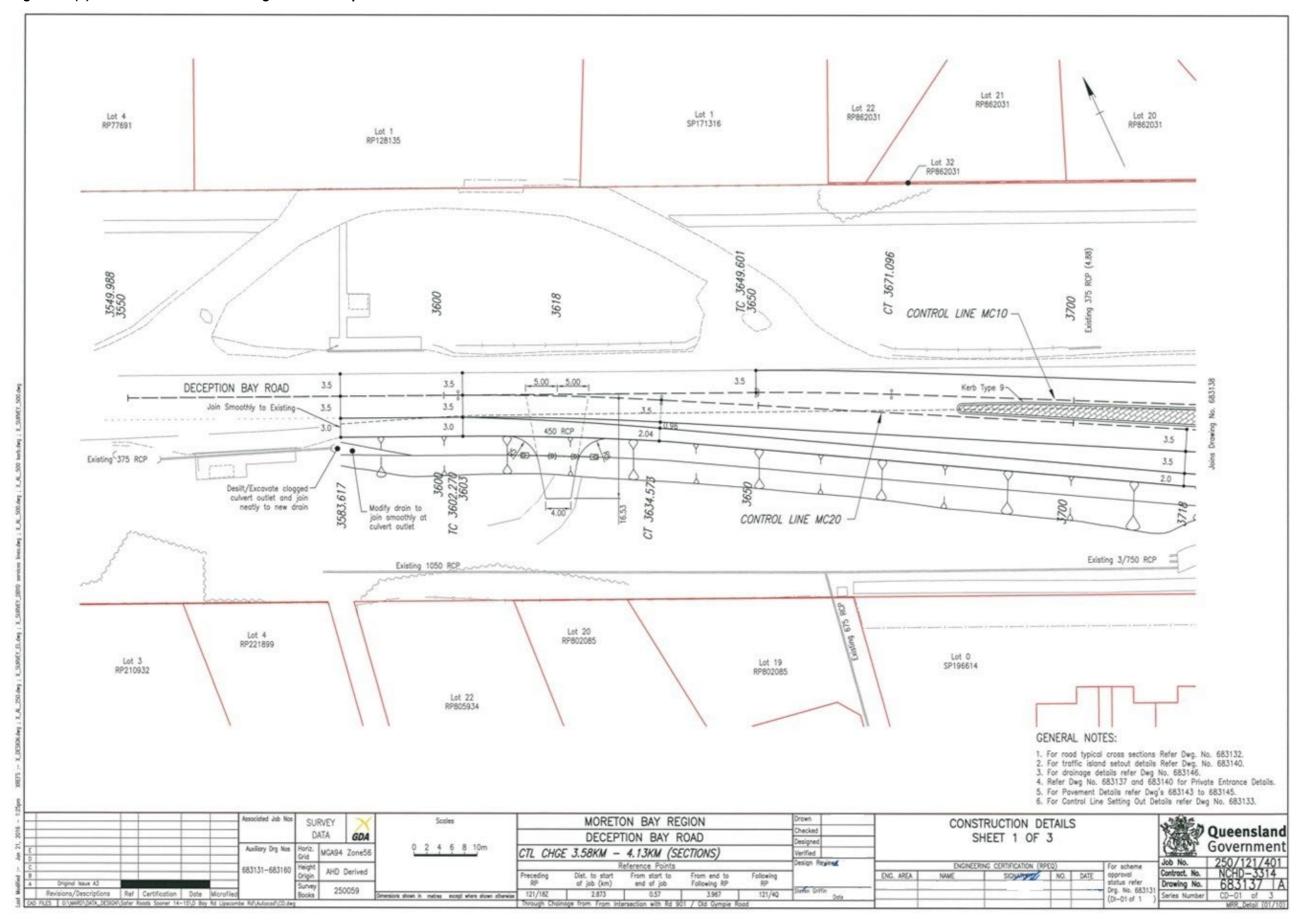


Figure 2.7(g) - Construction details - registered example 1

Department of Transport and Main Roads NOTES CONTROL LINES Tock Coot or SAMI - under AC14H or AC10H refer Note 2 or 3 The control lines shown on the drawings are for chainage reference purposes & have not been developed geometrically. Control lines shown are coincident with the current DTMR reference point (RP) plans. Ramp (10.0m) nom. refer asphalt overlay plans Sowcut PAVEMENT DETAILS General pavement treatment details as per 'Detail J' - General Treatment (50mm)' General pavement treatment details with SAMI as per 'Detail K - General Treatment (35mm) with SAMI' and 'Detail L - General Treatment (50mm) with SAMI'. Profile existing pavement (0-50mm) for asphalt ramps at Povement repairs - 100mm nominal compacted depth AC20 mix (Class 600 Binder). limits of work. Refer Note Provisional Quantity - if ordered, as directed by the Administrator (Item 4164). 5. Cracks <10mm - crack filling (Provisional Quantity - if ordered) as directed by the Existing povement END DETAIL 'A' - LONGITUDINAL RAMP (LONG) Administrator (item 5402.P) crocks > or = to 10mm - crock filling as above plus strain alleviating fabric strips - 250mm wide. BITACN BIT25 or equivalent product - (Provisional Quantity - if ordered), as directed by the Administrator refer Detail I. (Item 5403.P). 6. Existing retroreflective raised povement markers (RRPM's) shall be removed by mechanical means prior to placement of tack coat & wearing course. In areas where the 50mm profiled depth encounters unbound granular povement material, bitumen emulsion primer CRS (60%) or opproved equivalent product by the Administrator Tack Coot or SAMI - under AC14H or AC10H is to be applied prior to laying 50mm AC14H asphalt wearing course. The proposed spray rate for the bitumen emulsion prime (CRS) is 0.2/litres/m² and the Contractor shall adjust Ramp (2.0 to 5.0m) nom the rate accordingly based on site conditions. The Contractor shall undertake the SAMI seal design for both the 35mm and 50mm. Sowcut edge the Contractor shall unpertake the SAMI seal pesign for both the Samin and Summi treatment at the time of construction to suit conditions encountered at the time and to cater for actual ALD stone size used. This design is to be in accordance with latest Austroads sproyed seal design manual. The binder application rates are not expected to change but the aggregate spread rate may depending on the ALD size of the precoated Profile existing povement cover aggregate used during construction and should be based on spread rate 900/ALD. The stated seal spray and spread rate is based on design assumptions and is for pricing limits of work. Refer Note 7. purposes only. Where a 35mm and 50mm overlay adjain, a 10.0 metre transition shall be used to END DETAIL 'B' - LONGITUDINAL RAMP (SHORT) gradually modify the height. 10. All signs affected by the works to be removed and re-erected at same location clear of Traffic Lane/Shoulder Traffic Lone PAVEMENT MARKING All povement markings affected by the works to be surveyed and reinstated to match existing (pre construction) unless shown atherwise. Tack Coat or SAMI - under AC14H or AC10H refer Note 2 or 3 Width varies Profile to lane line (within lane, Max. 4.0m)/ All povement marking material shall be point unless noted otherwise. All povement arrows and stop bars shall be thermoplastic unless noted otherwise Existing kerb and channel edge line (within shoulder, Min. 1.5m) Unless indicated otherwise all signs & pavement marking shall be in accordance with the current manual of uniform traffic control devices (MUTCD). Existing surface -15. RRPM's shall be provided in accordance with the current manual of uniform traffic control devices (MUTCD). Profile existing pavement (0-50mm) to accept PUBLIC UTILITY PLANT (PUP) 35mm or 50mm of asphalt (depending on 16. All occess chamber lids in extent of works shall be adjusted to match new povement · In some cases profile povement to concrete treatment), profile 35mm or 50mm at channel lip. bus bay, drive way, spoon drain or parking bay. 17. The Contractor shall make enquiries to the PUP authorities regarding the location, depth & extent of PUP prior to commencement of work on the site. EDGE DETAIL 'C' - KERB & CHANNEL WITH OR WITHOUT SHOULDER PROFILED The Contractor shall be solely responsible for any damage to the existing PUP as a result of the execution of work under the contract. 19. No work shall be carried out within 3m of any existing PUP without prior consultation with 20. All existing hydronts and valves to be remarked with RRPM'S/Povement marking to match existing (pre construction). 21. All non standard drainage grates are to be replaced in accordance with standard drawing 1312. As directed by the Administrator Traffic Lane/Shoulder 22. Locations of potential conflicts and services are approximate only, Contractor to verify Traffic Lone Only underground services are shown. Contractor to ensure appropriate clearance to overhead services during construction. Tack Coat or SAMI - under AC14H or AC10H refer Note 2 or 3 Width vories Profile to lane line (within lane, Max. 4.0m), DETECTOR LOOPS edge line (within shoulder, Min. 1.5m) overlay 24. All vehicle detector loops affected by these works shall be reinstated by the Contractor Existing surface -(Item 6661). At least one weeks notice must be given to TMR prior to disconnection of existing detector loops. Loops should be reinstated not more than three days after poverner Profile existing pavement (0-50mm) to accept 35mm Height of guardrail to be measured on site and raised if required. Abraham blocks to be installed as directed by the Administrator. 50mm of asphalt (depending on treatment). ENVIRONMENTAL AND CULTURAL HERITAGE EDGE DETAIL 'D' - GENERAL TREATMENT WITHOUT KERB & SHOULDER PROFILED 26. Works shall be completed under Ventia Boral Amey's overarching environmental Queensland Government LOGAN CITY COUNCIL ASPHALT OVERLAY (SECTION 3 AND 4) BEENLEIGH - REDLAND BAY ROAD 1 2 3 46 CONSTRUCTION DETAILS AND NOTES SHEET 1 OF 2 MCA94 75/ CTL CHGE 1500 - 2890 0.1 0.2 0.3 0.4 R10/R004/705 ENGINEERING CERTIFICATION (RP Contract. No. SCHD-3120 Drawing No. 706742 AHD Derive From stort to end of job From end to Following RP Following RP SCALINE. 1.390km

Figure 2.7(h) - Construction details - registered example 2



2.8 Intersection details

This drawing shows intersection geometry and layout details.

Considerations

Scale

Usually 1:250 at A1/1:500 at A3

- Show kerb and median set-out points. Where possible set-out tables should be on the same sheet that the set-out points are positioned to avoid cross referencing between sheets. Show proposed roadway edges including K&C, medians, islands, footpaths, and accesses
- Show control lines to be used for construction set-out
- Include tables to identify control line numbers, point numbers, co-ordinates, heights and features
- Show road contours (as required) to assist in visualising geometry
- Show other features as necessary

Figure 2.8(a) – Intersection details and set-out tables – generic example 1

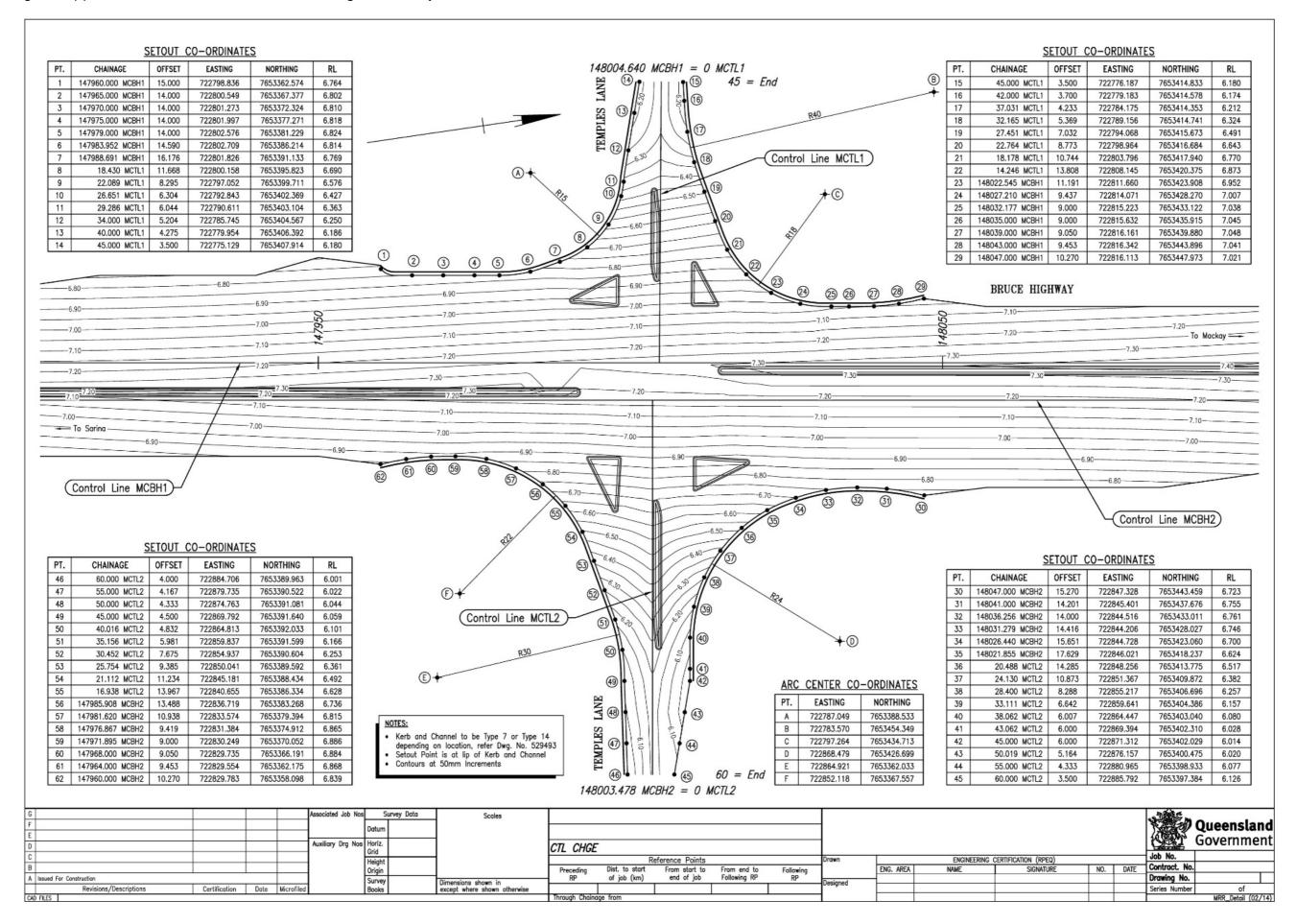


Figure 2.8(b) – Intersection details and set-out tables – generic example 2

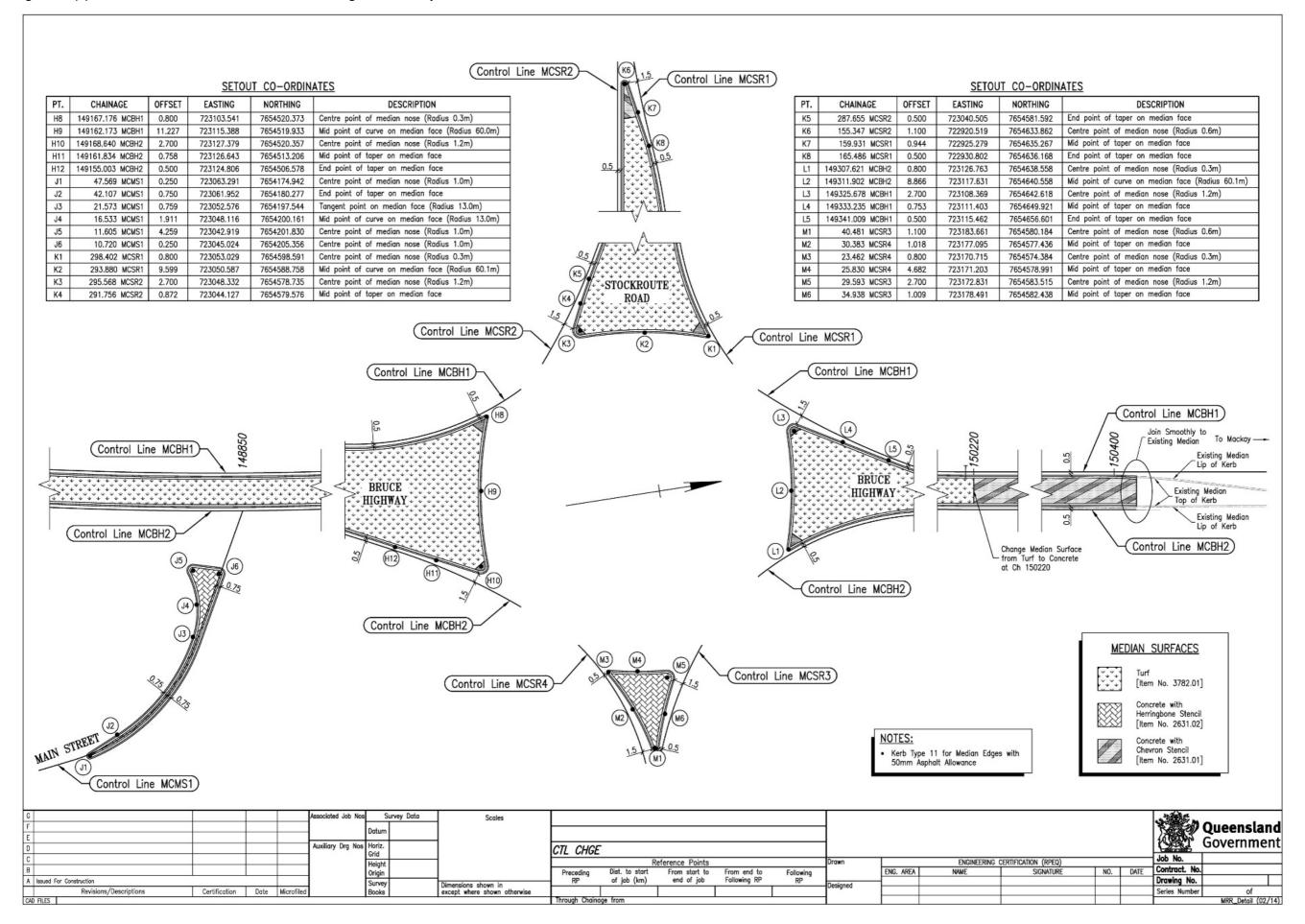


Figure 2.8(c) – Intersection details and set-out tables – generic example 3

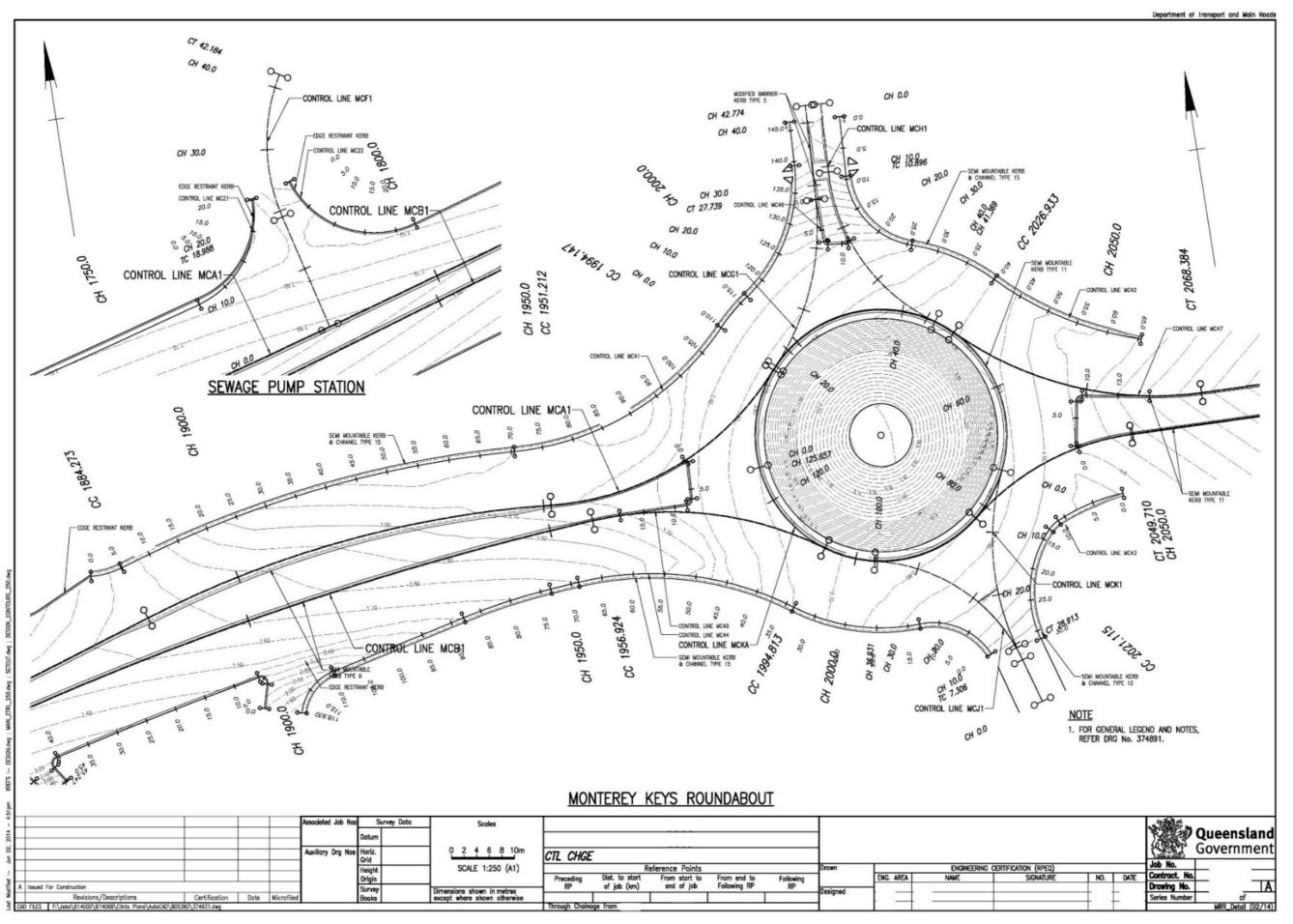
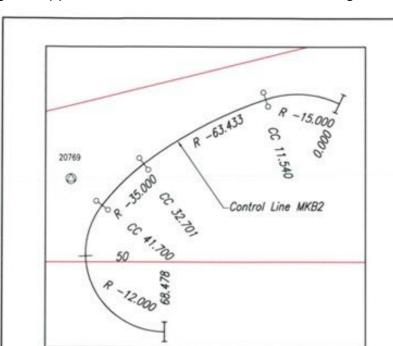


Figure 2.8(d) – Intersection details and set-out tables – generic example 4

Department of Transport and Main Roads KERB LIP MC11 (TYPE 15 SEMI MOUNTABALE KERB) KERB FACE MC13 (TYPE 9 SEMI MOUNTABALE KERB) CHAINAGE EASTING NORTHING CHAINAGE EASTING NORTHING RADIUS LEVEL RADIUS 0.000 531724.146 6915541.248 1.000 531725.104 6915541.533 2.000 531726.038 6915541.890 KERB LIP MC11 'CONT 3.515 999999.900 3.723 999999.900 3.986 999999.900 531768.823 6915596.497 -13.000 -13.000 531770.041 6915591.648 531771.259 6915586.799 4.450 5,000 (TYPE 15 SEMI MOUNTABALE KERB) 4.436 10.000 531726.942 6915542.318 531727.810 6915542.814 531772.476 6915581.949 531773.694 6915577.100 4.426 -13.000CHAINAGE EASTING NORTHING 15,000 4.183 999999.900 RADIUS 4.255 4.000 4.419 -13.00020.000 999999.900 70.000 531762.134 6915589.340 3,495 999999,900 531728.637 6915543.375 531728.743 6915543.454 4.416 -13.000 25.000 531774.912 6915572.250 4.200 KERB FACE MC21 (EDGE RESTRAIN KERB) 531762.043 6915589.704 4.416 229,000 28.407 1,100 531775.742 6915568.946 4.090 3.447 999999.900 4.070 1.100 6.000 7.000 531729.438 6915543.974 71.000 531761.892 6915590.311 28.938 531775.744 6915568.420 CHAINAGE EASTING NORTHING LEVEL RADIUS 531761.650 6915591.281 531730.241 6915544.570 4.414 229,000 29.469 531775.502 6915567.953 8.000 531731.046 6915545.163 9.000 531731.854 6915545.752 -15.000 -15.000 73 000 531761 408 6915592 251 3 372 gggggg ggg 531775.071 6915567.652 4.055 0.000 | 532353.054 | 6915730.512 229.000 3.352 999999.900 4.067 532354.005 6915730.820 4.412 229,000 30.583 531774.498 6915567.592 1,100 4.088 531732.665 6915546.337 229.000 75,000 531760.924 6915594.192 999999.900 531773.973 6915567.831 2.000 532354.934 6915731.191 2.537 -15.000 3.352 3.357 531760.682 6915595.162 999999.900 531733 478 6915546 919 76.000 532355 835 6915731 623 2.529 11 000 4 410 229,000 31.750 531773 641 6915568 302 999999.900 3.000 -15.0004.408 4.405 4.403 531734.294 6915547.498 229.000 531760 440 6915596 132 999999.900 531772.532 6915571.357 999999.900 532356.706 6915732.114 2.518 -15.000 77.257 531760.378 6915596.382 3.358 999999.900 50.000 50.000 13 000 531735.112 6915548.073 229,000 37 354 531771.728 6915573.570 4.192 5.000 532357.543 6915732.662 2.506 -15.0002.491 2.475 531735.933 6915548.644 229.000 531770.892 6915576.079 532358.341 6915733.264 -15.000 4.401 4.399 4.395 4.392 4.389 4.385 531736.756 6915549.212 531737.582 6915549.776 229.000 229.000 531770.239 6915578.429 531769.614 6915580.913 999999.900 999999.900 15.000 42.439 4 155 7,000 532359.097 6915733.918 -15.0002.475 2.437 2.423 2.421 2.410 2.400 2.397 2.393 4.100 532359.807 6915734.621 -15.000 531738.410 6915550.337 531739.240 6915550.893 229.000 229.000 531768.393 6915585.761 531767.173 6915590.610 3.910 3.649 17,000 50,000 999999.900 9.000 532360.470 6915735.370 -15.00018.000 10.000 532361.081 6915736.162 -15.000 55.000 999999.900 KERB LIP MC12 (TYPE 15 SEMI MOUNTABALE KERB) 3.456 531740.073 6915551.447 531740.909 6915551.996 60.000 531765.952 6915595.459 60.310 531765.877 6915595.760 10.102 -15.000 -15.000 19.000 229.000 532361.140 6915736.245 532361.638 6915736.992 229.000 3.453 999999.900 20.000 CHAINAGE EASTING NORTHING LEVEL 21.000 531741.746 6915552.542 531742.587 6915553.085 4.382 229.000 12.000 532362.138 6915737.858 -15.00012.418 -15.000 0.000 531773.687 6915598.794 532362.330 6915738.229 22,000 229,000 3.339 999999.900 4.373 4.368 532362.580 6915738.755 532362.961 6915739.679 531743.429 6915553.623 13.000 -15.000 24.000 531744.274 6915554.158 229,000 2.000 531774.156 6915596.850 3.343 999999.900 14.000 2.391 -15.0004.364 3.349 3.354 532363.279 6915740.627 532363.534 6915741.594 2.393 531745.121 6915554.690 15.000 -15.000 229.000 KERB FACE MC14 (TYPE 9 SEMI MOUNTABALE KERB) 16.000 -15.00026.000 531745.971 6915555.217 229.000 4.000 531774 625 6915594 906 999999.900 2.417 2.440 2.468 531746.823 6915555.741 531747.677 6915556.261 4.354 4.349 17.000 532363.723 6915742.575 -15.000 229.000 531774.856 6915593.952 999999.900 CHAINAGE EASTING NORTHING LEVEL RADIUS 532363.847 6915743.567 28 000 229,000 5.000 531774.860 6915593.934 3.372 999999,900 18.000 -15.0004.344 4.338 531748.533 6915556.778 531775.095 6915592.961 532363.905 6915744.566 -15.000 229.000 3.411 0.000 531759.680 6915541.301 6.000 999999.900 -100.000229.000 3.468 3.538 531760.539 6915541.813 531761.392 6915542.334 2.496 30.000 531749.392 6915557.290 7.000 531775 . 329 6915591 . 989 999999.900 1.000 3.484 -100.000 20.000 532363.895 6915745.565 -15.000531750.252 6915557.799 4.333 531775.564 6915591.017 20.229 532363.884 6915745.794 -15.000 8.000 3.482 -100.000999999.900 2.000 32,000 531751.115 6915558.304 531751.981 6915558.806 4.327 229.000 229.000 9.000 531775.798 6915590.045 10.000 531776.033 6915589.073 3.617 3.699 999999.900 531762.241 6915542.864 -100.000 -100.000 3.481 999999.900 4.000 531763.084 6915543.402 4.316 4.310 4.305 34.000 531752.848 6915559.303 35.000 531753.718 6915559.797 229.000 531776.268 6915588.101 3.780 999999.900 531763.921 6915543.948 -100.000 KERB FACE MC22 (EDGE RESTRAIN KERB) 229.000 12.000 | 531776.502 | 6915587.129 3.857 999999.900 6.000 531764.753 6915544.503 3.480 -100.00036.000 531754.589 6915560.287 37.000 531755.463 6915560.773 3.480 229.000 531776.737 6915586.157 3.923 531765.010 6915544.676 999999.900 CHAINAGE EASTING NORTHING LEVEL RADIUS 4.299 229.000 14.000 531776.971 6915585.185 3.963 999999.900 7.000 531765.581 6915545.064 999999.900 531766.409 6915545.625 531767.236 6915546.186 531768.064 6915546.748 531756.339 6915561.255 4.294 229.000 3.998 4.028 8.000 999999.900 0.000 532370.308 6915747.607 39.000 531757.217 6915561.734 16.000 531777.441 6915583.241 9.000 3.481 999999.900 999999.900 4.288 229.000 999999 900 1.000 532370.651 6915746.668 2.719 -15.000531757.385 6915561.825 4.287 -15.000 531777.558 6915582.754 -12.000 532371.057 6915745.754 -15.000 531758.086 6915562.229 11.000 531768.891 6915547.309 531769.719 6915547.871 3.480 40.000 4.284 -15.00017.000 531777.685 6915582.271 4.053 -12.000999999.900 2.624 2.580 2.539 2.512 2.489 2.471 2.458 2.448 3.000 532371.522 6915744.869 -15.000531758.921 6915562.780 4.283 -15.000 531778.000 6915581.322 4.070 -12.000 999999.900 4.000 532372.045 6915744.017 -15.000 4.080 4.083 4.081 4.081 42,000 531759.717 6915563.385 4.286 -15.00019.000 531778.392 6915580.403 20.000 531778.860 6915579.519 -12.000 -12.000 13.000 13.018 531770.547 6915548.432 531770.561 6915548.442 3.479 3.479 999999.900 -15.000 -15.000 4.286 4.292 4.302 4.315 4.332 4.352 4.364 4.365 5 000 532372.623 6915743.202 531760.470 6915564.041 -15.000 532373.255 6915742.427 531779.399 6915578.677 531779.448 6915578.608 21.000 21.085 -12.000 -12.000 3.481 3.487 44 000 531761 179 6915564 747 -15.00013.509 531770.934 6915548.760 7.000 8.000 532373.937 6915741.695 532374.666 6915741.011 -15.000 -15.000 531761.839 6915565.498 -15.000 14,000 531771.230 6915549.151 -2.250531762.447 6915566.291 531763.002 6915567.123 -15.000 -15.000 22.000 531780.007 6915577.884 23.000 531780.679 6915577.143 4.076 -12.000 -12.000 3.497 46.000 14.500 531771.437 6915549.605 -2.250 9.000 532375.439 6915740.377 -15.000 15.000 531771 538 6915550 093 -2.250532376.253 6915739.796 10.000 -15.00048.000 531763.499 6915567.991 48.178 531763.581 6915568.148 -15.000 -15.000 4.056 -12.000 -12.000 3.515 3.523 24.000 531781.410 6915576.461 531771.530 6915550.592 -2.250 2.441 2.439 2.438 11.000 11.648 532377.103 6915739.271 -15.000 25.000 531782.195 6915575.842 16.000 531771 411 6915551 077 -2.250532377.673 6915738.961 -15.00049.000 531763.938 6915568.889 50.000 531764.316 6915569.815 4.362 -15.000 -15.000 531783.029 6915575.291 4.029 -12.000 -12.000 531771.189 6915551.524 3.532 -2.250 12.000 532377.987 6915738.803 -15.000 3.542 3.553 -2.250 -2.250 27.000 531783.906 6915574.811 17.000 531770.874 6915551.910 2.438 2.440 2.444 13.000 532378.900 6915738.395 -15.000531764.631 6915570.764 4.321 -15.000 531783.995 6915574.768 4.012 -12.000 531770.481 6915552.218 532379.838 6915738.049 -15.000 3.562 3.570 3.574 3.581 -2.250 -2.250 -2.250 -2.250 52.000 531764.882 6915571.731 4.287 -15.00028 000 531784 820 6915574 406 3.998 -12 000 18.000 531770.030 6915552.432 531769.543 6915552.541 3.988 3.968 3.955 3.944 3.935 3.930 3.928 15.000 | 532380.797 | 6915737.766 -15.000531764.912 6915571.865 4.282 -15.000 -12.000 532381.773 6915737.547 2.455 -15.000 -12.00053.000 531765.069 6915572.713 4.246 -15.00030 000 531786 733 6915573 830 19.000 531769.044 6915552.539 2.463 2.469 2.474 2.476 17,000 532382,761 6915737,395 -15.000-12.000 -12.000 -12.000 531765.189 6915573.706 4.201 531787.718 6915573.663 -15.000 31.000 18.000 532383.757 6915737.308 -15.000 4.153 55.000 531765.243 6915574.704 -15.00032.000 531788.715 6915573.580 19.983 531768.122 6915552.222 -2.250 -15.000 -15.000 19.000 532384.756 6915737.288 56.000 57.000 531765.231 6915575.704 4.104 -15.000 33.000 531789.714 6915573.579 20.000 532385.755 6915737.334 4.057 -15.000 -15.000 34.000 531790.711 6915573.661 35.000 531791.697 6915573.826 -12.000 -12.000 531765.152 6915576.701 2.477 2.475 2.472 2.471 21 000 532386.748 6915737.447 532387.732 6915737.626 -15.000 -15.000 531765.007 6915577.690 22.000 58.979 531764.801 6915578.647 531764.796 6915578.667 3.975 3.974 999999.900 36.000 531792.665 6915574.073 37.000 531793.610 6915574.399 3.931 3.926 -12.000 -12.000 23.000 532388.702 6915737.870 23.186 532388.880 6915737.922 -15.000 999999.900 -15.000KERB FACE MC15 (TYPE 9 SEMI MOUNTABALE KERB) 60.000 531764.554 6915579.638 3.943 999999.900 38.000 531794.525 6915574.803 3.925 -12.000 -12.000 531764.312 6915580.608 3.916 999999.900 39.000 | 531795.402 | 6915575.282 3.928 CHAINAGE EASTING NORTHING RADIUS LEVEL 531764.070 6915581.578 531763.828 6915582.548 62.000 3.883 999999.900 40.000 531796.237 6915575.832 3.936 -12.000 3.845 63.000 999999.900 41.000 531797.023 6915576.450 3.948 -12.000531790.929 6915562.283 3.438 -1.005 -1.005 64.000 531763.586 6915583.519 3.802 41.281 531797.235 6915576.635 3.952 -12.000 531790.564 6915561.949 3.444 65.000 531763.344 6915584.489 3.754 3.453 3.463 -1.005 -1.005 999999.900 1.000 531790.403 6915561.481 531763.102 6915585.459 3.703 1.500 531790.484 6915560.993 999999.900 67,000 531762,860 6915586,430 3.472 3.477 -1.005 -1.005 3.650 999999.900 2 000 531790.789 6915560.603 531762.618 6915587.400 3.598 531791.242 6915560.406 69.000 531762.376 6915588.370 3.547 999999.900 531791.735 6915560.449 -1.005 -1.005 3.073 531791.803 6915560.475 Survey Data Queensland Government Auxiliary Drg CTL CHGE NOT TO SCALE ION (RPEQ) SIGNATURE deference Points FNG. AREA NO. DATE Following RP Drawing No.

AD FILES F:\Jobs\B14000\B14068\Clints Plans\AutoC40\B05360\374934.dw

Figure 2.8(e) - Intersection details and set-out tables - registered example 1



HORIZONTAL SETOUT CONTROL LINE MCA1

Pt	Chainage	Easting	Northing	Level	Bearing	Rad/Spiral	A.Length	D.Angle
					210'01'43.11"			
TC	22498.573	502224.873	6920164.468	28.086	210'01'43.11"			
			6920110.208				125.321	2'45'42.06"
CT	22623.894	502159.568	6920057.522	27.765	212'47'25.16"		7 4 7 7 1 7 1	
			6920008.782			, ,		
IP4	22912.905	502002.633	6919814.831	27.75	212'54'47.55"	3		

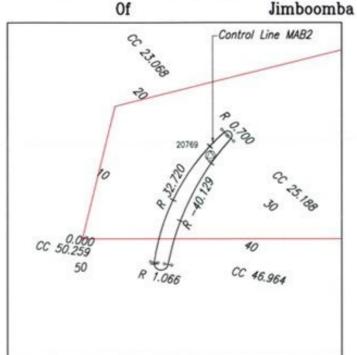
HORIZONTAL SETOUT CONTROL LINE MCA2

Pt	Chainage	Easting	Northing	Level	Bearing	Rad/Spiral	A.Length	D.Angle
P1	0	502228.219	6920170.257	28.147	210"11"16.33"			
TC	30.066	502213.101	6920144.268	27.869	210'11'16.33"			
IP2	42.394	502206.899	6920133.608	27.81		350	24.656	4'02'10.43"
CT	54.722	502199.962	6920123.41	27.732	214'13'26.76"			
TC	119.956	502163.273	6920069.472	27.686	214"13"26.76"			
IP3	124.079	502160.954	6920066.063	27.677		-350	8.246	1"20"59.40"
CT	128.202	502158.716	6920062.6	27.668	212'52'27.36"			
TC	275.925	502078.532	6919938.533	27.524	212'52'27.36"			
P4	283.781	502074.268	6919931.934	27.545		-350	15.712	234'19.26"
CT	291.636	502070.303	6919925.15	27.581	210'18'08.10"			
TC	352.915	502039.384	6919872.243	27.679	210'18'08.10"			
IP5	359.049	502036.289	6919866.947	27.68		350	12.267	2'00'29.38"
IP6	365.183	502033.01	6919861.763	27.676	212'18'37.48"			

HORIZONTAL SETOUT CONTROL LINE MCC1

Pt	Chainage	Easting	Northing	Level	Bearing
IP1	0	502147.933	6920058.715	27.4	302'46'12.54"
IP2	28.191	502124.229	6920073.974	25.928	302'46'12.54"

Of Parish

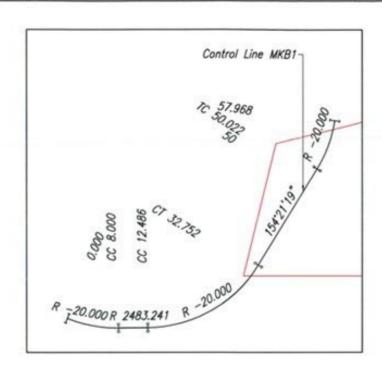


INSTRUMENT STATIONS / SURVEY MARKS

No.	Easting	Northing	meigns	Combined Scale	Remarks
PM26542	502271.847	6920183.694	26.567	0.99958949	PM26542 MR24P STANG
STN4A	502113.070	6920004.064	27.480	0.99958934	STN4A AL PLUG
STNKC5	502033.971	6919851.303	27.500	0.99958933	STNKC5 PEG
EF503	502314.436	6920313.049	33.465	0.99958841	EF503 BOLT
E502	502072.346	6919911,173	27.476	0.99958933	EF502 PEG
701	502093.911	6919947.854	27.525	0.99958933	701 GIN
205	502034.679	6919856.941	27.581	0.99958932	205 GIN
204	502116.363	6920006.086	27.488	0.99958933	204 GIN
303	502194.686	6920123.339	27.615	0.99958932	303 GIN
404	502171.371	6919961.981	26.267	0.99958953	404 GIN
20769	502176.159	6920027.036	26.872	0.99958943	SCREW

HORIZONTAL SETOUT CONTROL LINE MKB2

Pt	Chainage	Easting	Northing	Level	Bearing	Rod/Spiral	ALength	D.Angle
IP1	. 0	502163.513	6919986.477	25.715	58'34'21.54"			Santa 2
IP2	5.77	502168.695	6919989.643	26.045		-15	11.54	44"04"48.11"
CC	11.54	502170.215	6919995.523	26.192	14'29'33.43"	10000		
P3	22.121	502172.887	6920005.863	26.272		-63.433	21,161	19'06'49.69"
CC	32.701	502172.027	6920016.508	26.336	355'22'43.74"	SCENE		
IP4	37.201	502171.662	6920021.018	26.396		-35	8.999	14'43'52.56"
CC	41.7	502170.163	6920025.286	26.484	340"38"51.18"			
IP5	48.395	502167.682	6920032.351	26.703		-12	13.389	63'55'42.99"
CC	55.089	502160.245	6920033.227	27.154	276'43'08.20"			
P6	61.784	502152.809	6920034.103	27.578		-12	13.389	63'55'42.99"
P7	68.478	502148.753	6920027.809	27.673	212'47'25.21"			0 8

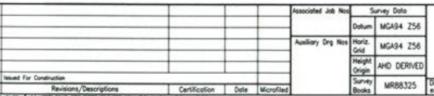


HORIZONTAL SETOUT CONTROL LINE MKB1

Pt	Chainage	Easting	Northing	Level	Bearing	Rod/Spiral	A.Length	D.Angle
IP1	0	502185.321	6920076.406	27.614	235'13'35.28"			
IP2	4	502181.99	6920074.094	27.655		-20	8	22"55"05.92"
CC	8	502179.824	6920070.667	27.654	212'18'29.36"	7.		
P3	10.243	502178.625	6920068.771	27.635		2483.241	4,486	0'06'12.64"
CC	12.486	502177.422	6920066.878	27.603	212'24'42.00"			
IP4	22.619	502171.473	6920057.508	27.381		-20	20.266	58'03'23.01"
CT	32.752	502176.277	6920047.502	27.241	154'21'18.99"	-		
TC	50.022	502183.751	6920031.933	27.019	154'21'18.99"		-	10.17
IP5	53.995	502185.494	6920028.303	26.968		-20	7.947	22'45'56.81"
P6	57.968	502188.505	6920025.631	26.917	131'35'22.18"			

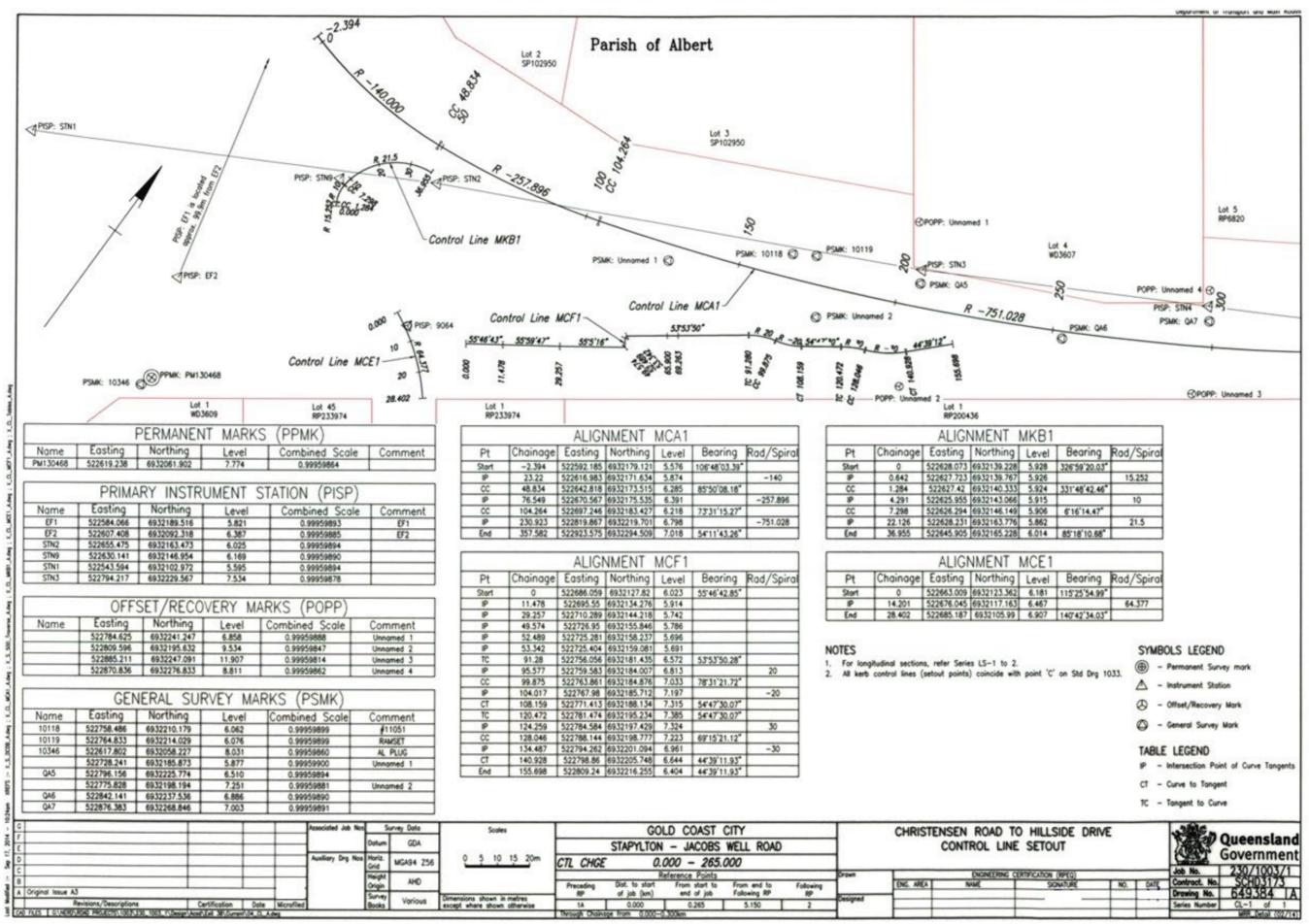
HORIZONTAL SETOUT CONTROL LINE MAB2

Pt	Chainage	Easting	Northing	Level	Bearing	Rad/Spiral	A.Length	0.Angle
IP1	0	502167.156	502167.156	27.447				
P2	11.534	502176.233	6920035.202	26.98	2 20 0	32.72	23.068	40'23'38.53"
CC	23.068	502178.025	6920023.299	26.689	171"26"26.96"			
P3	23.598	502178.123	6920022.645	26.654	J	0.7	1.06	86'46'06.67"
CC	24.128	502177.476	6920022.51	26.629	258'12'33.63"			
P4	24.658	502176.828	6920022.374	26.606		0.7	1.06	86'46'06.67"
P5	25.188	502176.656	6920023.013	26.596		-	-	
P6	36.076	502173.763	6920033.795	26.873		-40.129	21.776	31'05'30.24"
IP7	46.964	502165.717	6920041.534	27.55			-	
P8	47.787	502164.97	6920042.255	27.62	7	1.066	1.646	88'30'52.68"
00	48.61	502165.671	6920043.021	27.652	42'27'59.44"	-	-	
IP9	49.433	502166.372	6920043.787	27.494		1.066	1.646	88'30'52.68"
CC	50.259	502167.156	502167.156	27.447				-



LOGAN CITY COUNCIL MOUNT LINDESAY HIGHWAY CTL CHGE 22520 - 22910 From start to From end to end of job Following RP Following RP MILLSTREAM ROAD INTERSECTION CONTROL LINE SETOUT

Figure 2.8(f) – Intersection details and set-out tables – registered example 2



2.9 Longitudinal section

The longitudinal section drawing details the horizontal and vertical profile geometry of all control lines.

Considerations

Scale

- Select to allow representation of control lines
- Horizontal / vertical 10 to 1 distortion as standard practice

- Longitudinal section templates are available from the Transport and Main Roads 12D Model Customisation User Library
- Show longitudinal sections for all control lines to be used for construction set-out
- Show existing surface
- Detail all TP and IP chainages and heights, K values and grades on longitudinal section
- Tabulation to include surface and grade heights, earthwork volumes (where appropriate), and horizontal geometry aligned to vertical geometry
- Show superelevation development (if applicable)
- Location of drainage and services if required to highlight locations and proximity to grade line for conflict awareness

Figure 2.9(a) - Longitudinal section - generic example

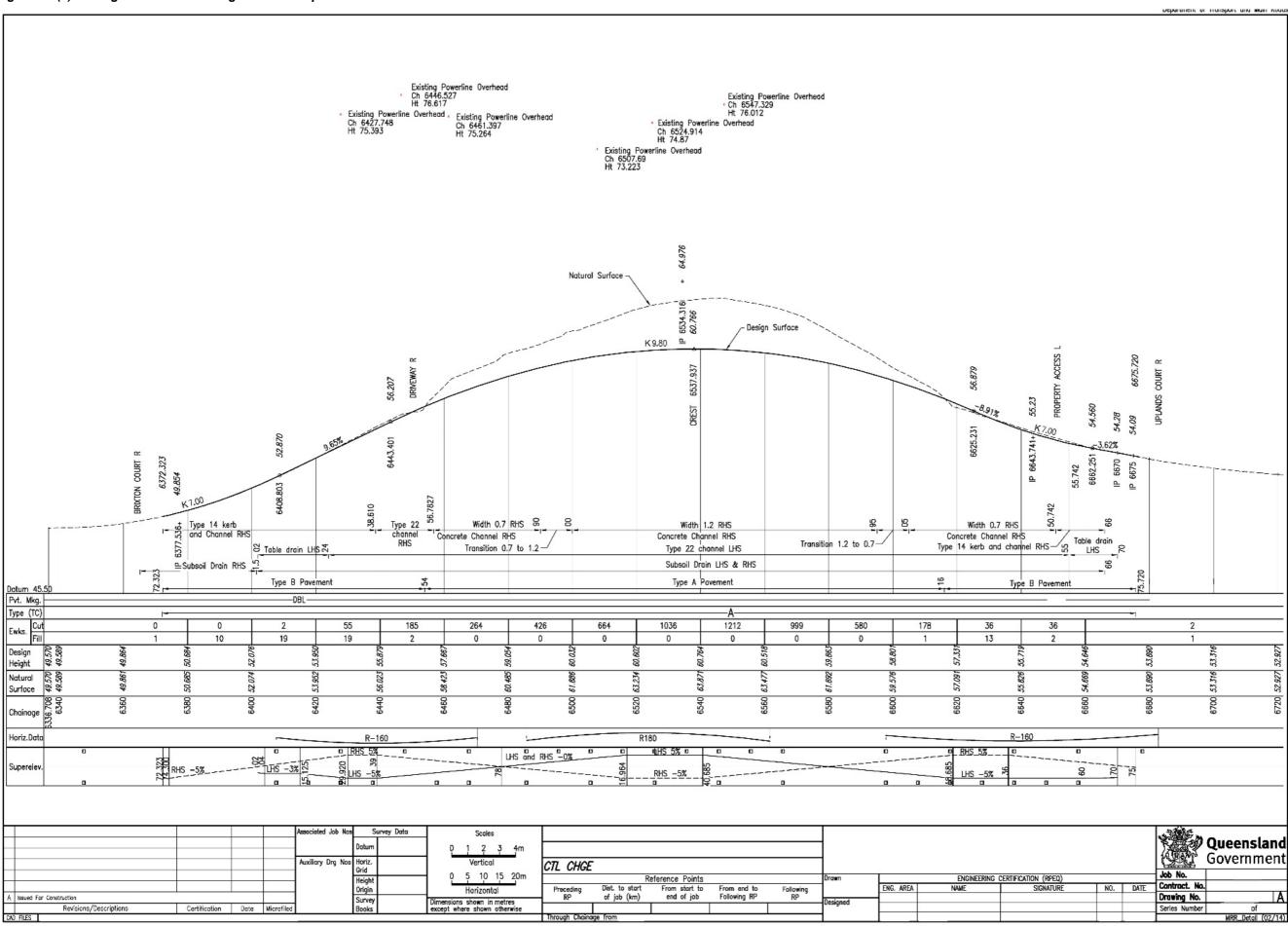


Figure 2.9(b) - Longitudinal section - registered example 1

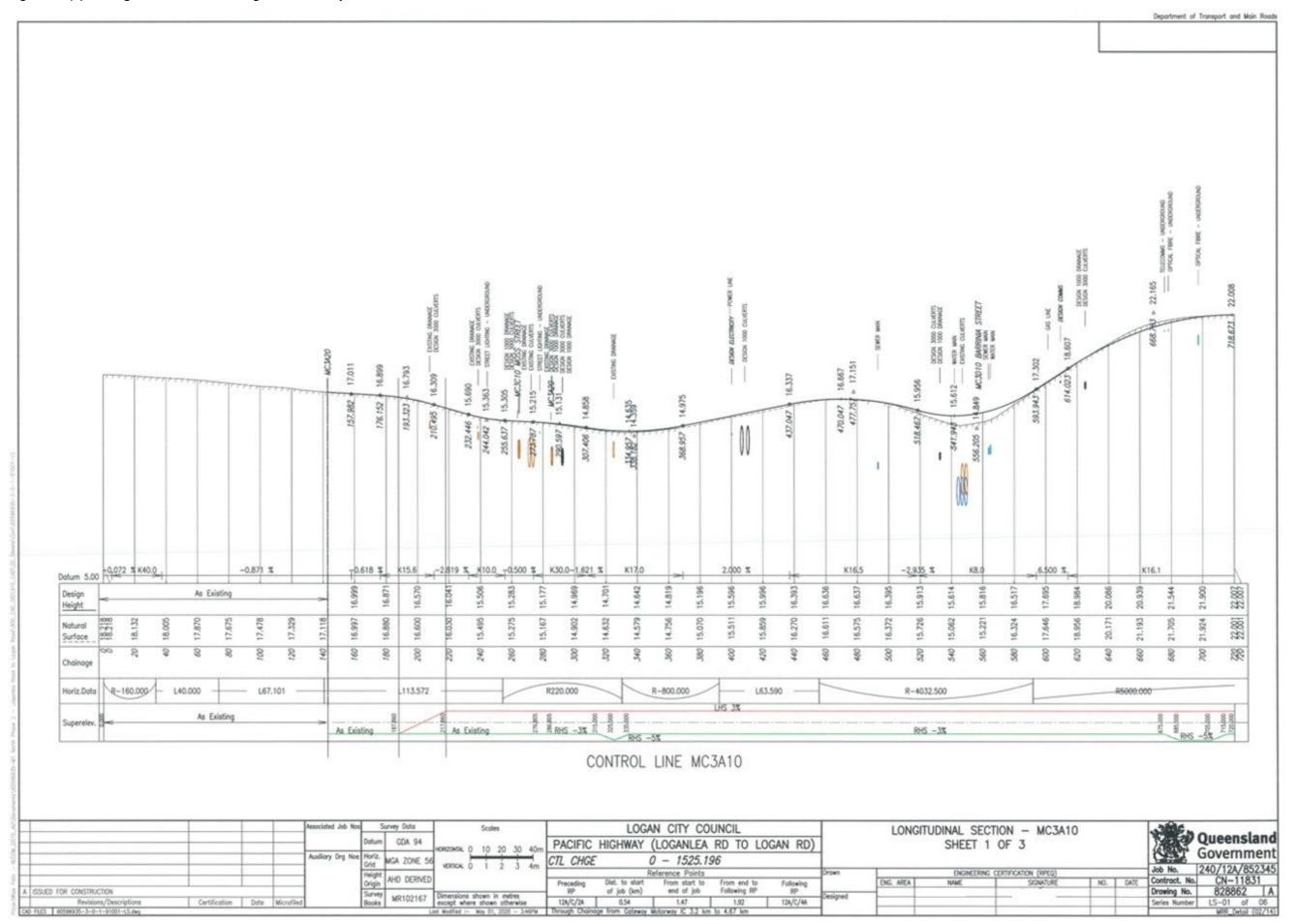
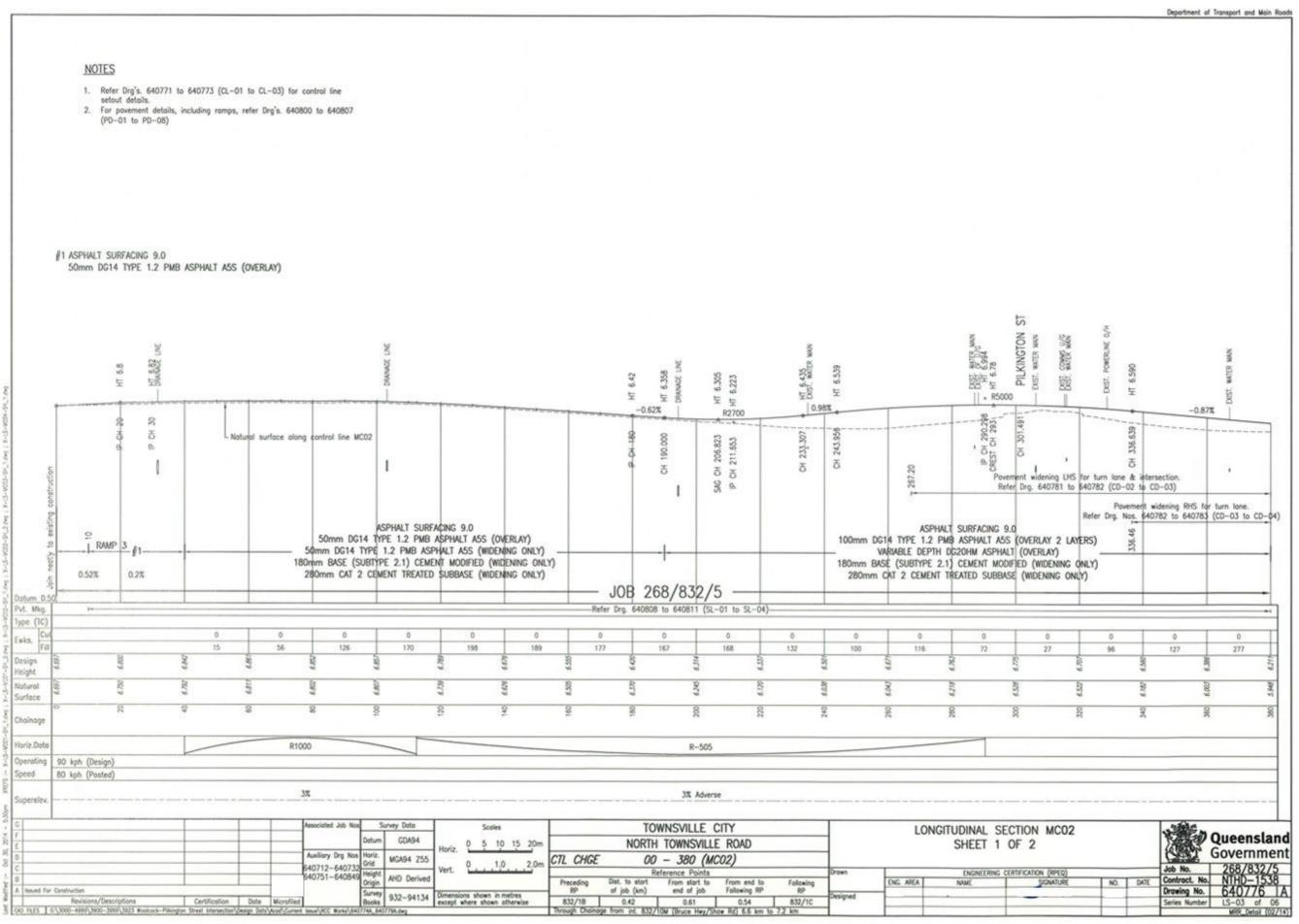


Figure 2.9(c) – Longitudinal section – registered example 2



2.10 Pavement details

These drawings detail the pavement design layouts, pavement types and treatments.

Considerations

Scale

 Usually 1:500 at A1 or 1:1000 at A3 (consider 1:250 at A1 or 1:500 at A3 if high degree of detail)

- Show traffic data and projected ESAs for design year
- Show CBR of subgrade used in the pavement design
- Include legend detailing all pavement designs and types
- Show treatment on plan view including medians, footpaths and so on
- Include details of connections to existing construction (tapers and so on)
- Provide details of pavement drainage in plan and sections, including outlet locations
- Provide relevant pavement notes
- It is preferential to use colour to differentiate between pavement types as this substantially improves clarity.

Figure 2.10(a) - Pavement details - generic example 1

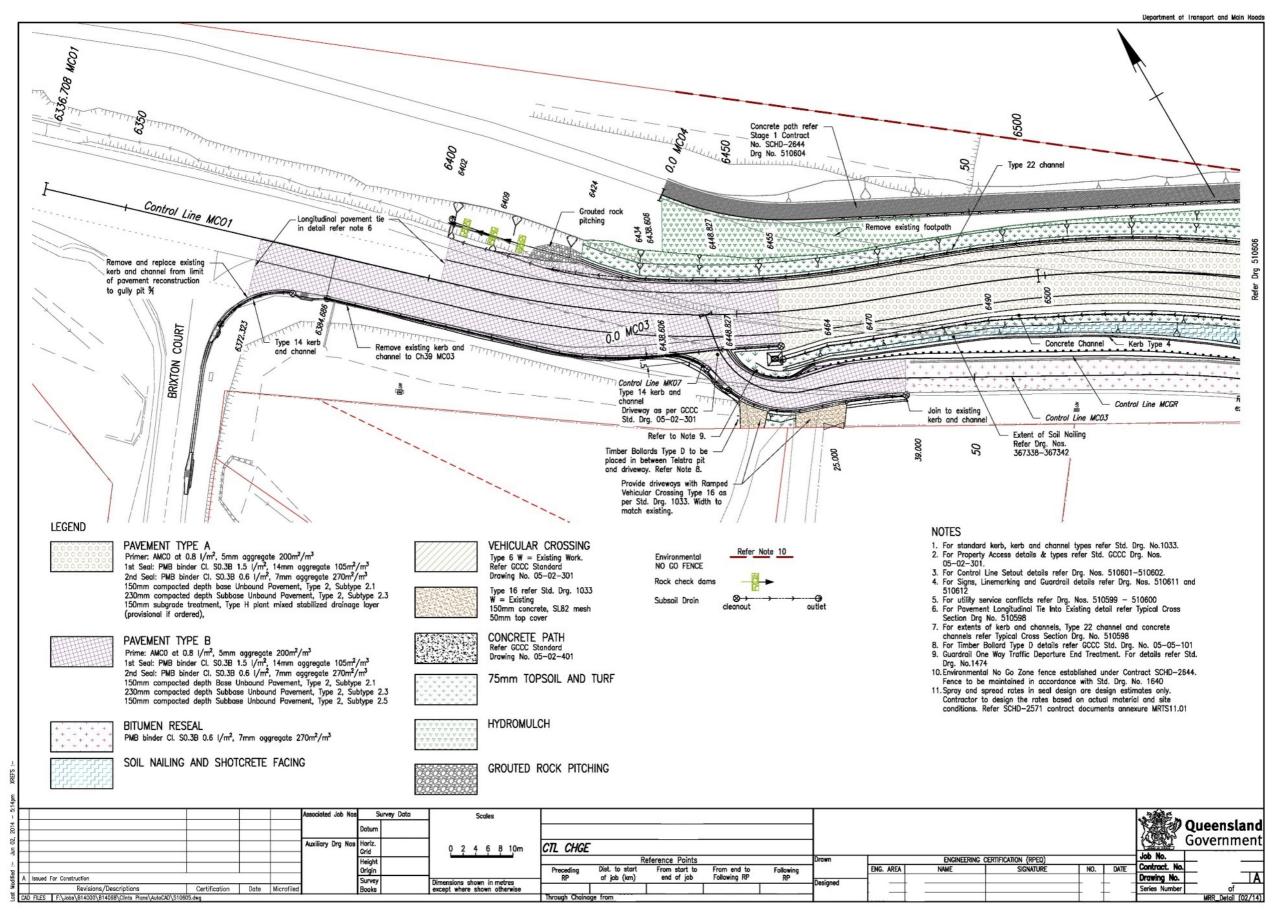


Figure 2.10(b) – Pavement details – generic example 2

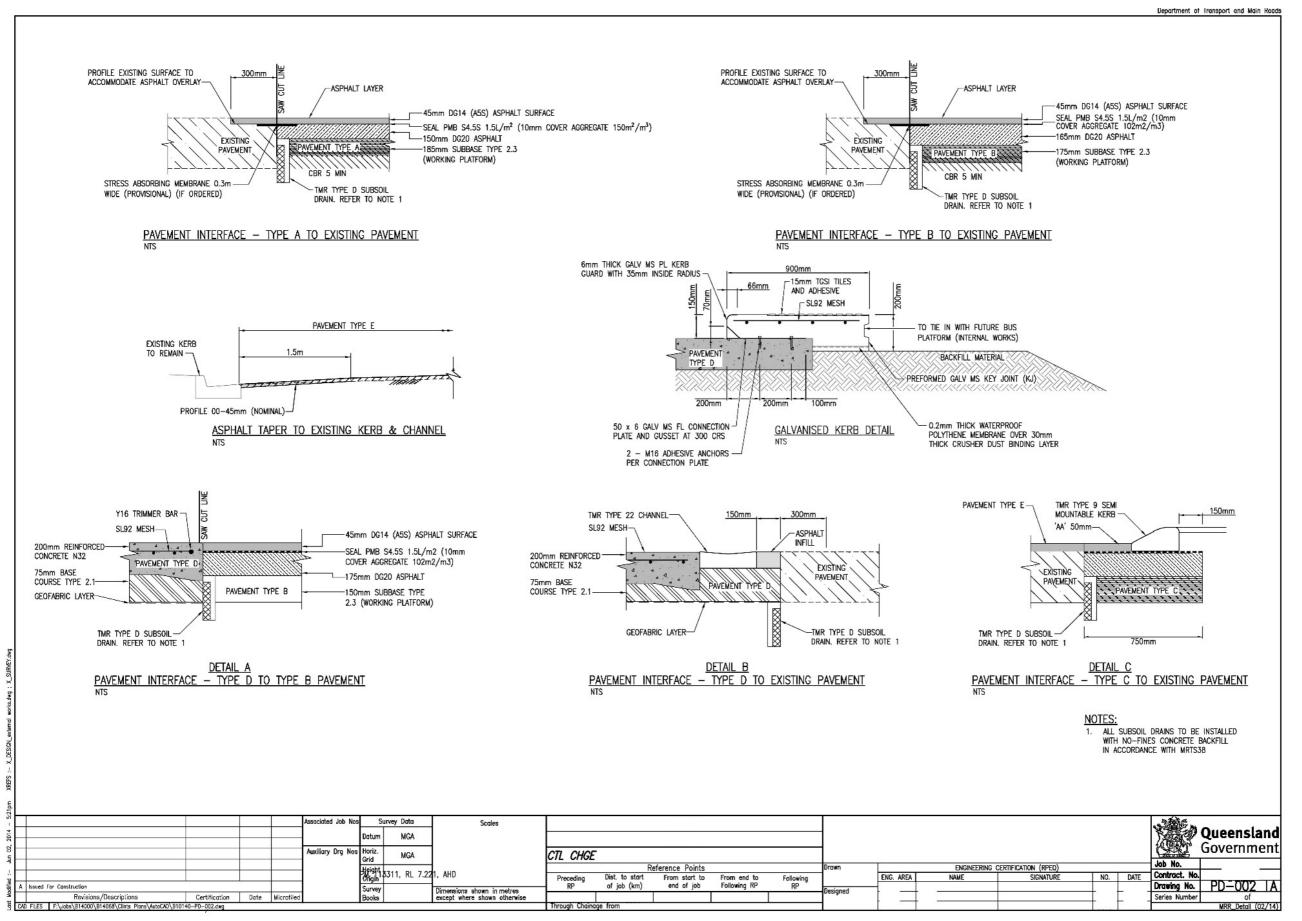


Figure 2.10(c) - Pavement details - generic example 3 - sheet 1 of 2

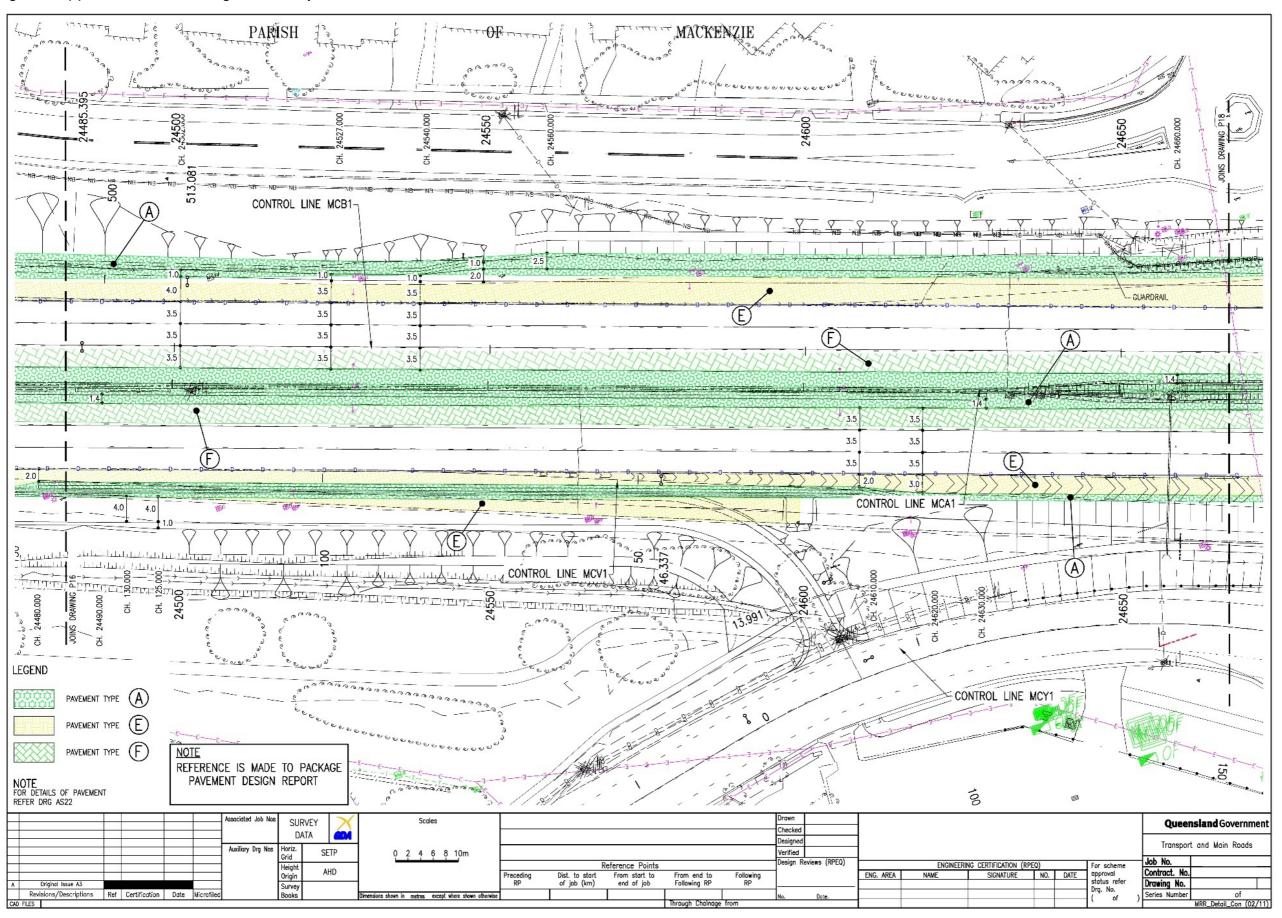


Figure 2.10(d) – Pavement details – generic example 3 – sheet 2 of 2

PAVEMENT TYPE A PAVEMENT TYPE A2 PAVEMENT TYPE B 40mm OPEN GRADED ASPHALT SURFACING (OG14) 50mm DENSE GRADED ASPHALT BINDER LAYER (DG14) 40mm OPEN GRADED ASPHALT SURFACING (OG14) 50mm DENSE GRADED ASPHALT BINDER LAYER (DG14) 40mm OPEN GRADED ASPHALT SURFACING (DG14) 50mm DENSE GRADED ASPHALT BINDER LAYER (DG14) 320mm DENSE GRADED ASPHALT BASE LAYER (DG20) 350mm DENSE GRADED ASPHALT BASE LAYER (DG20) 370mm DENSE GRADED ASPHALT BASE LAYER (DG20) 150mm WORKING PLATFORM CMB 2.1 1% 150mm WORKING PLATFORM CMB 2.1 1% CBR 3 - SWELL < 2.5% CBR 3 - SWELL < 2.5% 450 CONTROLLED SUBGRADE CBR 10 (PSTS101) CBR 3 - SWELL > 2.5% (REFER TO PAVEMENT PLAN FOR LOCATION) (REFER TO PAVEMENT PLAN FOR LOCATION) DESIGN ESA's 3.64 x 10' (50km/hr DESIGN HEAVY VECHICLE SPEED) (REFER TO PAVEMENT PLAN FOR LOCATION) (40 years) PAVEMENT TYPE C - 350mm MILL OUT PAVEMENT TYPE D - 250mm MILL OUT PAVEMENT TYPE E - 295mm MILL OUT (REFER TO PAVEMENT PLAN FOR LOCATION) (REFER TO PAVEMENT PLAN FOR LOCATION) (REFER TO PAVEMENT PLAN FOR LOCATION) PAVEMENT TYPE F- 205mm MILL OUT PAVEMENT TYPE G - 275mm MILL OUT PAVEMENT TYPE H - 325mm MILL OUT (REFER TO PAVEMENT PLAN FOR LOCATION) (REFER TO PAVEMENT PLAN FOR LOCATION) (REFER TO PAVEMENT PLAN FOR LOCATION) NOTE: 1. PROJECT RELIABILITY 95% FOR LOCAL ROADS CRITICAL LAYER - DG20 LAYER INCLUDES 10MM FOR CONSTRUCTION TOLERANCES. CBR VALUE AND SWELL PROPERTIES OBTAINED FROM TESTING. REFERENCE IS MADE TO PACKAGE PAVEMENT DESIGN REPORT SURVEY **Queensland** Government DATA PAVEMENT PROFILES Transport and Main Roads SETP Job No. ENGINEERING CERTIFICATION (RPEC Height Origin Survey AHD Contract. No. Drawing No. ENG. AREA NAME SIGNATURE NO. DATE Original Issue A3 Revisions/Descriptions Ref Certification Date Micr Series Number

