

**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**

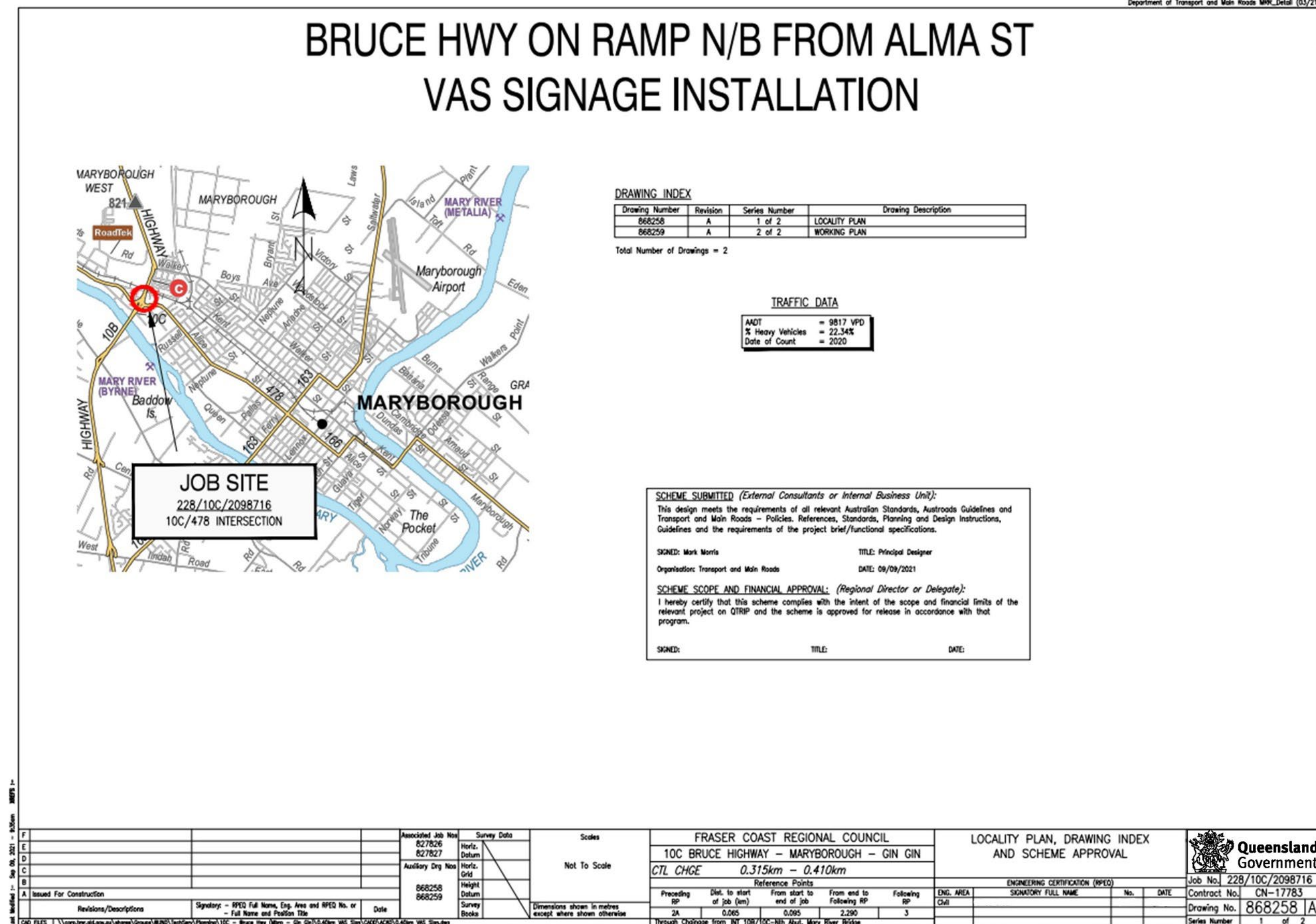
- Add drawing list attribute to standard sheet
- Include all drawings in the scheme
- Continue on additional sheet(s) if necessary

### **Submission and approval**

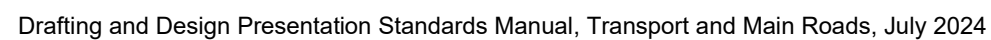
- Add approvals attribute to standard sheet – refer to the department's *Drafting and Design Presentation Standards Manual*, Volume 1, Chapter 1 Figure 1.6.3.1(a).

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

Department of Transport and Main Roads MRR\_Detail (03/21)









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







## **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 or 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:

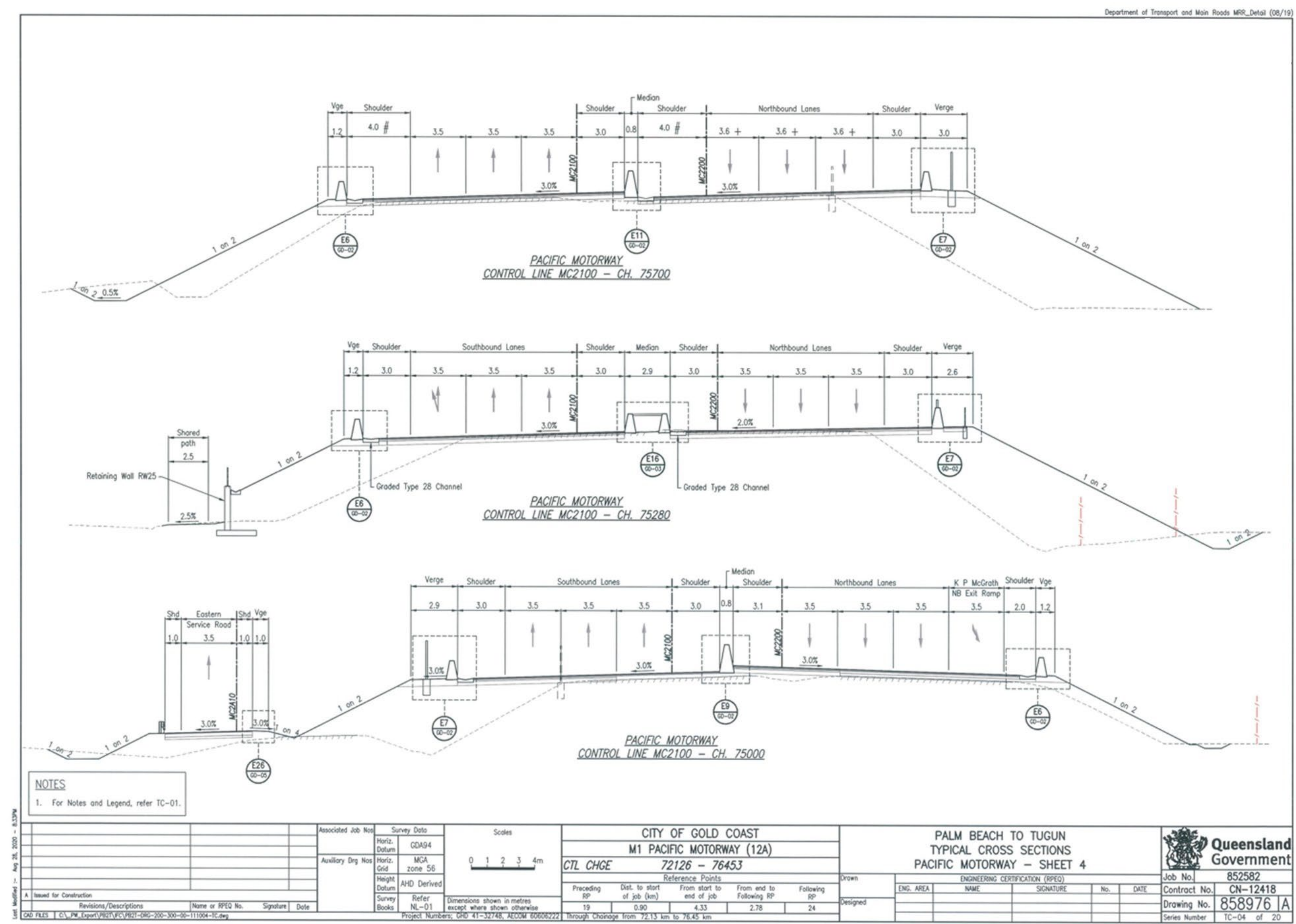
1. show traffic data and projected Equivalent Standard Axles (ESAs) for design year
2. show California Bearing Ratio (CBR) of subgrade used in the pavement design
3. identify details of pavement layers (if not shown elsewhere).

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









## **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**

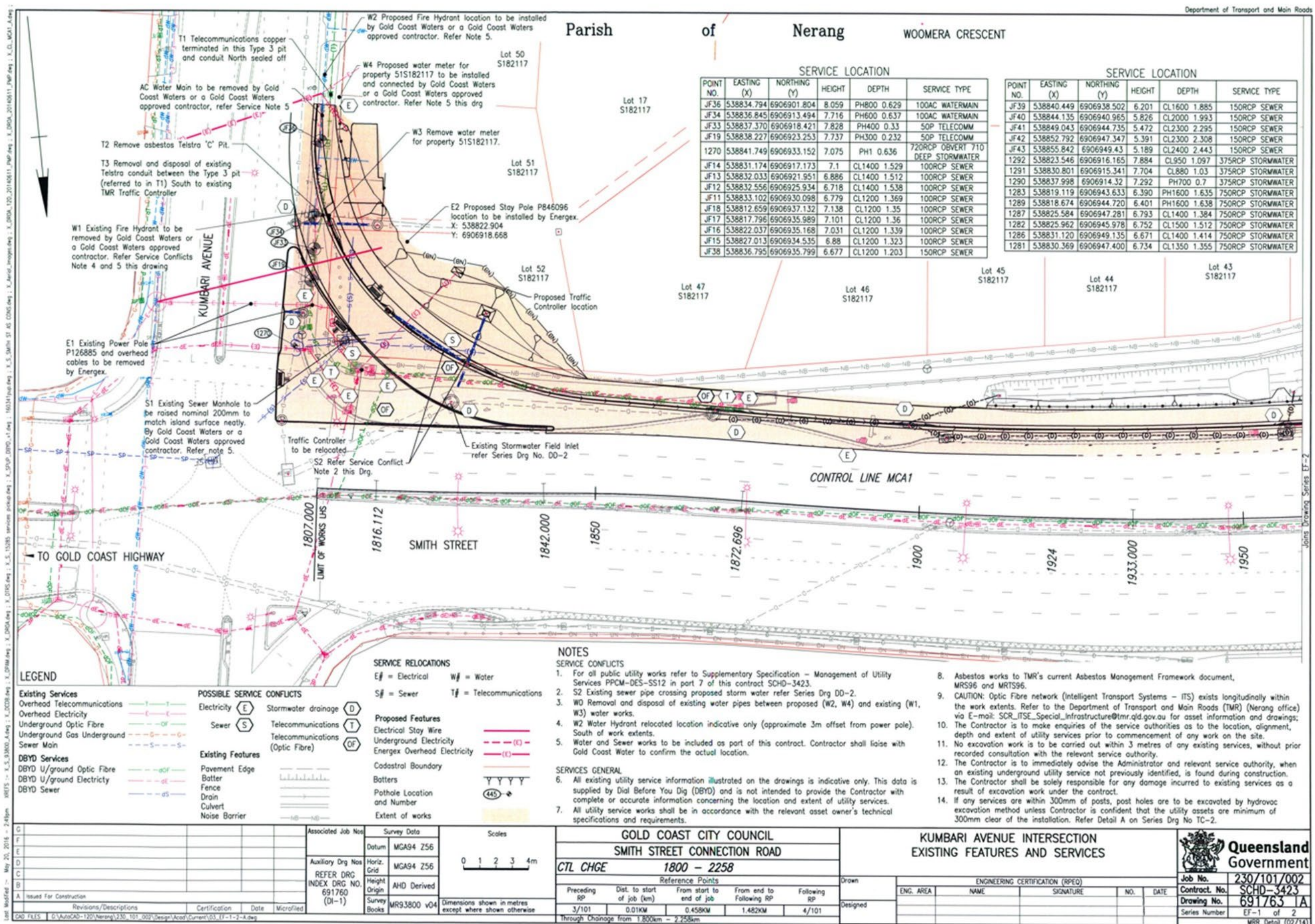
- Show proposed roadway layout including K&C, medians, islands, footpaths, and so on
- Show tie-in details to the existing road infrastructure
- Show property boundaries (red)

##### **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.



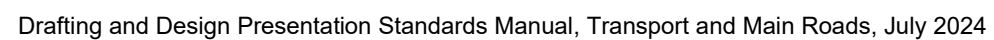
Figure 2.5.1(a) – Existing features – generic example 1













NOTES:

6. NEW SERVICE ALIGNMENTS ARE APPROXIMATE ONLY. THE PRINCIPAL CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL OF THE PROPOSED RELOCATIONS / NEW SERVICES BEFORE CONSTRUCTION BEGINS IN THE VICINITY OF PROPOSED WORKS.
7. FOR UTILITY SERVICE AUTHORITY CONTACTS, REFER MDSS 905.
8. CONTRACTOR ON THESE DRAWINGS AND ASSOCIATED DOCUMENTS REFERS TO THE PRINCIPAL CONTRACTOR FOR THE PACKAGE 1 - PRELOAD & PUP WORK, UNLESS STATED OTHERWISE.
9. CONTACT DETAILS FOR:
- ENERGEX = DEAN DUNLOP (0736647185)  
QUU = ANDRE BREEBART (0738567054)  
TELSTRA = DUNCAN McKECHNIE (0734550259)
10. THE SERVICES INFORMATION AND LOCATION ON THIS DRAWING IS BASED ON "DIAL BEFORE YOU DIG" RECORDS PROVIDED:
- APA = 07/01/14 TELSTRA = 14/01/14  
BCC = 15/01/14 ENERGEX = 6/12/13  
QUU = 8/01/14 LINKWATER = 29/11/13  
OPTUS = 07/01/14

- 
- Technical drawing of a motorway interchange showing proposed and existing infrastructure. The drawing includes labels for "GATEWAY MOTORWAY NORTHBOUND", "GATEWAY MOTORWAY SOUTHBOUND", "CONTROL LINE MC60A01", "CONTROL LINE MC60B01", "EL-18", and "EXISTING TOWER TO REMAIN". It also features a north arrow and a note: "AREA SUBJECT TO GROUND SURFACE TREATMENT (PRELOADING)". The drawing is divided into sections labeled "JOINS SHEET 1" and "JOINS SHEET 2".





SURVEYED SERVICES:

- ## DIAL BEFORE YOU DIG:

























- GENERAL:

- SEWER QUU AS BUILT  
LINE TO BE ABANDONED  
ELECTRICITY S-LIGHTS UG  
ELECTRICITY S-LIGHTS OH  
DRAINAGE  
STORMWATER  
GATEWAY 6 LANE  
REFERENCE DESIGN  
GATEWAY 8 LANE  
REFERENCE DESIGN

AREAS SUBJECT TO GROUND SURFACE TREATMENT:

-  (PRELOAD 0.0m SURCHARGE)  
 (PRELOAD 1.5m SURCHARGE)  
 (PRELOAD 2.0m SURCHARGE)  
 CONFLICT TAG

## SYMBOLS

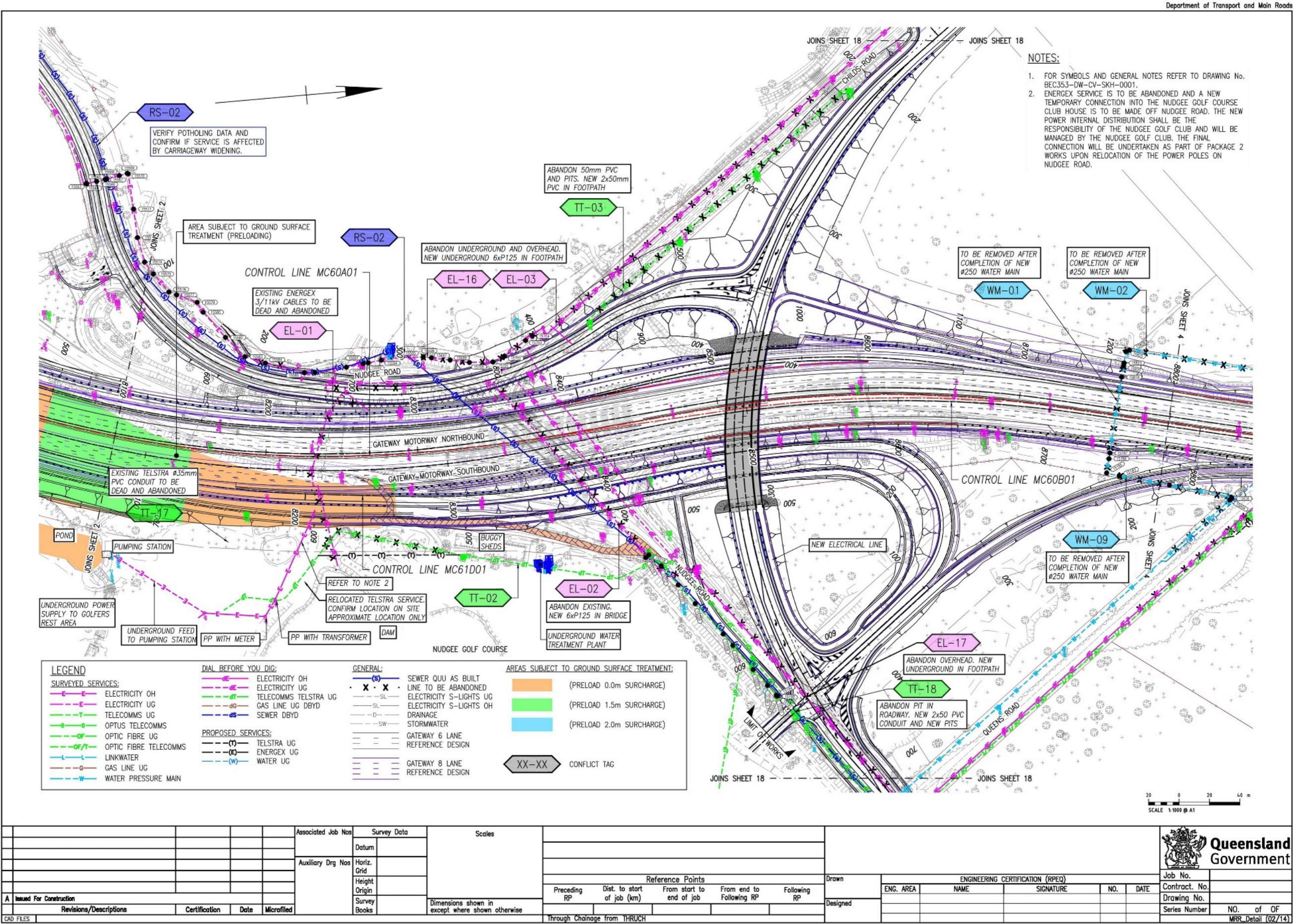
- |   |                                |   |                                       |   |                                       |
|---|--------------------------------|---|---------------------------------------|---|---------------------------------------|
|  | GULLY PIT                      |  | VALVE                                 |  | WATER - VALVE                         |
|  | STREET LIGHT WITH MAST ARM     |  | INSPECTION BOX/PIT SEWER              |  | MAINTENANCE HOLE - WATER              |
|  | FIRE HYDRANT                   |  | INSPECTION BOX/PIT OPTIC FIBRE        |  | MAINTENANCE HOLE - STORMWATER         |
|  | POWER POLE                     |  | INSPECTION BOX/PIT TELECOMMUNICATIONS |  | MAINTENANCE HOLE - UNSPECIFIED        |
|  | INSPECTION BOX - ELECTRICITY   |  | INSPECTION BOX/PIT ELECTRICITY        |  | MAINTENANCE HOLE - SEWER              |
|  | MARKER POST - ELECTRICITY      |  | INSPECTION BOX/PIT MAIN ROADS         |  | MAINTENANCE HOLE - TELECOMMUNICATIONS |
|  | MARKER POST - UNSPECIFIED      |  | TRAFFIC CONTROLLER BOX                |  | ELECTRICITY MANHOLE                   |
|  | MAINTENANCE HOLE - OPTIC FIBRE |  | WATER METER                           |  | SURVEY MARK                           |

20 0 20 40  
SCALE 1:1000 @ A1

[illegible]



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

Department of Transport and Main Roads

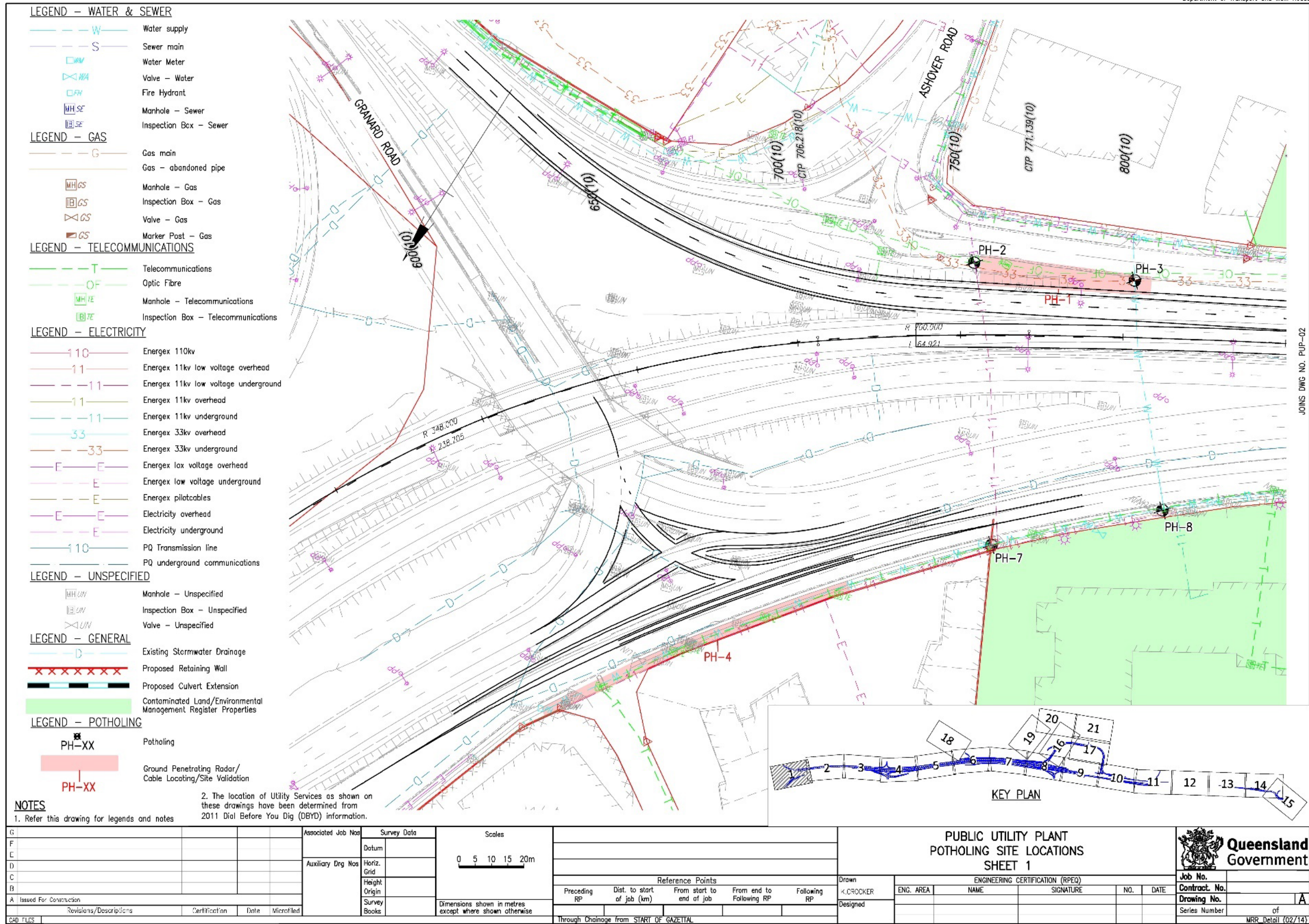




Figure 2.5.2(b) – Public utility plant – Conflict Plans generic example – Sheet 2 of 2

Department of Transport and Main Roads

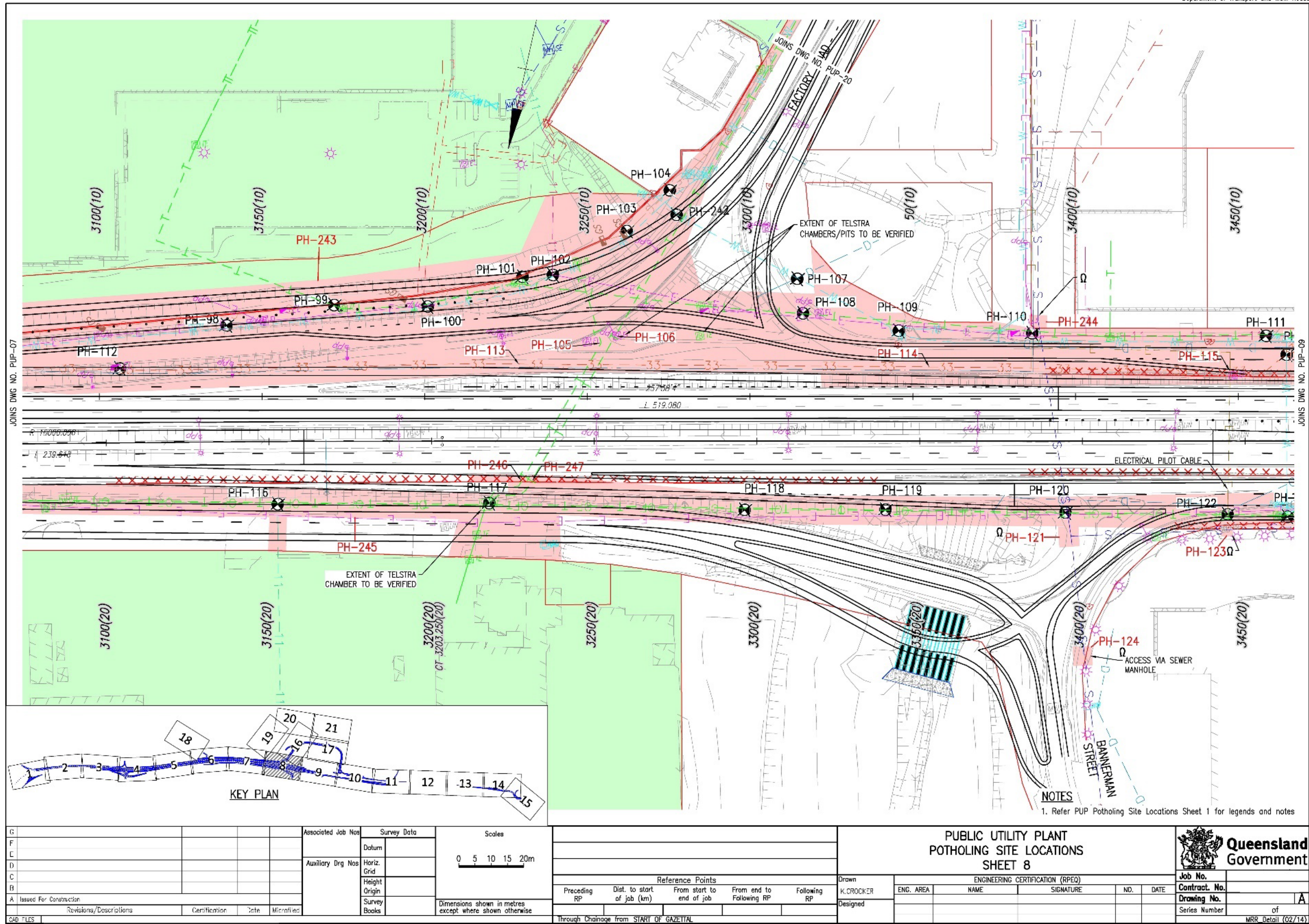





Figure 2.5.2(c) – PUP Potholing and Field Investigation Plans generic example – Sheet 1 of 4