Figure 2.10(e) – Pavement Subsoil Drainage Layout – generic example

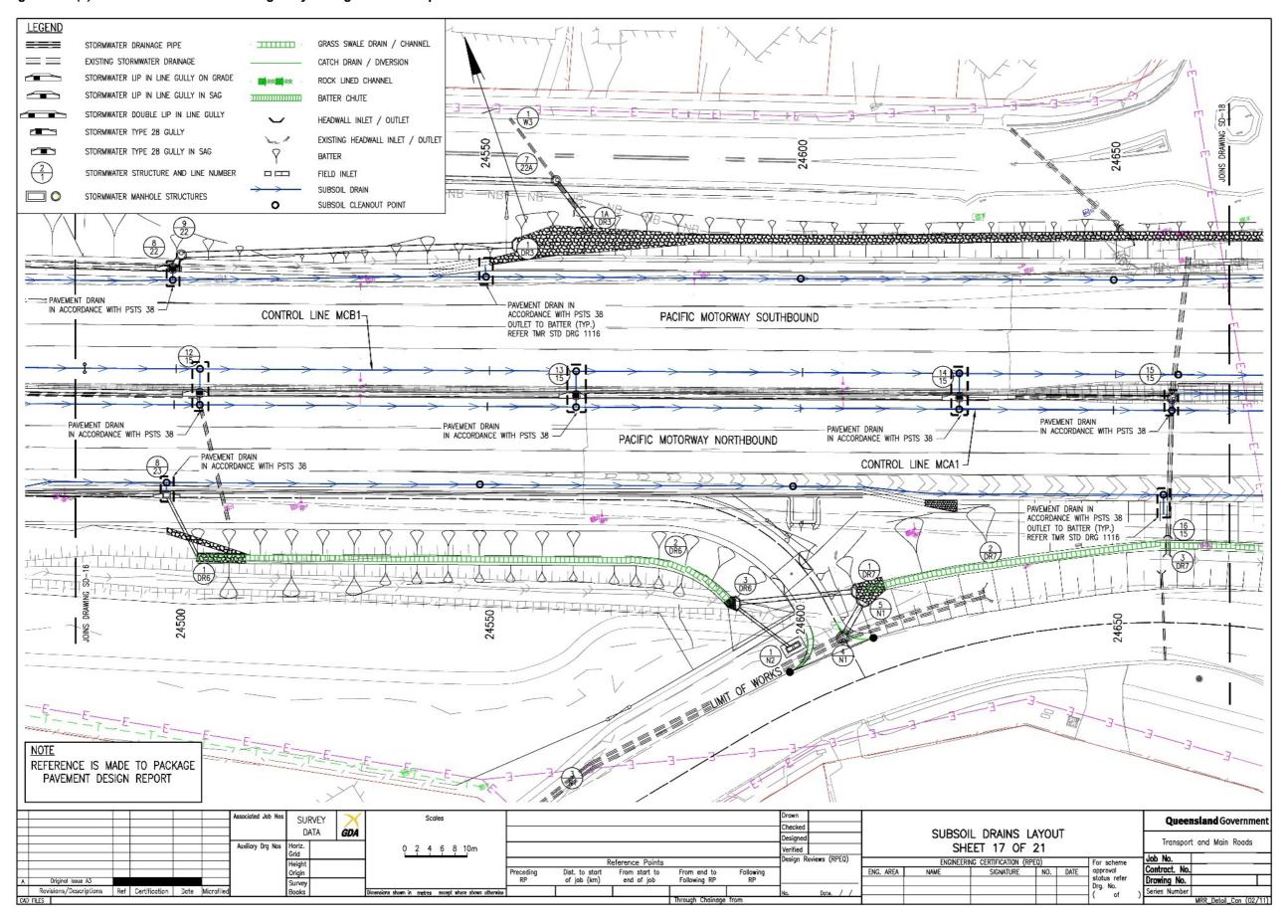


Figure 2.10(f) – Pavement Subsoil Drains Details – generic example

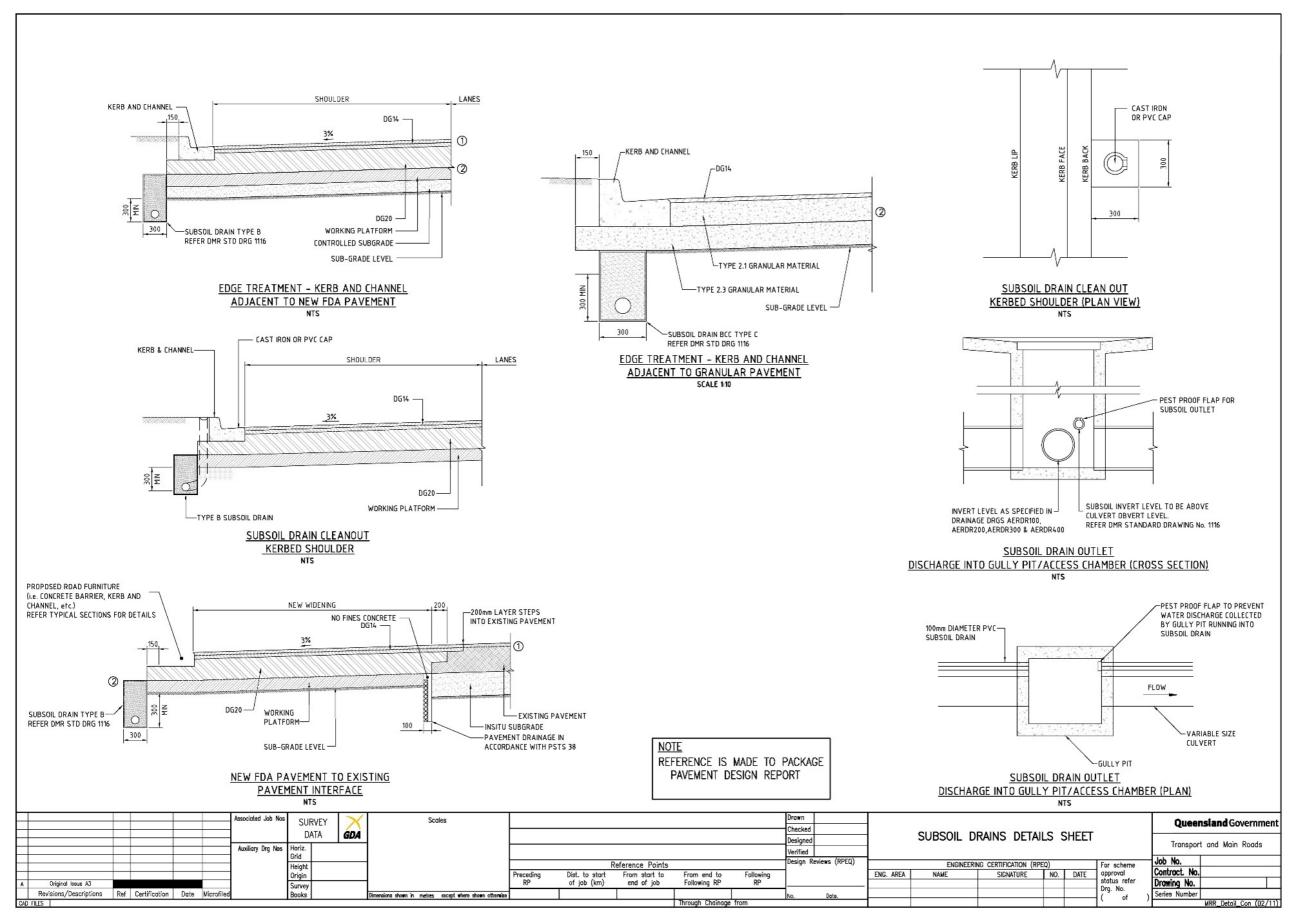


Figure 2.10(g) – Pavement details – registered example 1

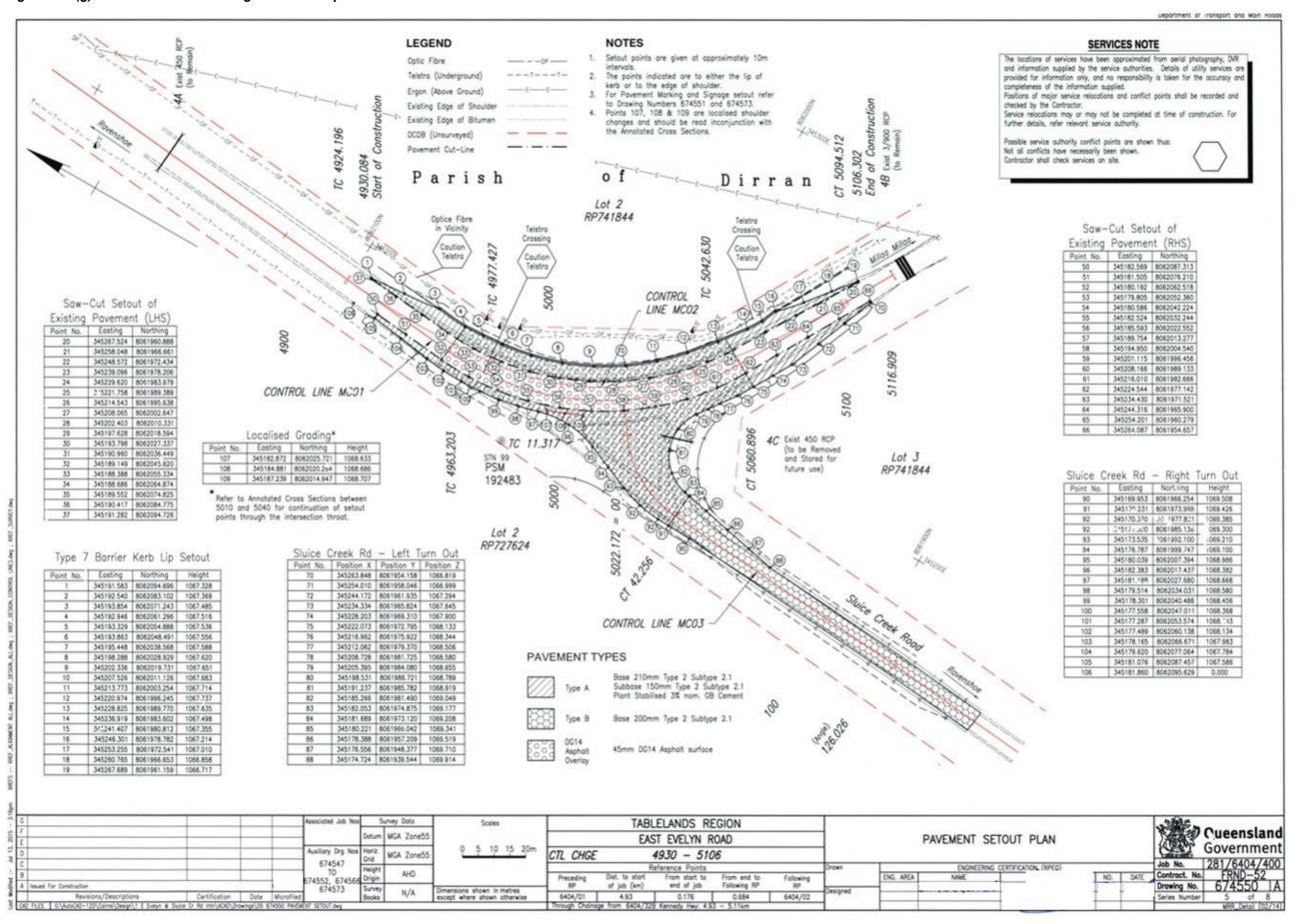
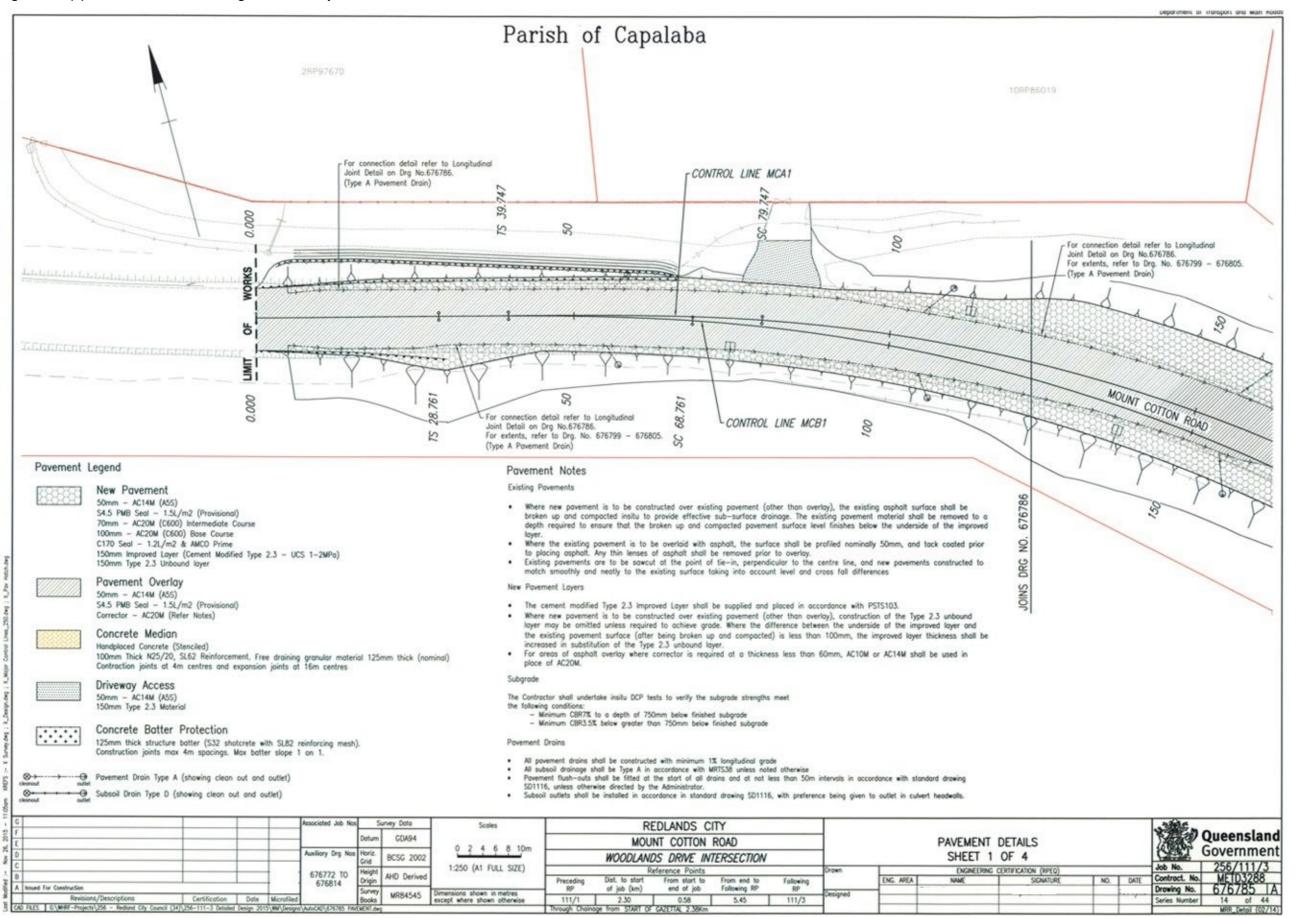


Figure 2.10(h) – Pavement details – registered example 2



2.11 Drainage

2.11.1 Drainage layout

The drainage layout drawing details the urban stormwater drainage layout. The location of the gully pits, access chambers, field inlets and so on, and culverts are identified on this drawing.

Considerations

Scale

 Usually 1:500 at A1 or 1:1000 at A3 (consider 1:250 at A1 or 1:500 at A3 if high degree of detail)

Drawing

- Show on existing feature detail background and design roadway (K&C, medians, shoulders and so on)
- Show conflicts with Underground Public Utility Plant (U/G PUP)
- Include legends
- Include reference number for chambers, pits and so on
- Show pipe and culvert sizes
- Include notes and details necessary for construction

Subsoil drainage

For small projects where the full set of drawings for the job does not include a separate set of drawings for pavements (i.e., specific pavement design drawings package is not provided), then drawings showing the following are required:

- show subsoil drainage location and direction of flow
- show outlet locations
- show special outlet details
- show locations of the subsoil drain clean out points (flush points).

Generally, the majority of pavement details should be shown in a separate set of pavement drawings (refer Section 2.10 *Pavement Details*) and the above requirements should be applied to those pavement drawings in order to keep all relevant pavement information together.

Figure 2.11.1(a) – Drainage layout – generic example 1

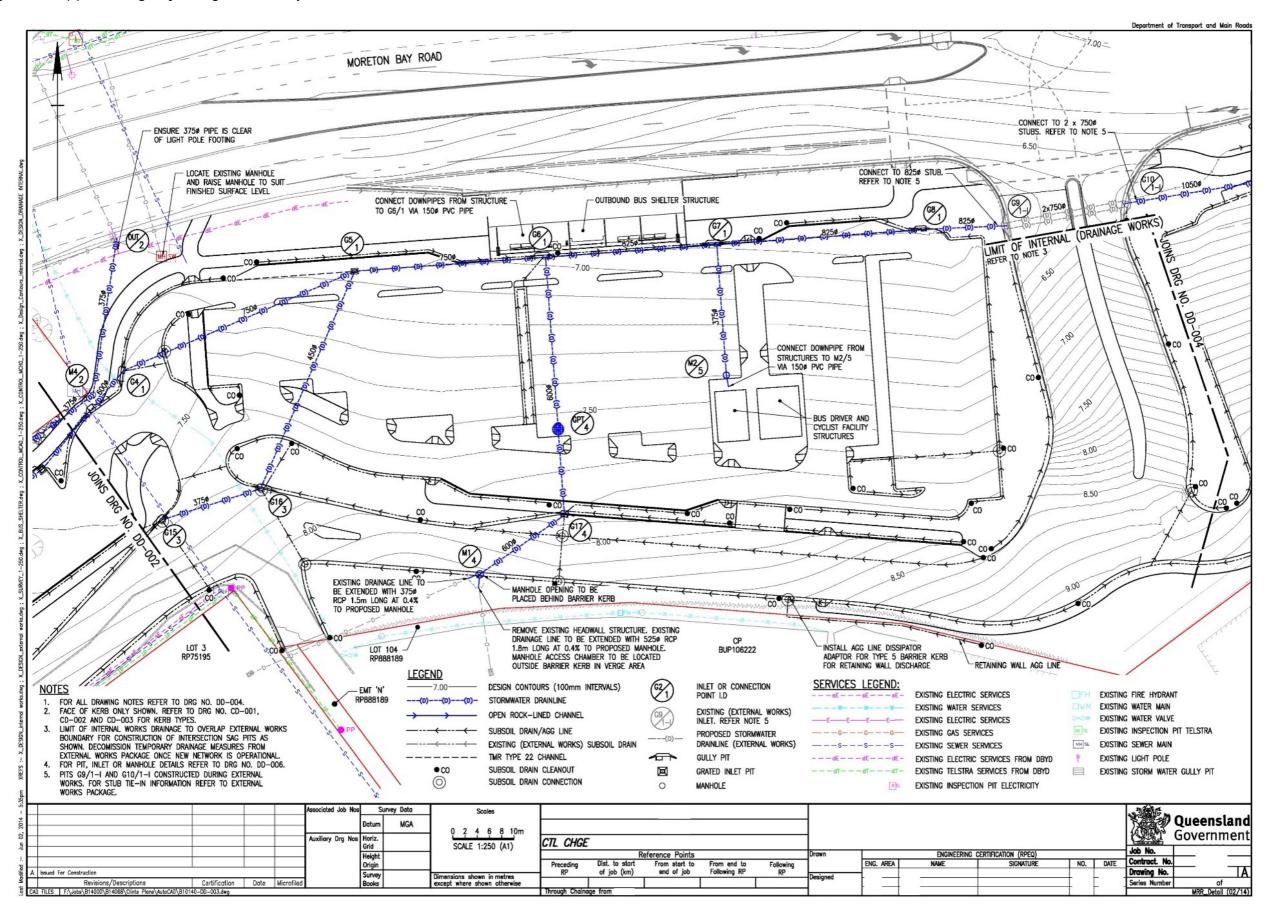


Figure 2.11.1(b) – Drainage layout – generic example 2

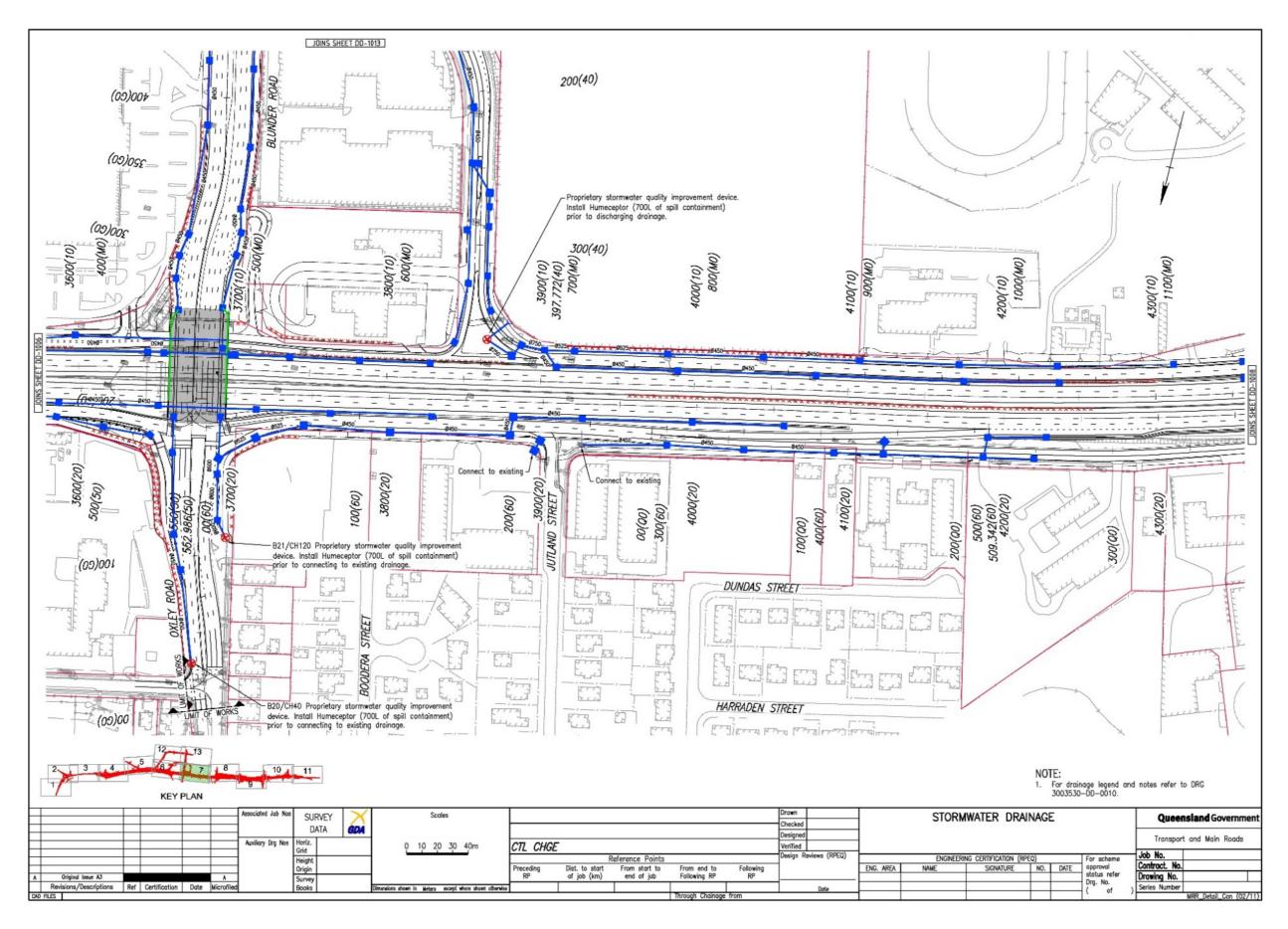


Figure 2.11.1(c) – Subsoil drainage details – generic example

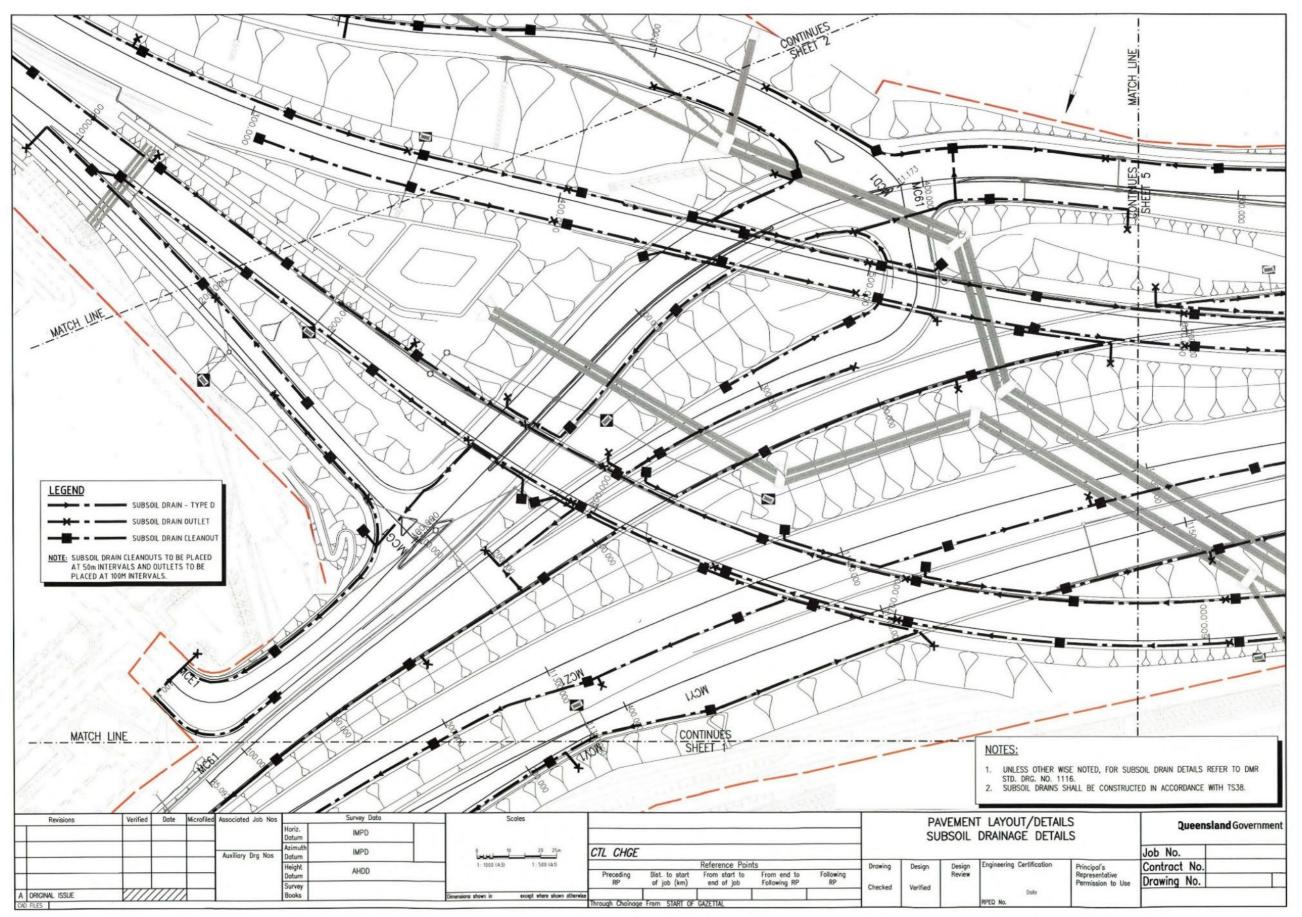


Figure 2.11.1(d) - Drainage layout - registered example 1

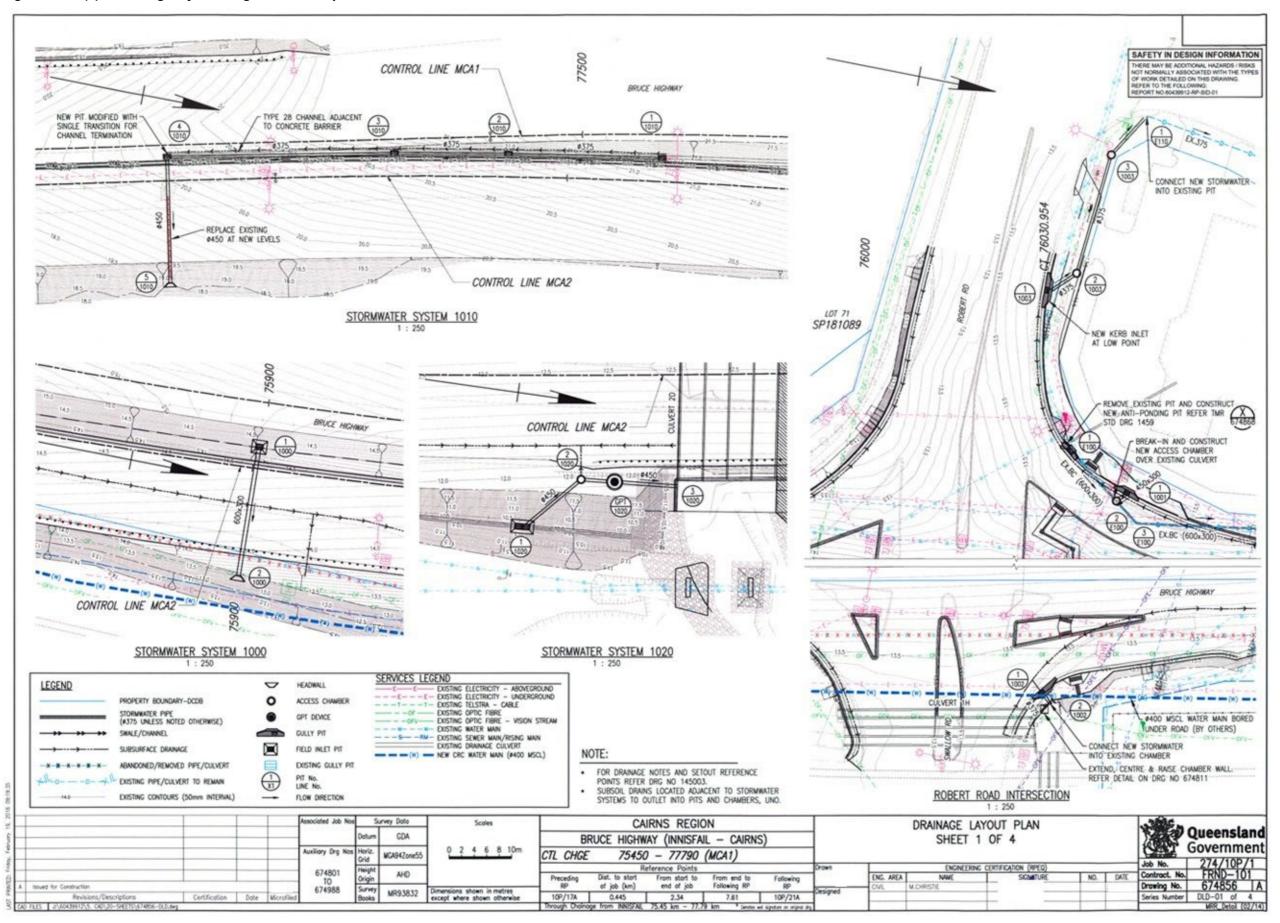
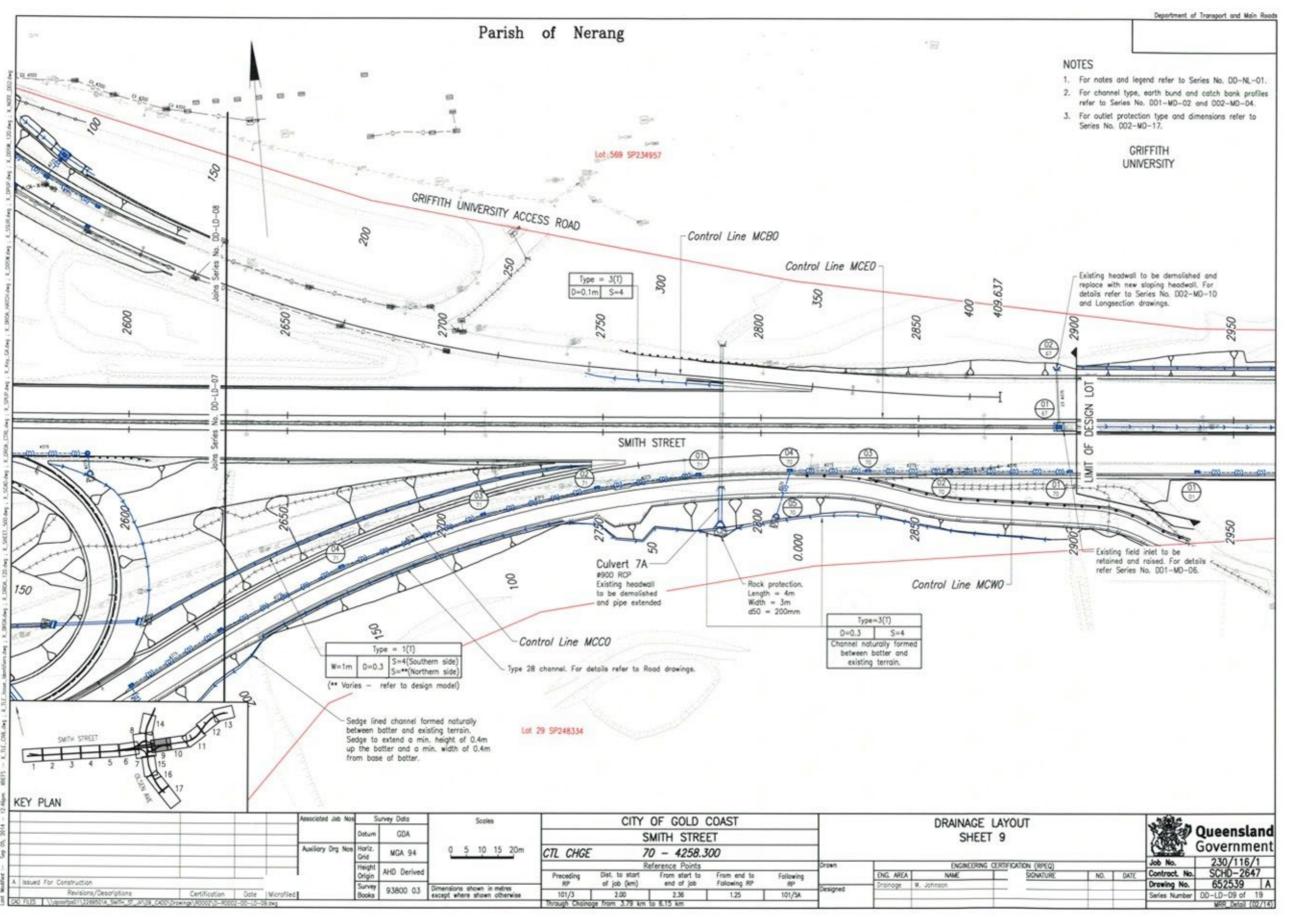


Figure 2.11.1(e) – Drainage layout – registered example 2



2.11.2 Drainage cross sections

The drainage cross sections drawing provide details of the cross drainage culverts, i.e., new culverts and extension of existing culverts. For further detailed requirements and considerations refer to DDSPM Volume 2, Part 2, Chapter 3: *Rural Road design Drawings*, Section 3.9.1.

2.11.3 Drainage longitudinal sections

The drainage longitudinal section drawing provides longitudinal details of the piped stormwater drainage. A longitudinal section shall be detailed for every piped leg of the stormwater system.

Considerations

Longitudinal sections

- Output from 'PC Drain' or equivalent drainage modelling package
 - structure names and description
 - include size, class, grade, flow velocity and capacity (cumecs)
 - coordinates (or chainage / offset) of reference points
 - annotation of long section (existing and design surfaces, hydraulic grade line and so on).

Figure 2.11.3(a) - Drainage longitudinal sections - generic example 1

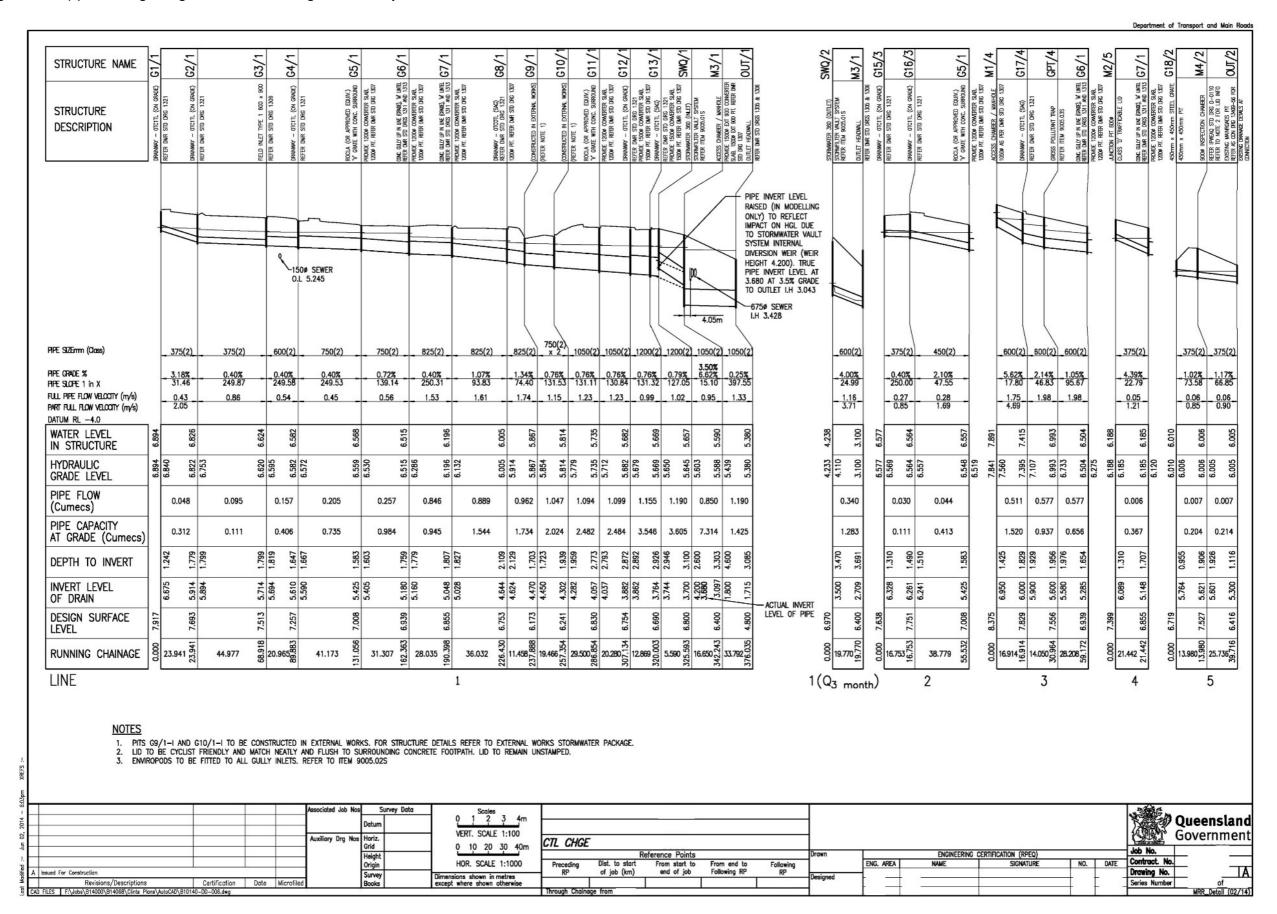


Figure 2.11.3(b) – Drainage longitudinal sections – generic example 2

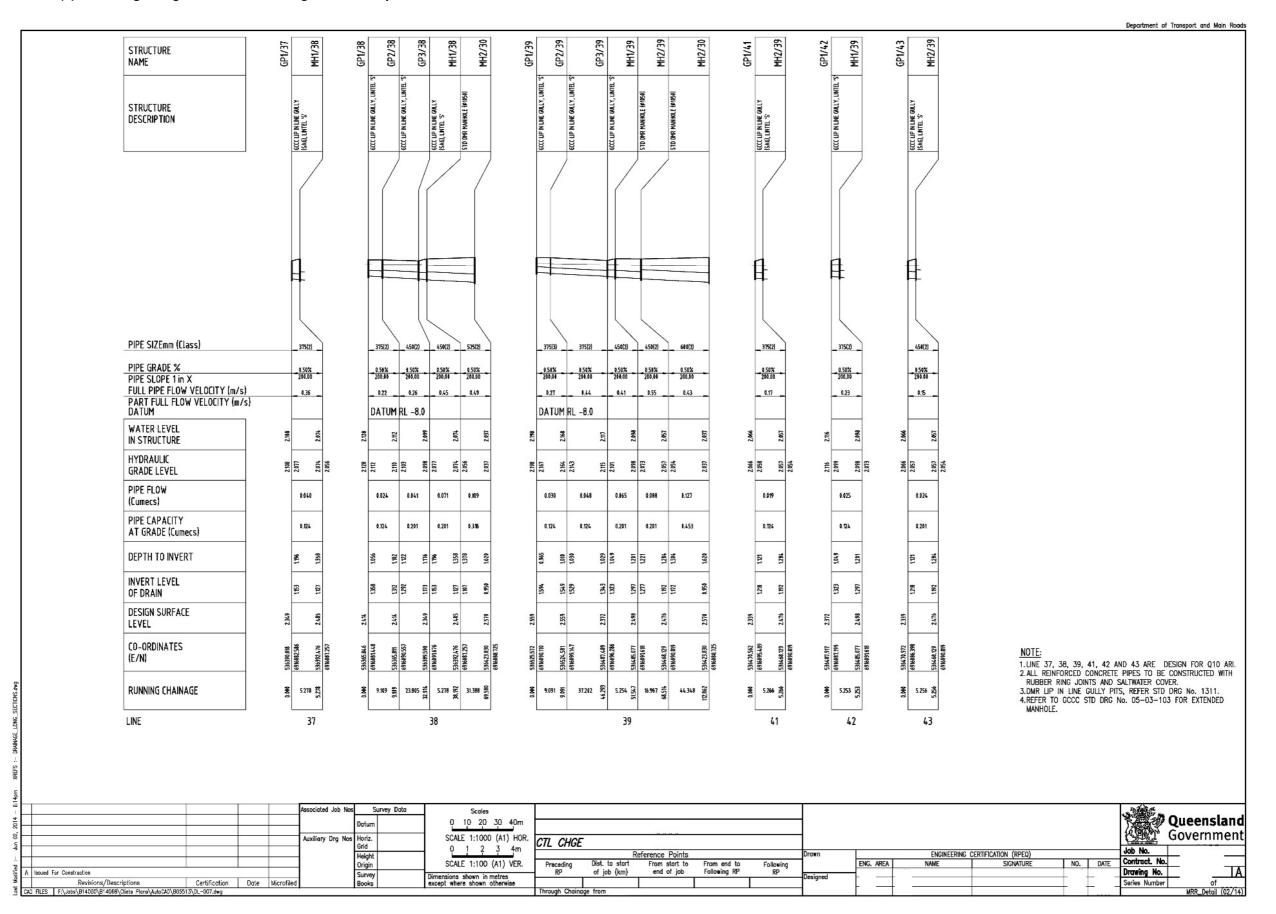
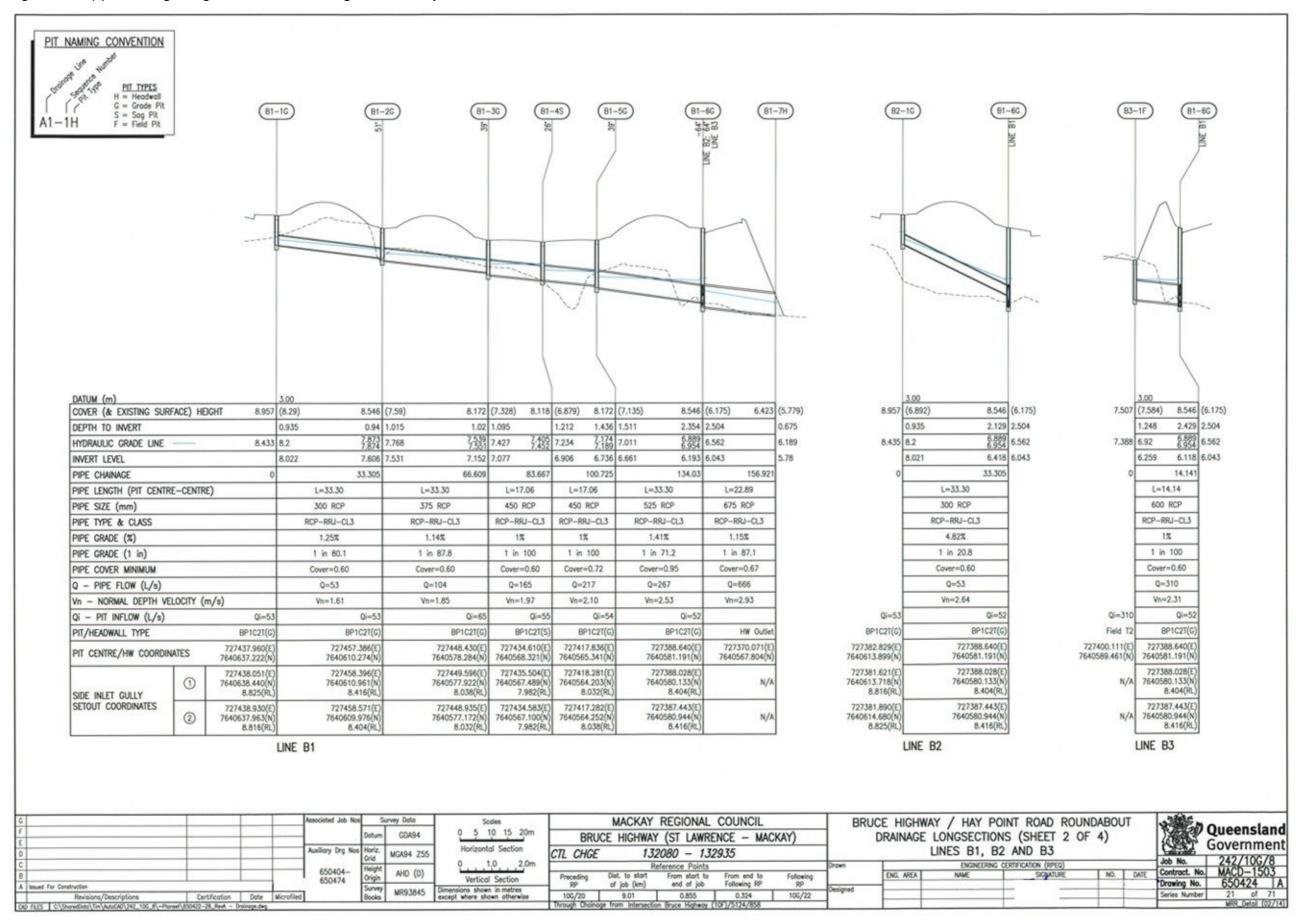


Figure 2.11.3(c) – Drainage longitudinal sections – registered example



2.11.4 Drainage details

This drawing provides specific drainage details, for example special access chambers and pits, junction details, special headwall details, open channel treatments and protection, and so on.

Considerations:

Scale

To suit details (consider 1:20 at A1/1:40 at A3 if high degree of detail)

Drawing

- Provide specific drainage details and treatments as required for construction
- Show all access chamber details and intersections of drainage lines

Figure 2.11.4(a) - Specific drainage details - generic example 1

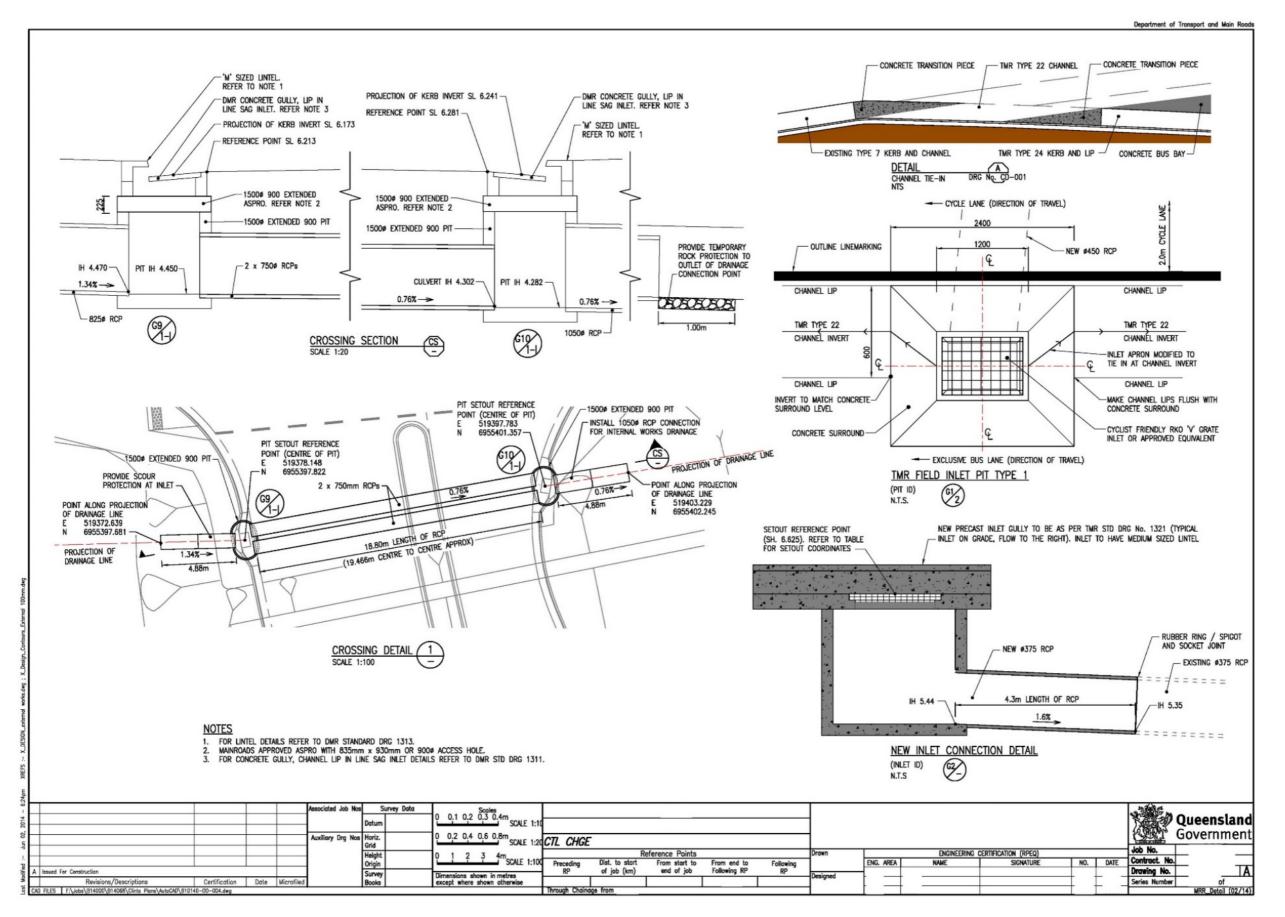


Figure 2.11.4(b) – Specific drainage details – generic example 2

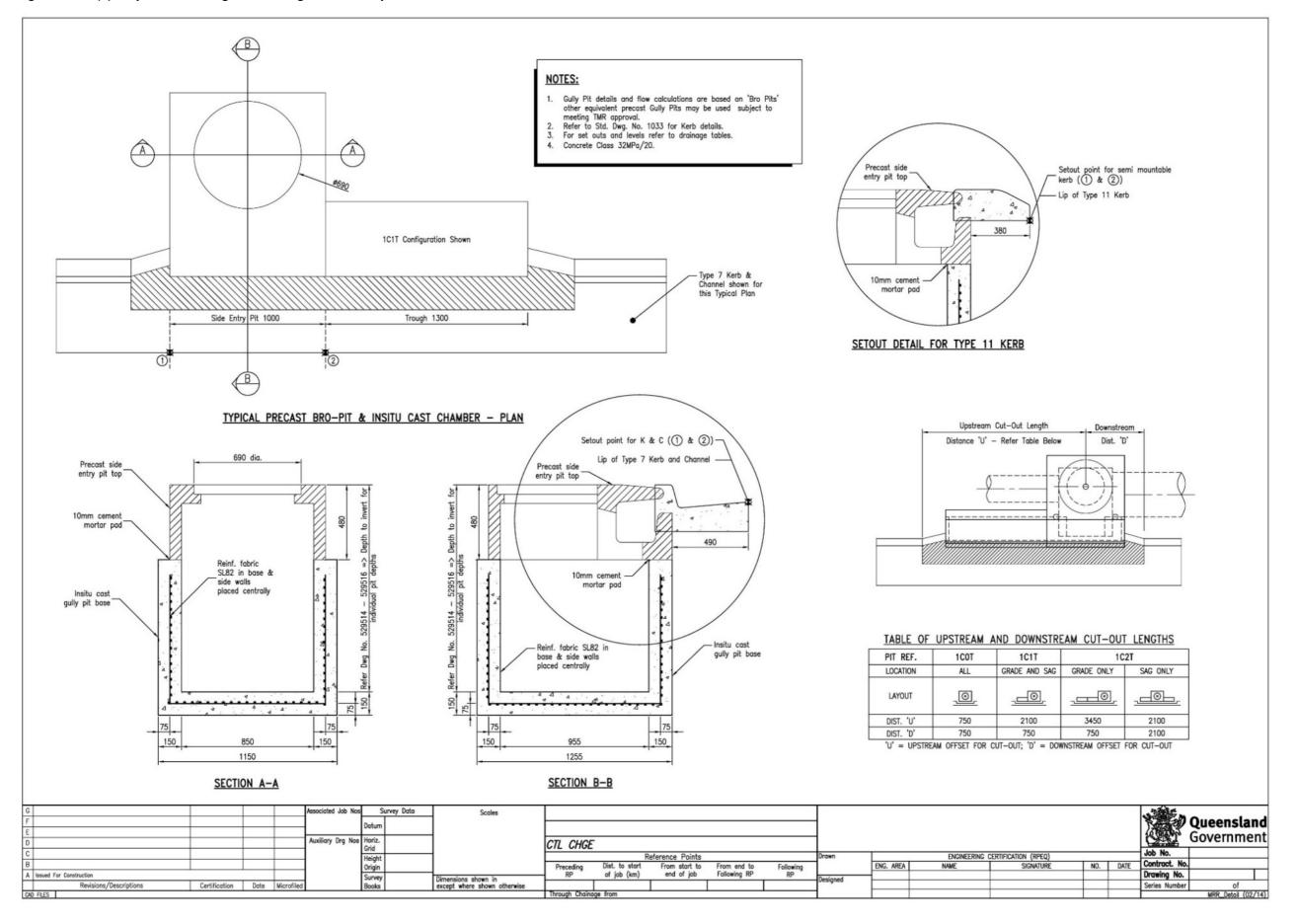


Figure 2.11.4(c) – Specific drainage details – generic example 3

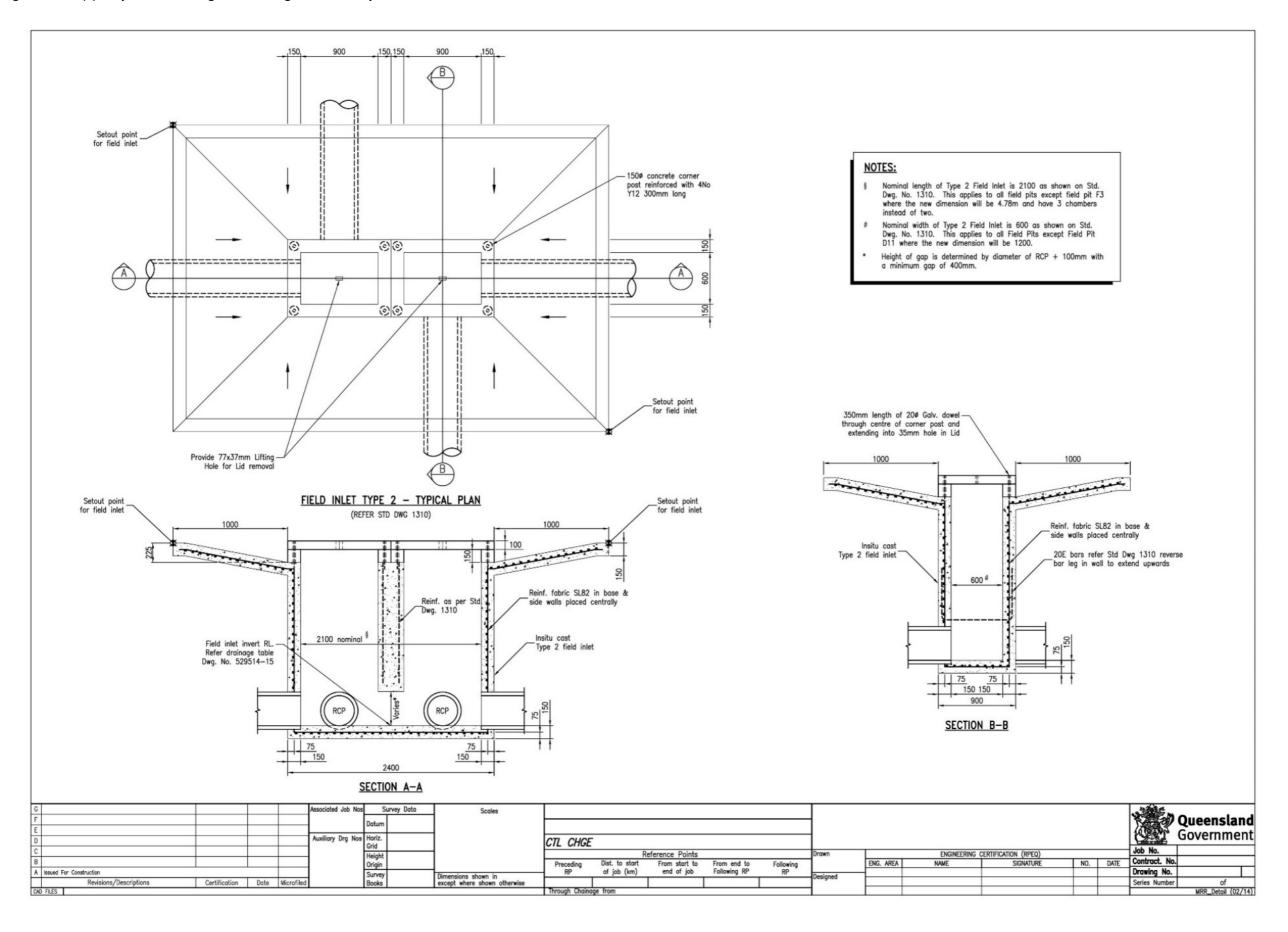


Figure 2.11.4(d) – Specific drainage details – registered example 1

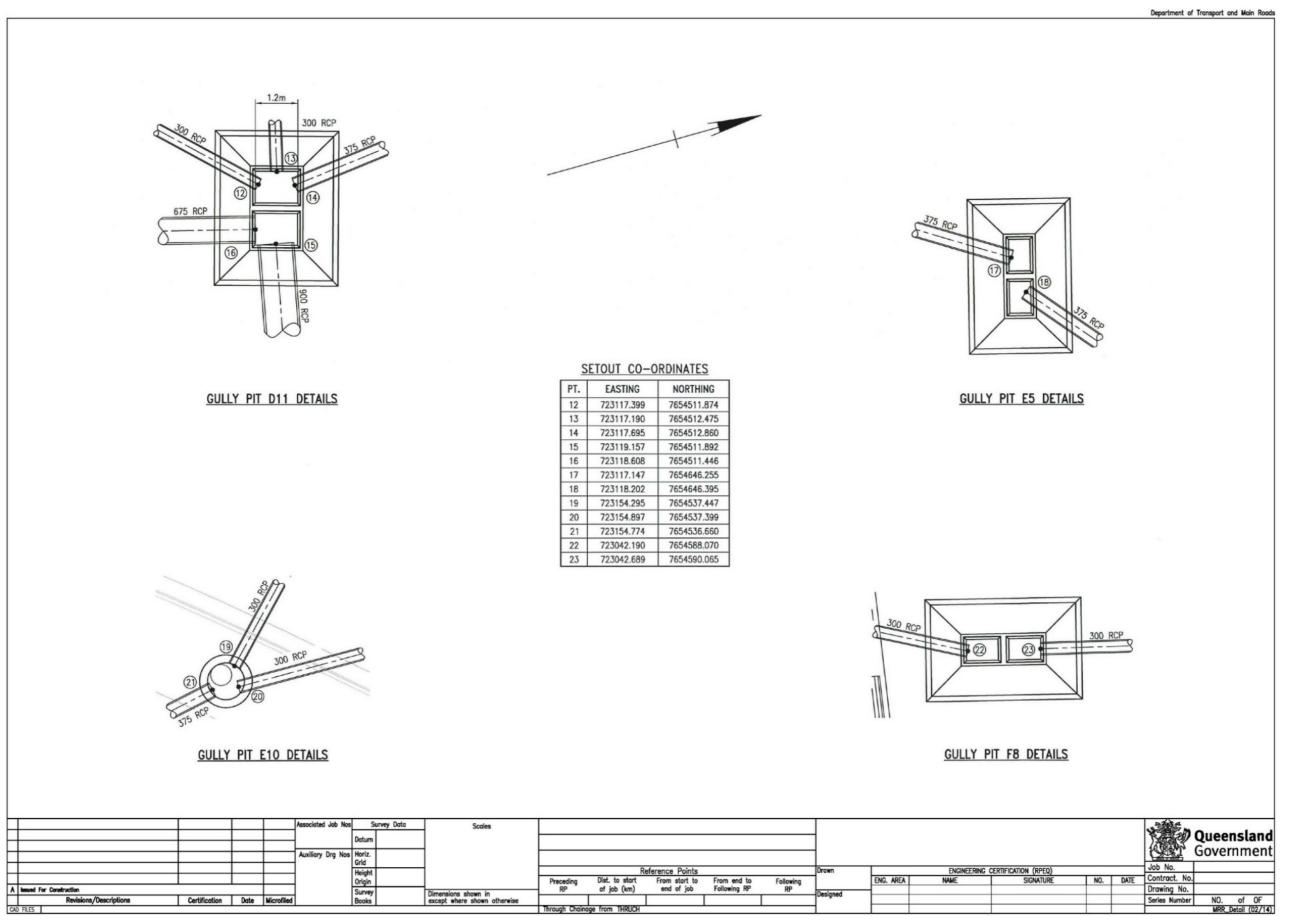
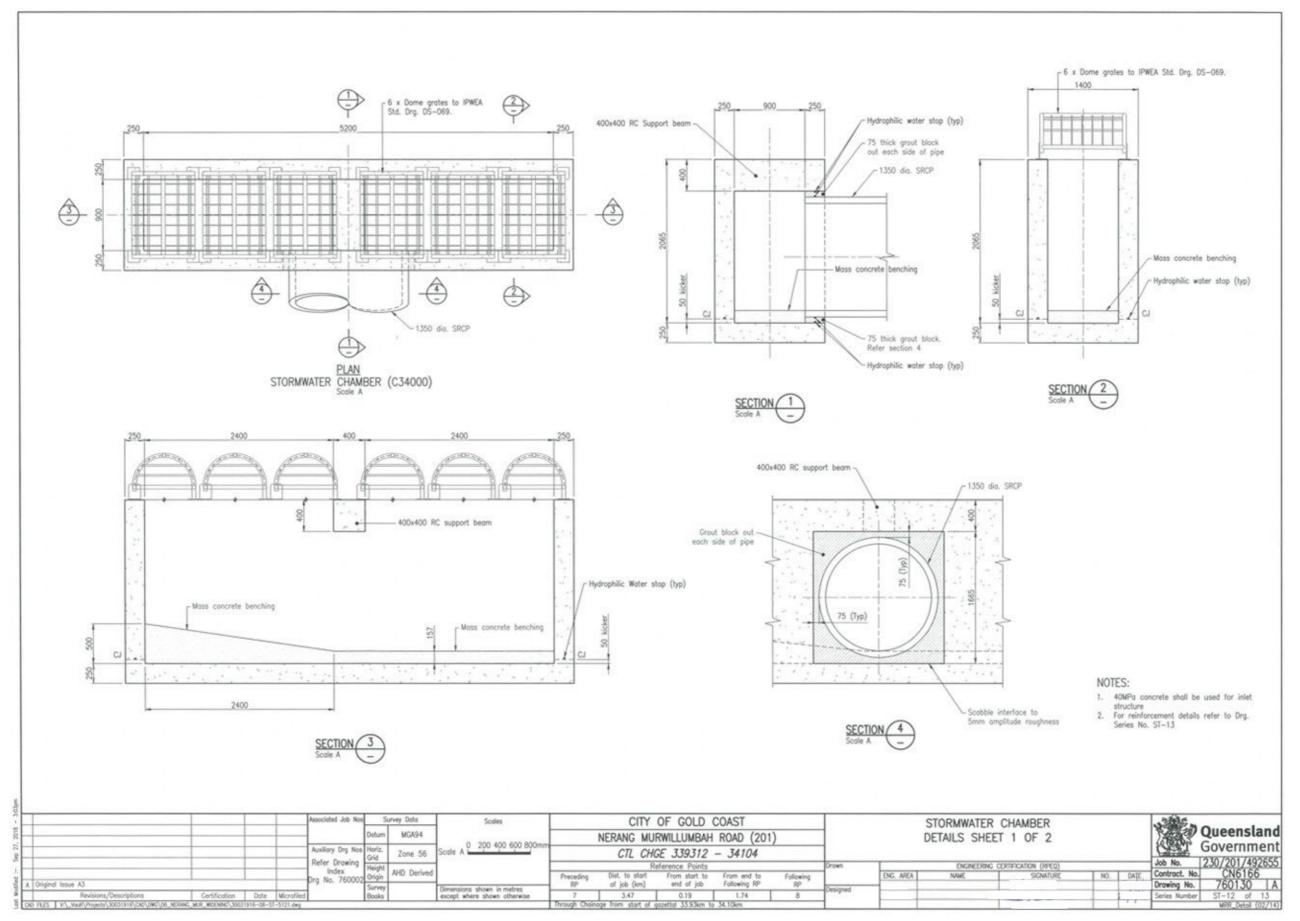


Figure 2.11.4(e) – Specific drainage details – registered example 2



2.11.5 Drainage catchments

The drainage catchments drawing details the individual catchments which contribute to the inlet flow at structures.

Considerations

Scale

To suit details requirements

Drawing

- Show property boundaries
- · Show catchment boundaries
- Label each catchment
- Show established catchment areas
- Proposed and existing contours with water flow direction indicators

Figure 2.11.5(a) – Drainage catchment – generic example 1

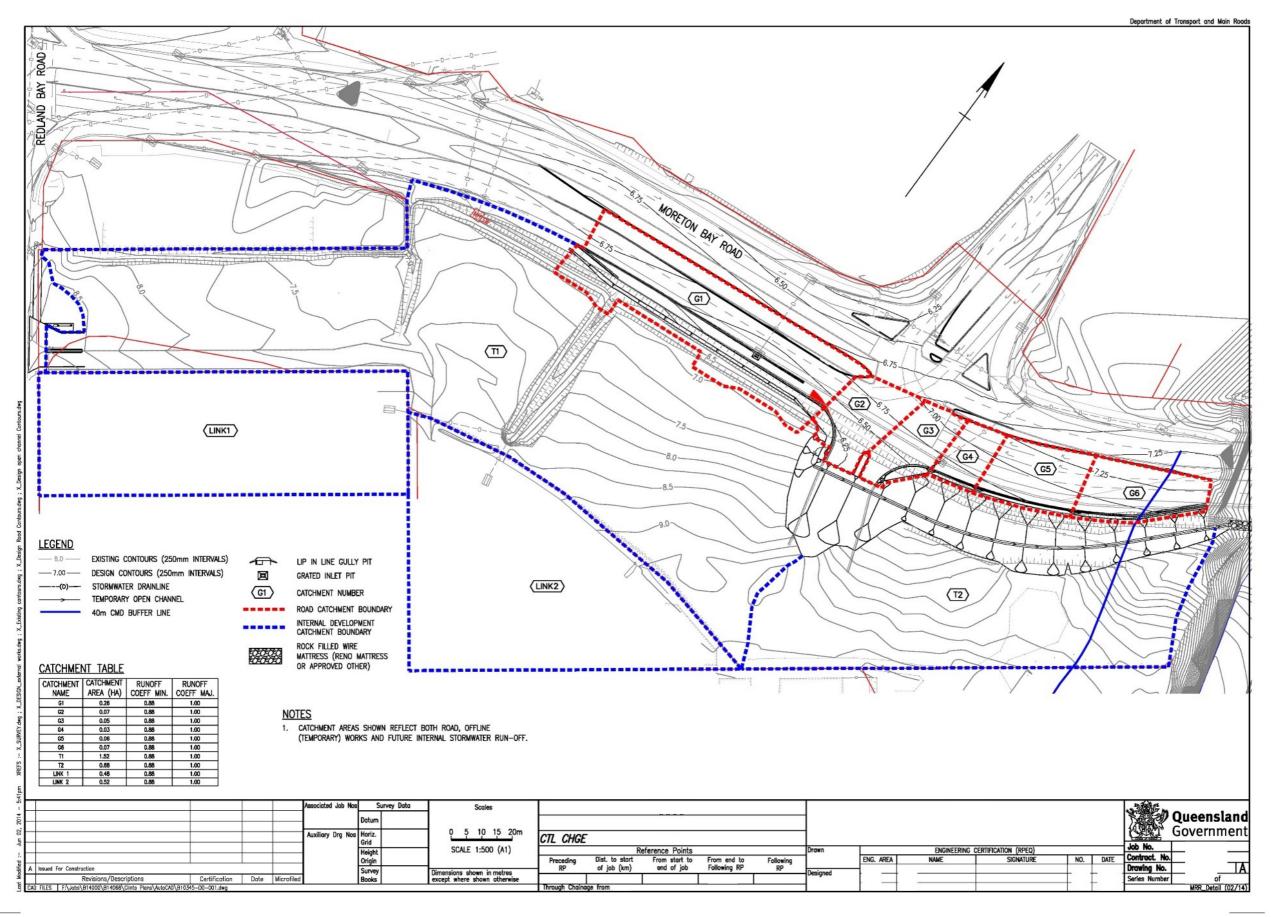


Figure 2.11.5(b) – Drainage catchment – generic example 2

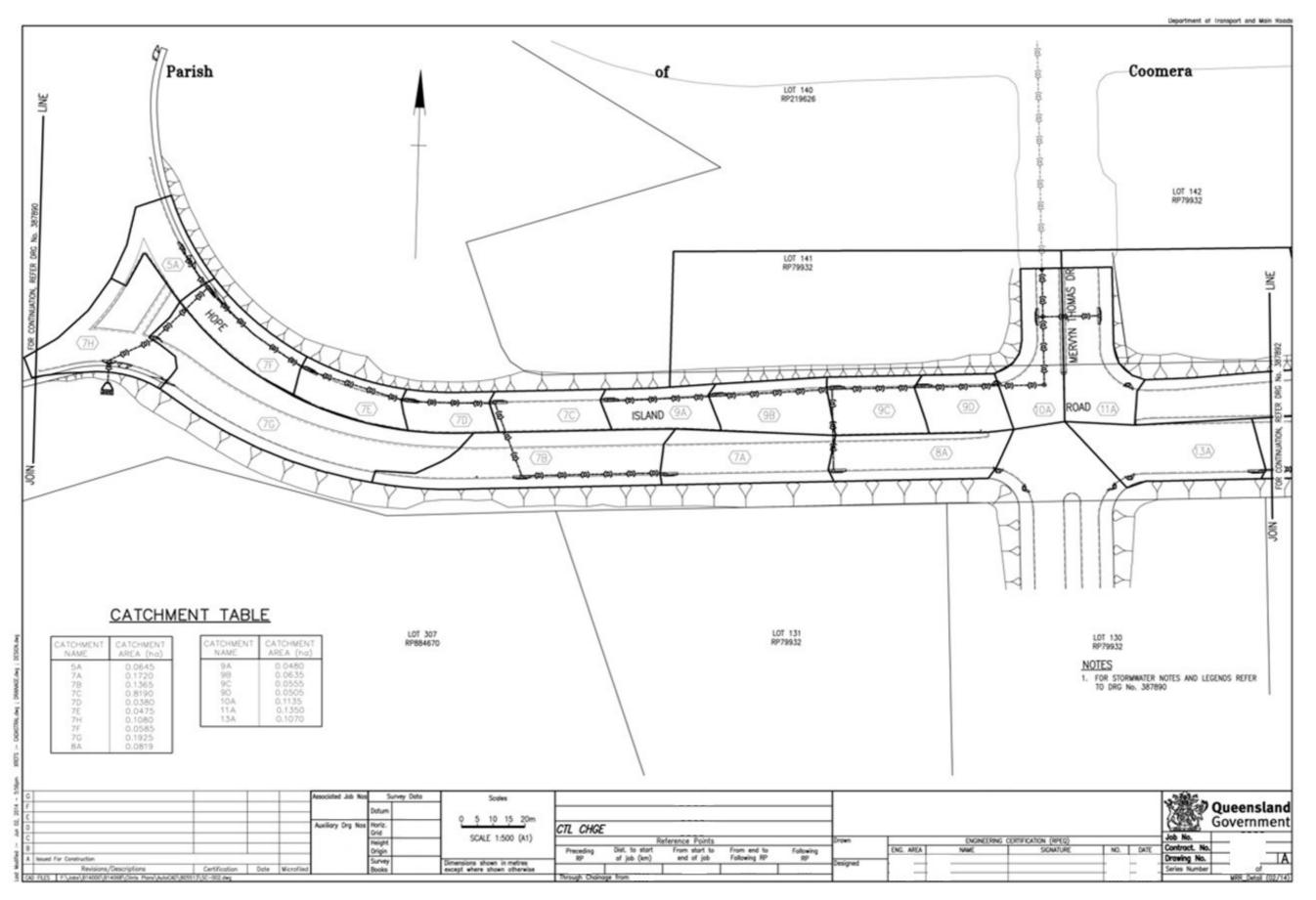
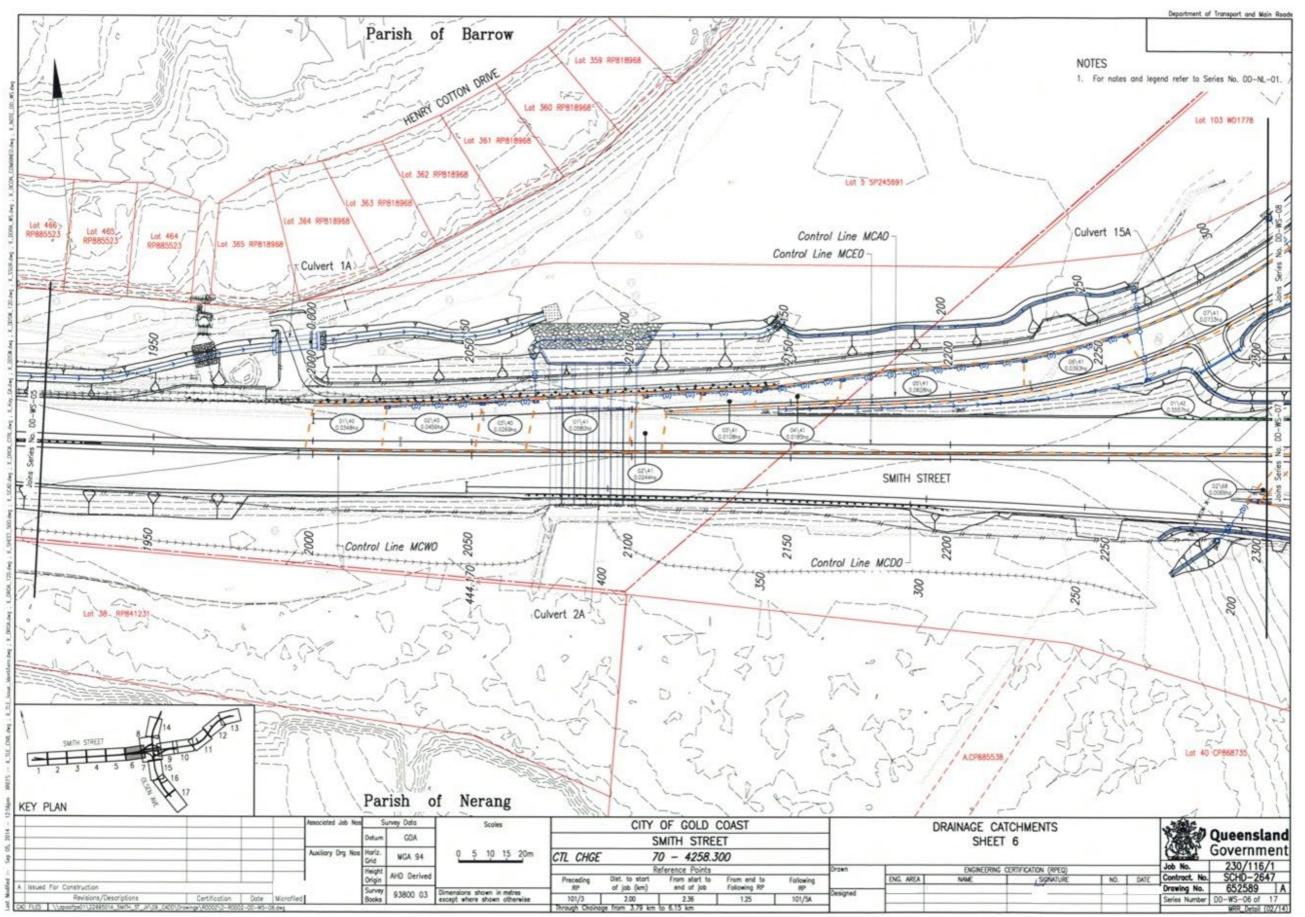


Figure 2.11.5(c) – Drainage catchment – registered example



2.12 Pavement markings and signage

This drawing details the roadway pavement markings and the type, size and location of the roadway signage.

Considerations

Scale

Usually 1:500 at A1/1:1000 at A3 (consider 1:250 at A1/1:500 at A3 if high degree of detail)

Drawing

- Desirable to combine pavement markings and signs on same drawing
- Include a legend for pavement markings (code, explanation and width of line types)
- Show lane widths, shoulder widths, cycle lane widths, etc., but if drawing is convoluted with too much information, then for details of widths and tapers of traffic lanes, shoulders, bicycle lanes, bus lanes, chevrons, and so on, refer to general arrangement plans.
- Show new sign details (in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) Ref No. size code)
- Show existing signs to be removed or to be relocated
- If drawing is convoluted with too much information, then it may be appropriate to provide tables on a separate drawing showing sign information such as sign number / location, new sign, existing sign to remain / relocate / remove, sign type and size, number of posts including type and size, and so on.
- Include a legend for signs:
 - existing remain / remove / relocate
 - new own post / joint mount.