 <b>PUP POT HOLE AND SITE INVESTIGATION SCHEDULE</b>				
<b>General Notes:</b>				
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 and 19/02/2015) to be cross checked against current Dial Before You Dig (DBYD) information and services identified on site. All PUP's need to be identified and recorded. 3. All exposed utility services need to be recorded in xyz format based on IPSWICH MOTORWAY DATUM and AHDD (height origin), with photos and sketches. 4. Site Investigations to services where excavation may not be possible (for example, sewer mains due to depth) may only involve lifting inspection lids / manhole covers to determine the depth, class and size of the service. 5. All affected PUP providers are to be contacted prior to potholing to confirm whether they need to be present during the exposure/excavation of the service at time of potholing. 6. Ensure services (example telecommunications) that are co-located within other service providers are recorded. 7. No potholes to be undertaken on existing road pavements without prior agreement from TMR. 8. Identify and record existing manholes (extent and depth of manholes), conduit configurations, extent of thrust blocks for water mains and other underground infrastructure, only within the areas of planned road widening works. 9. Potholes in Fire Ant sites; Contaminated sites - Spoil from potholing is to be legally disposed to designated approved sites. 10. Environmental controlled PUP activities - Oxley Creek and other known environmentally sensitive areas. 11. Principal Contractor may need to be appointed for PUP Potholing Investigations, Geotechnical Investigations and Other Investigations. 12. Identify Third Party assets, for example telecommunication cables installed on Energex power poles, within the intended road widening works. Contact Mark Dunphy - Shared Assets Manager 3664 4462 markdunphy@energex.com.au 13. The location of Utility Services as detailed in this schedule have been determined from 2011 Dial Before You Dig (DBYD) information.				
<b>Legend:</b>				
PH-XX	Ground penetrating radar/cable locating/site validation			
PH-XX	Potholing			
Plan Ref.	PH No.	Location	Utility Services Impact	PH Requirements over Utility Services/Purpose
Sheet 1	PH-1, PH-2, PH-3	Granard Rd & Ashover Rd intersection, Ch 750 to South side of motorway, approx. Ch 800	Electricity, Telecommunications, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services crossing the motorway. Only PUP in vicinity of planned road widening.
Sheet 1	PH-4, PH-7, PH-8	North side of motorway, approx. Ch 600 to Ch 800 & Crossing Motorway	Electricity, Water, Telecommunications, Gas	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services from kerb to property boundary and services crossing the motorway. Only PUP in the vicinity of planned road widening.
Sheet 2	PH-9, PH-10, PH-11	North side of motorway, approx. Ch 870 to Ch 950 & Crossing Motorway.	Telecommunications, Gas	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services crossing the motorway.
Sheet 2	PH-5, PH-12, PH-13	South side of motorway, approx. Ch 860 to Ch 910 & Crossing Motorway.	Electricity, Telecommunications, Gas	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services crossing the motorway.
Sheet 3	PH-14, PH-15	Crossing Motorway from North to South, approx. Ch 1270.	Telecommunications	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services crossing the motorway.
Sheet 3	PH-17	North side of motorway, approx. Ch 1510 to Ch 1580 & crossing motorway.	Electricity, Telecommunications, Water and other services as identified	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within limits of proposed works.
Sheet 3	PH-18, PH-19	South side of motorway, approx. Ch 1490 to Ch 1560 & crossing motorway.	Electricity, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services crossing the motorway.
Sheet 4	PH-21, PH-24	North side of motorway and crossing Suscatand Street, approx. Ch 1580 to 1670	Telecommunications, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within limits of proposed works.
Sheet 4	PH-22, PH-26, PH-27, PH-28, PH-38, PH-320	North side of motorway and crossing Suscatand Street, approx. Ch 1625 to 1825	Telecommunications	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service. Identify existing services within limits of proposed works.
Sheet 4	PH-39, PH-40, PH-237, PH-239	North side of motorway along Suscatand Street Exit Ramp, approx. Ch 1760 to 1875	Electricity, Telecommunications, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service. Identify existing services within limits of proposed works and at culvert extensions.
Sheet 4	PH-29, PH-30, PH-31, PH-234, PH-235	South side of motorway to the east and crossing Randolph St, approx. Ch 1600 to Ch 1650	Electricity, Telecommunications, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extent of proposed works.



**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
Sheet 4	PH-32, PH-33, PH-34, PH-35, PH-317	South side of motorway to the west of Randolph St, approx. Ch 1660 to Ch 1740	Electricity, Telecommunications, Water, Sewer	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extent of proposed works and at culvert extensions.
Sheet 4	PH-25, PH-36, PH-236	Crossing motorway, approx. Ch 1690.	Sewer	Validate asset owner, location, class, size (dia), depth, alignment of utility service via access to the sewer manholes. Identify existing service within limits of proposed works crossing motorway and at culvert extensions.
Sheet 4	PH-37	South side of motorway, approx. Ch 1850 to Ch 1965	Electricity	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing service within limits of proposed works.
Sheet 5	PH-42	South side of motorway crossing Banting Street, approx. Ch 1950 to Ch 2350	Electricity	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extent of proposed works. Track 33kV possibly located beneath service road, visible evidence of trenching exists.
Sheet 5	PH-240, PH-241, PH-41, PH-47	Crossing the Motorway at approx. Ch 2200 and Ch 2220	Electricity, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service. Identify existing services crossing the motorway and service roads.
Sheet 6	PH-49, PH-321, PH-59, PH-61, PH-62, PH-63, PH-64	South side of motorway, approx. Ch 2330 to Ch 2700	Electricity	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extent of proposed works. Track 33kV UG, possibly located beneath service road, visible evidence of trenching exists and also creek crossing. New service road proposed between Boundary Road and Factory Road.
Sheet 6	PH-51, PH-52, PH-53, PH-54, PH-55, PH-56	South side of motorway and crossing Boundary Road, approx. Ch 2400 to Ch 2500	Telecommunications, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extents of proposed works. PH-53 full extents of large chamber required. PH-55 & 56 Both watermain and Telecommunications crossings required.
Sheet 6	PH-57, PH-58, PH-73	Boundary Road and crossing motorway at approx. Ch 2560	Gas, Water	Validate asset owner, location, class, size (dia), depth, alignment of utility service Identify existing services within extents of proposed works and crossing the motorway.
Sheet 6	PH-322, PH-323	Crossing Boundary Road	Sewer	Validate asset owner, location, class, size (dia), depth, alignment of utility service via access to the sewer manholes. Identify existing service within limits of proposed works crossing Boundary Road.
Sheet 6	PH-76, PH-77, PH-315, PH-316	Crossing Motorway, approx. Ch 2630	Sewer	Validate asset owner, location, class, size (dia), depth, alignment of utility service via access to the sewer manholes. Identify existing service within limits of proposed works crossing motorway.
Sheet 6	PH-60, PH-65, PH-67	South side of motorway crossing Oxley Creek, approx. Ch 2610 to 2710	Gas	Validate asset owner, location, class, size (dia), depth, alignment of utility service Identify existing services within limits of proposed works.
Sheet 6	PH-66	South side of motorway crossing Oxley Creek, approx. Ch 2610 to 2710	Water	Validate asset owner, location, class, size (dia), depth, alignment of utility service Identify existing services within limits of proposed works and Bridge widening across Oxley Creek. New service road proposed between Boundary Road and Factory Road.
Sheet 6	PH-50, PH-69, PH-70, PH-71, PH-72, PH-74, PH-75, PH-78, PH-79	North side of motorway and crossing Oxley Creek, approx. Ch 2430 to Ch 2710	Electricity, Telecommunications, Water, Gas	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extents of proposed works.
Sheet 6	PH-64, PH-79	Crossing Motorway, approx. Ch 2700	Water	Validate asset owner, location, class, size (dia), depth, alignment of utility service Identify existing water main crossing the motorway including thrust blocks.
Sheet 7	PH-68, PH-87, PH-88, PH-89, PH-90, PH-91, PH-93, PH-94, PH-95, PH-96, PH-97	South side of motorway, approx. Ch 2720 to Ch 3060	Electricity, Water, Gas	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extents of proposed works including culvert extensions/bridge construction for services road. Note PH-68 to track gas mains and other PUPs.
Sheet 7	PH-80, PH-81, PH-82, PH-83, PH-84, PH-85, PH-86	North side of motorway, approx. Ch 2720 to Ch 3060	Telecommunications	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extents of proposed works including culvert extensions/bridge construction for service road.
Sheet 8	PH-98, PH-99, PH-100, PH-101, PH-102, PH-103, PH-104, PH-243	South side of motorway and along Factory Road, approx. Ch 3090 to Ch 3300	Electricity, Telecommunications, Water, Gas	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extents of proposed works.
Sheet 8	PH-112, PH-113, PH-114, PH-115, PH-243	South side of motorway, approx. Ch 3090 to Ch 3460	Electricity	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify 33kV cable within extents of proposed works.
Sheet 8	PH-242, PH-107, PH-109	South side of motorway crossing Factory Road, approx. Ch 3275 to Ch 3350	Water	Validate asset owner, location, class, size (dia), depth, alignment of utility service Identify existing services within extents of proposed works crossing Factory Road.
Sheet 8	PH-101, PH-108, PH-109, PH-110, PH-111, PH-243	South side of motorway crossing Factory Road, approx. Ch 3230 to Ch 3460	Electricity, Telecommunications, Water	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify existing services within extents of proposed works.
Sheet 8	PH-105, PH-106, PH-246, PH-247, PH-243	Crossing Motorway, approx. Ch 3230 to Ch 3270	Telecommunications	Validate asset owner, location, class, size (dia), depth, number of conduits, alignment of utility service Identify Telecommunications crossing motorway within extents of proposed works.



Figure 2.5.2(e) – PUP Potholing and Field Investigation Plans generic example – Sheet 3 of 4

Department of Transport and Main Roads

### Water Reticulation Construction

- Before construction of water main works commence, a joint pre-start meeting must be held at the construction site, between the following representatives:
  - The Principal or Principal's Representative;
  - The Administrator's Rep and/or the Administrator
  - Principal Contractor;
  - Sub-Contractor (if not the Principal Contractor) responsible for the construction of the water main works;
  - Unitywater officer/inspector; and
  - 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.
- All water main pipes, materials and sizes are specified in the drawings
- All work and materials shall be in accordance with the current requirements of Unitywater and the South East Queensland Water Supply and Sewerage Design and Construction Code (SEQ Code).
- Only products and materials approved for use, as listed in the Unitywater column of the SEQ Code Infrastructure Products and Materials 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.
- 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.
- 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, SEQ-WAT-1204-1.
- The Contractor shall undertake compaction and preparation for the trench floor to provide a flat firm base to support bedding material and minimise the potential for pipeline settlement.
- 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.
- 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.
- 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 material.
- Minimum cover to watermain shall be provided as follows:
  - Where water main is  $\leq 200\text{mm}$  NB
    - 800mm cover under verges and footpaths
    - 750mm cover under local/urban roads
    - 1200mm cover under State Controlled Roads
  - Where water main is  $> 200\text{mm}$  NB
    - 1000mm cover under verges and footpaths
    - 1000mm cover under local/urban roads
    - 1200mm cover under State Controlled Roads
- 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.
- Detectable marking tape shall be laid above all buried water mains in accordance with Unitywater requirements
- Minimum clearances to existing and new services are to be in accordance with the SEQ Code, unless otherwise shown.
- 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.
- Joint deflections are to be in accordance with manufacturer's specifications.
- 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 – Water Supply and Sewerage.

### PE Pipe Installation

- PE pipe may be cold bent to a maximum radius as specified in PPA Industry Guidelines POP202. Stakes or other sources of point loads shall not be used to assist in bending the pipe.
- 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 their location. Surrounds are to be adjusted to suit final surface levels and are to be adjusted should surface levels be altered.
- Marker posts are to be installed in accordance with standard drawing SEQ-WAT-1300-2 to the satisfaction of local authorities.
- Watermain road and pavement markers are to be installed in accordance with SEQ-WAT-1300-1.
- PE pipe shall be PE100 SDR11 PN16 with blue stripe and comply with AS4130. PE fittings shall comply with AS4129.
- An accredited pipe layer shall be on site while pipes are being laid and bedded and all pipe laying shall be supervised by persons having adequate experience in laying the relevant pipe material.
- The Contractor shall make allowance during construction for expansion and contraction of PE pipe due to temperature changes and pressurisation.
- PE pipes and fittings shall be joined in accordance with the Unitywater specification PR9904 – Specification for Pressure Pipe Construction, AS2033, SEQ Code, WSA 01 Polyethylene Pipeline Code and PPA Technical Guidelines.
- 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. Electrofusion 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.
- Refer standard drawings SEQ-WAT-1102-1 and SEQ-WAT-1409-1 for typical PE arrangements.
- PE sleeving is required on all DI pipes and fittings applied in accordance with AS3681. Two thickness required between fittings and thrust block. Reinstate any damaged sleeving as per manufacturers specifications.
- All DI fittings are to be FBE coated and lined. Care should be exercised during maneuvering and placement of fittings to avoid damage to the coating.
- All Valves are to be restrained in accordance with SEQ Code Standard Drawing SEQ-WAT-1206-1 to prevent shear loads from being transferred to pipe.

### Inspection and Testing Requirements

- 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.
- 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.
- All testing must be carried out by persons or companies accredited by the National Association of Testing Authorities Australia (NATA).
- The Contractor shall make allowance for liaison and co-ordination of work with Administrator and Unitywater including scheduling of and attendance at meetings and inspections.
- The construction of the water reticulation 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

- 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.
- As constructed documentation for all water supply infrastructure constructed and/or altered under this contract shall be prepared in accordance with Unitywater and SEQ Code requirements including but not limited to the SEQ Code Asset Information Specification.
- 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 package has been submitted to the satisfaction of the Administrator and Unitywater.

### Testing and Commissioning of Water Mains

- 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.
- Commissioning of water mains typically includes the following activities:
  - Completion and submission of as-constructed package and relevant test results to the Administrator and Unitywater for review and acceptance;
  - On-maintenance inspection and acceptance of constructed works by Administrator and Unitywater representative/s;
  - Pressure testing of water mains;
  - Disinfection (super chlorination and purging of pressure test water);
  - Flushing (purging of disinfection water);
  - Water quality acceptance testing;
  - Submission of completed inspection and test plan to Administrator and Unitywater for review and acceptance;
  - Submission of signed and completed F10045 Water Quality Mains Commissioning Form;
  - 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
  - Bringing pipe/main into service through construction of final connections;
- 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 Unitywater.

STANDARD DRAWINGS	
SEQ-WAT-1102-1	Typical Mains Construction Reticulation Main Arrangements
SEQ-WAT-1105-1	Typical PE Water Main Details
SEQ-WAT-1105-2	Typical Connection to Existing Mains
SEQ-WAT-1200-1	Typical Soil Classification Guidelines and Allowable Bearing Pressures for Anchors & Thrust Blocks
SEQ-WAT-1200-2	Embedment & Trenchfill Typical Arrangement
SEQ-WAT-1201-1	Standard Embedment – Typical Flexible & Rigid Pipes
SEQ-WAT-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 & widening
SEQ-WAT-1205-1	Typical Thrust Block Details – Mass Concrete
SEQ-WAT-1206-1	Typical Thrust and Anchor Blocks for Valves
SEQ-WAT-1208-1	Typical Restrained Joint System DN100 to DN375 DI Mains
SEQ-WAT-1209-1	Typical Trench Drainage – Bulkheads and Trenchsteps
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-WAT-1305-1	Typical Surface Fitting Installation Valve and Hydrant Surface Boxes – Trafficable and Non-Trafficable
SEQ-WAT-1306-1	Typical Surface Fitting Installation Valve and Hydrant Surface Boxes – Support and Surround Details
SEQ-WAT-1307-3	Typical Appurtenance Installation – Scour Arrangements
SEQ-WAT-1313-1	Flanged Joints – Typical Bolting Details
SEQ-WAT-1409-1	Hydrant Installation Fittings – Typical PE Assemblies Nomenclature

Issue Modified J. Sep 01, 2019 – 2:10pm

Associated Job Nos				Survey Data		Scales	
				Datum	Code		
				CGDA84	CGDA84		
Auxiliary Dwg Nos				Horiz. Grid	Vert. Grid		
				WGA84 Zone36	AHD Derived		
Survey Books				Dimensions shown in Metres except where shown otherwise			
WR100641							

Revisions/Descriptions

Rev	Description	Author	Check	Date
1	Issued For Construction			

SUNSHINE COAST REGIONAL COUNCIL									
BRUCE HIGHWAY (BRISBANE – GYMPIE)									
CTL CHGE 69423 – 73900 (MCS1BN0)									
Reference Points									
Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP					
10A/10A	3.92	4.48	6.61	10A/25A					
Through Change from Brisbane 89.42 to 73.90									

PUBLIC UTILITY PLAN NOTES AND LEGEND					
SHEET 1					
Drawn	ENGINEERING CERTIFICATION (RPEQ)				
ENG. AREA	NAME	SIGNATURE	No.	DATE	
Designed					

**WARNING**  
BEWARE OF UNDERGROUND SERVICES

THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVIDED ON SITE NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

<b>Queensland Government</b>		Job No.	280 10A 234413
		Contract No.	CN-11262
		Drawing No.	814744 A
		Series Number	PU-NL-001 of 1

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

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

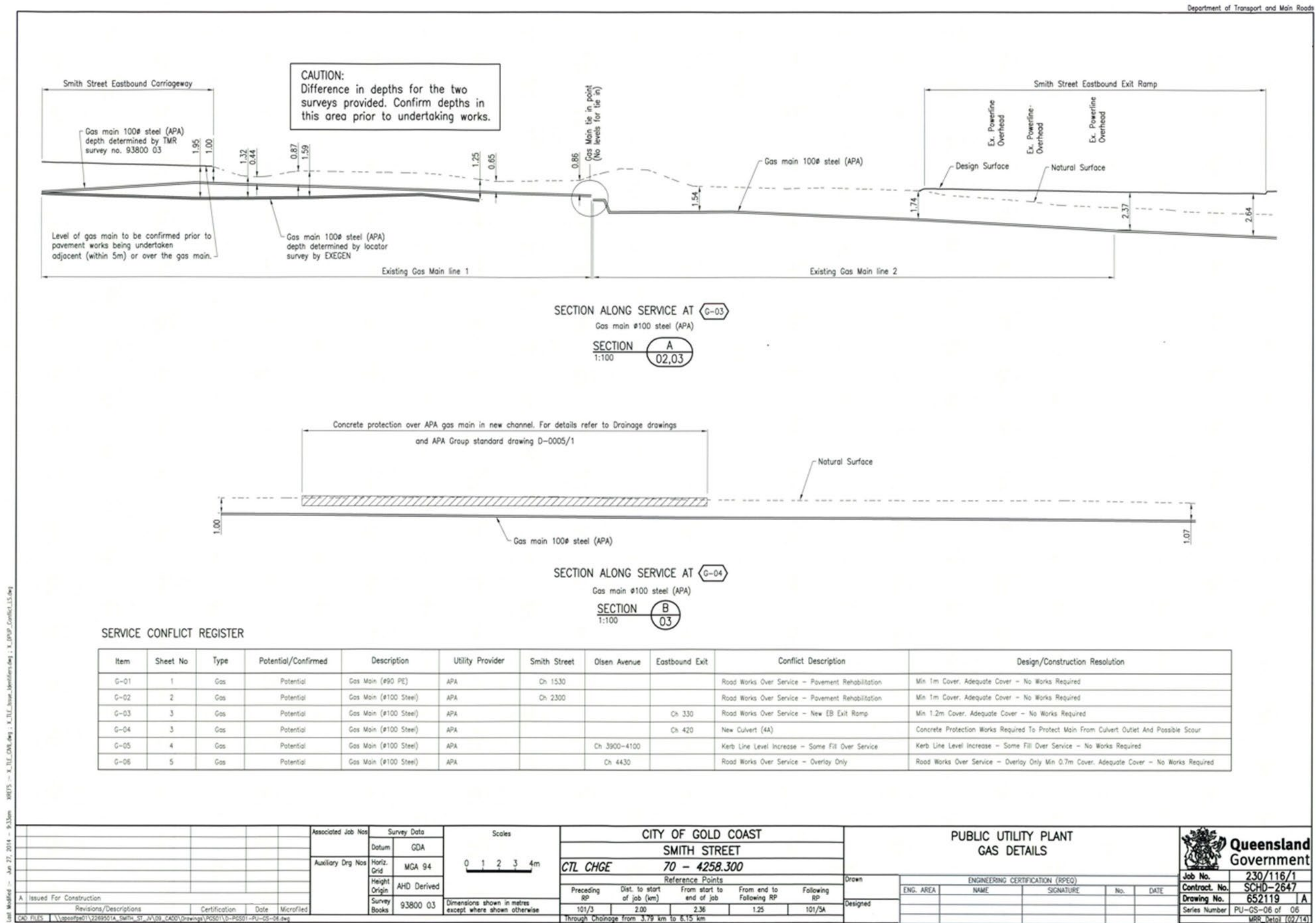


Figure 2.5.2(g) – PUP Notes and Legend generic example

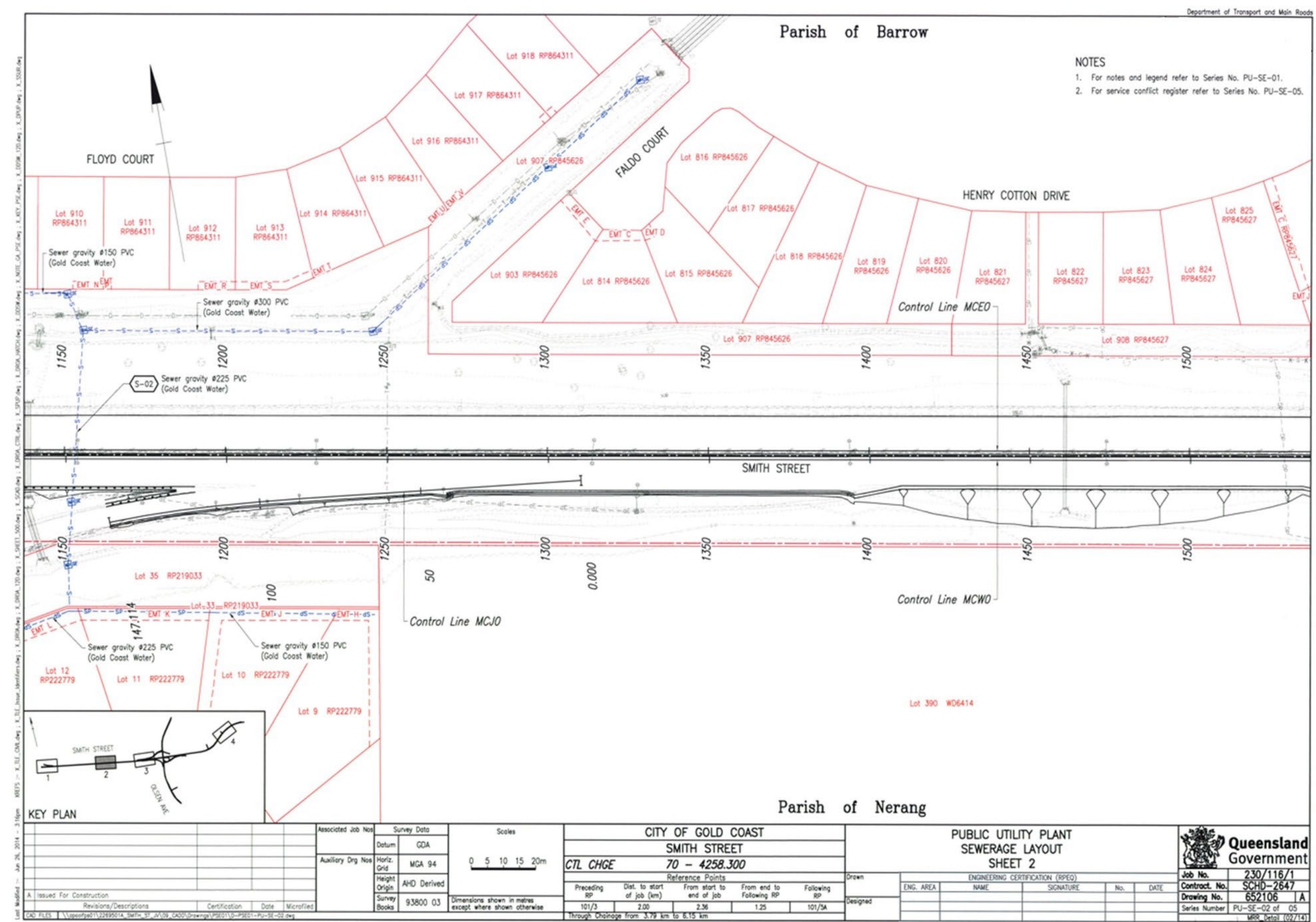




Figure 2.5.2(h) – PUP Service Details generic example

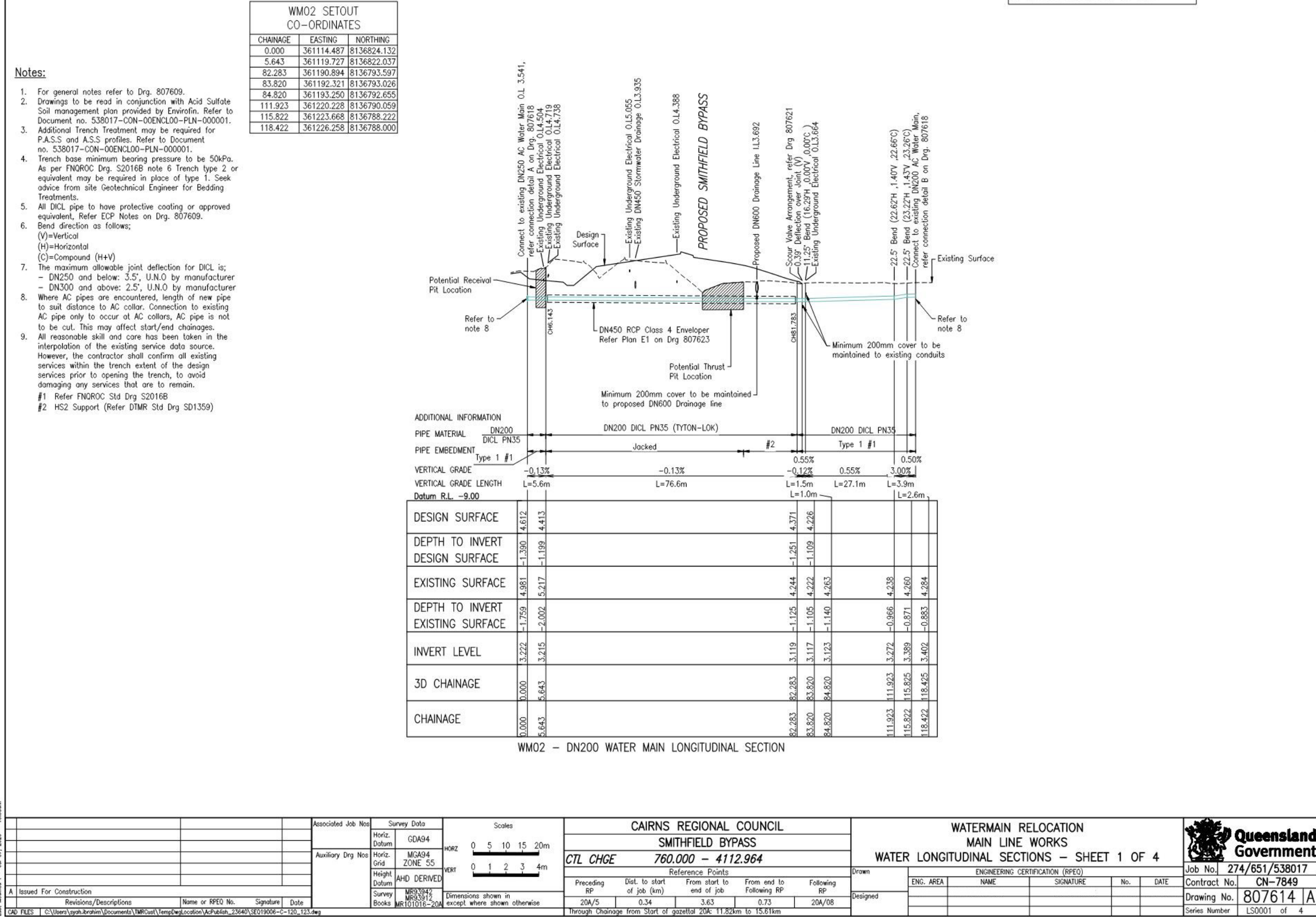
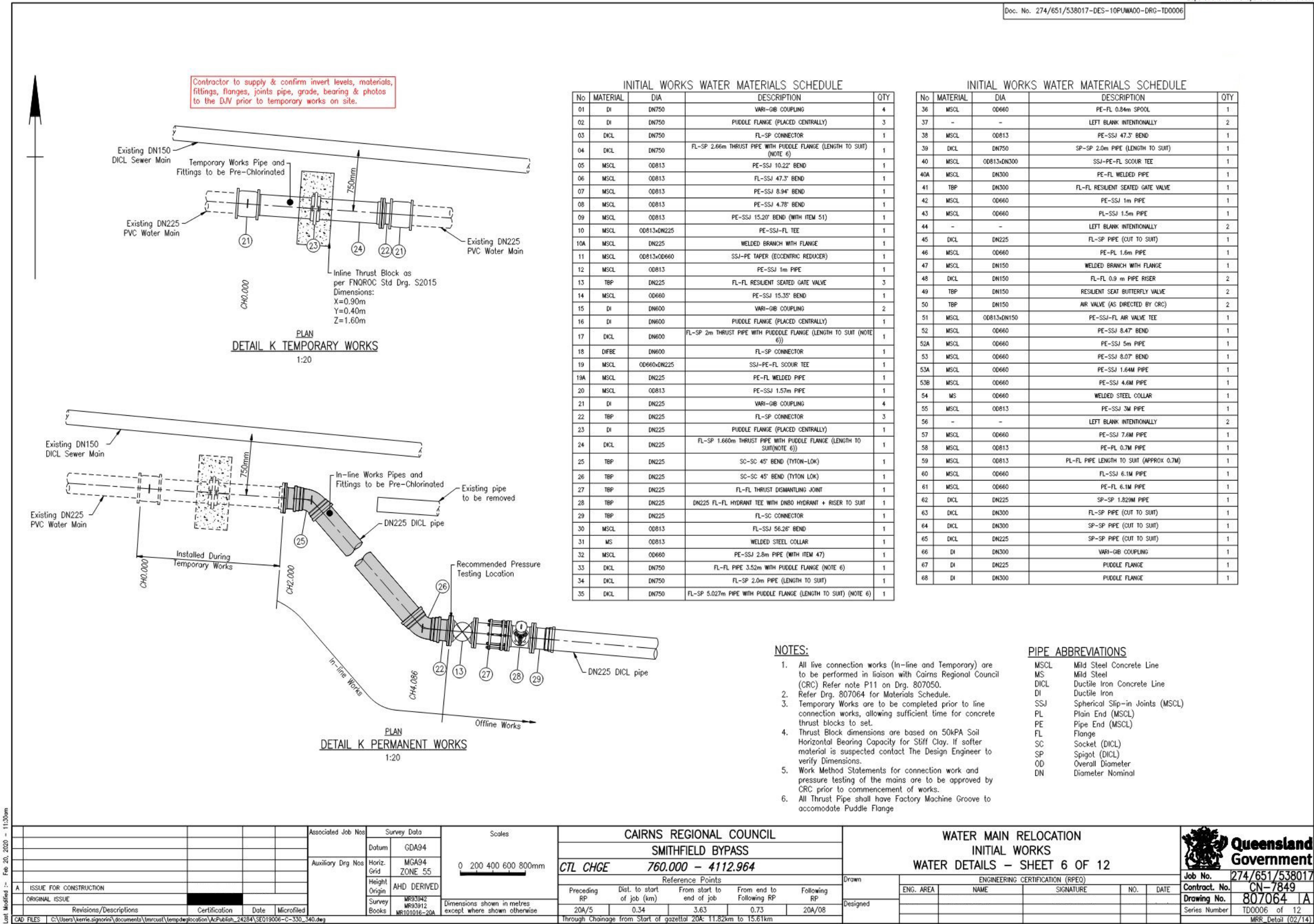


Figure 2.5.2(i) – PUP Details generic example



## **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)

#### **Drawing**

- 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

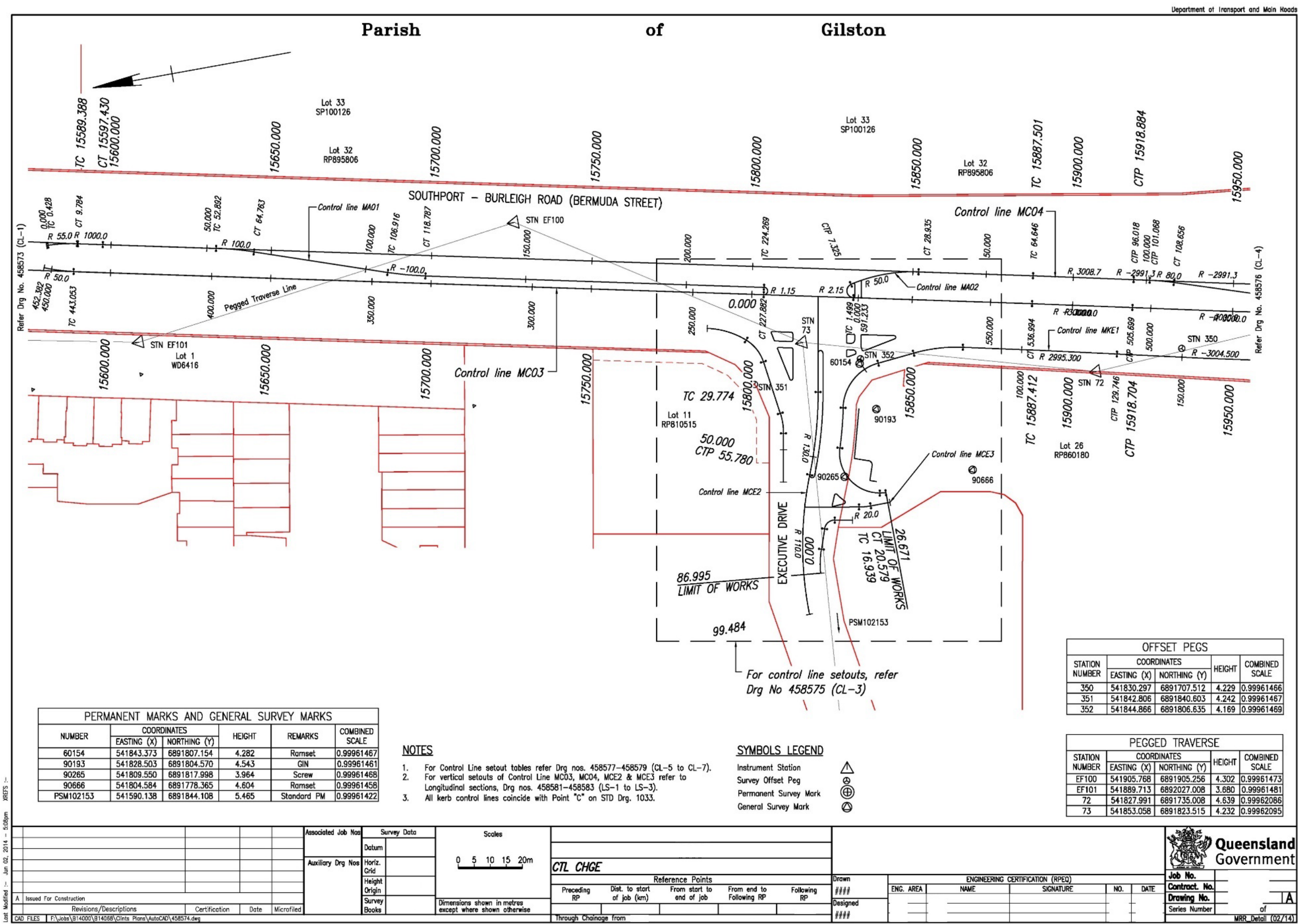


Figure 2.6(b) – Control line and set-out details – generic example 2

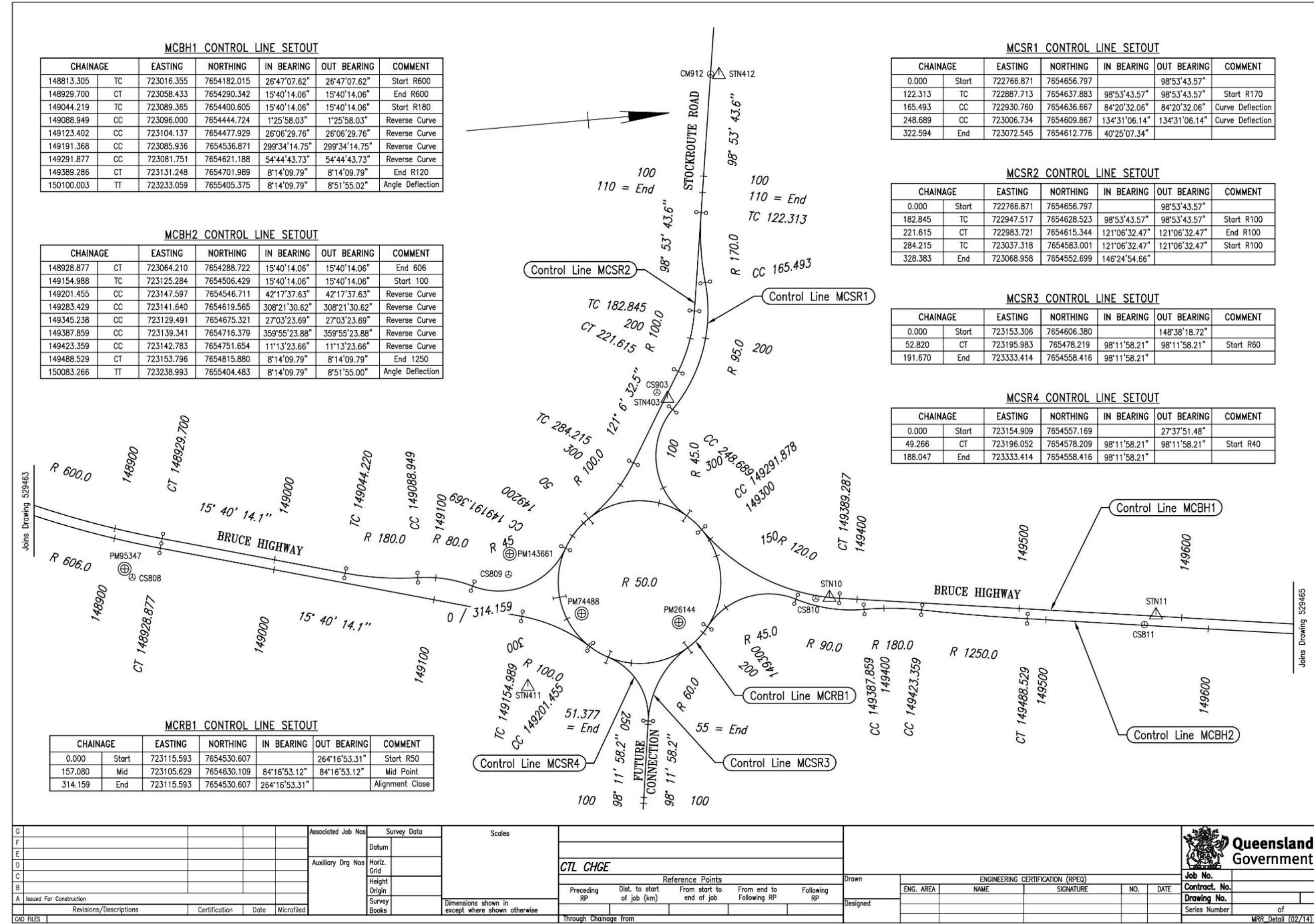
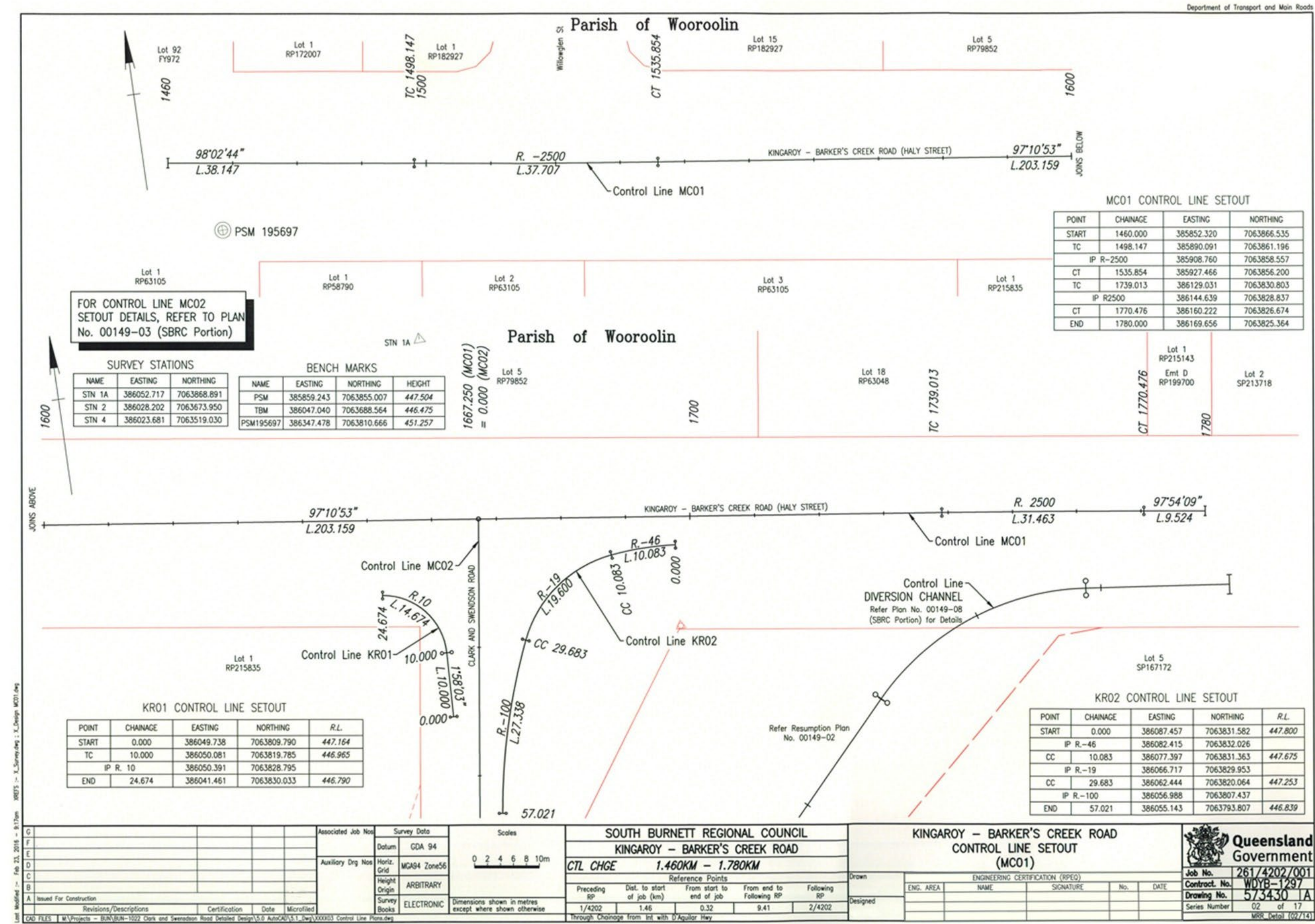




Figure 2.6(c) – Control line and set-out details – generic example 3



## **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)

#### **Drawing**

- 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

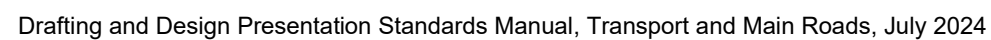
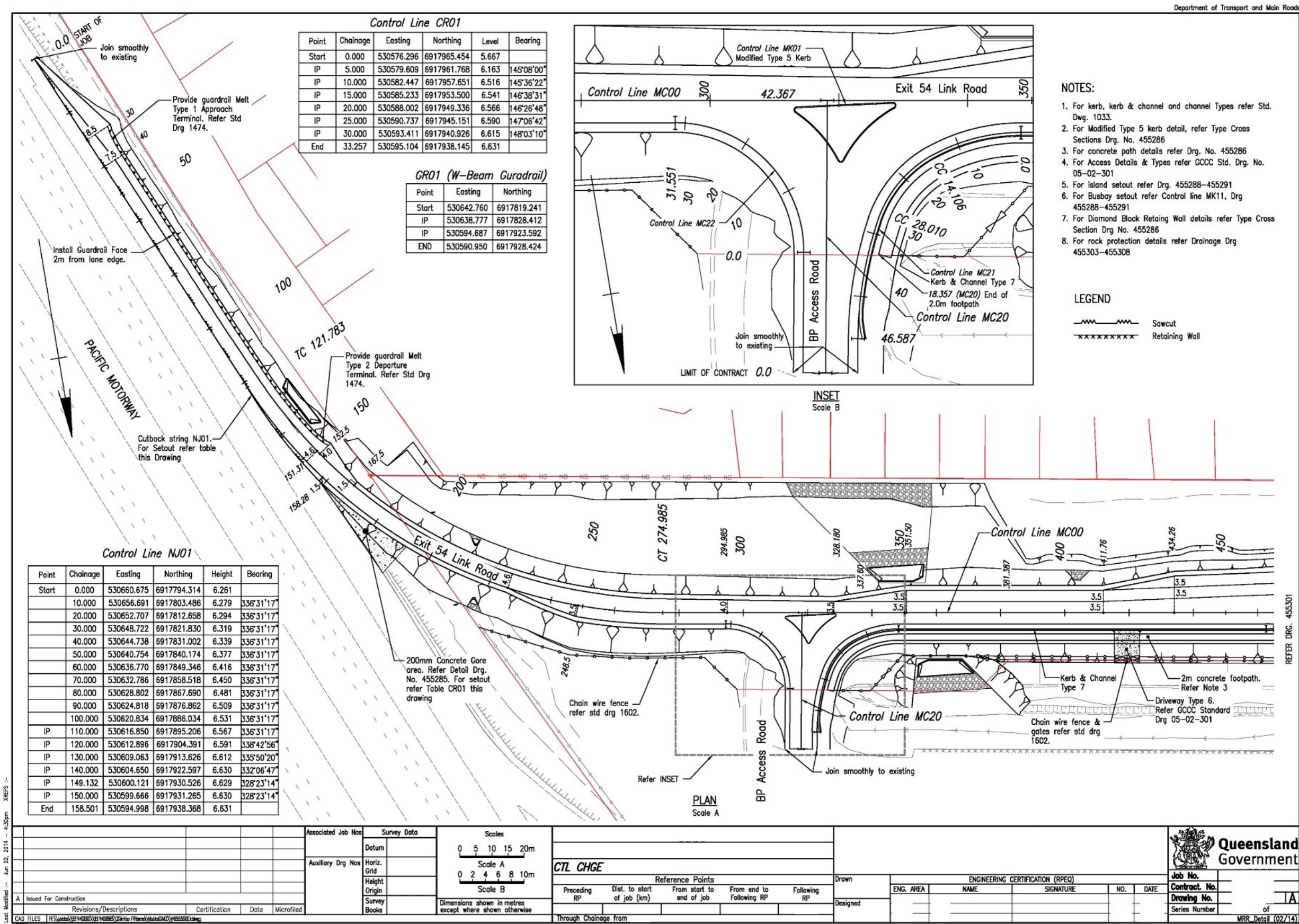




Figure 2.7(b) – Construction details – generic example 2





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

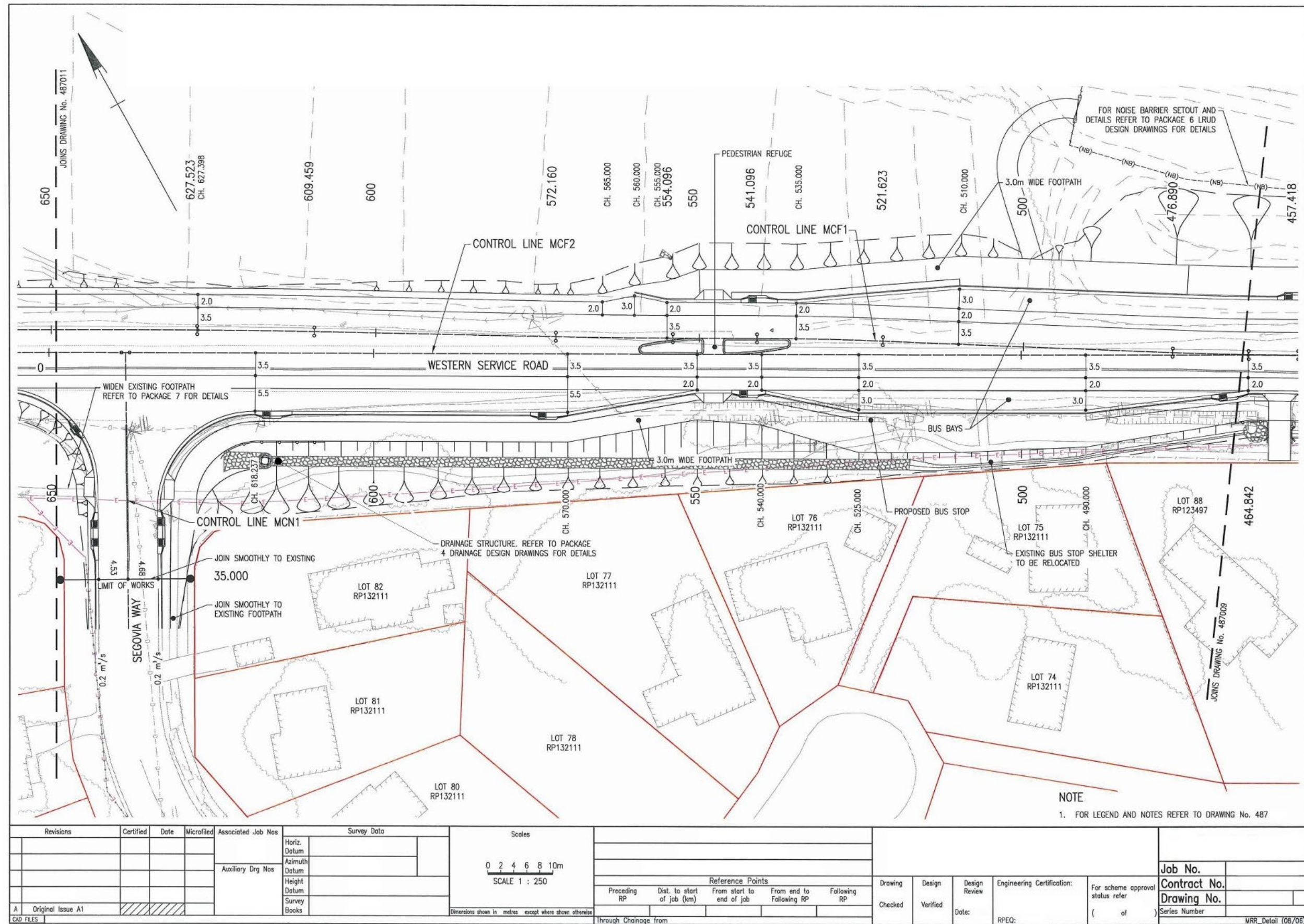
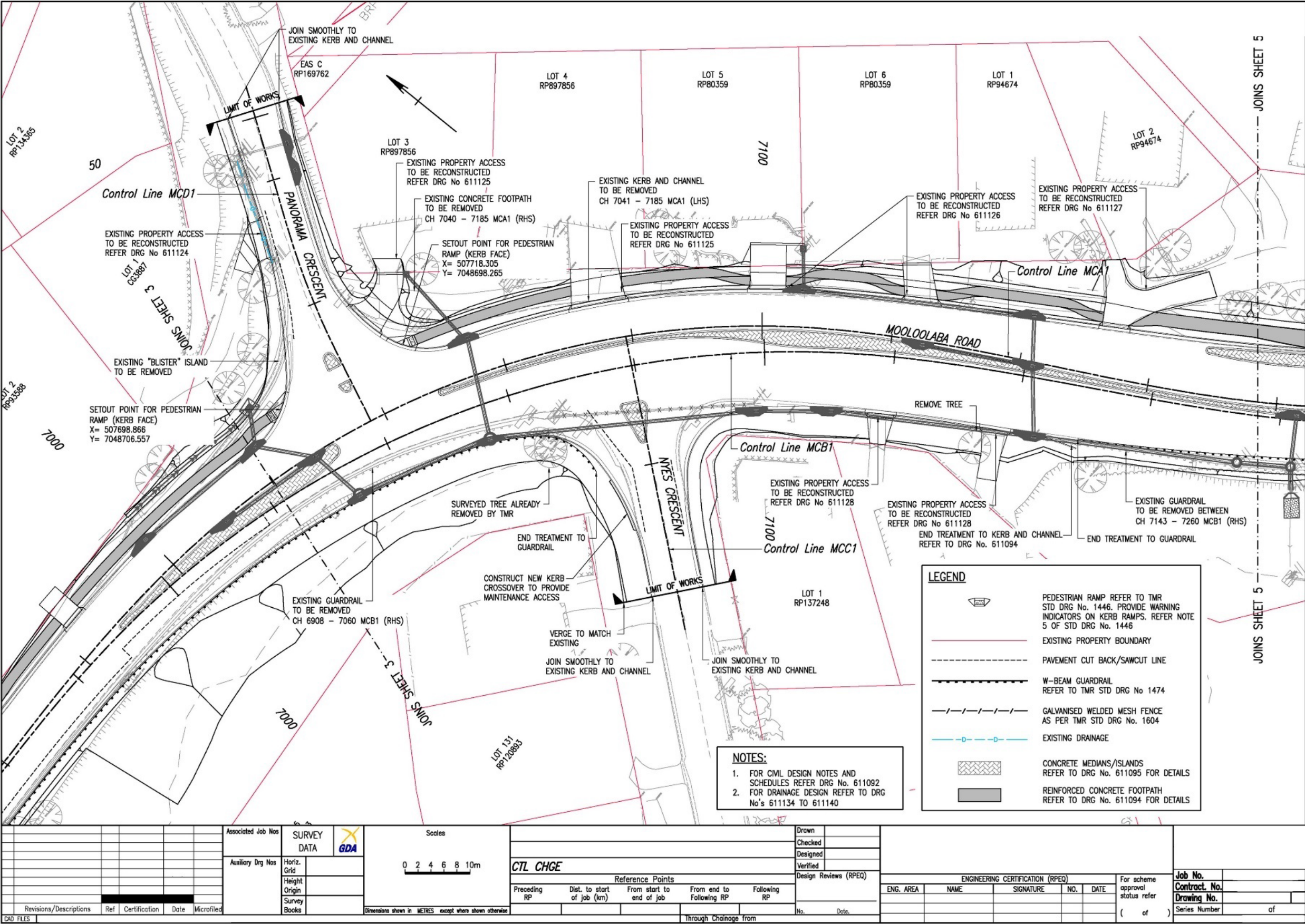