Figure 2.12(a) – Pavement markings and signage – generic example 1

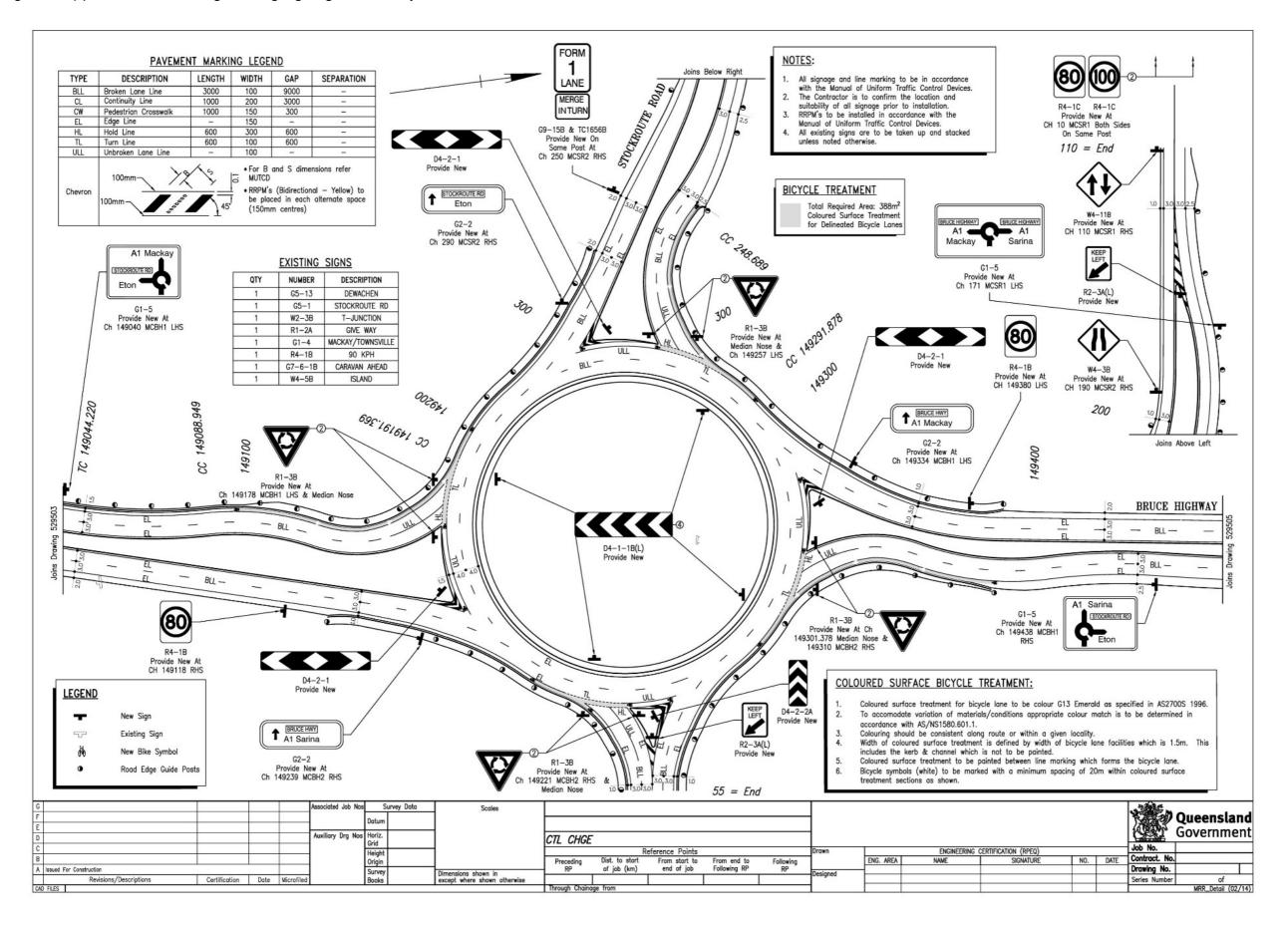


Figure 2.12(b) – Pavement markings and signage – generic example 2

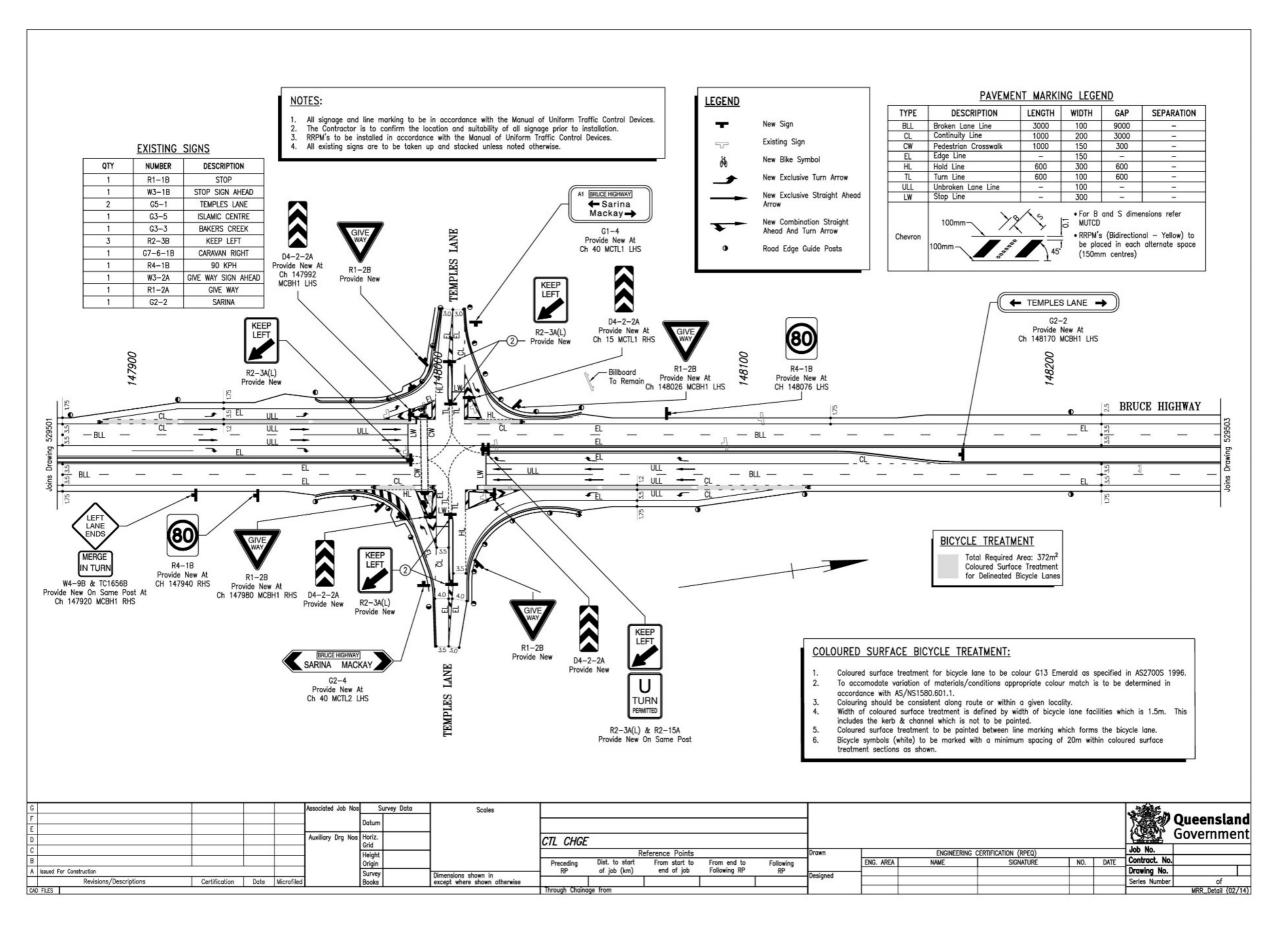


Figure 2.12(c) – Pavement markings and signage – generic example 3 – sheet 1 of 3

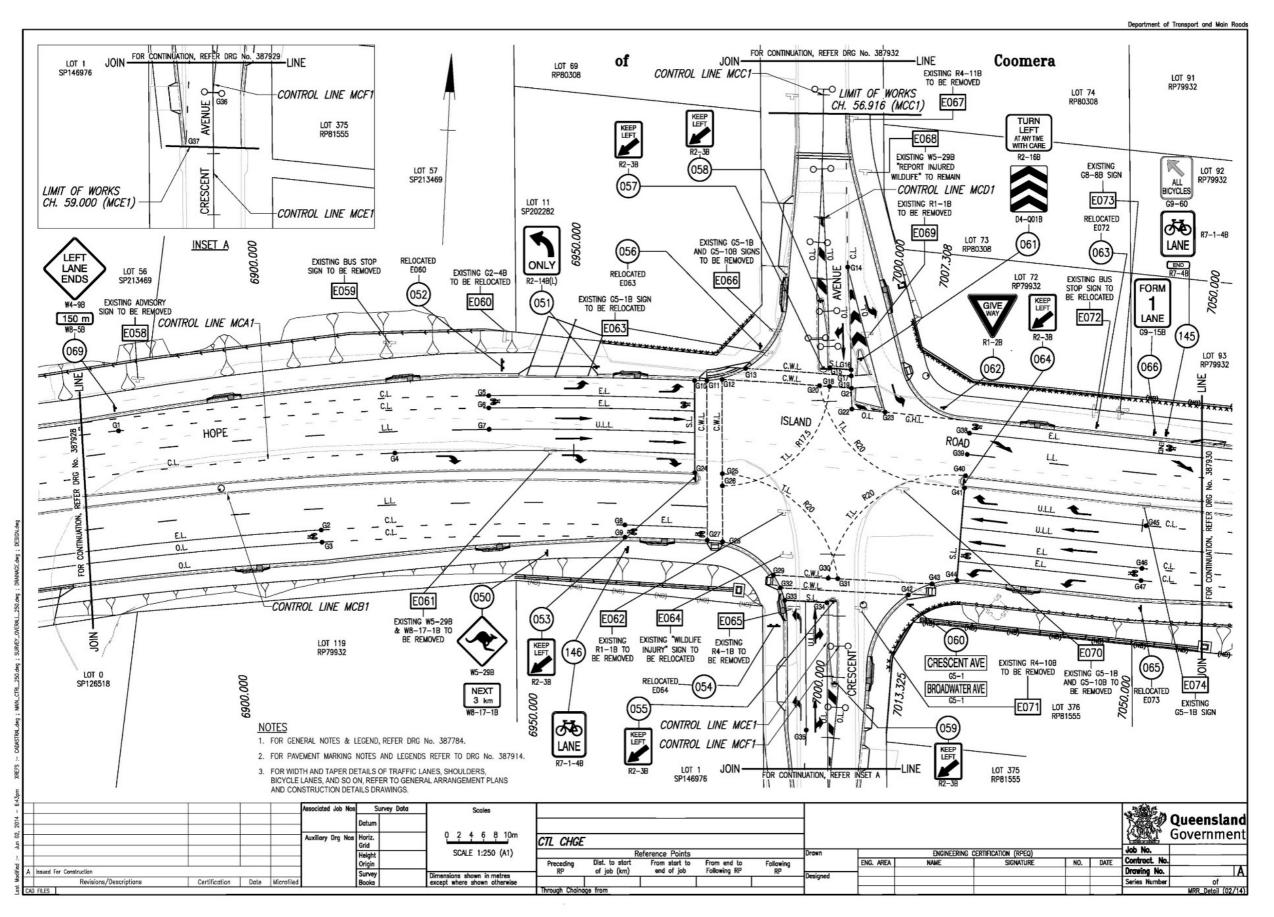


Figure 2.12(d) – Pavement markings and signage – generic example 3 – sheet 2 of 3

N No.	SIGN TYPE	SIGN LEGEND	No. OF POSTS	CC	DMMENT	SIGN No.	SIGN TYPE	SIGN LEGEND	No. OF POSTS	COMMENT	
001	R4-1B	SPEED RESTRICTION - 70km/h	& TYPE	LOCATE CH4865 (N		060	G5-1B	BROADWATER AVE	& TYPE		
02	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	LOCATE CH4865 (M				CRESCENT AVE	1 CHS	LOCATE CH7014 (MCB1 - RHS)	
03	W2-7B	ROUNDABOUT (AHEAD)	1 CHS	LOCATE CH4567 (061	R2-16B	*TURN LEFT AT ANY TIME WITH CARE"	285-37		
04 05	R4-1B R4-1B	SPEED RESTRICTION - 70km/h	1 CHS 1 CHS	LOCATE CH4959 (N		000	D4-Q01B	HAZARD MARKER	1 CHS	LOCATE CH6995 (MCA1 - LHS)	
06	K4-1B G4-1B	SPEED RESTRICTION - 70km/h OXENFORD 6	200000000000000000000000000000000000000	LOCATE CH4959 (I	ICB1 - RHS)	062 063	R1-2B G8-8B	GIVE WAY STATE ROUTE WARKER	1 CHS 1 CHS	LOCATE CH7008 (MCA1 - LHS) LOCATE CH7035 (MCA1 - LHS)	
~	04-1D	SANCTUARY 4	2 CHS	LOCATE CH5444 (M	ICB1 - RHS)	064	R2-3B	*KEEP LEFT*	1 CHS	LOCATE CH7013 (MCA1 - EHS)	
07	G1-5B	DIRECTIONAL SIGN	2 CHS	LOCATE CH5480 (N	ICA1 - LHS)	065	G5-1B	BOYKAMBIL	2 CHS	LOCATE CH7051 (MCB1 - RHS)	
08	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	LOCATE CH5477 (ICB1 - RHS)	066	G9-15B	FORM 1 LANE	1 CHS	LOCATE CH7044 (MCA1 - LHS)	
09	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	LOCATE CH5477 (N		067	R2-3B	"KEEP LEFT"	1 CHS	LOCATE CH7108 (MCA1 - LHS)	
10	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	LOCATE CH5593 (N		068	G2-4B	CRESCENT AVE	2 CHS	LOCATE CH7116 (MCB1 - RHS)	
12	R1-3B D4-2-1	GIVE WAY - ROUNDABOUT BIDIRECTIONAL HAZARD MARKER	1 CHS 2 CHS	LOCATE CH5582 (N		069	W4-9B	"LEFT LANE ENDS"	1.015	LOCATE CH6876 (MCA1 - LHS)	
13	R2-2B(L)	"ONE WAY"	1 CHS	LOCATE CH5597 (I	,	070	W8-5B	"150m" GCCC BUS STOP SIGN	1 CHS 1 CHS	LOCATE CH6736 (MCB1 - RHS)	
14	D4-1-1B	UNIDIRECTIONAL HAZARD MARKER	2 CHS	LOCATE CH5606 (M		071	R5-20(R)	BUS ZONE	1 CHS	LOCATE CH6730 (MCB1 - RHS)	
15	D4-1-1B	UNIDIRECTIONAL HAZARD MARKER	2 CHS	LOCATE CH5723 (N	ICB1 - LHS)	072	R1-2B	GNE WAY	1 CHS	LDCATE CH1333 (MCK1 - LHS)	
16	D4-2-1	BIDIRECTIONAL HAZARD MARKER	2 CHS	LOCATE CH5739 (N	ICA1 - RHS)	073	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH515 (MCK1 - CENTRAL)	
17	G2-2B	LABRADOR BROADWATER AVE	2 CHS	LOCATE CH5727 (I	ICA1 - LHS)	· · · · · · · · · · · · · · · · · · ·					
18	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	LOCATE CH5743 (I	ICB1 - RHS)						
19	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	LOCATE CH5743 (
20	R4-1B	Speed restriction — 70km/h	1 CHS	LOCATE CH5810 ()	ICA1 - RHS)						
21	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	LOCATE CH5810 ()	ICA1 - LHS)						
22	G4-1B	BROADWATER AVE LABRADOR 9	2 CHS	LOCATE CH5909 (I	ICA1 - LHS)						
23	G1-5B	DIRECTIONAL	2 CHS	LOCATE CH5917 (I	ICB1 - RHS)						
24	G5-1B	"BOYKAMBIL"	2 CHS	LOCATE CH5936 (N							
25	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	LOCATE CH5950 (N							
26	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	LOCATE CH5950 (I							
27	R2-3B(L) R2-3B(L)	"KEEP LEFT"	1 CHS 1 CHS	LOCATE CHEOSO (N							
28	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6050 (N							
9A	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6052 (I							
30	R2-4B	"NO ENTRY"	1 CHS	LOCATE CH6215 (M							
31	R2-2B	"ONE WAY" SIGN	1 CHS	LOCATE CH6224 (N							
32	R2-14B(L)	ALL TURNING TRAFFIC	1 CHS	LOCATE CH6226 (N							
33 34	R5-20(L) R5-20(R)	BUS ZONE BUS ZONE	1 CHS 1 CHS	LOCATE CH6252 (N							
35		GCCC BUS STOP SIGN	1 CHS	LOCATE CH6254 (I							
36		GCCC BUS STOP SIGN	1 CHS	LOCATE CH6277 (,						
37	R5-20(R)	BUS ZONE	1 CHS	LOCATE CH6312 (N							
38	R5-20(L)	BUS ZONE	1 CHS	LOCATE CH6290 (M	· · · · · · · · · · · · · · · · · · ·						
39 40	R4-1B R4-1B	SPEED RESTRICTION - 70km/h	1 CHS 1 CHS	LOCATE CH6308 (I							
41	G4-1B	SPEED RESTRICTION — 70km/h BROADWATER AVE									
"	04 10	OXENFORD 7	2 CHS	LOCATE CH6592 (N	ICB1 - RHS)						
42	R5-20(L)	BUS ZONE	1 CHS	LOCATE CH6718 (M	ICB1 - RHS)						
43	R2-2B	"ONE WAY" SIGN	1 CHS	LOCATE CH6807 (
14	R2-14B(L)	ALL TURNING TRAFFIC	1 CHS	LOCATE CH6803 (N							
45 46	R2-14B(L) R5-20(R)	ALL TURNING TRAFFIC BUS ZONE	1 CHS 1 CHS	LOCATE CH6813 (N							
47	K3-20(K)	GCCC BUS STOP SIGN	1 CHS	LOCATE CH6760 (I							
48	R5-20(L)	BUS ZONE	1 CHS	LOCATE CH6821 (I							
49											NOTES
50	W5-29B	KANGAROO	1 CHS	LOCATE CH6952 (M	ICB1 - RHS)						1. FOR PAVEMENT AND SIGN LAYOUT NOTES &
51	W8-17-1B R2-14B(L)	NEXT 3km ALL TURNING TRAFFIC	1 CHS	LOCATE CH6954 (I							LEGEND, REFER DRG No. 387936 & 38793
52	G2-4B	"CRESCENT AVE"	2 CHS	LOCATE CH6934 (I							
53	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6970 (I							
54		"WILDLIFE INJURY"	2 CHS	LOCATE CH6988 (N							
55	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH7000 (k	ICB1 - RHS)						
56	G5-1B	BROADWATER AVE	1 CHS	LOCATE CH6980 (M	ICA1 - LHS)						
57	R2-3B(L)	'KEEP LEFT"	1 CHS	LOCATE CH6990 (N	ICA1 _ LHS)						
58	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6989 (I							
59	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH7000 (
			Associated Job Nos	Survey Data	Carlo	ř .			Ī		nanta
			Associated Job Nos	T .	Scales	-		710000	_		Queens
			2.42						_		Govern
			Auxiliary Drg Nos Horiz	-	NOT TO SCALE	CTL CHGE					I-L M-
			Heig				Deferre	ce Points	Drawn	ENGINEERING CERTIFICATION (RPEC	JOD NO.

Figure 2.12(e) – Pavement markings and signage – generic example 3 – sheet 3 of 3

SN No.	SIGN TYPE	SIGN LEGEND	No. OF POST	8	OMMENT	SIGN No.	NG SIGNS SIGN TYPE	SIGN LEGEND	No. OF POSTS	COMMENT]
E001	W1-3B(R)	CURVE (RIGHT)	& TYPE		OWINICIAL	E056	W4-9B	LEFT LANE ENDS	& TYPE	COMMENT	
1	W8-2B	ADVISORY SPEED (50km/h)	1 CHS	REMOVE		2000	W8-15B	MERGE RIGHT	1 CHS	REMOVE	
E002	D4-6B	CHEVRON ALIGNMENT MARKER	1 CHS	REMOVE		E057	: -	ADVERTISING	? CHS	RELOCATE	
E003 E004	D4-6B W4-9A	CHEVRON ALIGNMENT MARKER LEFT LANE END	1 CHS	REMOVE		E058 E059		"SCHOOL BUS OPERATES IN THIS AREA" BUS STOP ADVISORY SIGN	1 CHS 1 CHS	REMOVE REMOVE	-
.5004	W8-15B	MERG RIGHT	1 CHS	REMOVE		E060	G2-4B	*CRESCENT AVE"	2 CHS	RELOCATED	1
E005	G1-5B	ADVANCE DIRECTION SIGN	1 CHS	REMOVE		E061	W5-29B	KANGAROOS			
E006	W1-1B(R)	BEND (RIGHT)	1 CHS	REMOVE			W8-17-1B	"NEXT 3km"	1 CHS	REMOVE	
E007	₩8-2B ₩4-11A	ADVISORY SPEED (40km/h) TWO WAY TRAFFIC	1 CHS	REMOVE		E062 E063	R1-1B G5-1B	STOP SIGN CRESCENT AVE	1 CHS 1 CHS	REMOVE RELOCATED	
2007	W4-4A	DIMDED ROAD	I ons	KEMOVE		E064		*WILDLIFE INJURY*	2 CHS	RELOCATED	1
E008	D4-1-10	TWO UNIDIRECTIONAL HAZARD MARKERS	2 CHS	REMOVE		E065	R4-1B	SPEED RESTRICTION - 50km/h	1 CHS	REMOVE	1
E009 E010	D4 1 1B	TWO UNIDIRECTIONAL HAZARD MARKERS	2 CHS 1 CHS	REMOVE		E066	G5-1B	CRESCENT AVE	4 010	DELINE	
E011	D4-6B D4-6B	CHEVRON ALIGNMENT MARKER CHEVRON ALIGNMENT MARKER	1 CHS	REMOVE		E067	G5-10B R4-11B	"NO THROUGH ROAD" END SPEED LIMIT AREA	1 CHS 1 CHS	REMOVE REMOVE	1
E012	D4 68	CHEVRON ALIGNMENT MARKER	1 OHS	REMOVE		E068	W5-29B	KANGAROO			1
E013	D4-6B	CHEVRON ALIGNMENT MARKER	1 CHS	REMOVE				"REPORT INJURED WILDLIFE"		REMAIN	1
E014 E015	R4-18 R4-18	SPEED RESTRICTION - 70km/h	1 CHS 1 CHS	REMOVE		E069 E070	R1-1B G5-1B	STOP	1 CHS	REMOVE	
E016	W1-1B(L)	SPEED RESTRICTION - 70km/h BEND (LEFT)	1 CHS	REMOVE		EU/0	G5-1B G5-10B	"NO THROUGH ROAD"	1 CHS	REMOVE	
	₩8-2B	ADVISORY SPEED (40km/h)	1 CHS	REMOVE		E071	R4-10B	SPEED LIMIT AREA	1 CHS	REMOVE	1
E017	G1-5B	DIRECTIONAL	2 CHS	RELOCATE		E072		GCCC BUS STOP SIGN	1 CHS	RELOCATED	
E018	G4-1B	SANCTUARY COVE 4 OXENFORD 6	2 CHS	DELOCATE		E073 E074	G8-8B G5-1B	STATE ROUTE MARKER "4" BOYKAMBIL	1 CHS 2 CHS	RELOCATED RELOCATED	-
E019	R2-3B(L)	KEEP LEFT	1 CHS	RELOCATE REMOVE		E074 E075	G5-1B R4-1B	SPEED RESTRICTION - 60km/h	1 CHS	RELOCATED	
E020	W4-9B	LEFT LANE ENDS	1 CHS	REMOVE		E076	G2-4B	"CRESCENT AVE"	2 CHS	RELOCATED	1
E021	D4-Q01B	BIDIRECTIONAL HAZARD MARKER	1 CHS	REMOVE		E077	R4-10B	SPEED LIMIT AREA	1 CHS	REMOVE	
E022 E023	R1-3B R1-3B	GIVE WAY - ROUNDABOUT GIVE WAY - ROUNDABOUT	1 CHS 1 CHS	RELOCATE RELOCATE		E078 E079	G9-15A W4-6A	FORM 1 LANE END DIVIDED ROAD	1 CHS 1 CHS	REMOVE REMOVE	
E023	R2-2B(L)	ONE WAY	1 CHS	RELOCATE		E079	G9-15A	FORM 1 LANE	1 CHS	REMOVE	
E025	D4-1-1B	TWO UNIDIRECTIONAL HAZARD MARKERS	1 CHS	RELOCATE		E081	R4-1A	SPEED RESTRICTION - 60km/h	1 CHS	REMOVE	1
E026	G2-2B	HOPE ISLAND ROAD				E082	R4-1A	SPEED RESTRICTION - 60km/h	1 CHS	REMOVE	
E027	D4-1-1B	OXENFORD	1 CHS	RELOCATE		E083 E084	G9-21 R2-3B(L)	ROAD SUBJECT TO FLOODING	2 CHS	REMOVE	
E027	R2-2B(L)	TWO UNIDIRECTIONAL HAZARD MARKERS ONE WAY	2 CHS 1 CHS	REMOVE REMAIN		E085	G9-21	ROAD SUBJECT TO FLOODING	1 CHS 2 CHS	REMOVE REMOVE	1
E029	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	RELOCATE		2000	** *!	o observe to i coupiilo	1 200		J
E030	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	RELOCATE							
E031 E032	D4-Q01B G2-2B	BIDIRECTIONAL HAZARD MARKER LABRADOR	1 CHS	REMOVE							
LVJZ	0Z-Z0	BROADWATER AVE	2 CHS	RELOCATE							
E033	W4-9B	LEFT LANE ENDS	1 CHS	REMOVE							
E034	W5-29B	KANGAROOS	1 CHS	REMOVE							
E035 E036	R2-3B(L) G9-15B	KEEP LEFT FORM ONE LANE	1 CHS 1 CHS	REMOVE REMOVE							
E037	G4-1B	BROADWATER AVE	1 013	REMOVE							
		LABRADOR 9	2 CHS	RELOCATE							
E038	G1-5B G5-1B	DIRECTIONAL	2 CHS 2 CHS	RELOCATE							
E039 E040	G5-1B W5-25B	BOYKAMBIL TURNING TRAFFIC	Z UHS	RELOCATE							
	W5-22B	TRUCKS (CROSSING OR ENTERING)	1 CHS	REMOVE							
E041	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	REMOVE							
E042 E043		BUS STOP SPEED LIMIT	1 CHS 1 CHS	REMOVE REMOVE							
E044	R2-3B(L)	KEEP LEFT	1 CHS	REMOVE	•						
E045	R2-6B(R)	NO RIGHT TURN	1 CHS	REMOVE							
E046	R1-2B	GIVE WAY	1 CHS	REMOVE							NOTE
E047 E048	R2-3B(L)	KEEP LEFT BUS STOP	1 CHS 1 CHS	REMOVE REMOVE							1. FOR PAVEMENT AND SIGN LAYOUT NOTES &:
E049	R2-5B	NO U TURN	1 CHS	REMOVE							LEGEND, REFER DRG No. 387936 & 387937.
E050	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	REMOVE							
E051	G4-1B	BROADWATER AVE - OXENFORD	2 CHS	RELOCATED							
E052 E053	R1-2B R2-4B	GIVE WAY NO ENTRY	1 CHS	REMOVE							
2000	R2-6B(R)	NO RIGHT TURN	1 CHS	REMOVE							
E054		BUS STOP SIGN	1 CHS	RELOCATE							
E055	R4-1B	SPEED RESTRICTION - 60km/h	1 CHS	REMOVE							
			Associated Job Nos	Survey Data	Scales						AFRE
				Datum					\dashv		Queen:
			Auxiliary Drg Nos	140000		מדו מומר			\dashv		Govern
				Grid	NOT TO SCALE	CTL CHGE	Deferre	ca Painte	Drawn	ENGINEERING CERTIFICATION	1102800
				Height Origin	ı	Preceding		ce Points om start to From end to Following	_		NATURE ND. DATE Contract. No.

Figure 2.12(f) – Pavement marking and signage – generic example 4 – sheet 1 of 2

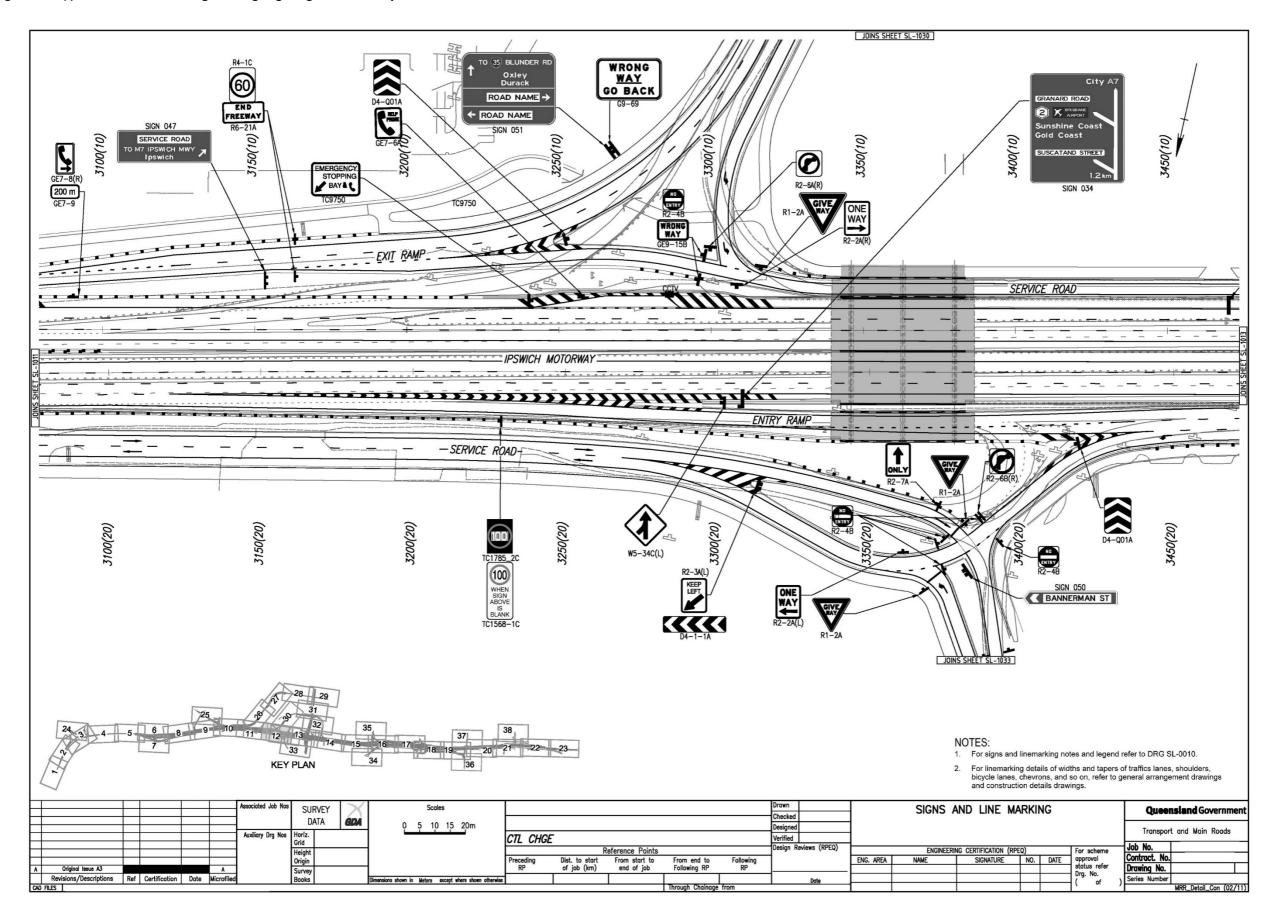


Figure 2.12(g) – Pavement marking and signage – generic example 4 – sheet 2 of 2

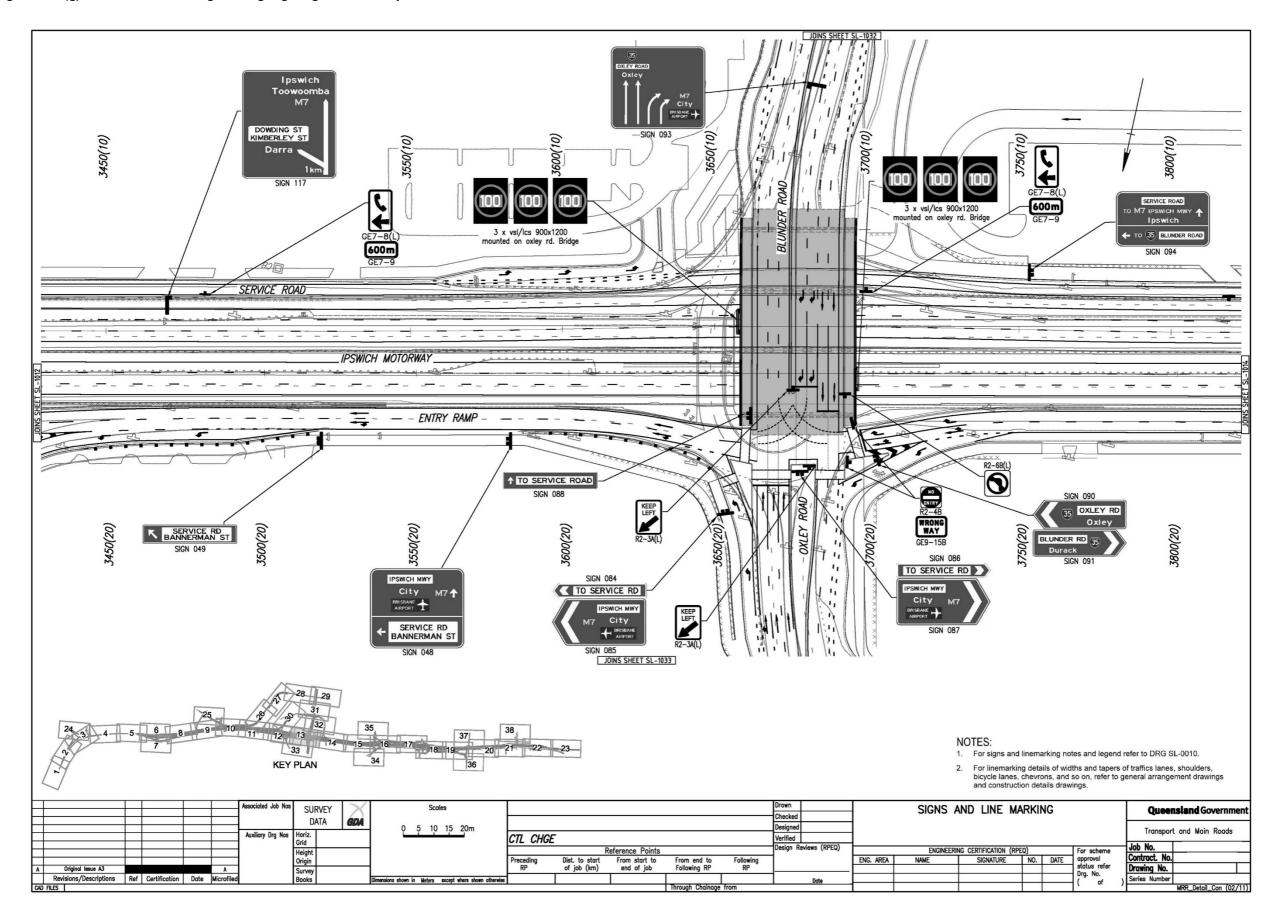


Figure 2.12(h) – Pavement markings and signage – registered example 1

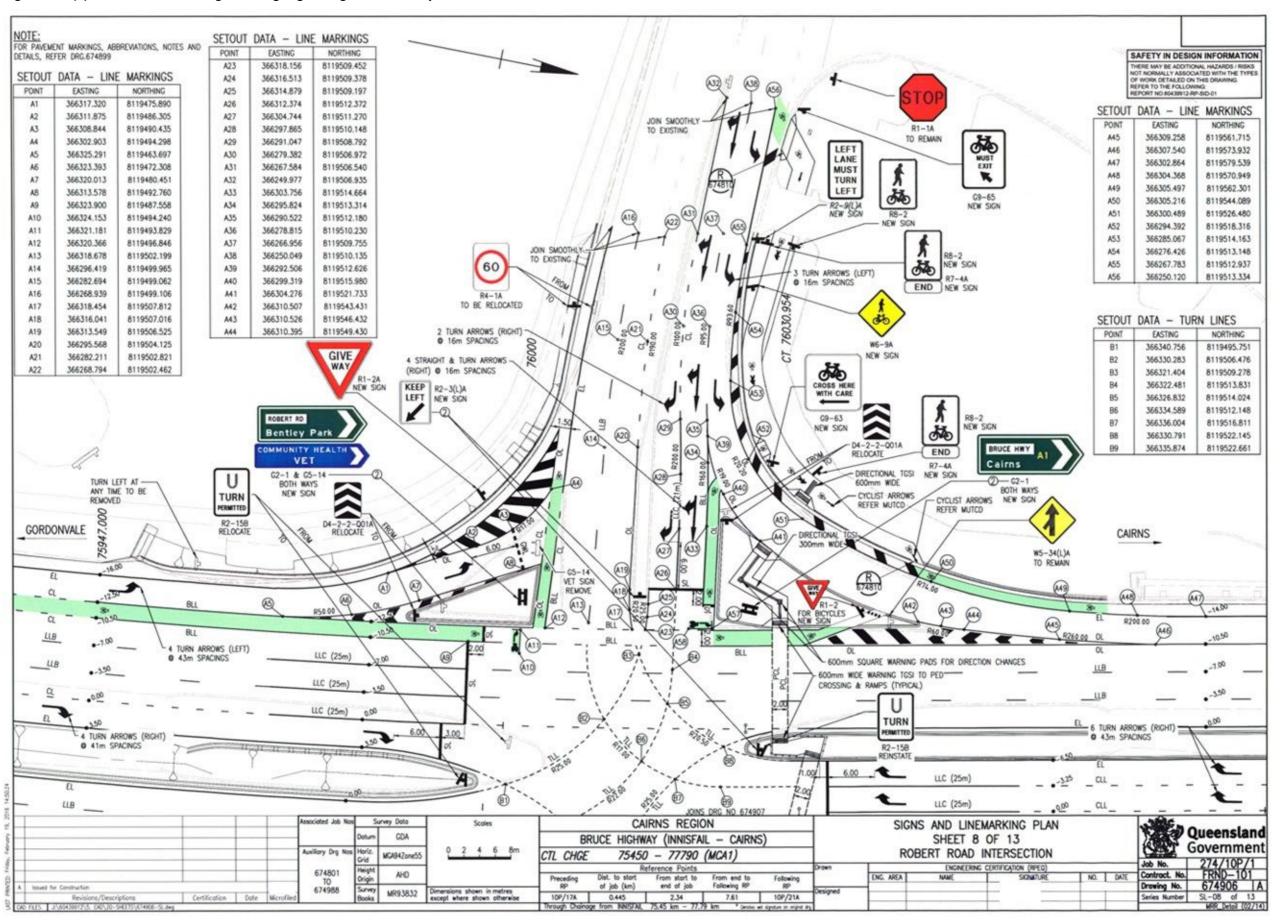


Figure 2.12(i) – Pavement markings and signage – registered example 2

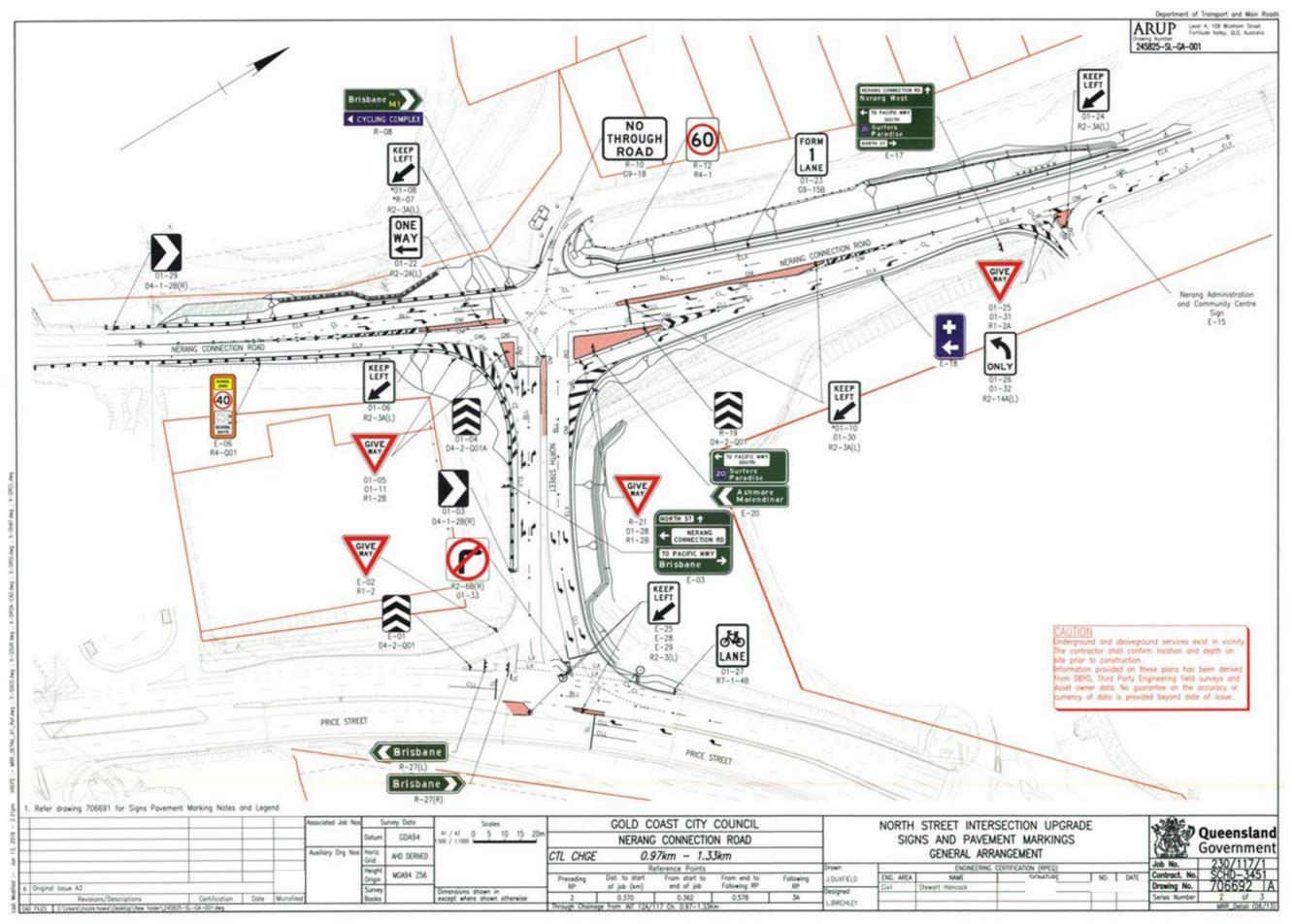


Figure 2.12(j) – Pavement markings and signage – registered example 3

ARUP Level 4, 108 Wickhorn Street ForStude Voltey, QLO, Austrolia 245825-SL-0S-001

- Refer to drawing 706654 for existing signs/features.
 Sign identification number prefix represented as follows:
 01 New
 R Relocated
 E Existing

STANDARD SIGNS SCHEDULE

POTENCIA POTENCIA	CICH MUNICO	CICH CHRICO AHACHAICO	CENTER P	COMMENTS		
DENTIFICATION NUMBER	SIGN NUMBER	SIGN OWNER/MAINTAINER	EASTING			
01-03	D4-1-28(R)	TMR	Sign To Be Moun	ited On Guardrail End		
01-04	04-2-Q01A	TMR	533184.401	6904338.468		
01-05	R1-28	TMR	533173.98	6904323.115		
01-06	R2-3A(L)	TMR	533161.648	6904321.507		
01-08	R2~3A(L)	TMR	To Be Mounte	ed On Traffic Post		
01-10	R2-3A(L)	TMR	To Be Mounte	ed On Troffic Post		
01-11	R1-28	TMR	533180.479	6904339.011		
01-22	R2-2A(L)	TMR	533169.447	6904337,748		
01-23	C9-158	TMR	533191.566	6904422.260		
01-24	R2-3A(L)	TMR	533238.732	6904511.251		
01-25	R1-2A	TMR	671076 440	EDDAEDA ECA		
01-26	R2-14A(L)	TMR	533236.442	6904501.561		
01-27	R7-1-4B	TMR	533301.129	6904328.64		
01-28	R1-28	TMR	533195.946	6904357.072		
01-29	D4-1-28(R)	TMR	Sign To Be Moun	ited On Guardrail End		
01-30	R2-3A(L)	TMR	533207.744	6904436.874		
01-31	R1-2A	TMR	533234.651	6904510.867		
01-32	R2~14A(L)	TMR	333234,031	0904310.007		
01-33	R2-6B(R)	TMR	To Be Mounte	ed On Troffic Post		
E-01	D4-2-Q01	TMR	ε	xisting	Existing Sign To Remain	
E-02	R1-2	TMR	Ε	xisting	Existing Sign To Remain	
8-06	R4-Q01	TMR	E	xisting	Existing Sign To Remain	
E-25	R2-3(t)	TMR		xisting	Existing Sign To Remain	
E-28	R2-3(t)	TMR	ε	xisting	Existing Sign To Remain	
E-29	R2-3(L)	TMR	ε	xisting	Existing Sign To Remain	
R-07	R2-3(L)	TMR	To Be Mounte	ed On Traffic Post	Existing Sign To Be Relocated	
R=10	C9-18	TMR	533162.147	6904361.564	Existing Sign To Be Relocated	
8-12	R4-1	TMR	533176.730	6904382.747	Existing Sign To Be Relocated	
R-19	D4-2-Q01	TMR	533191.893	6904390.033	Existing Sign To Be Relocated	
R-21	R1-2	TMR	533205.746	6904356.152	Existing Sign To Be Relocated	

GUIDE SIGNS SCHEDULE

DENTIFICATION	2010/0308	SIGN	CENTER POR	NT OF SIGN		Active Accessors	410000	YOUR STREET		********	
NUMBER	SIGN TYPE	OWNER/MAINTAINER	EASTING	NORTHING	Mounting Height	Mounting Arrangement	Spacing	Foundation DIM	Support	COMMENTS	
E-03	G1-2	TMR	Exist	ting						Existing Guide Sign To Remain	
E-15	G5-8	TMR	Exis	ting						Existing Guide Sign To Remain	
€-17	G1-2	TMR	Existing							Existing Guide Sign To Remain	
E-18	G7-3-1A, G7-3-18	TMR	Existing							Existing Guide Sign To Remain	
E-20	G2-5, G2-1	TMR	Exis	ting						Existing Guide Sign To Remain	
R-08	G2-1, G5-14	TMR	533163.5 6904350		2000	Mounted On 2 Post 50 NB CHS	1320	300×750	Rigid	Existing Guide Sign To Be Relocated. Be Mounted At 2.3m Height	
R-27(L)	G2-1	TMR	533262.5 6904282		2300	Mounted On 2 Post 50 NB CHS	1045	300x750	Rigid	Existing Guide Sign To Be Relocated. T Be Mounted At 2.3m Height	
R-27(R)	G2-1	TMR	533266.8 6904287		2300	Mounted On 2 Post 50 NB CHS	1045	300×750	Rigid	Existing Guide Sign To Be Relocated. Be Mounted At 2.3m Height	

1. Refer drawing 706694 for Signs Povement Marking Notes and Legend

1 30					Associated Job N	08 5	iurvey Data	Scoles		The second secon	OAST CITY						SECTION UPGRA			13
8						Datum	GDA94	NOT TO SCALE		NERANO	CONNECTIO	N ROAD		1	SIG		MENT MARKINGS			No.
5					Auxiliary Drg No	Grid	AHO DERMED		CTL CHGE	0.9	77km - 1.3	3km				SCHED				Job N
			_	-	1	Height	140104 755	1		R	eference Points			Drawn .		ENCINEERING	CERTIFICATION (RPEQ)		-	Canto
ا۵	Sales and the sales are a sales and the sales are a sa			11	4	Origin	MGA94 230		Preceding	Dist. to start	From start to	From end to	Following	J.DUXFELD	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Contro
ŝΙ	A Issued For Construction					Survey		Dimensions shown in	RP RP	of job (km)	end of job	Following RP	RP	Designed	Civit	Stewart Hancack				Drowin
ŝ	Revisions/Descriptions	Certification	Dote	Microfiled		Books		except where shown otherwise	2	0.370	0.362	0.578	3A	LBROKEY					-	Series
Ē	CAD FILES C:\projectwise\pne_projects\nicole.howie\j@ms699711	245825-51-05-001.6	fwg		b .		723		Through Choine	ge from INT 12A/	117 Ch. 0.97-1,338	m		Lancret						

2.13 Roadway lighting

2.13.1 Introduction

The following requirements apply to all Transport and Main Roads owned and maintained public lighting.

Road lighting is recognised for its ability to reduce night-time crashes. The process of road lighting involves the use of luminaires with specific output qualities mounted on either fixed or frangible poles placed in a designated pattern to meet the requirements of AS/NZS 1158.1.1.

Lighting drawings are required to accurately show the layout and type of luminaires and poles as well as detailing the Energy Queensland electrical network and any other services deemed necessary for the particular project. The tariff rating (Rate 2 or 3) also needs to be clearly detailed on the drawing for each luminaire.

Where an electrical design is required, the Energy Queensland point of supply must be detailed along with the respective cable routes from the switchboard. The electrical load shall also be shown.

Where the lighting is done under a Rate 2 tariff there are additional requirements for presentation of the drawing. If these requirements are not already known Energy Queensland should be approached for a list of their presentation standards.

Energy Queensland have updated the existing Rate lighting tariff classifications and introduced Rate 4 for LED upgrades. Definitions below.

Table 2.13.1 – Updated rate lighting tariff classifications

Tariff	Description
Rate 1	Public lighting is supplied, installed, owned, and maintained by Energy Queensland. Energy Queensland provide a contribution towards the installation. Rate 1 daily charge incurs a capital, operating and maintenance charge.
Rate 2	Public lighting is designed, constructed, and gifted to Energy Queensland by Transport and Main Roads, or third party for Energy Queensland to own and maintain. Rate 2 daily charge incurs an operating and maintenance charge only.
Rate 3	Public lighting is supplied, owned, installed and maintained by Transport and Main Roads. Energy Queensland only provides a point of supply for the installation.
Rate 4	Transport and Main Roads funds the replacement of a Rate 1 luminaire with an LED luminaire and gift the LED luminaire to Energy Queensland. Ownership and maintenance of the public lighting remains with Energy Queensland.

2.13.2 Preparation of road lighting drawings

2.13.2.1 General

Transport and Main Roads road lighting designs shall be produced on the standard MRR_DETAIL A1 size title sheet, refer to Section 2.4.3.1 of DDPSM Volume 1, Chapter 2, using the current Transport and Main Roads customisation package. The final printed output will be produced on an A3 sheet with a scale of 1:1000 unless otherwise approved by Transport and Main Roads. All text shall be legible when produced in A3 format and meet the requirements of DDPSM Volume 1, Chapter 2.

It is preferable that the layout on the drawing is orientated with the major road being left to right, with north facing upwards on the sheet – if it is part of an overarching road design scheme it will follow the road design orientation.

The drawing title block shall provide enough information to accurately detail the location of the project. Where the lighting forms part of an overall road design scheme the information provided in the title block shall match the details for the overall road design drawings, as appropriate.

The title block shall also detail the tariff rating. Where the project falls within Energex's region, the suburb location (where appropriate) and an Energex project number shall be added to the title block (generally above the Transport and Main Roads logo). All Energex approved lighting design consultancies should have an allocation of project numbers from Energex. For projects that fall within the Ergon region, designers should refer to Ergon specific requirements.

Where a number of drawings are required for a scheme, the title block shall also show what sheet number the particular drawing is in the series, in addition to the overall scheme series number in bottom right corner of title block, for example 'Rate 2 Road lighting Sheet 1 of 4' in the title block and 'RL-01 of 04' in the series number. This requirement is beneficial where Rate 2 tariff and Rate 3 tariff lighting drawings are included in the one lighting scheme.

All features must be in accordance with the department's current standards for road lighting symbols as in Standard Drawing 1636 and abbreviations, symbols, line styles, text font and height and designated layers as outlined in the DPPSM Volume 1, Chapter 2.

2.13.2.2 Base plan

The base plan may be a drawing from field survey data, aerial photo or a new road design.

The focal point of the base plan is the physical layout of the site and its surrounding area. The following features of the site shall be shown on the base plan:

- Relevant property boundaries.
- Location of shoulders and kerbs, driveway crossings.
- Edges of medians and islands.
- Paved footpaths and driveways.
- Parking, bus bays or taxi zones.
- Electricity supply corporations' overhead and underground network. Poles and/or pillar identification numbers, including point of supply location(s) for lighting circuits. Voltage and number of conductors to be recorded for example, 3 wire 11KV or 4 wire LV (refer Standard Drawing 1636).
- Location and type of any existing lighting and associated conduits and pits, mounting height of luminaire and outreach arm length to be recorded.
- Other services for example, water, sewage, telecommunications, gas and so on, may be shown as part of preliminary design approval process for location of new poles but are not necessary on the final drawing unless they are in close proximity to proposed pole foundations and pit locations.
- Proposed service relocation alignments should also be shown if available.
- · Pavement markings.
- Road names. All local road names shown on layout, shall be shown.
- Clear join lines where drawings overlap.

In modification works, any existing features to be removed shall be placed on a separate layer to existing feature layers that are to remain.

2.13.2.3 Locality plan and drawing list

Includes the site locality with reference to the road network in the area, list of drawings and submitted and approval signature blocks.

For stand-alone road lighting design projects and schemes including other project drawings / designs, this drawing is included. Refer Figure 2.13(b).

2.13.2.4 Road lighting layout drawing

This drawing will show the base survey plan with any new road design including all relevant services above and below ground.

The drawing will indicate the position of all pits and footings and conduits between pits. Conduit size and cable type shall be shown.

All new, existing to remain, and existing to be removed luminaires shall be shown. For new LED luminaires, the LED symbol shall have the wattage rating of the luminaire clearly labelled beside the proposed luminaire.

Station numbers shall be given to each pole supporting a luminaire(s), intermediate pits not associated with a pole, point of supply poles and switchboards.

A series of general notes or stamps detailing any specific project requirements is required on the drawing.

Suggested standard general notes as follows:

- 1. Luminaires are to be only as specified on this drawing.
- 2. Lighting design parameters refer to Transport and Main Roads Standard Drawing No 1315.
- 3. Unless otherwise stated all outreach arms are to be perpendicular to the adjacent carriageway.
- 4. Any possible variations to pole locations considered necessary prior to installation, or in the field shall be approved by the Superintendent.
- 5. The contractor shall ensure existing lighting levels are maintained during construction. Where construction staging prevents this, the Principal will approve an appropriate level of lighting.
- 6. Rate 3 lighting infrastructure shall conform to Transport and Main Roads technical specifications and standards. Rate 2 lighting infrastructure shall conform to Energy Queensland technical specifications and standards.
- 7. Transport and Main Roads Smart Lighting Controller (Model ID: iSLC3100-7P-N-AD-G-IO-CATC-05-SW) installed on all Rate 3 LED luminaires at this site.

Depending on the tariff rating, references to either Rate 2 or Rate 3 may be removed from the notes.

A lighting design compliance certificate block shall be located on the drawing. Where there are multiple drawings in a scheme this certificate is only required on one drawing. Refer Figure 2.13.2.4(a) for example of minimum details to be shown.

Figure 2.13.2.4(a) – Lighting Design Compliance Certificate

LIGHTING DESIGN COMPLIANCE CERTIFICATE

This lighting design complies with the nominated categories of

AS/NZS 1158.1.1

Lighting category: V3

Luminaire Details:

Manufacturer & Model LRL NXT 72
Type & Wattage L160A

I-Table NXT-72M-700MA-2ES-4000K.CIE

Initial Lumens 17167

Computer Design Details:

AS/NZS 1158.2:2005 Compliant Software Perfect Lite Source of Program Wadello Pty Ltd

0.8 - Based on 6 year cleaning

Maintenance Factor cycle and 20 year service life for

LED luminaires

Road Reflection Class CIE-R3

All lighting calculations are available upon request

For lighting arrangement, spacings, mounting heights, outreach details and significant road features, refer to drawing.

The following schedules shall be included on the drawing(s):

- road lighting schedule (refer Section 2.13.2.5).
- pole placement schedule (refer Section 2.13.2.6) (only required for new poles being installed)
- pit schedule (refer Section 2.13.2.7)
- underground conduit schedule (refer Section 2.13.2.8)
- road lighting schematic and circuit schedule (refer Section 2.13.2.9), and
- underground cable schedule (refer Section 2.13.2.10).

Where large projects are involved, the use of multiple drawings will be required. In these cases, the civil and electrical details of the lighting scheme may be split. That is, the road lighting layouts, road lighting schedule, pole placement schedule, conduit schedule, pit schedule and the underground cabling schedule may be shown on separate drawings. However, the switchboard single line diagram and circuit schedule that are associated with the same switchboard must be shown on the same drawing.

Refer to Figures 2.13.2.4(b) to 2.13.2.4(g) for an example of a project involving multiple drawings and Figure 2.13.2.4(h) for a single drawing. A locality drawing is not shown in conjunction with Figure 2.13.2.4(h) but would be required if this was a stand-alone road lighting project.

The figures and examples shown are for presentation purposes only. 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 an appropriately qualified RPEQ to confirm that the details are appropriate for the specific project.

Figure 2.13.2.4(b) – Locality plan and index drawing – registered example

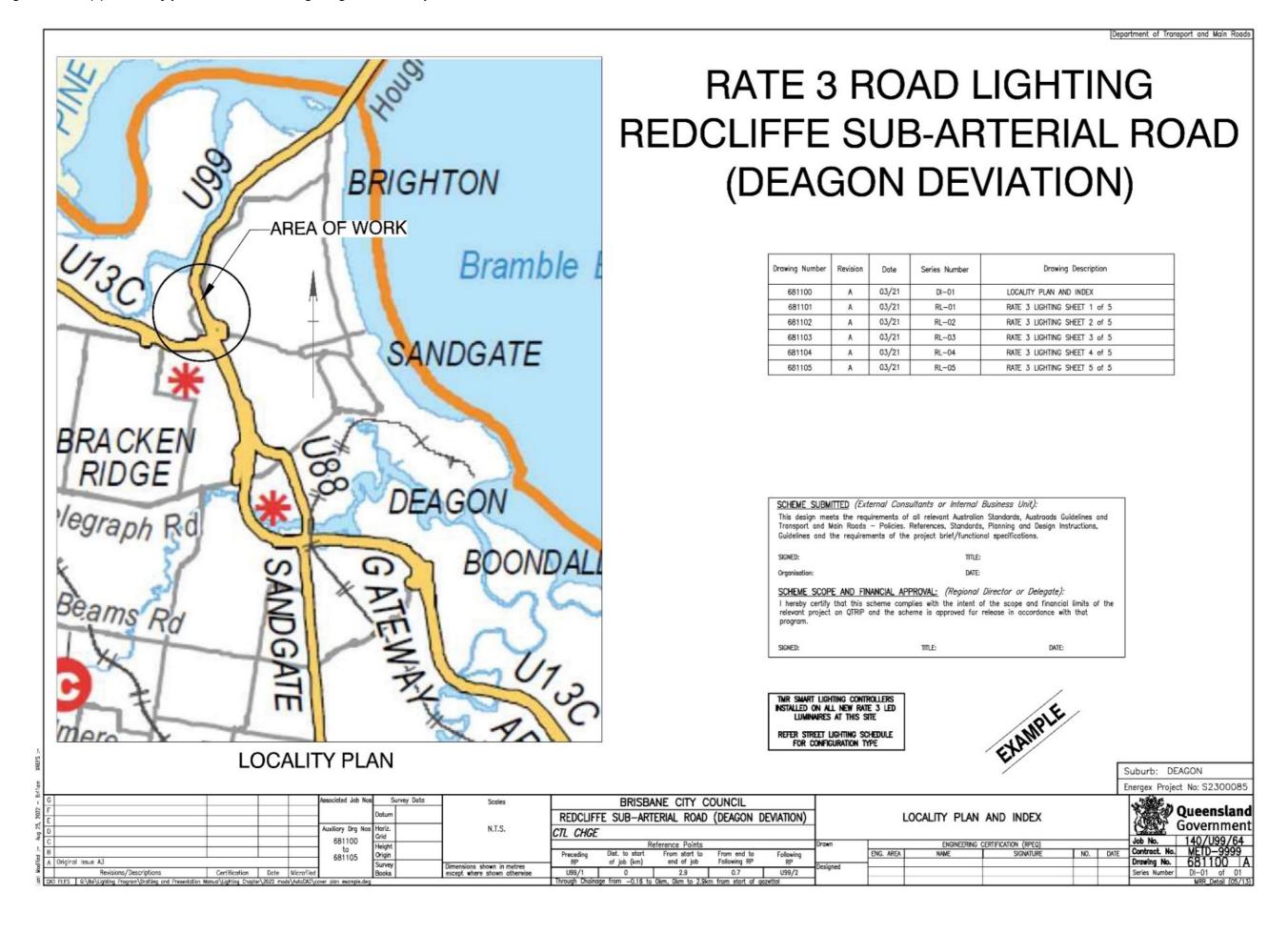


Figure 2.13.2.4(c) – Road lighting layout – sheet 1 of 5 – registered example 1

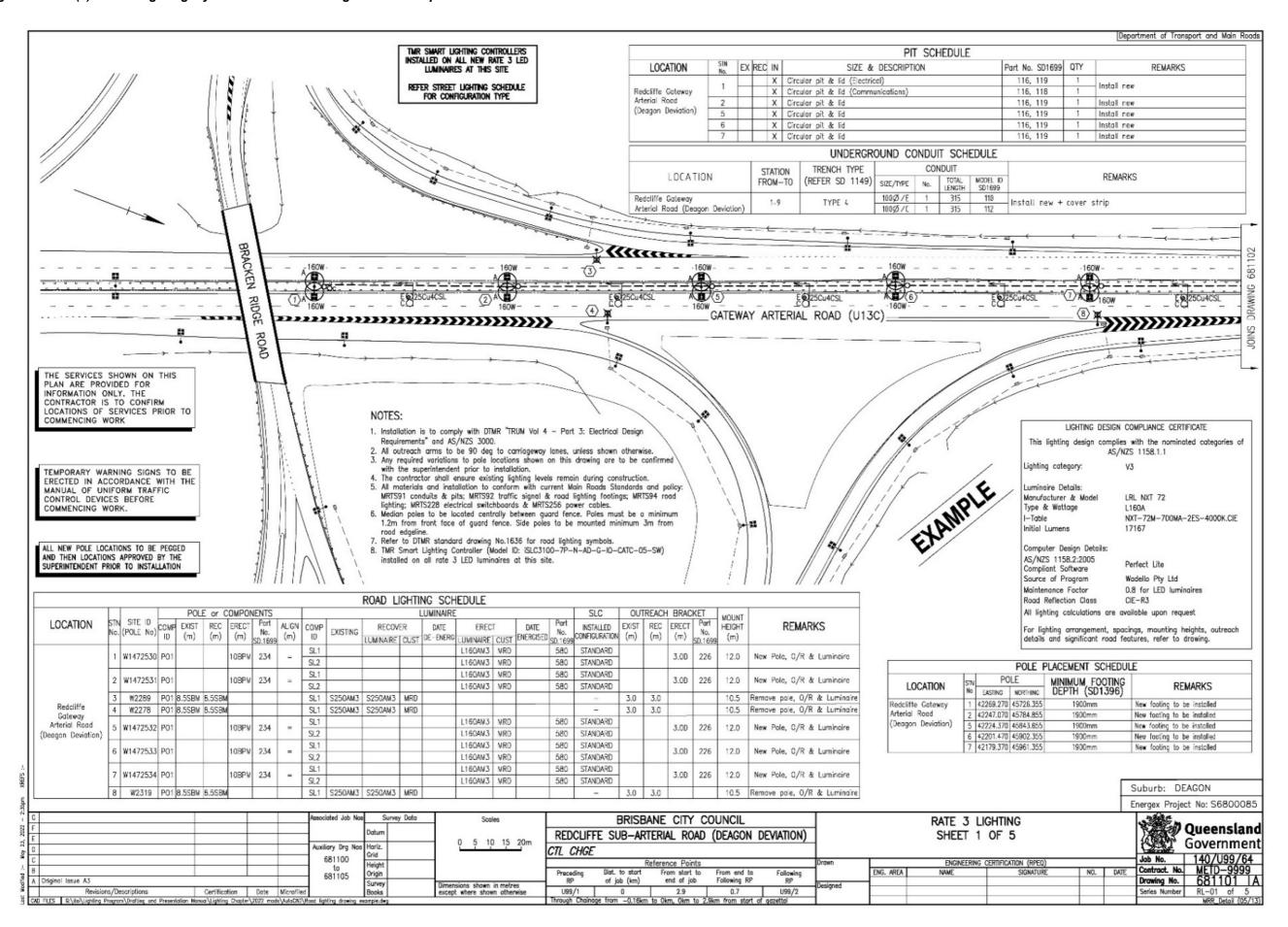


Figure 2.13.2.4(d) – Road lighting layout – sheet 2 of 5 – registered example 2

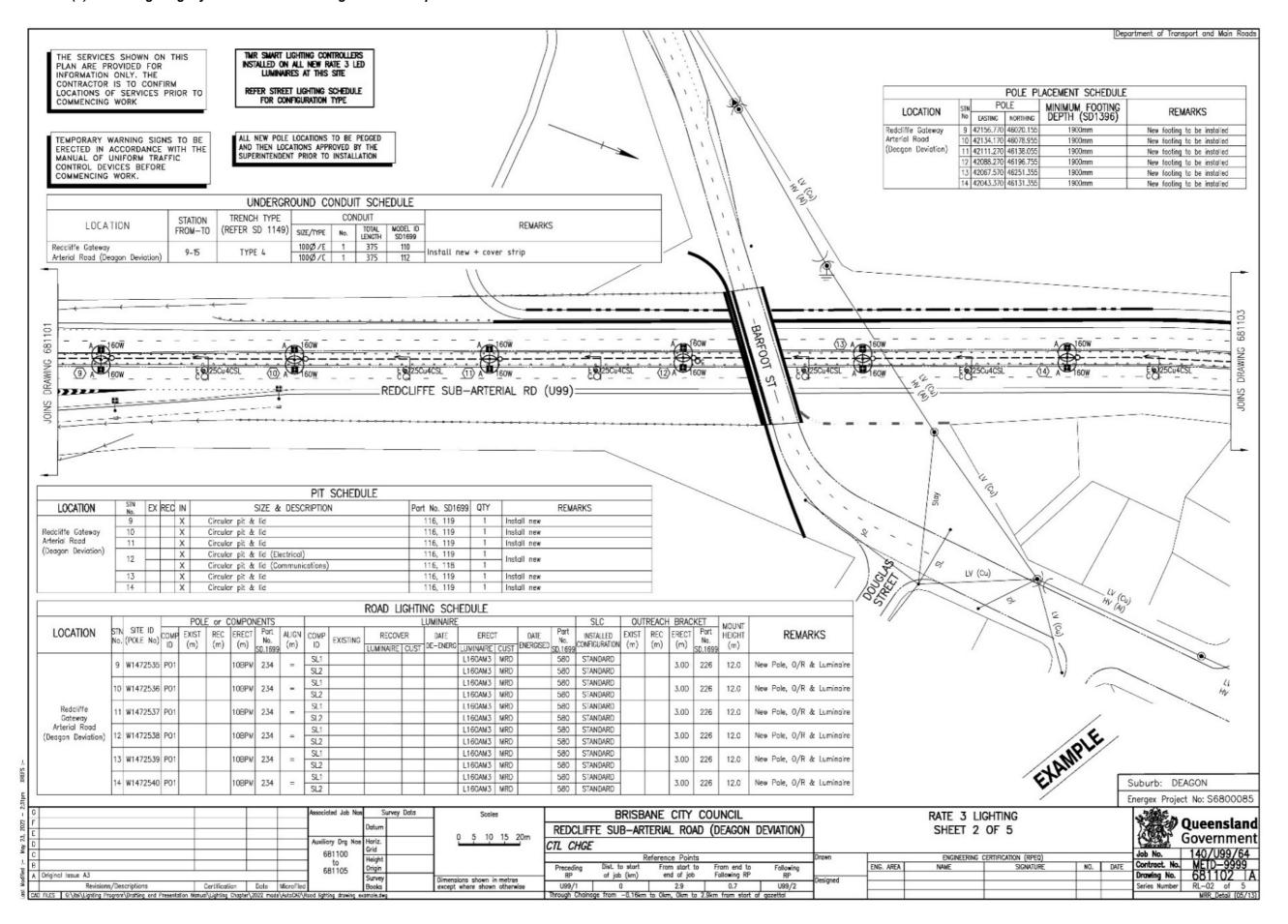


Figure 2.13.2.4(e) – Road lighting layout – sheet 3 of 5 – registered example 3

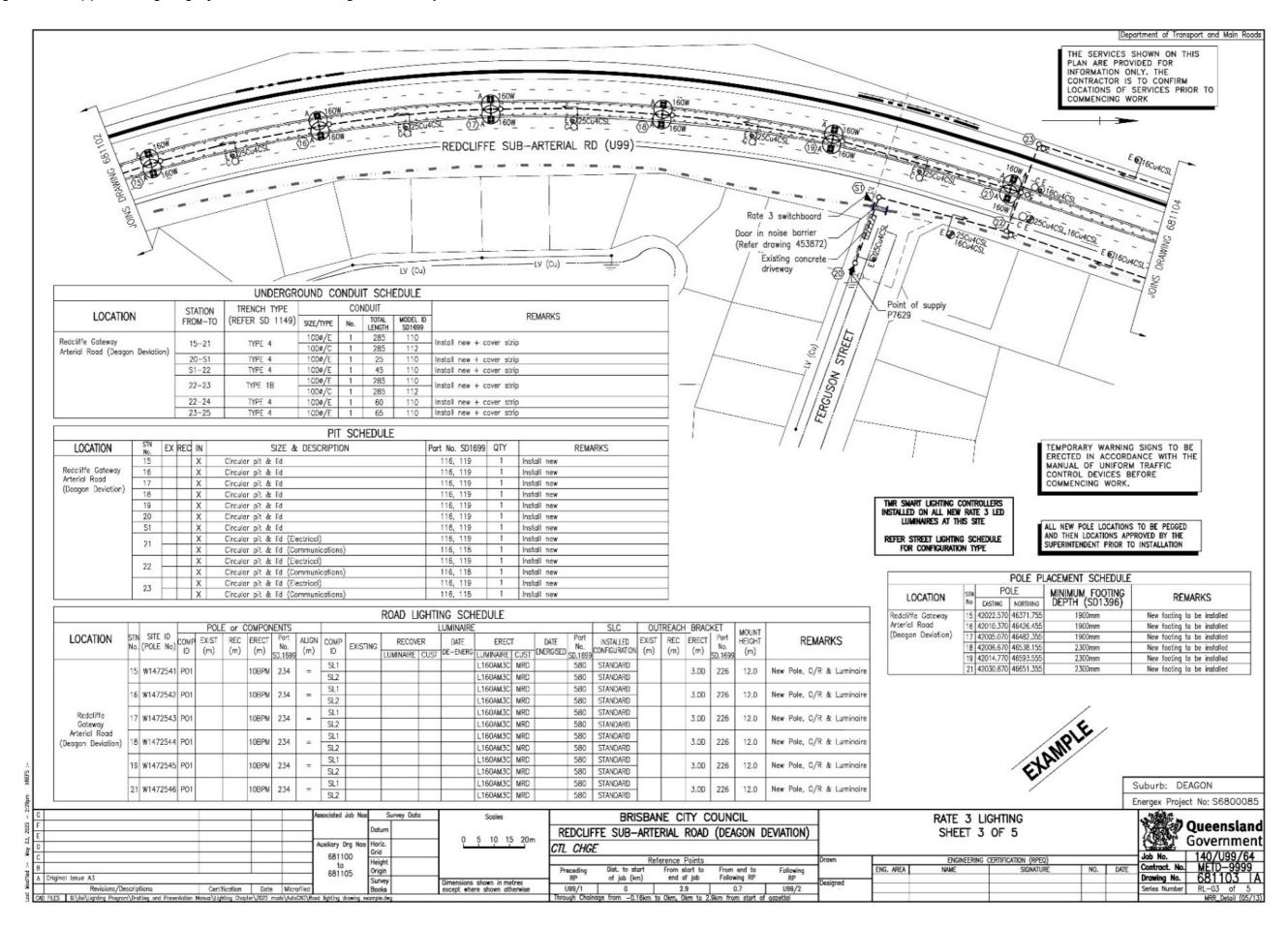


Figure 2.13.2.4(f) – Road lighting layout – sheet 4 of 5 – registered example 4

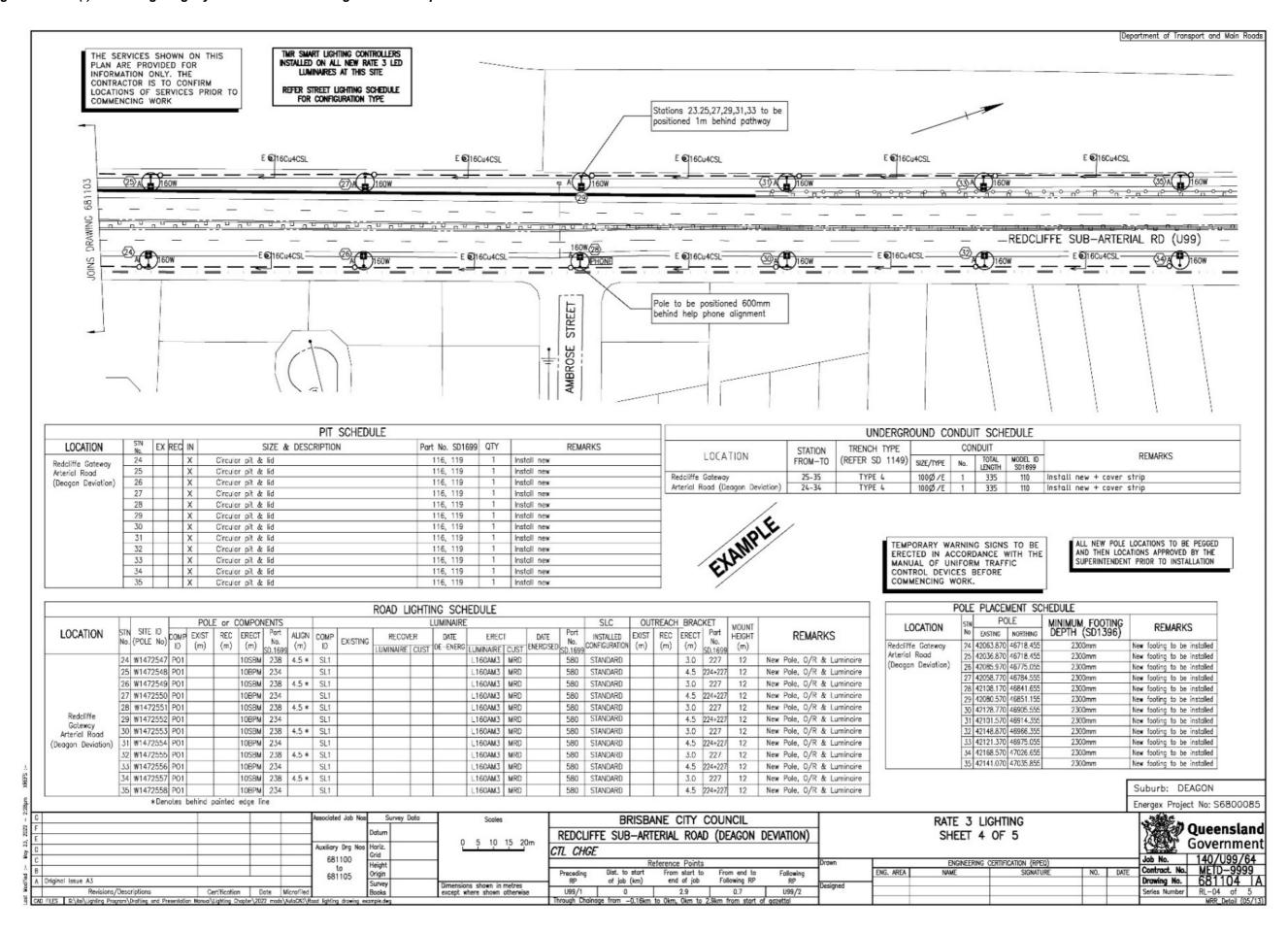


Figure 2.13.2.4(g) – Road lighting layout – sheet 5 of 5 – registered example 5

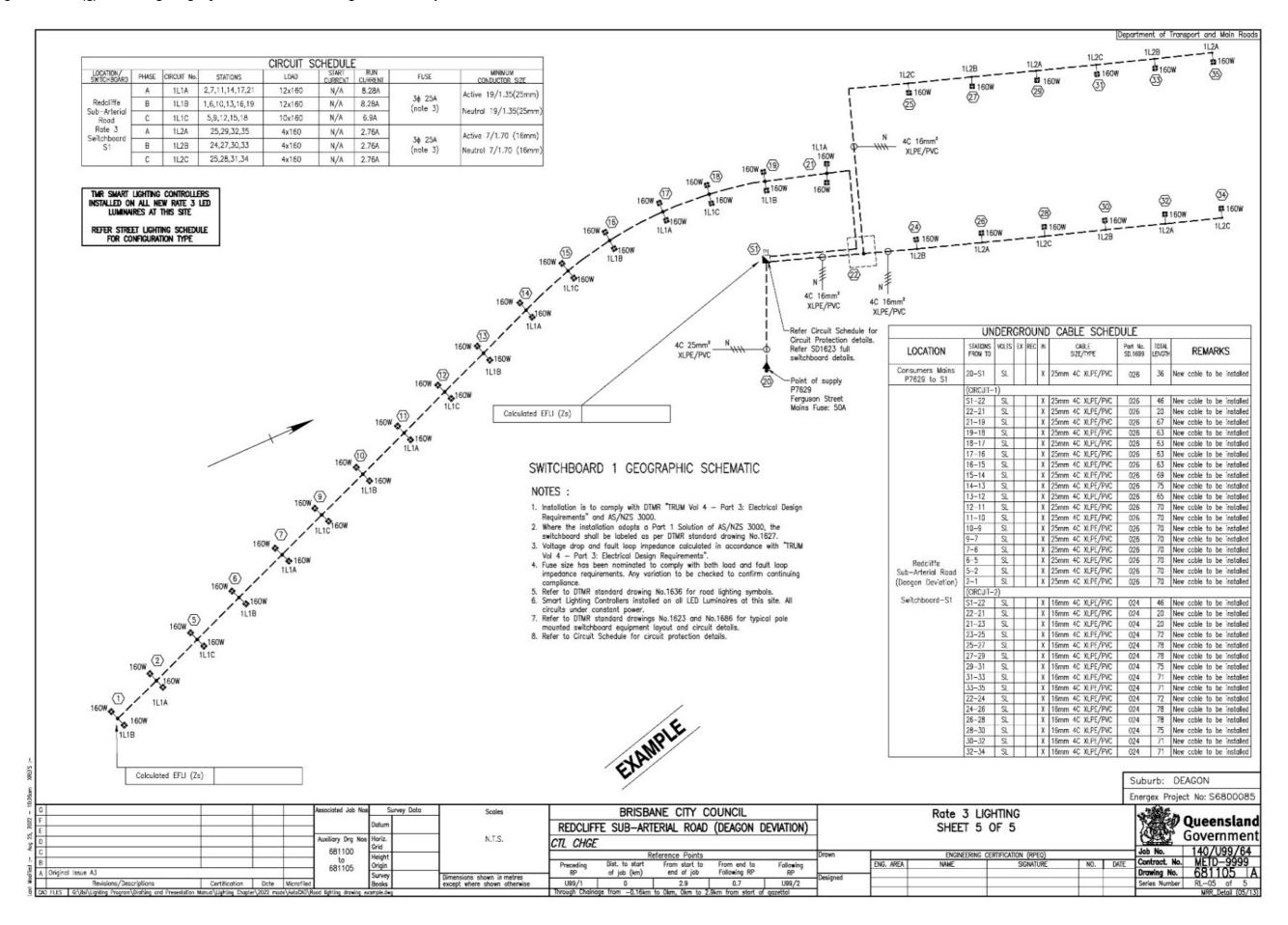
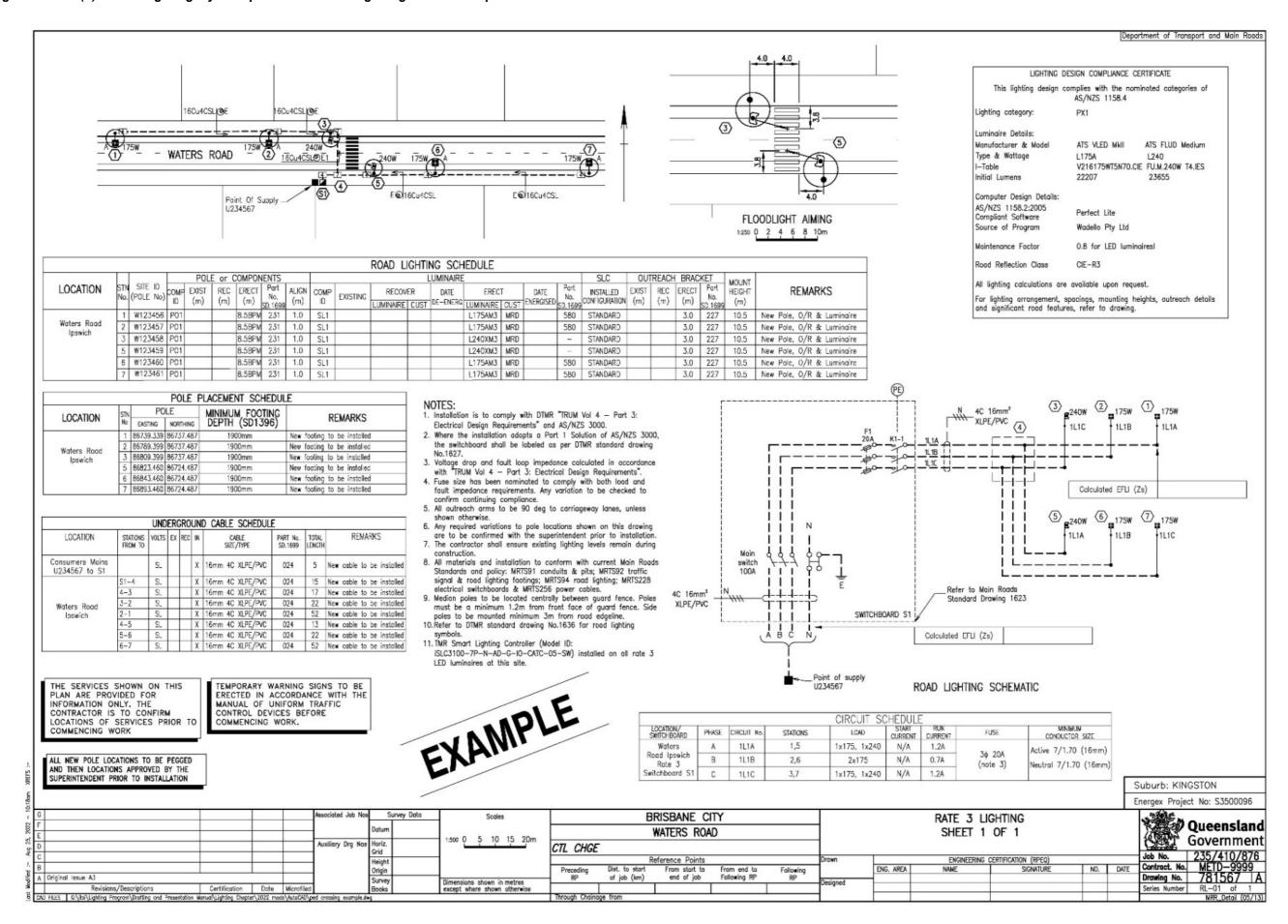


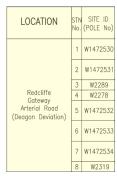
Figure 2.13.2.4(h) – Road lighting layout – pedestrian crossing – registered example



2.13.2.5 Road lighting schedules

The road lighting schedule is used to detail the type of pole, outreach and luminaire that forms part of the design. It shows both removed and installed road lighting infrastructure. Each road light is linked back to a station number that appears on the layout drawing. In some cases, an asset owner may have a specific station numbering system that is linked to the site identification numbering. When modifying existing sites, the designer must consult with the Transport and Main Roads asset owner to ensure that the existing station numbering system continues on for the new assets that are proposed to be added to the site. This should be understood prior to the first design submission for client review. A site number must be allocated to each road lighting pole, and this is also shown on this schedule. Where available the site identification number will need to follow Energy Queensland numbering convention for billing purposes. If unavailable, then the designer must consult with the Transport and Main Roads asset owner early in the design phase to ensure correct numbering of the asset. As part of the as constructed process the date the luminaire is either energised or de-energised shall be detailed on this schedule. An example of a completed road lighting schedule is shown below which details the design shown in Figure 2.13.2.4(d).