Figure 2.7(d) – General arrangement – generic example 1









Department of Transport and Main Roads

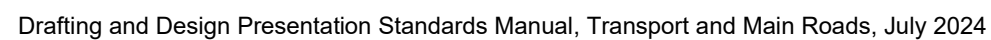




Figure 2.7(g) – Construction details – registered example 1

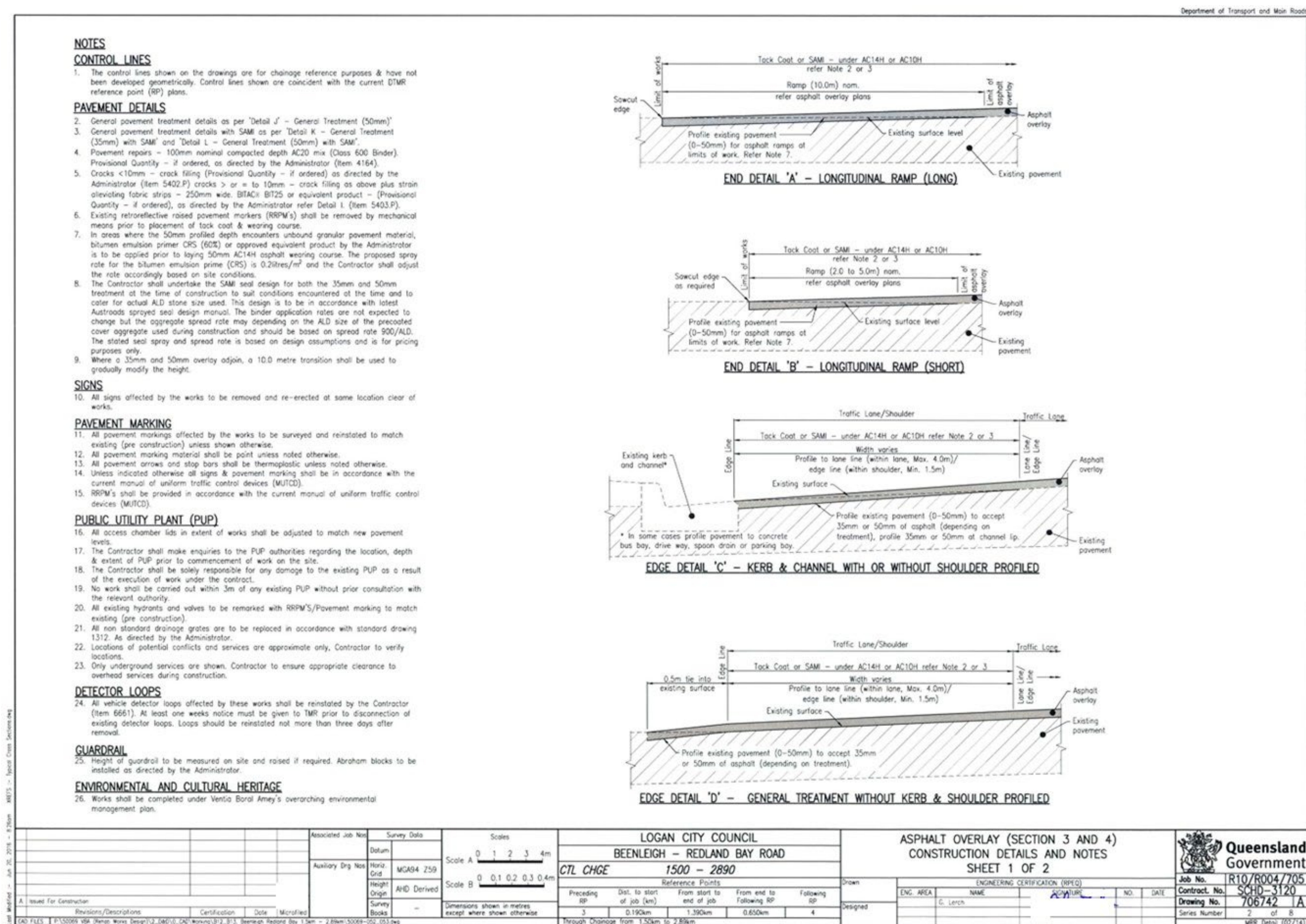
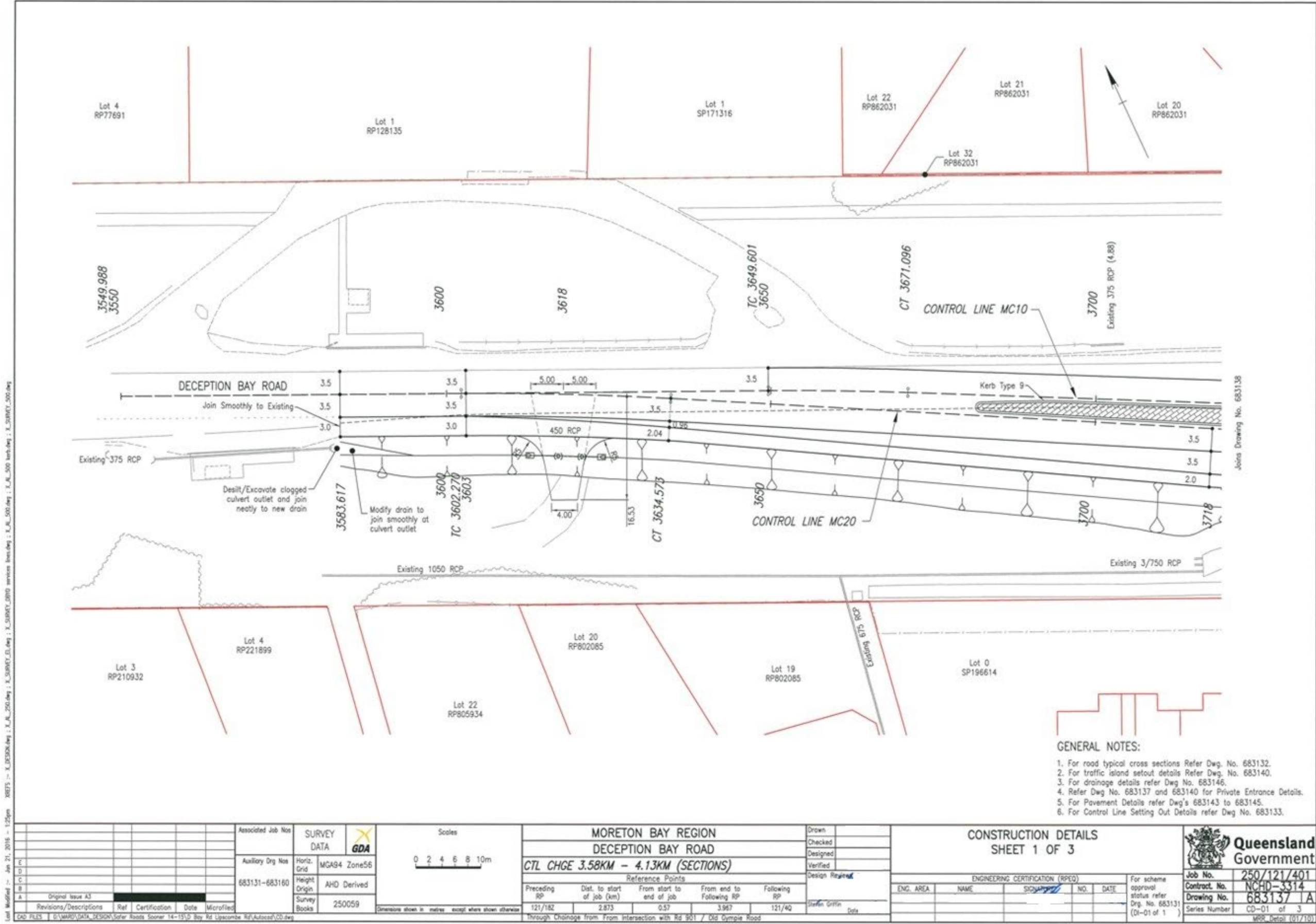


Figure 2.7(h) – Construction details – registered example 2





## **2.8 Intersection details**

This drawing shows intersection geometry and layout details.

### **Considerations**

#### **Scale**

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

#### **Drawing**

- 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

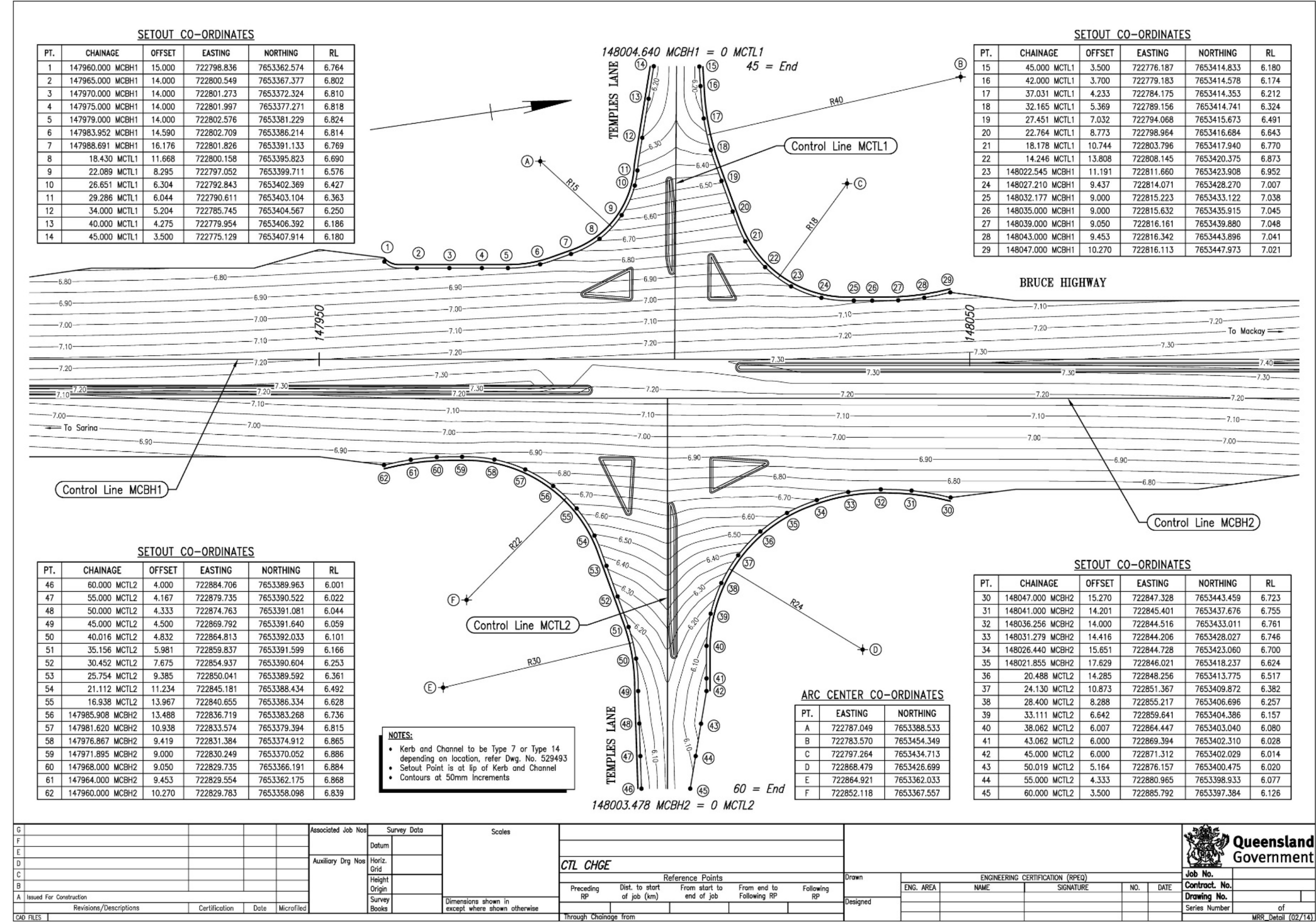
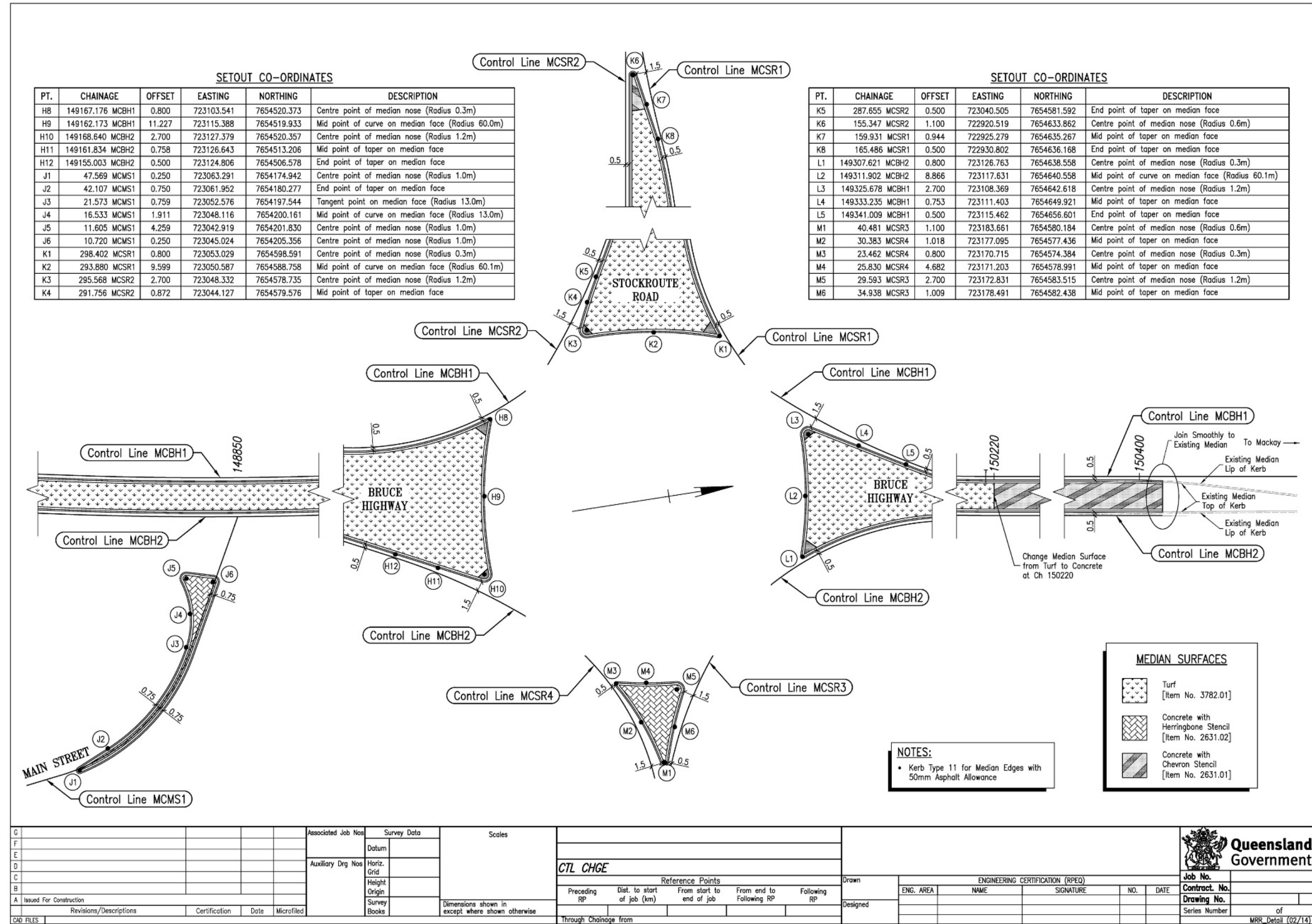




Figure 2.8(b) – Intersection details and set-out tables – generic example 2







Post Modified :- Jun 02, 2014 - 5:01pm XREFS :-

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

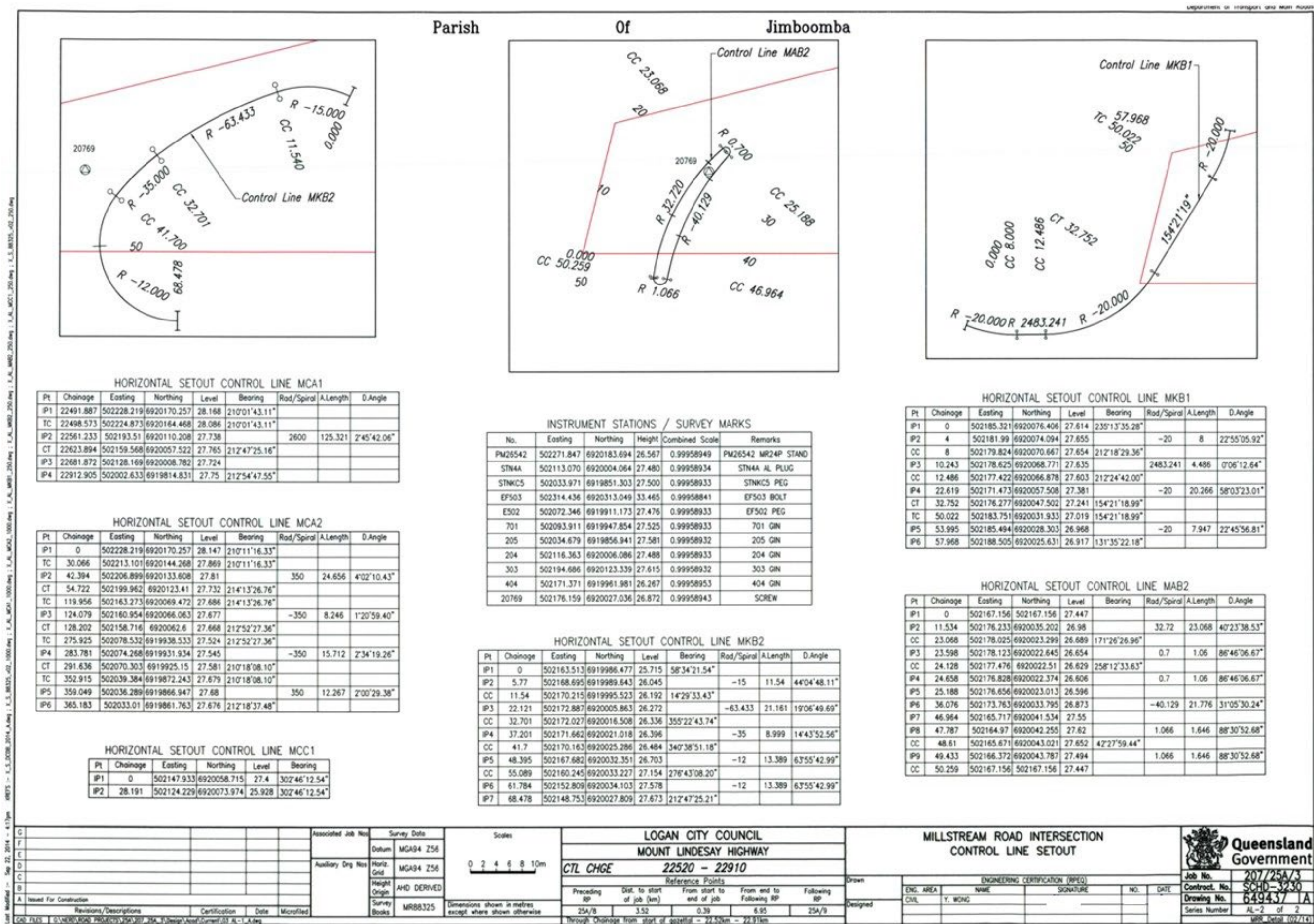
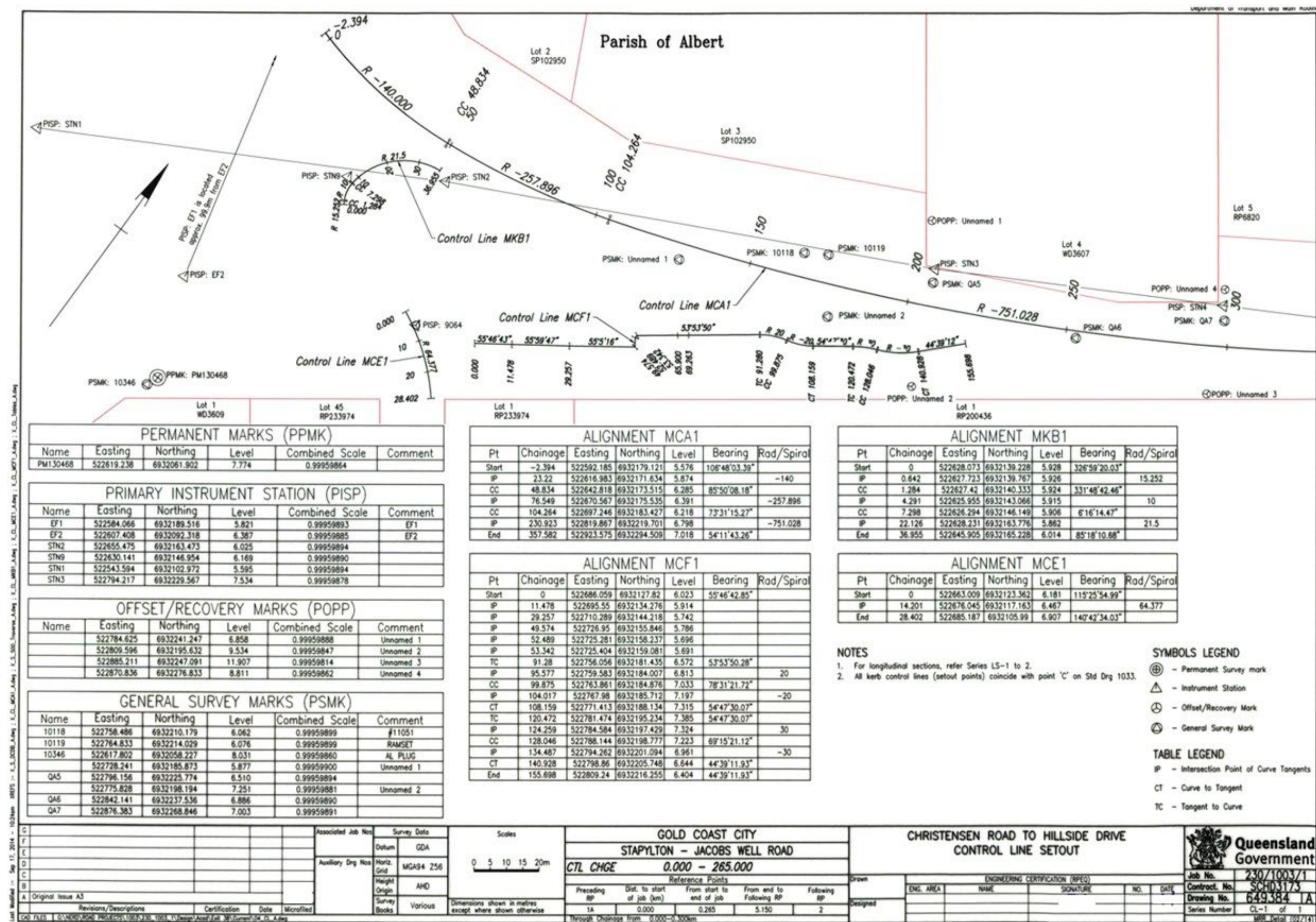




Figure 2.8(f) – Intersection details and set-out tables – registered example 2



## **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

#### **Drawing**

- 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

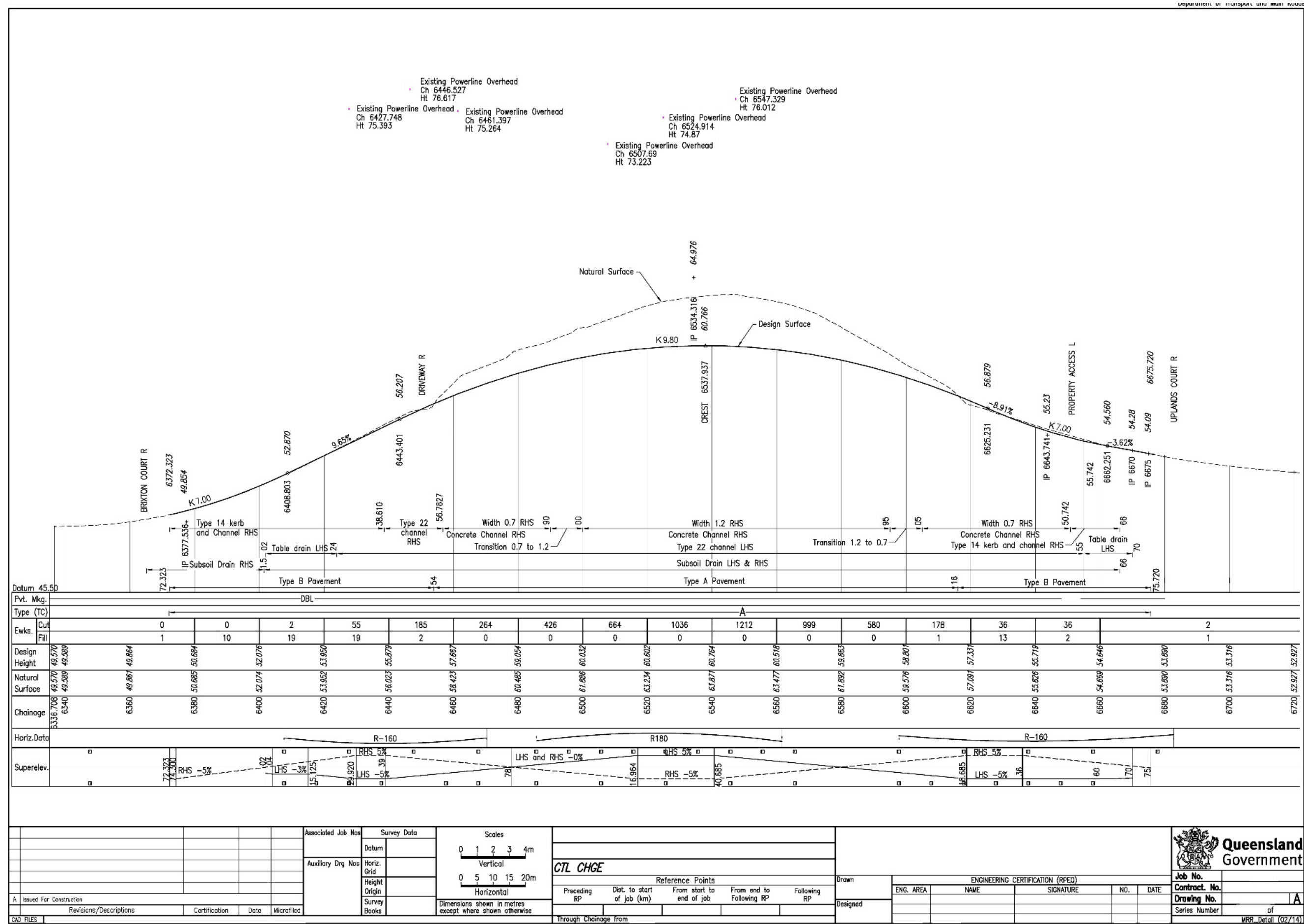
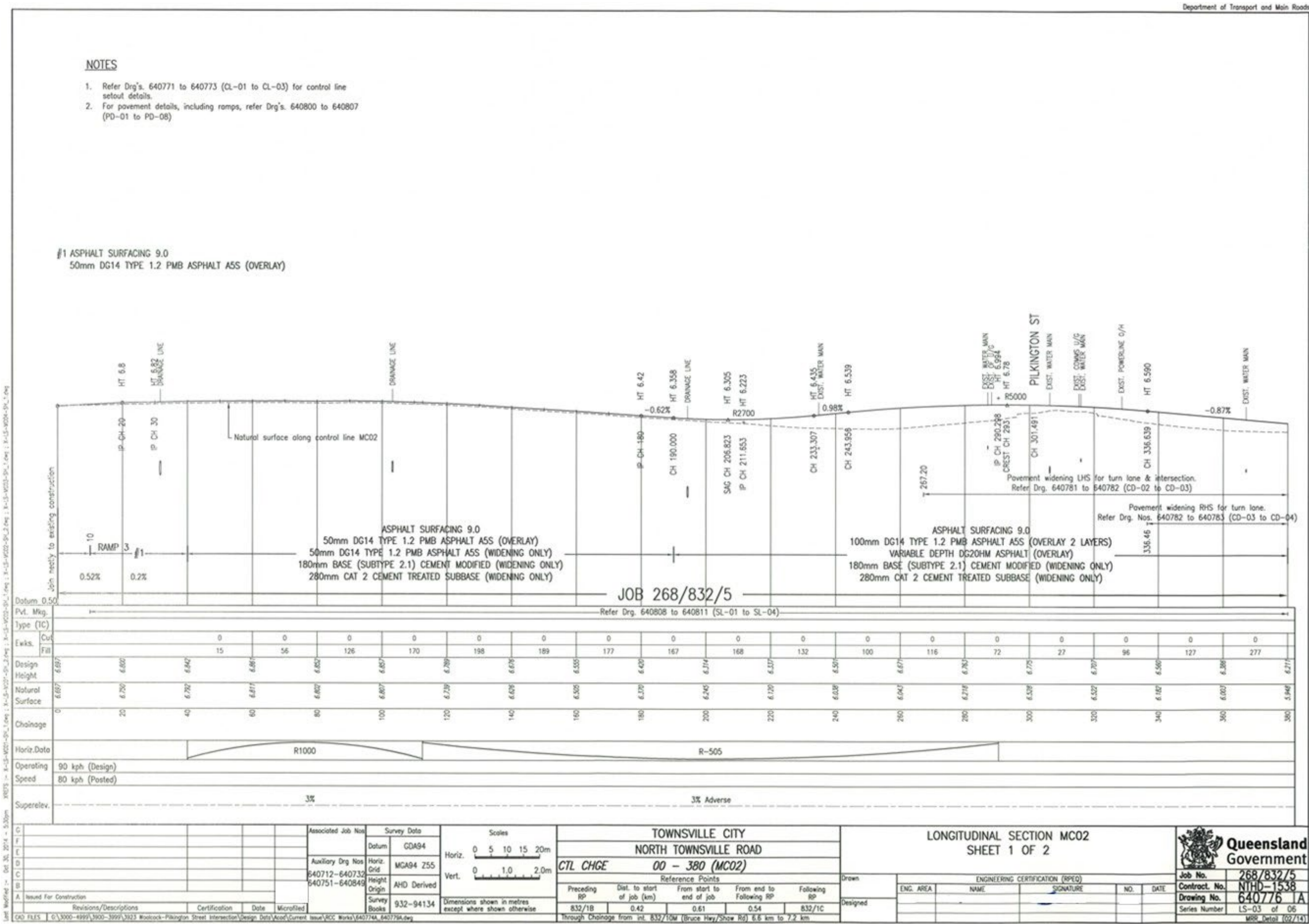