	ROAD LIGHTING SCHEDULE																							
				POL	E or (COMPO	NENTS					ı	UMINAIRE					SLC	OUT	REACH	BRAC	KET	MOUNT	
LOCATION	STN No.	(POLE No)	COMF ID	EXIST (m)	REC (m)	ERECT (m)	Part No. SD.1699	ALIGN (m)	COMP ID		RECOV		DATE DE-ENERG	EREC	CUST	DATE ENERGISED	Part No. SD.1699	INSTALLED CONFIGURATION	EXIST (m)	REC (m)	ERECT (m)	Part No. SD.1699	HEIGHT (m)	REMARKS
		W1472530	DO 1			10004	234		SL1					L160AM3	MRD		580	STANDARD			3.0D	226	12.0	New Pole, O/R & Lumingire
	'	W1472530	PUI			TOBPM	234	-	SL2					L160AM3	MRD		580	STANDARD			3.00	220	12.0	New Pole, O/R & Lumindre
	2	W1472531	DO 1			10004	234	=	SL1					L160AM3	MRD		580	STANDARD			3.0D	226	12.0	New Pole, O/R & Luminaire
	-	W14/2551	PUI			TUBPM	M 2J4		SL2					L160AM3	MRD	RD	580	STANDARD			3.00	220	12.0	New Pole, O/R & Lumindre
	3	W2289	P01	8.5SBM	8.5SBM				SL1	S250AM3	S250AM3	MRD						-	3.0	3.0			10.5	Remove pole, O/R & Luminaire
Redcliffe	4	W2278	P01	8.5SBM	8.5SBM				SL1	S250AM3	S250AM3	MRD						-	3.0	3.0			10.5	Remove pole, O/R & Luminaire
Gateway Arterial Road	6	W1472532	DO1			10004	234	_	SL1					L160AM3	MRD		580	STANDARD			3.0D	226	12.0	New Pole, O/R & Lumingire
(Deagon Deviation)	3	W1472332	FUI			IUDEM	254	_	SL2					L160AM3	MRD		580	STANDARD			3.00	220	12.0	New Fole, O/N & Lumindie
	6	W1472533	DO1			10004	234	=	SL1					L160AM3	MRD		580	STANDARD			3.0D	226	12.0	New Pole, O/R & Luminaire
	0	W1472333	FUI			TUBEM	234	_	SL2					L160AM3	MRD		580	STANDARD			3.00	220	12.0	New Fole, O/IV & Editillarie
	7	W1472534	DO1			10004	234		SL1					L160AM3	MRD		580	STANDARD			3.0D	226	12.0	New Pole, O/R & Lumingire
		W1472334	FUI			TOBEN	OBPM 234 =		SL2					L160AM3	MRD		580	STANDARD			3.00	226	12.0	12.0 New Pole, O/R & Luminaire
	8	W2319	P01	8.5SBM	8.5SBM				SL1	S250AM3	S250AM3	MRD						-	3.0	3.0			10.5	Remove pole, O/R & Luminaire



- LOCATION General location of the road lighting design.
- STN No. Each pole is given a station number.
- SITE ID This is the number that has been allocated to the pole for site identification, including power poles used for lighting.

	POLI	E or C	OMPON	IENTS	
COMP ID	EXIST (m)	REC (m)	ERECT (m)	Part No. SD.1699	ALIGN (m)
P01			10BPM	234	=
P01			10BPM	234	=
P01	8.5SBM	8.5SBM			
P01	8.5SBM	8.5SBM			
P01			10BPM	234	=
P01			10BPM	234	=
P01			10BPM	234	Ш
P01	8.5SBM	8.5SBM			

POLE or COMPONENTS:

- COMP ID This will always be PO1.
- EXISTING / RECOVER / ERECT This is the pole vertical section height reference for example 8.5BPM (Base Plate Mounted – Fixed Base), 8.5SBM (Slip Base Mounted).
- PART No. or IIN Will either be a: Transport and Main Roads part number, refer Standard Drawing 1699 for Rate 3 lighting or an electricity supply corporation number, if available, for Rate 2 lighting.
- ALIGN (m) This will detail the offset of the pole from the painted traffic lane edge line or face of kerb. When only one type of offset is used it shall be noted under the table. Where one type of offset cannot be used, painted edge line and face of kerb can be abbreviated, that is EL and KF and shown in the drawing legend or directly under the streetlight schedule (if sufficient room).

	LUMINAIRE										
COMP	EXISTING	RECOV	ER	DATE	EREC	T	DATE	Part No.			
ID		LUMINAIRE	CUST	DE-ENERG	LUMINAIRE CUST		ENERGISED	SD.1699			
SL1					L160AM3	MRD		580			
SL2					L160AM3	MRD		580			
SL1					L160AM3	MRD		580			
SL2					L160AM3	MRD		580			
SL1	S250AM3	S250AM3	MRD								
SL1	S250AM3	S250AM3	MRD								
SL1					L160AM3	MRD		580			
SL2					L160AM3	MRD		580			
SL1					L160AM3	MRD		580			
SL2					L160AM3	MRD		580			
SL1					L160AM3	MRD		580			
SL2					L160AM3	MRD		580			
SL1	S250AM3	S250AM3	MRD								

LUMINAIRE:

- COMP ID This is the component identification for each individual luminaire located on a pole for example SL1 for the first luminaire on a dual outreach and SL2 for the second luminaire.
- EXISTING Description of any existing luminaires that shall remain, for example S250AM3.
- LUMINAIRE CODING The table below describes the meaning of each letter used in the luminaire code.

Table 2.13.2.5 – Luminaire code meanings

	RECOVER and ERECT (Break-up of code)							
Lamp type	Wattage	Luminaire type	Tariff customer	Tariff rate				
S (high pressure sodium)	(high pressure sodium) None if dished prismatic							
H (metal halide)	As	A (aeroscreen)	M (Transport and Main Roads)	3				
M (mercury vapour)	required	HM (high mast)	or L (local government)	or 2				
L (Light Emitting Diode)		X (pedestrian xing floodlight)	2 (loodi govoriillorit)	_				
E.g., L160AM3 – A 160W LED luminaire with Transport and Main Roads paying the tariff under a Rate 3 arrangement.								

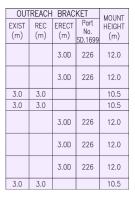
 CUST – A further breakdown of the tariff customer, for example MRD (Transport and Main Roads) GCCC (Gold Coast City Council). A list of customer codes is available from Energex for lighting installed in their area.

- DATE DE-ENERGISED and DATE ENERGISED Date the luminaire is either switched off or
 on. This information shall be marked on the schedule when the as constructed details are
 received. This information is important to maintain accurate network data and accounts.
- Part No. or IIN as for the pole.



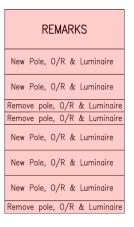
SMART LIGHTING CONTROLLER (SLC)

- INSTALLED CONFIGURATION this is the type configuration the SLC has been installed with. Examples and description below.
 - STANDARD SLC has been installed with standard PE cell mode of switching.
 - ASTRO CLOCK SLC has been installed with time-of-day mode of switching.
 - BLANK no SLC installed.



OUTREACH BRACKET:

- EXISTING / RECOVER / ERECT Outreach description, for example 3.0 (3 m single), 4.5D (4.5 m double).
- Part No. or IIN as for the pole.
- MOUNT HEIGHT Luminaire mounting height.



• **REMARKS** – Generic or special requirement may be stated here.

2.13.2.6 Pole placement schedule

This schedule details the physical location of the road lighting poles and is only required where poles are being relocated or new poles are being installed. Pole placements may be determined by offset and co-ordinates (easting, northing). Where survey data is not provided, the chainage and offset need only be used. The easting and northing schedule shall be as follows.

			POLE PI	ACEMENT SCHEDULE	
LOCATION	STN	PC	LE	MINIMUM FOOTING	REMARKS
LOCATION	No	EASTING	NORTHING	MINIMUM FOOTING DEPTH (SD1396)	KEMAKKS
Redcliffe Gateway	15	42022.570	46371.755	1900mm	New footing to be installed
Arterial Road	16	42010.370	46426.455	1900mm	New footing to be installed
(Deagon Deviation)	17	42005.070	46482.355	1900mm	New footing to be installed
	18	42006.670	46538.155	2300mm	New footing to be installed
	19	42014.770	46593.555	2300mm	New footing to be installed
	21	42030.870	46651.355	2300mm	New footing to be installed

- LOCATION and STN No. in accordance with the road lighting schedule.
- POLE Once the system for locating the poles has been established the unused columns can be deleted from the table.
- MINIMUM FOOTING DEPTH This is the minimum footing depth required for the new
 installed pole. Refer to relevant Transport and Main Roads Standard Drawings for footing
 depth parameters. For soil type details, designers should refer to the project geotechnical
 report. Designers can refer to project Cross section / Typical cross section drawings (refer
 Section 2.4 for examples) to obtain slope details where poles are installed on steep batter
 slopes.

2.13.2.7 Pit schedule

The pit schedule provides details of new pits to be installed or removed in a new or modified road lighting installation. Pits can be shown indicatively on plan. Prior to install, the final pit location must follow all relevant Transport and Main Roads Standard Drawings and specifications including all nominated hold points. Where sections of an existing installation remain unmodified, these pits need not be included in the pit schedule. Figure 2.13.2.4(d) and the Figure below is an example of a complete pit schedule.

	PIT SCHEDULE										
LOCATION	STN No.	EX REC	IN	SIZE & DESCRIPTION	Part No. SD169	9 QTY	REMARKS				
	15		Х	Circular pit & lid	116, 119	1	Install new				
Redcliffe Gateway	16		X	Circular pit & lid	116, 119	1	Install new				
Arterial Road (Deagon Deviation)	17		X	Circular pit & lid	116, 119	1	Install new				
(Deagon Deviation)	18		Х	Circular pit & lid	116, 119	1	Install new				
	19		X	Circular pit & lid	116, 119	1	Install new				
	20		Х	Circular pit & lid	116, 119	1	Install new				
	S1		X	Circular pit & lid	116, 119	1	Install new				
	21		X	Circular pit & lid (Electrical)	116, 119	1	Install new				
	21		X	Circular pit & lid (Communications)	116, 118	1	Install new				
	22		X	Circular pit & lid (Electrical)	116, 119	1	Install new				
	22		X	Circular pit & lid (Communications)	116, 118	1	Install new				
	23		X	Circular pit & lid (Electrical)	116, 119	1	Install new				
	23		Х	Circular pit & lid (Communications)	116, 118	1	Install new				

- LOCATION and STN No. each pit is given a station number.
- **EX** indicates if Pit is existing.
- REC indicates if station is to be removed.

- **IN** indicates if station is to be installed.
- Type & Description As per standard Transport and Main Roads pit type and description of
 use (Electrical or Comms). Electrical joints need not be nominated, as these are detailed on
 the electrical schematic.
- Part No. refer Standard Drawing No. 1699 for Transport and Main Roads part number.

2.13.2.8 Underground conduit schedule

The underground conduit schedule is used to provide additional details for conduit installation. The conduit design must follow all Transport and Main Roads Standard Drawings and specifications, including maximum lengths between pits. Each conduit segment should be shown indicatively on the plan between each referenced pit. An example of a complete underground conduit schedule is as per below.

		UNDERGR	OUND CO	DDU	IT SCH	EDULE	
LOCATION	STATION	TRENCH TYPE	CONDUIT				DENADIC
LOCATION	FROM-TO	(REFER SD 1149)	SIZE/TYPE	No.	TOTAL LENGTH	MODEL ID SD1699	REMARKS
Redcliffe Gateway	15-21	TVDE 4	100ø/E	1	285	110	Install new + cover strip
Arterial Road (Deagon Deviation)	15-21	TYPE 4	100ø/C	1	285	112	listali new + cover strip
/ records read (Bedger Beviolen)	20-S1	TYPE 4	100ø/E	1	25	110	Install new + cover strip
	S1-22	TYPE 4	100ø/E	1	45	110	Install new + cover strip
	22-23	TYPE 1B	100ø/E	1	285	110	Install new + cover strip
	22-23	I IIFL IB	100ø/C	1	285	112	listali new + cover strip
	22-24	TYPE 4	100ø/E	1	60	110	Install new + cover strip
	23-25	TYPE 4	100ø/E	1	65	110	Install new + cover strip

- **Station From To** this indicates the segment of conduit referenced between each adjoining pit station.
- Trench Type this is the required trench type as per Transport and Main Roads standard Drawing Standard Drawing No. 1149.

• Conduit:

- Size / Type indicates the diameter (in millimetres) of the conduit and type (Electrical or Communications) to be installed.
- No. Number of conduits to be installed.
- Length length of conduit segment between the two referenced pits.
- Model ID the model ID as per Transport and Main Roads Standard Drawing 1699 to ensure correct conduit type is installed.

2.13.2.9 Road lighting schematic and circuit schedule

The road lighting schematic shall detail simplified electrical layouts of the installation – refer Figure 2.13.2.4(g), neutral connections and associated hardware can be omitted for clarity, as comprehensive information is detailed in the referred Standard Drawing 1623. Luminaires in the field are to be shown geographically (reflecting localities in the field). It shall include the following:

- point of supply, which the switchboard is connected to, including pole or pillar number
- size and type of cable for consumer mains
- switchboard main switch rating, circuit protection fuse size and contactor
- size and type of cable for individual circuits

- the circuit number allocation for each light, for example 1L1A (switchboard number 1, lighting circuit number 1 and phase allocation), and
- the calculated fault loop impedance in accordance with the *Traffic and Road Use Management Manual* (TRUM), for the following locations:
 - at each switchboard, and
 - for the furthest light in each circuit (shown at end of circuit run).
- for LED luminaires, the wattage for the luminaire shall also be shown beside the luminaire symbol.

Where existing installations are being modified. All circuits schematics and circuits schedules connected shall be updated to show the new configuration of the electrical layout for the complete switchboard. This is to maintain accurate documentation for electrical safety, maintenance and record keeping.

The circuit schedule details the number of luminaires, load, circuit protection and cable size for each circuit.

				CIRCUIT SC	CHEDULE	-		
LOCATION/ SWITCHBOARD	PHASE	CIRCUIT No.	STATIONS	LOAD	START CURRENT	RUN CURRENT	FUSE	MINIMUM CONDUCTOR SIZE
	Α	1L1A	2,7,11,14,17,21	12x160	N/A	8.28A	71 054	Active 19/1.35(25mm)
Redcliffe Sub-Arterial	В	1L1B	1,6,10,13,16,19	12x160	N/A	8.28A	3φ 25A (note 3)	Neutral 19/1.35(25mm)
Road	С	1L1C	5,9,12,15,18	10x160	N/A	6.9A	(**************************************	Neutral 19/1.55(25mm)
Rate 3 Switchboard	Α	1L2A	25,29,32,35	4x160	N/A	2.76A	71.054	Active 7/1.70 (16mm)
S1 Switchboard	В	1L2B	24,27,30,33	4x160	N/A	2.76A	3φ 25A (note 3)	Neutral 7/1.70 (16mm)
	С	1L2C	25,28,31,34	4x160	N/A	2.76A	(**************************************	Trouble 77 1170 (Tolling)

- **LOCATION / SWITCHBOARD ID** switchboard location, the tariff rating and ID number. ID number to be provided by Transport and Main Roads asset owner.
- PHASE A, B or C.
- **CIRCUIT No.** circuit identification for each luminaire, for example 1L1A (power supply no 1, circuit 1, Phase A).
- LOAD number of luminaires on each circuit.
- START CURRENT combined start current of each luminaire in the circuit.
- RUN CURRENT combined run current of each luminaire in the circuit.
- **FUSE** rating of fuse to be used to provide protection for the circuit. Fault loop impedance calculations based on this value.
- MINIMUM CONDUCTOR SIZE size of cable required to ensure calculated voltage drops, fault loop impedance and current carrying capacity is maintained.

Refer to Figure 2.13.2.4(h) for table shown.

The following notes are suggested for inclusion with the above circuit detail:

1. Installation is to comply with the department's TRUM Volume 4 – Part 3: *Electrical Design for Roadside Devices* and AS/NZS 3000.

- 2. All new luminaires to comply with Transport and Main Roads specification MRTS94 *Road Lighting*.
- 3. Fault loop impedance and voltage drop calculated in accordance with the department's TRUM Volume 4 Part 3: *Electrical Design for Roadside Devices*.
- 4. Fuse size nominated to comply with both load and fault loop impedance requirements. Any variation to be checked to confirm continuing compliance.
- 5. Refer to the Transport and Main Roads Standard Drawing 1636 for road lighting symbols.

Calculations for voltage drop and fault loop impedance must be submitted to Transport and Main Roads with the design as evidence that the design meets the requirements of AS/NZS 3000.

2.13.2.10 Underground cable schedule

This schedule details the actual route of the electrical cable from the switchboard for each circuit.

		UND	ERO	GRO	UN	CABLE SCHEDUL	E		
LOCATION	STATIONS FROM TO	VOLTS	EX	REC	IN	CABLE SIZE/TYPE	PART No. SD.1699	TOTAL LENGTH	REMARKS
Consumers Mains U234567 to S1		SL			Χ	16mm 4C XLPE/PVC	024	5	New cable to be installed
	S1-4	SL			Χ	16mm 4C XLPE/PVC	024	15	New cable to be installed
	4-3	SL		0.0	X	16mm 4C XLPE/PVC	024	17	New cable to be installed
w	3-2	SL		1	Χ	16mm 4C XLPE/PVC	024	22	New cable to be installed
Waters Road Ipswich	2-1	SL			Χ	16mm 4C XLPE/PVC	024	52	New cable to be installed
	4-5	SL			Χ	16mm 4C XLPE/PVC	024	13	New cable to be installed
	5-6	SL			χ	16mm 4C XLPE/PVC	024	22	New cable to be installed
	6-7	SL			Χ	16mm 4C XLPE/PVC	024	52	New cable to be installed

- LOCATION in accordance with the road lighting schedule.
- **STATIONS FROM TO** route that the cable run follows from the switchboard including any tee-offs.
- EX / REC / IN existing cable, recover cable or install cable.

Refer to Figure 2.13.2.4(h) for cable runs shown in the table.

2.13.3 Completion of Issued for Construction road lighting drawings

All road lighting drawings completed for Transport and Main Roads shall be given a drawing number generated through the departmental Geospatial Information Management System (GIMS). Generally, these numbers will be allocated by the region where the road lighting is to be installed.

Design review drawings such as isolux drawings do not require a drawing number.

The Issued for Construction drawing shall have an Issued for Construction box marked on the drawing.

All lighting drawings are to be certified by an appropriately qualified Registered Professional Engineer of Queensland (RPEQ). The RPEQ's name and number shall be shown. Unless advised otherwise by the Principal, the use of an electronic RPEQ signature is now deemed equivalent to a wet ink signature provided it meets the criteria stipulated in the *Drafting and Design Presentation Standard Manual* Volume 1: Chapter 1 – *Introduction*.

Once the scheme has been signed approved on the locality drawing the design media package (see below) shall be sent to the Principal.

Issued for Construction – Design Media Package:

- Provide:
 - Electronically signed PDF drawings in accordance with the *Drafting and Design* Presentation Standard Manual Volume 1: Chapter 1 Introduction, and
 - If advised by the Principal, A3 size, hard copy drawings on permanent paper with all signoff names in text, and RPEQ hand signature(s) in blue pen of permanent non-smudging type.
- Provide all electronic design AutoCAD files zipped in one file. The ZIP file shall include all
 relevant electronic design models associated with the Road lighting electronic design model,
 i.e., Survey, Civil and Services electronic design models.
- If requested by the Principal, provide scanned PDF files at correct scale showing hand signature(s). File size should be kept to a minimum, whilst ensuring good quality images of the hard copy originals.

This package should be addressed / delivered as per the Principal's advice. Typically, this will be to a nominated Project Manager or Design Manager who will distribute the electronic files internally to relevant staff in the District office, and the hard copies to the department's Plan Room for storage.

2.13.4 Amendment to roadway lighting drawings

Design revisions during construction, should be provided according to the DPPSM Volume 1 through the departmental Project Manager or Design Manager, showing drawn and checked names in text and electronic RPEQ certification (or in blue pen). Once the drawing has been signed then the revised drawing shall be sent to the nominated Transport and Main Roads contact as per the Principal's advice.

2.13.5 As Constructed roadway lighting drawings

As Constructed revisions shall be provided as soon as possible after 'switch-on' of the road lighting installation, showing the as constructed revision. For example, the text "AS CONSTRUCTED (Switch-on date)" should be included in the revision column.

Incorporate any changes from the red mark-up drawings provided by the contractor and remove any abandoned conduits, pits, clouds, and construction notes. The Earth Fault Loop Impedance measurements by the contractor shall also be included. As Constructed drawings are to be plotted from CADD files with the required signatures, i.e., no hand markups nor be produced from photocopies (refer to the DPPSM Volume 1).

The As Constructed revisions shall be either verified by an appropriate person or certified by an RPEQ, depending on whether any amendments affect the engineering intent or functionality of the installation (refer to the DDPSM Volume 1, Chapter 1).

As with the Issued for Construction drawings, an As Constructed design media package shall be provided and submitted to the nominated Transport and Main Roads contact as advised by the Principal.

2.14 Traffic signals

2.14.1 Introduction

Unlike road and structure design where drawings are primarily used for construction, traffic signal drawings become an 'active' drawing in that they are used initially for construction purposes but are then used for network optimisation, traffic operations, modification works and maintenance.

The design should normally include two (2) drawings: The primary "Operations and Electrical" drawing (formerly known as Cable Connections) which may be revised multiple times after initial switch-on; and the secondary "Design Layout" which is used only for initial construction.

For a stand-alone traffic signal design project an additional front sheet drawing titled "Locality Plan and Drawing List" is required.

Applicable manuals and guides which designers should consult include the department's DDPSM, Chapter 18 of the *Road Planning and Design Manual* (RPDM – 2nd edition), Transport and Main Roads Standard Drawings Roads, MUTCD (Queensland) Part 14, TRUM Manual, and *Austroads Guide to Traffic Management* Part 6; Part 9; Part 10.

The above documents, along with additional or supplementary considerations canvased below, may not be a complete appraisal of all elements. Civil road and structure design, traffic modelling, lighting, ITS, and the needs of pedestrians, cyclists and other users, must also be effectively integrated with the signals design.

The designer should liaise with other project partners to ensure all design elements which impact on the signals installation and operations, are included in the drawings where appropriate.

Consultation with the local departmental district office is recommended.

2.14.2 "Design Layout" drawing

This drawing contains the civil components for the complete signals installation. It should be provided for new installations or major modifications. In some instances, for example minor modifications, this drawing may not be required – consult local departmental district office.

The drawing would typically be derived from new civil design layout and/or field survey data. If no civil design, then field survey is preferred. Alternatively, photogrammetry, road corridor maintenance drawings, or high-quality aerial photograph image files may be used to draft the necessary road layout line work. For existing installations, the current signals drawing may be suitable for updating and reuse, in the absence of better layout data.

The drawing should include:

- Conduits, pits, and footing locations for signal posts, mast arms, joint-use columns, camera poles, and controller & plinth / concrete surround.
- Show all existing and proposed signals, lighting and ITS conduits and pits in the vicinity of the
 intersection. Identify and confirm suitability by site inspection, for either continued use in the
 design or to be abandoned. Note, that in the immediate intersection area, generally bounded
 by the main signal conduit routes, any road lighting cabling (typically for joint-use columns)
 shall be integrated within and accommodated by the signals conduit system.

Conduit systems should be integrated efficiently together – refer Figure 2.14.4(d) – Example 3, for unacceptable arrangement:

- Setting out (co-ordinates) for footings, pits and controller base, including survey source data in the drawing title block.
- Mast arm and lighting outreaches shown at the correct azimuth angle.
- All existing underground and overhead services where survey is available also proposed service relocations. Pits, chambers, valves and so on may need to be drawn to scale where footpath space restrictions impact on signal hardware location. Where signals infrastructure is in close proximity to, or restricts access to, another underground service, written acceptance or approval from the service authority should be obtained.
- All existing features of the road and verge surrounds where survey is available, including
 property boundaries and building lines, bridge decks, parapets, abutments and relieving slabs,
 and obstructions such as shop awnings. Any existing features to be removed should be
 placed on a separate layer to those remaining.
- All road layout and line marking details including kerbs and ramps.
- Minor civil design such as pedestrian kerb ramp and Tactile Ground Surface Indicator (TGSI) set-out design, and line markings. However, this detail should normally be included in civil road design drawings, where road design is part of the project.
- All existing and proposed concrete surfacing and paths liaise with civil design where needed
 to ensure surfacing accommodates pedestrian storage, and to reduce erosion around pits and
 footings, adjacent the kerb ramps.
- Lanterns and pedestrian buttons are not shown.

Use traffic signal title block (refer Section 2.14.3.1.1). Preferred scale for this drawing is 1:250 or 1:200, for A3 size originals. Alternatively, 1:500 (A3) with 'inset' details at 1:250 (A3).

Refer Figure 2.14.4(a) for example as a general guide.

2.14.3 Operations and electrical drawing

This drawing contains the electrical system and traffic operations components for the complete signals installation. It is derived in the same manner as the Design Layout; however, its presentation is tailored specifically for its operations and electrical purposes.

It includes:

• lanterns, posts and columns hardware, and controller placement

- other ITS equipment such as camera and field cabinet placement and details
- loop placement
- conduits, pits and cabling
- · phasing and special conditions
- special features if required, for example red light camera, train phase, fire station turn-out, or advance flashing warning lights, and
- road layout showing kerb line, edge of bitumen where no kerb, and line markings.

2.14.3.1 Presentation

Refer Figure 2.14.4(b) and Figure 2.14.4(c) for examples, as a general guide.

2.14.3.1.1 Standard drawing plan sheet, and drawing symbols

Use *Transport and Main Roads AutoCAD Customisation* and *Transport and Main Roads 12D Model Customisation* tools menu to select the traffic signal "Plan Sheet". Then select the "Plan Sheet Insert" – use the "8 Phase Insert" without clearance times.

Replace the standard revision block in the left bottom corner with the optional block provided which includes 'Drawn' and 'Checked'.

Modify the main title block to replace 'Drawn' and 'Designed' boxes with 'Designed' and 'Verified' headings respectively. The verifier confirms all details are checked, correct and fit for purpose, according to the DDPSM Volume 1, and ready for certification.

Many of the symbols or blocks, and parts of the title block and insert have selectable options, for example controller type, and lantern symbols.

Transport and Main Roads supplied drawing number – must be included.

Transport and Main Roads Job / Contract numbers should be included where applicable.

Transport and Main Roads supplied site number must be included. This will have an "M" prefix for Transport and Main Roads owned signals. Local authorities may use a different prefix for example "B" for Brisbane, or no prefix.

2.14.3.1.2 Visual appearance

The drawing is produced at A3 original issue size, and hence it is imperative that for clarity and readability some of the civil road layout line work considered unnecessary for signal purposes, should not be displayed for the final design submitted for approval.

When copied in black and white form, all lines should maintain full acuity – for example, full black lines of select thickness and line style. 'Gray-scaling' of the complete road design line work will not be accepted, due to multiple line work clutter and loss of detail in subsequent copying or scanning. Use of coloured lines is restricted according to the DDPSM Volume 1 and should be avoided for this drawing type.

2.14.3.1.3 Orientation and scale

Road layout scale is 1:500 (A3). Rotate the intersection to preferably show the main road horizontally across the sheet.

North point should be the standard Transport and Main Roads symbol prominently displayed, with direction pointing upwards or to the side, falling anywhere within the upper hemisphere of the drawing layout. This in some instances will not reflect the orientation of other scheme drawings in a large project. However, for minor signal modifications to existing drawings an existing alternate orientation may be retained to reduce unnecessary work.

For large intersections, the main road may be rotated to an alignment, for example from the bottom left corner to top right corner, in order to show advance loops and/or other features at correct scaled distance if possible. Alternatively, a second preference may include use of 'cut' lines if suitable.

2.14.3.1.4 Line work

Kerb Line – Should be shown as a single line representing the kerb face – this equates to the nominal edge of trafficable pavement – Refer 'Line of Kerb' on Standard Drawing 1033. This is also used for measuring length of pedestrian crossings for 'walk' times.

The line must be of suitable thickness (For example, 0.7 mm @A1 AutoCAD drawing size) for easy identification and differentiation from the thinner 'edge of bitumen' line where there is no kerb. Line style may be a continuous full line, or other style for example chain-dot, and in either case identified in the Legend as 'Kerb Face'.

Kerb back and kerb top are not displayed to improve legibility and reduce clutter.

Edge of bitumen / asphalt line – where no kerb, display as continuous line with light-weight pen thickness.

Line markings – including LL, ULL, EL, OL, CL, TL, HL & GWL. Segment lengths to be scaled correctly, with single lines of light-weight pen thickness.

Stop Lines – to be full width black as shown in Figure 2.14.4(b) – Example 1.

Other pavement markings – Minimise markings shown for clarity as follows:

- Arrows where marked Show 'right-only', 'through-and-right' and 'left-only' arrows where applicable at all signalised approach lanes on main road and side roads. Show 'left-through-right' combination arrows if applicable. Remove all other arrows, including at separated (slip lane) left turns.
- Only one arrow symbol need be shown in each lane, if marked.
- Chevrons Remove all those that are unnecessary or unambiguous. Retain only where needed for interpreting operations, for example for a painted / chevron median, island, or unused traffic lane.
- Property boundaries Display on all corners / sides in light-weight pen thickness.

2.14.3.1.5 UBD reference

Display below the site number in the title block.

2.14.3.1.6 Text

Design specific text is preferred to be upper case, refer AS100.101 & AS/NZS4383. Use either ISO 4 mm or MR Romans 3.5 mm minimum height equivalent to A1 AutoCAD size. However, upper / lower case will be accepted with minimum height complying with the DPPSM Volume 1.

Rotate text where necessary, for correct orientation for reading of drawings.

2.14.3.1.7 Pedestrian kerb ramps and TGSI

Pedestrian kerb ramps and TGSI are not shown for clarity.

2.14.3.1.8 Loops

Loops to be placed at correct scaled location distance measured as per Transport and Main Roads Standard Drawing 1425. Loop number text to be rotated as required. Loop tail lines need only be shown where pit connection is ambiguous.

2.14.3.1.9 Services "Warning" Block

Where underground excavation is required, include the Tools Menu block "Warning Services Are Not Shown ..." Alternatively provide a prominent equivalent note.

2.14.3.2 Design Content Depiction

2.14.3.2.1 The Designer

The Designer should carry out site inspections to confirm details of existing infrastructure, including cabling, conduits, pits, and so on. Also, to confirm suitable 230V supply pole or pillar; communications connection; and that the design is suitable for and does not conflict with other elements of the road environment.

In unusual, rare circumstances, non-standard design solutions utilizing Extended Design Domain methodology, may be necessary. For example, use of mast arms longer than 6.5 metres.

The designer should also liaise and negotiate changes to the civil design if necessary. For example, if signal posts and columns are not protected by kerb or other barrier type, the civil design is normally expected to be altered to include this.

2.14.3.2.2 Controller

Type to be RTA TSC/4 compatible and identified on the drawing. For example, Metropolitan District currently prefers Tyco Eclipse EC1-62.

Controller should be located in accordance with Chapter 18 of the RPDM (2nd Edition), generally adjacent the property boundary and preferably adjacent a substantial fence or wall (identified on the drawing). Where the location of the property boundary on site is unclear, and there is no project survey available, provide for this in the schedule of work items. Note this requirement on the drawing, to ensure survey cost is included for correct placement of controller in the road reserve.

The controller should be orientated so the door opens away from the intersection where possible. This allows field personnel to observe operations while working at the controller.

Place the symbol at desired orientation and scale (so it can be easily sighted on the drawing) and provide text "CONTROLLER" together with arrow pointing to it. Add "WITH TOP HAT" where required. If communications connection is via wireless, also add the text "WIRELESS CONNECTED".

2.14.3.2.3 Signal group numbering

Signal group numbering should be allocated as follows – For example for a full four-way intersection, in numerical order start with:

- Main road 'through' first the left-hand approach then right-hand
- Main road 'right-turns' left then right

- Side road(s) 'through' first bottom approach, then top approach
- Side road(s) 'right-turns' bottom then top
- Main road 'left-turns' left then right
- Side road(s) 'left-turns' bottom then top
- Pedestrian group(s) across side road(s) top then bottom
- Pedestrian group(s) across main road left then right.

This example ensures adjacent signal groups (typically mounted in a common target board) will mostly flash together when the intersection is in the 'flash' condition.

For the current Eclipse controller, signal group outputs are grouped together in fours. For example, groups 1 to 4 and 9 to 12 flash together and alternately to, groups 5 to 8 and 13 to 16.

2.14.3.2.4 Detectors, detector table

Traffic Loops shall be numbered clockwise from the controller (Chapter 18 of the RPDM 2nd Edition), followed by counting loops also clockwise from the controller. For type and placement, refer TRUM Volume 4, Part 5 and relevant departmental Standard Drawings.

Count loops in free left turn slip lanes should preferably be placed upstream typically near or adjacent the approach nose of the island.

Right turn presence (Pres) loops may require an additional dual use presence / count loop this is 'software diode" connected to the presence set.

Add "DET2 DIODE TO DET1" text to the relevant phase conditions, where 1 is the presence set, and 2 is the presence / count loop. The loop / input numbers are grouped with a hyphen for example 1-2, below the signal group in the phase box.

Detector Table loop descriptions typically include – 'STOP LINE; 'ADVANCE'; 'PRES'; 'PRES / COUNT'; 'COUNT'; 'QUEUE' – as per the Tools menu selections.

'Vehicle' Inputs are to be located in numerical order with no gaps from the top of the table, including and starting with general traffic loops followed by counting, then queue loops, followed by external contacts including push buttons other than basic pedestrian (for example, bicycle); train detect / train conflict; fire detect / fire cancel; radar or optical sensor (pedestrian vacate); and so on.

Standard 'Pedestrian' button detectors will be located in numerical order starting from input 24 and proceeding through 23, 22 and so on with no gaps. This will suit a majority of installations using Eclipse controller detector cards which have only 24 LEDs.

Pedestrian detector numbers need not be shown adjacent the button symbols in the layout, for standard single-detector pedestrian groups. Where a separate detector is allocated to each button, for example a staged crossing, then the number is shown adjacent each button.

If 'vehicle' and 'pedestrian' inputs total more than 24, then the pedestrian buttons will be located at the bottom of the table starting from input 32. The above are general rules for use in the majority of cases.

Each Loop Detector Module (LDM) card has capacity for a maximum of 16 actual loops. Note that detector table logic input numbering may not reflect LDM LED displays where a second card is used. Refer Section 2.14.3.3 for additional notes.

2.14.3.2.5 Phasing

Phase diagrams are to be orientated at the same rotation as the main layout. For complex intersection layouts, include a single line layout in light-weight pen, in each phase box to reduce ambiguity. Scale the layout(s) to maximum size. Figure 2.14.4(c) – Example 2.

U Turn Permitted – include 'UTP' text, with hollow arrow in 180 degrees configuration, where applicable.

Vehicle detectors to be grouped for common function, for example advance detectors '8, 9, 10' in one column under their associated signal group.

Pedestrian calls to be identified as 'PED1' etc.

Presence calls to be identified as 'PRES'.

Standard TRAFF sequence should be provided for 'diamond' or 'double-diamond' arrangements.

2.14.3.2.6 Stop lines

Stop lines should be 0 m - 3 m upstream of the primary and/or dual primary lantern posts. In some cases, up to 5 metres upstream of the nearest point of conflict. On the main road which is typically higher speed / volume, generally 3 m separation from the pedestrian 'cross walk' line is preferred.

Stop lines shown on the proposed civil design may need to be altered to suit the signal design.

2.14.3.2.7 Mast arms

Mast arms are generally placed at the approach side (primary). An alternative location on the depart side (tertiary) may be accepted. 6.5 m outreaches should be used only where necessary, for example where approach curve / sight line requires, or on exceptionally wide approaches. Otherwise, the OH lantern need only be positioned over the kerb side lane to minimise lane closures for maintenance, with 5 m suitable for most locations.

2.5 m may be used if appropriate. In rare cases greater than 6.5 m may also be accepted.

2.14.3.2.8 Joint-use lighting columns

Confirm locations with the Lighting Designer and show outreach alignments at correct azimuth angle (usually 90 degrees to the carriageway) and identified on the drawing with the letters "JU" (Joint-Use Pole) or "CMA" (Combination Mast Arm), with mounting height. For example, "JU 10.5 MH".

Alternate tabulated details would be accepted.

2.14.3.2.9 Lanterns

For un-common arrangements, for example 45 deg arrows, or 'B', 'T', or bike symbol, provide a separate lantern face detail, such as that shown in Figure 2.14.4(c) – Example 2.

2.14.3.2.10U-Turn Permitted (UTP)

Include UTP sign face (from civil Tools Menu) with leader arrow pointing towards the correct side of the signal post, where applicable. The designer is to consult all relevant project partners to confirm the addition, removal and/or retention of U-turns.

2.14.3.2.11 Conduits

Use the Tools Menu symbols to show conduit details, for example the 2 x 100 selection will display as two lines. Ensure line type and scale match that shown in the Legend.

Alternatively, for multiple conduits consider using a single line style with identifier such as that shown in Figure 2.14.4(c) – Example 2. Include the line style chosen, in the Legend.

Use of the conduit detail boxes shown in departmental Standard Drawing 1436 is a suitable method for the Design Layout but is not always suitable for the Operations and Electrical drawing as it can reduce readability.

Existing Conduits show all existing conduits and pits on the drawing. Identify and confirm suitability by site inspection, to be either retained or to be removed or abandoned. Those identified to be removed or abandoned are to be removed from this drawing for the as constructed revision.

Road crossings should desirably be perpendicular to the road carriageway, and provide a complete single alignment straight crossing, rather than staggered or angular. This reduces impact on and complexity for future pavement widening or rehabilitation works. It minimises the length of the crossing, provides a more predictable cabling direction, and is less restrictive for future additional UG crossings by other service authorities. Layout constraints may require exceptions to the above.

Where possible, bored crossings should be specified in the design and work items, for the departmental main road where no pavement overlay is included in the project. The designer should be aware of the extent of pavement or asphalt works to be included.

Where practicable provide 3 x 100 orange conduits for the major complete crossing of the main road and continue this to the controller pit to accommodate converging cabling runs to the controller.

Elsewhere provide 2 x 100 conduits including across all free left turns.

Conduit lines between footings and pits are not shown, unless significantly longer than standard.

For communications include either (or both if required) the following options:

- Public network An appropriate white conduit to the controller J pit; continue this separate conduit across intersection to the nearest Telstra pit if needed.
- Transport and Main Roads fibre and/or ITS network An additional 1 x 100 orange conduit to the controller pit. For example, for a central median fibre network provide a total of 4 orange electrical conduits from the median pit across the main road to the controller pit. Alternatively, a separate white conduit and pit system may be considered particularly for copper communications cable systems. However, this can result in congested traffic islands, medians and footways.

Multiple (Separate) Conduit Systems – the designer must liaise with other design disciplines such as lighting and ITS conduit systems to ensure all elements are integrated efficiently at the intersection, in order to reduce unnecessary duplication of road crossings and pits.

For example, in a central median route, an Energex Rate 2 lighting conduit may be laid in a joint trench with a departmental ITS or fibre conduit, providing spatial separation requirements are met – both conduits may enter a common traffic signals pit at the intersection.

Once at the intersection, any Rate 2 or Rate 3 lighting cabling should utilise a spare traffic signal conduit allocated for such use, to traverse around the intersection, typically to access joint-use or combination mast arm columns. Elsewhere Rate 2 cabling must be via a separate conduit / pit network.

Refer Figure 2.14.4(d) – Example 3, for an unacceptable, non-integrated arrangement.

2.14.3.2.12Pits

Circular pits are to be used for all 100 diameter (dia) routes. In constrained locations for example narrow congested footways, rectangular pits may be more appropriate. Supply pole connection may utilise either a 100 dia or 50 dia conduit, with separate pit (circular or No. 4 respectively.) at the pole if length requires.

Provide separate No. 3 pits for all loop tail connections even if close to a circular or No. 7 pit – this provides separate mechanical protection for the tails and joints from the heavier multicore cabling.

Use No. 4 or No. 7 pit symbol for all No. 3 pits, as the No. 3 symbol is too small. Identify as appropriate, in layout and/or legend.

2.14.3.2.13Controller plinth

Provide for a concrete base (as per departmental Standard Drawing 1423) surrounding the controller plinth and adjacent pits at all locations where surrounding surface is not paved. An exception would be at built up urban locations where adjacent hard surfacing is provided for example by footway or verge paving.

For large intersections requiring multiple cable runs and conduits, specify an alternative ('Everhard' or equivalent) plinth which can accommodate 4 x 100 dia conduit entries.

2.14.3.2.14Pedestrian crossing

Locations and alignments should be optimised according to the guides, to minimise crossing length and to reduce angle of approach to kerbs for ramp design. Care is needed with crossing locations and stop line setbacks for left turn movements including choice of corner radii for speed and sight distance of turning vehicles accelerating through adjacent pedestrian crossings. Crossing width should also be suitable for expected pedestrian volume and storage needs.

The designer needs to ensure the above aspects are suitably addressed in the civil design, as they can impact on signal operations.

Pedestrian button post or column locations should be easily accessible for all users. Minimum offset from kerb face will often need to be increased for optimum placement.

2.14.3.2.15Bicycle provision

Where required, consider provision of count loops for main road 'through' movements in A Phase, and a push button for movements calling side streets. For buttons, a separate short post will often be required, located closer to the kerb. This will typically be fed from the adjacent primary signal post location through its adjacent pit, with 6 core cable shown in the cable schedule. Station No. will be for example 6a, with 6 being the primary post location – detector number is shown adjacent the button symbol.

2.14.3.2.16Cable connections

36 core cable is to be used for the main runs, for the majority of cases. Follow the sample connections and core identifiers provided in the drawing 'Insert' from Customisation. Vehicle signal groups will be in numerical order from the top, with no gaps. Pedestrian groups will continue immediately below the vehicles, in similar fashion.

Pedestrian detectors will start from the bottom refer Figure 2.14.4(b) - Example 1.

Spare cores are shown for all cables except the 19 core in Mast Arms.

2.14.3.2.17 Supply connections

For **electrical connection** identify a suitable Energex or Ergon asset with "SUPPLY POLE P------,", or "SUPPLY PILLAR U------,", in text with leader arrow.

Mains supply connection is preferred to be at nearest suitable pole or pillar if neither is available at or near the intersection, then the designer must either: negotiate with the project manager or developer, for the project to provide an Energex mains extension; or provide an alternative such as an extended consumer mains connection in the signals design, for approval.

For **communications connection**, identify the asset, which is suitable for local connection, for example "TELSTRA PIT" (use appropriate pit symbol) with leader arrow. Or identify alternate connection type and route, for example if part of a departmental communications system.

If no suitable connection is available nearby, the designer must either: negotiate with the project manager or developer to ensure a public network connection is made available; or include a suitable connection to the departmental network in the design. In some instances, both conduit connections may be required. If conduit connection is too costly or impracticable, a wireless connection may be accepted.

2.14.3.2.18Red light camera installation

Where applicable include the following details as a general guide:

- show all RLC loops numbered as required, and camera and flash post locations
- provide separate RLC loop pit (No. 4 if necessary) and 80 dia HD orange conduit connection to nearest suitable traffic signal pit
- provide 2 x 80 dia orange electrical conduits and No. 4 pits, linking the two RLC posts to the nearest suitable traffic signal pit
- provide 'Red Signal' connection table and details in the drawing layout.

NOTE - RLC standards are currently under review - consult local District Office before proceeding.

2.14.3.2.19Services

No services are to be shown on this drawing. However, in rare cases for example power poles close to signal hardware; fibre optic cable close to mast arm or JU footings; and overhead conductors very close to a mast arm, these should be identified.

All services where surveyed and provided as part of the civil design, must be shown in detail on the "Design Layout" drawing, where this drawing is required.

The designer must assess all hardware and footing locations, and trench alignments for UG and OH service conflicts, and provide appropriate clearances. Where signals infrastructure is in close proximity to, or restricts access to another service, the designer should obtain written acceptance or approval from the service authority.

2.14.3.3 Additional information on Detector Input Allocation

Two detector cards are required if there are more than 16 actual loops, or 'vehicle' and pedestrian inputs total more than 24. TRAFF software uses a maximum of 32 'force switch' inputs – therefore only the first 8 switches on LDM2 are used. The detector table on the drawing does not reflect this. Possible examples:

- 1. If total "vehicle" inputs number from 1 20 (for example 18 loops and 2 external contacts), and there are 4 pedestrians, then the pedestrian buttons may be located from 24 (LDM1) as above loops 17 and 18 will be on LDM2 (possibly LEDs 1 & 2).
- 2. If there are 6 pedestrians (rather than 4 above), then the pedestrian button group will be located at the bottom of the table from input 32 located on LDM2 (possibly using LEDs 3,4,5,6,7,8).

LDM2 LED locations are not able to be depicted on the signal drawing.

2.14.3.4 Amending existing drawings

For projects requiring only minor modifications, the existing operations and electrical drawing may be revised. Where existing symbols such as lanterns, buttons and mast arms are old, they should all be updated to those current symbols on departmental Standard Drawing 1436.

A construction note referring to the revision number should be added, detailing the proposed changes. Revision description will be short, for example 'SG6 & STN 8 ADDED, PHASING & DETS ALTERED'.

Consultant's Logo with contact details to be placed above the Revisions area.

2.14.3.5 New drawings superseding existing

For major modifications, or where a decision is made to supersede an old sub-standard drawing, a prominent note should be added above the title block.

In addition, the 'A' revision 'Original Issue' text should be amended to add a short description as per Section 2.14.3.4. Refer Figure 2.14.4(c) – Example 2.

2.14.4 Drawing Media Package

Issued for Construction – final certified design:

- Provide A3 size, hard copy drawings on 'permanent paper' with all sign-off names in text, and RPEQ hand signature(s) in blue pen of permanent non-smudging type. Consultant's Logo with contact details to be placed above the Revisions area.
- Provide electronic AutoCAD files.
- Provide scanned pdf files at correct scale showing hand signature(s). File size should be kept to a minimum, whilst ensuring good quality images of the hard copy originals.

This package should be addressed / delivered to the departmental Project Manager or Design Manager who will distribute the electronic files internally to relevant staff in the District office, and the hard copies to department's Plan Room for storage.

Design revisions during construction, should be provided according to the DDPSM Volume 1 through the departmental Project Manager or Design Manager, showing drawn and checked names in text and RPEQ certification in blue pen. Consultant's Logo with contact details to be placed above the Revisions area.

'As Constructed' revisions provide A3 hard copy drawings and electronic files as above, as soon as possible after 'switch-on' of the signals, showing the as constructed revision. For example, the text "AS CONSTRUCTED (Switch-on date)" should be included in the revision column.

Incorporate any changes from the red mark-up drawings provided by the contractor, and remove any abandoned conduits, pits, and construction notes. 'As Constructed' drawings are to be plotted from CADD files with the required signatures, i.e., no hand markups nor be produced from photocopies (refer to the DDPSM Volume 1).

Revision clouds as per the DDPSM Volume 1 are not used for traffic signal drawings.

RPEQ certification for traffic signal drawings is not required for the as constructed revision or other non-design revisions, unless there have been significant engineering technical changes. Provide drawn and checked names in text & signature in blue pen.

Figure 2.14.4(a) – Traffic Signals – Design Layout – generic example

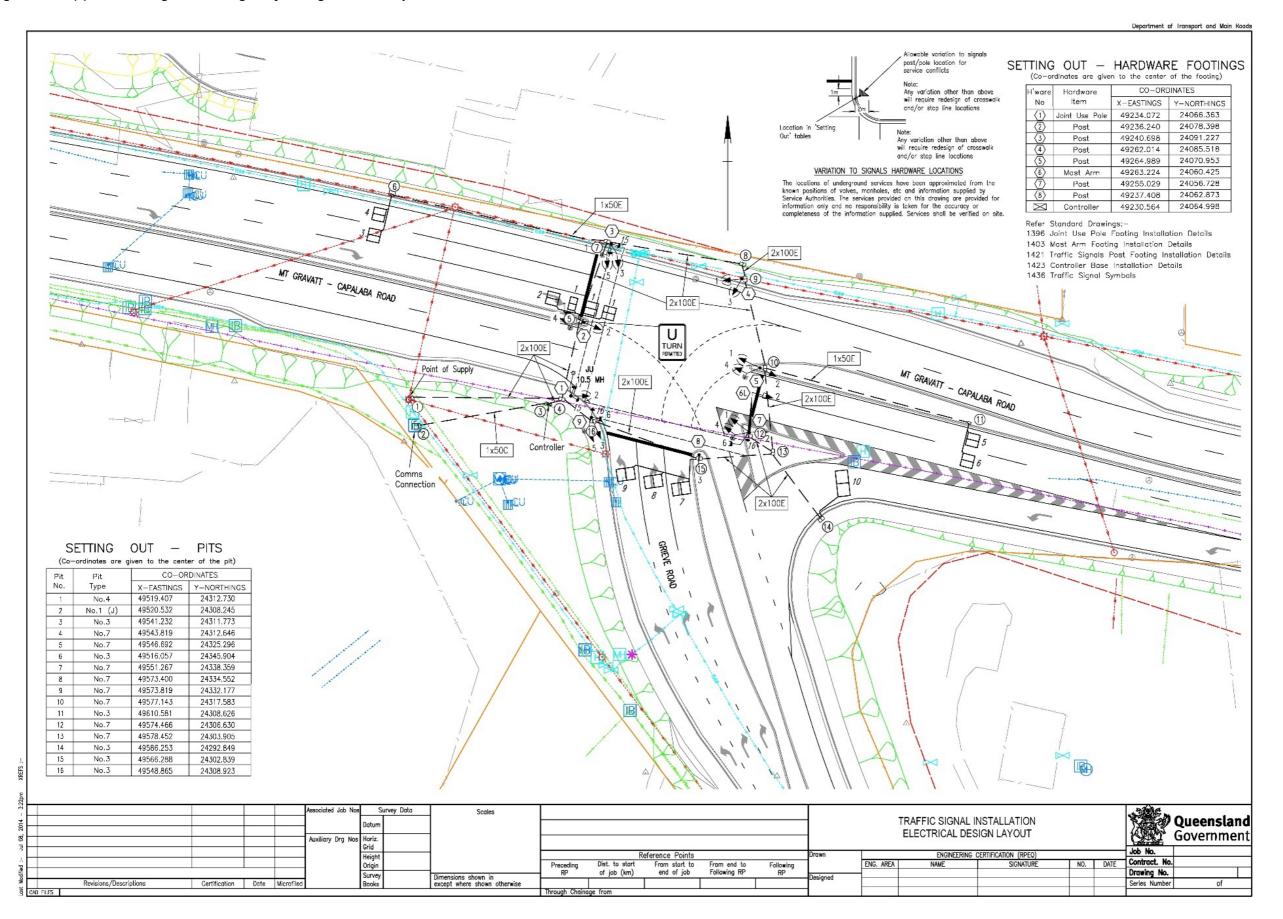


Figure 2.14.4(b) – Traffic Signals – Operations and Electrical – registered example 1

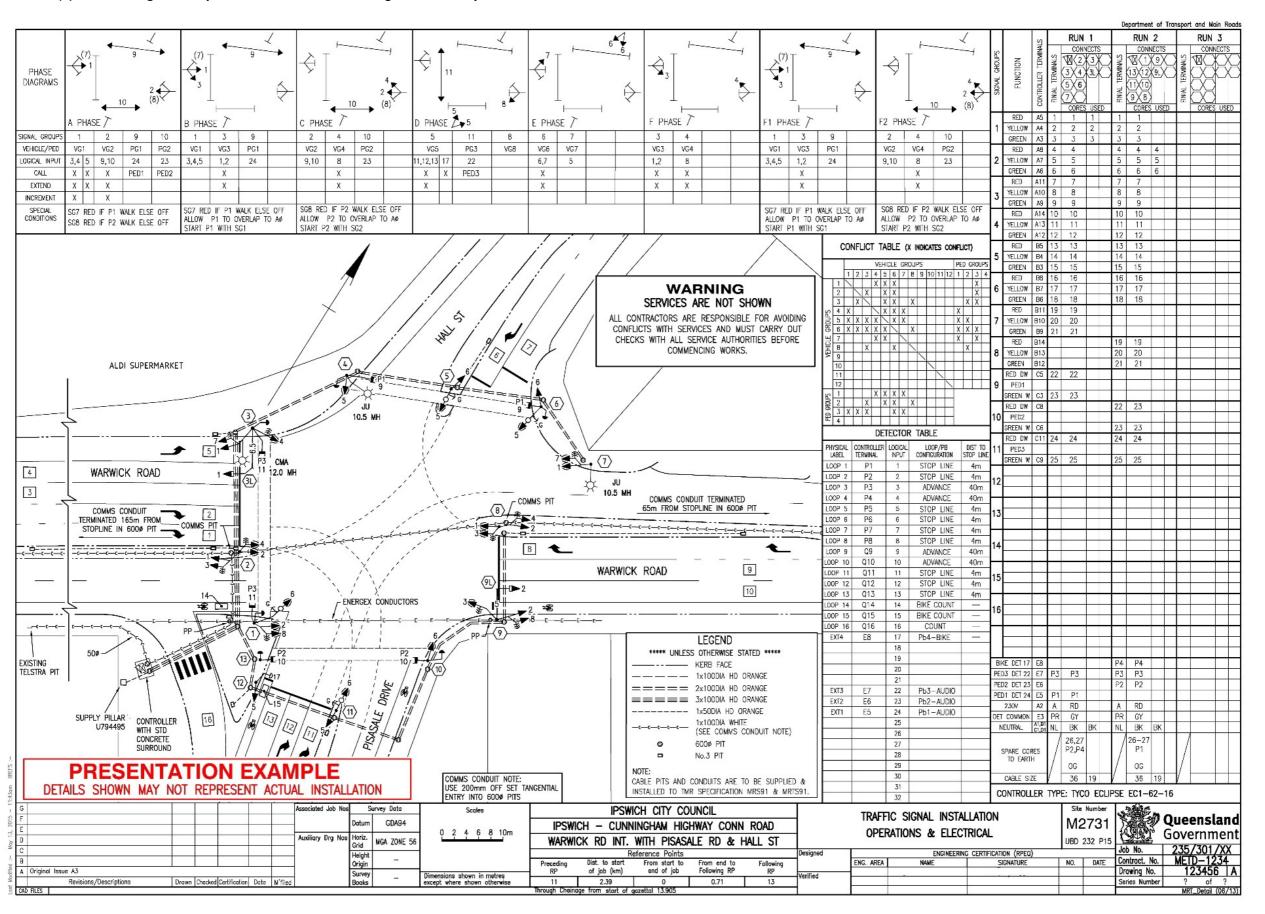


Figure 2.14.4(c) – Traffic Signals – Operations and Electrical – registered example 2

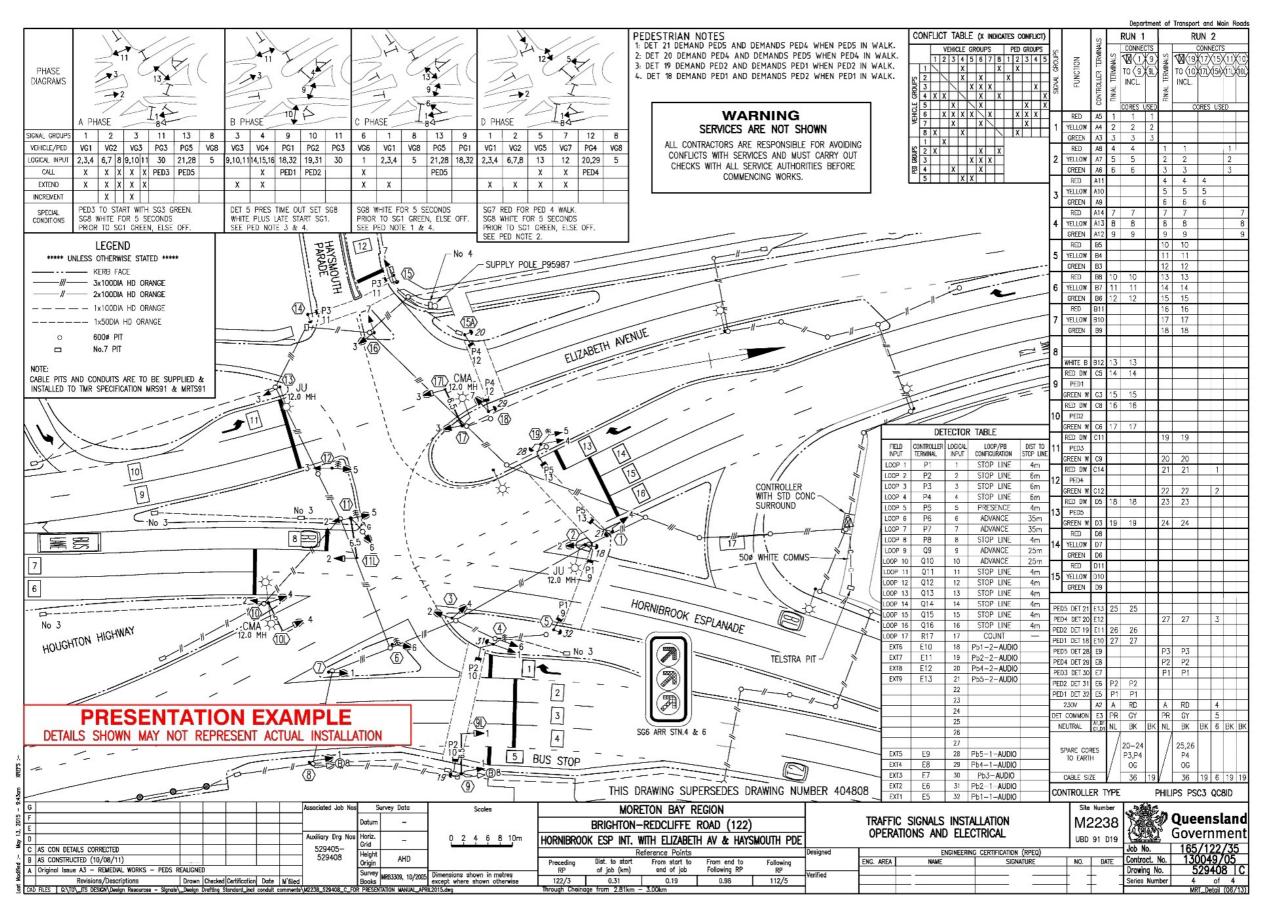
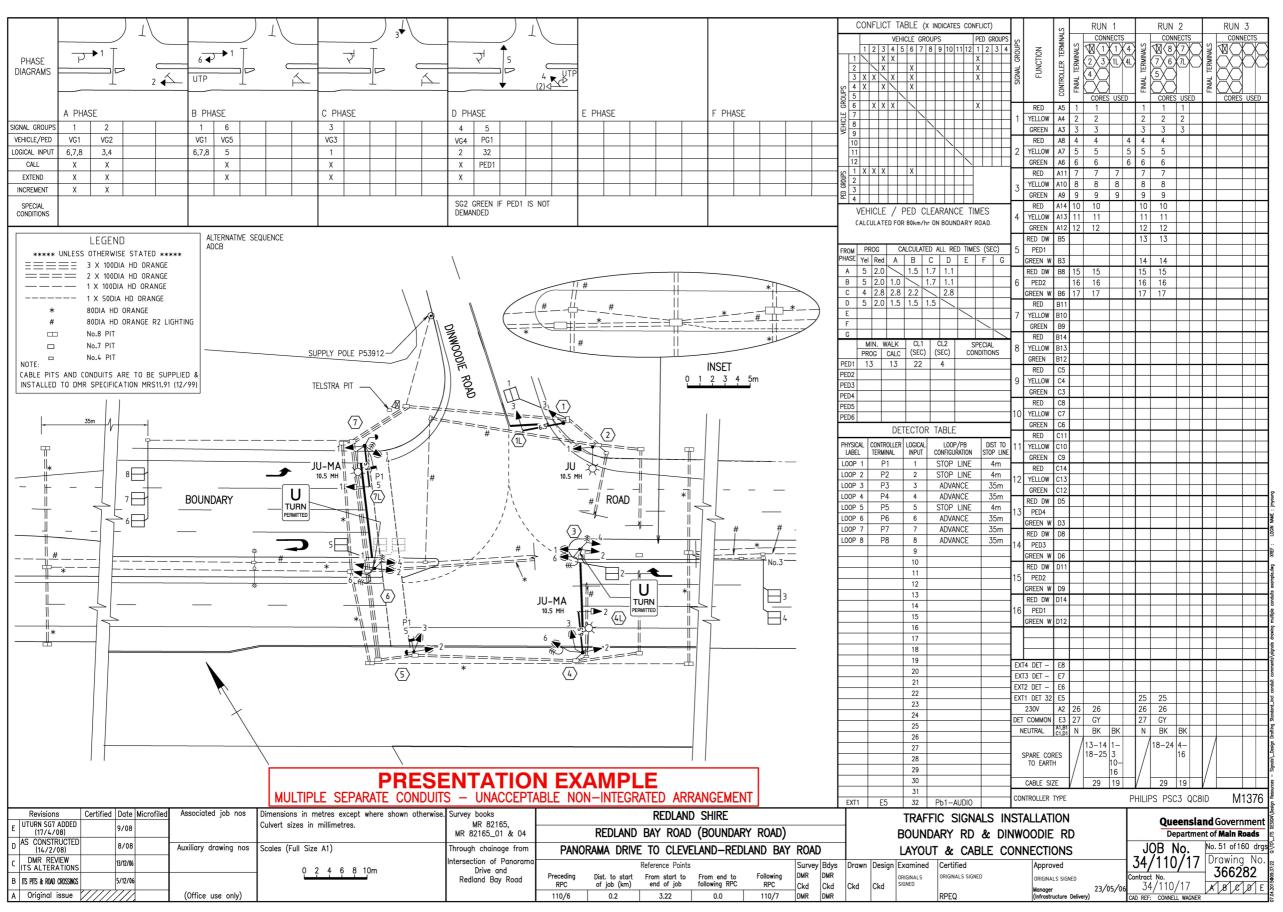


Figure 2.14.4(d) - Traffic Signals - Operations and Electrical - registered example 3



2.15 Intelligent Transport Systems (ITS)

2.15.1 Introduction

2.15.1.1 General

Intelligent Transport Systems (ITS) used for the management of transportation systems depends on many different types of technologies and devices. The deployment and integration of ITS require many facets of planning and all aspects need to be considered in the design to achieve the functional and operational requirements.

ITS design drawings are an integral part of the deployment and integration of ITS.

The ITS designer shall liaise with the local departmental office and where required, other project partners, to ensure that any requirements or impacts on the ITS operations and installations, are addressed in the ITS design drawings being undertaken.

Applicable manuals and guidelines which the designer should consult include, but is not limited to:

- Transport and Main Roads' Drafting and Design Presentation Standards Manual (DDPSM)
- Queensland Guide to Smart Motorways (QGSM)
- Queensland Guide to Traffic Management (QGTM)
- Queensland Manual of Uniform Traffic Control Devices (Queensland MUTCD)
- Traffic and Road Use Management Manual (TRUM) Volume 4
- · Standard Specifications
- Standard Drawings, and
- Technical Notes.

2.15.1.2 Preparation of ITS drawings

The design of Intelligent Transport Systems (ITS) may vary from single systems to many complex systems on multi-lane roads having numerous devices sharing a cabinet. Consequently, the suite of ITS design drawings will depend on the scale of ITS deployment and complexity of the project.

ITS drawings or plans, for the department of Transport and Main Roads, involving complex urban road design projects will typically be composed of the following components.

- Cover Sheet and Locality Plan
- Drawing Index
- General Notes and Legend
- ITS Layout Plan
- Typical Installation Details, where applicable
- Network Topology
- Fibre Optic Topology
- Field Cabinet Details

- · ITS Device Installation Details, and
- General equipment / device schedule.

For smaller scale ITS projects, only a subset of the above drawing components may apply. The Designer to confirm with local departmental office the set of drawings required.

To maintain clarity in presentation, the designer must ensure that a drawing that contains too much information for a single page, is split into separate drawings. Conversely, when combining drawings, priority must be given to clear presentation and effective communication of complementary information.

Transport and Main Roads ITS drawings shall be produced on the standard Road Design Detail A1 size title sheet using the current Transport and Main Roads customisation package. Refer to DDPSM Volume 1, Chapter 2, Section 2.4.3.1. Drawings in Portable Document Format (PDF) shall be produced on an A3 sheet with a scale of 1:1000 unless deemed appropriate or otherwise approved by Transport and Main Roads. All text and line work shall be legible when produced in A3 format and shall meet the requirements of DDPSM Volume 1 Chapter 2.

The preferred final printed output is on an A1 sheet with a scale of 1:500 and an A3 sheet with a scale of 1:1000 unless otherwise approved by Transport and Main Roads.

A scale of 1:250 at A1 and/or 1:500 at A3 would be appropriate depending on the drawing and, for a higher degree of detail, an 'Inset' details at scale up to 1:2 at A3 may be necessary. The scale should align with the overall road design drawings, other design packages, should be selected depending on content and be sufficient in showing the appropriate level of detail.

For drawings not drawn to scale, the 'Not to scale (NTS)' note shall be displayed.

The following sections outline the minimum requirements for the presentation of drawings that constitute ITS designs as listed in Table 2.15.2 and are intended to convey to the designer the level of detail required by the department to achieve a design that is suitable for its intended purpose.

2.15.2 Title block

The drawing title block shall be based on the Road Design and Civil Works MRR_DETAIL as specified in Table 2.4.3.1 of DDPSM Volume 1 Chapter 2. The title block shall provide enough information to accurately detail the location of the ITS project.

Where the ITS forms part of an overall road design scheme, the information provided in the title block shall match the details for the overall road design drawings, as appropriate.

The three lines of text required for completing the title of each ITS drawing are shown in Figure 2.15.2(a), and unless otherwise specified, the drawing sheet titles should follow the three-line format as shown in Table 2.15.2. Below is a description of the expected content in each line for the title block.

• **Line 1** should include "Intelligent Transport Systems " followed by the scope , site ID or project location description, separated by a hyphen.

- **Line 2** should feature the primary heading specified in the ITS design category. For instance, "Cover Sheet and Locality Plan" or "Layout Plan," etc.
- **Line 3** should consist of a sub-heading relevant to the primary heading, followed by the corresponding sheet number within the series in the format Sheet X of Y.

The designer must ensure each line remains within a single line length, using abbreviations if necessary. Refer to the examples in Table 2.15.2.

Figure 2.15.2(a) – Lines of Text in ITS title block

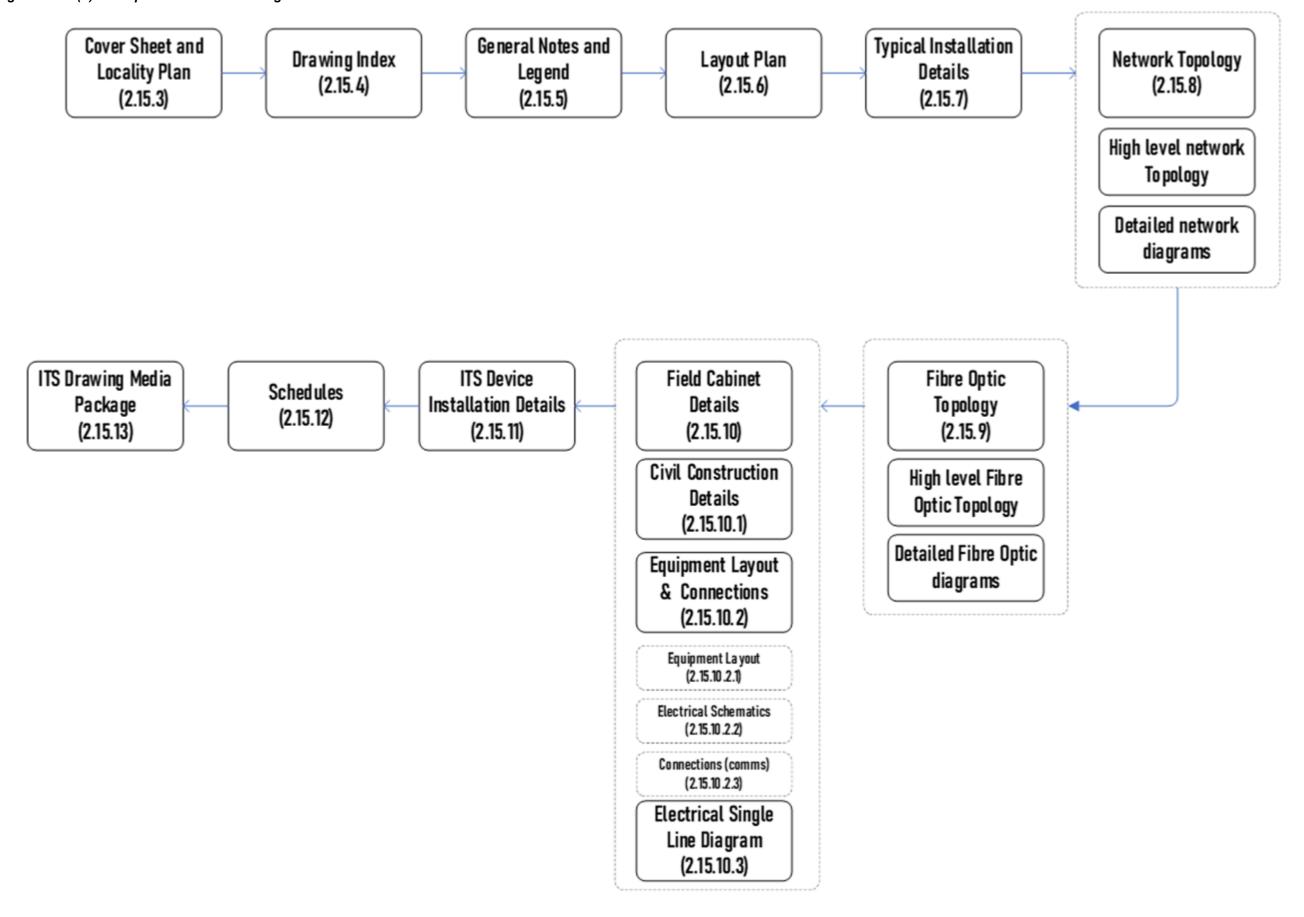
						LINE 3	<u> </u>			Job No.	Governme
		st. to start f iob (km)	From start to end of job	From end to Following RP	Following RP	ENG. AREA	SIGNATORY FULL NAME	No.	DATE	Contract No.	
Dimensions shown in metres except where shown otherwise	ough Chainage fra		one or job	Tollowing To	M					Drawing No. Series Number	of

Table 2.15.2 – ITS drawing sheet title block format

ITS drawing Category	Title Block Format	Example
Cover Sheet and Locality Plan	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: Cover Sheet and Locality Plan Line 3: "Relevant sub-heading"	Intelligent Transport System – Project wide Cover Sheet & Locality Plan
Drawing Index	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: Drawing Index Line 3: "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide Drawing Index Sheet 1 of 1
General Notes and Legend	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: General Notes and Legend Line 3: "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide General Notes and Legend Sheet 1 of 2
Layout Plan	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: Layout Plan Line 3: "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide Layout Plan Drawing Key – Sheet 1 of 3
Typical Installation Details	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: Typical Installation Details Line 3: "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide Typical Installation Details Sheet 1 of 1
Network Topology	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: Network Topology Line 3: "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide Network Topology Field Communications Block Diagram – Sheet 1 of 1
Fibre Optic Topology	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: Fibre Optic Topology Line 3: "Relevant sub-heading" – Sheet X of Y	
Field Cabinet Details	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: Field Cabinet Details Line 3: "Relevant sub-title" – Sheet X of Y	Intelligent Transport System – Site BH123 Field Cabinet Details Field Cabinet Site layout – Sheet 1 of 5
		Intelligent Transport System – Site BH123 Field Cabinet Details Equipment layout – Sheet 2 of 5
		Intelligent Transport System – Site BH123 Field Cabinet Details Electrical Schematic – Sheet 3 of 5
		Intelligent Transport System – Site BH123 Field Cabinet Details Electrical Single line Diagram – Sheet 4 of 5
		Intelligent Transport System – Site BH123 Field Cabinet Details Connections & Data communications – Sheet 5 of 5

ITS drawing Category	Title Block Format	Example
{ITS Device Name} Installation Details	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: {ITS Device Name} Installation Details Line 3:"Relevant sub-title" – Sheet X of Y	Intelligent Transport System – Site XYZ Variable Speed Limit Signs Installation details Typical Installation Details – Sheet 1 of 2
		Intelligent Transport System – Site XYZ Variable Speed Limit Signs Installation details Maintenance access Details – Sheet 2 of 2
General {equipment / device name} schedule	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: General {equipment / device name} schedule Line 3: "Relevant sub-title" – Sheet X of Y	Intelligent Transport System – Project wide General Pits and Conduits Schedule Sheet 1 of 2
Other User defined ITS Title	Line 1: Intelligent Transport System – "Scope" or "Site ID", or "Location" Line 2: User defined title Line 3: "Relevant sub-title" – Sheet X of Y	

Figure 2.15.2(b) - Components of ITS drawings



This approach provides uniformity and consistency. However, there is provision for the designer to define their own "User defined ITS Title" should there be circumstances where specific titles are required such as if the defined categories above are not sufficient. In this case, it is preferred that the user-defined title follow the same pattern defined here.