Figure 2.9(c) – Longitudinal section – registered example 2



### **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)

##### **Drawings**

- 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

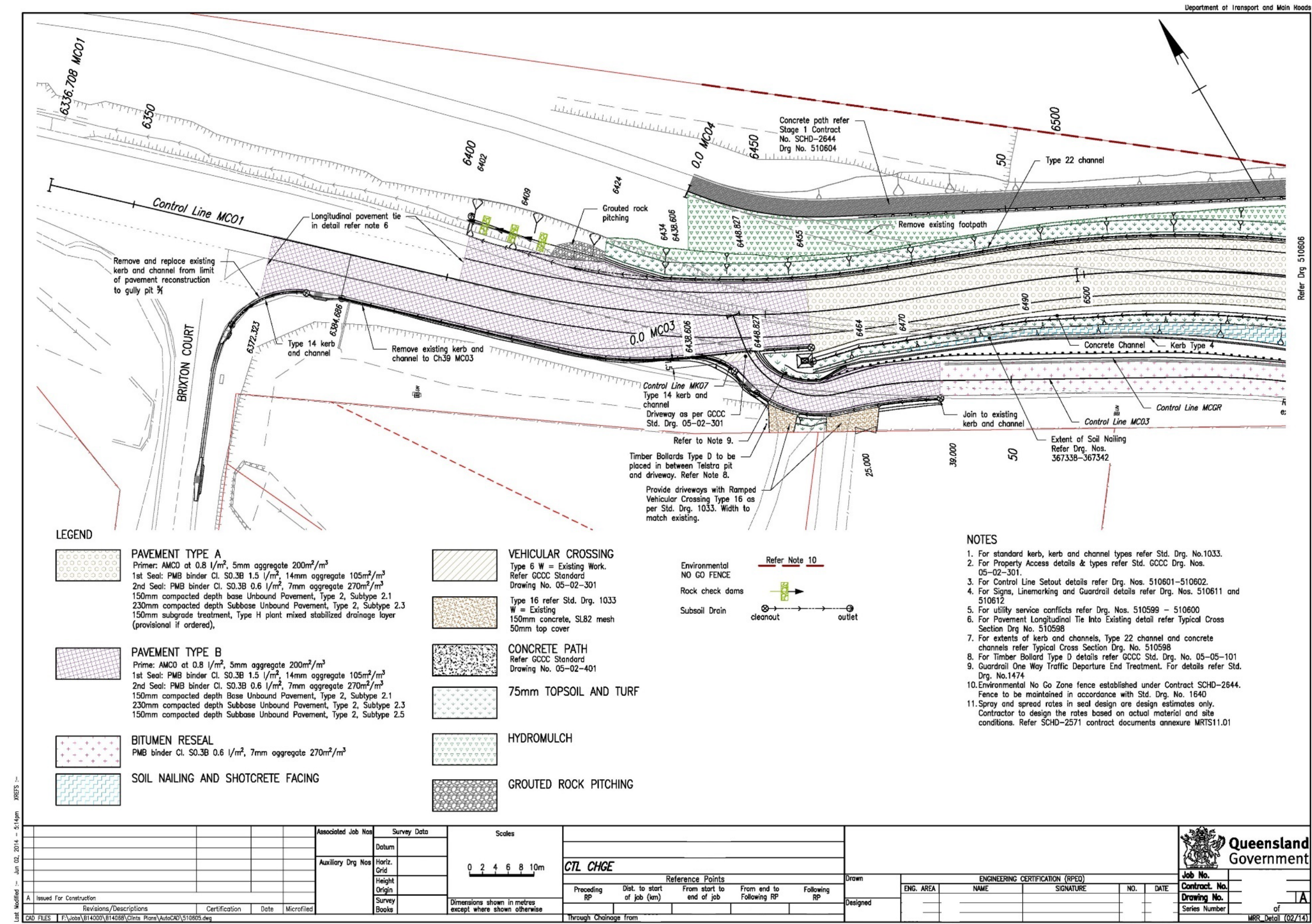
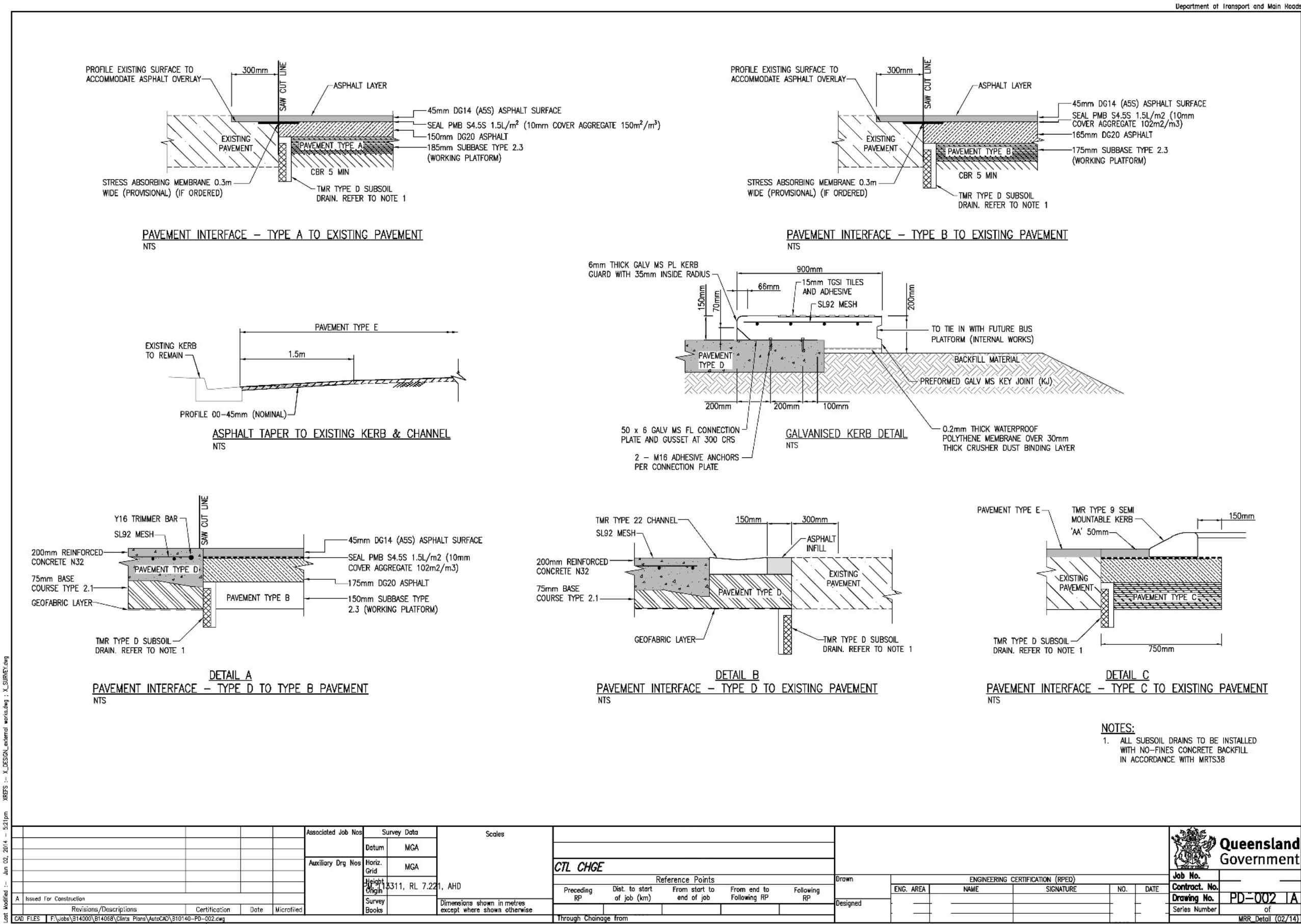
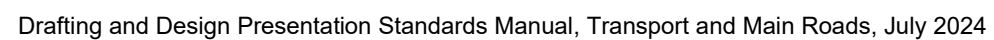


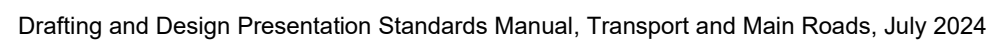
Figure 2.10(b) – Pavement details – generic example 2













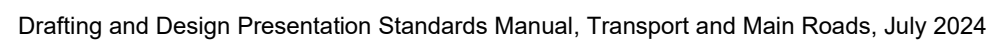








Figure 2.10(g) – Pavement details – registered example 1

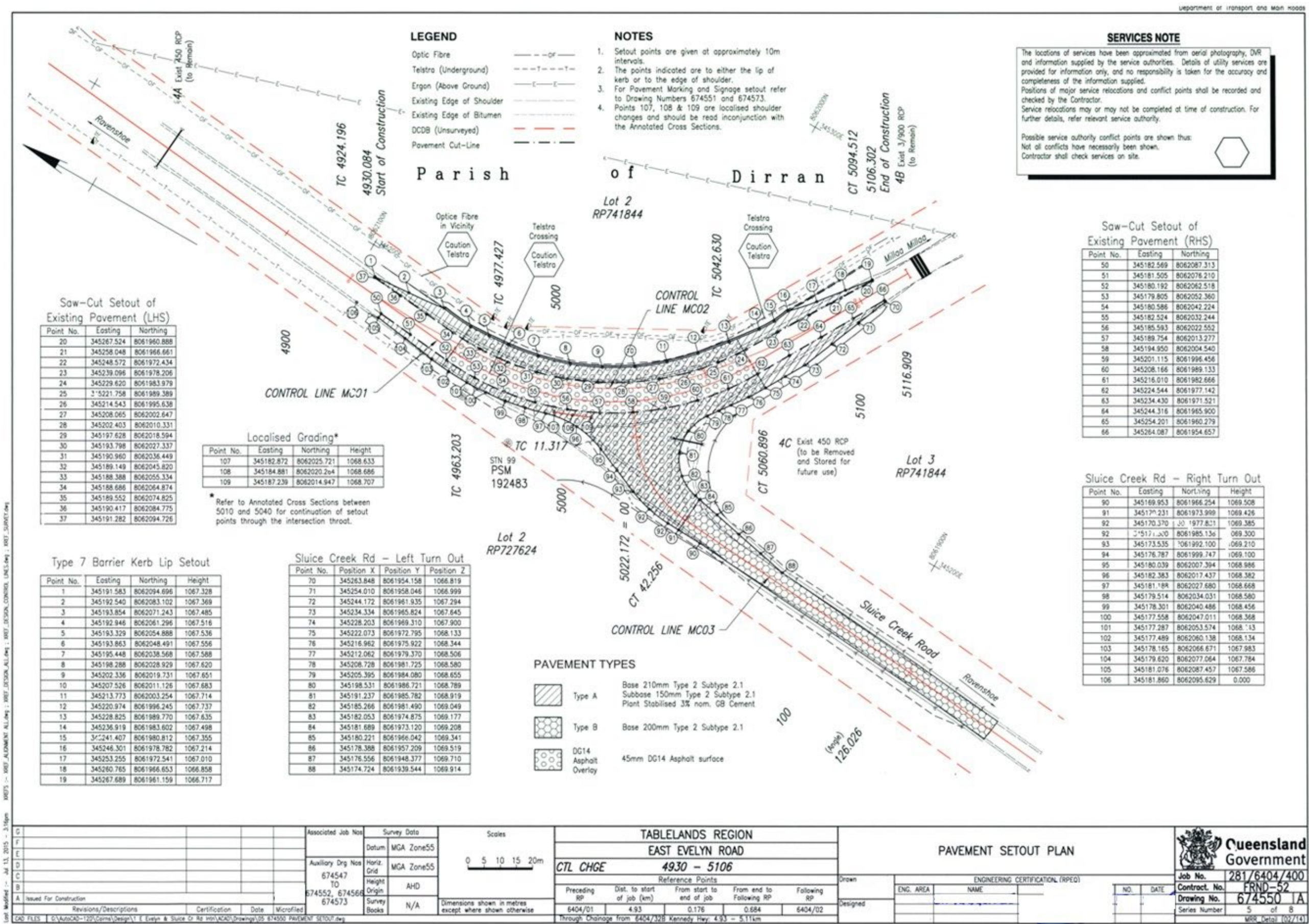
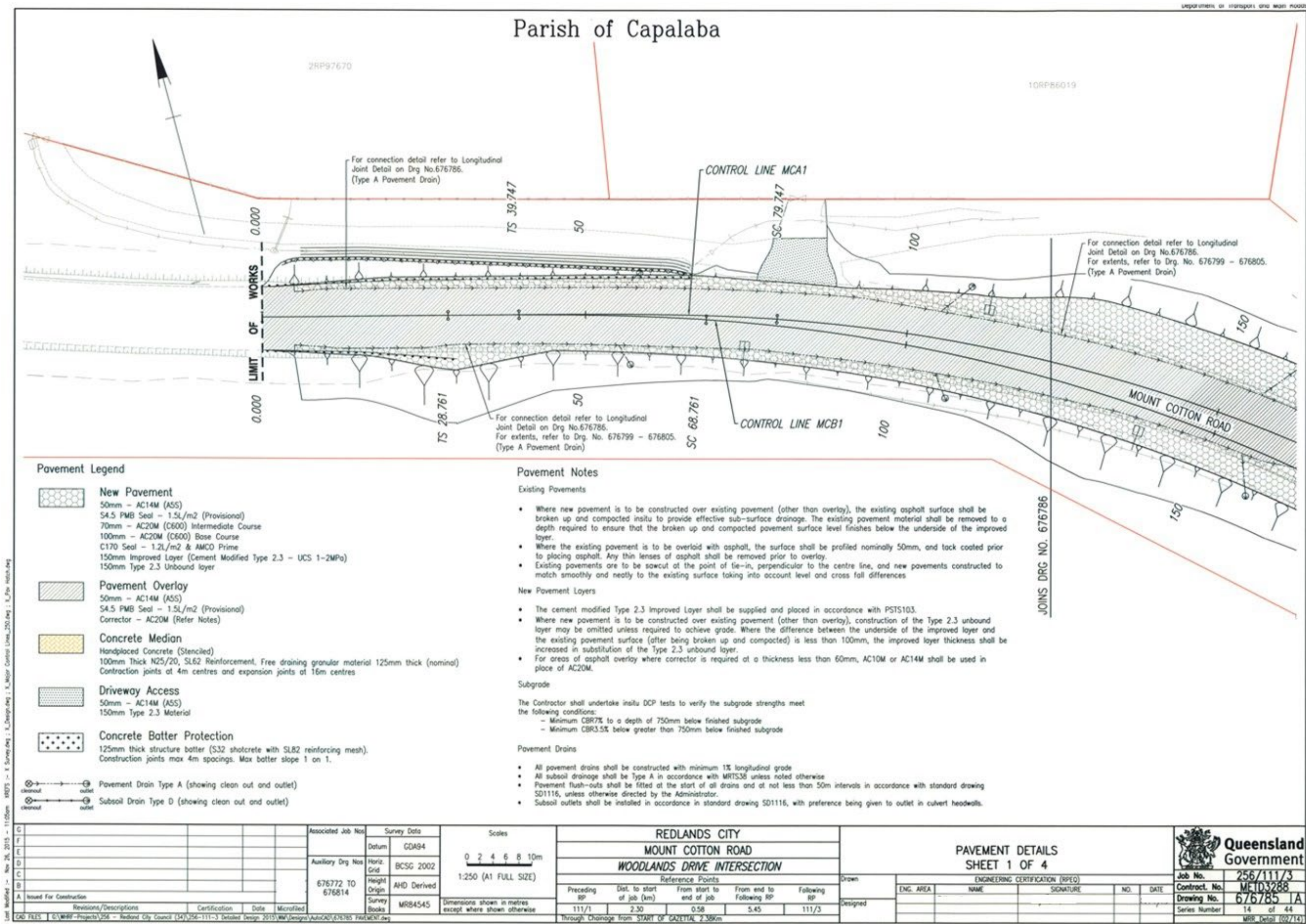




Figure 2.10(h) – Pavement details – registered example 2





## **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

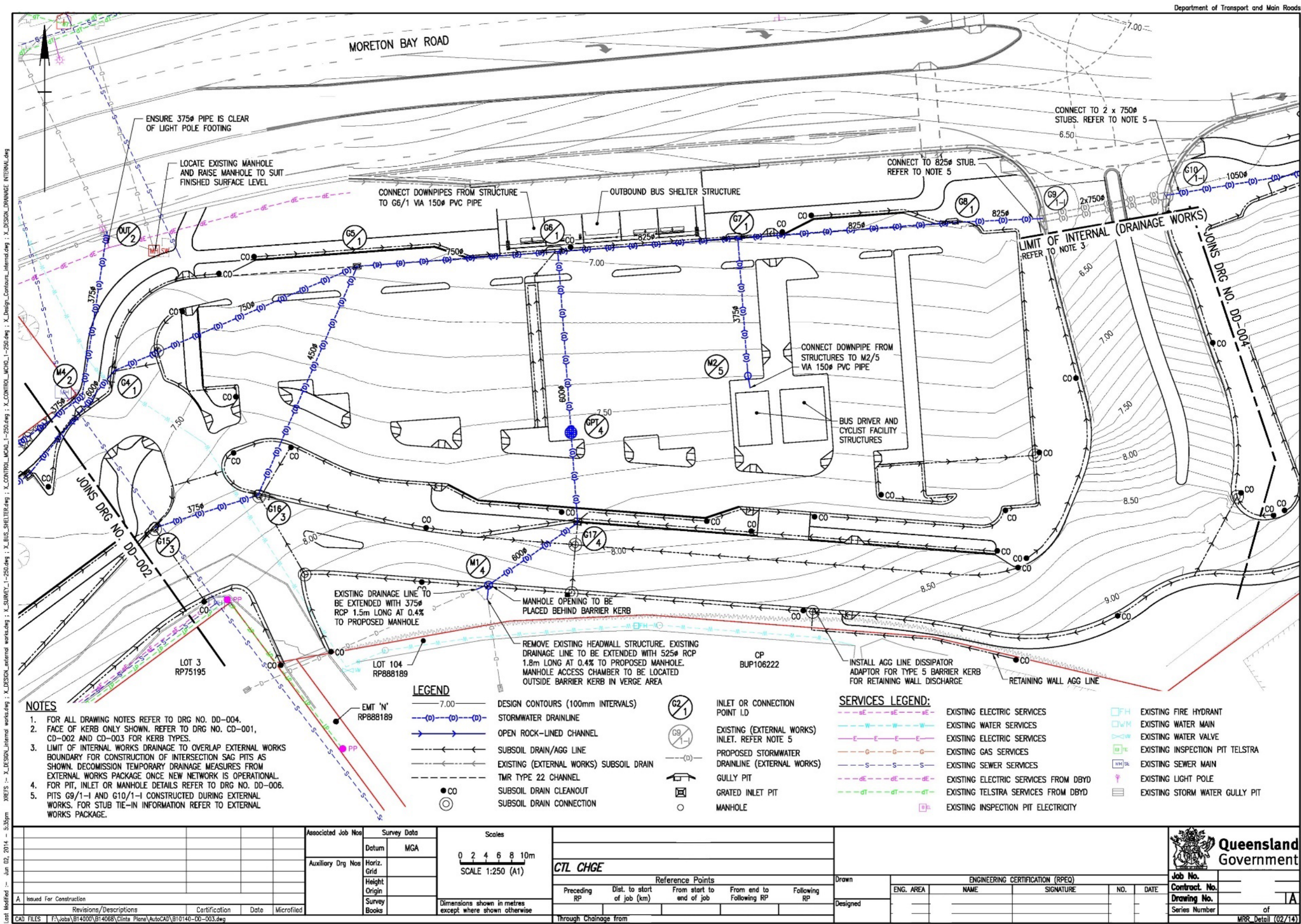
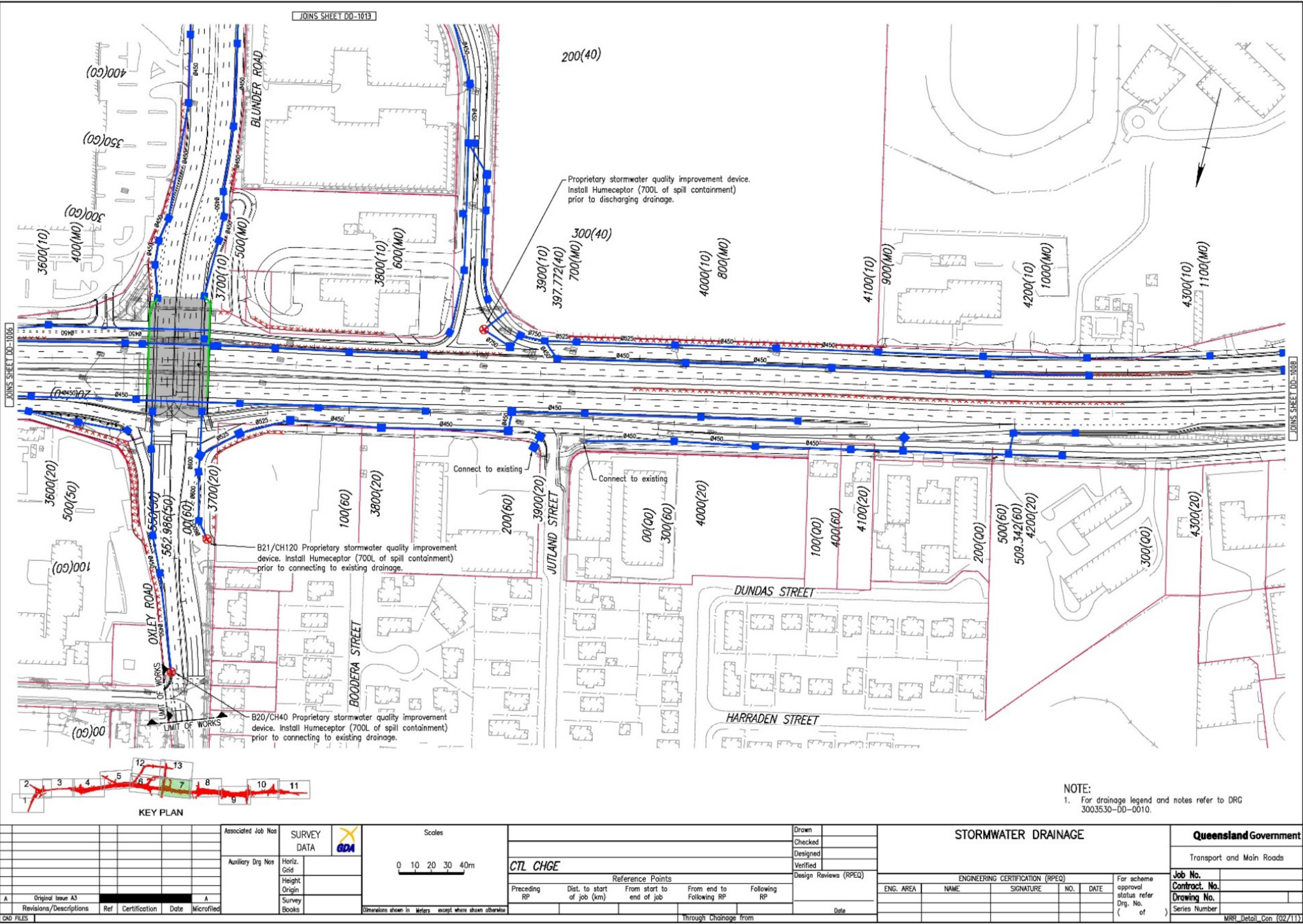