The site ID is typically assigned by the local departmental office to a cabinet or a particular ITS device which doesn't share a cabinet.

Figure 2.15.2(b) shows how this section is organised based on the ITS drawing component.

2.15.3 Cover Sheet and Locality Plan

The cover sheet is intended to provide an overview of the project and drawing package in a single page, and includes the locality plan, which depicts the site locality with reference to the road network in the area. The page may also include a drawing key for General Arrangements. Refer to Figure 2.15.5(a) for an example.

Where an image is used to depict the site or project location, it shall be at least 600dpi.

2.15.4 Drawing Index

The drawing index is a register (or table) of project drawings. As a minimum, the register shall display the following features of the drawing:

- Transport and Main Roads Drawing number
- revision
- date
- project defined Series Number, and
- drawing description, typically using the primary headings and sub-headings from Table 2.15.2.

In small projects, the drawing index may be on the same page as the cover sheet and locality plan. Refer to Figure 2.15.5(b) for an example.

2.15.5 General Notes and Legend

The general notes and legend page(s) apply across multiple drawings and are used to clearly explain all details necessary to ensure correct interpretation of the design across the project.

The general notes, typically include information, standards, departmental specifications / drawings, design requirements / constraints, and construction notes.

All symbols used in the legend must be in accordance with the department's current standards for ITS symbols as in Standard Drawing 1736 and abbreviations, symbols, line styles, text font and height and designated layers as outlined in DPPSM Volume 1, Chapter 2. The legend shall clearly delineate between existing, new, removed or relocated ITS devices. Where an ITS device or equipment is not represented in Standard Drawing 1736, the designer may define a symbol, preferably a block with the device name or abbreviation, and add it to the legend.

The legend may be in a separate page or combined with the general notes depending on the scale of the project.

The ITS infrastructure assets, devices and equipment shall follow the department's *Road Infrastructure ITS Asset Classification Hierarchy* and ITS devices naming convention consistently throughout the drawings.

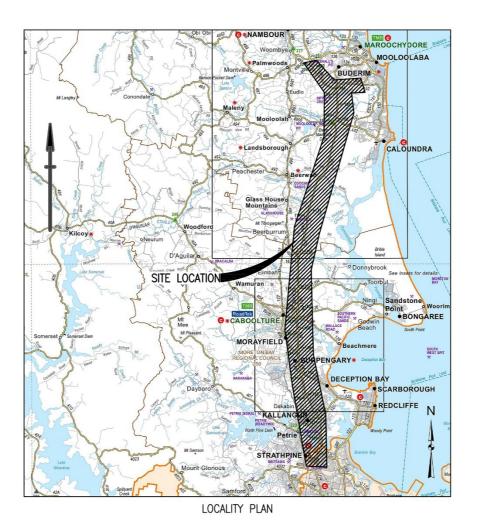
Where the general notes are not sufficient to capture all project information, additional notes may be included in the relevant drawings, as necessary.

Figure 2.15.5(a) – Cover Sheet and Locality Plan example

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

LOGO

BRUCE HIGHWAY SMART MOTORWAYS DETAILED DESIGN



SCHEME SUBMITTED (External Consultants or Internal Business Unit):

This design meets the requirements of all relevant Australian Standards, Austroads Guidelines and Transport and Main Roads — Policies. References, Standards, Planning and Design Instructions, Guidelines and the requirements of the project brief/functional specifications.

SIGNED: TITLE:
Organisation: DATE:

SCHEME SCOPE AND FINANCIAL APPROVAL: (Regional Director or Delegate):

I hereby certify that this scheme complies with the intent of the scope and financial limits of the relevant project on QTRIP and the scheme is approved for release in accordance with that program.

ED: TITLE: DATE

Queensland Government BCC - MBRC - SCRC INTELLIGENT TRANSPORT SYSTEM CUNNINGHAM ARTERIAL RD (Ipswitch Motorway) LOCALITY PLAN Auxiliary Drg I CTL CHGE GRANARD RD TO HARCOURT RD Not to Scale 201/U16/3 Job No. Reference Points Contract No. CN-XXXX ISSUED FOR CONSTRUCTION SIGNATORY FULL NAME Drawing No. 0.89 70.51 4.61

Figure 2.15.5(b) – Drawing Index example

			EXAMPLE										·	LOGO
RAWING I	NDEX — G	LOBAL	,											
Drawing Number	Date Date	Series Number		Drawir	ng Description			Drawing Number	Date Date	Series Number			Drawing Description	
891291 891292	A 07/08/21 U 24/04/24	LP00-01 of 01 DI00-01 of 09	LOCALITY PLAN DRAWING INDEX SHEET 1					891346 891347		IT01-NW-10 Of 50	ITS NETWORK TOPOLO ITS NETWORK TOPOLO			
891293	F 24/04/24	DI00-01 of 09	DRAWING INDEX SHEET 2					891348		IT01-NW-12 Of 50	ITS NETWORK TOPOLO			
891525	F 26/07/23	DI00-03 of 09	DRAWING INDEX SHEET 3					891349		IT01-NW-13 Of 50	ITS NETWORK TOPOLO			
891601	C 28/07/22	DI00-04 of 09	DRAWING INDEX SHEET 4					891350	, ,	IT01-NW-14 Of 50	ITS NETWORK TOPOLO			
891642 891727	B 24/08/21 E 05/03/24	DI00-05 of 09 DI00-06 of 09	DRAWING INDEX SHEET 5 DRAWING INDEX SHEET 6					891351 891352		IT01-NW-15 Of 50	ITS NETWORK TOPOLO ITS NETWORK TOPOLO			
891811	F 08/11/23	DI00-07 of 09	DRAWING INDEX SHEET 7					891353		IT01-NW-17 Of 50	ITS NETWORK TOPOLO			
891849	F 31/05/23	DI00-08 of 09	DRAWING INDEX SHEET 8					891354		IT01-NW-18 Of 50	ITS NETWORK TOPOLO			
891959	E 01/08/22		DRAWING INDEX SHEET 9					891355		IT01-NW-19 Of 50	ITS NETWORK TOPOLO			
891294 891295	A 07/08/21 A 07/08/21	DK00-01 Of 02 DK00-02 Of 02	DRAWING KEY DIAGRAM GA AND PU SERIES DRAWING KEY DIAGRAM PAM LOCATIONS					891356 891357		IT01-NW-20 Of 50	ITS NETWORK TOPOLO ITS NETWORK TOPOLO			
891296	A 07/08/21	CL00-01 Of 10	CONTROL LINE AND SETOUT DETAILS SHEET 1					891358		IT01-NW-22 Of 50	ITS NETWORK TOPOLO			
891297	A 07/08/21	CL00-02 Of 10	CONTROL LINE AND SETOUT DETAILS SHEET 2					891359		IT01-NW-23 Of 50	ITS NETWORK TOPOLO			
891298	A 07/08/21	CL00-03 Of 10	CONTROL LINE AND SETOUT DETAILS SHEET 3					891360		IT01-NW-24 Of 50	ITS NETWORK TOPOLO			
891299 891300	A 07/08/21 A 07/08/21	CL00-04 Of 10 CL00-05 Of 10	CONTROL LINE AND SETOUT DETAILS SHEET 4 CONTROL LINE AND SETOUT DETAILS SHEET 5					891361 891362		IT01-NW-25 Of 50 IT01-NW-26 Of 50	ITS NETWORK TOPOLO ITS NETWORK TOPOLO			
891301	A 07/08/21	CL00-05 Of 10	CONTROL LINE AND SETOUT DETAILS SHEET 6					891363		IT01-NW-27 Of 50	ITS NETWORK TOPOLO			
891302	A 07/08/21	CL00-07 Of 10	CONTROL LINE AND SETOUT DETAILS SHEET 7					891364		IT01-NW-28 Of 50	ITS NETWORK TOPOLO			
891303	A 07/08/21	CL00-08 Of 10	CONTROL LINE AND SETOUT DETAILS SHEET 8					891365		IT01-NW-29 Of 50	ITS NETWORK TOPOLO			
891304	A 07/08/21	CL00-09 Of 10	SETOUT TABLES SHEET 1					891366		IT01-NW-30 Of 50	ITS NETWORK TOPOLO			
891305 891306	A 07/08/21 B 17/06/22	CL00-10 Of 10 NL00-01 Of 05	SETOUT TABLES SHEET 2 GLOBAL NOTES SHEET 1					891367 891368		IT01-NW-31 Of 50 IT01-NW-32 Of 50	ITS NETWORK TOPOLO ITS NETWORK TOPOLO			
891307	C 16/09/22		GLOBAL NOTES SHEET 2					891369		IT01-NW-33 Of 50				
891308	A 07/08/21	NL00-03 Of 05	GLOBAL NOTES SHEET 3					891370	A 07/08/21	IT01-NW-34 Of 50	ITS NETWORK TOPOLO	GY SHEET 34		
891309	A 07/08/21	NL00-04 Of 05	GLOBAL NOTES SHEET 4					891371		IT01-NW-35 Of 50	ITS NETWORK TOPOLO			
891310	A 07/08/21	NL00-05 Of 05	GLOBAL NOTES SHEET 5					891372 891373		IT01-NW-36 Of 50	ITS NETWORK TOPOLO			
891311 891312	A 07/08/21 A 07/08/21	GD00-01 Of 17 GD00-02 Of 17	GENERAL DETAILS SHEET 1 GENERAL DETAILS SHEET 2					891374 891374		IT01-NW-37 Of 50 IT01-NW-38 Of 50	ITS NETWORK TOPOLO ITS NETWORK TOPOLO			
891313	A 07/08/21	GD00-03 Of 17	GENERAL DETAILS SHEET 3					891375		IT01-NW-39 Of 50	ITS NETWORK TOPOLO			
891314	A 07/08/21	GD00-04 Of 17	GENERAL DETAILS SHEET 4					891376		IT01-NW-40 Of 50	ITS NETWORK TOPOLO			
891315	A 07/08/21	GD00-05 Of 17	GENERAL DETAILS SHEET 5					891377		IT01-NW-41 Of 50	ITS NETWORK TOPOLO			
891316 891317	A 07/08/21 A 07/08/21	GD00-06 Of 17 GD00-07 Of 17	GENERAL DETAILS SHEET 6 GENERAL DETAILS SHEET 7					891378 891379		IT01-NW-42 Of 50 IT01-NW-43 Of 50	ITS NETWORK TOPOLO ITS NETWORK TOPOLO			
891318	A 07/08/21	GD00-08 Of 17	GENERAL DETAILS SHEET 8					891380		IT01-NW-44 Of 50	ITS NETWORK TOPOLO			
891319	A 07/08/21	GD00-09 Of 17	GENERAL DETAILS SHEET 9					891381	B 31/08/21	IT01-NW-45 Of 50	ITS NETWORK TOPOLO	GY SHEET 45		
891320	A 07/08/21	GD00-10 Of 17	GENERAL DETAILS SHEET 10					891382		IT01-NW-46 Of 50	ITS NETWORK TOPOLO			
891321 891322	A 07/08/21 B 22/06/23	GD00-11 Of 17 GD00-12 Of 17	GENERAL DETAILS SHEET 11 GENERAL DETAILS SHEET 12					891383 891384		IT01-NW-47 Of 50	ITS NETWORK TOPOLO ITS NETWORK TOPOLO			
891323	A 07/08/21	GD00-12 0f 17	GENERAL DETAILS SHEET 13					891385	, ,	IT01-NW-49 Of 50	ITS NETWORK TOPOLO			
891324	B 17/06/22		GENERAL DETAILS SHEET 14					891386		IT01-NW-50 Of 50	ITS NETWORK TOPOLO	GY SHEET 50		
891325	A 07/08/21	GD00-15 Of 17	GENERAL DETAILS SHEET 15					891387		IT00-FS-01 Of 45	ITS NETWORK FIBRE			
891326 891327	A 07/08/21	GD00-16 Of 17 GD00-17 Of 17	GENERAL DETAILS SHEET 16					891388 891389	A 07/08/21	ПОО-FS-02 Of 45 ПОО-FS-03 Of 45	ITS NETWORK FIBRE			
891328	B 17/08/23 A 07/08/21		GENERAL DETAILS SHEET 17 DRAINAGE DETAILS SHEET 1								ITS NETWORK FIBRE			
	A 07/08/21										ITS NETWORK FIBRE			
891330	A 07/08/21	DD00-03 Of 05	DRAINAGE DETAILS SHEET 3					891392	B 24/08/21	IT00-FS-06 Of 45	ITS NETWORK FIBRE	SPLICING SHEET 6		
		DD00-04 Of 05						891393			ITS NETWORK FIBRE			
891332 891333		DD00-05 Of 05	DRAINAGE DETAILS SHEET 5 ITS NETWORK LEGEND SHEET 1					891394 891395		IT00-FS-08 Of 45				
3913334			ITS NETWORK LEGEND SHEET 1								ITS NETWORK FIBRE			
891335	A 07/08/21	IT00-NL-03 Of 03	ITS NETWORK LEGEND SHEET 3					891397	A 07/08/21	IT00-FS-11 Of 45	ITS NETWORK FIBRE	SPLICING SHEET 11		
891336			ITS NETWORK TOPOLOGY HIGH LEVEL								ITS NETWORK FIBRE			
891337 891338			ITS NETWORK TOPOLOGY SHEET 1 ITS NETWORK TOPOLOGY SHEET 2					891399 891400		IT00-FS-13 Of 45	ITS NETWORK FIBRE ITS NETWORK FIBRE			
891339			ITS NETWORK TOPOLOGY SHEET 2							IT00-FS-14 Of 45				
891340			ITS NETWORK TOPOLOGY SHEET 4					891402		IT00-FS-16 Of 45				
			ITS NETWORK TOPOLOGY SHEET 5								ITS NETWORK FIBRE			
891342			ITS NETWORK TOPOLOGY SHEET 6							IT00-FS-18 Of 45				
891343 891344			ITS NETWORK TOPOLOGY SHEET 7 ITS NETWORK TOPOLOGY SHEET 8					891405 891406		IT00-FS-19 Of 45	ITS NETWORK FIBRE			
			ITS NETWORK TOPOLOGY SHEET 9								ITS NETWORK FIBRE			
								Continued on	Series No. DIO)-02				
				As	sociated Job Nos	Survey Data	Scales	BCC	- MBRC	- SCRC		INTELLIGE	NT TRANSPORT SYSTEM	33 F. A
						Horiz. Datum		CUNNINGHAM AF	RTERIAL RD	(Ipswich Mot	orway)	[RAWING INDEX	Queensl
				A	uxiliary Drg Nos		7	CTL CHGE GRANARI					SHEET 1 of 1	Governm
				\vdash		Grid Height	4		Reference Poin				NEERING CERTIFICATION (RPEQ)	Job No. 201/U16/3
ED FOR CONS	STRUCTION					Datum Datum	_	Preceding Dist. to start	From start	to From end to		G. AREA SIGN	IATORY FULL NAME No.	DATE Contract No. CN-XXX
Rev	sions/Descriptions	s Sigr	natory: - RPEQ Full Name, Eng. Area and RPEQ No. or	Date		Survey	Dimensions shown in metres	RP of job (km)	end of job			t., ITS John Citizen	XXXXXX 15/	10/2019 Drawing No.
	,		- Full Name and Position Title S2 CAD\CAD\Drawings\Figure 4 Drawing Index.dwg			Books	except where shown otherwise	U14/11 0.89 Through Chainage from	70.51	4.61	10A/21A			Series Number D100-01 of

2.15.6 ITS Layout Plan

The ITS layout plan depicts a project wide level plan view of the project area including the civil components and general arrangements from field survey data, aerial photo or a new road design across the project.

As a minimum, the ITS layout plan shall include the following features with clear labelling:

- roadside and on-road ITS installations
- cabinets and plinth / concrete surrounds
- electrical / communication cables, conduits runs and pits
- mounting structures for roadside equipment, such as poles and gantries
- electrical entity network assets such as transformer and point of supply
- underground and overhead services where survey is available or based on BYDA where no survey available— also proposed service relocations, and
- any other associated infrastructure assets, such as barriers.

The preferred scale is 1:1000 at A3, however plan view and scale are to be consistent with Roadway lighting and civil layout drawings. It is preferable that the layout is oriented with the major road being left to right, with north facing upwards on the sheet. However, if it is part of an overarching road design scheme it will follow the road design orientation and scale. In this case, the direction of the north arrow shall be the same across all drawings in a drawing suite, as appropriate.

The ITS layout plan view shall show all proposed conduits and pits shared across the ITS, traffic signals and street lighting packages, irrespective of whether the conduits and pits are being used for ITS infrastructure. Where the ITS design includes or is adjacent to traffic signals and streetlight packages, common Pit Identification IDs shall be used across the entire design packages.

Rate 2 conduits shall not be shown on Transport and Main Roads ITS plans, and ITS cables shall not be installed in Rate 2 conduits.

All fibre optic cable location shall be shown on the ITS layout drawings, including the location of the required 20 m cable slack coils every 200 m and the location of the associated fibre optic joint enclosures.

It is expected that the existing and proposed elements of interest as well as the integration and transition means are detailed in the ITS layout drawings and supported by symbols defined in the ITS legend.

All ITS cabinets and infrastructure shall use the ITS numbering convention defined by the Principal. All devices shall be uniquely numbered in accordance with the ITS numbering convention. The designer shall contact the local departmental office for the allocation of the designated site abbreviations.

Refer to Figures 2.15.7(a) and 2.15.7(b) for examples of ITS layout.

It is preferred that layout drawings include an inset for the drawing key and the identification of the current drawing in the drawing key as shown in example Figure 2.15.7(c).

2.15.7 Typical installation details

Typical installation details drawings provide an overview of installation specifics across a project. They consolidate common elements repeated throughout multiple installations, particularly in large-scale projects with standardised configurations. These drawings specify installation parameters, including dimensions, hardware specifications, general configurations, and related information.

These drawings also present a general arrangement of infrastructure assets, detailing their positioning, layout, mounting, and cable connections. They illustrate how these assets connect to supporting structures, foundations, embankments, batters, and neighbouring items across the project. ITS Mounting Structures must reference the Transport and Main Roads Structural Drawing number on the ITS drawings.

IMPORTANT NOTE: Typical drawings are unsuitable when significant variations exist between project installations. For instance, cabinet arrangements often differ from site to site.

Refer to Figure 2.15.7(d) for an example of a typical drawing.

Figure 2.15.7(a) – ITS Layout (example 1)

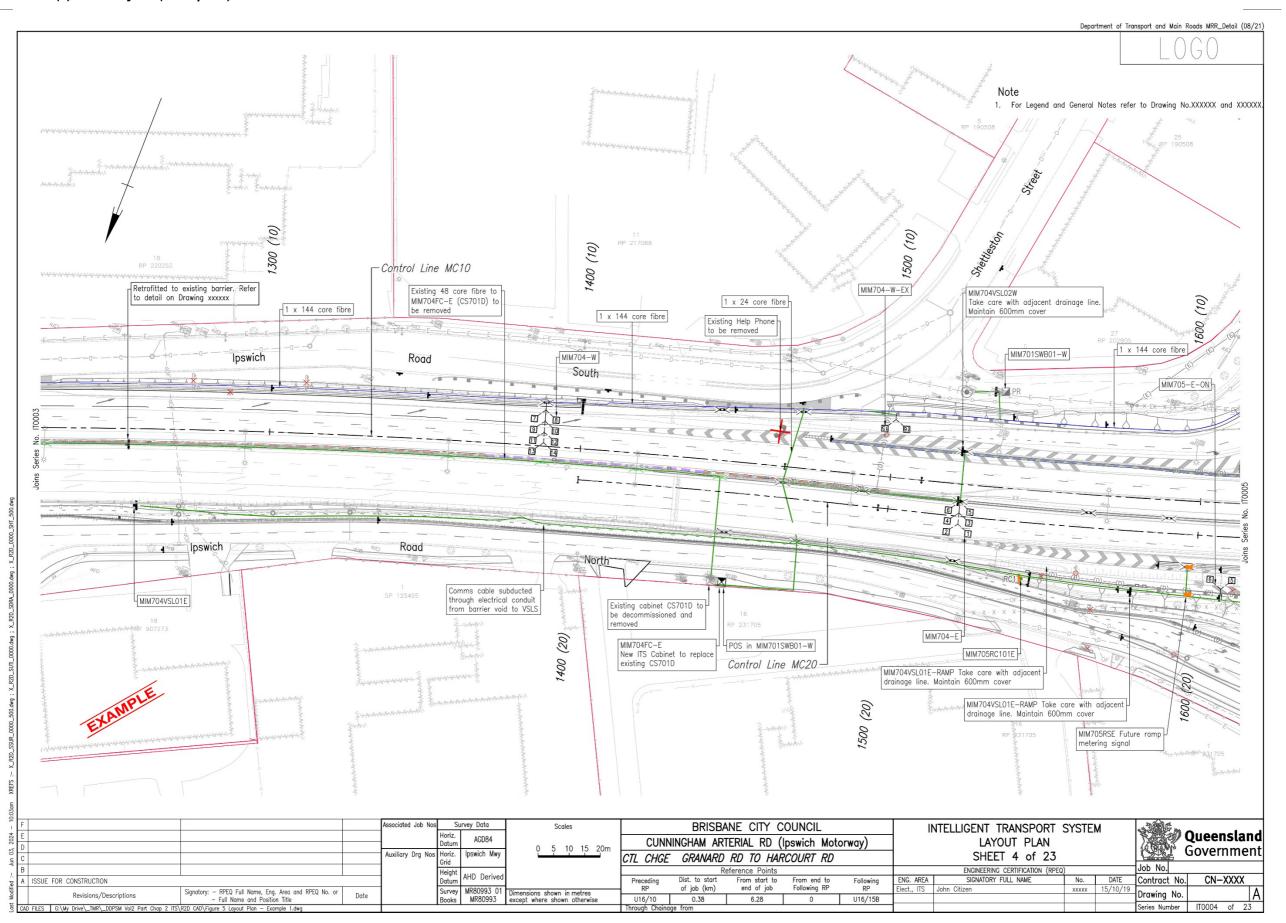


Figure 2.15.7(b) – ITS Layout (example 2 – aerial imaging)

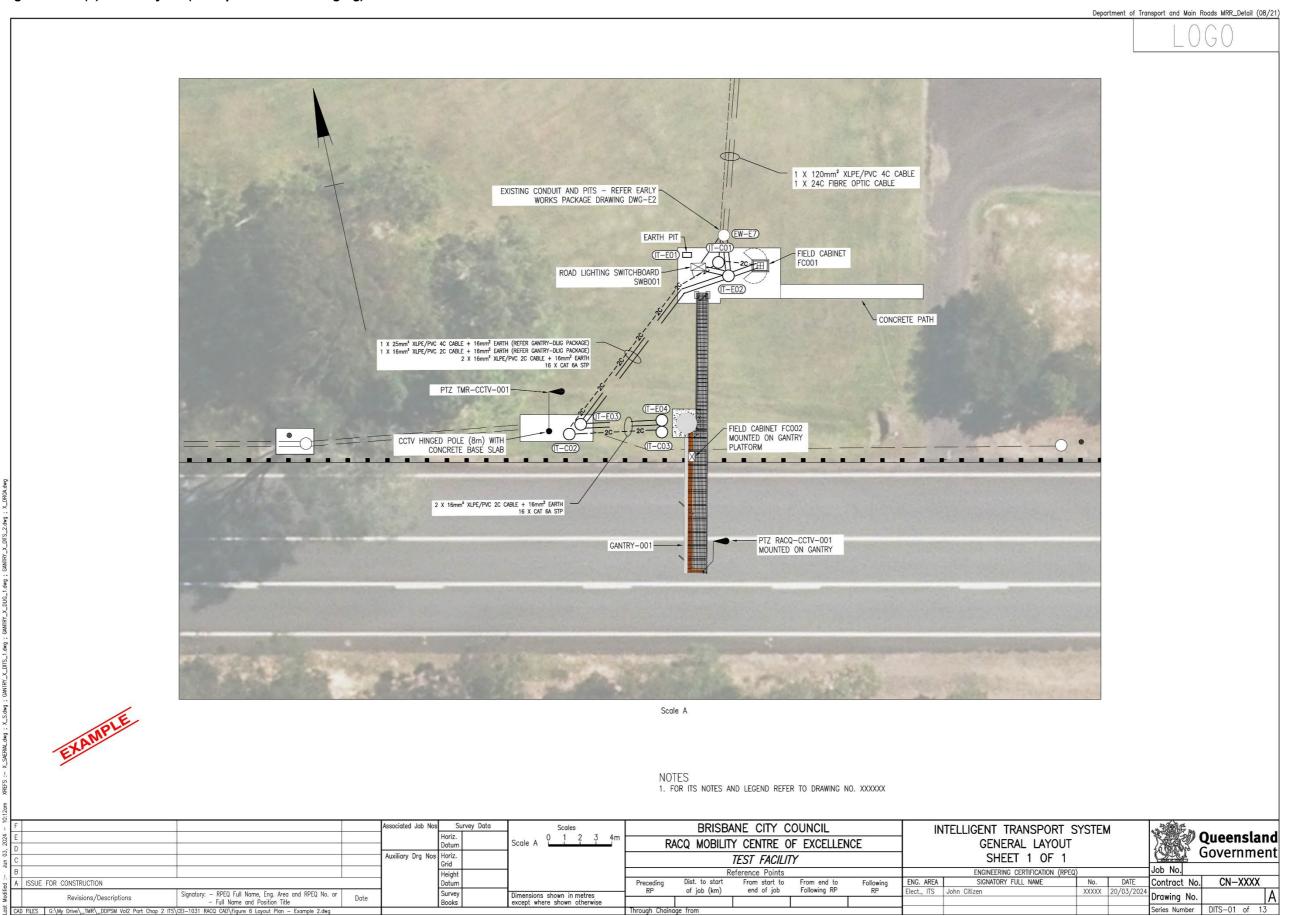


Figure 2.15.7(c) – ITS layout (example 3 - with drawing key)

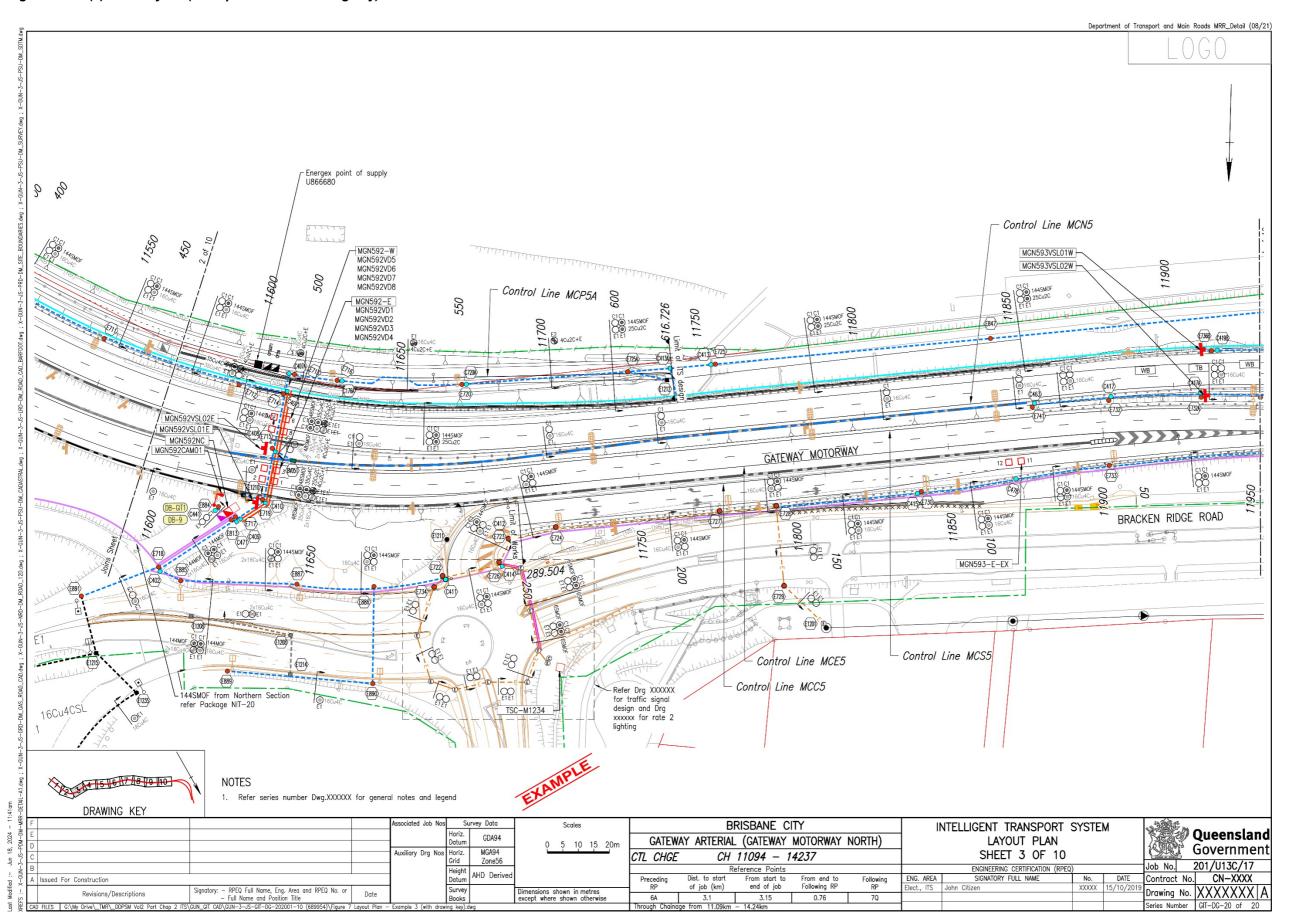
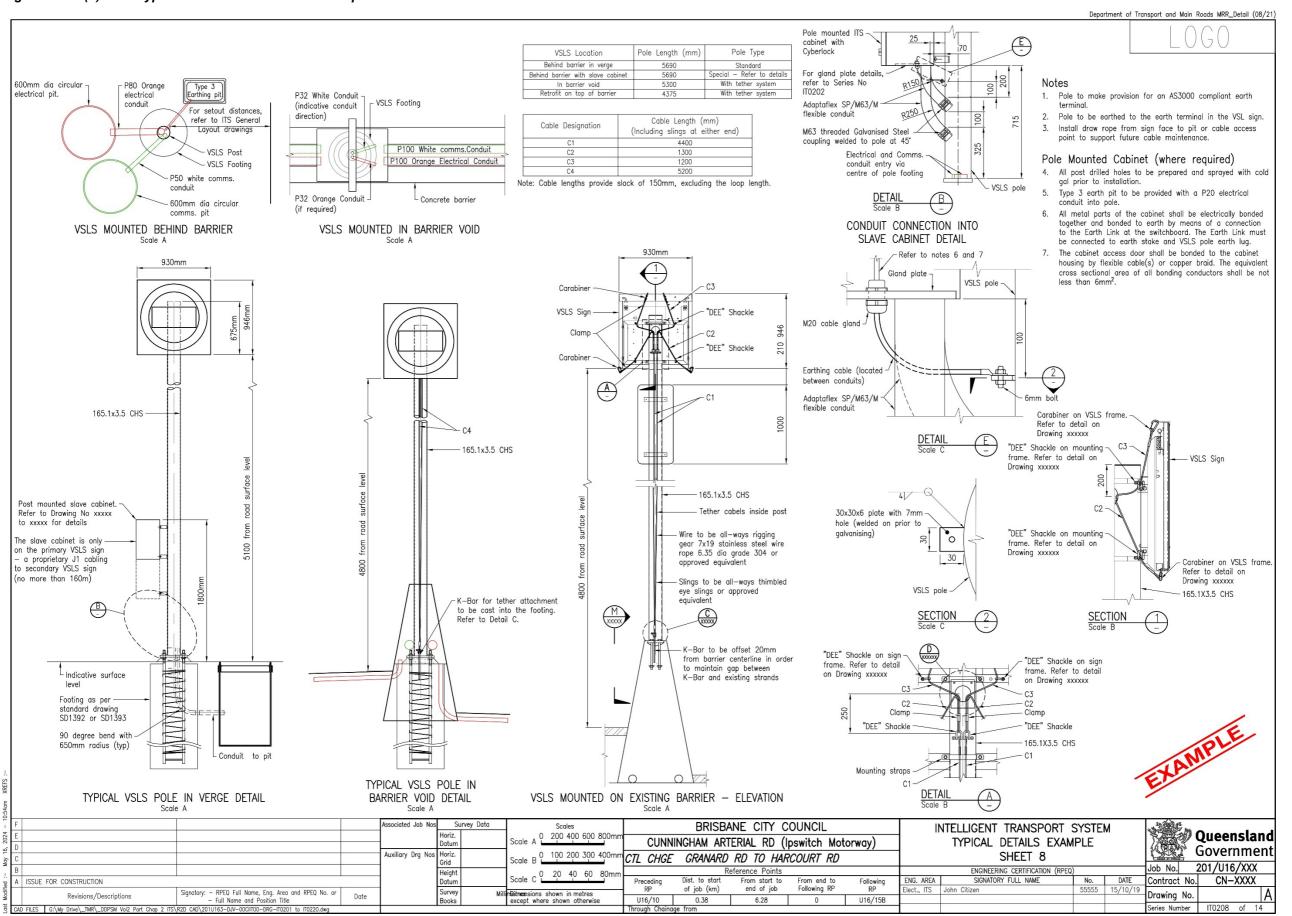


Figure 2.15.7(d) – ITS typical installation details – example



2.15.8 Network topology

Network topology refers to a series of project wide and site-specific drawings that depict the interconnections of switches and devices within a network infrastructure. These drawings outline connections at various levels including:

- the high-level backbone Layer 3 Core / Distribution
- the Layer 2 field network and subnetwork segment, and
- the edge device connections.

The drawings shall be in accordance with the ITS network technical design requirements defined in MRTS245 *ITS Telecommunications Network (ITS TN)*. Additionally, the drawings shall provide the following information:

- specific port connections for each switch and edge device
- communication types, speeds, and protocols used
- information on spare capacity and redundancy within the network, and
- a schedule of switches depicted in the drawings for each network segment, along with details
 on network address allocation and Virtual Local Area Network (VLAN) assignments (this
 information may also be provided separately in project schedules refer to Section 2.15.12).

The drawing should preferably be created using AutoCAD; However, Visio may be used initially and then incorporated into AutoCAD. Refer to Figures 2.15.8(a),2.15.8(b) and 2.15.8(c) for examples of Network topology presentation.

Figure 2.15.8(a) - Network topology example 1 - high level connectivity in Visio

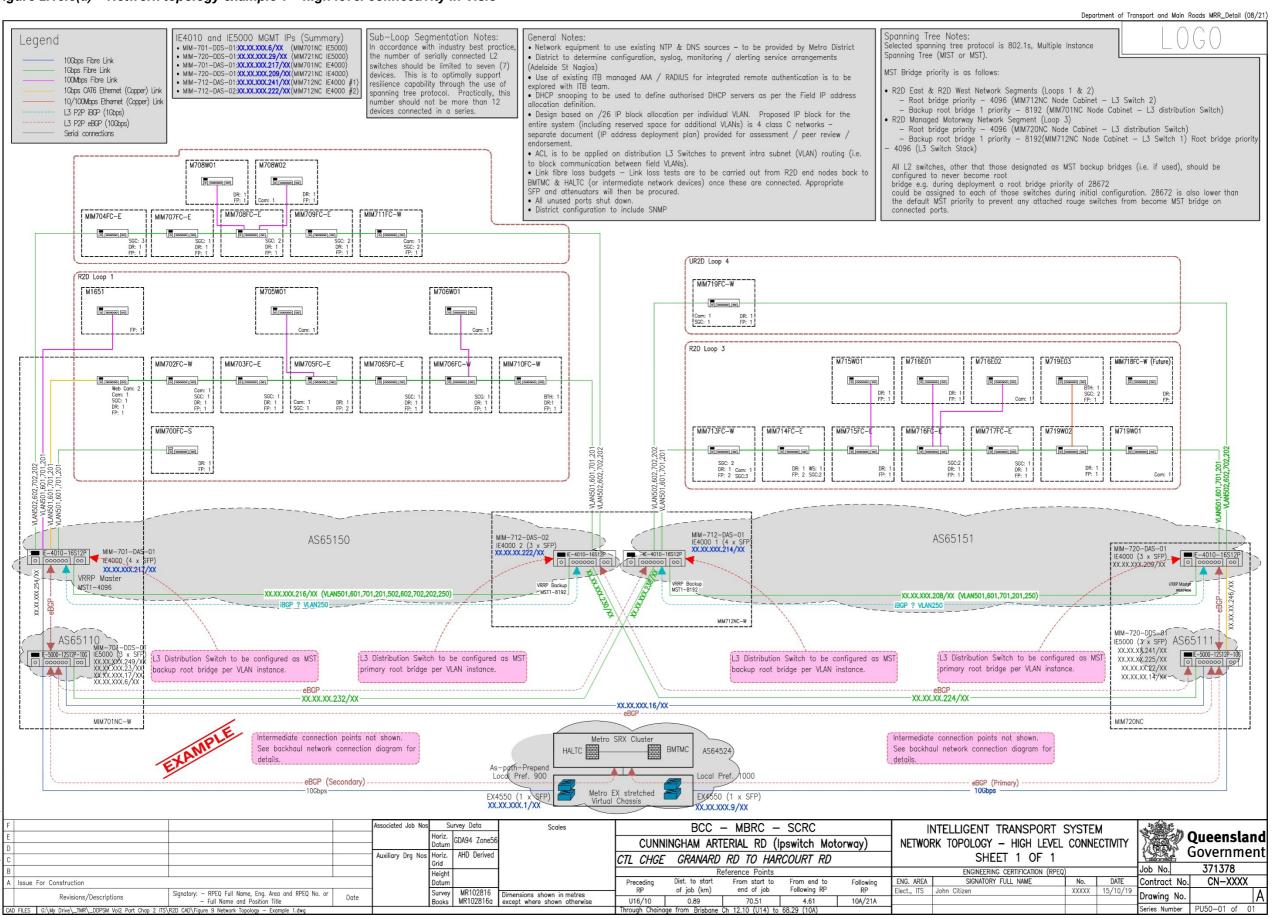


Figure 2.15.8(b) – Network topology example 2 – high level connectivity

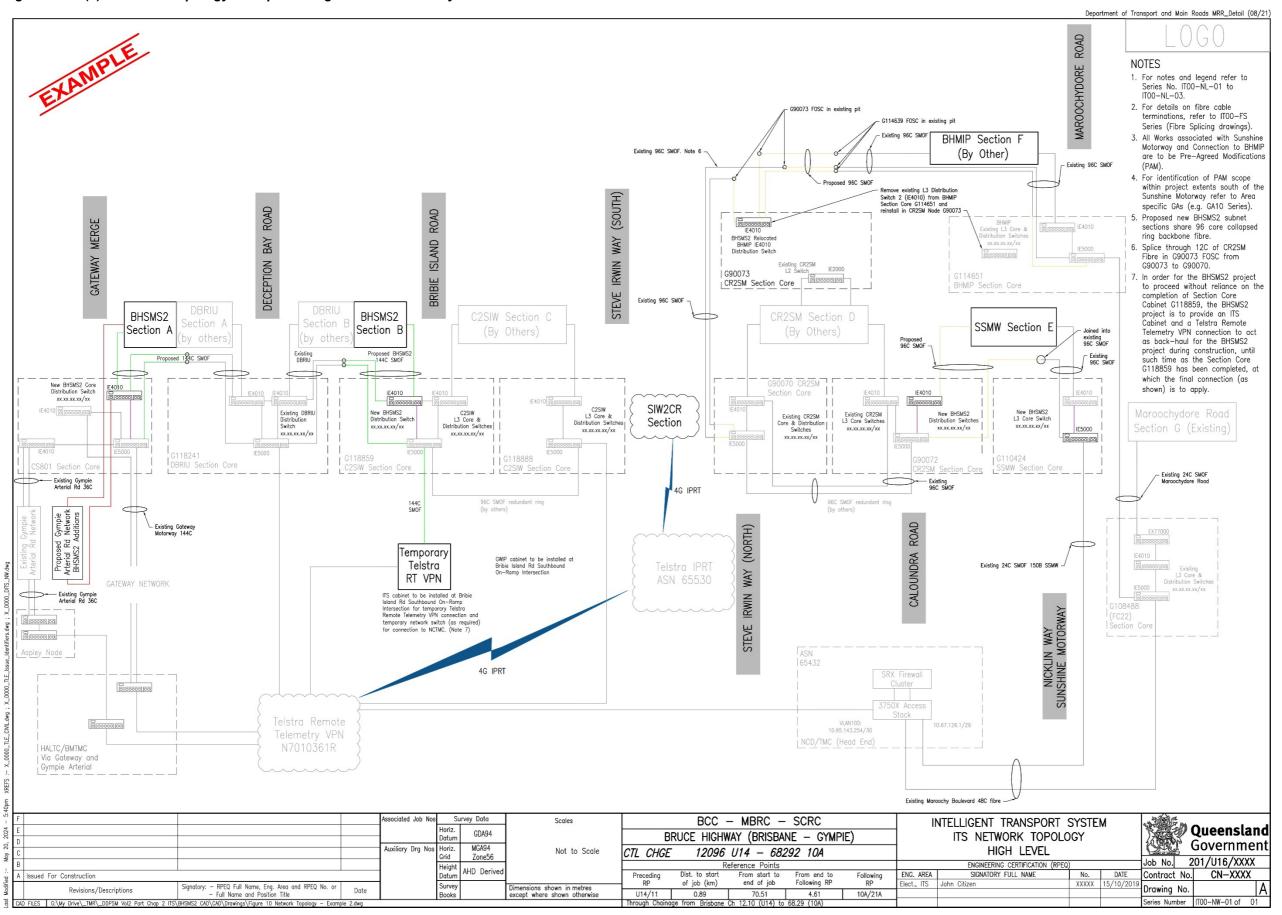


Figure 2.15.8(c) – Network topology example 3 – detailed connections Department of Transport and Main Roads MRR_Detail (08/21) MGA101CAM01N (CCTV01N-L) McN599VSL01N McN599VSL02N (VSL01N-L) (VSL02N-R) McN599CAM02N (CCTV01N-L) MGA103VSL01N MGA103VSL02N MAG MATS (VSL01N-L) (VSL02N-R) NOTES MGA101VSL01N (VSL01N-L) MGA101VSL02N 100 100 (VSL02N-R) For ITS notes refer to SPD Drg No.XXXXXX SPD 2. For ITS legend refer to SPD VDS Drg No.XXXXXX to Drg No.XXXXXX FP VDS IE2000-4 (L2 SWITCH) MC MC MC МС Fibre optic cable identifier names NTU L2 SWITCH L2 SWITCH FP shortened for clarity and presentation purposes. For full MC SM,4C SM,4C VSL SITE CONTROLLER SM,4C SM,4C fibre optic cable identification MC x2 FOBOT/FOPP VSL SITE CONTROLLER names refer to fibre cable FOBOT/FOPP FOSC SM,4C SM,4C L2 SWITCH FOBOT/FOPP FOSC FOSC schedule drawings. FOSC FOSC MC x2 FOBOT/FOPP MC MC MC FOSC FOSC WTS SM,24C SM,24C M101FCN FOBOT/FOPP WTS-3313 (FC-0101N) SM,24C SM, FOBOT/FOPP (CCTV0221) FO-M101FCN F0-VSL01N-L F0-VSL02N-R Field cabinet SM,24C circular communications pit NB FOSC-M102FCS SM,24C SM,24C (3) 3 (F0-M101FCN-M102FCS) 1000 SM,36C AREA OF Gympie Arterial Network (TMR Metro District Network) LIMIT SM,24C MINI FOBOT M102FCS SPD (PC-0102S) SPD

BCC - MBRC - SCRC

BRUCE HIGHWAY (BRISBANE - GYMPIE)

12096 U14 - 68292 10A

From start to end of job

INTELLIGENT TRANSPORT SYSTEM

NETWORK TOPOLOGY - DETAILD CONNECTIONS

SHEET 1 OF 1

ENGINEERING CERTIFICATION (RPE

SIGNATORY FULL NAME

ENG. AREA

10A/21A

Signatory: - RPEQ Full Name, Eng. Area and RPEQ No. or - Full Name and Position Title

Issued For Construction

Revisions/Descriptions

Survey Data

Auxiliary Drg No

Date

GDA94

MGA94

Zone56

AHD Derived

Not to Scale

CTL CHGE

U14/11

0.89

Queensland

Job No. 201/U16/XXXX

Contract No. CN-XXXX

Drawing No.

Government

2.15.9 Fibre optic topology

The fibre optic topology drawings show the fibre optic components within the network topology above and shall be in accordance with the requirements of MRTS234 *Communication Cables* and MRTS245 *ITS Telecommunications Network (ITS TN)* and show the high-level fibre optic topology as well as detailed site level fibre optic connections.

Key elements that shall be included in the Fibre Optic Topology drawing are:

- identification of Fibre Optic Breakout Trays(FOBOTs) on the plan using the appropriate and consistent labels across all the relevant Communications Detail Drawing
- a schedule adjacent to each FOBOT on the drawing showing the Source FOBOT ID / Port Number and Destination FOBOT ID / Port Number
- identification of Fibre Optic Splice Enclosures on the plan with a unique equipment ID as per the ITS Numbering Convention, specifying connection types and details of splicing and patching to devices
- identification of the pit containing the Fibre Optic Splice Enclosure on the plan with the Pit Identification ID from the Intelligent Transport System Layout Drawings (refer to Section 2.15.6)
- identification of the Fibre Optic Joint make, model and part number on the drawing, and
- displaying the Splice Diagram for any Splice Enclosure showing every core of every cable within the enclosure and detailing Fibre splicing information for each individual fibre optic joint.

Additionally, all cables shall be identified by their respective cable ID in the splicing diagram. Where each core is displayed it shall state onto which corresponding core it is spliced to. Where all cores of a specific loose tube are spliced 1 to 1 to another loose tube, the splicing of that tube may be represented by a single splice on the drawing. The presentation of the spliced, un-spliced cores and looped through fibre cores shall be labelled consistently.

Cores allocated to third parties shall be labelled on the plan accordingly.

Refer to Figures 2.15.9(a), 2.15.9(b) and 2.15.9(c) for examples of fibre optic topology drawings.

Figure 2.15.9(a) – Fibre Optic Topology (example 1)

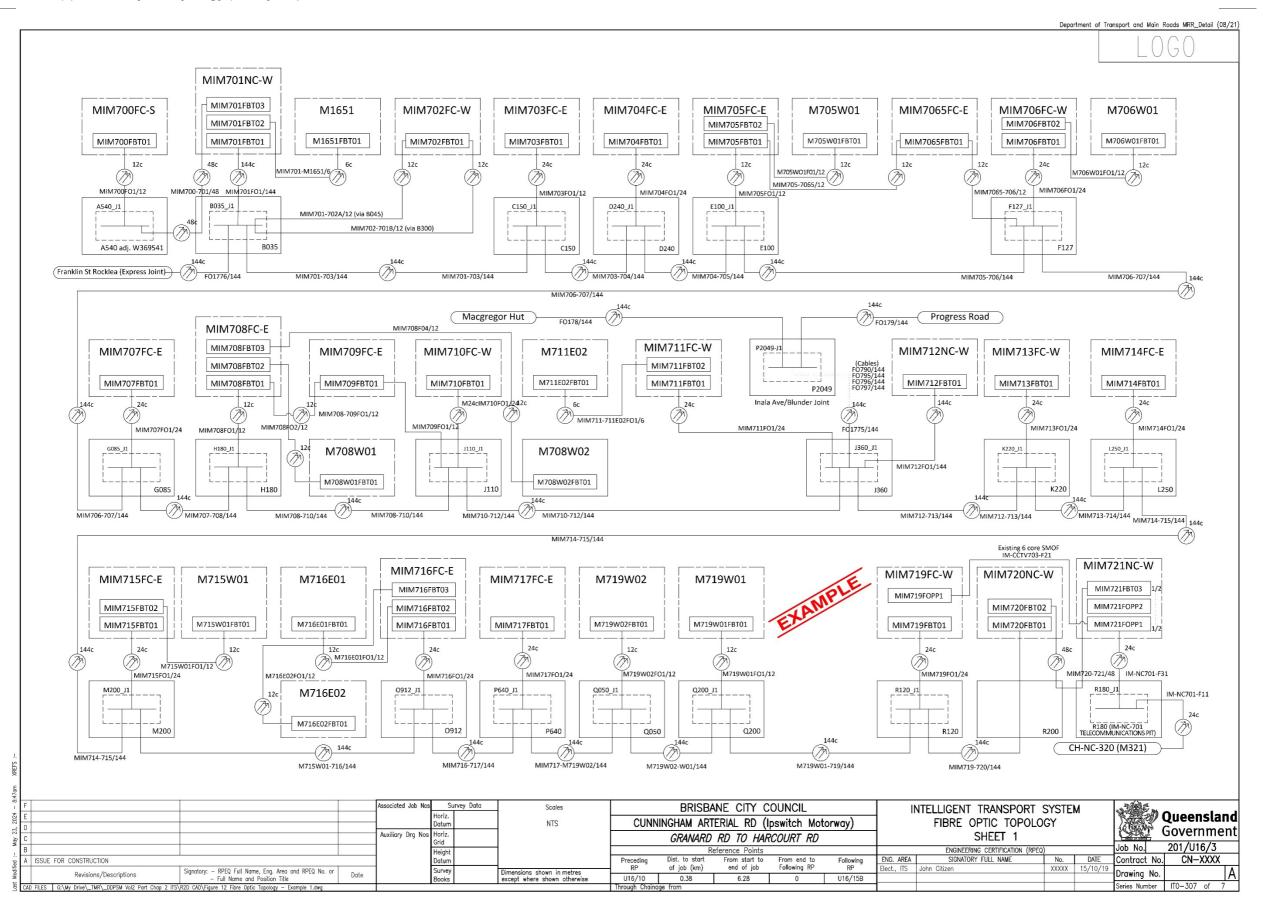


Figure 2.15.9(b) – Fibre Optic Topology (example 2)

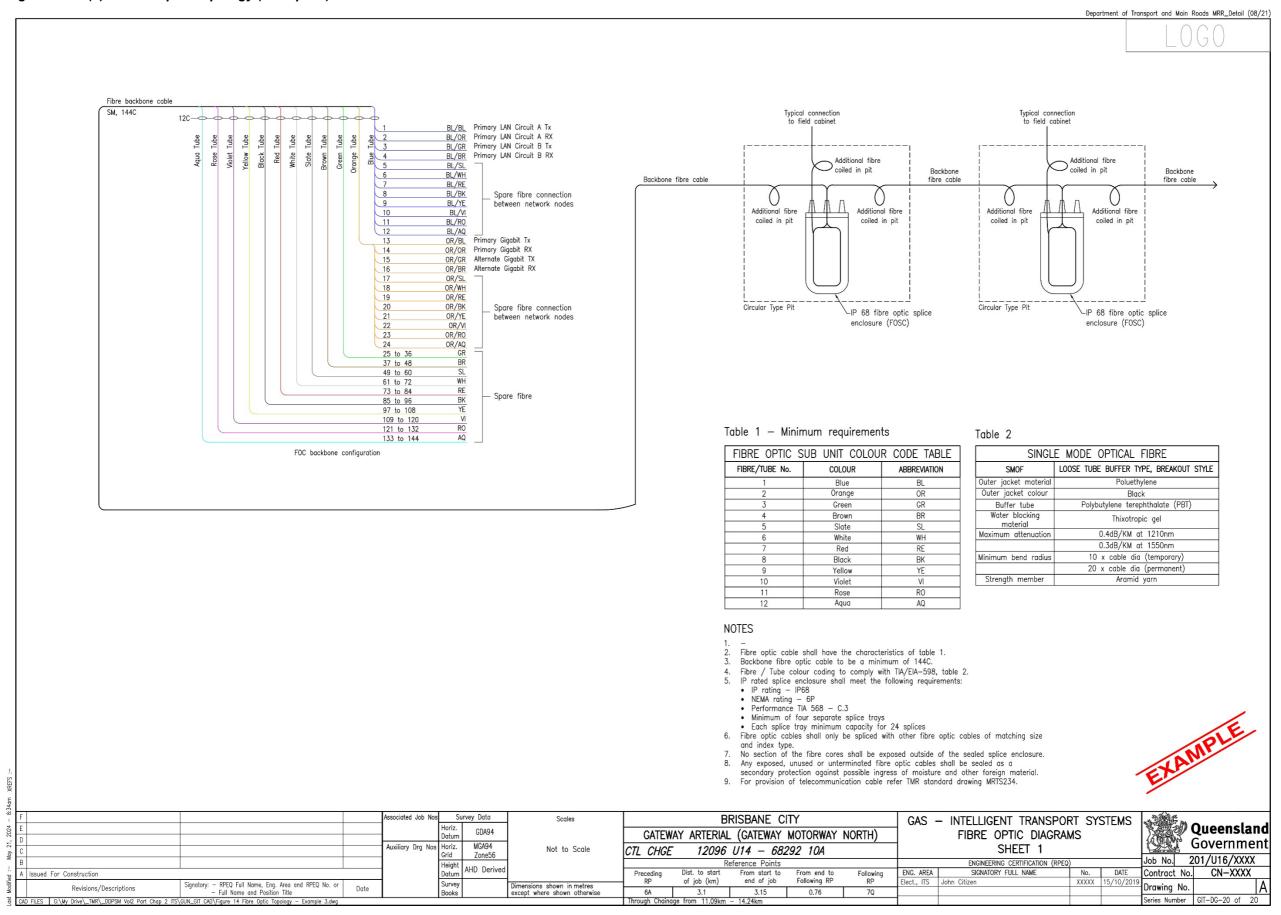
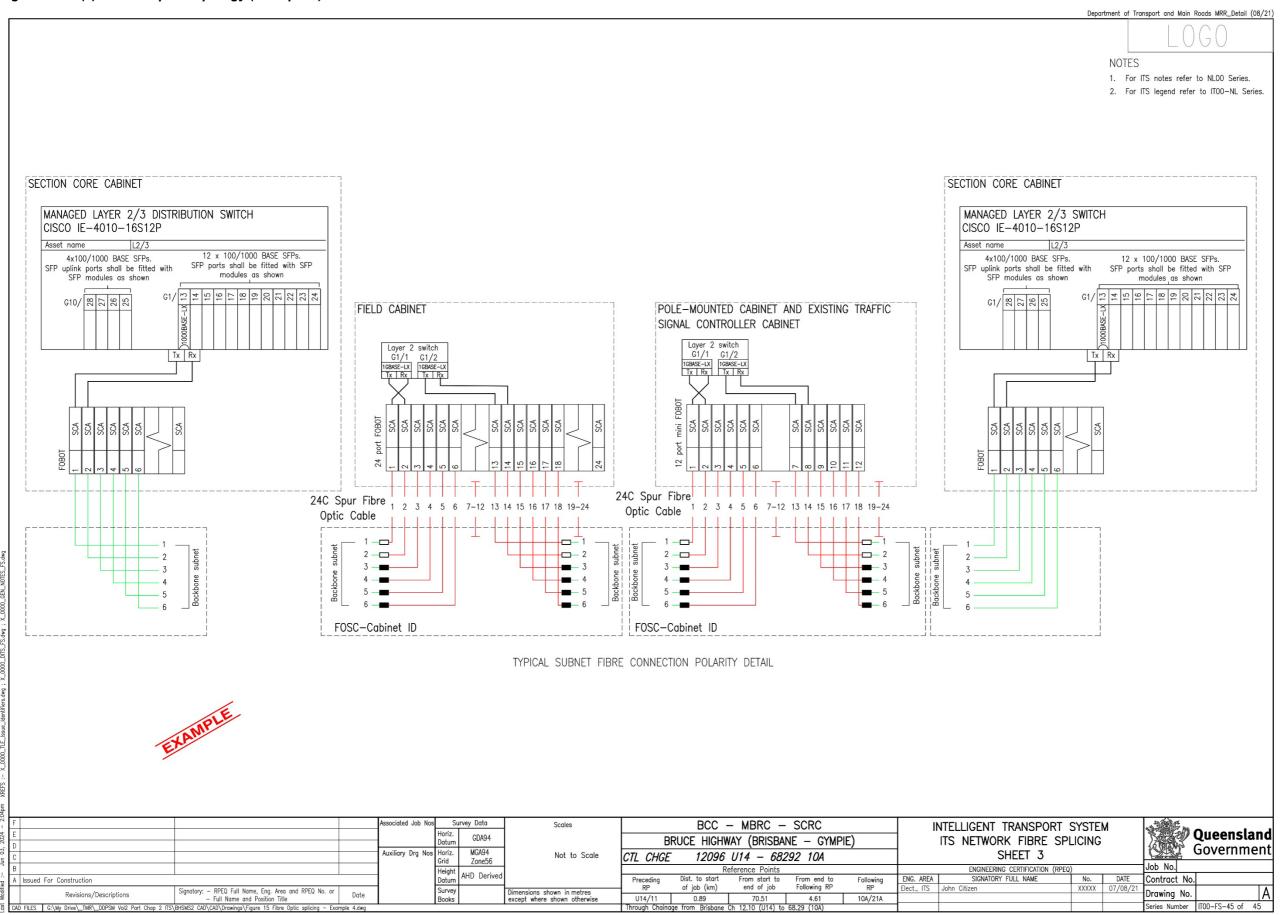


Figure 2.15.9(c) – Fibre Optic Topology (example 3)



2.15.10 Field cabinet details

These set of drawings provide, at the site level, all relevant information regarding the field cabinet at site.

The designer must provide a drawing for each cabinet in the project, and as a minimum each cabinet drawing must include:

- the civil construction details, which include site layout, plinth, surround concrete slab, pits and conduits, fencing and clearances from obstructions
- the internal cabinet equipment layout including electrical and communications schematics,
- · the communications single line drawings, and
- electrical single line diagrams showing the connections of the field cabinet to the power source as well as the destination ITS device.

These component drawings are detailed below.

Transport and Main Roads considers field cabinets to be site-specific installations requiring unique drawings and therefore project-wide typical installation details, such as those in Section 2.15.7, do not apply for field cabinet drawings.

This type of drawing applies to all the following types of field cabinets:

- ITS Node Cabinets
- ITS Field Cabinets
- Pole Mount Enclosures including CCTV, VSLS, LUMS, RC Signs, Solar and battery cabinets
- Post / Pedestal Mount Enclosures
- Traffic Signal Extension Cabinet (Top Hat)
- Traffic Signal Cabinet where no Extension Cabinet proposed, or ITS equipment mounted within the Traffic Signal Cabinet, and
- UPS Cabinet.

2.15.10.1 Civil Construction details (Field Cabinet Site layout)

This drawing shows, at a site level, the civil construction layout of each field cabinet and associated ITS infrastructure including:

- location information Site ID
- · cabinet make, model and manufacturer
- · the cabinet concrete slab layout
- · electrical pits and conduits
- communications pits and conduits
- retaining walls, fences, gates, guardrail, barrier

- maintenance access plan, and
- any other significant site-specific features.

The information expected include site-specific arrangements for the proper set-out, mounting, maintenance and installation of the ITS devices and equipment to the supporting structure or foundation, embankments and batters, and adjacent items at a particular site or location. It defines the installation and specific information needed including dimensional data, hardware descriptions, general configuration information and so on.

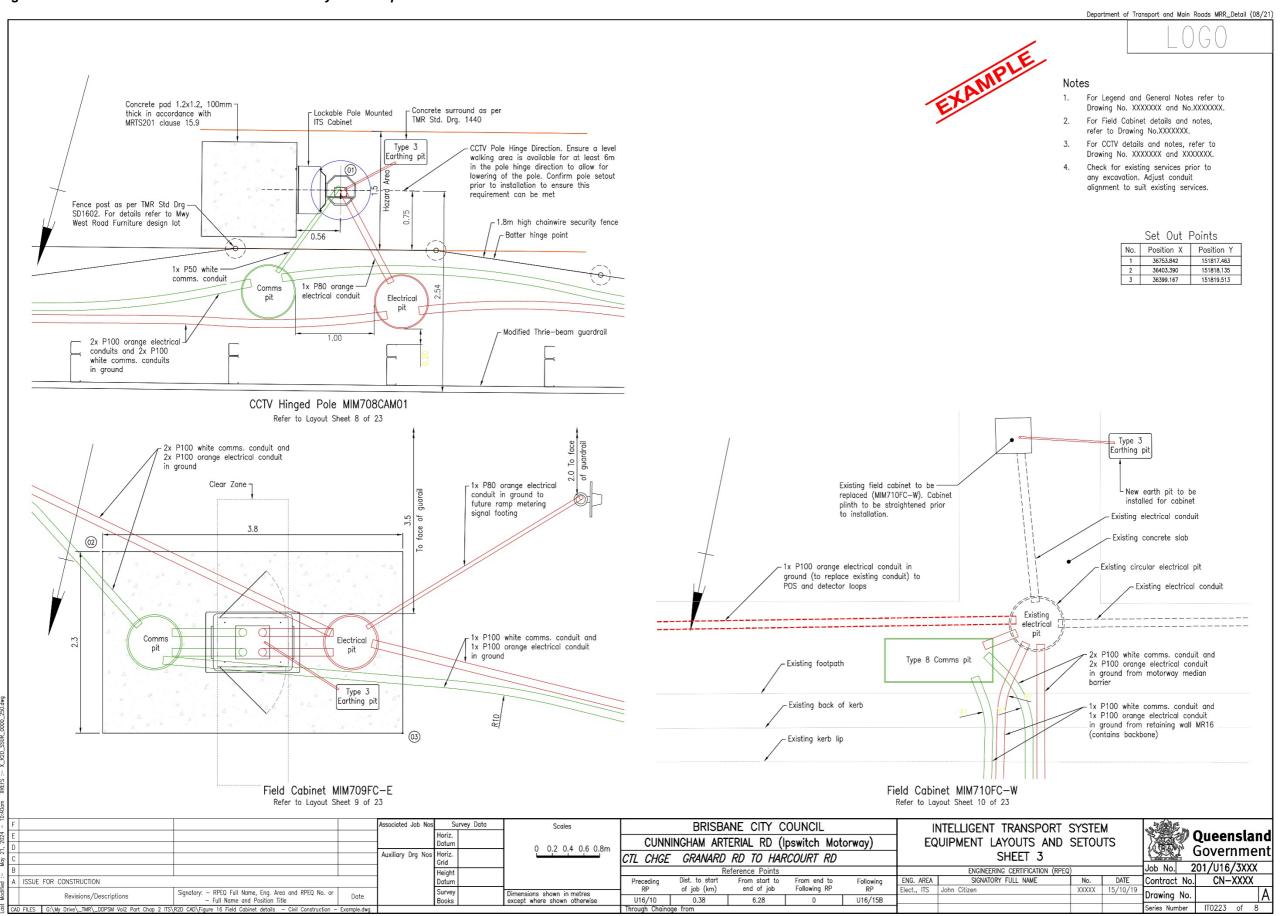
Pit and conduit detail shall include display of location, the transition from underground conduits into concrete barrier, on embankments and batters, or transition from underground conduits to surface mounted conduits, or conduit transition from verge into barrier and any other structure.

Refer to Figure 2.15.10.1 for an example of field cabinet civil construction detail.

To ensure comprehensive documentation, remote ITS hardware sites linked to the field cabinet should be integrated into the series related to the field cabinet. The civil layouts depicting the specific ITS equipment remotely linked to the cabinet might require an additional inset. However, in larger projects, detailed information about the remote ITS device, including maintenance access plans, should be documented separately under ITS device installation details – refer to Section 2.15.11

ITS Mounting Structures used in the project shall reference the correct Transport and Main Roads Structural Drawing number on the ITS drawings.

Figure 2.15.10.1 – Field cabinet civil construction layout example



2.15.10.2 Cabinet equipment layout and connections

2.15.10.2.1 General

This drawing shows the general layout arrangement of the cabinet internal components, and the ITS devices, equipment, and ancillaries for each individual rack within the cabinet.

A component list table for all native components in the cabinet, including the switchboard, power supplies, surge protection devices, fixed and sliding shelves, earthing parts and so on shall be provided. An equipment list table representing all the ancillary ITS devices and equipment in the cabinet shall be also provided on a separate list where necessary.

The table as a minimum shall contain details such as item number and description, make and models numbers, quantities, and any item specific information. The item in the table shall be in ascending order.

Refer to Figures 2.15.10.2.3(a) and 2.15.10.2.3(b) for example on representing field cabinet equipment layout.

Typically, the cabinet equipment layout drawing should be accompanied with electrical schematic, and equipment data communications and connections block diagram.

2.15.10.2.2 Field Cabinet Electrical Schematics

The electrical schematic shows, at the site-cabinet level, the electrical representations of the components and interconnections of the circuit using standardised symbolic representations. The schematic shall use symbols in accordance with Standard Drawing 1636 and Standard Drawing 1736. The presentation of the interconnections between circuit components in the schematic diagram does not necessarily correspond to the physical arrangements of the installation.

Refer to Figure 2.15.10.2.3(c) for an example of field cabinet electrical schematic.

2.15.10.2.3 Field Cabinet Communications and Connections Diagram

The communications and connections diagram shall show equipment, interconnections, and their relative position to a cabinet. Connection details must include as a minimum, FOBOT, Network Switches, and Field Processor.

Where devices use industry standard connectors (RJ45, RS232, RS422), pinouts are not required. Where screw connectors or other like connectors are used, the individual wiring detail is required to be shown.

The physical characteristics and connections must be detailed for logical understanding and to assist in troubleshooting. The diagram shall also include information on the make and model, type and size of cables and connectors, protocols, and any specific information as appropriate.

All cables and hardware details in the communications drawings shall be labelled with unique IDs in accordance with ITS Device numbering scheme.

Connections to external ITS equipment may be shown at a high level to provide an overview of the entire device / system connection. However, the detailed connections of the external ITS equipment shall be provided as part of the ITS device installation details described in Section 2.15.11.

Explanatory notes may be provided on the drawing. Refer to Figure 2.15.10.2.3(d) for an example.