Figure 2.11.1(b) – Drainage layout – generic example 2





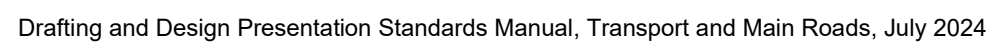
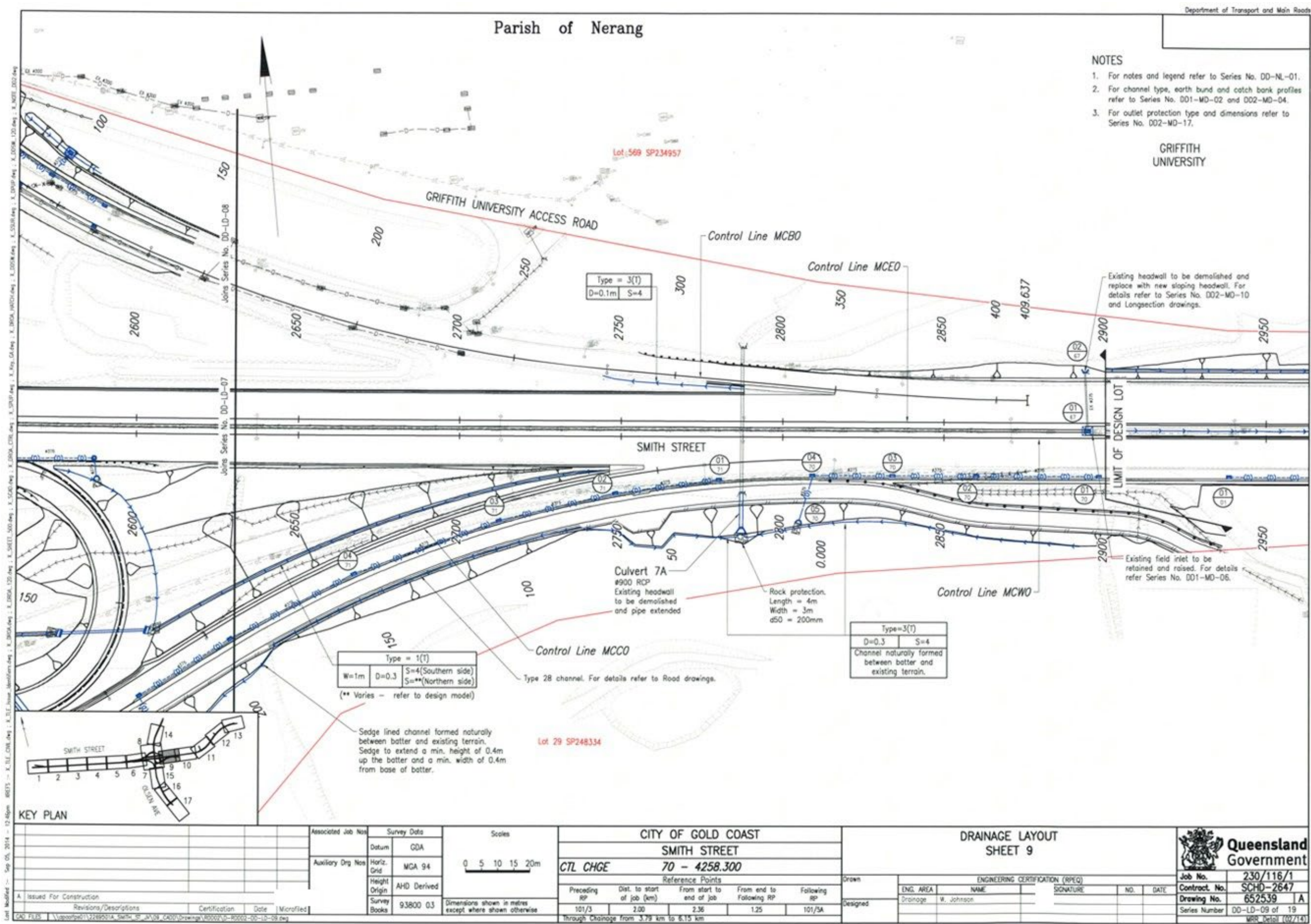








Figure 2.11.1(e) – Drainage layout – registered example 2





### **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**

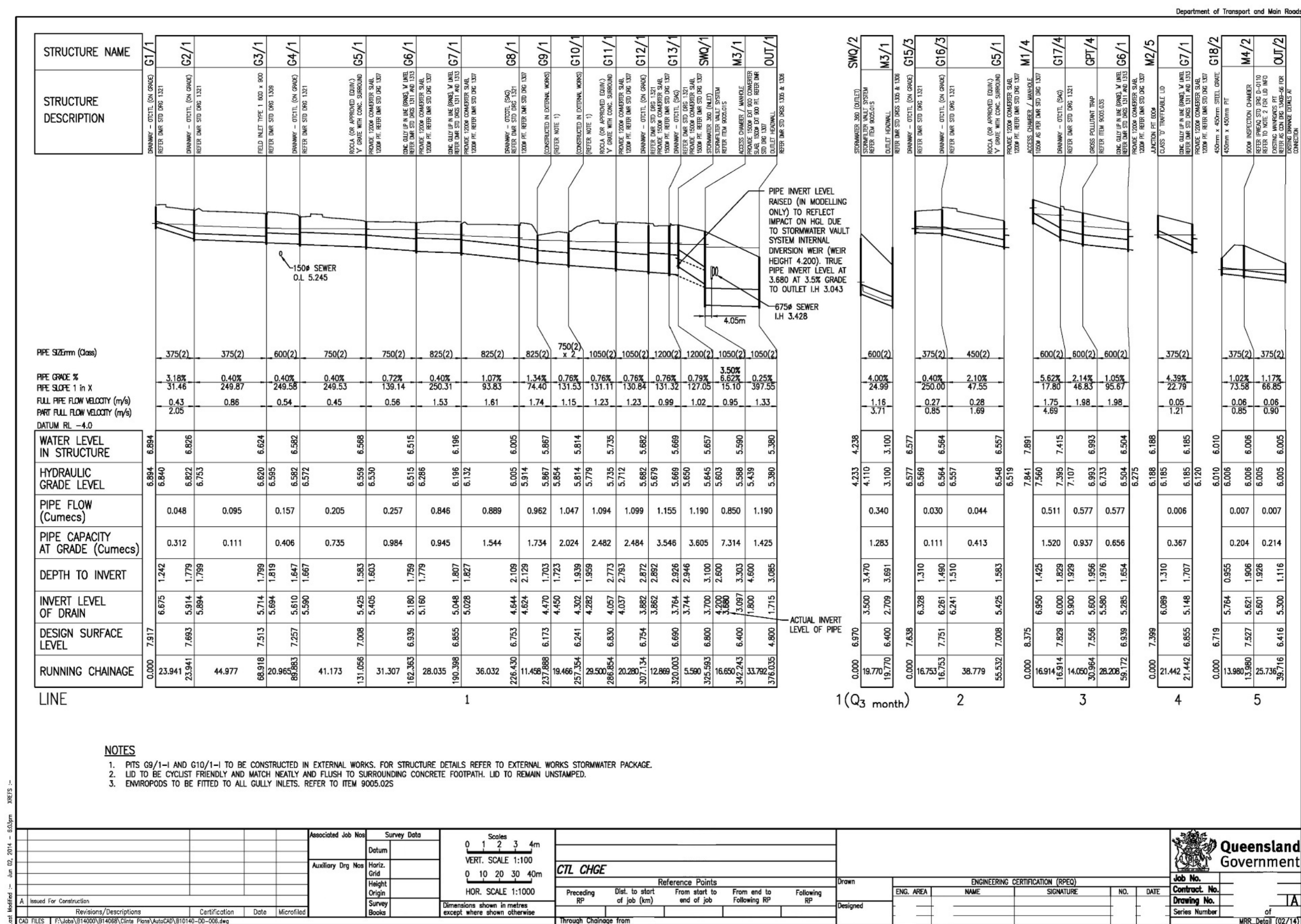
The drainage longitudinal section drawing provides longitudinal details of the piped stormwater drainage. A longitudinal section shall be detailed for every piped leg of the stormwater system.

#### **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**



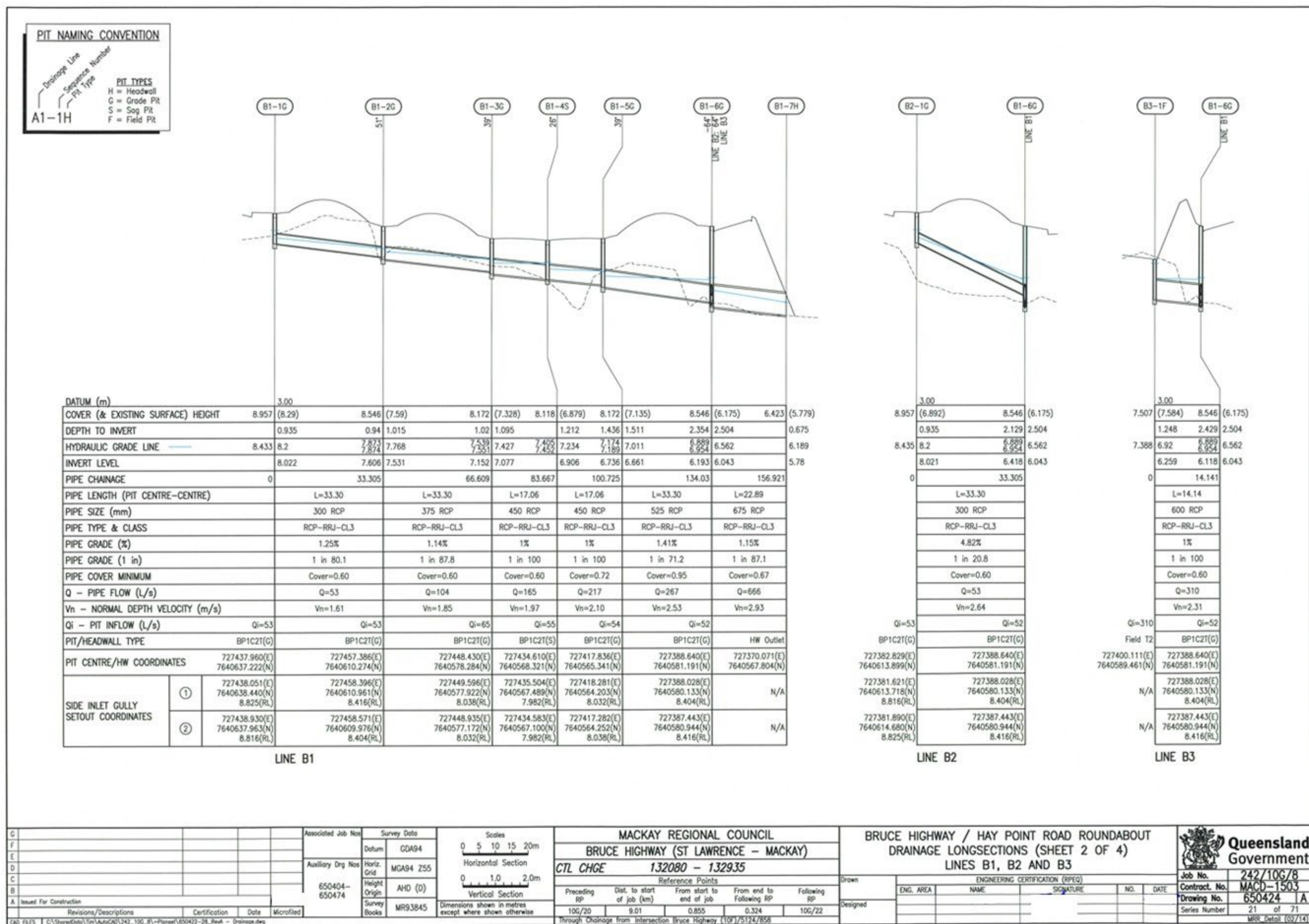


**NOTE:**

- 1.LINE 37, 38, 39, 41, 42 AND 43 ARE DESIGN FOR Q10 AIR
- 2.ALL REINFORCED CONCRETE PIPES TO BE CONSTRUCTED WITH RUBBER RING JOINTS AND SALTWATER COVER.
- 3.DMR LIP IN LINE GULLY PITS, REFER STD DRG No. 1311.
- 4.REFER TO GCCC STD DRG No. 05-03-103 FOR EXTENDED MANHOLE.



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

Department of Transport and Main Roads

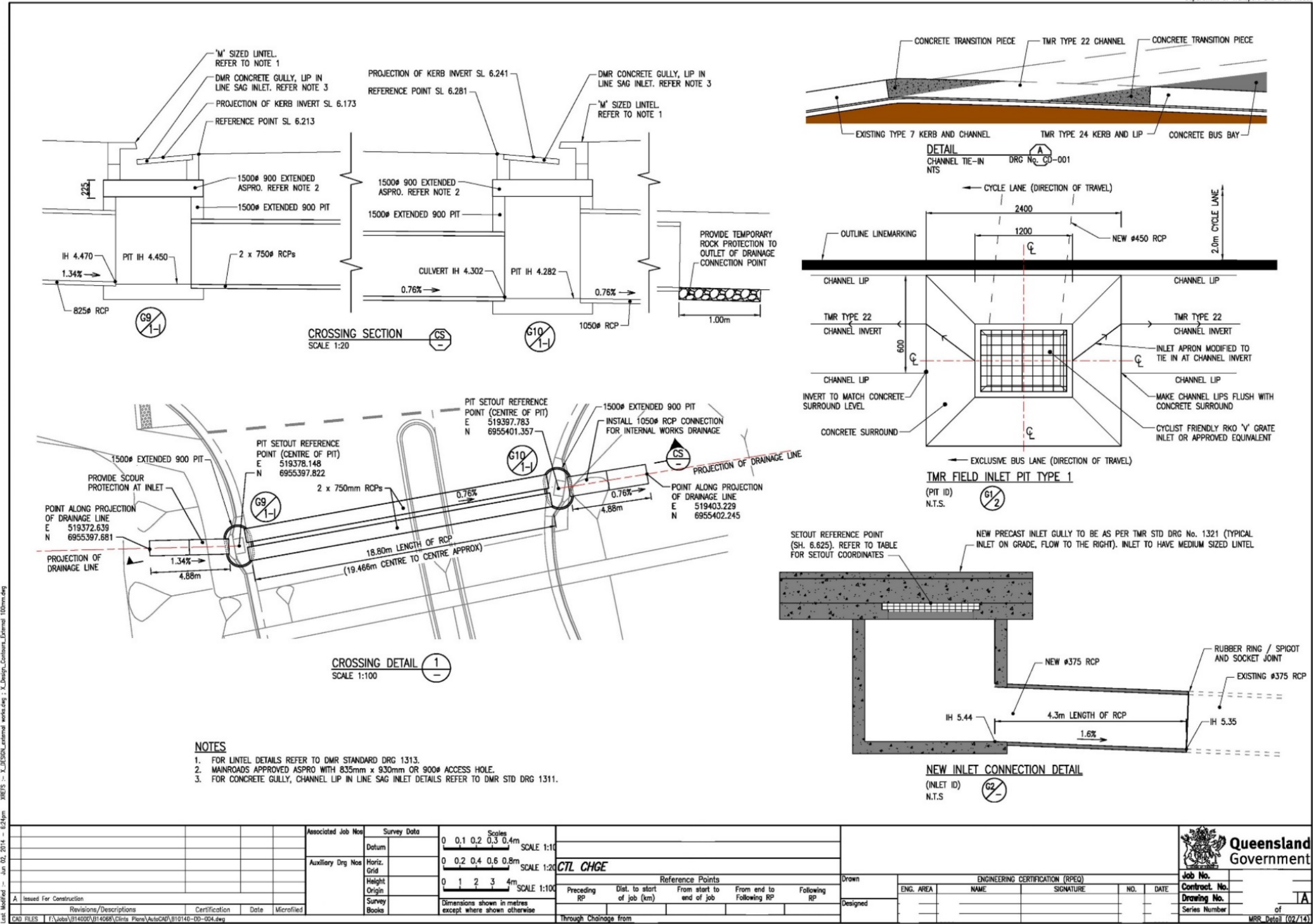






Figure 2.11.4(c) – Specific drainage details – generic example 3

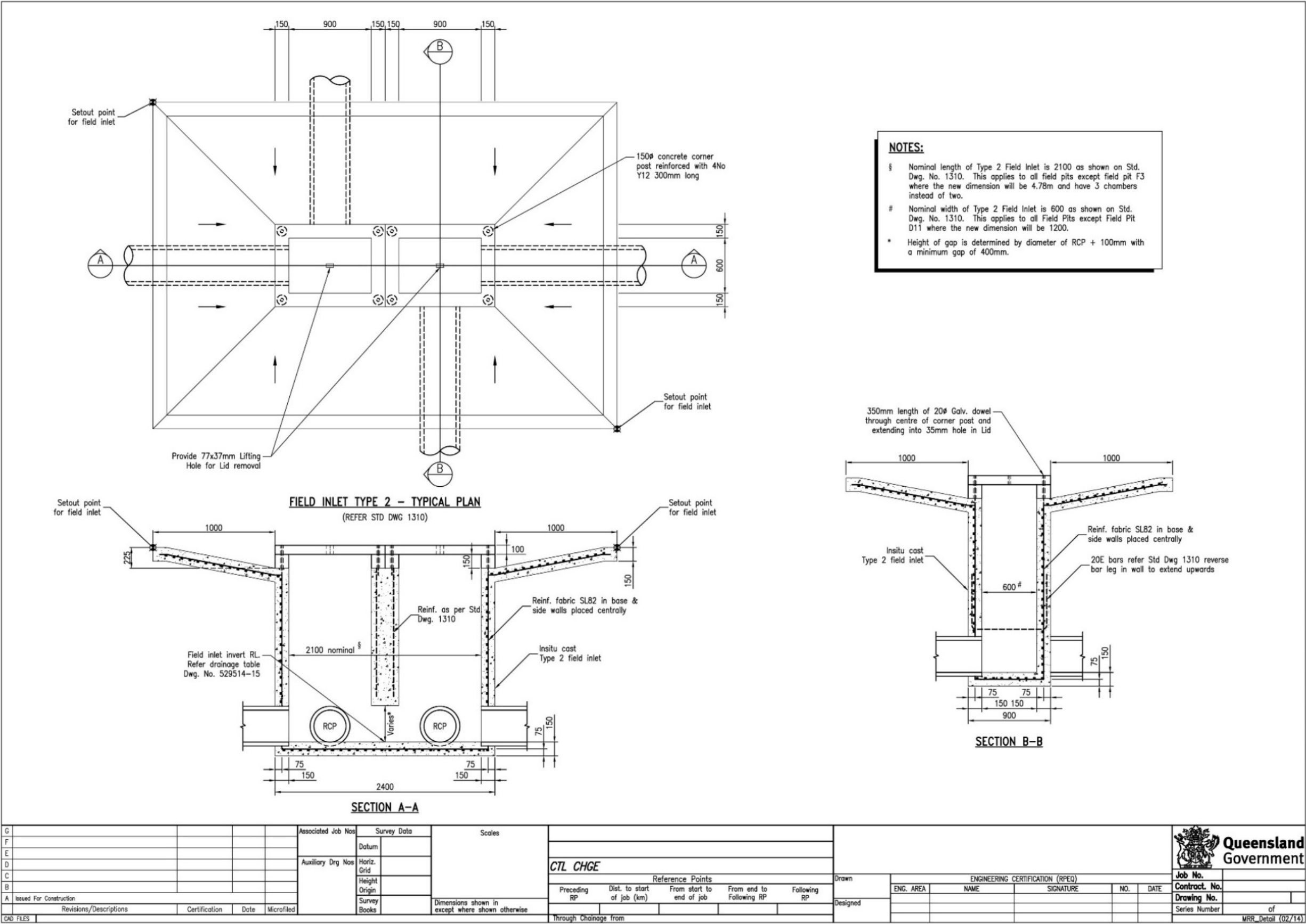
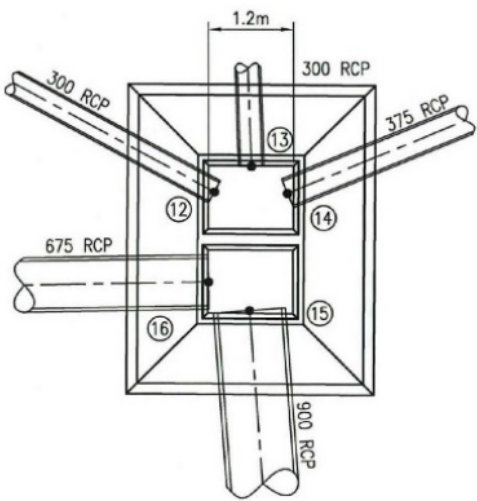


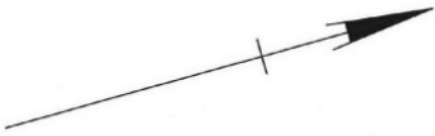


Figure 2.11.4(d) – Specific drainage details – registered example 1

Department of Transport and Main Roads

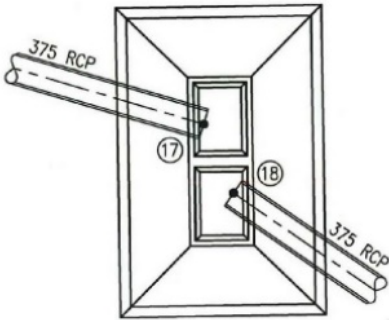


GULLY PIT D11 DETAILS

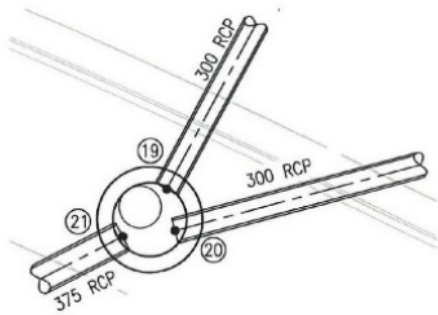


SETOUT CO-ORDINATES

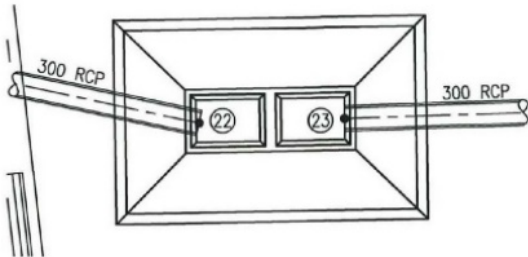
PT.	EASTING	NORTHING
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13	723117.190	7654512.475
14	723117.695	7654512.860
15	723119.157	7654511.892
16	723118.608	7654511.446
17	723117.147	7654646.255
18	723118.202	7654646.395
19	723154.295	7654537.447
20	723154.897	7654537.399
21	723154.774	7654536.660
22	723042.190	7654588.070
23	723042.689	7654590.065



GULLY PIT E5 DETAILS



GULLY PIT E10 DETAILS



GULLY PIT F8 DETAILS


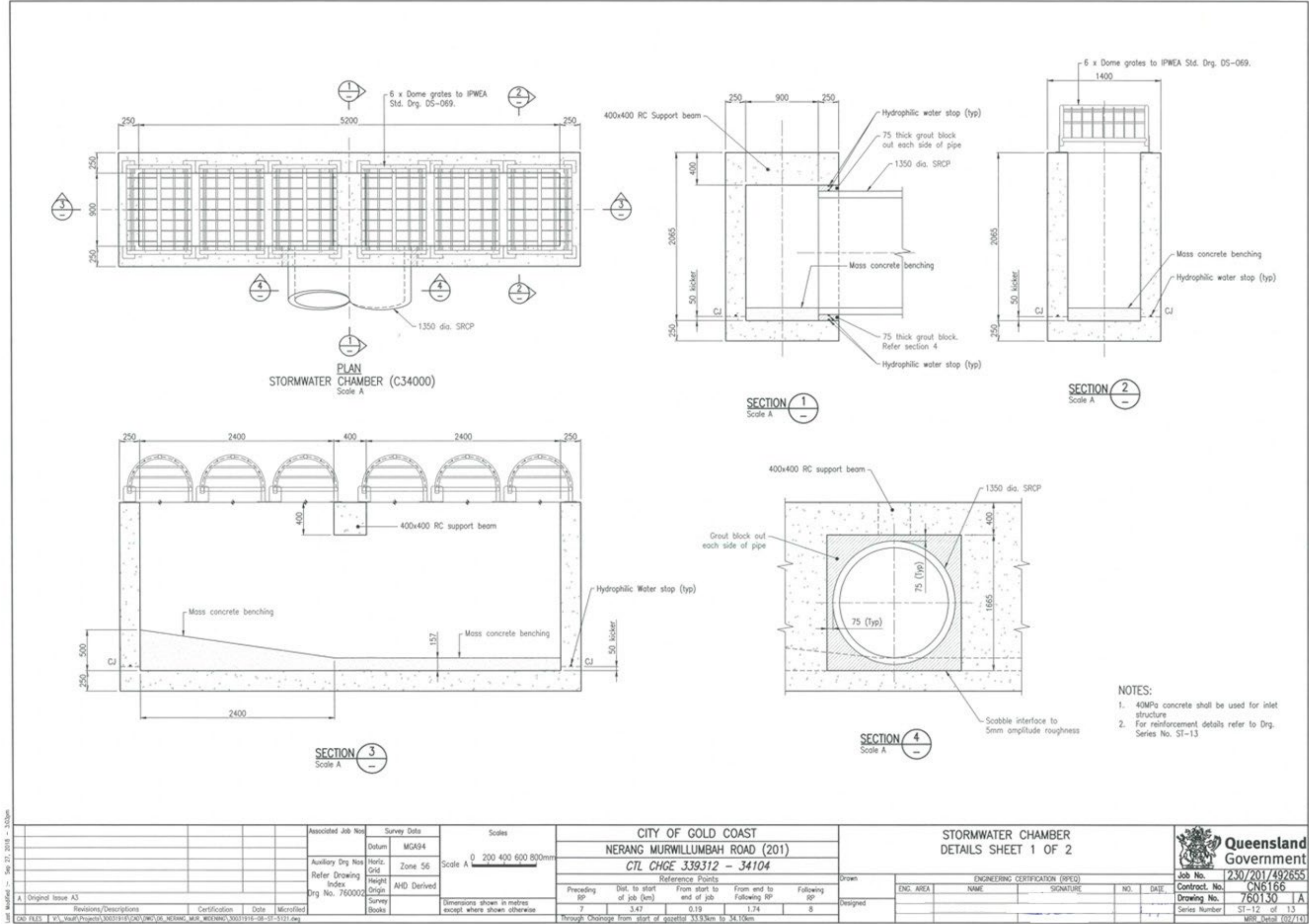
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					Datum															
				Auxiliary Drg. Nos.	Horiz. Grid															
					Height Origin															
A Issued For Construction					Survey Books		Dimensions shown in except where shown otherwise	Reference Points					Drawn	ENGINEERING CERTIFICATION (RPEQ)						
Revisions/Descriptions				Certification	Date	Microfilmed		Preceding RP					Dist. to start of job (km)	From start to end of job	From end to Following RP	ENG. AREA	NAME	SIGNATURE	NO.	DATE
								Through Chainage from THROUGH												

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

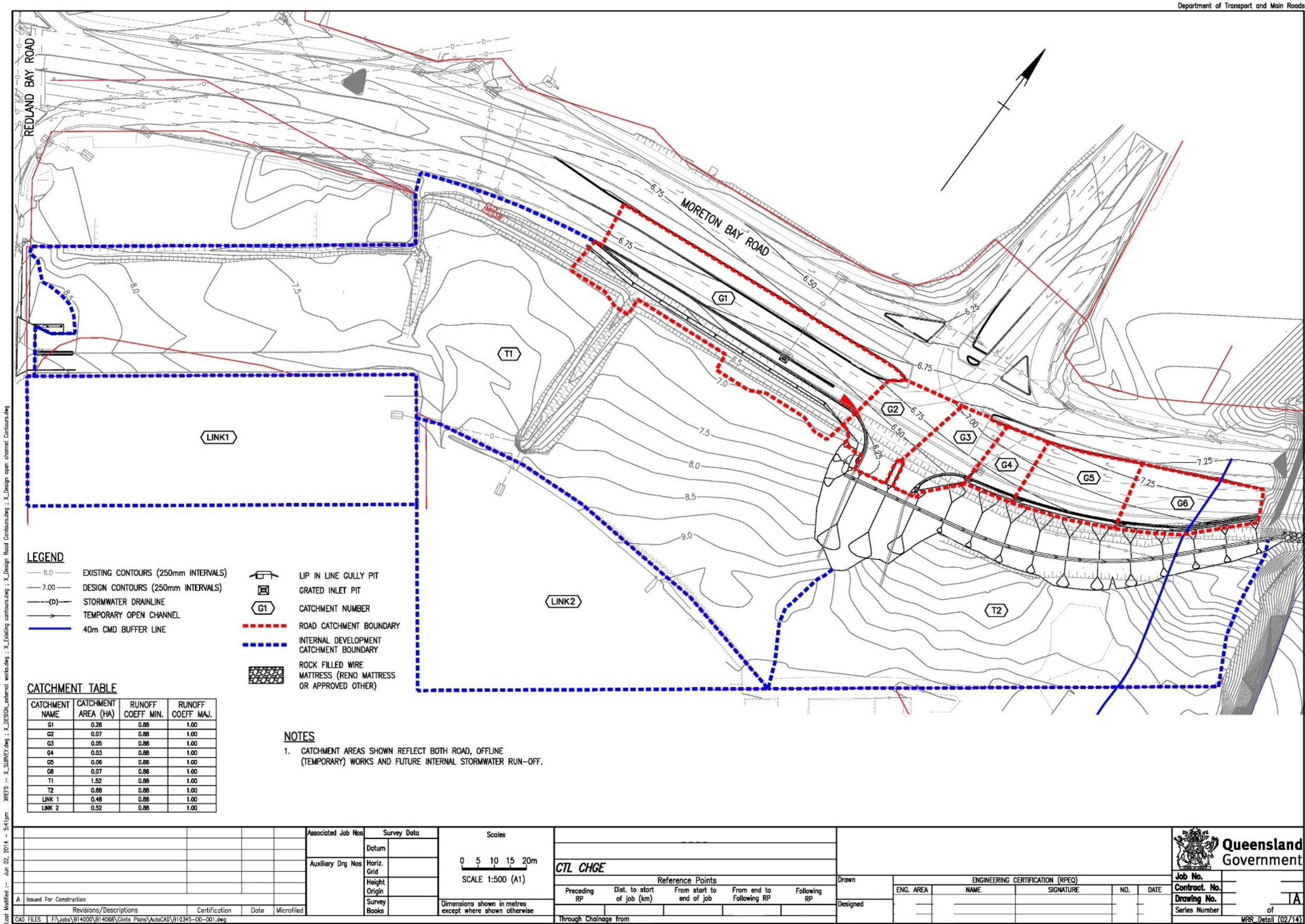




Figure 2.11.5(b) – Drainage catchment – generic example 2

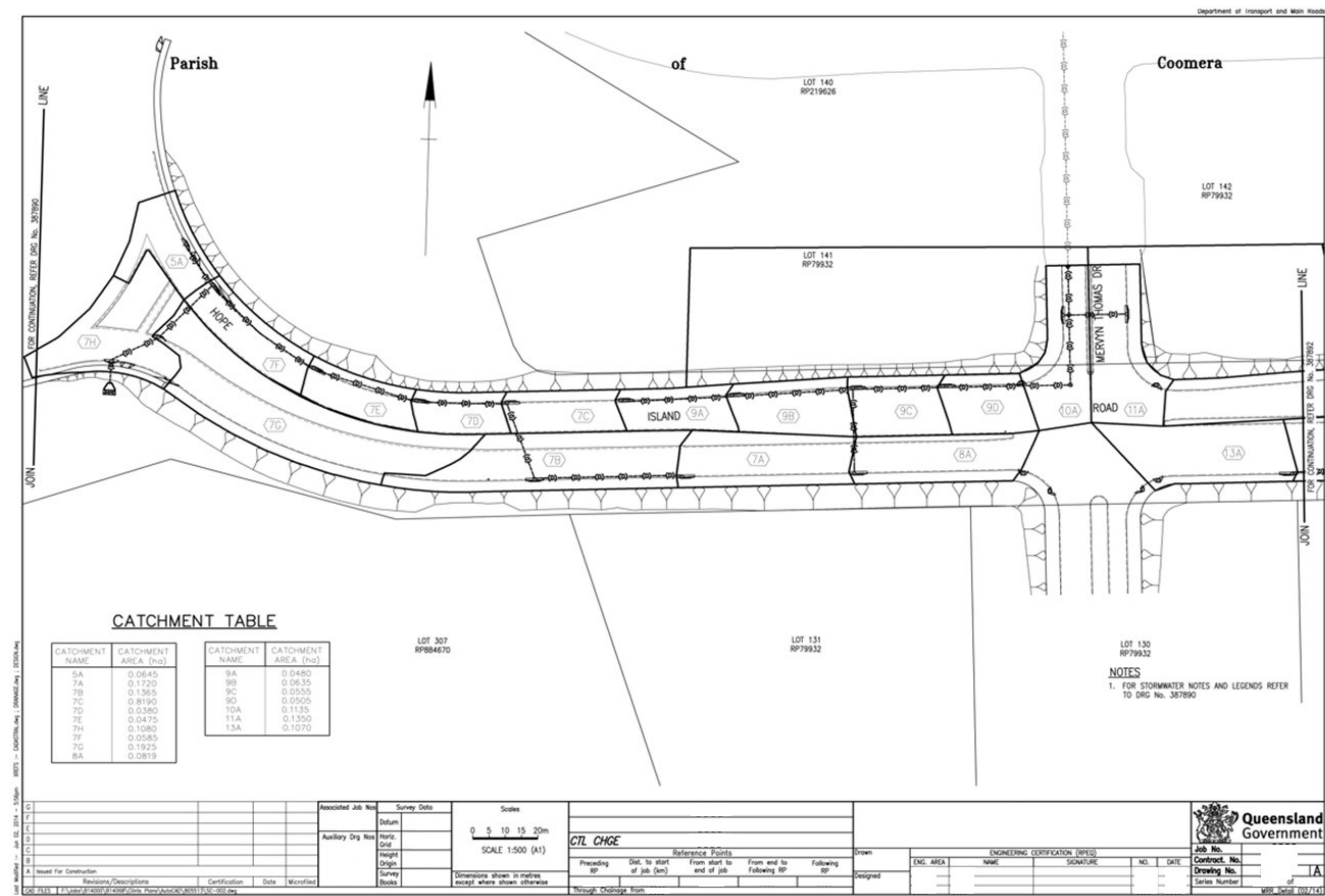
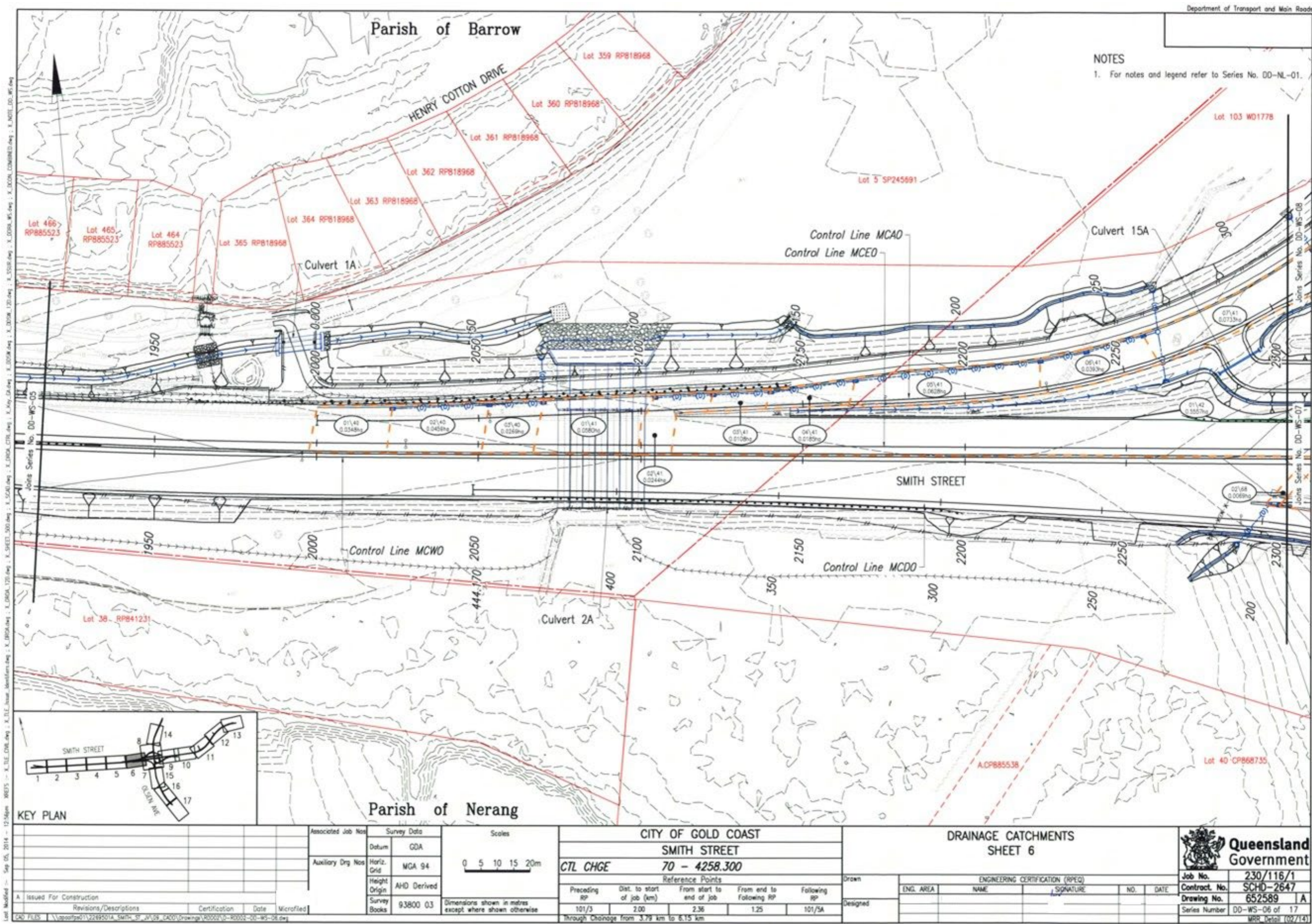




Figure 2.11.5(c) – Drainage catchment – registered example





## **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)

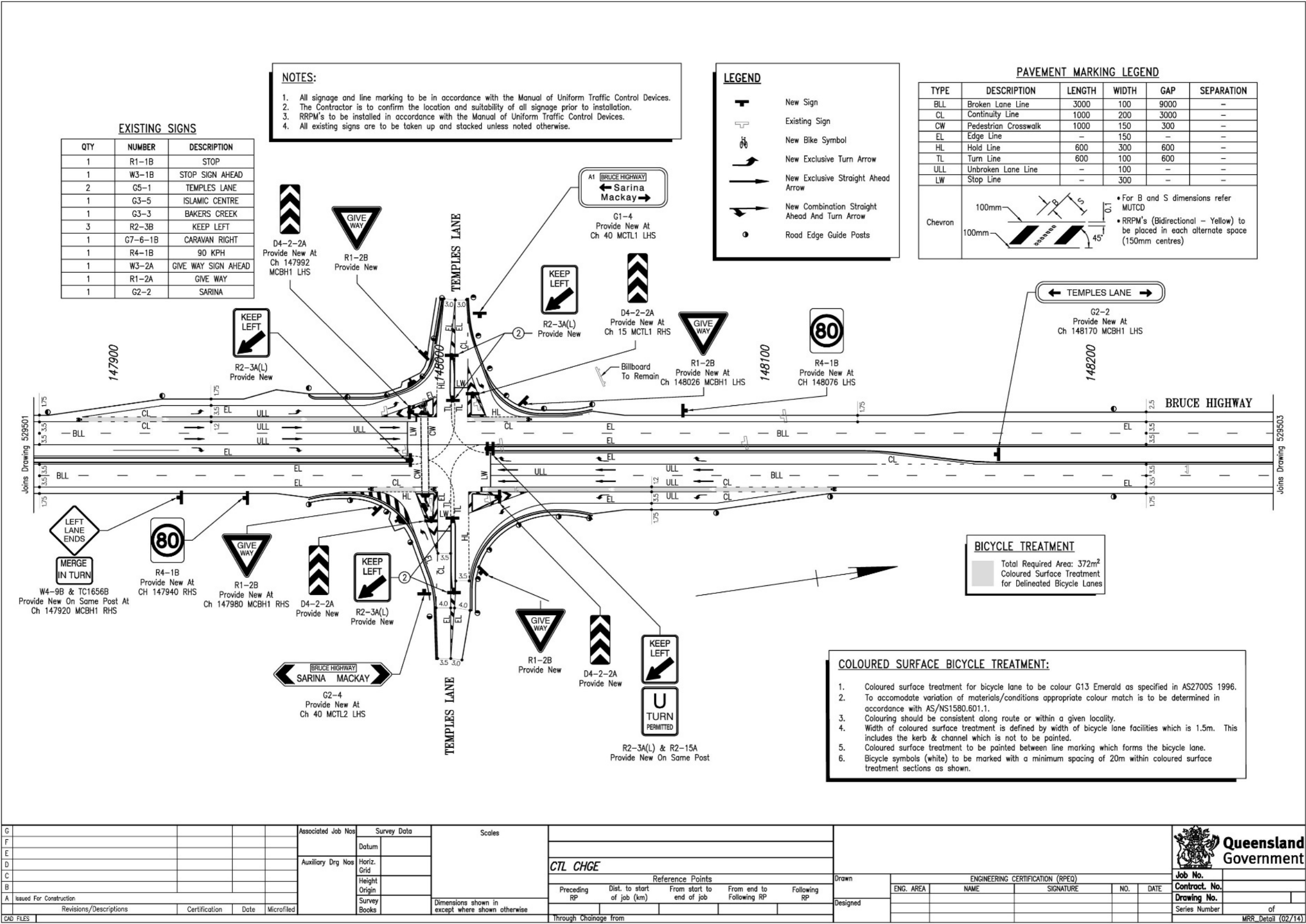
#### **Drawing**

- 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(b) – Pavement markings and signage – generic example 2



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

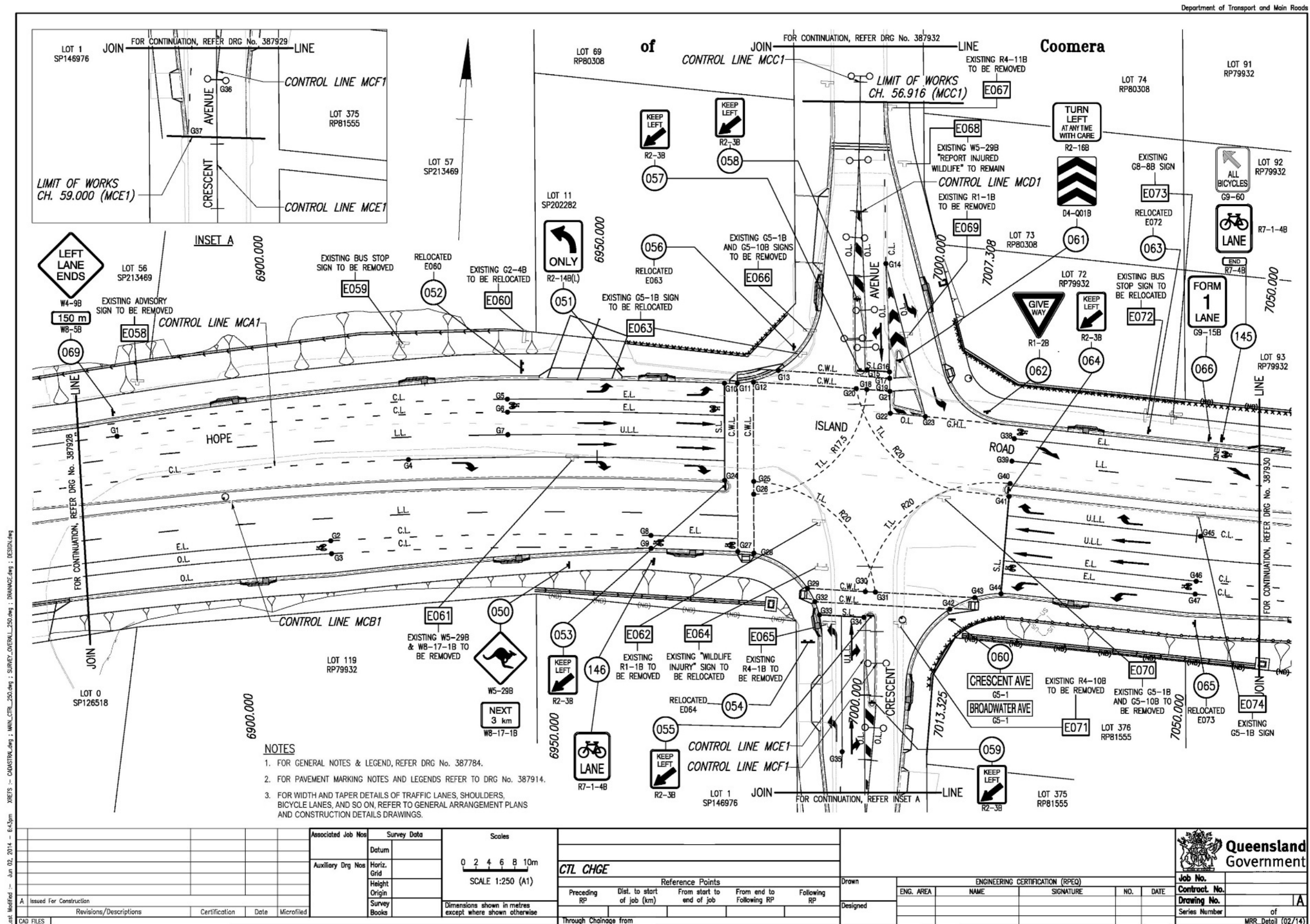




Figure 2.12(d) – Pavement markings and signage – generic example 3 – sheet 2 of 3

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NEW SIGNS

SIGN No.	SIGN TYPE	SIGN LEGEND	No. OF POSTS & TYPE	COMMENT
001	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH4865 (MCA1 – LHS)
002	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH4865 (MCA1 – RHS)
003	W2-7B	ROUNDABOUT (AHEAD)	1 CHS	LOCATE CH4567 (MCB1 – RHS)
004	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH4959 (MCB1 – LHS)
005	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH4959 (MCB1 – RHS)
006	G4-1B	OXENFORD 6 SANCTUARY 4	2 CHS	LOCATE CH5444 (MCB1 – RHS)
007	G1-5B	DIRECTIONAL SIGN	2 CHS	LOCATE CH5480 (MCA1 – LHS)
008	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH5477 (MCB1 – RHS)
009	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH5477 (MCB1 – LHS)
010	R1-3B	GIVE WAY – ROUNDABOUT	1 CHS	LOCATE CH5593 (MCA1 – LHS)
011	R1-3B	GIVE WAY – ROUNDABOUT	1 CHS	LOCATE CH5582 (MCA1 – RHS)
012	D4-2-1	BIDIRECTIONAL HAZARD MARKER	2 CHS	LOCATE CH5546 (MCB1 – LHS)
013	R2-2B(L)	"ONE WAY"	1 CHS	LOCATE CH5597 (MCA1 – RHS)
014	D4-1-1B	UNIDIRECTIONAL HAZARD MARKER	2 CHS	LOCATE CH5606 (MCA1 – RHS)
015	D4-1-1B	UNIDIRECTIONAL HAZARD MARKER	2 CHS	LOCATE CH5723 (MCB1 – LHS)
016	D4-2-1	BIDIRECTIONAL HAZARD MARKER	2 CHS	LOCATE CH5739 (MCA1 – RHS)
017	G2-2B	LABRADOR BROADWATER AVE	2 CHS	LOCATE CH5727 (MCA1 – LHS)
018	R1-3B	GIVE WAY – ROUNDABOUT	1 CHS	LOCATE CH5743 (MCB1 – RHS)
019	R1-3B	GIVE WAY – ROUNDABOUT	1 CHS	LOCATE CH5743 (MCB1 – LHS)
020	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH5810 (MCA1 – RHS)
021	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH5810 (MCA1 – LHS)
022	G4-1B	BROADWATER AVE LABRADOR 9	2 CHS	LOCATE CH5909 (MCA1 – LHS)
023	G1-5B	DIRECTIONAL	2 CHS	LOCATE CH5917 (MCB1 – RHS)
024	G5-1B	"BOYKAMBI"	2 CHS	LOCATE CH5936 (MCA1 – LHS)
025	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH5950 (MCB1 – LHS)
026	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH5950 (MCB1 – RHS)
027	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6025 (MCA1 – RHS)
028	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6050 (MCA1 – LHS)
029	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6073 (MCA1 – RHS)
029A	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6052 (MCB1 – RHS)
030	R2-4B	"NO ENTRY"	1 CHS	LOCATE CH6215 (MCA1 – LHS)
031	R2-2B	"ONE WAY" SIGN	1 CHS	LOCATE CH6224 (MCA1 – RHS)
032	R2-14B(L)	ALL TURNING TRAFFIC	1 CHS	LOCATE CH6226 (MCA1 – LHS)
033	R5-20(L)	BUS ZONE	1 CHS	LOCATE CH6252 (MCB1 – RHS)
034	R5-20(R)	BUS ZONE	1 CHS	LOCATE CH6254 (MCA1 – LHS)
035	- - -	GCCC BUS STOP SIGN	1 CHS	LOCATE CH6267 (MCB1 – RHS)
036	- - -	GCCC BUS STOP SIGN	1 CHS	LOCATE CH6277 (MCA1 – LHS)
037	R5-20(R)	BUS ZONE	1 CHS	LOCATE CH6312 (MCB1 – RHS)
038	R5-20(L)	BUS ZONE	1 CHS	LOCATE CH6290 (MCA1 – LHS)
039	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH6308 (MCA1 – RHS)
040	R4-1B	SPEED RESTRICTION – 70km/h	1 CHS	LOCATE CH6308 (MCB1 – LHS)
041	G4-1B	BROADWATER AVE OXENFORD 7	2 CHS	LOCATE CH6592 (MCB1 – RHS)
042	R5-20(L)	BUS ZONE	1 CHS	LOCATE CH6718 (MCB1 – RHS)
043	R2-2B	"ONE WAY" SIGN	1 CHS	LOCATE CH6807 (MCB1 – LHS)
044	R2-14B(L)	ALL TURNING TRAFFIC	1 CHS	LOCATE CH6803 (MCB1 – RHS)
045	R2-14B(L)	ALL TURNING TRAFFIC	1 CHS	LOCATE CH6813 (MCB1 – RHS)
046	R5-20(R)	BUS ZONE	1 CHS	LOCATE CH6760 (MCA1 – LHS)
047	- - -	GCCC BUS STOP SIGN	1 CHS	LOCATE CH6805 (MCA1 – LHS)
048	R5-20(L)	BUS ZONE	1 CHS	LOCATE CH6821 (MCA1 – LHS)
049				
050	W5-29B W8-17-1B	KANGAROO NEXT 3km	1 CHS	LOCATE CH6952 (MCB1 – RHS)
051	R2-14B(L)	ALL TURNING TRAFFIC	1 CHS	LOCATE CH6954 (MCA1 – LHS)
052	G2-4B	"CRESCENT AVE"	2 CHS	LOCATE CH6938 (MCA1 – LHS)
053	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6970 (MCB1 – LHS)
054	- - -	"WILDLIFE INJURY"	2 CHS	LOCATE CH6988 (MCB1 – RHS)
055	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH7000 (MCB1 – RHS)
056	G5-1B	BROADWATER AVE CRESCENT AVE	1 CHS	LOCATE CH6980 (MCA1 – LHS)
057	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6990 (MCA1 – LHS)
058	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH6989 (MCA1 – LHS)
059	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH7000 (MCB1 – RHS)

NEW SIGNS (con't)

SIGN No.	SIGN TYPE	SIGN LEGEND	No. OF POSTS & TYPE	COMMENT
060	G5-1B	BROADWATER AVE CRESCENT AVE	1 CHS	LOCATE CH7014 (MCB1 – RHS)
061	R2-16B D4-Q01B	"TURN LEFT AT ANY TIME WITH CARE" HAZARD MARKER	1 CHS	LOCATE CH6985 (MCA1 – LHS)
062	R1-2B	GIVE WAY	1 CHS	LOCATE CH7008 (MCA1 – LHS)
063	G8-8B	STATE ROUTE MARKER	1 CHS	LOCATE CH7035 (MCA1 – LHS)
064	R2-3B	"KEEP LEFT"	1 CHS	LOCATE CH7014 (MCA1 – RHS)
065	G5-1B	BOYKAMBI	2 CHS	LOCATE CH7051 (MCB1 – RHS)
066	G9-15B	FORM 1 LANE	1 CHS	LOCATE CH7044 (MCA1 – LHS)
067	R2-3B	"KEEP LEFT"	1 CHS	LOCATE CH7108 (MCA1 – LHS)
068	G2-4B	CRESCENT AVE	2 CHS	LOCATE CH7116 (MCB1 – RHS)
069	W4-9B W8-5B	"LEFT LANE ENDS" "150m"	1 CHS	LOCATE CH6876 (MCA1 – LHS)
070	- - -	GCCC BUS STOP SIGN	1 CHS	LOCATE CH6736 (MCB1 – RHS)
071	R5-20(R)	BUS ZONE	1 CHS	LOCATE CH6770 (MCB1 – RHS)
072	R1-2B	GIVE WAY	1 CHS	LOCATE CH1333 (MCK1 – LHS)
073	R2-3B(L)	"KEEP LEFT"	1 CHS	LOCATE CH515 (MCK1 – CENTRAL)

NOTES

1. FOR PAVEMENT AND SIGN LAYOUT NOTES & LEGEND, REFER DRG No. 387936 & 387937.

Associated Job Nos

Survey Data

Datum

Horiz. Grid

Height Origin

Survey Books

Scale

NOT TO SCALE

Dimensions shown in metres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP

Dist. to start of job (km)

From start to end of job

From end to Following RP

Following RP

Through Chainage from

Drawn

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA

NAME

SIGNATURE

NO.

DATE

Designed

Queensland Government

Job No.

Contract No.

Drawing No.