Figure 2.15.10.2.3(a) – Field Cabinet equipment layout example

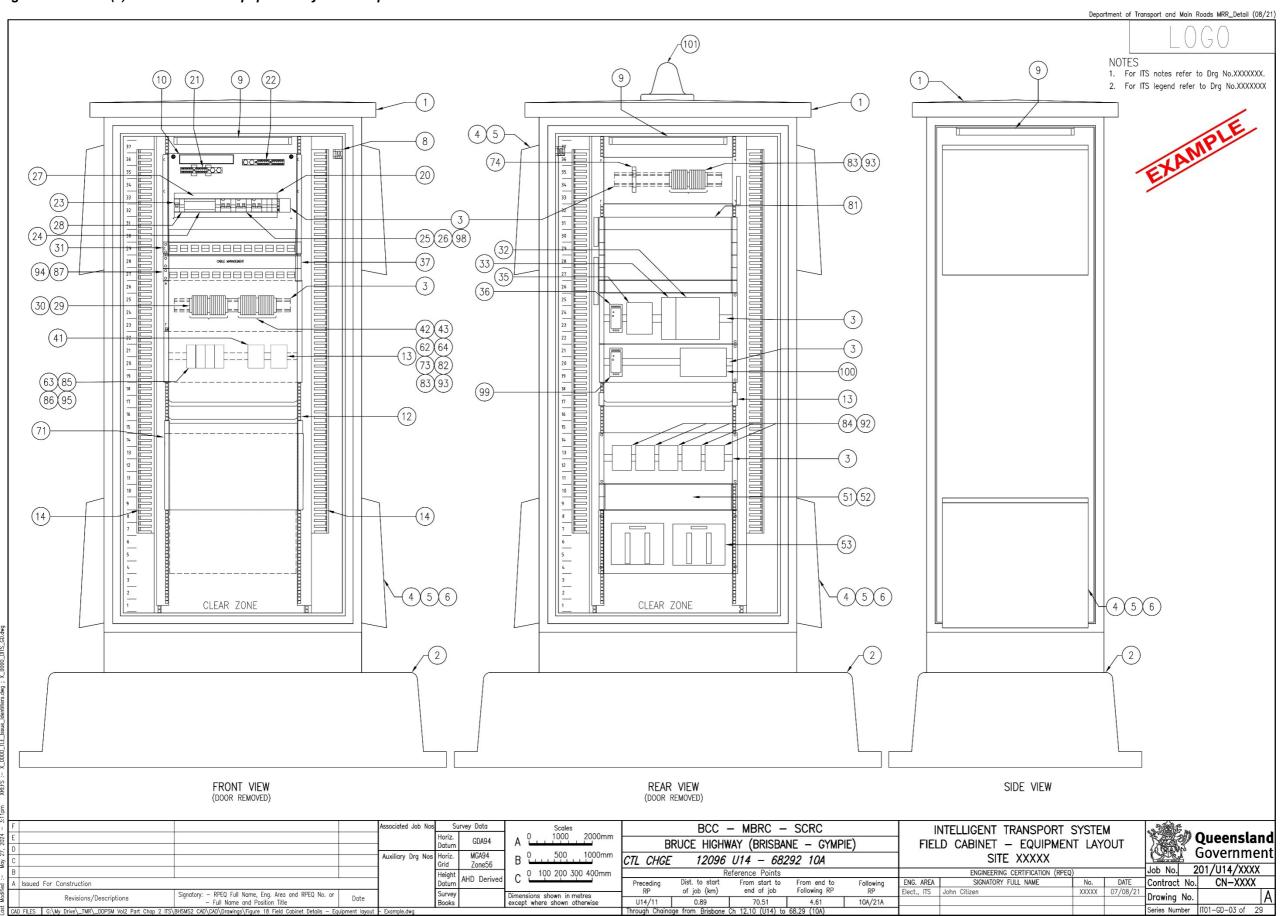


Figure 2.15.10.2.3(b) – Field cabinet equipment schedule - example

TMF	SCHEDULE			FΩ	LJIPMFN	NT SCHEDULE (CONTINUE	וו		NOTES
	1	DETAILS	MANUFACTURER / PART NO (OR APPROVED	7 [1	1	Í	MANUFACTURER / PART NO (OR APPROVED	For ITS notes refer to Draw No.XXXXXXX.
4	DESCRIPTION	DETAILS	EQUIVALENT)	4	ITEM	DESCRIPTION	DETAILS	EQUIVALENT)	2. For ITS legend refer Drawii
+	Concrete Plinth Din Rail	Precast, 300H X 1350W X 800D DIN Rail 35mm Slotted	Logix / ITCS-CP-031306 Standard Issue With Logix PME 100603/S/W	+		- CCTV 24VAC Power Cable (Not Shown)			No.XXXXXXX
	Vent And Hood	Logix Proprietary Part (LOGIX PME HOOD). Comes C/W Vermin	Standard Issue With Logix PME 100603/S/W	+	Add (Where	Fixed CCTV (Security) Camera			
+	Ventilation Inlet / Filter	Mesh	Leipold FK5522.300	+	Specified	i)			/
	Fan (Not Shown)	24 VDC, 230 CFM	Leipold		66	- Industrial PoE Injector - CCTV PoE RJ45 Surge	Input 12-48VDC, PoE: 802.3af, Class 3, 30W	Planet IPOE-162	JOV
	Thermostat + End Cap (Not Shown)		Leipold JWT6011F + Weidmuller EW35	NTS)	67	Protector - Ethernet Patch Lead (Not	PoE: 802.3af, Class 3	Novaris RJ45-1CAT6	EXAMPLE
\exists	Door Limit Switch		Telemecanique XCK-P			Shown)	Cat6A Ethernet UTP Cable — RJ—45 Terminated		CAN'
+	Internal Light Communications Earth Terminals	5W/24VDC LED Light Batten 25mm2 Terminals	Techlight ST3930 Standard Issue With Logix PME 100603/S/W	- 9	Add (Where	Vehicle Detection-RADAR (VDR):			
	Door Handle And Lock (Not Shown)	3 Point Locking Mechanism	Cyber Lock Issued With Logix ITCS 180906/TMR/226	- -	Specified				
	Door Handle And Lock (Not Snown)	3 Form Locking Mechanism	Cyber Lock Issued with Logix 1163 100900/1Mity 220	 <u> </u>	81	Detection System (Not Shown)		Wavetronix SmartSensor HD SS-126	
+	Solar Label	Solar 24VDC (AS5033)		1 \{	82	- Combined Coms & 24VDC Surge Protector	Din Rail Mount	Wavetronix Click 200 Voltage Surge Protection	
	Cabinet Identifier Label (Not Shown)			7 2	83	- 12VDC To 24VDC Power Supply	12VDC-24VDC 30W 1.25A DIN Mount Power Supply	Snaptec GB30-1224	
\pm	10" Chalf 490mm Vantlated Cliding		Standard Issue With PME100603/S	- AND	84	-24VDC Protection Device (SPD) -RS422 / RS485		Novaris SSP6A-26-G	
	19" Shelf - 480mm Ventlated Sliding		Standard Issue With PME100603/S	- Iss	85	Converter/Repeater/Isolator	Din Rail Mount	CESCOM CE-0019D RS422/RS485 Repeater/Isolator	
+	19" Shelf - Fixed		Sturiouru issue with FME100000/3	+		-3 Way Fused Terminal Block -9 Way Terminal Block	Din Rail Mount In Enclosure Mounted Within Pole Hatchway Din Rail Mount In Enclosure Mounted Within Pole Hatchway		
	40mm X 60mm Cable Duct			1		-24VDC Power Cable	2 Core 4mm PVC/PVC Cable (Not Shown)		
	Quick Release Gland Plates (Not Shown)					-RS422 Serial UTP Cable	U/G Cat 6 UTP PE/PE Cable (Not Shown)		
	A3 Documents Holder (Not Shown)] L		-RS422 Serial UTP Cable	Cat 6 UTP PE/PE Patch Cable (Not Shown)		
	Solar Equipment: - PV Fuse Holder + Fuse	25A, 30A, 1000V	Mersen HP10M25, HP10M30 + Legrand 05808	-					
1	- MPPT Solar Regulator	100V, 30A	Victron SmartSolar MPPT 100/30 - Part No.	1					
-	- VE Direct To Modbus/TCP Converter	Solar Equipment Monitoring	SCC110030210 Victron Venus GX + Victron ASS030530218	+					
	+ VE Direct 1.8m Cable - Dual Gang Panel / Battery /			-					
	Equipment Isolator	63A	ABB SD202/63 2CDD282101R0063						
+	- Fuse Holder + Fuse	Rated For DC Voltages Normally Screw/Bolt Weidmuller Terminals If Used. Size	Legrand 05808 + Fuse	٠					
	- Fuse Terminals (ELV)	Dependent On Cable Size.			SOLA	R EQUIPMENT — EXTERNA	AL 10 FIELD CABINET		
	- Terminals	Normally Screw/Bolt Weidmuller Terminals If Used. Size Dependent On Cable Size.		ITE	M DESC	CRIPTION	DETAILS	Manufacturer / Part No (Or Approved Equivalent)	
	- Solar PV Surge Protector (Monitored)	Solar PV Protector With Remote Alarm	Novaris SDPV-50-1000	1 2		lar Panel Pole lar Panel Pole Footing	7m Solar Panel Pole As Per TMR SD1684	GM Poles I.D FBM-07-TMR	
	- DC Surge Protector For Solar	Solar DC Protector With Remote Alarm	Novaris SDD2-40-50	7 L		lar Panels	24VDC, 360W, Monocrystalline	Victron SPM043602400 1956L X 992W	
+	System (Monitored) - Battery Protection Module	12/24VDC 65A Battery Protection Module For Use With MPPT		4	- Sol	lar Panel Bracket	To Suit Pole And Solar Panel	Design By Manufacturer	
	- Temperature Sensor	100/30 1-Wire Temperature Sensor, Mounted Internally To Cabinet	Victron 12/24V 65A Battery Protection Module	5		,	Lithium Iron Phosphate (LiFePo4) 24VDC, 150Ah	SPB Sentry SNLV150BT 518L X 271W X 222H	
		1-wire reinperdure Sensor, Mounted internally to Cabinet	Teracom TST100	ے I ا	- Inlin	ine Waterproof Fuse For Underground	100	Bussman PV-40ANH1 + Bussman SD1-D-PV	
_	- Recessed Mounting Plate Incl DIN			6	Mount	ting	40A, 1000V	bussilian 17 Torrent 1 bussilian Sb1 b 17	
	Rail Communications Equipment:			- 0 7	Mount	ting se In Reopenable Joint (30A)	40A, 1000V As Per SD1624	Bussman 17 Turtiff 1 Bussman Suf D 17	
_	Rail	C/W Security Dongle	Transmax / FP.MINI-6		Mounti - Fus - Bat	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly	10000 1 (0.00000)	Tri Underground 14479	
	Rail Communications Equipment: - Field Processor - Ethernet I/O Module	Modbus TCP/IP	Teracom TCW241	- 7	Mounti - Fus - Bat	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel	As Per SD1624		
	Rail Communications Equipment: — Field Processor — Ethernet I/O Module — NTU	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi	Teracom TCW241 UHS UC-441-T	7 8 9	— Bat — Bat — Bat — Cover — 15r	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail	Tri Underground 14479	
	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi 698–960&1710–2700MHz	Teracom TCW241	7 8 9 10	Mounti - Fus - Bat Cover - 15r	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel rm Hinged CCTV Pole rm Hinge Pole Footing	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684	Tri Underground 14479 Tri Underground BB—TRI—CS—01 / BB—TRI—CS—02 GM Poles I.D MH—CAM15—TMR	
	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna - Serial Patch Lead (Not Shown)	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi	Teracom TCW241 UHS UC-441-T	7 8 9	Mounti - Fus - Bat - Bat Cover - 15r - 15r - 15r	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684 RJ45 Network Terminations, Din Rail Mount	Tri Underground 14479 Tri Underground BB—TRI—CS—01 / BB—TRI—CS—02 GM Poles I.D MH—CAM15—TMR Novaris RJ45—1CAT6	
	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi 698–960&1710–2700MHz RS232 Serial STP Cable CAT 6A, RJ45–RJ45	Teracom TCW241 UHS UC-441-T Elite Electroncis RFI CDQ7195-B	9 - 10 - 12	Mounti Fus Bat Bat Cover 1 - 15r 1 - 2 - Et - 1F	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole m Hinge Pole Footing thernet Surge Protection Device (PoE) VAC Surge Protection	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684 RJ45 Network Terminations, Din Rail Mount Novaris DIN Mount Mounted In CCTV Pole Hatch	Tri Underground 14479 Tri Underground BB—TRI—CS—01 / BB—TRI—CS—02 GM Poles I.D MH—CAM15—TMR	
	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna - Serial Patch Lead (Not Shown) - Ethernet Patch Lead (Not Shown)	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi 688–960&1710–2700MHz RS232 Serial STP Cable	Teracom TCW241 UHS UC-441-T	7 8 9 10 11 12 13 14 15	Mounti - Fus - Bat - Bat - Cover - 15r - 1	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole m Hinge Pole Footing thernet Surge Protection Device (PoE) VAC Surge Protection P66 Enclosure Jin Rail And Terminals	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684 RJ45 Network Terminations, Din Rail Mount Novaris DIN Mount	Tri Underground 14479 Tri Underground BB-TRI-CS-01 / BB-TRI-CS-02 GM Poles I.D MH-CAM15-TMR Novaris RJ45-1CAT6 Novaris SSP6A-38-G	
i re	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna - Serial Patch Lead (Not Shown) - Ethernet Patch Lead (Not Shown) - Cellular Antenna Coaxial Surge	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi 698–960&1710–2700MHz RS232 Serial STP Cable CAT 6A, RJ45–RJ45	Teracom TCW241 UHS UC-441-T Elite Electroncis RFI CDQ7195-B	7 8 9 10 11 12 13 14 15	Mount - Fus - Bat - Bat Cover - 15r - 17r	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole m Hinge Pole Footing thernet Surge Protection Device (PoE) VAC Surge Protection P66 Enclosure in Hinged VDS-RADAR Pole	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684 RJ45 Network Terminations, Din Rail Mount Novaris DIN Mount Mounted In CCTV Pole Hatch Mounted In Enclosure	Tri Underground 14479 Tri Underground BB-TRI-CS-01 / BB-TRI-CS-02 GM Poles I.D MH-CAM15-TMR Novaris RJ45-1CAT6 Novaris SSP6A-38-C Schneider/Thalassa PC NSYTBP241910H	
d reeied)	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna - Serial Patch Lead (Not Shown) - Ethernet Patch Lead (Not Shown) - Cellular Antenna Coaxial Surge Protector (Not Shown) PTZ CCTV Equipment (Per Camera):	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi 688-9604.1710-2700MHz RS232 Serial STP Cable CAT 6A, RJ45-RJ45 In Line SPD With N-Type Female / Female Connectors	Teracom TCW241 UHS UC-441-T Elite Electroncis RFI CDQ7195-B Novaris CN-FF-90-3	7 8 9 10 1: 1: 1: 14 15 16 11	Mounting	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole m Hinge Pole Footing thernet Surge Protection Device (PoE) VAC Surge Protection P66 Enclosure in Roll And Terminals n Hinged VDS-RADAR Pole n Hinged VDS-RADAR Pole Footing	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684 RJ45 Network Terminations, Din Rail Mount Novaris DIN Mount Mounted In CCTV Pole Hatch Mounted In Enclosure Footing Details As Per TMR Std Drg 1328 And 1684	Tri Underground 14479 Tri Underground BB-TRI-CS-01 / BB-TRI-CS-02 GM Poles I.D MH-CAM15-TMR Novaris RJ45-1CAT6 Novaris SSP6A-38-C Schneider/Thalassa PC NSYTBP241910H	
i re	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna - Serial Patch Lead (Not Shown) - Ethernet Patch Lead (Not Shown) - Cellular Antenna Coaxial Surge Protector (Not Shown)	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi 698–960&1710–2700MHz RS232 Serial STP Cable CAT 6A, RJ45–RJ45	Teracom TCW241 UHS UC-441-T Elite Electroncis RFI CDQ7195-B	7 8 9 10 11 12 13 14 15 16 17 18	Mount - Fus - Bat - Bat - Cover - 15r - 15r - 15r - 15r - 15r - 17r - 7m - 7m - Cover - Cover - 7 - 7m - Cover	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole m Hinge Pole Footing thernet Surge Protection Device (PoE) VAC Surge Protection P66 Enclosure in Roil And Terminals n Hinged VDS-RADAR Pole n Hinged VDS-RADAR Pole Footing mmunications Pit	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684 RJ45 Network Terminations, Din Rail Mount Novaris DIN Mount Mounted In CCTV Pole Hatch Mounted In Enclosure Footing Details As Per TMR Std Drg 1328 And 1684 600mm Circular Communication Pit With Steel Cover	Tri Underground 14479 Tri Underground BB-TRI-CS-01 / BB-TRI-CS-02 GM Poles I.D MH-CAM15-TMR Novaris RJ45-1CAT6 Novaris SSP6A-38-C Schneider/Thalassa PC NSYTBP241910H	
d reeied)	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna - Serial Patch Lead (Not Shown) - Ethernet Patch Lead (Not Shown) - Cellular Antenna Coaxial Surge Protector (Not Shown) PTZ CCTV Equipment (Per Camera): - 24VDC-24VAC Inverter	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi 688-9604.1710-2700MHz RS232 Serial STP Cable CAT 6A, RJ45-RJ45 In Line SPD With N-Type Female / Female Connectors 24VDC-24VAC 100W DC/AC Inverter	Teracom TCW241 UHS UC-441-T Elite Electroncis RFI CDQ7195-B Novaris CN-FF-90-3 Snaptec CSI24-100-24	7 8 9 10 1: 1: 1: 14 15 16 11	Mount - Fus - Bat - Bat Cover 0 - 15r - 15r - 15r - 15r - 15r - 17r - 7m - 7m - Corr -	se In Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole m Hinge Pole Footing thernet Surge Protection Device (PoE) VAC Surge Protection P66 Enclosure in Roll And Terminals n Hinged VDS-RADAR Pole n Hinged VDS-RADAR Pole Footing	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684 RJ45 Network Terminations, Din Rail Mount Novaris DIN Mount Mounted In CCTV Pole Hatch Mounted In Enclosure Footing Details As Per TMR Std Drg 1328 And 1684	Tri Underground 14479 Tri Underground BB-TRI-CS-01 / BB-TRI-CS-02 GM Poles I.D MH-CAM15-TMR Novaris RJ45-1CAT6 Novaris SSP6A-38-C Schneider/Thalassa PC NSYTBP241910H	
d free ree (ied)	Rail Communications Equipment: - Field Processor - Ethernet I/O Module - NTU - Cellular Antenna - Serial Patch Lead (Not Shown) - Ethernet Patch Lead (Not Shown) - Cellular Antenna Coaxial Surge Protector (Not Shown) PTZ CCTV Equipment (Per Camera): - 24VDC-24VAC Inverter - Ethernet Surge Protection Device - 24VAC Surge Protection - HRC Fuse Holder + Fuse (For	Modbus TCP/IP IPRT Compliant NTU Omnidirectional Mobile Antenna LTE 6.5dBi 688-960&4710-2700MHz RS232 Serial STP Cable CAT 6A, RJ45-RJ45 In Line SPD With N-Type Female / Female Connectors 24VDC-24VAC 100W DC/AC Inverter RJ45 Network Terminations, Din Rail Mount	Teracom TCW241 UHS UC-441-T Elite Electroncis RFI CDQ7195-B Novaris CN-FF-90-3 Snaptec CSI24-100-24 Novaris RJ45-1CAT6	77 88 99 110 12 13 14 15 16 17 18 18 19 20 2	Mount	se in Reopenable Joint (30A) ttery Box Base + Lid Assembly ttery Pit Concrete Enclosure With Steel m Hinged CCTV Pole m Hinge Pole Footing thernet Surge Protection Device (PoE) VAC Surge Protection P66 Enclosure in Rail And Terminals n Hinged VDS-RADAR Pole n Hinged VDS-RADAR Pole Footing mmunications Pit rth Pit, Stake And Conduit attic Dome CCTV 8GB Micro SDHC Card	As Per SD1624 Waterproof Battery Bell, As Per Battery Installation Detail 956L X 756W, As Per Battery Installation Detail Footing Details As Per TMR Std Drg 1328 And 1684 RJ45 Network Terminations, Din Rail Mount Novaris DIN Mount Mounted In CCTV Pole Hatch Mounted In Enclosure Footing Details As Per TMR Std Drg 1328 And 1684 600mm Circular Communication Pit With Steel Cover As Per SD1627	Tri Underground 14479 Tri Underground BB-TRI-CS-01 / BB-TRI-CS-02 GM Poles I.D MH-CAM15-TMR Novaris RJ45-1CAT6 Novaris SSP6A-38-G Schneider/Thalassa PC NSYTBP241910H TH35 7.5 HikVision DS-2CD1753G0-I(Z)	
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Figure 2.15.10.2.3(c) – Field cabinet electrical schematic example

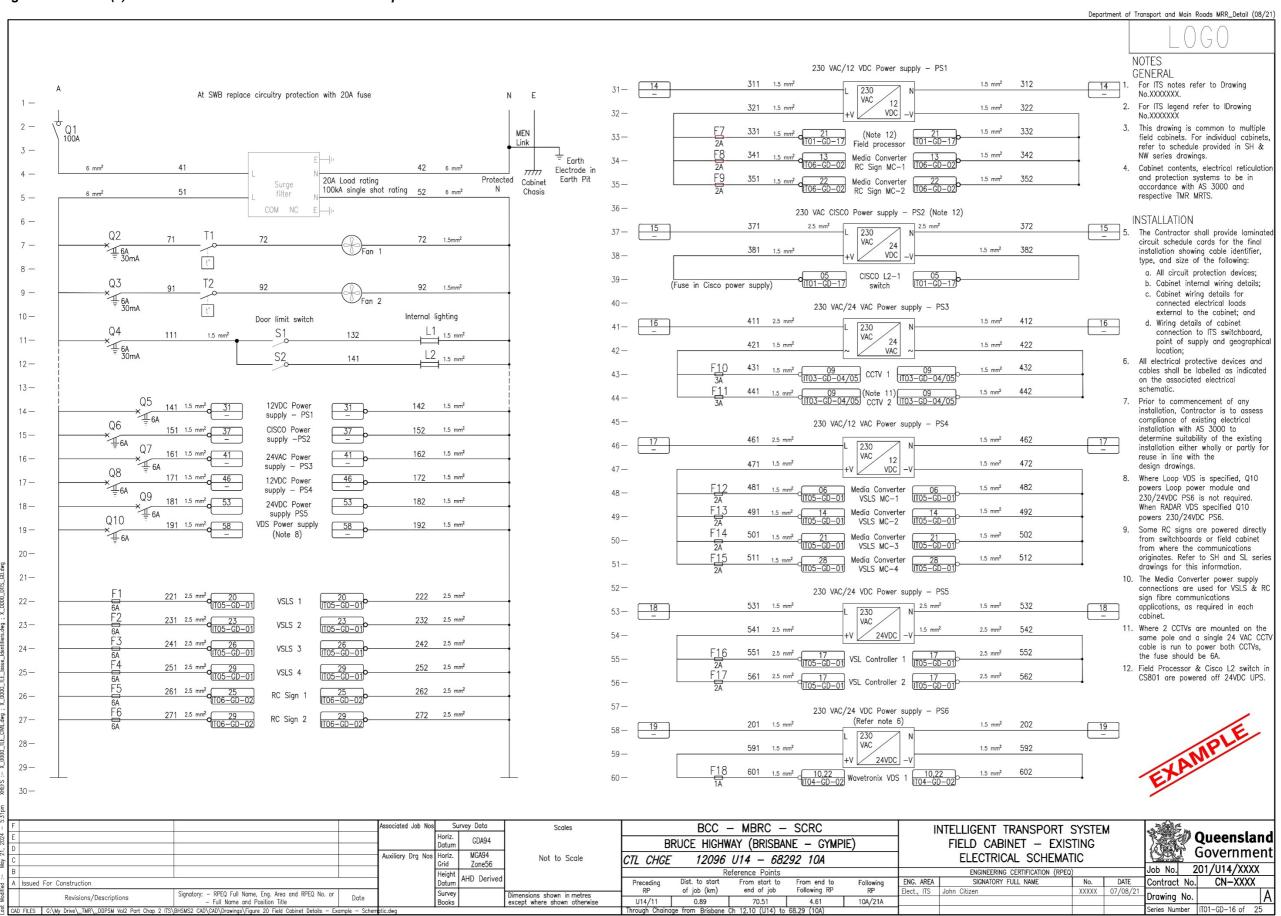


Figure 2.15.10.2.3(d) – Field cabinet communications and connections diagram example Department of Transport and Main Roads MRR_Detail (08/21) ITS CABINET - MIM701NC SC PATCH LEAD - CAT5 (MIM701L201-D01) - RS422 SERIAL 144 PORT FOBOT LAYER 3 SWITCH (5000) LAYER 2 SWITCH MIM701FBT01 FIELD PROCESSOR 1 VSL SIGN CONTROLLER EQUIP NO MIM701DDS01 EQUIP NO MIM701L201 EQUIP NO MIM701FP01 EX-4550 HALTC 38 SC/APC EQUIP NO MIM701SGC1 10GE1 25x RJ45 RJ45 2x RJ45 RS422 to RS422 MIM701VSLS01W Sign 1 SEE Drawing 2 RS232) RJ45 RS422 (10GE1) RJ45 GE1 RS232 (26x L302-D11 EARTH E EBGP1-2 SITE ID LOOP 1 RS232 ((MIM701L201-D13) -MIM701FP01-SITE ID LOOP 2 RJ45 Surge Protector LOOP 3 EXTERNAL MIM712DAS01 EQUIP NO MIM701SP01 TO M1719-FP o RJ45 (M1719-D01 RJ45 - CAT5 (MIM701L302-D12) Granard/ Ipswich intersection EARTH E MIM712DAS02 SC PATCH LEAD NETWORK LOOP RETURN MIM720DDS L SC PATCH LEAD 144 CORE TO VEHICLE DETECTOR RS232 MIM701F01 (MIM701L302-D11) CAT5 -RACK MIM701DR01 SEE Drawing SC PATCH LEAD MIM704L2 No.XXXXXXX SC PATCH LEAD M1651L2 LAYER 3 SWITCH (4000) CAT 5 TO CCTV MIM701CAM01 EQUIP NO MIM701DAS01 -(MIM701L201-D14) SEE Drawing No.XXXXXXX IBGP1-1 SC PATCH LEAD MIM12-DAS-02 CAT 5 TO WEB CAM MIM701WWEB01 48 PORT FOBOT CAT 5 MIM701WWEB02 ID MIM701FBT03 SEE Drawing 5 SC/APC 6 SC/APC No.XXXXXXX MIM700L2 MIM700L201 BAUD RATES: VSLS Baud Rate is 38400 RC SIGNS (RC1, RC2 & RC3) Baud Rate is 115200 ONLY BEND INSENSITIVE 48 SC/APC 48 CORE FIBRE Queensland Government Survey Data BRISBANE CITY COUNCIL INTELLIGENT TRANSPORT SYSTEM CUNNINGHAM ARTERIAL RD (Ipswitch Motorway) CABINET MIM701NC - DATA CABLING uxiliary Drg N CTL CHGE GRANARD RD TO HARCOURT RD JOHN CITIZEN ELECTRICAL RPEQ 17334 24.08.22 AS CONSTRUCTED REVISIONS 201/U16/3 Job No. B AS CONSTRUCTED JOHN CITIZEN ELECTRICAL RPEO 17334 19.08.21 CN-XXXX Dist. to start of job (km) Contract No. From start to end of job From end to Following RP Following RP Signatory: - RPEQ Full Name, Eng. Area and RPEQ No. or - Full Name and Position Title Drawing No. Revisions/Descriptions U16/15B U16/10 0.38 6.28

2.15.10.3 Electrical Single line diagram

This drawing shows, at a project wide and/or site level, a simplified diagrammatic and symbolic representation of an electrical installations for each site from the point of supply through the internal components of the ITS cabinet and ending at the ITS device connected to the cabinet.

Note that the field cabinet is at the centre of the electrical single line diagram, linking the point of supply to the ITS end devices.

Electrical and ITS symbols shall be in accordance with Standard Drawings 1636, 1736 and 1836.

Unless otherwise directed, the drawing shall be organised such that electrical connections are from left-to-right, top-to-bottom sequence.

The diagram shall provide details including:

- the point of supply ID
- · main switchboard details
- · distribution board details
- physical / electrical characteristics (including ID) of:
 - consumer's mains cable
 - isolators
 - circuit protections
 - internal cabinet components and wiring, and
 - sub mains cables leading to the intended roadside ITS device.

The internal component wiring should not include portable or stationary electrical equipment connected by plug and socket-outlet.

The identifiers such as cabinet and circuit ID's and references are to be also included next to the symbol.

It is preferred that the presentation of the interconnections between circuit components in the single line diagram correspond to the physical arrangements of the installation by providing a geographic electrical diagram such that the connections are traced through the road layout.

A table with the calculated maximum Voltage Drop (Vd) and Earth Fault Loops Impedance (EFLI) at the point of supply, cabinet, equipment, and AS/NZS 3000 *Electrical installations (Wiring Rules)* maximum values of EFLI figures shall be included. The EFLI measurements by the contractor shall also be shown in the table following installation.

Explanatory notes may be provided on the drawing. Refer to Figures 2.15.10.3(a) and 2.15.10.3(b) for examples.

Figure 2.15.10.3(a) – Electrical single line diagram (example 1)

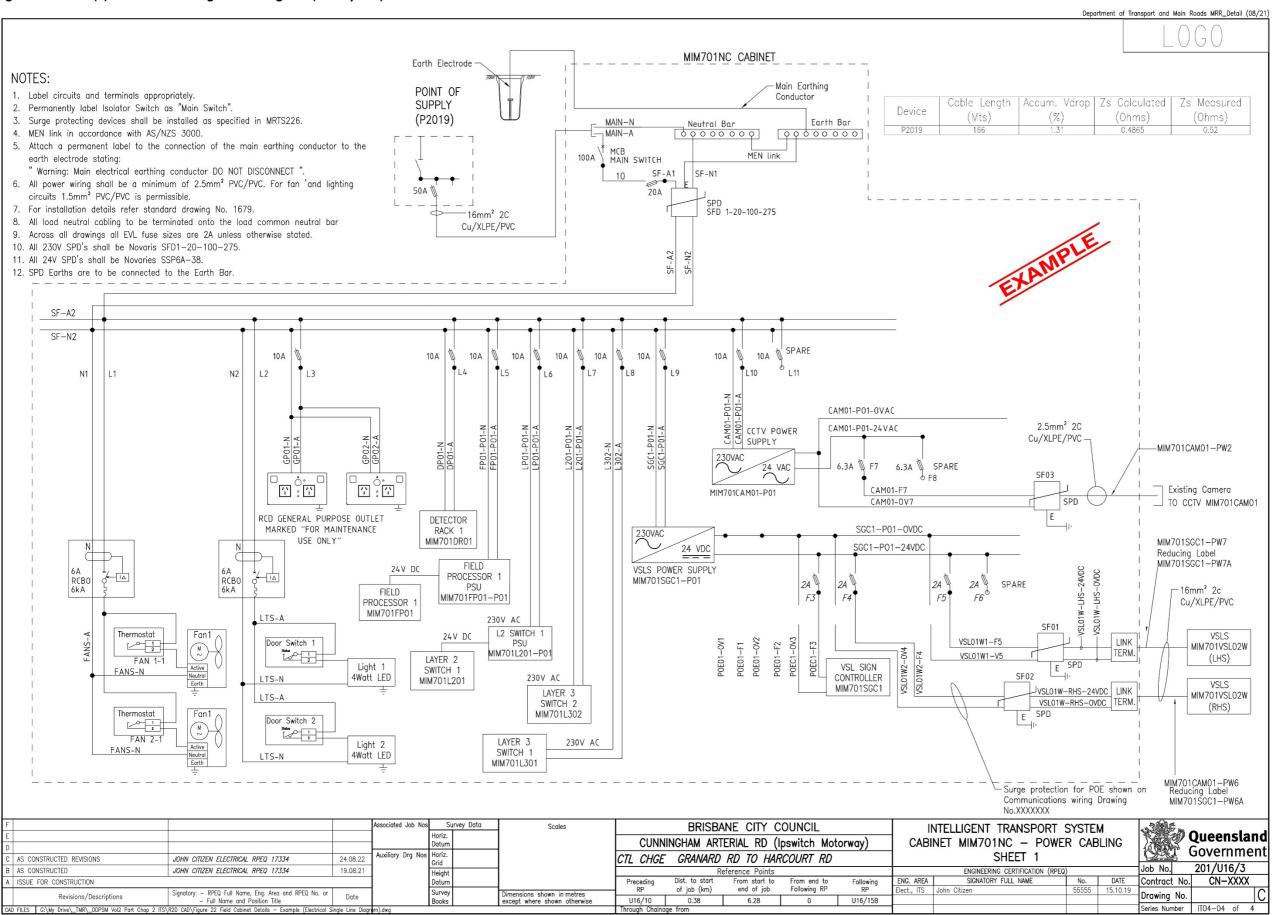
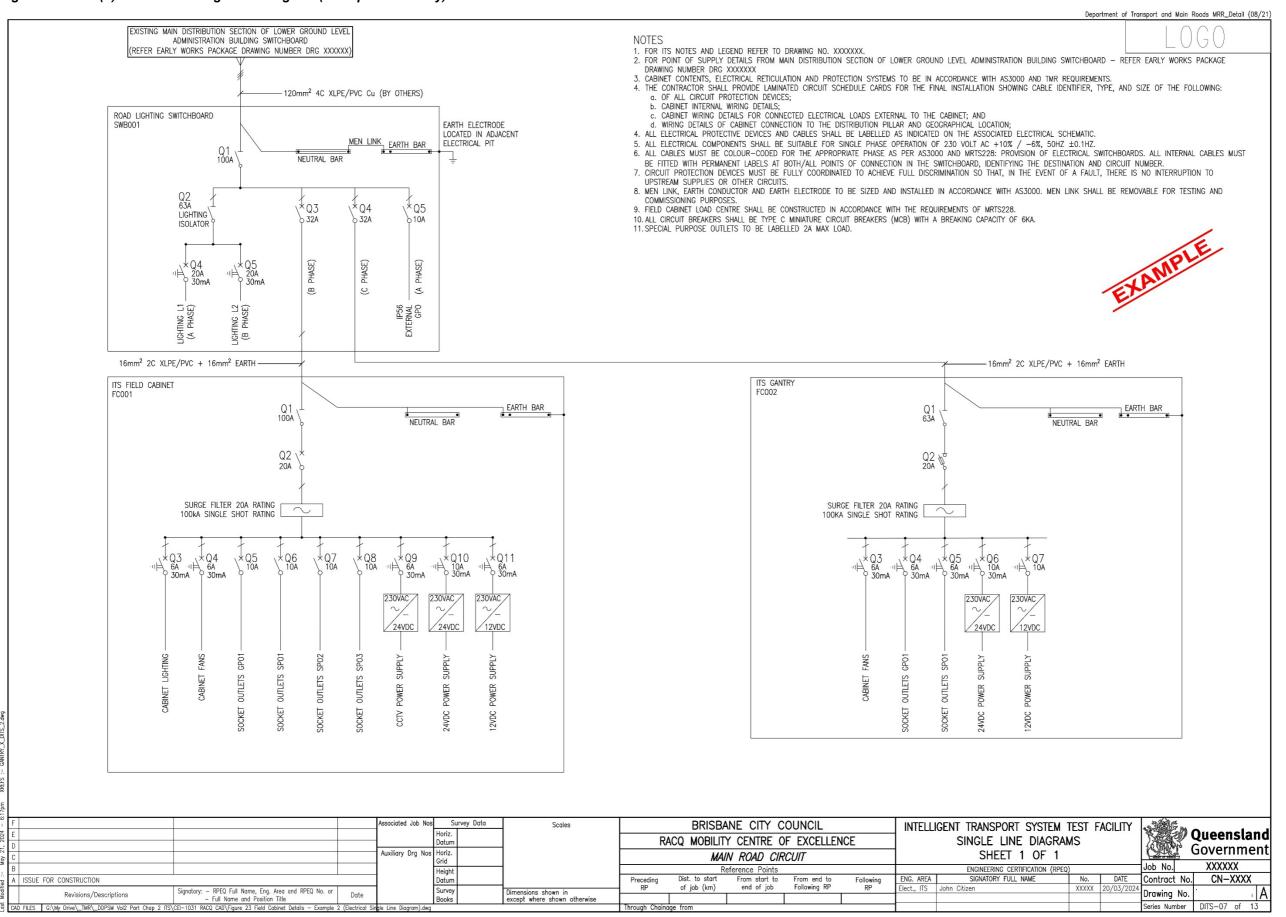


Figure 2.15.10.3(b) – Electrical single line diagram (example 2 - Gantry)



2.15.11 ITS device installation details

The ITS device installation details drawings, shows, at a site / equipment level, all the necessary end device installation details including the civil / structural mounting detail and connections that were not covered in the civil construction details for the associated cabinet (refer Section 2.15.10.1).

Where the mounting detail is captured in other design packages, (such as Structural design package for example), the general drawing notes shall include references to the Transport and Main Roads drawing numbers of the alternate packages. Where detail is applicable across multiple sites, the list of sites applicable to the detail shall be documented on the plan. In this case, the drawing may be considered as part of the typical installation details (refer Section 2.15.7).

ITS devices such as electronic signs, environmental sensors, and traffic sensors / data collection devices shall be documented in such a way as to show association with the connecting cabinet and specific details shown in Table 2.15.11. A separate drawing is required for each ITS device site. Transport and Main Roads drawing references shall be included across the entire set where the communications connection carry onto a separate drawing.

All ITS device identification shall be consistent with the associated ITS Layout Drawing. Refer to Figures 2.15.11(a) and 2.15.11(b) for examples.

Figure 2.15.11(a) – CCTV civil installation detail (example)

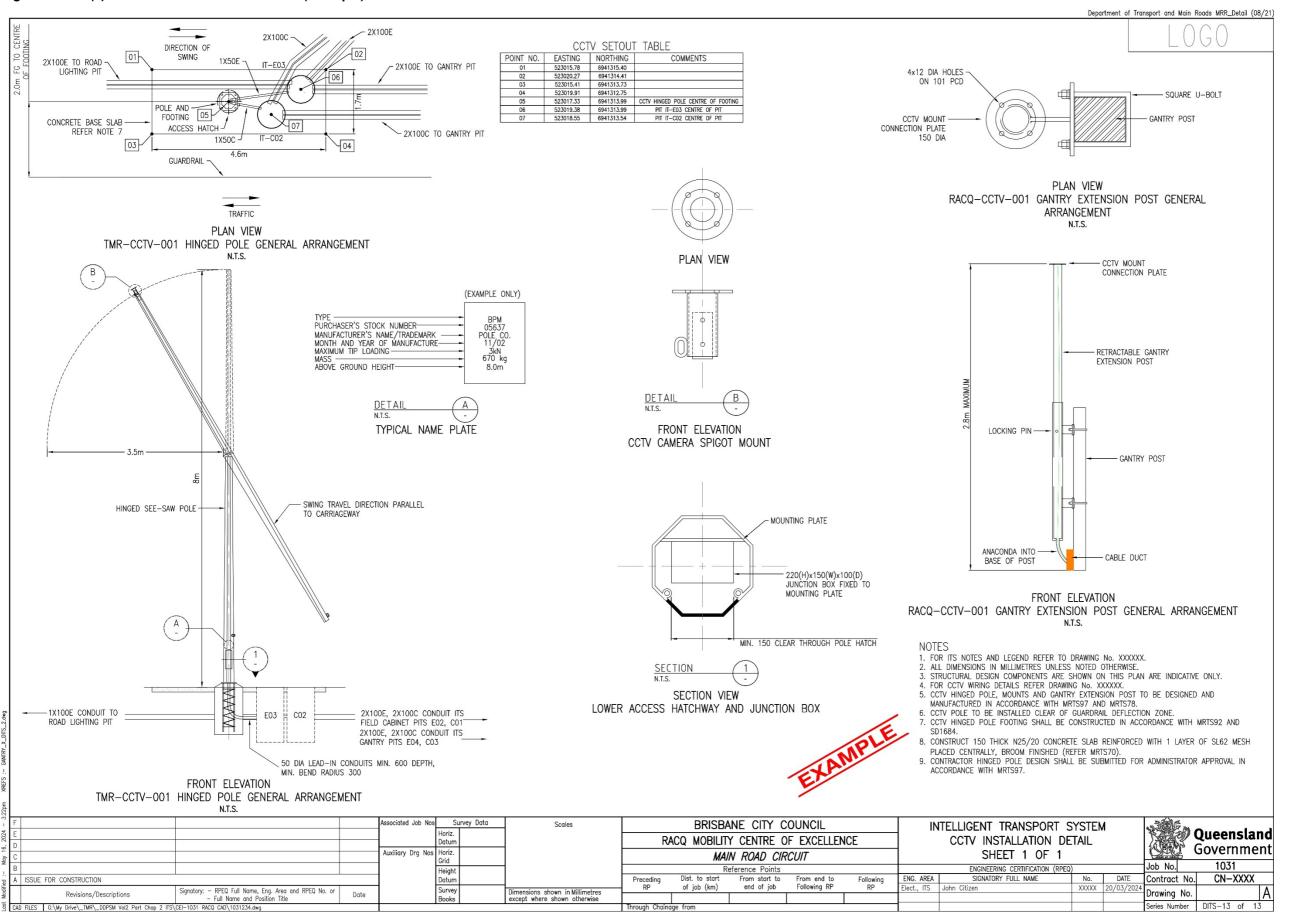


Figure 2.15.11(b) – CCTV installation detail showing connections (example)

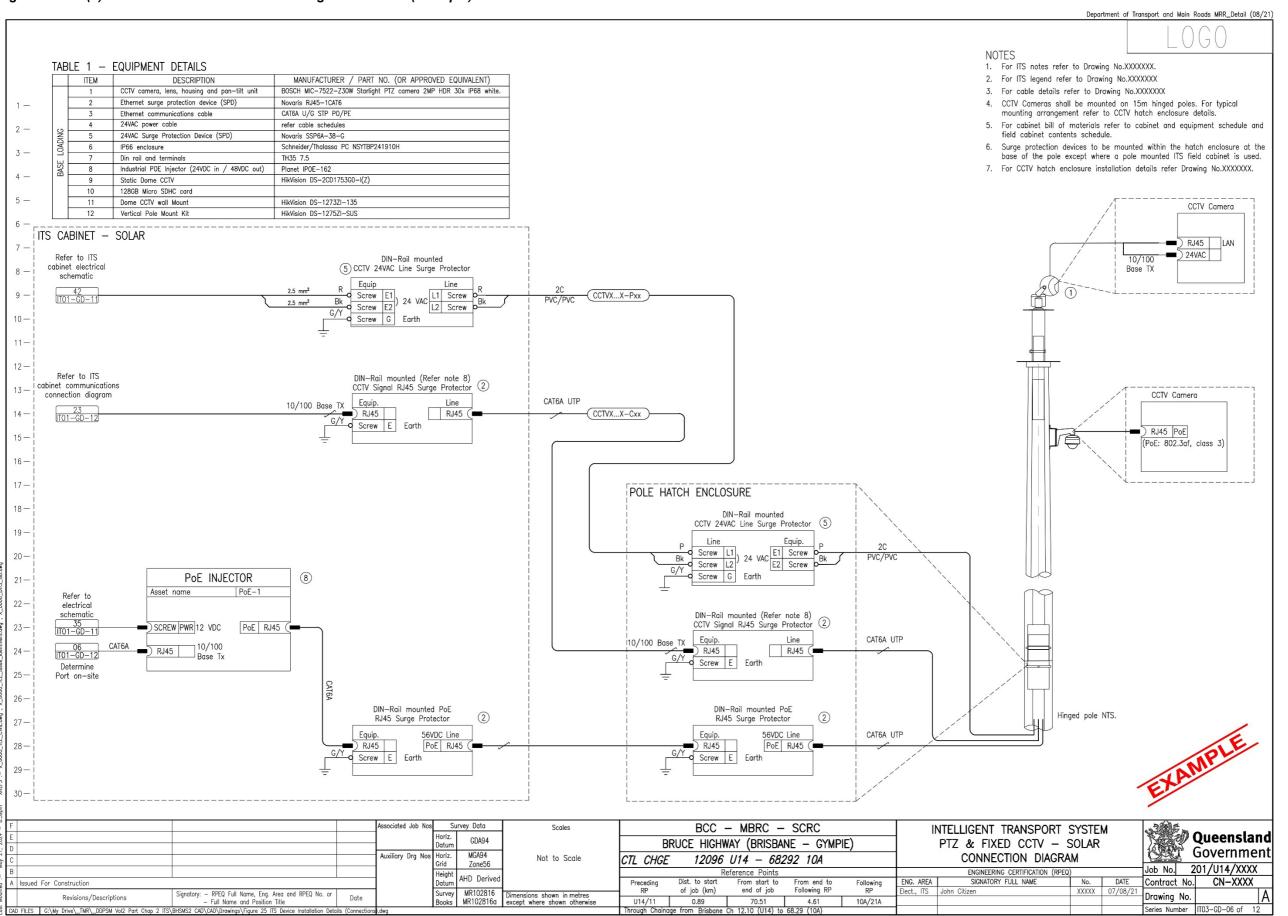


Table 2.15.11 – ITS device details required in drawing

ITS Category	Examples and Specifications	Additional information required in device installation drawing
ITS-Electronic Signs	VMS – MRTS202 VSL / LUMS – MRTS206	For Electronic signs (such as VSLS / LUMS and RC signs), details to be included as follows:
	Road Condition Information Signs – MRTS216	Site or Device IDs (STREAMS Name)
	Ramp Signs – MRTS217	UID detail and DIP Switch settings (manufacturer specified)
	Vehicle Activated Signs – VAS	Labelling of Serial cables, Ethernet cables and ribbon cables
	School Zone Signs – MRTS222 Changeable Message Signs – MRTS227 eTCS – MRTS229	A table showing the permissible frame combinations configured on the group controller (for VSL) or the RC1 sign controller
ITS-Environmental	Weather Monitors / Sensors – MRTS231	For Environmental sensors, details to be included as follows:
Sensors	Flood Monitors / Sensors – MRTS233	Site or Device IDs (STREAMS Name)
		UID detail (manufacturer specified)
		Labelling of Serial cables, Ethernet cables and ribbon cables
		A table showing the sensor settings and event trigger points
ITS-Traffic Sensing and Data Collection	Weigh-in-Motion system – MRTS203 Vehicle Detectors – MRTS204	For Traffic sensing and data collection devices, details to be included as follows:
	Wireless Traffic Sensors e.g. Bluetooth – MRTS214	Site or Device IDs (STREAMS Name)
	Imaging (CCTV) – MRTS255	Sensor number (e.g. Loop / Piezo Number / Radar)
	ANPR – MRTS250	Lane ID
	Counters and Classifiers – MRTS251	Labelling of Serial cables, Ethernet cables, ribbon cables and Loop
	Feeder and Loop cables – MRTS257	feeder cables
		 A table showing the permissible frame combinations configured on the group controller (for VSL) or the RC1 sign controller

2.15.11.1 Maintenance access plan

The ITS drawings shall be in accordance with the design principles in the QGSM which outlines maintenance access requirements for ITS devices.

The maintenance access plan drawing shows, at a site level, the permanent vehicular and non-vehicular access points, and paths to allow safe entry and exit to a particular site and equipment for inspections and maintenance purposes. A maintenance access plan should be provided when there is complex entry and exit or when there is potential for ambiguity to access a site.

Refer to Figure 2.15.12(a) for an example of a maintenance access layout plan

2.15.12 Schedules

This drawing shows, at a project wide and/or site level, an itemised table list of infrastructure assets, devices and/or equipment. It details the location, origin / destination route, identifications or references numbers, quantities, size and types, and comments.

Some of the common ITS schedules include:

- · pits schedule
- conduits schedule
- devices and equipment schedule
- power cable schedule
- · communications cable schedule
- fibre optic cable schedule
- fibre optic splicing and patching schedule
- · civil hardware schedule, and
- sensors.

Where schedules are listed elsewhere, this drawing shall not duplicate the information. As an example, the field cabinet equipment schedule may be captured in the field cabinet layout drawing.

Refer to Figures 2.15.12(b) and 2.15.12(c) for examples of ITS schedules.

Figure 2.15.12(a) – Maintenance access layout example

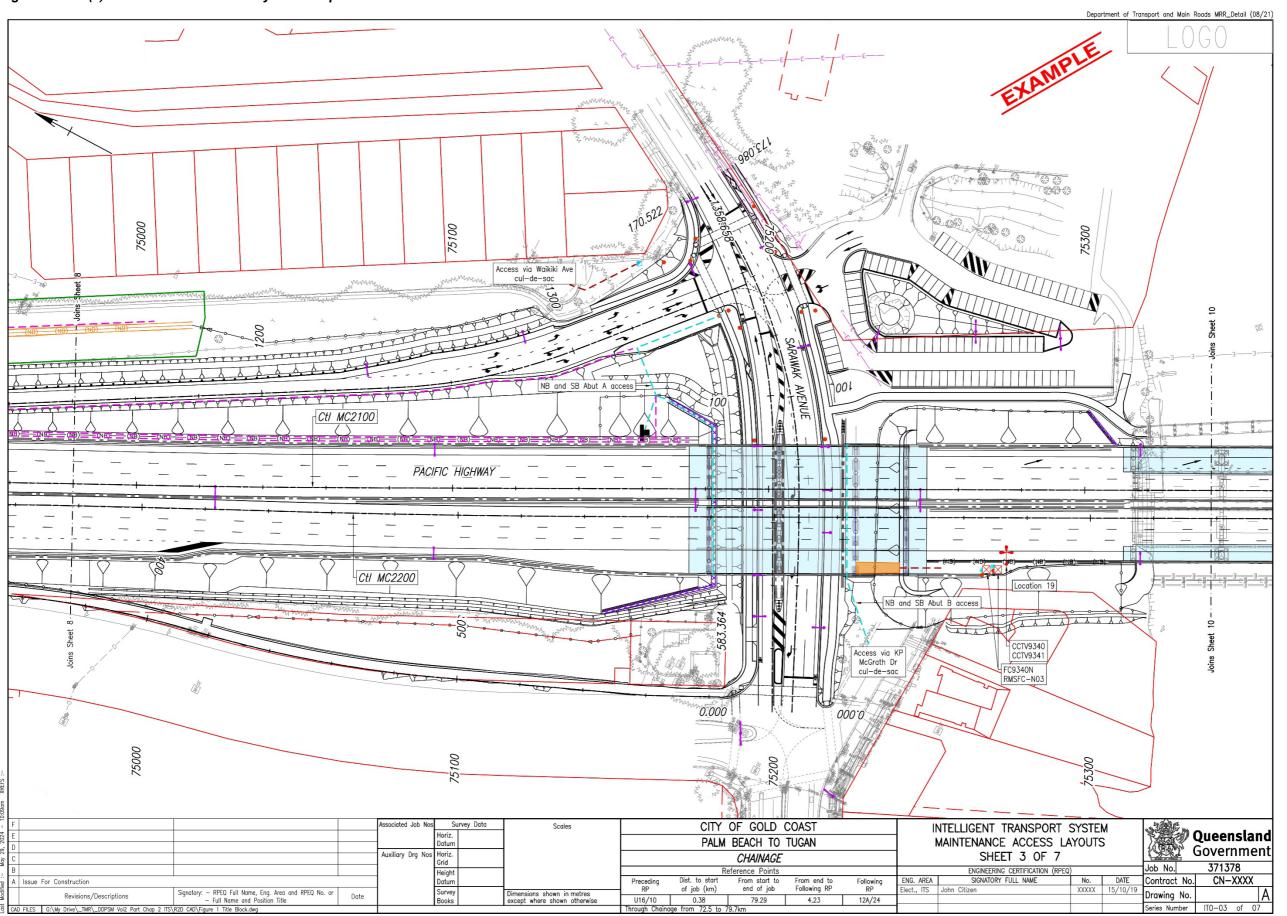


Figure 2.15.12(b) – ITS equipment connection schedule example 1

Department of Transport and Main Roads MRR_Detail (08/21

LOGO

						DISTRIBUTION	BOARD GIT-1 (CALCULATED EX	TERNAL IMPE	DANCE = 0.10)Ω)				
Reference Point		Maximum Design Current per Phase (A)	No of	Circuit Protection	Length	Via (Reference Points)	Cable Size / Type		Segment Voltage	Total Voltage Drop (V)	Total Voltage	Calculated Segment Fault Loop Impedance Ω	Calculated Total Fault Loop Impedance Ω	Maximum Allowable Fault Loop Impedance Ω
From	То	Current per Phase (A)	Pridses		(m)			Drop (V)	Drop (%)	Drop (v)	Drop (%)	Loop impedunce 12	Loop impeduice 12	Loop impeddice 12
P4939	DB-GIT1	15	3	63A Fuse (0.4 seconds)	330		35mm2 4C XLPE / PVC	3.18	0.80	3.18	0.80	0.42	0.53	0.55
DB-GIT1	MGN592NC	15	1	32A Fuse (0.4 seconds)	20		16mm2 2C XLPE / PVC	0.38	0.17	3.56	1.55	0.05	0.58	1.28
MGN592NC	MGN592VSL01E	1	1	6A Fuse (0.4 seconds)	25		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.13	0.06	3.69	1.61	0.33	0.78	11.50
MGNJ9ZNC	MGN592VSL02E	1	1	6A Fuse (0.4 seconds)	50		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.25	0.12	3.81	1.66	0.66	1.11	11.50
DB-GIT1	MGN593FC	10	1	25A Fuse (0.4 seconds)	503		25mm2 2C XLPE / PVC	4.04	1.76	7.22	3.14	0.81	1.33	1.64
MGN593FC	MGN593VSL01W	1	1	6A Fuse (0.4 seconds)	100		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.51	0.23	7.73	3.36	1.32	2.66	11.50
MGNJ9JFC	MGN593VSL02W	1	1	6A Fuse (0.4 seconds)	115		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.58	0.26	8.31	3.62	1.52	4.17	11.50

					DISTRIBUTION BOARD GIT-2 (CALCULATED EXTERNAL IMPEDANCE = 0.11Ω)														
	nce Point	Maximum Design	No of	Circuit Protection	Length	Via (Reference Points)	Cable Size / Type		Segment Voltage	Total Voltage		Calculated Segment Fault	Calculated Total Fault	Maximum Allowable Fault					
From	То	Current per Phase (A)	Phases		(m)	,	, ,,	Drop (V)	Drop (%)	Drop (V)	Drop (%)	Loop Impedance Ω	Loop Impedance Ω	Loop Impedance Ω					
P####	DB-GIT2	15	3	40A Fuse (0.4 seconds)	420		35mm2 4C XLPE / PVC	4.05	1.020	4.05	1.02	0.54	0.65	0.96					
DB-GIT2	MGN594FC	10	1	25A Fuse (0.4 seconds)	20		16mm2 2C XLPE / PVC	0.25	0.110	4.30	1.88	0.05	0.70	3.59					
	MGN594VSL01W	1	1	6A Fuse (0.4 seconds)	105		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.53	0.240	4.83	2.11	1.39	2.09	11.50					
	MGN594VSL02W	1	1	6A Fuse (0.4 seconds)	70		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.35	0.160	4.66	2.03	0.92	1.62	11.50					
MGN594FC	MGN594VSL03E	1	1	6A Fuse (0.4 seconds)	65		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.33	0.150	4.63	2.02	0.86	1.56	11.50					
	MGN594VSL04E	1	1	6A Fuse (0.4 seconds)	85		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.43	0.190	4.73	2.06	1.12	1.82	11.50					
	MGN594VSL05W	1	1	6A Fuse (0.4 seconds)	235		4mm2 2C PVC / PVC + 2.5mm2 Earth	1.19	0.520	5.49	2.39	3.10	3.80	11.50					
DB-GIT2	MGN595FC	10	1	25A Fuse (0.4 seconds)	881		35mm2 2C XLPE / PVC	5.12	2.230	9.17	3.99	1.02	1.67	2.09					
	MGN595VSL01W	1	1	6A Fuse (0.4 seconds)	230		4mm2 2C PVC / PVC + 2.5mm2 Earth	1.16	0.510	10.34	4.50	3.04	4.71	11.50					
MGN595FC	MGN595VSL02W	1	1	6A Fuse (0.4 seconds)	255		4mm2 2C PVC / PVC + 2.5mm2 Earth	1.29	0.570	10.46	4.55	3.37	5.04	11.50					
WGNJ93FC	MGN595VSL03E	1	1	6A Fuse (0.4 seconds)	255		4mm2 2C PVC / PVC + 2.5mm2 Earth	1.29	0.570	10.46	4.55	3.37	5.04	11.50					
	MGN595VSL04E	1	1	6A Fuse (0.4 seconds)	280		4mm2 2C PVC / PVC + 2.5mm2 Earth	1.42	0.620	10.59	4.61	3.70	5.37	11.50					

						DISTRIBUTION	BOARD GIT-3 (CALCULATED EX	TERNAL IMPE	DANCE = 0.22	2Ω)				
	nce Point To	Maximum Design Current per Phase (A)	No of	Circuit Protection	Length	Via (Reference Points)	Cable Size / Type	Segment Voltage Drop (V)	Segment Voltage Drop (%)	Total Voltage Drop (V)	Total Voltage Drop (%)	Calculated Segment Fault Loop Impedance Ω	Calculated Total Fault Loop Impedance Ω	Maximum Allowable Fault Loop Impedance Ω
From		current per mase (A)			(11)						DIOP (78)	Loop impoddioc n	Loop impodding ii	Loop impoddited if
P38869	DB-GIT3	20	3	40A Fuse (0.4 seconds)	220		35mm2 4C XLPE / PVC	2.83	0.710	2.83	0.71	0.28	0.50	0.96
DB-GIT3	MGN596FC	10	1	25A Fuse (0.4 seconds)	670		25mm2 2C XLPE / PVC	5.38	2.340	8.21	3.57	1.08	1.57	2.09
DB-GIT3	MGN596VMS01E	10	1	25A Fuse (0.4 seconds)	670		25mm2 2C XLPE / PVC	5.38	2.340	8.21	3.57	1.08	1.57	2.09
DB-GIT3	MGN597FC	10	1	25A Fuse (0.4 seconds)	20		16mm2 2C XLPE / PVC	0.25	0.110	3.08	1.34	0.05	0.55	2.09
	MGN597VSL01E	1	1	6A Fuse (0.4 seconds)	60		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.30	0.140	3.38	1.48	0.79	1.34	11.50
MGN597FC	MGN597VSL02E	1	1	6A Fuse (0.4 seconds)	75		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.38	0.170	3.46	1.51	0.99	1.54	11.50
MIGNJ9/FC	MGN597VSL03W	1	1	6A Fuse (0.4 seconds)	170		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.86	0.380	3.94	1.72	2.24	2.79	11.50
	MGN597VSL04W	1	1	6A Fuse (0.4 seconds)	160		4mm2 2C PVC / PVC + 2.5mm2 Earth	0.81	0.360	3.89	1.70	2.11	2.66	11.50
DB-GIT3	MGN597VMS01W	10	1	25A Fuse (0.4 seconds)	20		16mm2 2C XLPE / PVC	0.25	0.110	3.08	1.34	0.05	0.55	2.09

EXAMPLE

14pm					
F	Associated Job Nos Survey Data	Scales	BCC - MBRC - SCRC	INTELLIGENT TRANSPORT SYSTEM	
3	Horiz. Datum		BRUCE HIGHWAY (BRISBANE - GYMPIE)	EQUIPMENT CONNECTION SCHEDULE	Queensland Government
6 C	Auxiliary Drg Nos Horiz. Grid	Not to Scale	CTL CHGE 12096 U14 - 68292 10A	SHEET 1 OF 2	
B	Height	1	Reference Points	ENGINEERING CERTIFICATION (RPEQ)	Job No. 201/U14/XXXX
B A Issued For Construction	Datum		Preceding Dist to start From start to From end to Following	ENG. AREA SIGNATORY FULL NAME No. DATE	Contract No. CN-XXXX
Revisions/Descriptions Signatory: - RPEQ Full Name, Eng. Area and RPEQ No. or Date	Survey Books	Dimensions shown in metres		Elect., ITS John Citizen XXXXX 07/08/21	Drawing No.
- Full Name and Position little	Books	except where shown otherwise	U14/11 0.89 70.51 4.61 10A/21A		J / 1
3 CAD FILES G:\My Drive_TMR_DDPSM Vol2 Part Chap 2 ITS\BHSMS2 CAD\CAD\Drawings\Figure 26 ITS Schedules — Example 1.dwg			Through Chainage from Brisbane Ch 12.10 (U14) to 68.29 (10A)		Series Number IT03-GD-06 of 12

Figure 2.15.12(c) – Equipment schedules example 2

															LUGU
			ELEC	TRICAL PIT S	CHEDU	JLE				ELE	CTRICAL PIT	SCHEDU	JLE		
	LOCATION	PIT No.	EASTING	NORTHING 1	TYPE	USAGE	REMARKS	LOCATION	PIT No.	EASTING	NORTHING	TYPE	USAGE	REMARKS	
	Gateway Motorway	E1201		Cir	rcular	Electrical	Existing pit to remain	Gateway Motorway	E757			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E1202			rcular	Electrical	Existing pit to remain	Gateway Motorway	E758			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E1203			rcular	Electrical	Existing pit to remain	Gateway Motorway	E759			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E1204			rcular	Electrical	Existing pit to remain	Gateway Motorway	E760			Circular	Electrical	New pit to be installed	
	Gateway Motorway Gateway Motorway	E1205			rcular	Electrical	Existing pit to remain Existing pit to remain	Gateway Motorway Gateway Motorway	E761			Circular	Electrical	New pit to be installed New pit to be installed	
	Gateway Motorway	E1206 E1207			rcular	Electrical Electrical	Existing pit to remain	Gateway Motorway	E762 E763			Circular Circular	Electrical Electrical	New pit to be installed	
	Gateway Motorway	E683			rcular	Electrical	Refer NIT-20	Gateway Motorway	E764			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E701	-		rcular	Electrical	New pit to be installed	Gateway Motorway	E765			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E702			rcular	Electrical	New pit to be installed	Gateway Motorway	E766			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E703			rcular	Electrical	New pit to be installed	Gateway Motorway	E767			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E704			rcular	Electrical	New pit to be installed	Gateway Motorway	E768			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E705		Cir	rcular	Electrical	New pit to be installed	Gateway Motorway	E769			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E706		Cit	rcular	Electrical	New pit to be installed	Gateway Motorway	E770			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E707		Cir	rcular	Electrical	New pit to be installed	Gateway Motorway	E771			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E708		Cir	rcular	Electrical	New pit to be installed	Gateway Motorway	E772			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E709			rcular	Electrical	New pit to be installed	Gateway Motorway	E773			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E710			rcular	Electrical	New pit to be installed	Gateway Motorway	E774			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E711			rcular	Electrical	New pit to be installed	Gateway Motorway	E775			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E712			rcular	Electrical	New pit to be installed	Gateway Motorway	E776			Circular	Electrical	New pit to be installed	
	Gateway Motorway Gateway Motorway	E713 E714			rcular	Electrical Electrical	New pit to be installed New pit to be installed	Gateway Motorway Gateway Motorway	E777 E778			Circular Circular	Electrical Electrical	New pit to be installed New pit to be installed	
	Gateway Motorway	E714					New pit to be installed	Gateway Motorway	E779					New pit to be installed	
	Gateway Motorway	E716	-		rcular	Electrical Electrical	New pit to be installed	Gateway Motorway	E780			Circular Circular	Electrical Electrical	New pit to be installed	
	Gateway Motorway	E717			rcular	Electrical	New pit to be installed	Gateway Motorway	E781			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E718			rcular	Electrical	New pit to be installed	Gateway Motorway	E782			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E719			rcular	Electrical	New pit to be installed	Gateway Motorway	E783			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E720			rcular	Electrical	New pit to be installed	Gateway Motorway	E784			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E721			rcular	Electrical	New pit to be installed	Gateway Motorway	E785			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E722			rcular	Electrical	New pit to be installed	Gateway Motorway	E786			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E723		Cir	rcular	Electrical	New pit to be installed	Gateway Motorway	E787			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E724		Cit	rcular	Electrical	New pit to be installed	Gateway Motorway	E788			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E725		Cir	rcular	Electrical	New pit to be installed	Gateway Motorway	E789			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E726			rcular	Electrical	New pit to be installed	Gateway Motorway	E790			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E727		Cir	rcular	Electrical	New pit to be installed	Gateway Motorway	E791			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E728			rcular	Electrical	New pit to be installed	Gateway Motorway	E792			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E729			rcular	Electrical	New pit to be installed	Gateway Motorway	E793			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E730			rcular	Electrical	New pit to be installed	Gateway Motorway	E794			Circular	Electrical	New pit to be installed	
	Gateway Motorway Gateway Motorway	E731 E732			rcular	Electrical Electrical	New pit to be installed New pit to be installed	Gateway Motorway Gateway Motorway	E795 E796			Circular Circular	Electrical Electrical	New pit to be installed New pit to be installed	
	Gateway Motorway	E733			rcular	Electrical	New pit to be installed	Gateway Motorway	E797			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E734	-		rcular	Electrical	New pit to be installed	Gateway Motorway	E798			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E735			rcular	Electrical	New pit to be installed	Gateway Motorway	E799			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E736			rcular	Electrical	New pit to be installed	Gateway Motorway	E800			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E737			rcular	Electrical	New pit to be installed	Gateway Motorway	E801			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E738		Cir	rcular	Electrical	New pit to be installed	Gateway Motorway	E802			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E739			rcular	Electrical	New pit to be installed	Gateway Motorway	E803			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E740		Cir	rcular	Electrical	New pit to be installed	Gateway Motorway	E804			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E741			rcular	Electrical	New pit to be installed	Gateway Motorway	E805			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E742			rcular	Electrical	New pit to be installed	Gateway Motorway	E806			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E743			rcular	Electrical	New pit to be installed	Gateway Motorway	E807			Circular	Electrical	New pit to be installed	
	Gateway Motorway	E744			rcular	Electrical	New pit to be installed	Gateway Motorway	E809			Circular	Electrical	Existing pit to remain	
	Gateway Motorway	E745			rcular	Electrical	New pit to be installed	Gateway Motorway	E810			Circular	Electrical	New pit to be installed	
	Gateway Motorway Gateway Motorway	E746			rcular	Electrical	New pit to be installed	Gateway Motorway Gateway Motorway	E811			Circular	Electrical	New pit to be installed New pit to be installed	
	Gateway Motorway	E748 E749			rcular	Electrical Electrical	New pit to be installed New pit to be installed	Gulewuy Motorwdy	E812			Circular	Electrical	ivew pit to be installed	
	Gateway Motorway	E750			rcular	Electrical	New pit to be installed	+							
	Gateway Motorway	E751	+		rcular	Electrical	New pit to be installed	+							
	Gateway Motorway	E752	-		rcular	Electrical	New pit to be installed	4						1	
	Gateway Motorway	E753			rcular	Electrical	New pit to be installed	1							NOTES
	Gateway Motorway	E754			rcular	Electrical	New pit to be installed	+						/APY	
	Gateway Motorway	E755			rcular	Electrical	New pit to be installed	7						N	 Pit eastings and northings completed on as—built dro
	Gateway Motorway	E756			rcular	Electrical	New pit to be installed	7							completed on as built are
				,				_					E		
				Associated Job No	_	urvey Data	Scales	BR	ISBANE	CITY			INTELLIGE	NT TRANSPORT SYSTEM	- 12 Ec
				_	Horiz. Datum	GDA94	F	GATEWAY ARTERIAL			AY NORTH)	\neg		PMENT SCHEDULES	Que
				Auxiliary Drg No	_	MGA94	Not to Scale				ii iiokiiij	\dashv		SHEET 1 OF 2	Gove
				- January Dry No.	Grid	Zone56	INUT TO SCORE		1094 -						Aloka at substill
				_	Height	AHD Derived		*** * * * * * * * * * * * * * * * * * *	erence Point From start t			ENG. AF		NEERING CERTIFICATION (RPEQ) NO.	Job No. 201/U1
truction				1	Datum			Preceding Dist. to start			to Following			IATORY FULL NAME No.	

2.15.13 ITS Drawings Media Package

2.15.13.1 Issued For Construction ITS drawings

Issued for Construction (IFC) ITS drawings completed for Transport and Main Roads shall be given a drawing number generated through the departmental Geospatial Information Management System (GIMS).

The Issued For Construction drawings shall have an Issued For Construction box marked on the drawing.

The IFC ITS design media package shall include:

- electronically signed PDF drawings provided in accordance with DDPSM Volume 1: Chapter 1
- if requested by the Principal, A3 size, hard copy drawings on permanent paper with all sign-off names in text, and RPEQ hand signature(s) in blue pen of permanent non-smudging type
- electronic design AutoCAD files zipped into one file and including all relevant electronic design models associated with the design, and
- if requested by the Principal, scanned PDF files at correct scale showing hand signature(s).
 File size should be kept to a minimum, whilst ensuring good quality images of the hard copy originals.

This package should be addressed / delivered as per the Principal's advice. Typically, this will be to a nominated Project Manager or Design Manager who will distribute the electronic files internally to relevant staff in the local departmental office, and the hard copies to the department's Plan Room for storage.

2.15.13.2 ITS revision drawings

Design revisions during construction, should be provided according to DDPSM Volume 1 through the departmental Project Manager or Design Manager. The submissions should include the names of individuals responsible for both drawing and checking, provided in text format, along with electronic or blue pen RPEQ certification as required.

Once the drawing has been signed then the revised drawing shall be sent to the nominated Transport and Main Roads contact as per the Principal's advice.

2.15.13.3 New drawings superseding existing

Where a decision is made to supersede an existing drawing, a prominent 'Superseded' note should be added above the title block with a reference to the new Transport and Main Roads drawing number. The revision date must reflect the date that the site was changed as well as the date when the drawing was updated.

2.15.13.4 As Constructed ITS drawings

The As Constructed drawings should be submitted, as soon as possible, after switch-on of the ITS installation, to the nominated Transport and Main Roads contact as advised by the Principal.

The text "AS CONSTRUCTED (switch-on date)" should be included in the revision column.

As Constructed drawings shall be in accordance with DDPSM Volume 1 and incorporate any changes from the red mark-up (also known as as-built) drawings provided by the contractor, removing any abandoned conduits and pits. There shall be no construction notes on the As Constructed drawings and only Transport and Main Roads drawing numbers shall remain.

The Earth Fault Loop Impedance measurements by the contractor shall also be included.

The revision date must reflect the date that the site was changed and not the date when the drawing was updated.

The As Constructed revisions shall be either verified by an appropriate person or certified by an RPEQ, depending on whether any amendments affect the engineering intent or functionality of the installation (refer DDPSM Volume 1, Chapter 1).

As with the IFC, As Constructed design media package shall be appropriately signed and submitted to the nominated Transport and Main Roads contact as advised by the Principal.

All design AutoCAD files shall be provided zipped in one file. The zip file shall include all relevant design models associated with the ITS, mechanical and electrical electronic design model, i.e. Survey, Civil and Services electronic design models.

The filename should follow the format, Transport and Main Roads drawing number, revision, and an abridged drawing description. Drawing names and IDs should also correspond to the references made to them in the associated design report provided by the design consultant.

2.16 Landscaping

2.16.1 Introduction

Urban road landscape design drawings shall typically be prepared by a qualified landscape architect with a minimum of 10 years experience in the development and delivery of landscape drawings and landscape-design-related contract documentation (including, MRTS16 *Landscape and Revegetation Works* Annexure and Tender Schedule), unless otherwise specified in the project brief.

Where urban landscape design components consist of grass seeding or turfing vegetation treatments only, the landscape documentation may be prepared by the civil designer in consultation with the department's landscape architects and/or District / Region environmental officers.

Where the civil designer, landscape architect and/or environmental officer are unfamiliar with suitable, local grass or turf species, they are to consult local or centralised seed merchants for native grass, species, and agricultural seed merchants or agronomists for pasture grass species. Consultation criteria is to include the suitability and availability of individual seed species and the selection and application rates per species per seed mix. For turf species, consult local suppliers for suitable and available turf species (and varieties) and refer to Clause 7.5 of MRTS16 *Landscape and Revegetation* for the applicable grade of turf.

For grass seeding treatments, Revegetation contractors, familiar with the project area and experienced in undertaking seeding operations for the department, can also provide beneficial information on the success of the different seeding treatments and species.

Refer to MRTS16 *Landscape and Revegetation Works* (and MRTS16 Appendix) for soil, seeding and turfing material / construction requirements, and MRS16 *Landscape and Revegetation Works* for Standard Work Items.

Where urban landscape design components consist of grass seeding, native groundcover, shrub and tree seeding, turfing and vegetation treatments

Where urban landscape design components consist of seeding or planting vegetation treatments other than grass species, for example, groundcover, macrophyte, shrub and tree species seed mixes or container stock, a suitably qualified / experienced landscape architect shall prepare the landscape drawings and landscape-design-related contract documentation, in consultation with the project design team, including the department's landscape architect and/or environmental officer.

All landscape design drawings shall be prepared in consultation with an appropriately qualified Registered Professional Engineer of Queensland (RPEQ). The RPEQ certifies the drawings to demonstrate the proposed landscape works do not conflict with engineering requirements of the civil design (sight visibility, clear zones, drainage design flows and so on) and structural design (proximity to retaining structures and so on). The RPEQ's name and number shall be shown with the signature.

Landscape design drawings are an integral component of the development phase drawings. They are required to clearly and accurately show landscape treatments, their context and associated design constraints.

The following information is relevant to both preliminary design and detailed design phases.

2.16.2 Preparation of landscaping drawings

2.16.2.1 Title blocks

Landscape design drawings shall use the Road Design Detail A1 size title sheet; refer to Section 2.3.3 of the DDPSM Volume 1, Chapter 2.

The RPEQ shall certify the drawings.

2.16.2.2 Drawing scale and layout

Landscape design drawing size, scaling and layouts are typically identical to civil design layout plans. This may differ when:

- landscape treatment extents encompass a larger area than is shown on the civil design drawings and additional layout sheets are required to show vegetation treatments to these areas, or
- 2. the scale of the civil design drawings is insufficient to illustrate the detail of the proposed landscape treatments, or
- 3. where it is reasonable to cover a far greater area in fewer drawings due to the simplicity of design (for example, project with one landscape treatment, or a project with few treatments with extents easily identifiable with notation and/or type sections and details) while clearly and accurately showing the proposed landscape treatments.

Stand-alone landscape drawing packages, with no associated civil packages, shall be produced on the standard Road Design Detail A1 size title sheet, refer Section 2.3.3 of the DDPSM Volume 1, Chapter 2, using the current Transport and Main Roads customisation package. The final printed output shall be produced on an A3 sheet with a minimum scale of 1:1000 unless otherwise approved by the department. All text shall be legible when produced in A3 format and meet the requirements of the DDPSM Volume 1.

2.16.2.3 Layers, line types and hatches

Landscape drawings shall be drafted using layers, line types and hatches as set-out in the DDPSM Volume 1, Chapter 2.

As the landscape drawings display a large amount of background information, it is necessary to use line types, line weights, hatches and/or semi-transparent solid coloured hatches that are easily recognisable as unique treatments and do not conflict with content from other x-referenced drawings. The designer is to clearly communicate the landscape design, and how it integrates with other road design infrastructure components – both drawing presentation and construction-wise. The preferred use of semi-transparent solid coloured hatches allows for x-referenced drawing components to be clearly shown and as such, avoid design, construction or function conflicts, and safety hazards.

As microfilming is the method used to register drawings, all drawings shall remain legible when reproduced in black and white.

2.16.3 Typical landscape drawing package

The landscape drawing package shall include the following sheets:

- · locality plan and drawing list
- notes and legends
- · plant and seed schedules
- layouts, and
- construction details.

2.16.3.1 Locality plan and drawing list

A landscape design that is part of a larger civil design package does not require a separate locality plan and drawing list as part of the landscape drawing package.

A stand-alone landscape design project (no associated civil documentation) shall include a locality plan and drawing list (refer Section 2.3).

2.16.3.2 Notes, legends

Notes, legends shall include the following information:

Road design legend

- existing and proposed civil, drainage and structural design components shown in the landscape design layout drawings (for example, survey, roadway, structures, drainage, fencing, services, permanent access tracks, signage, lighting and so on), and
- a unique line type delineating clear zones and a hatch pattern or preferred semi-transparent solid coloured hatch delineating sight visibility zones.

Landscape design legend

- Proposed landscape design treatments with an accompanying description of the associated standard drawing and Work Operations.
- For contract types using the MRS Specifications (Measurement), Standard Work Item numbers and associated Standard Work Operations descriptions, as listed in MRS16 Landscape and Revegetation Works, shall be listed with the standard drawing used.

- General notes general design criteria and operations information and the standard Transport and Main Roads technical specifications and site specific design requirements / constraints and construction notes.
- Offsets and clearances schedule Minimum vegetation setback and clearances schedule from the department's *Road Landscape Manual*, Appendix 4 to identify design constraints for any onsite variations to the design.

2.16.3.2.1 Plant and seed schedules

Plant schedules shall meet the format requirements as shown in Clause 3.4.1 of MRTS16.1 Annexure. In addition, where a plant code is shown on the drawings, it shall be included in the schedule against the relevant plant species. Common names of plant species may be included with the botanical names, but they are not permitted to replace botanical names.

The minimum information required (preliminary and detailed design) is:

- species botanical name, including plant code name (ABC xyz)
- container size
- mature height and width of plant (m)
- plant density (per m²) / spacing (m), and
- plant quantities.

the plant schedule shall be subdivided under the following sub-headings:

- trees
- shrubs
- groundcovers and climbers
- macrophytes, and/or
- location / function.

Seed schedules shall meet the format requirements of the tables in MRTS16.1 Annexure. The minimum information required (preliminary design and detailed design) is:

- mix name and approximate area of treatment (m²)
- · species botanical name
- · mature height and spread of plant (m), and
- application rates (kg/ha).

Depending on the scale and nature of the project the seed scheduling noted above may be subdivided under various mix names relative to locality / function.

2.16.3.3 Layout drawings

The intent of the layout drawings is to communicate the landscape design and its associated constraints. To adequately develop and communicate the landscape design, proposed and existing information needs to be shown in the drawing. The information listed below is not prescriptive or exhaustive. Some projects may require inclusion of additional items, while others may not require all of these items to clearly communicate outcomes and constraints:

- Civil design safety constraints clear zones and sight visibility (road, intersection and
 operational signage) requirements must be shown on all Landscape Designs. These shall be
 provided by the civil design team. It is imperative that these criteria are identified early in the
 design process to guide the development of the landscape design.
- Civil proposed and existing civil components including road formations (cut / fill batters and so on) kerbs, lane markings, shoulders, medians, pedestrian / cyclist paths, ramped kerb crossings, access ways to adjoining properties and so on.
- Structures proposed and existing structures including bridges (abutments and spill throughs, columns and piers and so on), tunnels, overpasses, interchanges, noise fences, overhead signage, pedestrian bridges, buildings and so on.
- Road furniture proposed and existing elements such as streetlights, traffic lights, signage elements, safety barriers, utility boxes, fence lines, bollards, power poles and so on.
- Drainage proposed and existing drainage devices including channels, drains / swales, pits, culverts, outfalls, catch / diversion banks, sedimentation basins, batter chutes and so on.
- Public utility plant proposed and existing above and below ground public utility plant
 including electricity, water, gas, sewer, telecommunications, oil and petroleum products mains
 and so on, and any associated departmental or service provider maintenance access.
- Cadastral information and proposed resumption boundaries proposed and existing property boundaries, services easements, Australian Height Datum (AHD) boundaries, road reserves, nature reserves, development exclusion zones, and any regulatory boundaries or zones and so on.
- Extent / limit of works boundary line or extent of disturbance boundary lines, whichever is greatest.
- Topographical data proposed and existing topographical information including site contours, landforms, batter slopes, gradients and so on.
- Existing vegetation to be retained significant individual specimens and/or vegetation zones to be retained.

2.16.3.4 Construction details

Construction details may be in the form of plans, cross sections, elevations and sectional elevations. They are shown at a scale suitable to convey the design intent and accurately document works to ensure it is sufficiently understood and constructed correctly.

Cross sections or typical cross sections shall show landscape treatments (at maturity) on the landform. Sections shall be based on civil cross sections and include the following information:

· existing ground line

- fill / cut batters and drainage structures, including gradients and engineering treatments if applicable
- road profile including road surface levels, pavement and sub-base levels, kerb and channels, cross falls, lane and shoulder extents, verges, hinge points, medians, islands and so on
- other proposed hard paved areas
- road infrastructure, furniture or structures including footings and sub structures
- clear zones, sight visibility zones and other setback and clearance constraints such as above and below ground services.

The department's Landscape and Revegetation Standard Drawings are standard construction details used in association with the department's specification MRTS16 *Landscape and Revegetation Works* and should be included in all landscape design packages.

2.16.4 Examples of landscape drawings

Refer to the following landscape drawings as examples of the DDPSM standard landscape drawings presentation requirements.

Figure 2.16.4(a) - Landscaping layout and details - generic example 1

Department of Transport and Main Roads RAMSAY ST - CLONCURRY LANDSCAPE AND URBAN DESIGN CONCEPT INTRODUCTION Cloncurry Shire Council and the Department of Transport & Main Roads (DTMR) are working in partnership to manage the preparation and delivery of a design report for the development of Ramsay Street from Urh St to west of Henny St, Cloncurry. Landscape Architecture and Urban Design, Core Technology Services (DTMR) is preparing the design in two stages: concept (sketch) design and detailed design documentation. This report summarises the concept design stage. LOCALITY PLAN · A joint site inspection was held on 4 November 2010 to review the site constraints. SCALE N.T.S. DESIGN BRIEF & SITE ISSUES DISCUSSIONS A joint meeting was held to confirm the intent of the design brief and issues discussed as a result of the site visit. Key issues discussed were: · Low maintenance native planting beds and turf grass areas Shaded area for centre parking and footpath Short term parking spaces · Footpath pavement treatment Reflection of QR Corner Park design Safety pedestrian crossing The landscape and urban design concept is developed from the design dated back 2005 by TMR. This revised concept plan of ramsay st continues to maintain providing shade to pedestrian and parking area as well to improve the safety of traffics. QR Corner since has been developed reflecting the regional nature and built landscape. This design theme of Ramsay St is continuing to build on the similar intents to provide coherence of characters of the precinct. Elements such as coloured concrete, bollards, shade structure, sandblasted pattern are incorporated into the design. Gateway on west is to announce the entrance of the precinct. Additional median strips and planting bed are proposed offering visual awareness of traveling speed and provide relieve of harsh pavement environment. Build-out planting bed applies water sensitive urban design principles to utilise run off water for plants to reduce the maintenance needs. Dedicated pedestrian crossing has been highlighted with different pavement materials, planting beds and/or shade structure, street trees are located on both sides of the road to provide much needed shade for pedestrian; with the landmark centre feature trees together they form the major part of this streetscape. The design provides opportunities for community art works (school, local artists and so on) to be integrated to enhance its ownership. King St intersection treatment presents the possibilities to link north culture precincts, museum, gallery, sports and Council facilities, to stitch community together. LEGEND LANDSCAPE WORKS SYMBOL EAST ENTRY VISUAL SPEED AWARENESS WITH POSSIBLE LINK TO CULTURAL PRECINCT POTENTIAL EXTENDING PAVEMENT TREATMENT TO SCARR ST CORNER HIGHLIGHTED PEDESTRIAN COLOURED ASPHALT AWARENESS WITH POSSIBLE ENTRY STATEMENT DEVELOPMET APPROVAL CAPP. 24 CTN PARKING SPACES SK 03 Queensland Government CTL CHGE Job No. Contract. No. Drawing No.

Figure 2.16.4(b) – Landscaping layout and details – generic example 2

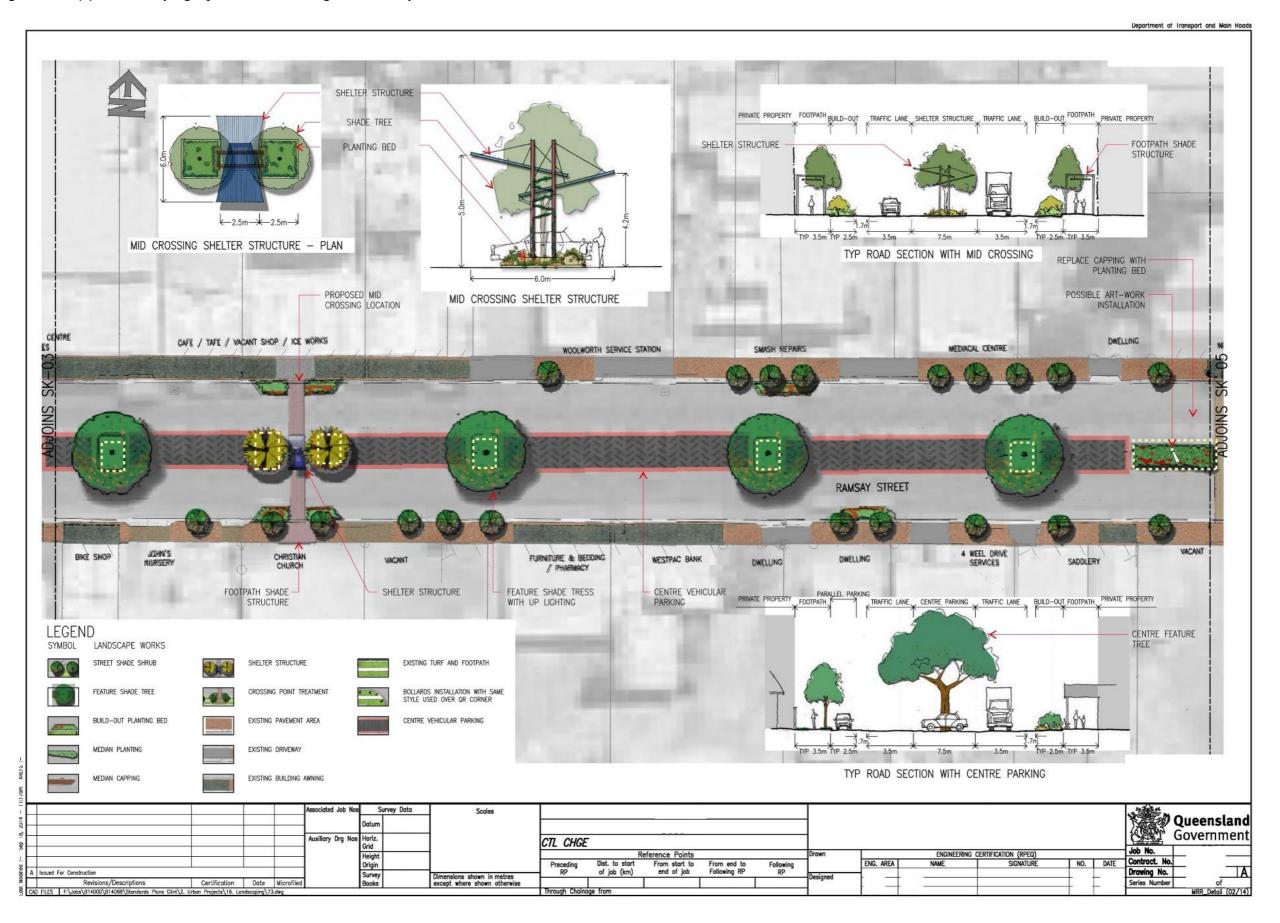


Figure 2.16.4(c) – Landscaping layout and details – generic example 3

Department of Transport and Main Roads Gas, oil, Energex easements are to be planted with easement specific plant species.

5.0m clearance from outer parapet/rail of bridge structures.

0.5m or 1/2 mature width of shrubs and groundcovers (whichever is greater) along maintenance access tracks, kerbs, walls, poths, edging and edge of povement.

1.0m clearance for groundcovers/shrubs and 1.5m for trees against noise barriers where maintenance access is provided. 1.3. LINE MARKING/ROAD SURFACE DELINEATION Carpark area line marking shall conform to MRTS45, road surface delineation, and engineer drawings requirements 14. CARPARK SURFACING Carpark area surfacing shall conform to MRTS12, sprayed bituminous emulsion surfacing, and engineer drawings requirements. 15. COATINGS Primer:
Colours of priming coats (and body coats where specified) are to be lighter than those of finish coat.
Day, Film Thickness
The Day, Film Thickness shall be a min. of 125 microns uno in Annexure MRTS88 Painting New Work. Preparation — General
Surface preparation shall conform to MRTS88, painting new work, requirements.
Surface preparation shall to a standard no less than ASZ311, Section 3, requirements.
Remove dust, dirt, plaster, grease and other mater affecting the finish work. Do not remove existing plaques and Remove dust, arr, piaster, grease and other mater affecting the finish work. Do not remove existing piagles and lettering.

Remove blisters or other imperfections in pervious coats caused by foreign substances or paint skins from painted surface before the subsequent coat is applied.

Thoroughly stir materials in containers before application, uno directed by the manufacturer to ensure uniformity of colour and mass.

Preparation — Concrete Preparation — Concrete
The moisture content of the concrete should be below 6%.
All surfaces should be clean, dry and free from grease, oil, dirt. An surroces should be clean, ary and tree from grease, oil, airt.

Protection

Furnish and lay suitable cloths in areas where painting is being done to protect floors and other surfaces from damage during the work.

Application

Execute pointing shall conform with manufacturer's recommendations, and with the provisions of AS 2311, Section 6. <u>Cleaning</u>
At completion of work in each area, remove paint spots and oil from adjacent surfaces. DESIGN LIFE.

Asset must perform its intended function without replacement, refurbishment or major maintenance of the minimum design life as below:

Drainage elements that are accessible for refurbishment and maintenance

Lighting systems

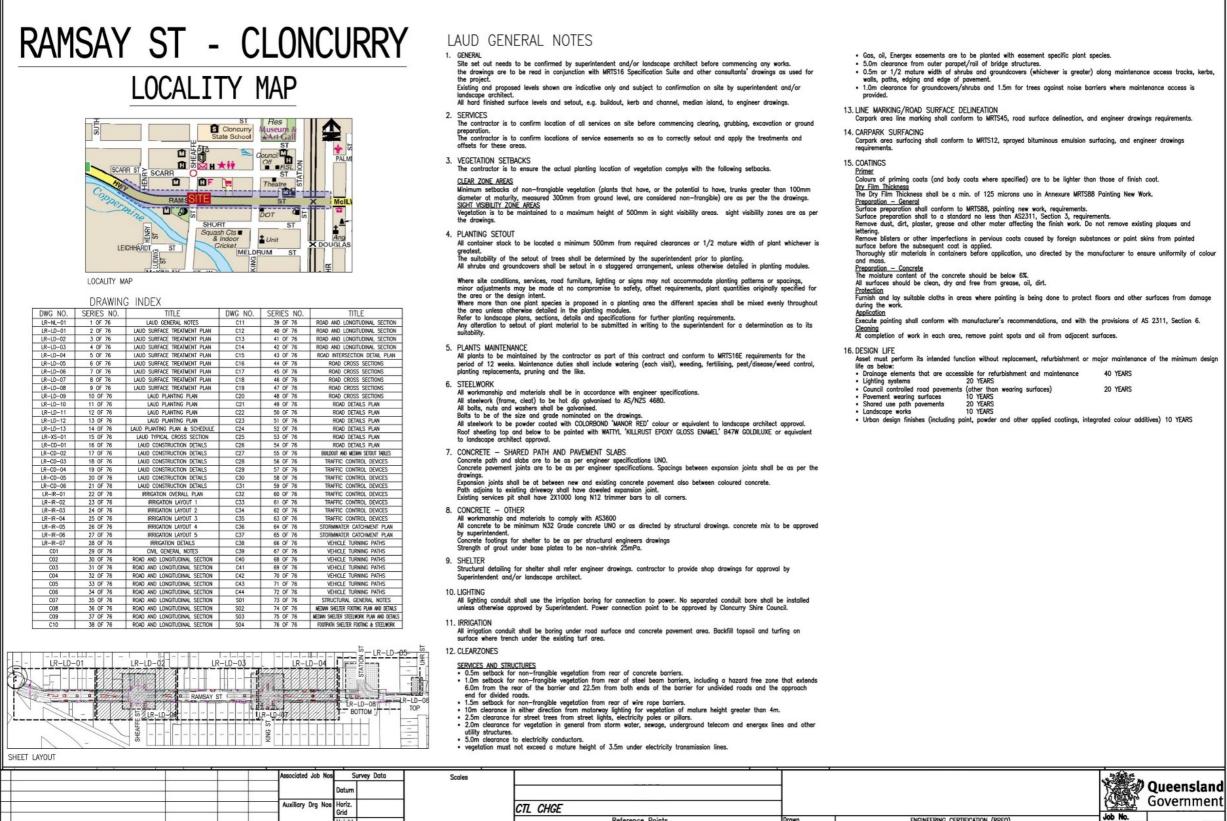
20 YEARS

Council controlled road powements (other than wearing surfaces)

20 YEARS

Powement wearing surfaces

10 YEARS Urban design finishes (including paint, powder and other applied coatings, integrated colour additives) 10 YEARS



CTL CHGE

of job (km)

From start to end of job

Drafting and Design Presentation Standards Manual, Transport and Main Roads, July 2024

Certification Date Microfiled

A Issued For Construction

uxiliary Drg N

Height Origin

Job No.

Contract. No.

Drawing No.

Figure 2.16.4(d) – Landscaping layout and details – generic example 4

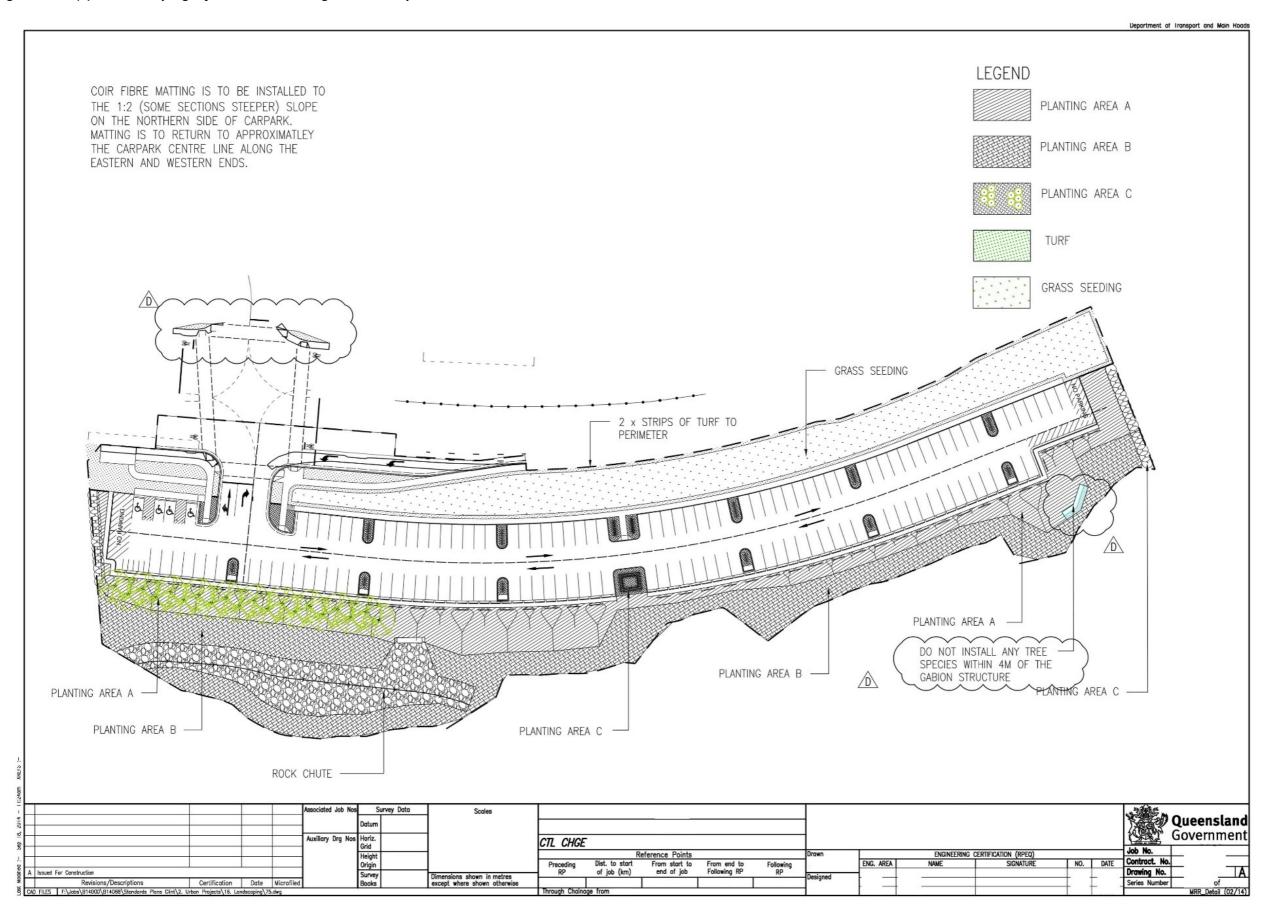


Figure 2.16.4(e) – Landscaping layout and details – generic example 5

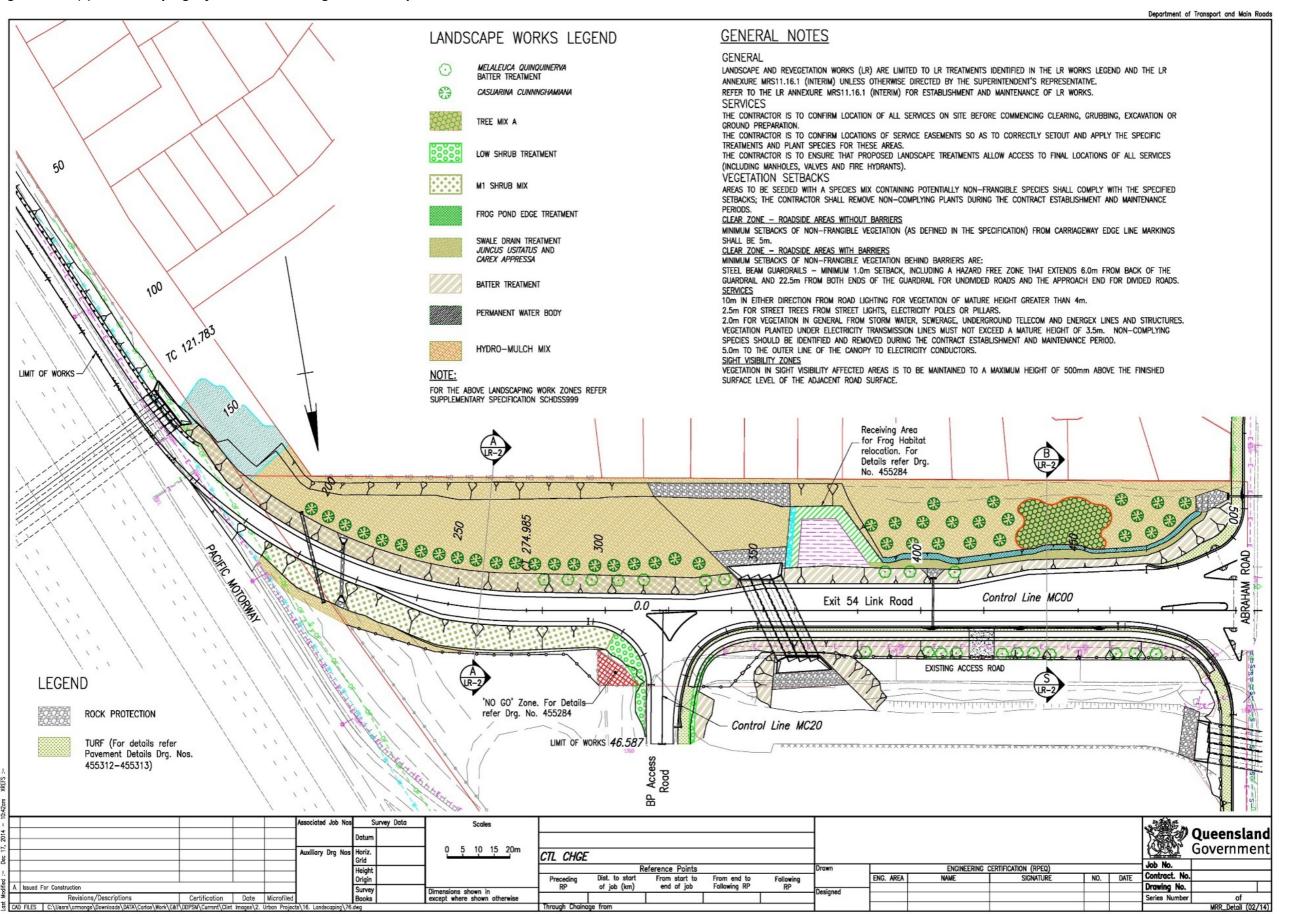


Figure 2.16.4(f) – Landscaping layout and details – generic example 6

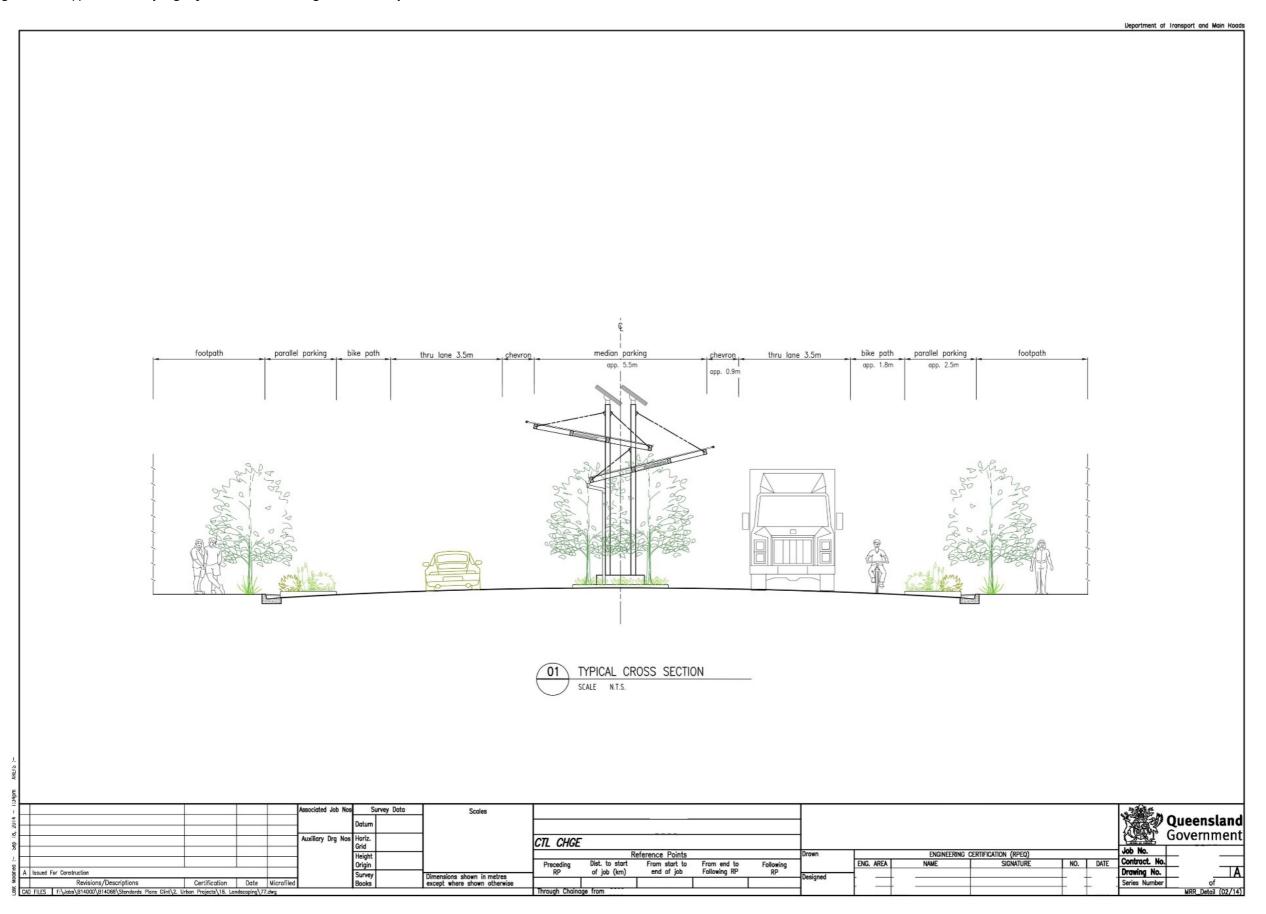


Figure 2.16.4(g) – Landscaping layout and details – generic example 7

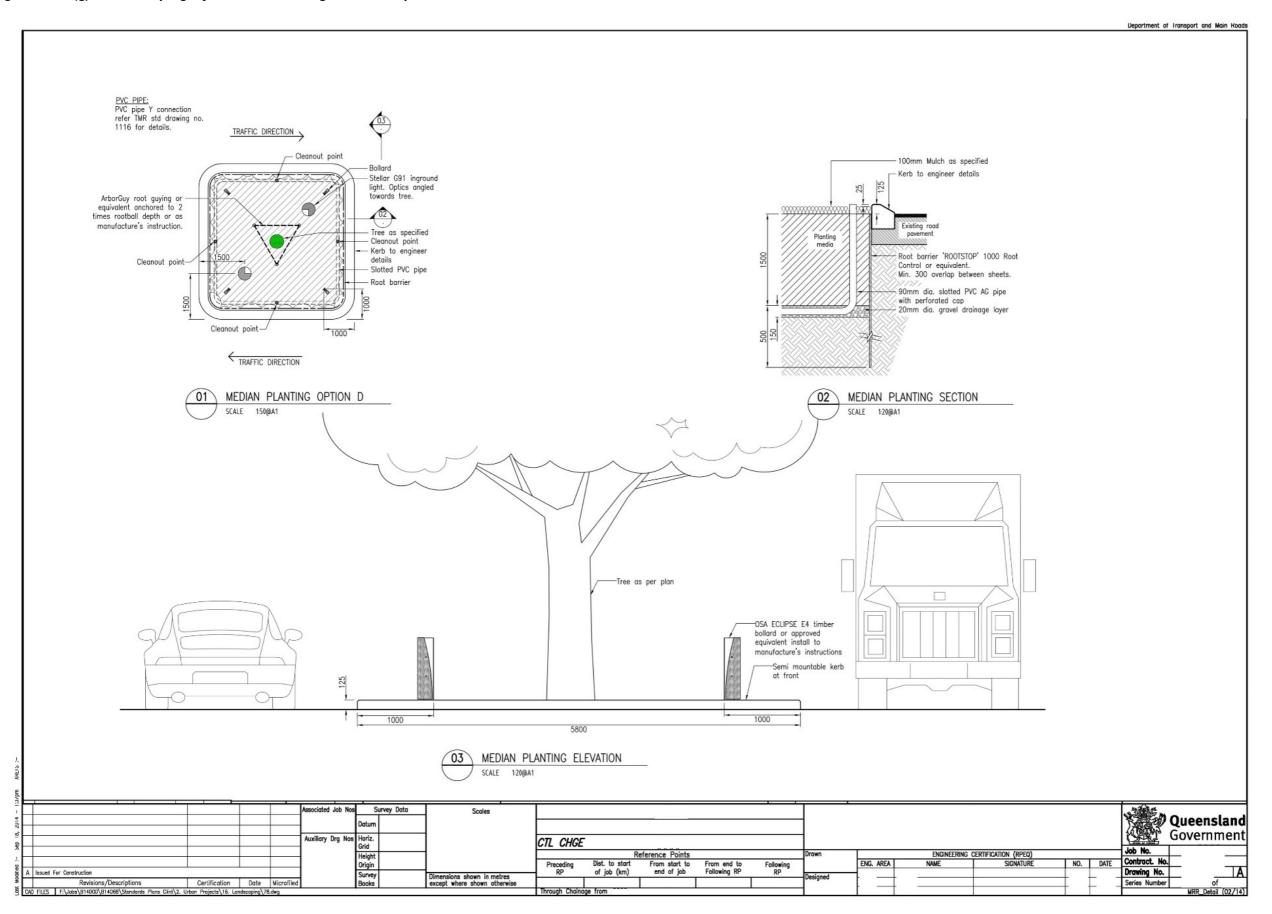
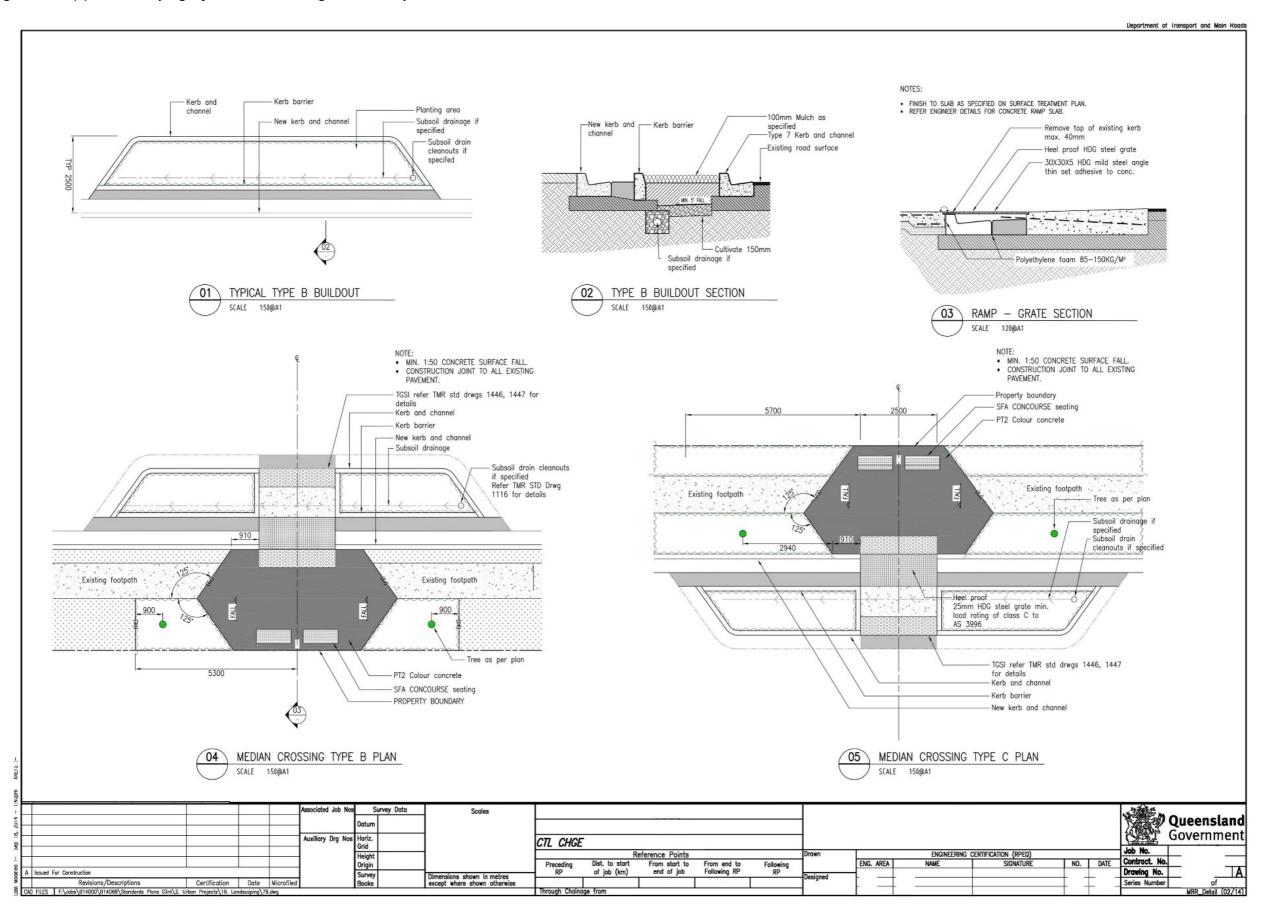


Figure 2.16.4(h) – Landscaping layout and details – generic example 8



2.17 Noise barriers

Noise barrier drawings are to depict, construction detail and consider all design elements of the proposed noise barrier including, location, height and length as determined from an approved noise assessment report.

These drawings are to refer to other relevant standard drawings and standard specifications as they relate to the project specific requirements.

Considerations

Drawing

- Show existing features, including PUP
- Show control line of barrier
- Detail post and footing details including chainage locations
- Identify design wind speed
- · Identify design strength of subsoil
- Add relevant notes and details
- Identify service conflicts
- Show design height of barrier on the longitudinal section
- Provide a longitudinal section on each noise barrier including minimum noise barrier in accordance with the approved noise study and show internal and end panels
- Cross sections of the noise barrier along the alignment
- Typical sections of the noise barrier
- Show location of panels intermediate and end
- Show other detail (as applicable)

Figure 2.17(a) - Noise barrier - registered example - sheet 1 of 5

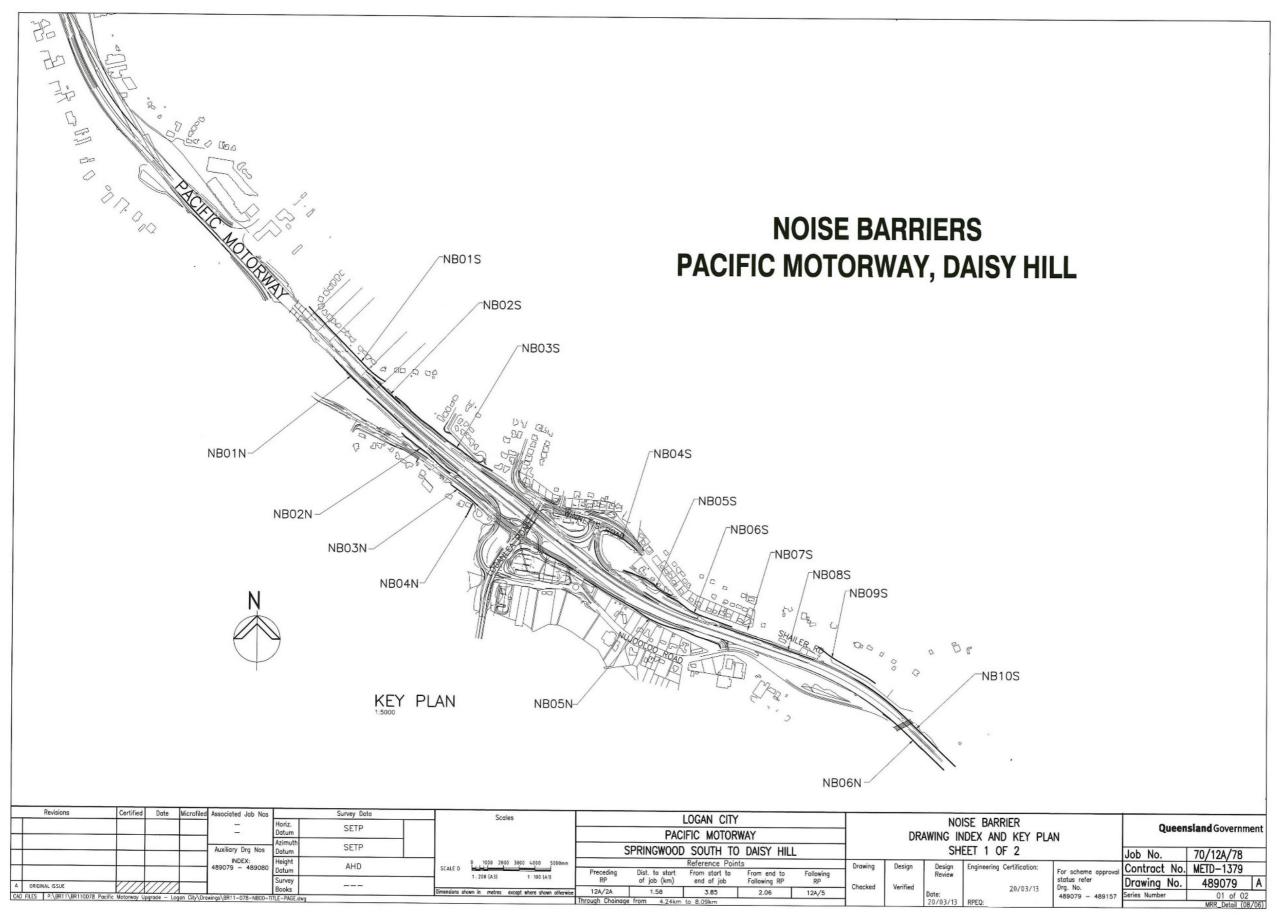


Figure 2.17(b) – Noise barrier – registered example – sheet 2 of 5

NOISE BARRIERS PACIFIC MOTORWAY, DAISY HILL

REFERENCE DRAWINGS

BR110078NB00N01	489079	NOISE BARRIER DRAWING INDEX & KEY PLAN SHEET 1 OF 2
BR110078NB00N02	489080	NOISE BARRIER DRAWING INDEX & KEY PLAN SHEET 2 OF 2
BR110078NB01N01	489081	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N02	489082	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N03	489083	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N04	489084	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB01N05	489085	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB01N06	489086	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB01N07	489087	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB02N01	489088	NOISE BARRIER NB02N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB02N02	489089	NOISE BARRIER NB02N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB02N03	489090	NOISE BARRIER NB02N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB02N04	489091	NOISE BARRIER NB02N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB03N01	489092	NOISE BARRIER NB03N (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB03N02	489093	NOISE BARRIER NB03N (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB03N03	489094	NOISE BARRIER NB03N (SHAILER RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
3R110078NB04N01	489095	NOISE BARRIER NB04N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB04N02	489096	NOISE BARRIER NB04N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB05N01	489097	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
R110078NB05N02	489098	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
R110078NB05N03	489099	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
R110078NB05N04	489100	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
R110078NB05N05	489101	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
R110078NB05N06	489102	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
R110078NB05N07	489103	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS
R110078NB05N08	489104	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS

BR110078NB05N09	489105	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB05N10	489106	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB05N11	489107	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB05N12	489108	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB05N13	489109	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB06N01	489110	NOISE BARRIER NBOSN (PACIFIC MWY, DAISY HILL) FOR FENCO LONG SECTION
BR110078NB06N02	489111	NOISE BARRIER NBOSN (PACIFIC MWY, DAISY HILL) FOR FENCO LONG SECTION
BR110078NB06N03	489112	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO LONG SECTION
BR110078NB06N04	489113	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO LONG SECTION
BR110078NB06N05	489114	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB06N06	489115	NOISE BARRIER NBOBN (PACIFIC MWY, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB06N07	489118	NOISE BARRIER NBOSN (PACIFIC MWY, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB06N08	489117	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB01S01	489118	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01S02	489119	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01S03	489120	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01S04	489121	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01S05	489122	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01S06	489123	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01S07	489124	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB02S01	489125	NOISE BARRIER NB02S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB02S02	489126	NOISE BARRIER NB02S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB02S03	489127	NOISE BARRIER NB02S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB03S01	489128	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB03S02	489129	NOISE BARRIER NB03S (WINNETT'S RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB03S03	489130	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION

		NOISE BARRIER NB03S
BR110078NB03S04	489131	(WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB03S05	489132	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB03S06	489133	NOISE BARRIER NBOSS (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB03S07	489134	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB04S01	489135	NOISE BARRIER NB04S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB04S02	489136	NOISE BARRIER NB04S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB04S03	489137	NOISE BARRIER NB04S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB05S01	489138	NOISE BARRIER NB06S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB05S02	489139	NOISE BARRIER NB055 (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB05S03	489140	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB05S04	489141	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB05805	489142	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB05S06	489143	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB05S10	489144	NOISE BARRIER NB055 (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB05S01	489145	NOISE BARRIER NB06S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB06S02	489146	NOISE BARRIER NB06S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB06S03	489147	NOISE BARRIER NB06S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB06S04	489148	NOISE BARRIER NBOSS (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB06S05	489149	NOISE BARRIER NB06S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB07S01	489150	NOISE BARRIER NB07S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB07S02	489151	NOISE BARRIER NB07S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
3R110078NB07S03	489152	NOISE BARRIER NB07S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB07S04	489153	NOISE BARRIER NB07S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB08S01	489154	NOISE BARRIER NB0BS (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB08S02	489155	NOISE BARRIER NB08S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB08S03	489156	NOISE BARRIER NB08S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS

BR110078NB09S01	489157	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB09S02	489158	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB09S03	489159	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB09S04	489160	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB09S05	489161	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB10S01	489162	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB10S02	489163	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB10S03	489164	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB10S04	489165	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB10S05	489166	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB10S06	489167	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB10S07	489168	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB10S08	489169	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTION, NOTES AND DETAILS
BR110078NB10S09	489170	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB10S10	489171	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB10S11	489172	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTION, NOTES AND DETAILS

			_																	
Revisions	Certified	Date	Microfiled	Associated Job Nos		Survey Data Scales			LOGAN CITY						NO	Queensland Government				
				_	Horiz.	SETP							NOISE BARRIER							
			_	-	Datum		1		PACIFIC MOTORWAY DRAWING INDEX AND KEY PLAN						AN					
				Auxiliary Drg Nos	Azimuth	SETP			SPRINGWOOL	D SOUTH TO	DAISY HILL		SHEET 2 OF 2					Joh No	70/104/70	
				INDEX:	Height		0 1000 2000 3000 4000 5000mm	SPRINGWOOD SOUTH TO DAISY HILL Reference Points			-						Job No.	70/12A/78		
				489079 - 489080	Datum	AHD	SCALE D	Preceding	Dist. to start	From start to	From end to	Following	Drawing	Design	Design	Engineering	Certification:	For scheme approval	Contract No.	METD-1379
	////	,,,,			Survey		1 - 200 (A3) 1 . 100 (A1)	RP	of job (km)	end of job	Following RP	RP			IVENIEW			status refer	Drawing No.	489080 A
A ORIGINAL ISSUE	///X	////			Books		Dimensions shown in metres except where shown otherwise	12A/2A	1.58	3.85	2.06	12A/5	Checked	Verified	Date:		20/03/13	Org. No. 489079 - 489157	_	02 of 02
CAO FILES P:\BR11\BR110078 Pacific	Motorway Up	grade - Lo	gan City\Ora	wings\BR11-078-NB00-	TITLE-PAGE.	dwg		Through Chainag	e from 4.24km	n to 8.09km					20/03/13	RPEQ:		4030/3 - 40913/	derice Hamber	MRR Detail (08/06)

Figure 2.17(c) - Noise barrier - registered example - sheet 3 of 5

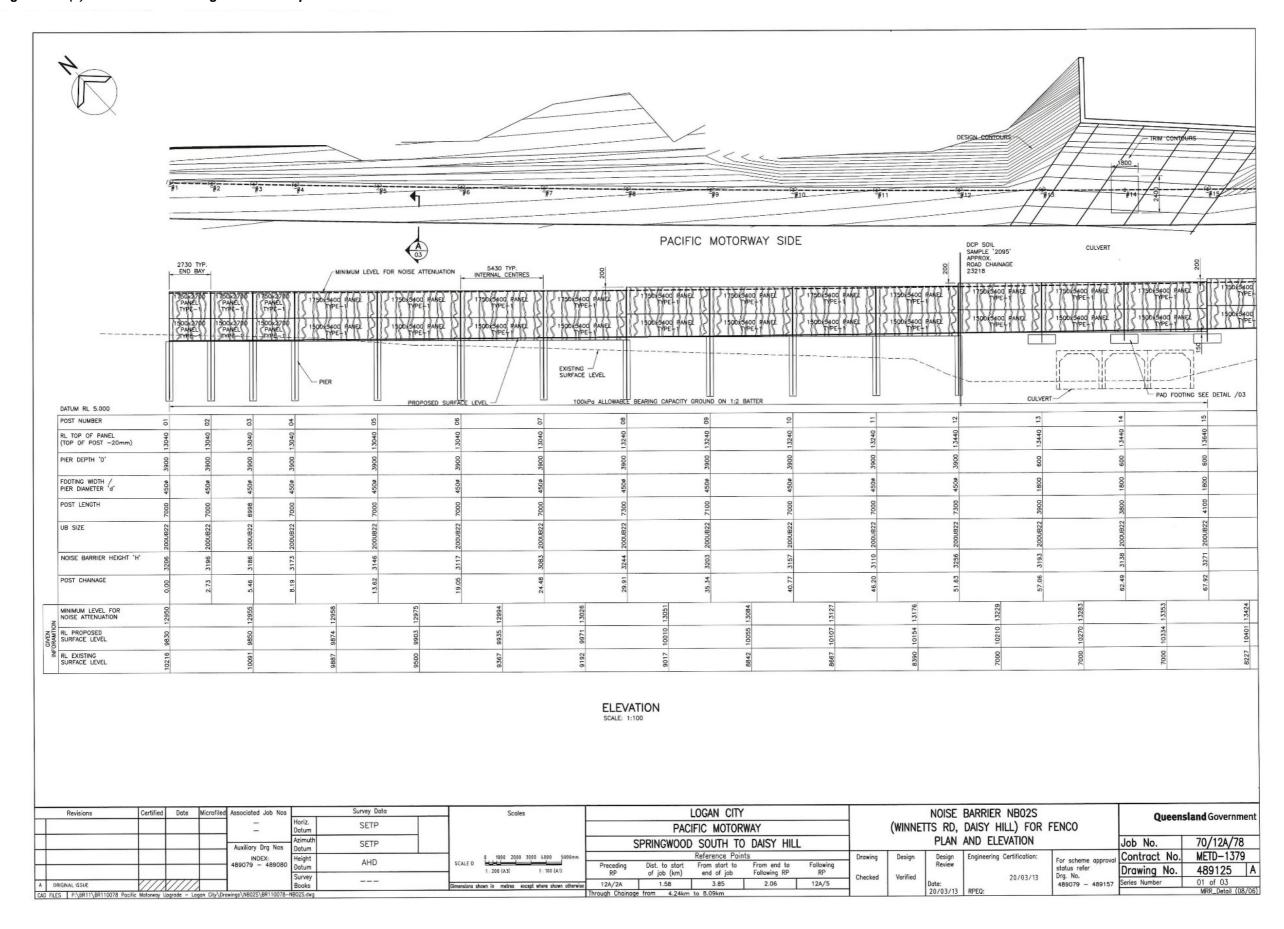


Figure 2.17(d) – Noise barrier – registered example – sheet 4 of 5

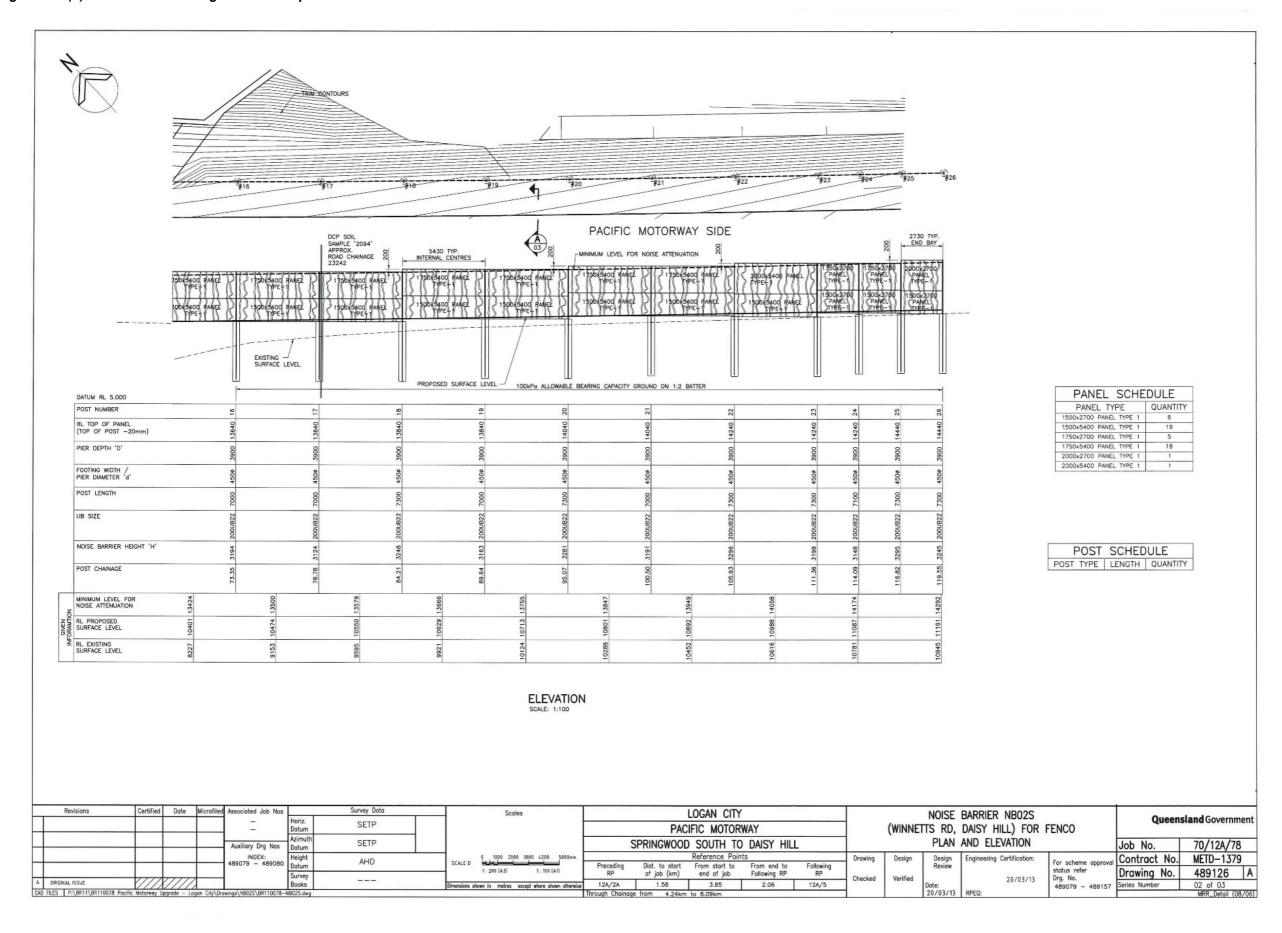
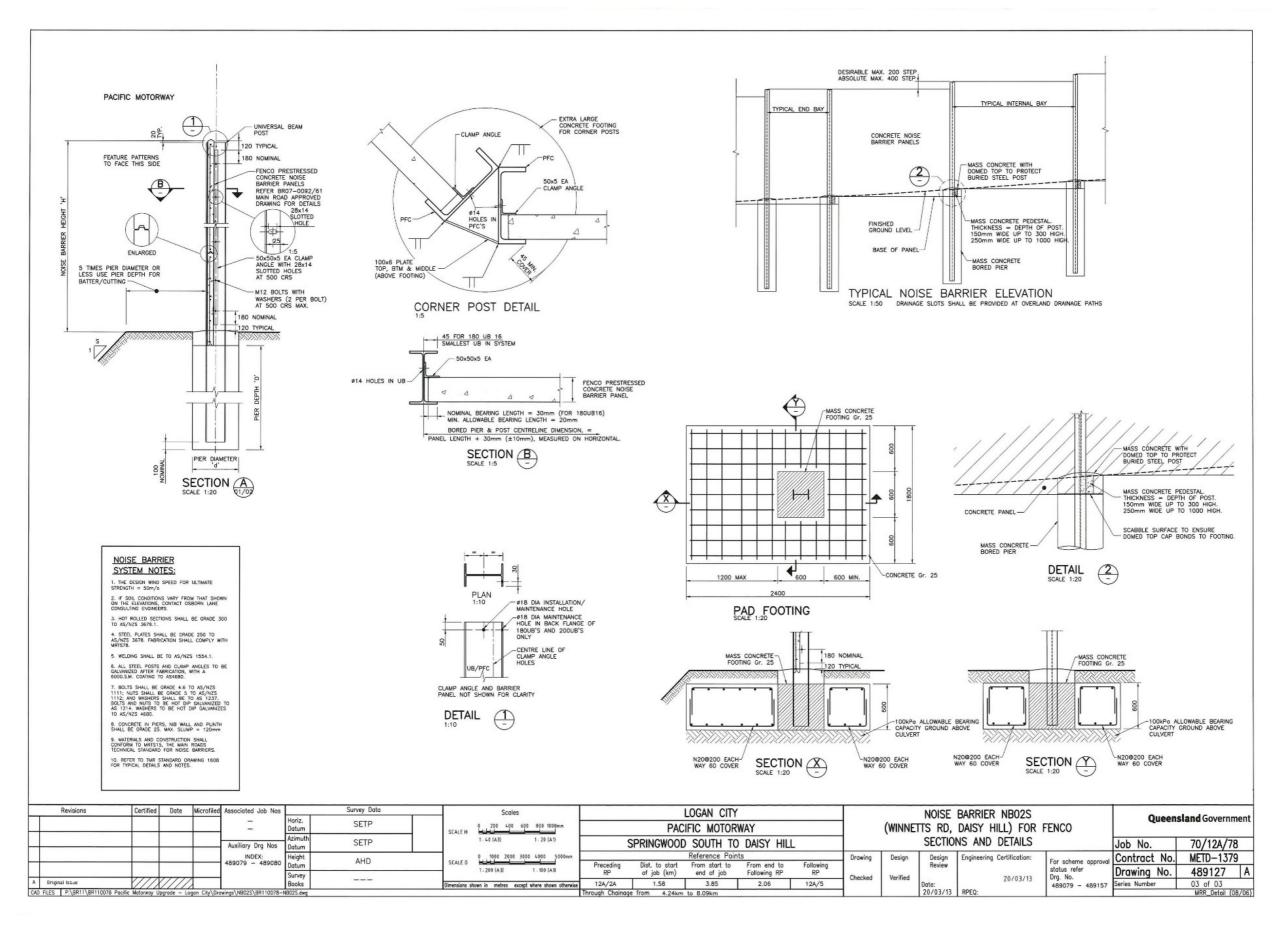


Figure 2.17(e) – Noise barrier – registered example – sheet 5 of 5



2.18 Special treatment details

The special treatment details drawing provides specific project details, for example driveway details, vehicle crossing points, footpath details, minor retailing walls, and so on.

Considerations

Scale

• To suit details (consider 1:250 at A1/1:500 at A3 if high degree of detail)

Drawing

- Provide specific treatment details as required for construction
- Content typically includes details that are not incorporated into other design drawings

Figure 2.18(a) – Driveway details – generic example

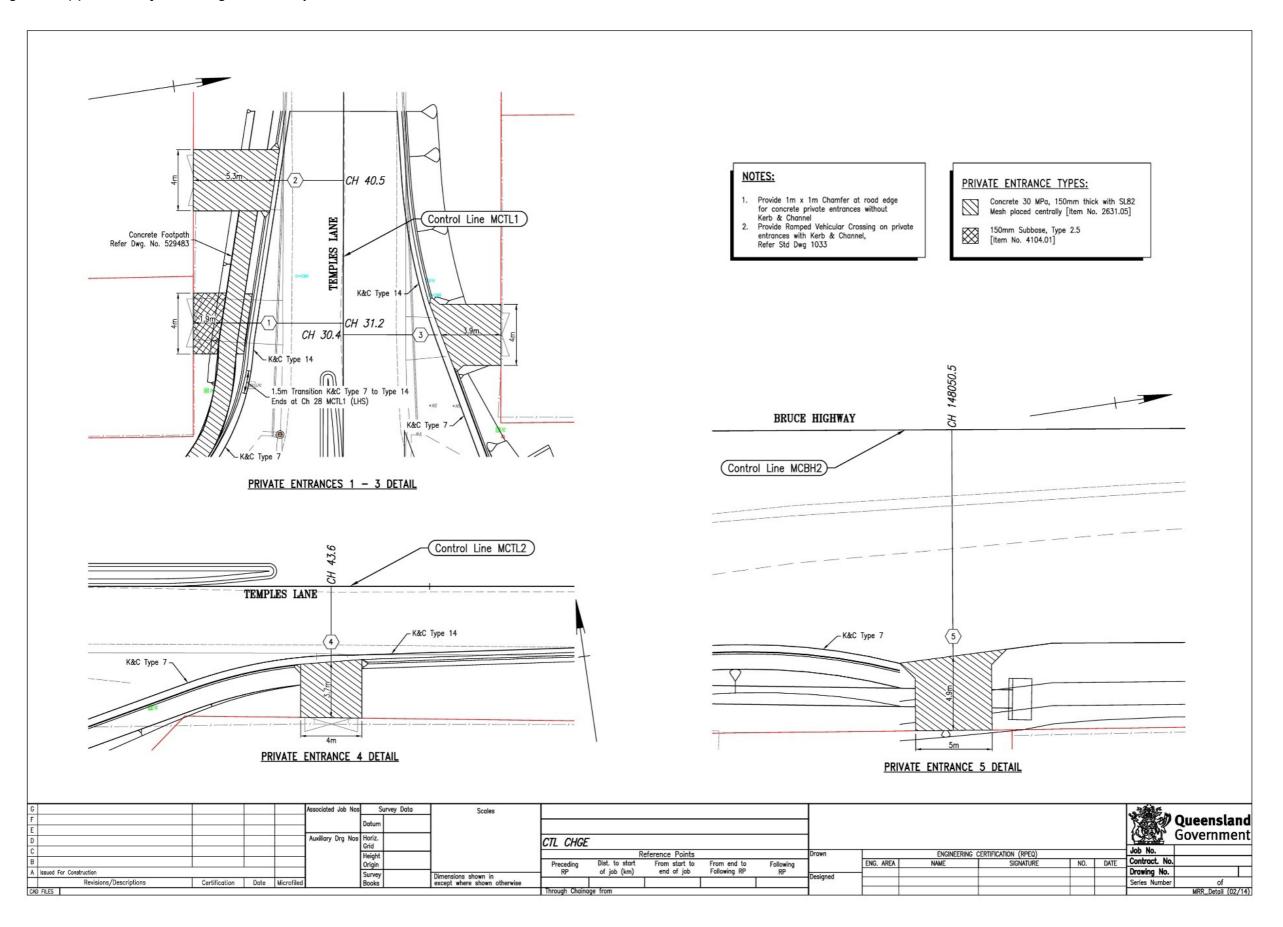


Figure 2.18(b) – Vehicle crossing details – generic example

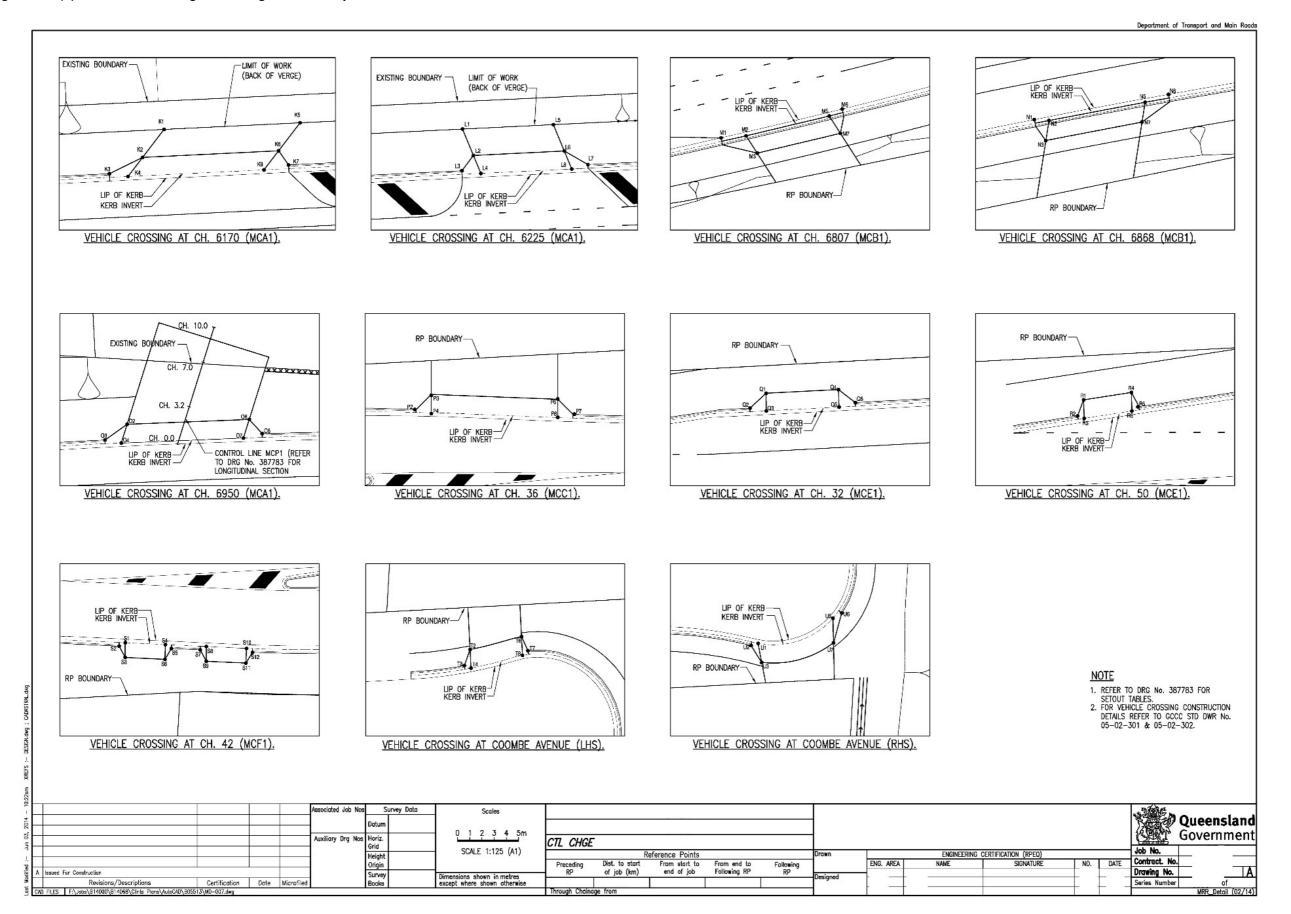


Figure 2.18(c) – Kerb ramp crossing details – generic example

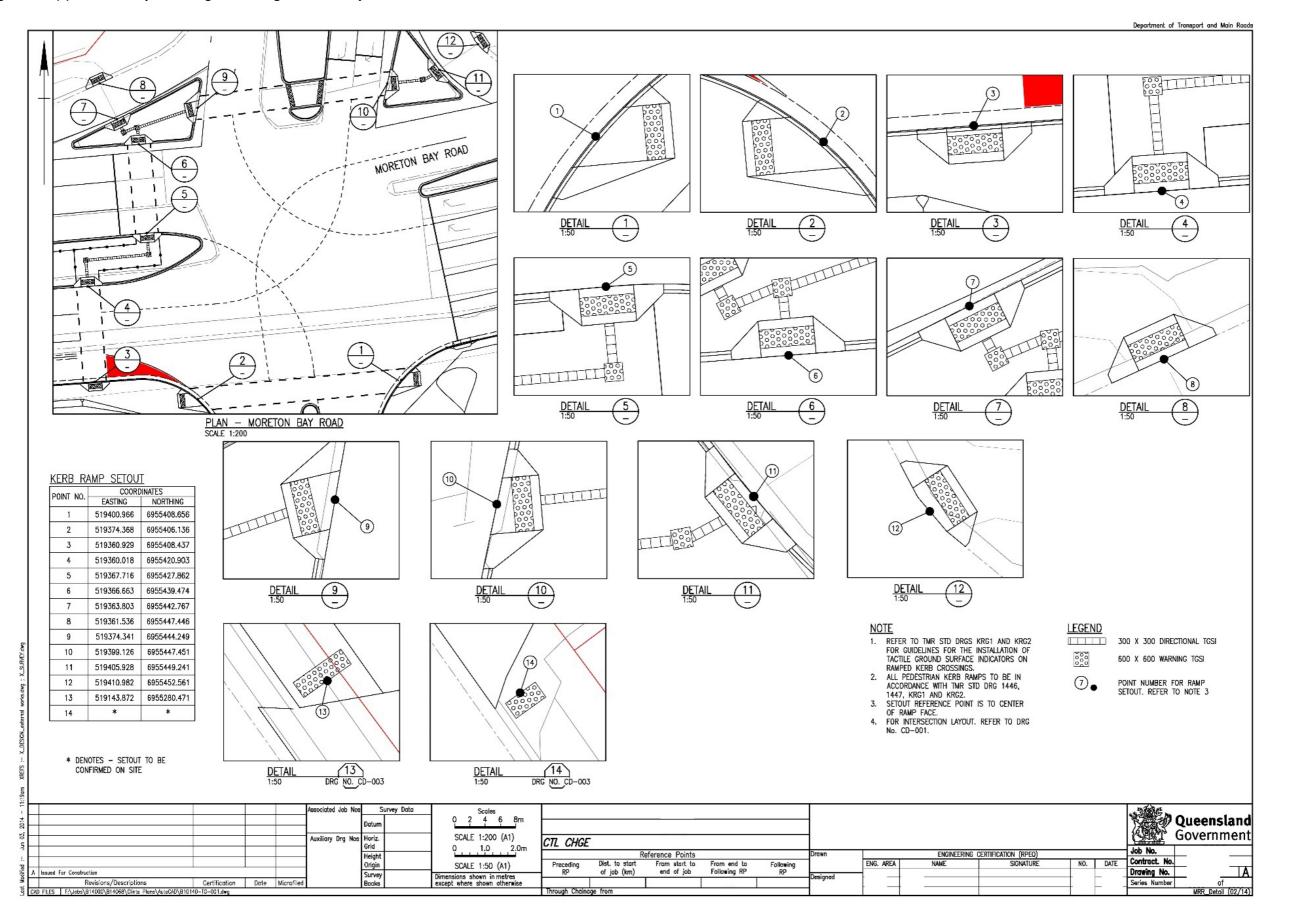


Figure 2.18(d) – Footpath details – generic example

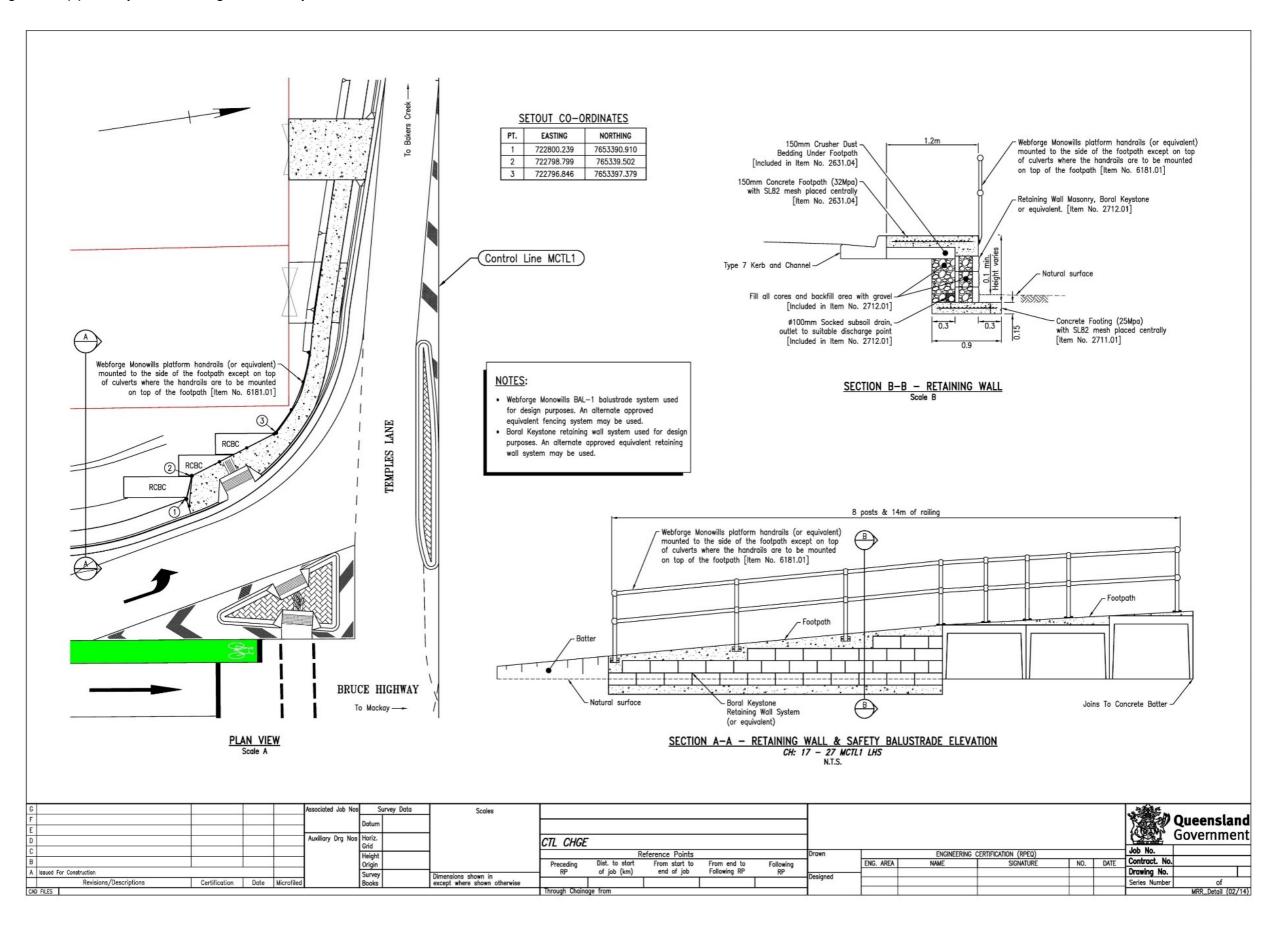


Figure 2.18(e) – Cycle lane facilities layout – generic example sheet 1 of 2

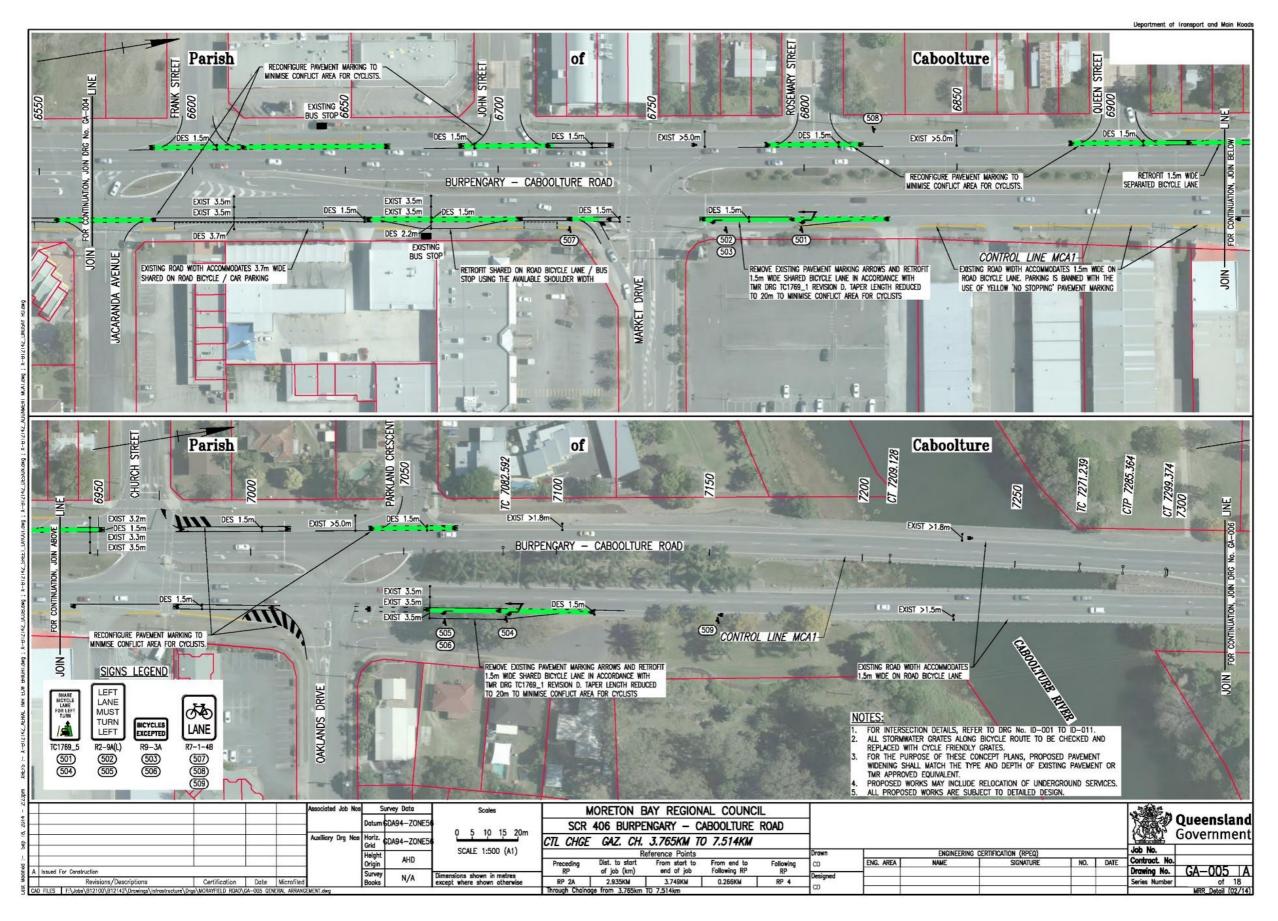


Figure 2.18(f) – Cycle lane facilities layout – generic example sheet 2 of 2

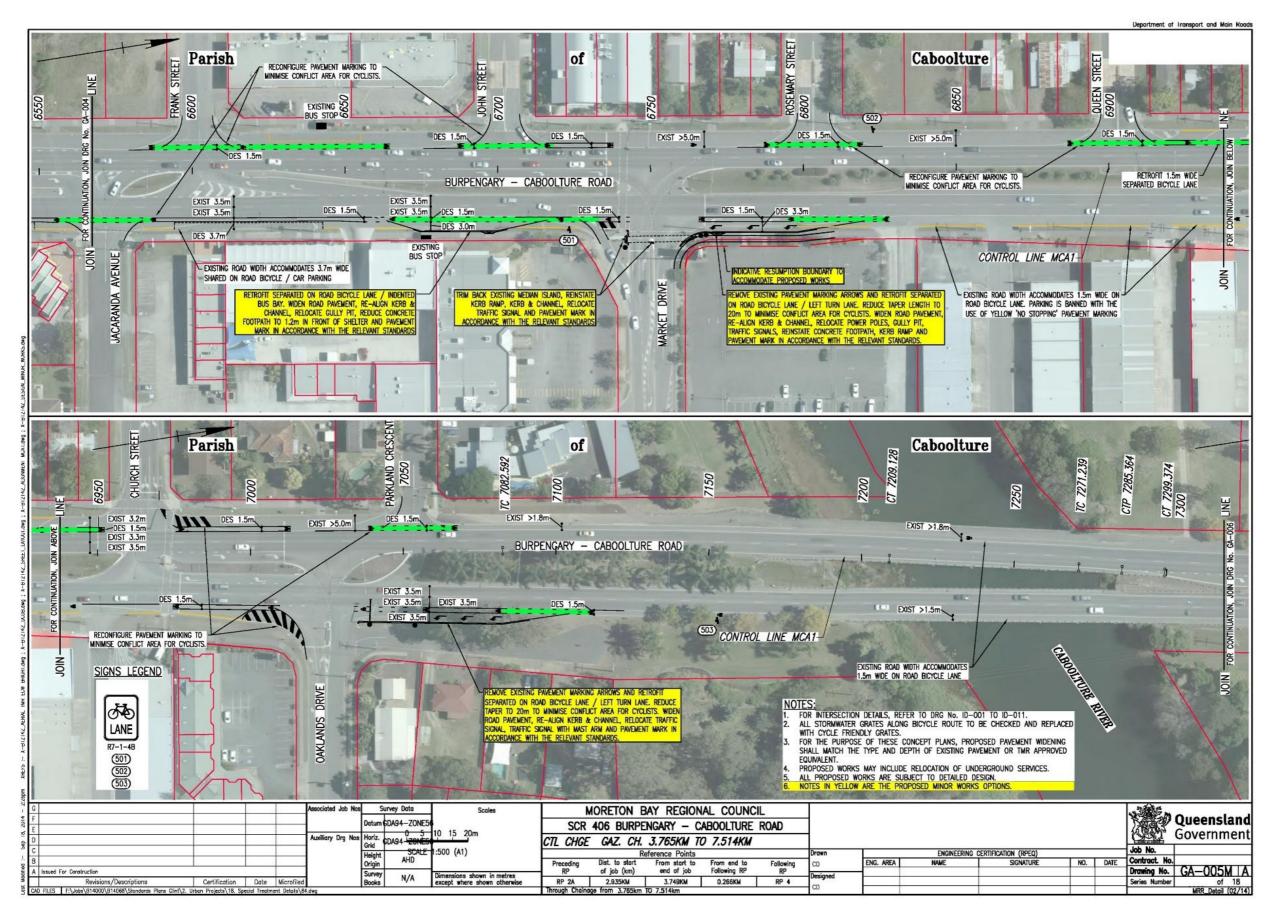


Figure 2.18(g) – Private access details – registered example

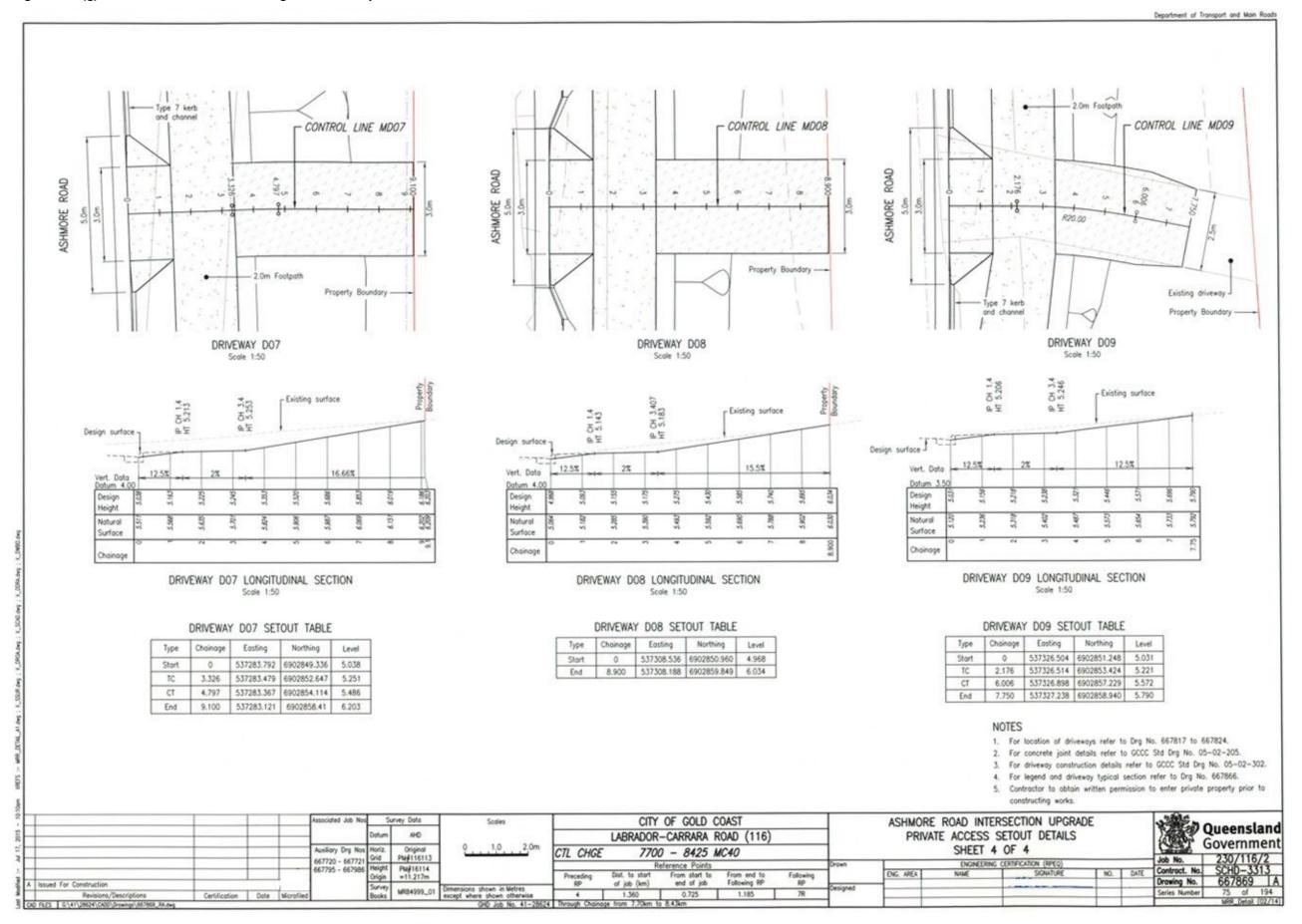
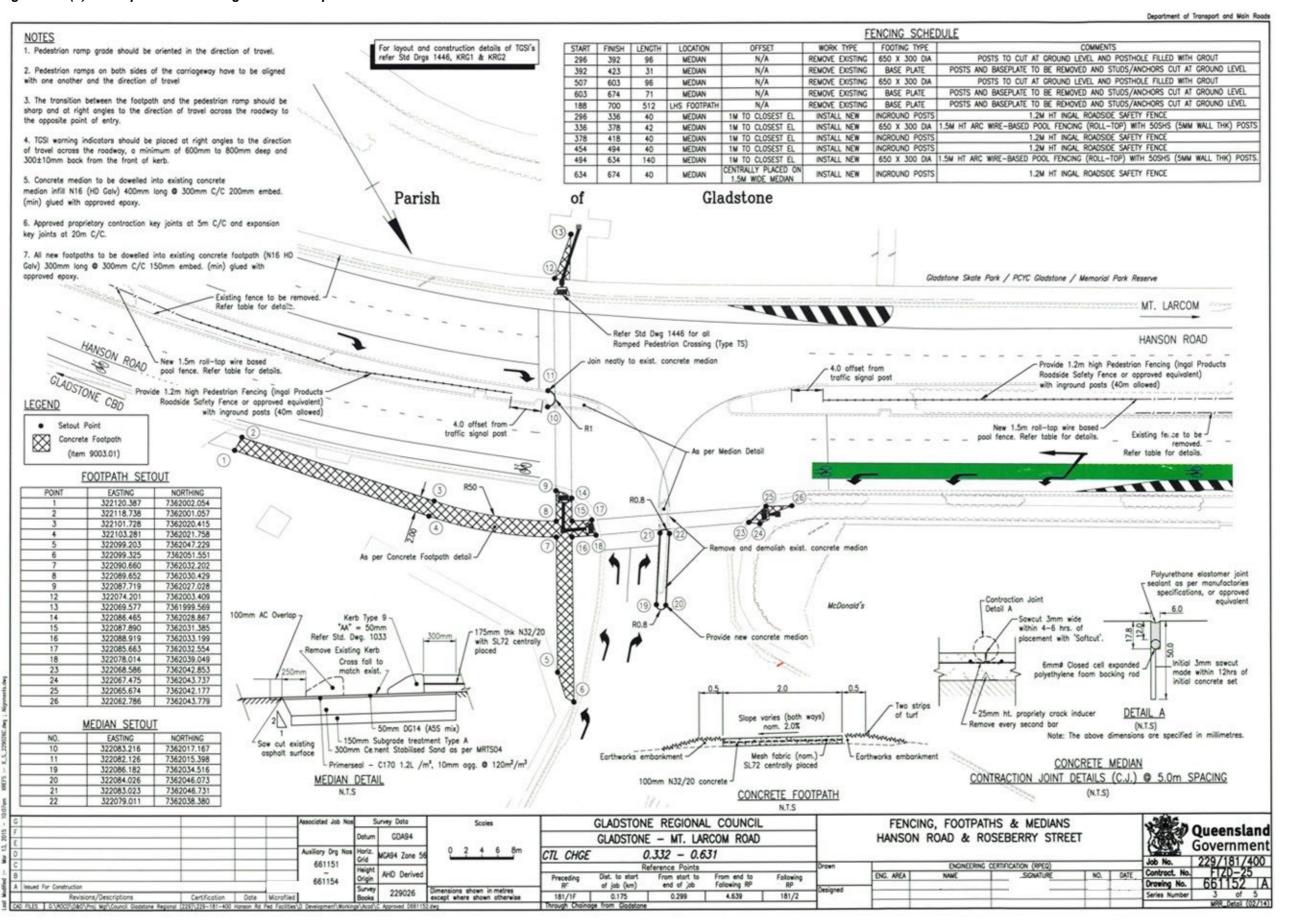


Figure 2.18(h) – Footpath details – registered example



2.19 Annotated cross sections (if required)

Note: Electronic design models are generally made available to the construction contractor, therefore annotated cross sections may not be required as part of the tender documentation.

The annotated cross sections indicate the extents of the construction works necessary to complete the project works. They provide the designer and the client with a better understanding of the issues involved with the construction of the works.

Considerations

Scale

- Consider 1:100 at A1 or 1:200 at A3
- Natural scale (unless requested with Horizontal / Vertical distortion)

Drawing

Annotated cross section templates are available from the *Transport and Main Roads 12D Model Customisation* User Library (several templates are available)

Figure 2.19(a) - Annotated cross sections - generic example 1

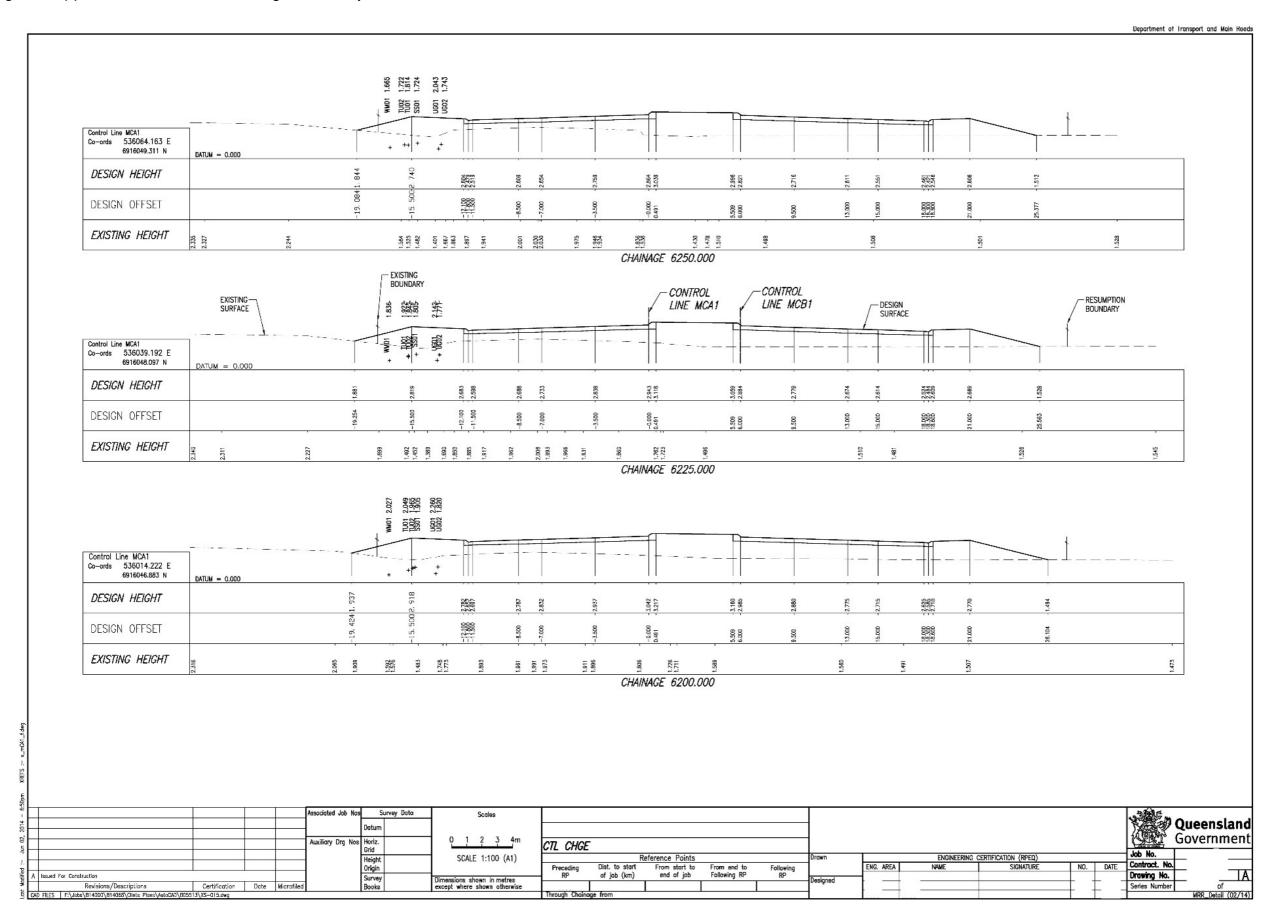


Figure 2.19(b) – Annotated cross sections – generic example 2

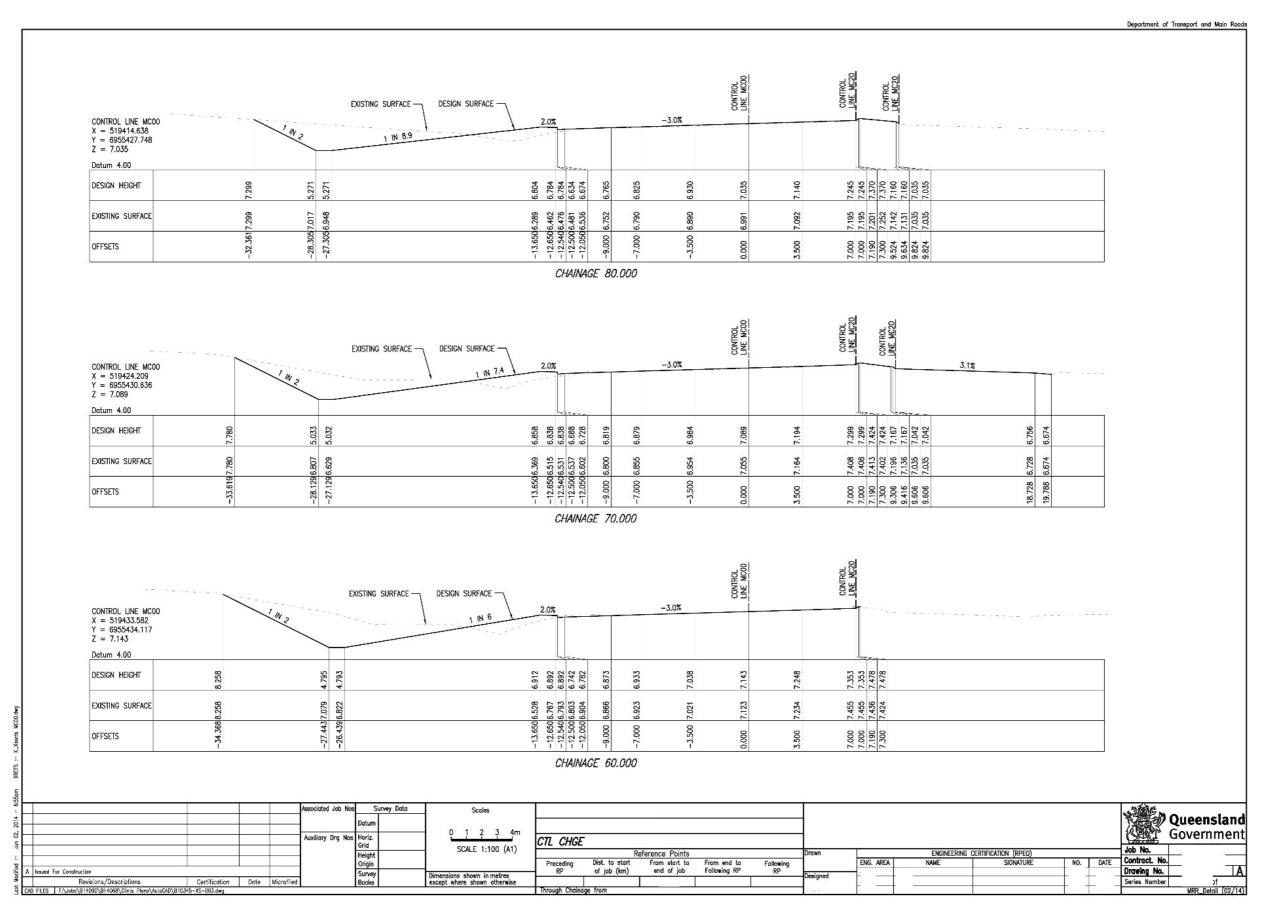


Figure 2.19(c) – Annotated cross sections – generic example 3

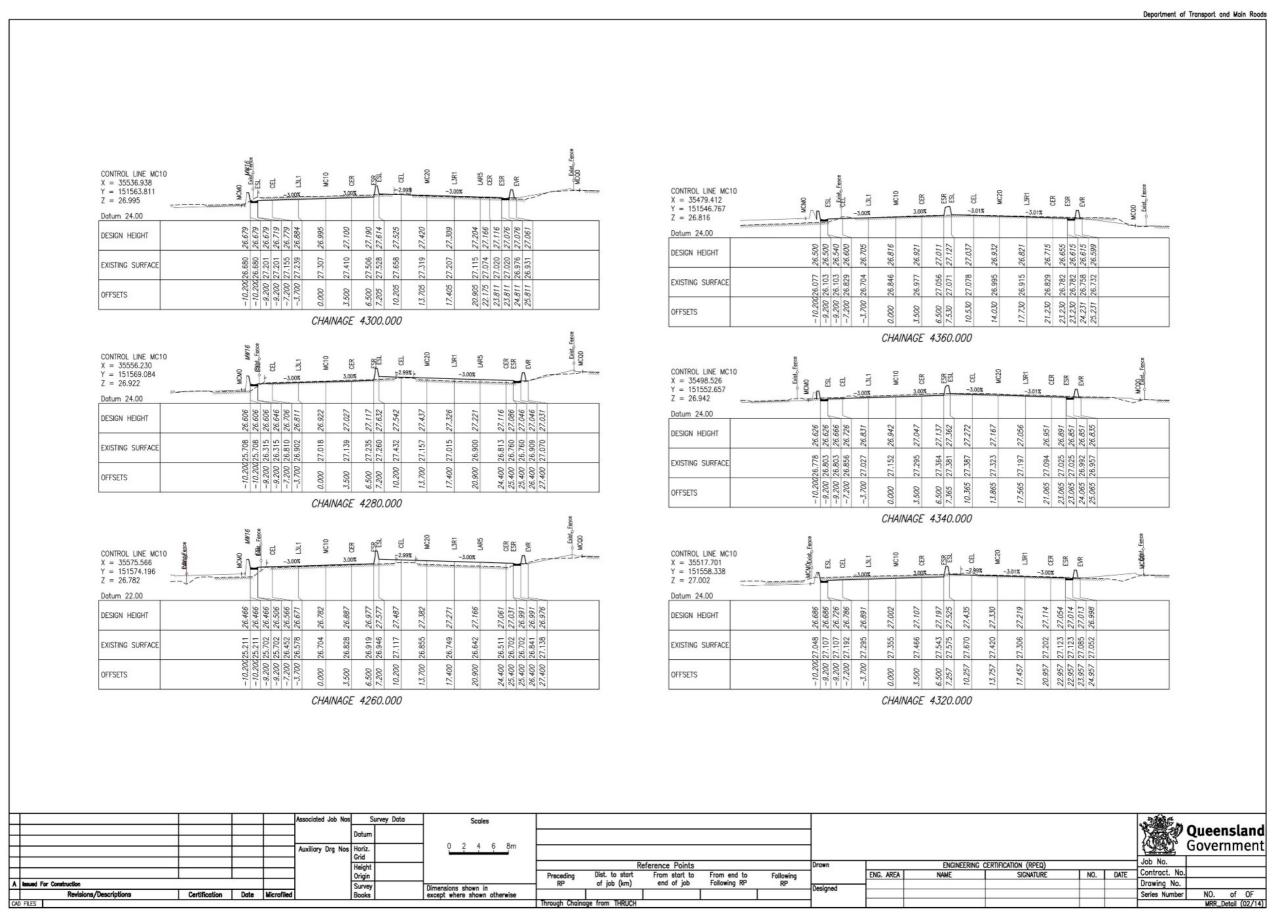


Figure 2.19(d) – Annotated cross sections – generic example 4

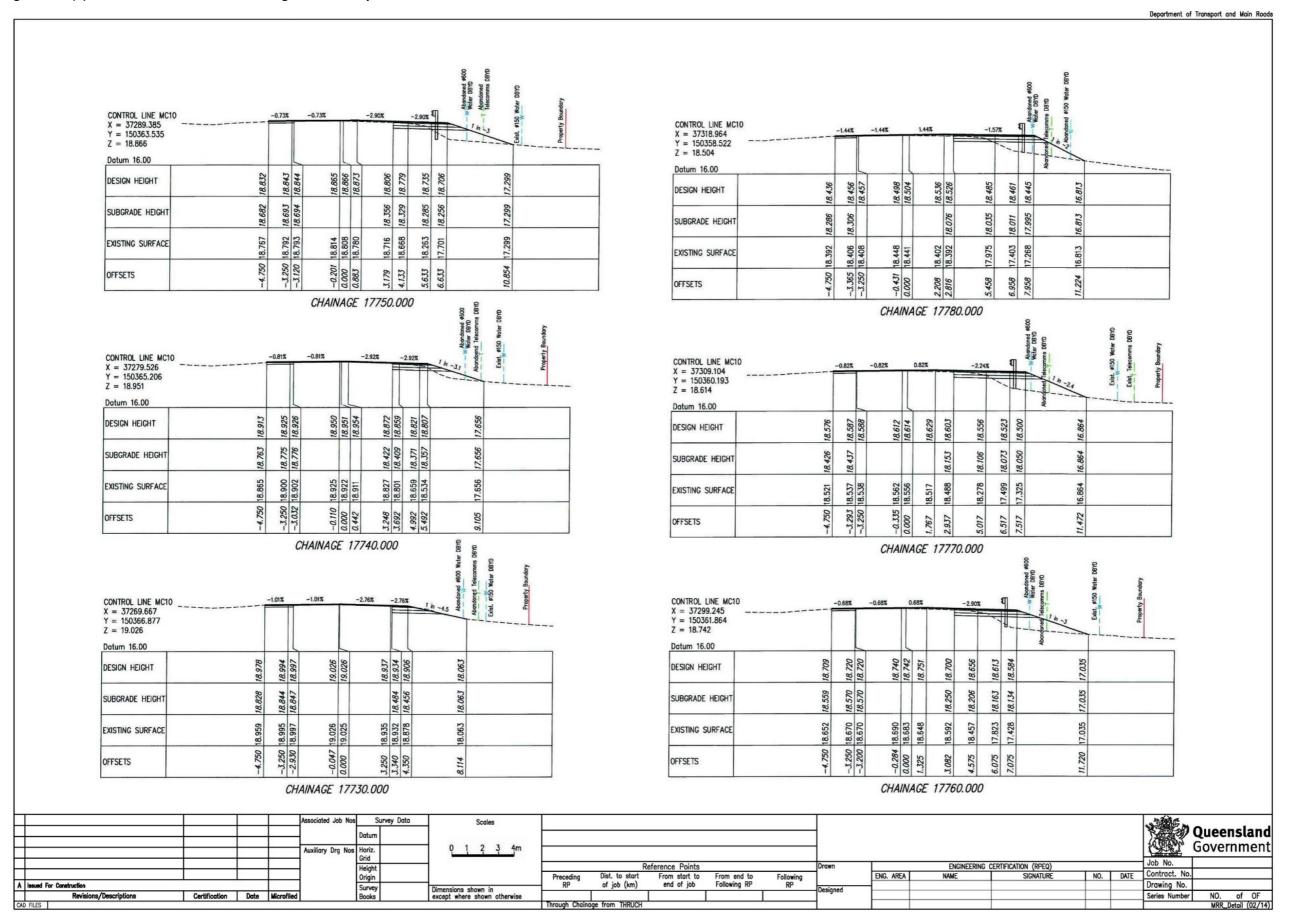


Figure 2.19(e) – Annotated cross sections – registered example 1

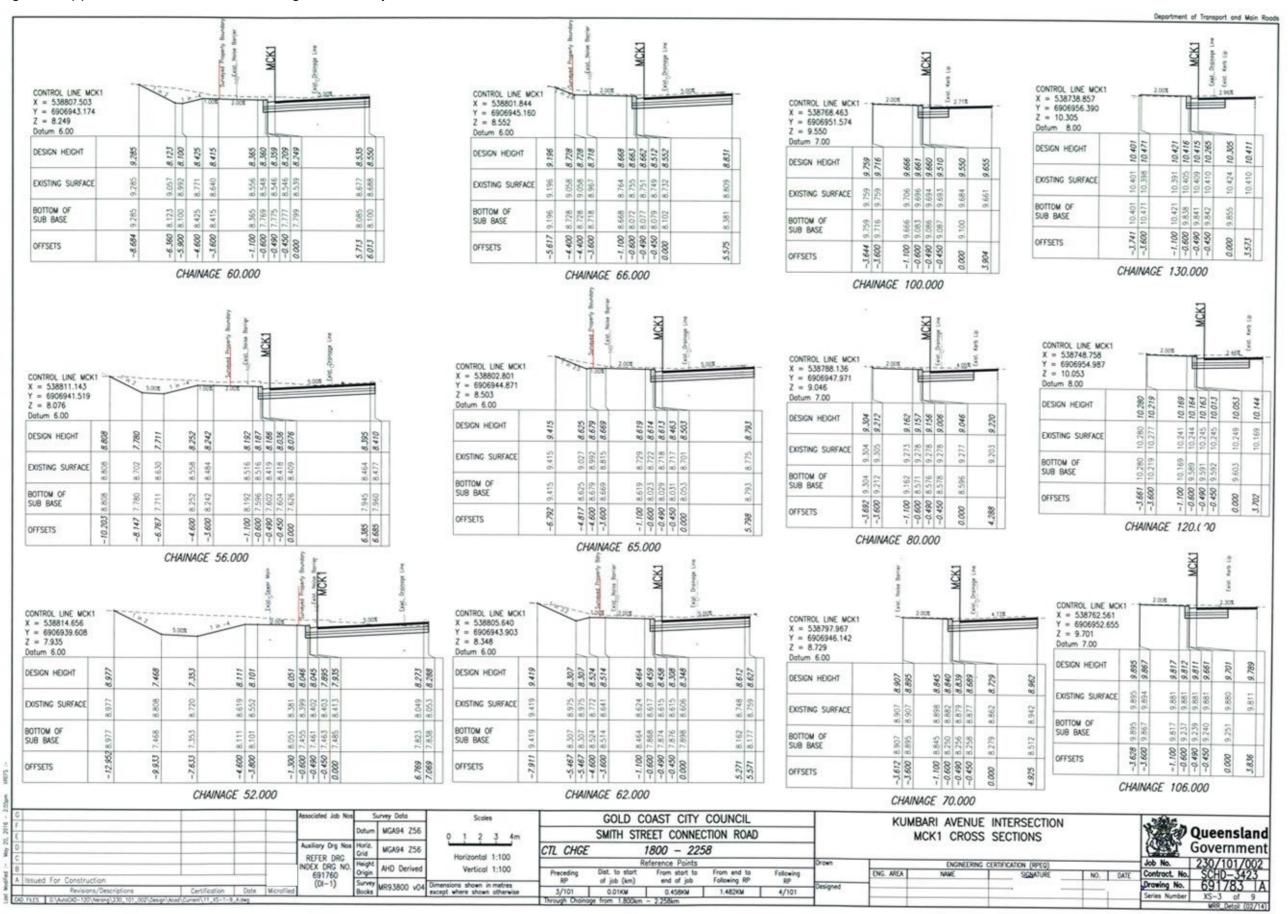
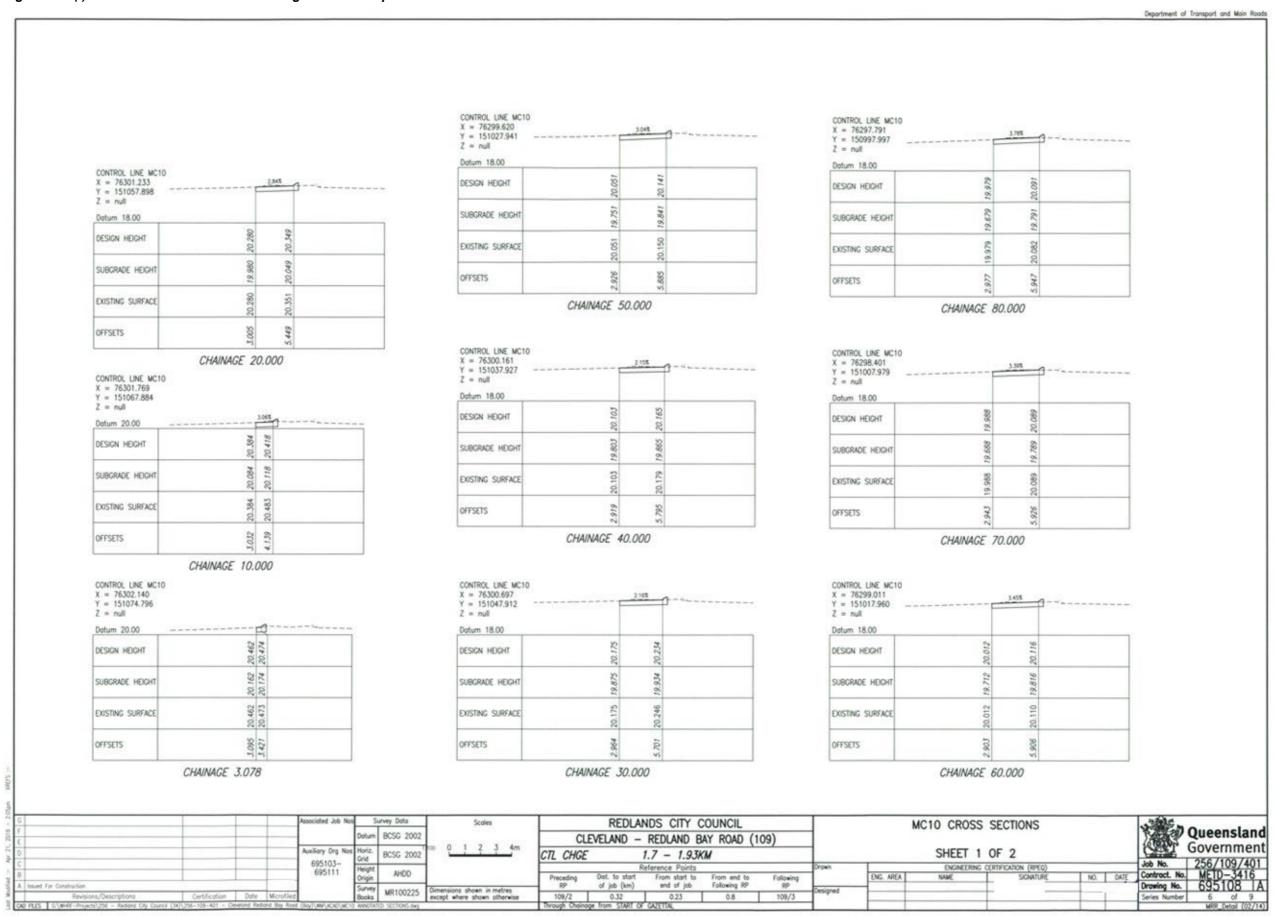


Figure 2.19(f) – Annotated cross sections – registered example 2



2.20 Construction staging

Traffic management and construction staging requirements are generally the responsibility of the construction contractor. However, the designer is responsible for demonstrating the constructability of the project.

Traffic management / sequencing plans may not necessarily be presented to the construction contractor as part of the tender documents.

When preparing traffic management layout plans consider:

- safety for all road users, including pedestrians, cyclists and motorcyclists
- traffic management during construction
- sequencing and staging of construction (where traffic travel during construction)
- appropriate speed restriction for the conditions and traffic volumes
- turning paths for heavy vehicles
- temporary pavement markings and signage
- site access / exit to construction areas (safety in design requirements)
- construction requirements (area for construction, safety clearances and requirements, etc.)
- appropriate temporary safety barriers and end treatments
- temporary construction and interface between temporary pavement and existing
- horizontal and vertical alignment
- sight lines around and over temporary barriers and at intersections
- readability of the intended temporary travel paths
- pavement widths / curve widening
- · access for pedestrians and cyclists
- access to properties and businesses
- street lighting requirements
- temporary traffic control, that is traffic signals, traffic controllers
- detours and side tracks
- · constructability issues have been addressed
- undertaking a road safety audit of the traffic management plans.

Figure 2.20(a) - Construction staging - generic example 1 - sheet 1 of 2

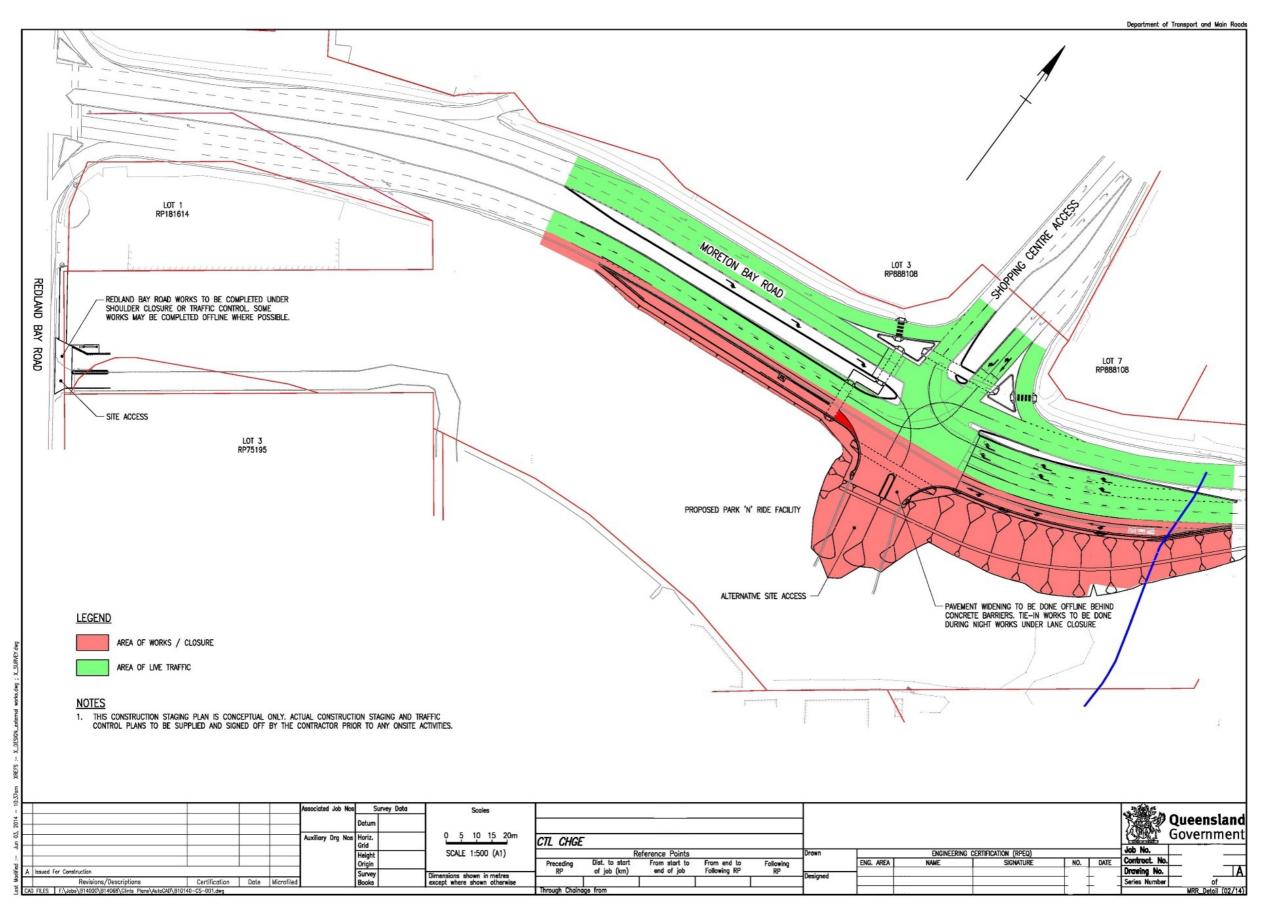


Figure 2.20(b) – Construction staging – generic example 1 – sheet 2 of 2

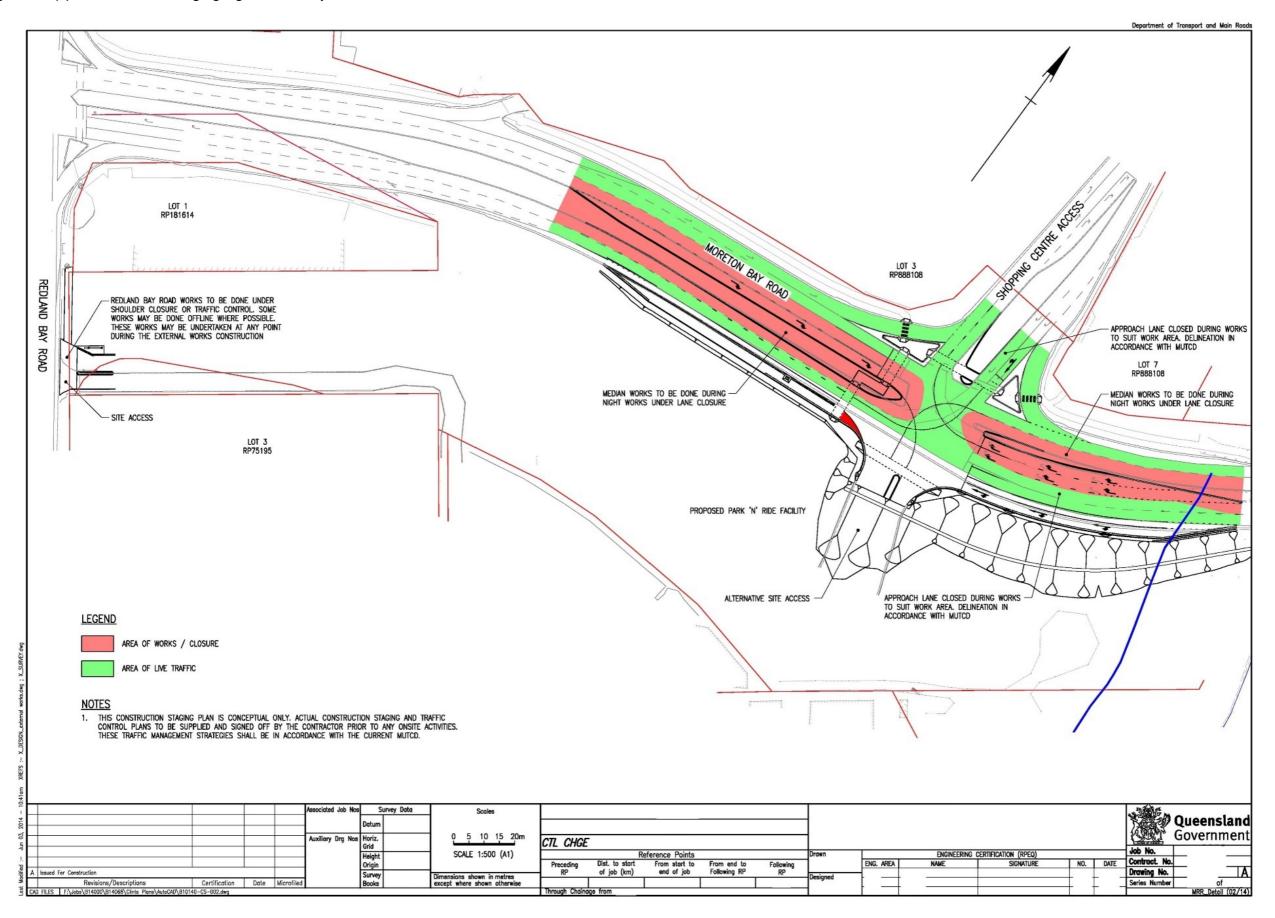


Figure 2.20(c) – Construction staging – generic example 2 – sheet 1 of 2

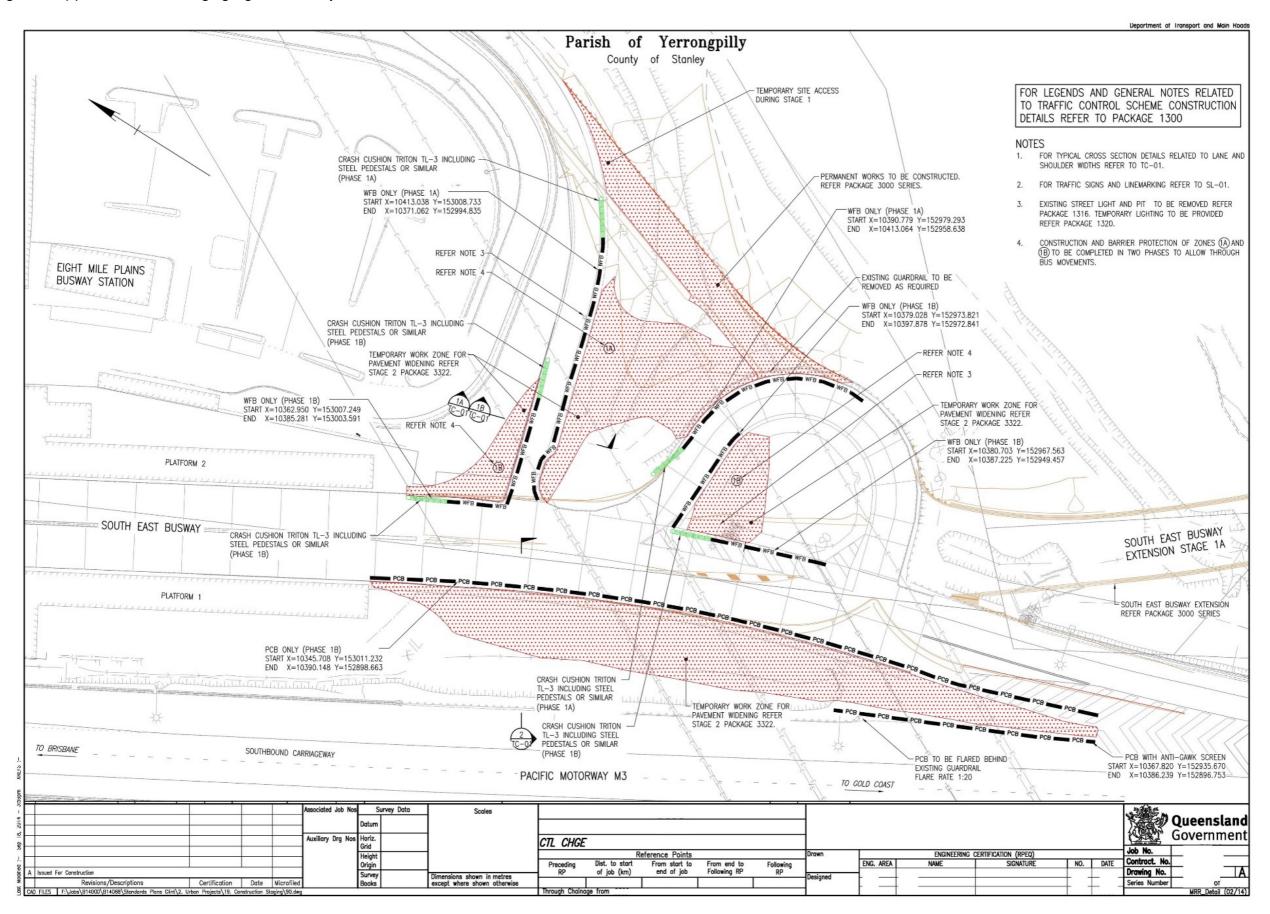
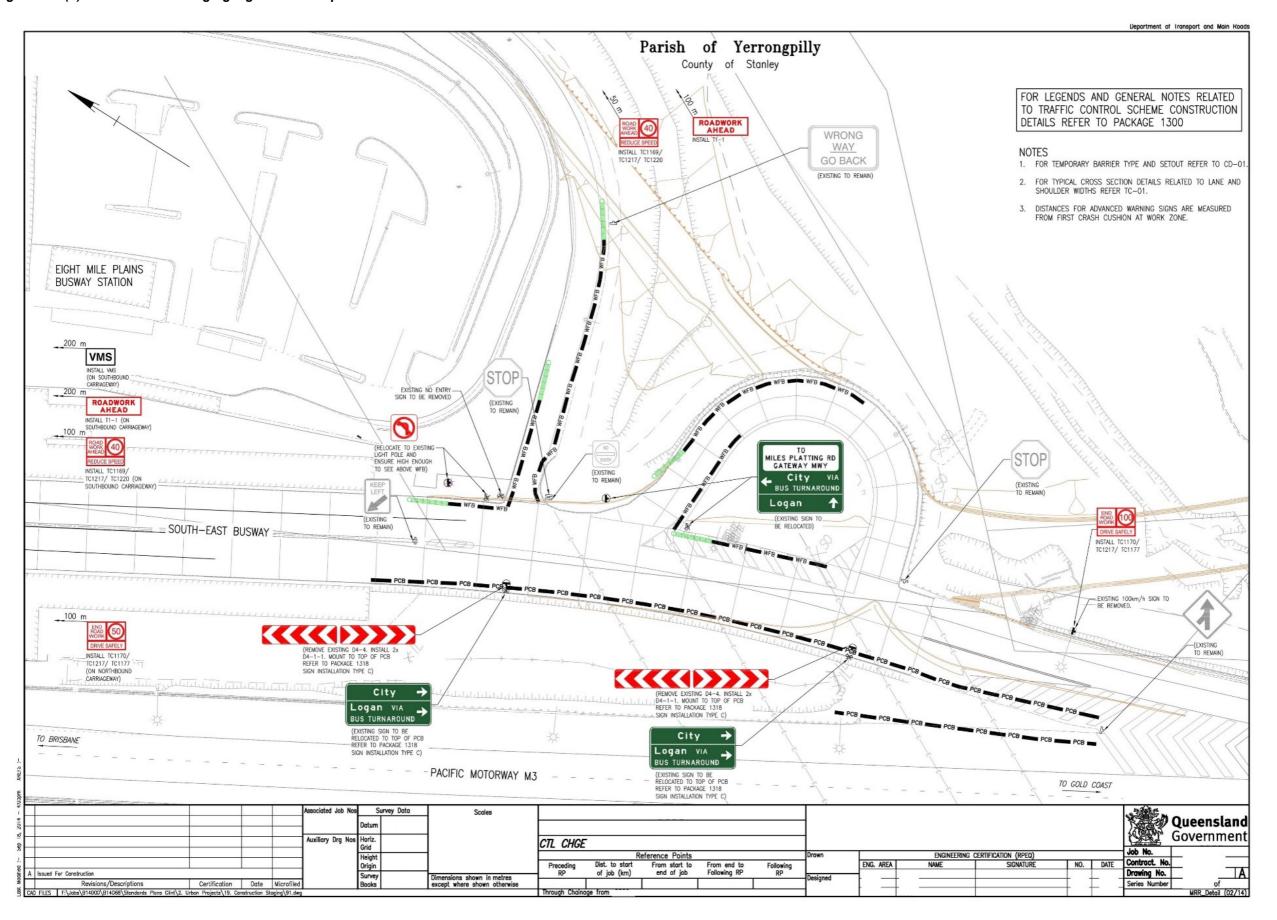


Figure 2.20(d) – Construction staging – generic example 2 – sheet 2 of 2



2.21 Environmental

2.21.1 Clearing and Grubbing

Clear and grub drawings are developed to display the full extent of vegetation clearing required and should complement environmental investigations undertaken during the preliminary and detailed design phases by containing relevant information in visual format.

Depending on project activities and the surrounding environment, clear and grub drawings will range from simple to quite complex in the amount of information required.

Considerations

Scale

• Scale – appropriate to level of detail

Drawing

- Clearly define the project boundary
- Show the location of all areas of vegetation clearing
- Differentiate between areas permanent and temporary disturbance
- Clearly identify the location of significant vegetation*
- Show 'no go zones' where access to significant vegetation areas will be excluded by physical barrier
- Identify any individual plants or areas of vegetation that are the subject of an environmental permit or approval
- If any plants (or parts of plants such as hollows or logs) are being salvaged or relocated, identify these and the location of replanting / placement
 - *Significant vegetation includes:
 - Vegetation with associated legislative requirements: endangered, vulnerable or near threatened species, Type A plants, koala habitat, marine vegetation, etc.
 - Vegetation or areas with fauna habitat values such as tree hollows, nests, logs etc.
 - Vegetation with heritage value such as scar trees or trees with historical significance
 - Other significant features as determined through environmental investigations.

Figure 2.21.1(a) - Clearing and Grubbing - generic example - sheet 1 of 2

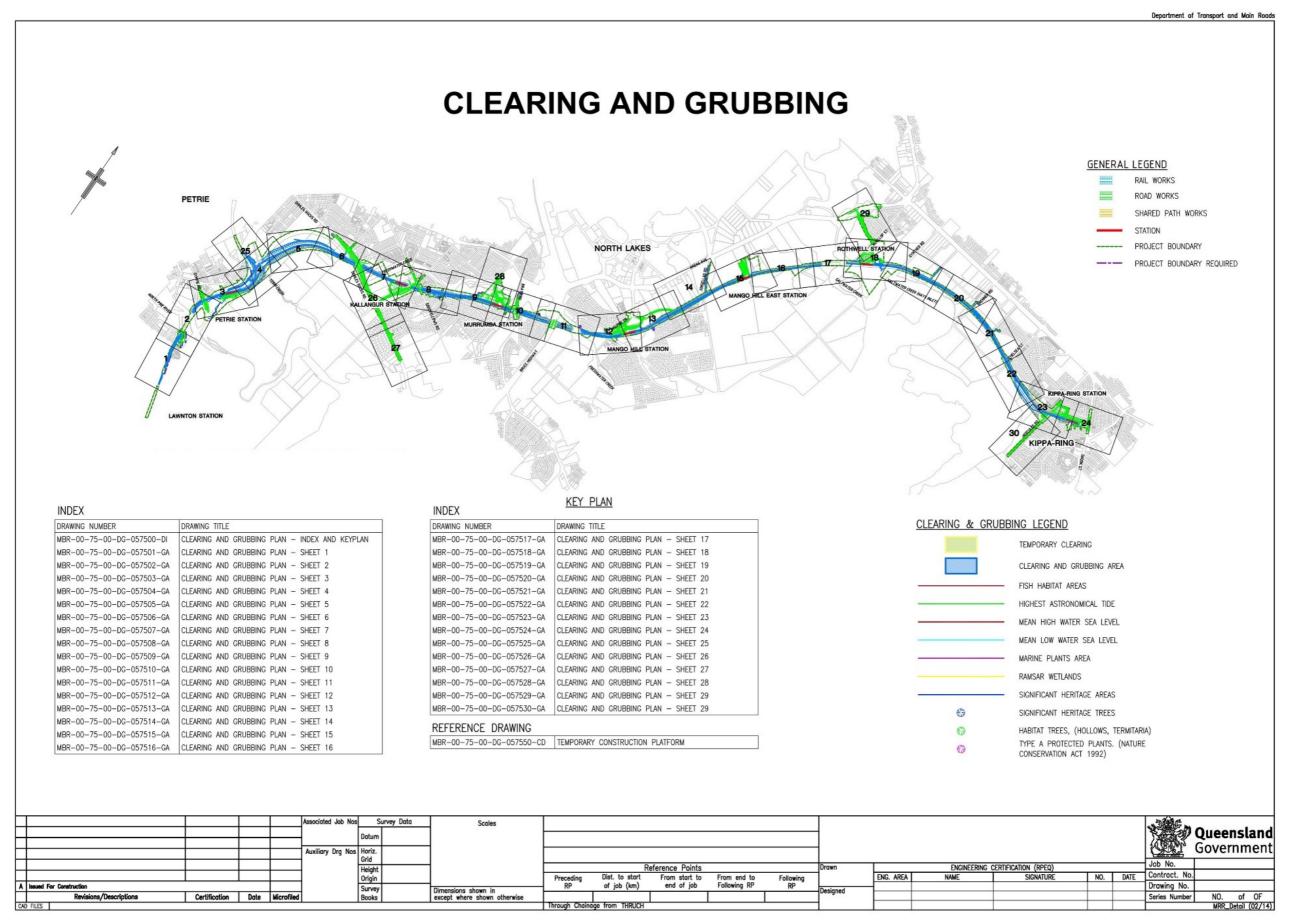
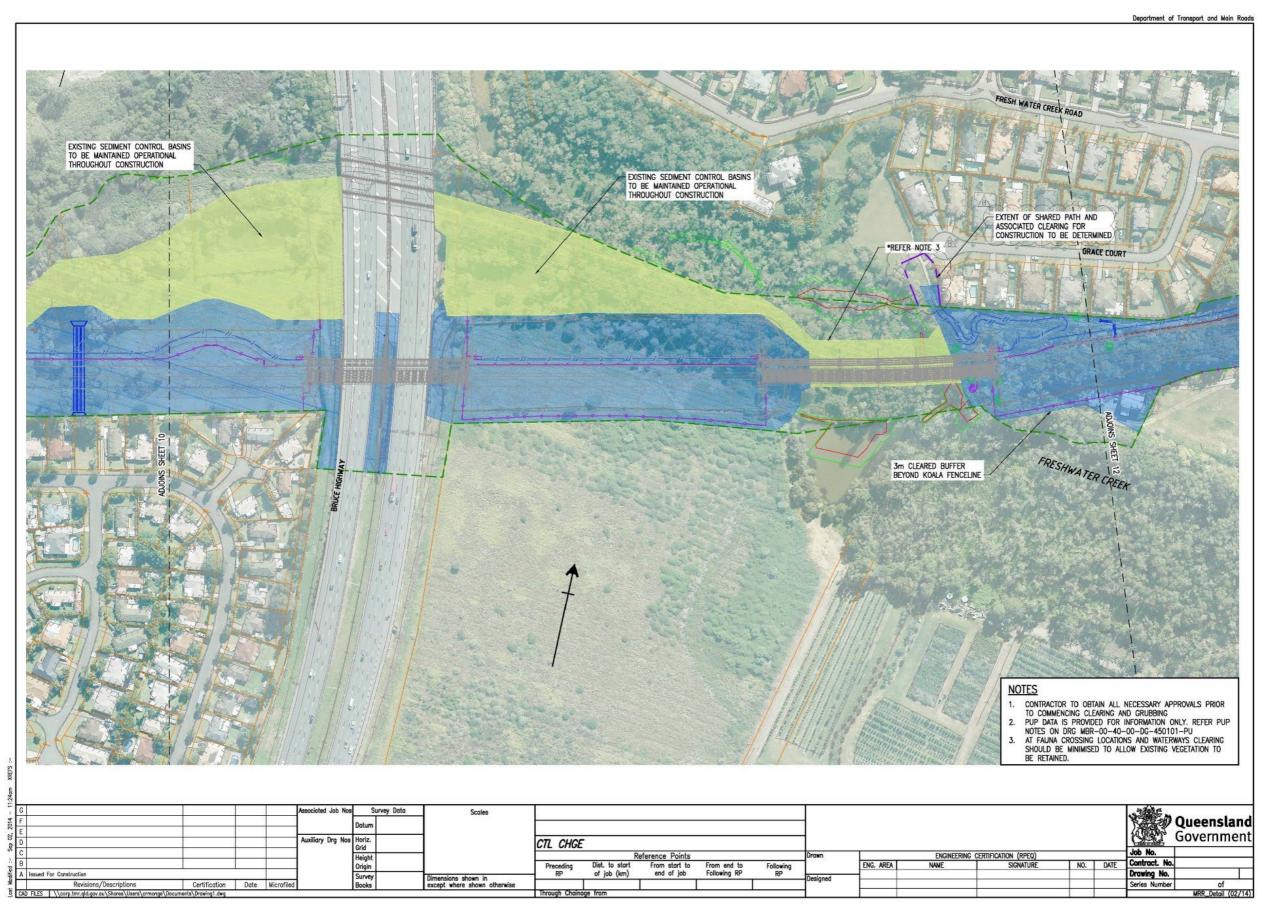


Figure 2.21.1(b) – Clearing and Grubbing – generic example – sheet 2 of 2



2.21.2 Erosion and sediment control

While the design of permanent erosion and sediment control devices, such as sediment basins, is the responsibility of the designer, preparation for acceptance of temporary erosion and sediment control drawings is normally the responsibility of the construction contractor (refer MRS52 *Erosion and Sediment Control*). However, the designer should prepare temporary erosion and sediment control drawings and present these to the contractor for guidance as to the minimum standards required by the department. The Erosion and Sediment Control Plan shall be prepared and updated by personnel who have the requisite level of training and experience outlined MRTS52 *Erosion and Sediment Control*.

An erosion and sediment control plan drawing shows a possible approach for sediment and erosion management. The drawing should be included in contract documentation so that tenderers can use it as a basis for pricing. After the contract has been awarded the contractors can choose to adopt the drawing(s) or develop their own:

- EMP(C) Environmental Management Plan (Construction) Drawings
- Environmental Management Plan (Construction) Drawing shows the environmental risks associated with the construction of a project.

The standard sets out what must be contained on the drawings but allows the option that information is shown on drawings and diagrams as opposed to just text. EMP(C) drawings are not intended to replace a text-based document but to provide an efficient means of conveying information.

Considerations

It is intended that these drawings could completely replace a text-based document complementing Specification MRS52 *Erosion and Sediment Control*.

Scale

Scale – appropriate to level of detail

Drawing

- Show the design measures and techniques proposed to control erosion and sedimentation during construction and operation, on design layout
- Show areas to be landscaped, for example seeded, turfed, etc.
- Detail sediment fences, erosion sock locations and rip rap
- Show check dams (stepped) and sediment basins
- Show rock mattress batter chute
- Define the limit of clearing (chainage / offset)
- Show existing bitumen treatment
- Provide additional supporting information for work to be done

Figure 2.21.2(a) - Erosion and sediment control - generic example 1

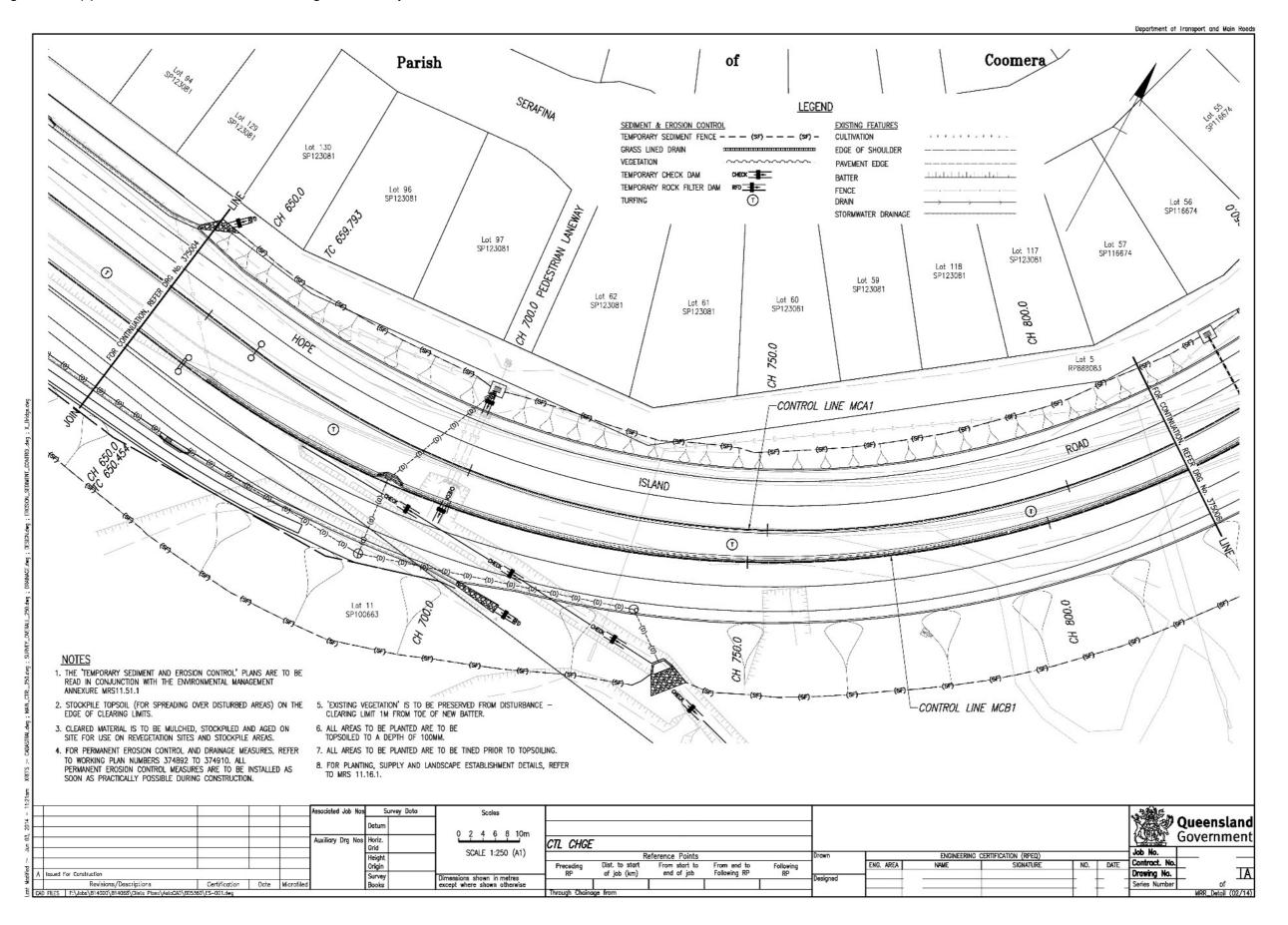


Figure 2.21.2(b) – Erosion and sediment control – generic example 2

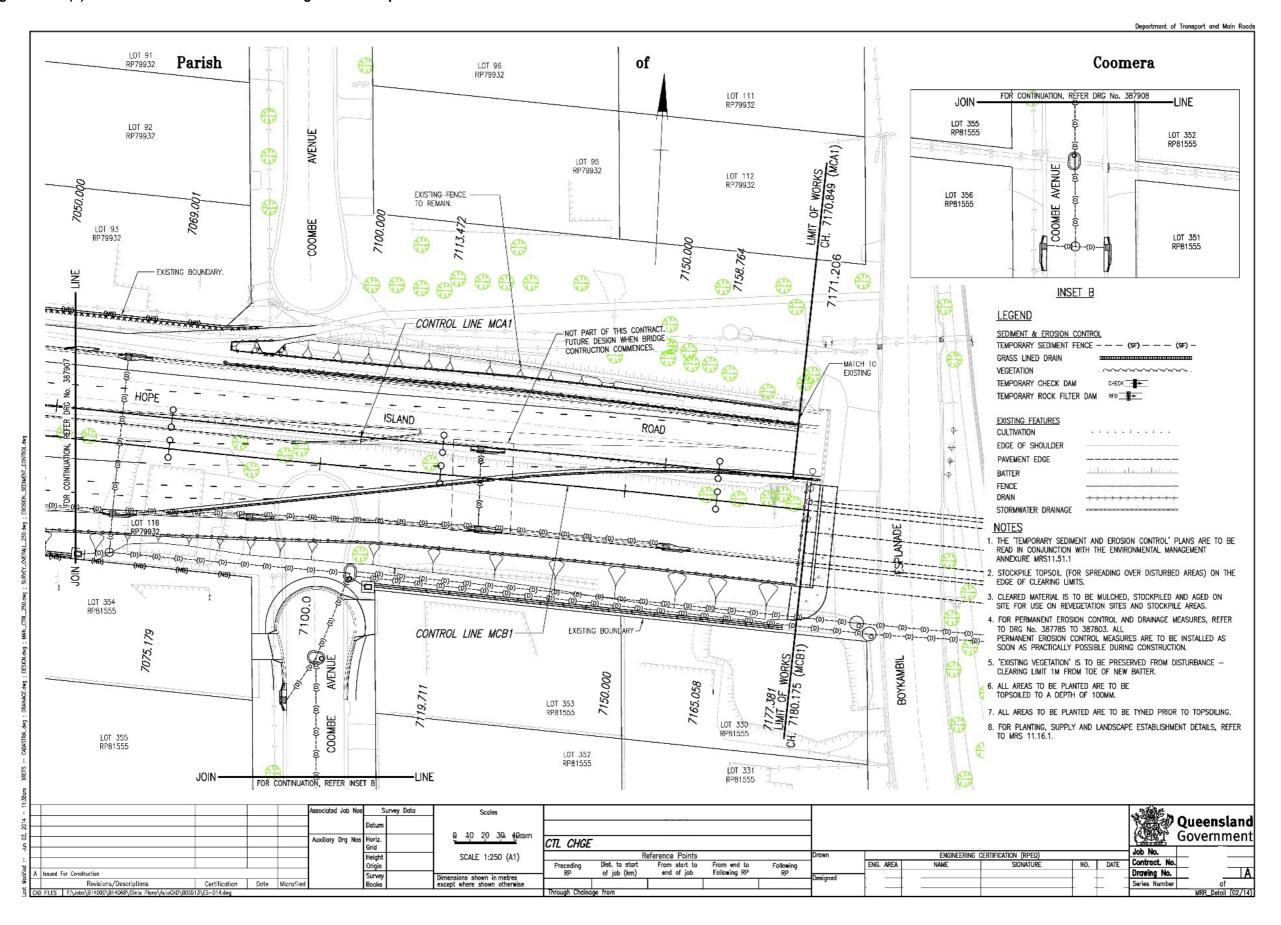


Figure 2.21.2(c) – Erosion and sediment control – registered example 1

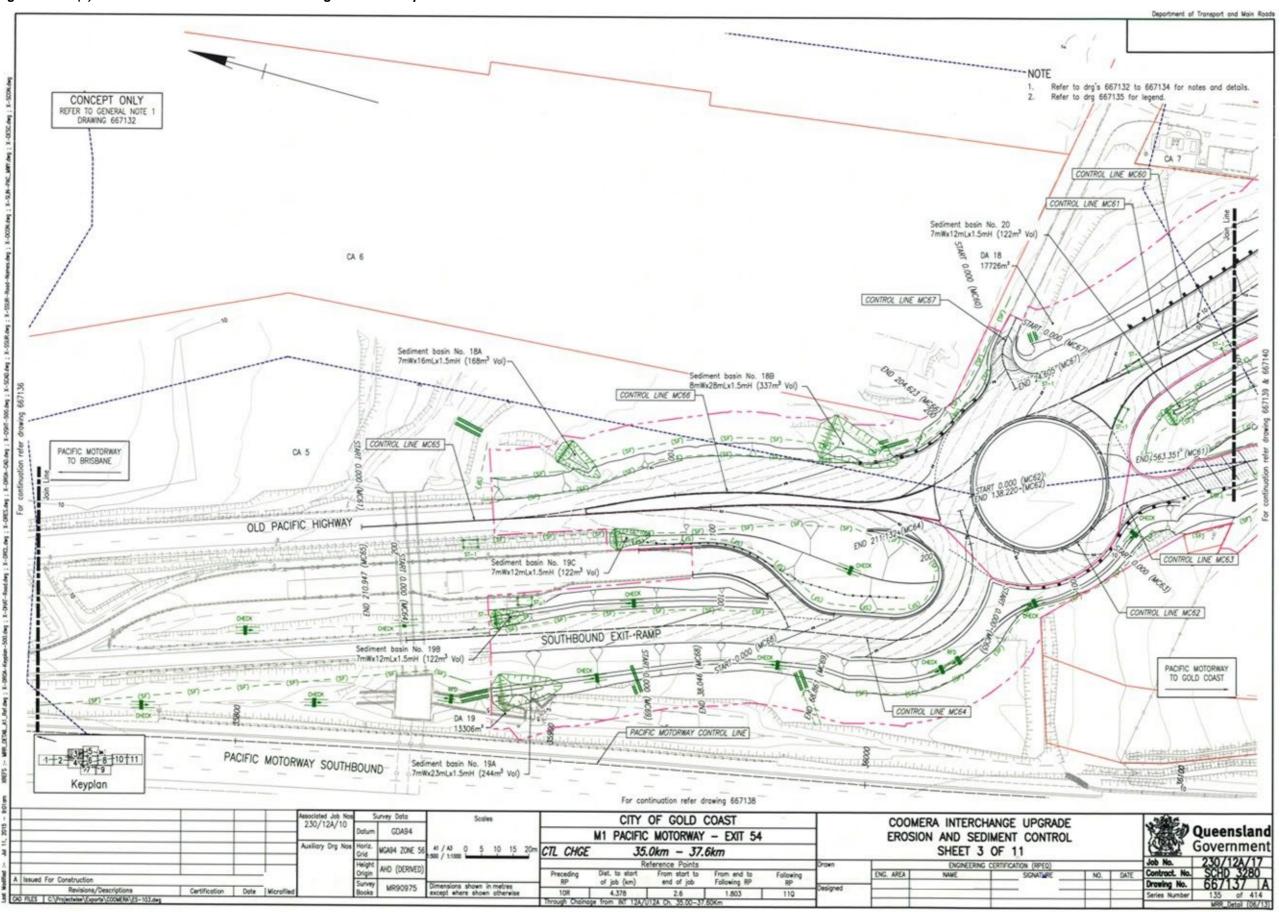
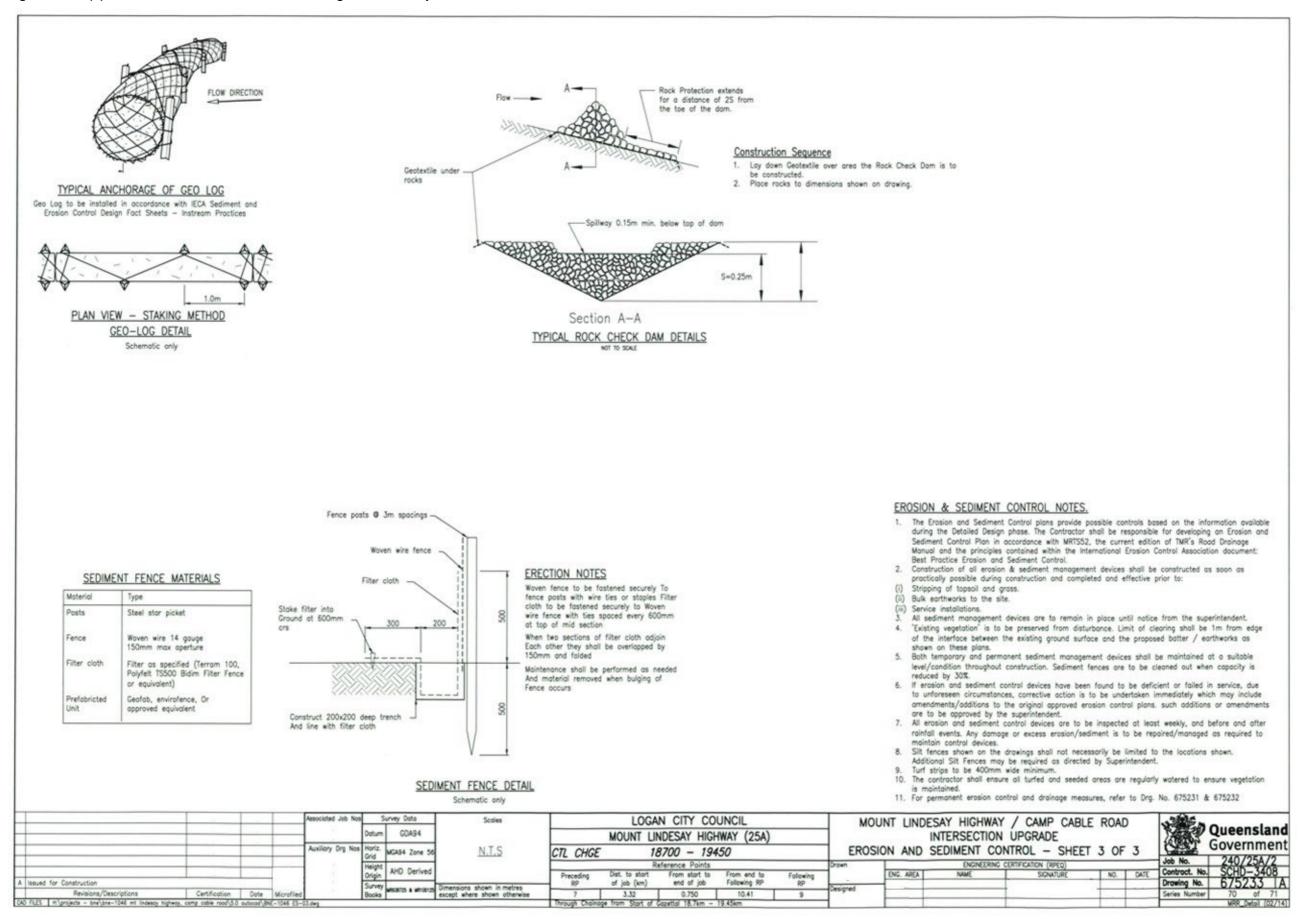


Figure 2.21.2(d) – Erosion and sediment control – registered example 2



2.22 Extended Design Domain (EDD) and Design Exceptions (DE)

Extended Design Domain (EDD) values for geometric road design are values outside of the Normal Design Domain (NDD) that through research and/or operating experience, particular road authorities have found to provide a suitable solution in constrained situations (typically Brownfield sites). Design Exceptions are either below EDD or above NDD that do not have defined values. Adapting existing DE, particularly if below EDD, or introducing such values may be subject to more scrutiny and risk analysis due to the associated uncertainty and research that may be required to support proposals.

Examples of when EDD and DE may be considered are as follows:

- reviewing the geometry of existing roads
- realignment of a few geometric elements on existing roads in constrained locations
- improving the standard of existing roads in constrained locations
- building temporary roads.
- Retention of existing works within a project with no associated crash history

Application of the EDD and DE involves identification and documentation of driver capability. Ultimately, the capabilities that are accepted may have to pass the test of what is reasonable capability (the capability that a court decides a motorist can reasonably be expected to have when they are taking reasonable care for their own safety). The decision to use EDD and DE should not be taken lightly especially when introducing multiple low design values in close proximity and if there is a demonstrated crash history associated with a certain parameter

If using EDD and DE values, the reduction in standard or capability associated with their use should not be less than appropriate for the prevailing local conditions. As stated, EDD and DE should be used for only one parameter in any application and not be used in combination with any other minimum or EDD value for any related or associated parameters.

Through collective experience it has been accepted for a very long time that the use of minimum values for several parameters at the same location does not constitute good practice and generally leads to an inferior or unsafe design. This is particularly relevant with DE where standard values cannot be sourced and proposals are to be supported by research and risk analysis.

Considerations

Scale

Scale – appropriate to level of detail where EDD and DE information has been provided

Drawing

- Show the location and the extents where EDD and DE have been applied (EDD details and DE capability may be shown on the same relevant drawing if practicable)
- EDD and DE details and capability may be shown on a separate drawing
- Make reference to the corresponding EDD and DE Summary Report containing all the detailed EDD and DE information and justifications being used

Contain values within shadow boxes and clearly indicate locations on alignments and details

Figure 2.22(a) – Extended design domain – generic example 1

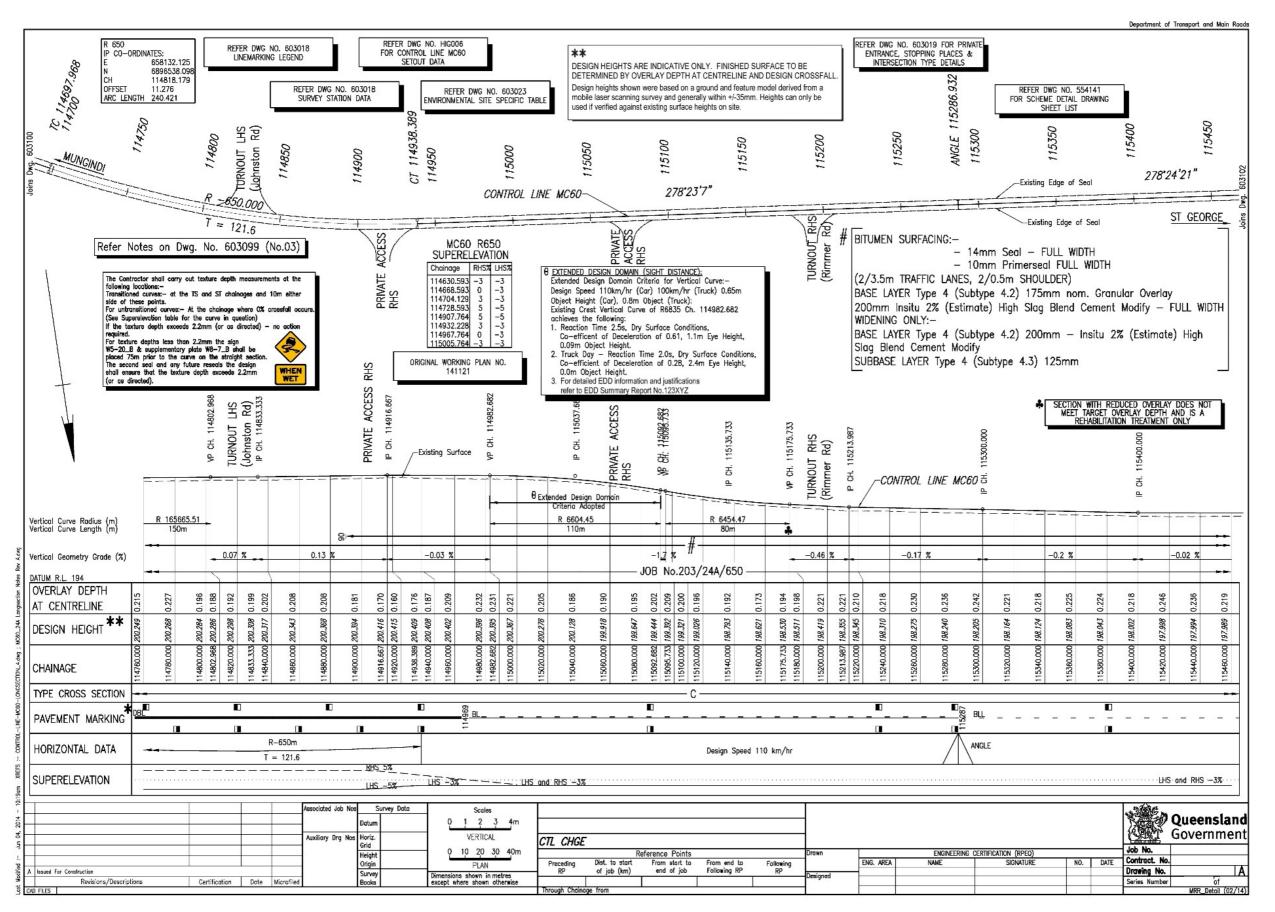


Figure 2.22(b) - Extended design domain - generic example 2

EXTENDED DESIGN DOMAIN DETAILS EXTENDED DESIGN DOMAIN DETAILS Radius 1400 Radius 2200 Posted Speed 60kph Design Speed: 110km/hr Design Speed 70kph Wet/Norm Day Conditions Design Speed 80kph Wet/Norm Day Conditions Sight Stopping Distance Criteria: 0.4m Object Height, 1.15m Eye Height, 2.5 sec Reaction Time, Car Eye Height 1.1m, Object Height 0.2m Car Eye Height 1.1m, Object Height 0.2m Longitudinal Deceleration 0.46 Longitudinal Deceleration 0.46 Normal Day, Dry Conditions Truck Eye Height 2.4m, Object Height 0.8m Truck Eye Height 2.4m, Object Height 0.8m Reaction Time 1.5 secs Reaction Time 1.5 secs Minimum VC Radii: 3300m (Restricted Visibility Widening applied to R3300m VC) DESIGN EXCEPTION DETAILS Section: Crest Location © Chainage 101700.

Due to the presence of hard rock observed on the existing road surface, together with the proximity to the gravel pit access and limited budget, a radius of 1200m is proposed. This radius will allow for minimum vertical profiling for new payement and seal. EXTENDED DESIGN DOMAIN DETAILS The roadway width is to be increased to 13.0m (for Restricted Visibility) plus flat bottom table drains to provide for manoeuvring. The AADT is 32 with 35% commercial vehicles, Radius 1600, 2000 Posted Speed 80kph Design Speed 90kph Additional delineation will be provided by reducing the post spacing for REGP's. Appropriate pavement marking and crest warning signage will be provided. Wet/Norm Day Conditions Car Eye Height 1.1m, Object Height 0.2m Longitudinal Deceleration 0.41 wet Truck Eye Height 2.4m, Object Height 0.2m Reaction Time 1.5 secs Advisory Curve Speed sign of 70km/h used to lower speed on Radius 310m. For detailed EDD information and justifications refer to EDD Summary Report No.123XYZ EXTENDED DESIGN DOMAIN EDD had been used for several crest curves based on the following criteria. Reaction time Rt = 1.5 secs. Predominantly wet conditions d = 0.46 (Car) d= 0.29 (Truck/s) **EDD CAPABILITY** Crests at CH9950 and CH10140 are Design Exceptions. Refer to the Design Domain Design Speed 80km/hr (70km/hr Advisory Speed Design Speed is dictated by adjacent horizontal curve radii and has been calculated Signs for adjacent R305 Horizontal Curve) Rt = 1.5 seconds (Tight Horizontal Curves) MANOEUVRE CHAINAGE CREST REDIUS SPEED Norm Day (Wet) WIDENING 6740 110/100 1.5M 1.5M SSD met. 1.15 - 0.4 Object Height 110/100 7970 110/100 Manoeuvre Widening required - 1.5m 10140 110/100 1) Design speed above is car/truck. 2) Manoeuvre widening includes the concrete channel of concrete table drain (1 on 6 maximum). Queensland Government Survey Data CTL CHGE Job No. Reference Points From start to end of job ENGINEERING CERTIFICATION (RPEQ)
NAME SIGNATURE Dist. to start of job (km) From end to Following RP Contract. No. Following RP Drawing No. A Issued For Construction Certification Date Microfiled

Department of Transport and Main Roads

2.23 As Constructed

Refer to the DDPSM Volume 1, Chapter 1 Section 1.7.1: As Constructed.

2.24 Road safety barrier system

Road safety barrier system drawings are to depict construction details and consider all design elements of the proposed barrier system as determined from a risk evaluation.

The main elements of interest are:

- barrier:
 - containment level
 - length (L)
 - length of need or point(s) of redirection
 - working width or dynamic deflection (as applicable), and
 - motorcyclist protection device (MPD), and
- end treatment:
 - containment level
 - function (gating or non-gating)
 - width (W)
 - length (L)
 - point of redirection (if applicable)
 - taper (if applicable), and
 - motorcyclist protection device (MPD).

Minimum requirements for drawings

Specific products shall not to be named in design drawings. The design basis for the verified performance requirements shall be documented in the design development report.

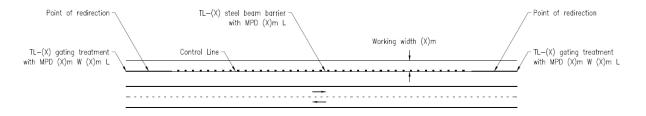
Designers are to specify barrier systems in design drawings as per the following or similar:

- "TL-(X) [steel beam / wire rope / concrete] barrier [with MPD] (X)m L", and
- "TL-(X) [gating / non-gating] end treatment [with MPD] (X)m W (X)m L".

Drawing

- show control line of barrier system
- show main elements of interest (for more complex projects show a summary table that details the main elements of interest)
- · show road safety barrier system connection locations
- show variant locations
- add relevant notes (such as, design foundation pavement conditions), and
- show other detail (as applicable).

Figure 2.24 – Road safety barrier system – drawing example



- Notes:

 1. Foundation pavement conditions to be minimum AASHTO standard standard soil strength. If pavement construction is lower or different refer TMR Accepted Road Safety Barrier System Devices for options or variants.

 2. Point of redirection will be product specific. Refer to TMR Accepted Road Safety Barrier System Devices.

Table 2.24 – Road safety barrier system – summary table example

ID	Description	Control line	Start chainage	End chainage	Point of redirection	Working width (m)	Variant
1	TL-3 gating end treatment with MP 0.5 m W 16.0 m L	MC01	0	16	Post #3	n/a	n/a
2	TL-3 steel beam barrier with MP 200 m L	MC01	16	216	n/a	1.65	n/a
3	TL-3 steel beam barrier with MP 20 m L	MC01	216	236	n/a	1.65	Base plate installation
4	TL-3 steel beam barrier with MP 50 m L	MC01	236	286	n/a	1.65	n/a
5	TL-3 gating end treatment with MP 0.5 m W 16.0 m L	MC01	286	302	Post #3	n/a	n/a

Notes:

1. Point of redirection will be product specific. Refer to Department of Transport and Main Roads Accepted Road Safety Barrier Systems and Devices for product specific information.