Series Number

of

WRR Detail (02/14)

A

Issue For Construction

Revisions/Descriptions

Certification

Date

Microfied

CAD FILES

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

Department of Transport and Main Roads

EXISTING SIGNS

SIGN No.	SIGN TYPE	SIGN LEGEND	No. OF POSTS & TYPE	COMMENT
E001	W1-3B(R)	CURVE (RIGHT)	1 CHS	REMOVE
E002	W8-2B	ADVISORY SPEED (50km/h)	1 CHS	REMOVE
E003	D4-6B	CHEVRON ALIGNMENT MARKER	1 CHS	REMOVE
E004	W4-8A	LEFT LANE END	1 CHS	REMOVE
E005	W8-15B	MERG RIGHT	1 CHS	REMOVE
E006	G1-5B	ADVANCE DIRECTION SIGN	1 CHS	REMOVE
E007	W1-1B(R)	BEND (RIGHT)	1 CHS	REMOVE
E008	W8-2B	ADVISORY SPEED (40km/h)	1 CHS	REMOVE
E009	W4-11A	TWO WAY TRAFFIC	1 CHS	REMOVE
E010	W4-4A	DIVIDED ROAD	1 CHS	REMOVE
E011	D4-1-1B	TWO UNIDIRECTIONAL HAZARD MARKERS	2 CHS	REMOVE
E012	D4-1-1B	TWO UNIDIRECTIONAL HAZARD MARKERS	2 CHS	REMOVE
E013	D4-6B	CHEVRON ALIGNMENT MARKER	1 CHS	REMOVE
E014	D4-6B	CHEVRON ALIGNMENT MARKER	1 CHS	REMOVE
E015	D4-6B	CHEVRON ALIGNMENT MARKER	1 CHS	REMOVE
E016	D4-6B	CHEVRON ALIGNMENT MARKER	1 CHS	REMOVE
E017	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	REMOVE
E018	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	REMOVE
E019	W1-1B(L)	BEND (LEFT)	1 CHS	REMOVE
E020	W8-2B	ADVISORY SPEED (40km/h)	1 CHS	REMOVE
E021	G1-5B	DIRECTIONAL	2 CHS	RELOCATE
E022	G4-1B	SANCTUARY COVE 4	2 CHS	RELOCATE
E023	R2-3B(L)	KEEP LEFT	1 CHS	REMOVE
E024	W4-9B	LEFT LANE ENDS	1 CHS	REMOVE
E025	D4-Q01B	BIDIRECTIONAL HAZARD MARKER	1 CHS	REMOVE
E026	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	RELOCATE
E027	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	RELOCATE
E028	R2-2B(L)	ONE WAY	1 CHS	RELOCATE
E029	D4-1-1B	TWO UNIDIRECTIONAL HAZARD MARKERS	1 CHS	RELOCATE
E030	G2-2B	HOPE ISLAND ROAD	1 CHS	RELOCATE
E031	D4-1-1B	TWO UNIDIRECTIONAL HAZARD MARKERS	2 CHS	RELOCATE
E032	R2-2B(L)	ONE WAY	1 CHS	RELOCATE
E033	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	RELOCATE
E034	R1-3B	GIVE WAY - ROUNDABOUT	1 CHS	RELOCATE
E035	D4-Q01B	BIDIRECTIONAL HAZARD MARKER	1 CHS	REMOVE
E036	G2-2B	LABRADOR	2 CHS	RELOCATE
E037	W4-9B	BROADWATER AVE	1 CHS	REMOVE
E038	W5-29B	KANGAROO	1 CHS	REMOVE
E039	R2-3B(L)	KEEP LEFT	1 CHS	REMOVE
E040	G9-15B	FORM ONE LANE	1 CHS	REMOVE
E041	G4-1B	BROADWATER AVE	2 CHS	RELOCATE
E042	G1-5B	DIRECTIONAL	2 CHS	RELOCATE
E043	G5-1B	BOYKAMBIL	2 CHS	RELOCATE
E044	W5-25B	TURNING TRAFFIC	1 CHS	REMOVE
E045	W5-22B	TRUCKS (CROSSING OR ENTERING)	1 CHS	REMOVE
E046	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	REMOVE
E047	----	BUS STOP	1 CHS	REMOVE
E048	----	SPEED LIMIT	1 CHS	REMOVE
E049	R2-3B(L)	KEEP LEFT	1 CHS	REMOVE
E050	R2-6B(R)	NO RIGHT TURN	1 CHS	REMOVE
E051	R1-2B	GIVE WAY	1 CHS	REMOVE
E052	R2-3B(L)	KEEP LEFT	1 CHS	REMOVE
E053	----	BUS STOP	1 CHS	REMOVE
E054	R2-5B	NO U TURN	1 CHS	REMOVE
E055	R4-1B	SPEED RESTRICTION - 70km/h	1 CHS	REMOVE
E056	G4-1B	BROADWATER AVE - OXFENFORD	2 CHS	RELOCATED
E057	R1-2B	GIVE WAY	1 CHS	REMOVE
E058	R2-4B	NO ENTRY	1 CHS	REMOVE
E059	R2-6B(R)	NO RIGHT TURN	1 CHS	REMOVE
E060	----	BUS STOP SIGN	1 CHS	RELOCATE
E061	R4-1B	SPEED RESTRICTION - 60km/h	1 CHS	REMOVE

EXISTING SIGNS (con't)

SIGN No.	SIGN TYPE	SIGN LEGEND	No. OF POSTS & TYPE	COMMENT
E062	W4-9B	LEFT LANE ENDS	1 CHS	REMOVE
E063	W8-15B	MERGE RIGHT	1 CHS	REMOVE
E064	----	ADVERTISING	? CHS	RELOCATE
E065	----	"SCHOOL BUS OPERATES IN THIS AREA"	1 CHS	REMOVE
E066	----	BUS STOP ADVISORY SIGN	1 CHS	REMOVE
E067	G2-4B	"CRESCENT AVE"	2 CHS	RELOCATED
E068	W5-29B	KANGAROO	1 CHS	REMOVE
E069	W8-17-1B	"NEXT 3km"	1 CHS	REMOVE
E070	R1-1B	STOP SIGN	1 CHS	REMOVE
E071	G5-1B	CRESCENT AVE	1 CHS	RELOCATED
E072	----	"WILDLIFE INJURY"	2 CHS	RELOCATED
E073	R4-1B	SPEED RESTRICTION - 50km/h	1 CHS	REMOVE
E074	G5-1B	CRESCENT AVE	1 CHS	REMOVE
E075	G5-10B	"NO THROUGH ROAD"	1 CHS	REMOVE
E076	R4-11B	END SPEED LIMIT AREA	1 CHS	REMOVE
E077	W5-29B	KANGAROO	1 CHS	REMAIN
E078	R1-1B	STOP	1 CHS	REMOVE
E079	G5-1B	CRESCENT AVE	1 CHS	REMOVE
E080	G5-10B	"NO THROUGH ROAD"	1 CHS	REMOVE
E081	R4-10B	SPEED LIMIT AREA	1 CHS	REMOVE
E082	----	GCCC BUS STOP SIGN	1 CHS	RELOCATED
E083	G8-8B	STATE ROUTE MARKER "4"	1 CHS	RELOCATED
E084	G5-1B	BOYKAMBIL	2 CHS	RELOCATED
E085	R4-1B	SPEED RESTRICTION - 60km/h	1 CHS	REMOVE
E086	G2-4B	"CRESCENT AVE"	2 CHS	RELOCATED
E087	R4-10B	SPEED LIMIT AREA	1 CHS	REMOVE
E088	G9-15A	FORM 1 LANE	1 CHS	REMOVE
E089	W4-6A	END DIVIDED ROAD	1 CHS	REMOVE
E090	G9-15A	FORM 1 LANE	1 CHS	REMOVE
E091	R4-1A	SPEED RESTRICTION - 60km/h	1 CHS	REMOVE
E092	R4-1A	SPEED RESTRICTION - 60km/h	1 CHS	REMOVE
E093	G9-21	ROAD SUBJECT TO FLOODING	2 CHS	REMOVE
E094	R2-3B(L)	KEEP LEFT	1 CHS	REMOVE
E095	G9-21	ROAD SUBJECT TO FLOODING	2 CHS	REMOVE

Associated Job Nos

Survey Data

Datum

Horiz. Grid

Height Origin

Survey Books

Scales

NOT TO SCALE

Dimensions shown in metres except where shown otherwise

CTL CHGE

Reference Points

Preceding RP

Dist. to start of job (km)

From start to end of job

From end to following RP

Following RP

Through Chalmers from

Drawn

Designed

ENG. AREA

NAME

SIGNATURE

NO.

DATE

Job No.

Contract No.

Drawing No.

Series Number

of

MRR Detail (02/14)

Queensland Government

NOTE

1. FOR PAVEMENT AND SIGN LAYOUT NOTES & LEGEND, REFER DRG No. 387936 & 387937.

Issue For Construction

Revisions/Descriptions

Certification

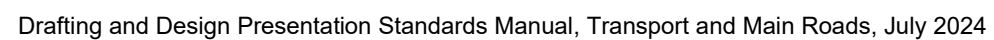
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**Figure 2.12(g) – Pavement marking and signage – generic example 4 – sheet 2 of 2**

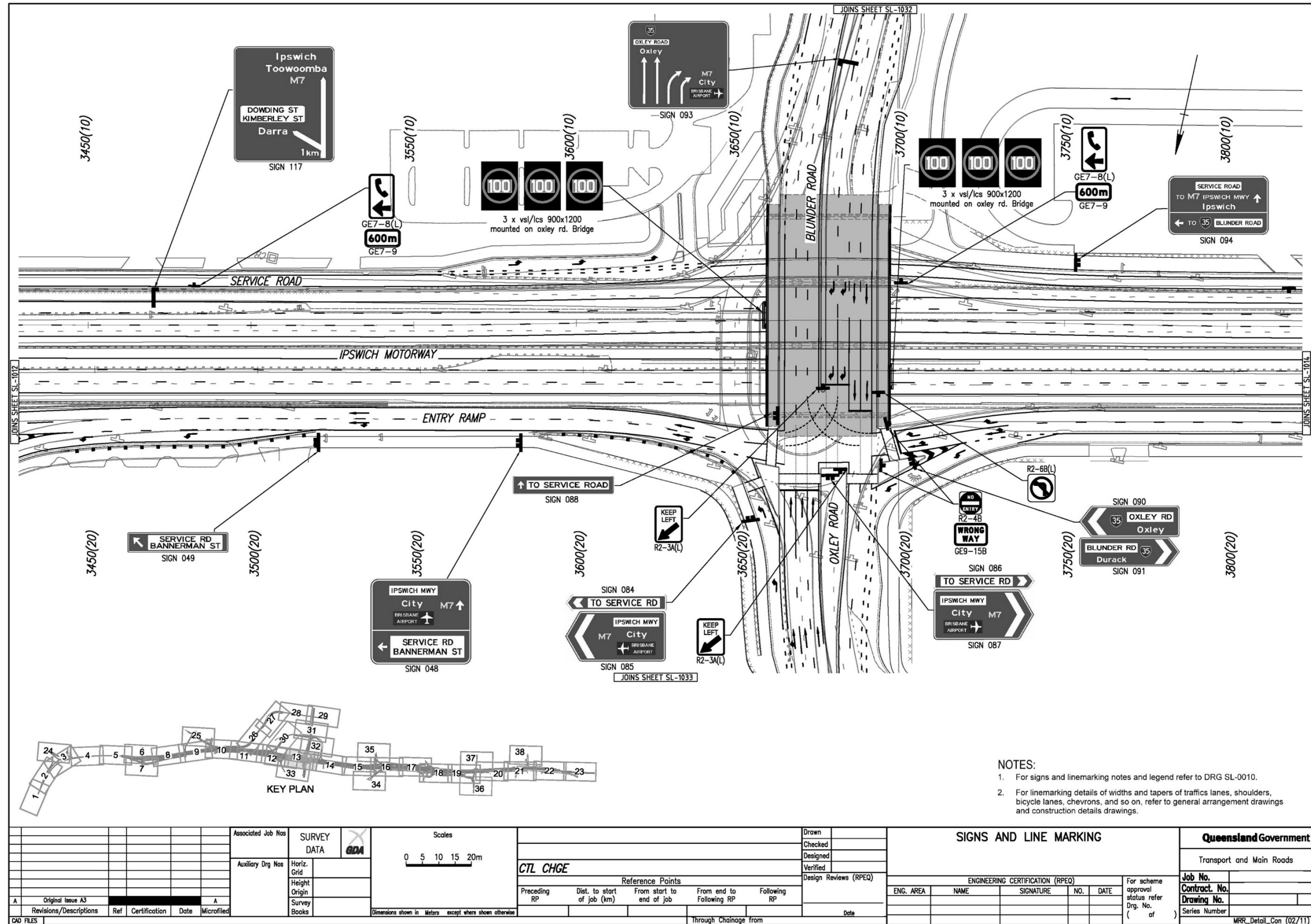




Figure 2.12(h) – Pavement markings and signage – registered example 1

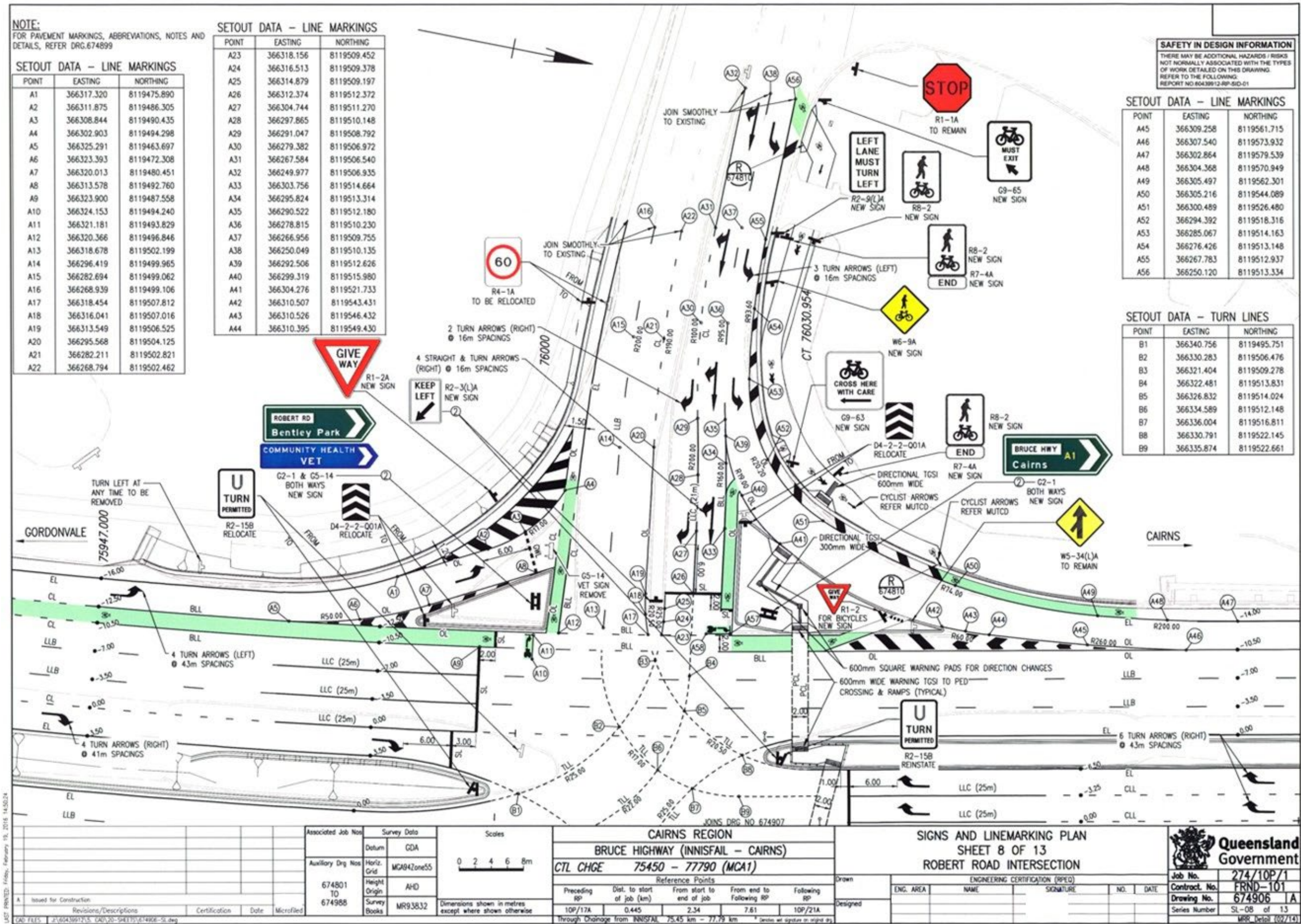




Figure 2.12(i) – Pavement markings and signage – registered example 2

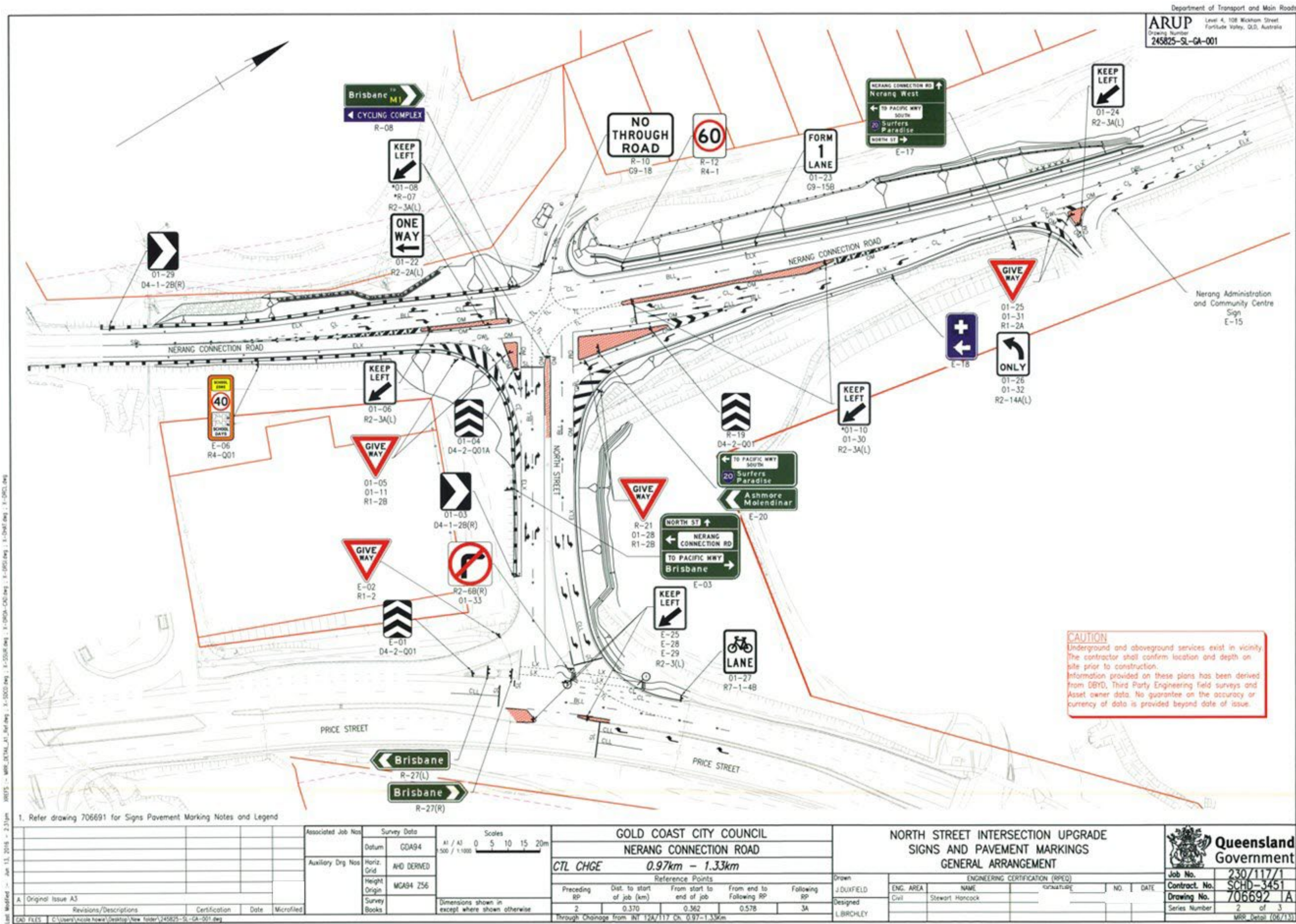




Figure 2.12(j) – Pavement markings and signage – registered example 3

Department of Transport and Main Roads  
**ARUP** Level 4, 108 Wickham Street  
 Fortitude Valley, QLD, Australia  
 Drawing Number  
**245825-SL-05-001**

**Notes:**

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

### STANDARD SIGNS SCHEDULE

IDENTIFICATION NUMBER	SIGN NUMBER	SIGN OWNER/MAINTAINER	CENTER POINT OF SIGN		COMMENTS
			EASTING	NORTHING	
01-03	D4-1-2B(R)	TMR	Sign To Be Mounted On Guardrail End		
01-04	D4-2-Q01A	TMR	533184.401	6904338.468	
01-05	R1-2B	TMR	533173.98	6904323.115	
01-06	R2-3A(L)	TMR	533161.648	6904321.507	
01-08	R2-3A(L)	TMR	To Be Mounted On Traffic Post		
01-10	R2-3A(L)	TMR	To Be Mounted On Traffic Post		
01-11	R1-2B	TMR	533180.479	6904339.011	
01-22	R2-2A(L)	TMR	533169.447	6904337.748	
01-23	G9-15B	TMR	533191.566	6904422.260	
01-24	R2-3A(L)	TMR	533238.732	6904511.251	
01-25	R1-2A	TMR	533236.442	6904501.561	
01-26	R2-14A(L)	TMR			
01-27	R7-1-4B	TMR	533301.129	6904328.64	
01-28	R1-2B	TMR	533195.946	6904357.072	
01-29	D4-1-2B(R)	TMR	Sign To Be Mounted 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			
01-33	R2-6B(R)	TMR	To Be Mounted On Traffic Post		
E-01	D4-2-Q01	TMR	Existing		Existing Sign To Remain
E-02	R1-2	TMR	Existing		Existing Sign To Remain
E-06	R4-Q01	TMR	Existing		Existing Sign To Remain
E-25	R2-3(L)	TMR	Existing		Existing Sign To Remain
E-28	R2-3(L)	TMR	Existing		Existing Sign To Remain
E-29	R2-3(L)	TMR	Existing		Existing Sign To Remain
R-07	R2-3(L)	TMR	To Be Mounted On Traffic Post		Existing Sign To Be Relocated
R-10	G9-18	TMR	533162.147	6904361.564	Existing Sign To Be Relocated
R-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

IDENTIFICATION NUMBER	SIGN TYPE	SIGN OWNER/MAINTAINER	CENTER POINT OF SIGN		Mounting Height	Mounting Arrangement	Spacing	Foundation DIM	Support	COMMENTS
			EASTING	NORTHING						
E-03	G1-2	TMR	Existing							Existing Guide Sign To Remain
E-15	G5-8	TMR	Existing							Existing Guide Sign To Remain
E-17	G1-2	TMR	Existing							Existing Guide Sign To Remain
E-18	G7-3-1A, G7-3-1B	TMR	Existing							Existing Guide Sign To Remain
E-20	G2-5, G2-1	TMR	Existing							Existing Guide Sign To Remain
R-08	G2-1, G5-14	TMR	533163.5	6904350	2000	Mounted On 2 Post 50 NB CHS	1320	300x750	Rigid	Existing Guide Sign To Be Relocated. To 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. To Be Mounted At 2.3m Height
R-27(R)	G2-1	TMR	533266.8	6904287	2300	Mounted On 2 Post 50 NB CHS	1045	300x750	Rigid	Existing Guide Sign To Be Relocated. To Be Mounted At 2.3m Height

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

Associated Job Nos	Survey Data		Scales NOT TO SCALE	GOLD COAST CITY COUNCIL					NORTH STREET INTERSECTION UPGRADE					Queensland Government Job No. 230/117/1 Contract No. SCHD-3451 Drawing No. 706693-1A Series Number 3 of 3 MGR Detail (06/13)			
	Datum GDA94			NERANG CONNECTION ROAD					SIGNS AND PAVEMENT MARKINGS								
	Auxiliary Org Nos			CTL CHGE 0.97km – 1.33km					SCHEDULE								
	Horiz. Grid AHD DERIVED			Reference Points					ENGINEERING CERTIFICATION (RPEC)								
Height Origin MGA94 Z56		Survey Books		Dimensions shown in except where shown otherwise		Preceding RP		Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	Drawn J DUXFIELD	ENG. AREA	NAME	SIGNATURE	NO.	DATE
						2		0.370	0.362	0.578	3A	Designed L.BROCHLEY	Civil	Stewart Hancock			
						Through Change from INT 12A/117 Ch. 0.97-1.33km											

A Issued For Construction  
 Revisions/Descriptions  
 Certification  
 Date  
 Microfilm  
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## 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	Perfect Lite
Compliant Software	
Source of Program	Wadello Pty Ltd
Maintenance Factor	0.8 – Based on 6 year cleaning 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.	

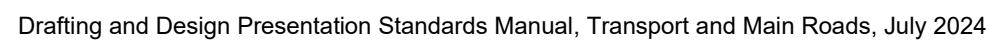
The following schedules shall be included on the drawing(s):

- 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(c) – Road lighting layout – sheet 1 of 5 – registered example 1**

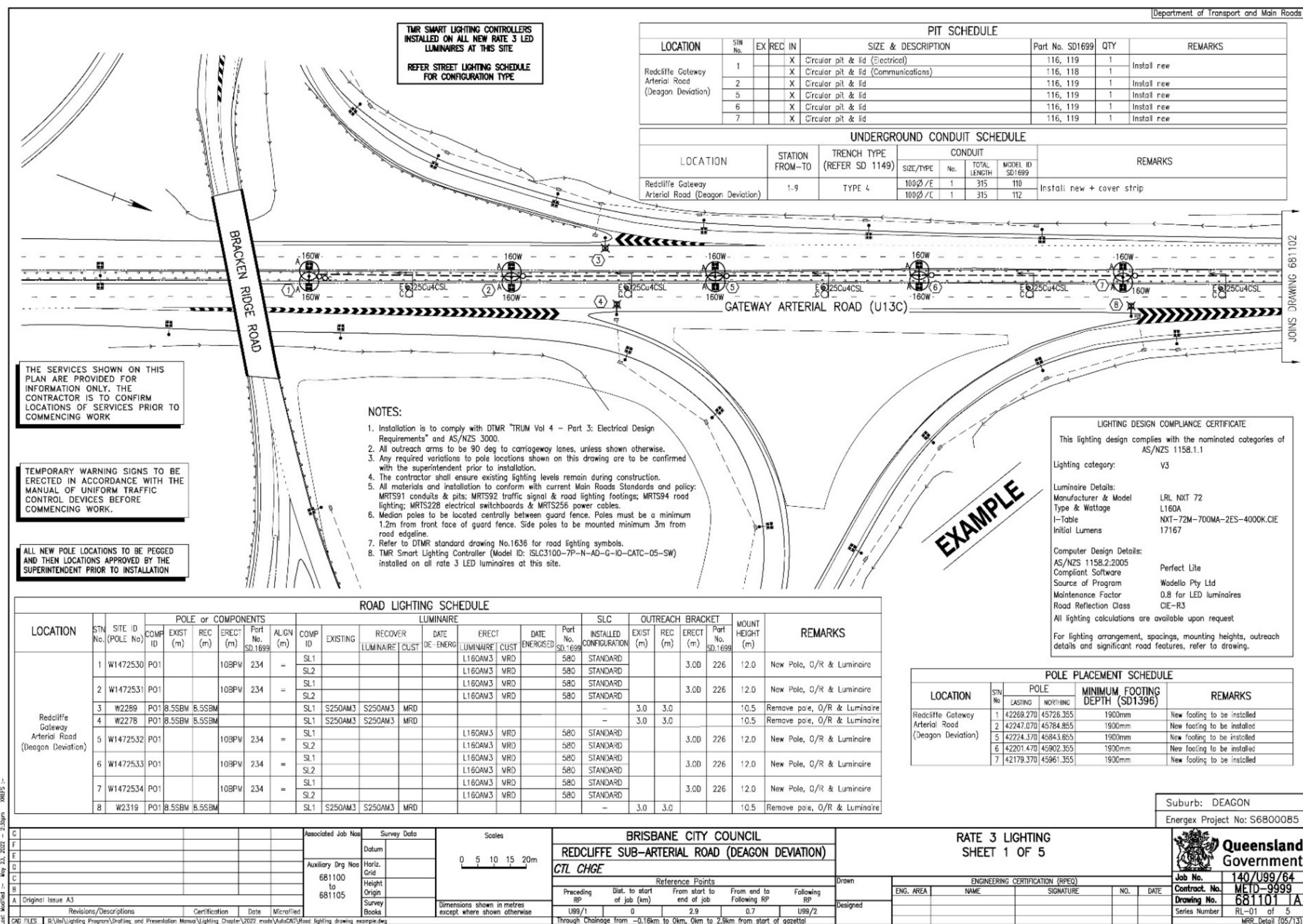


Figure 2.13.2.4(d) – Road lighting layout – sheet 2 of 5 – registered example 2

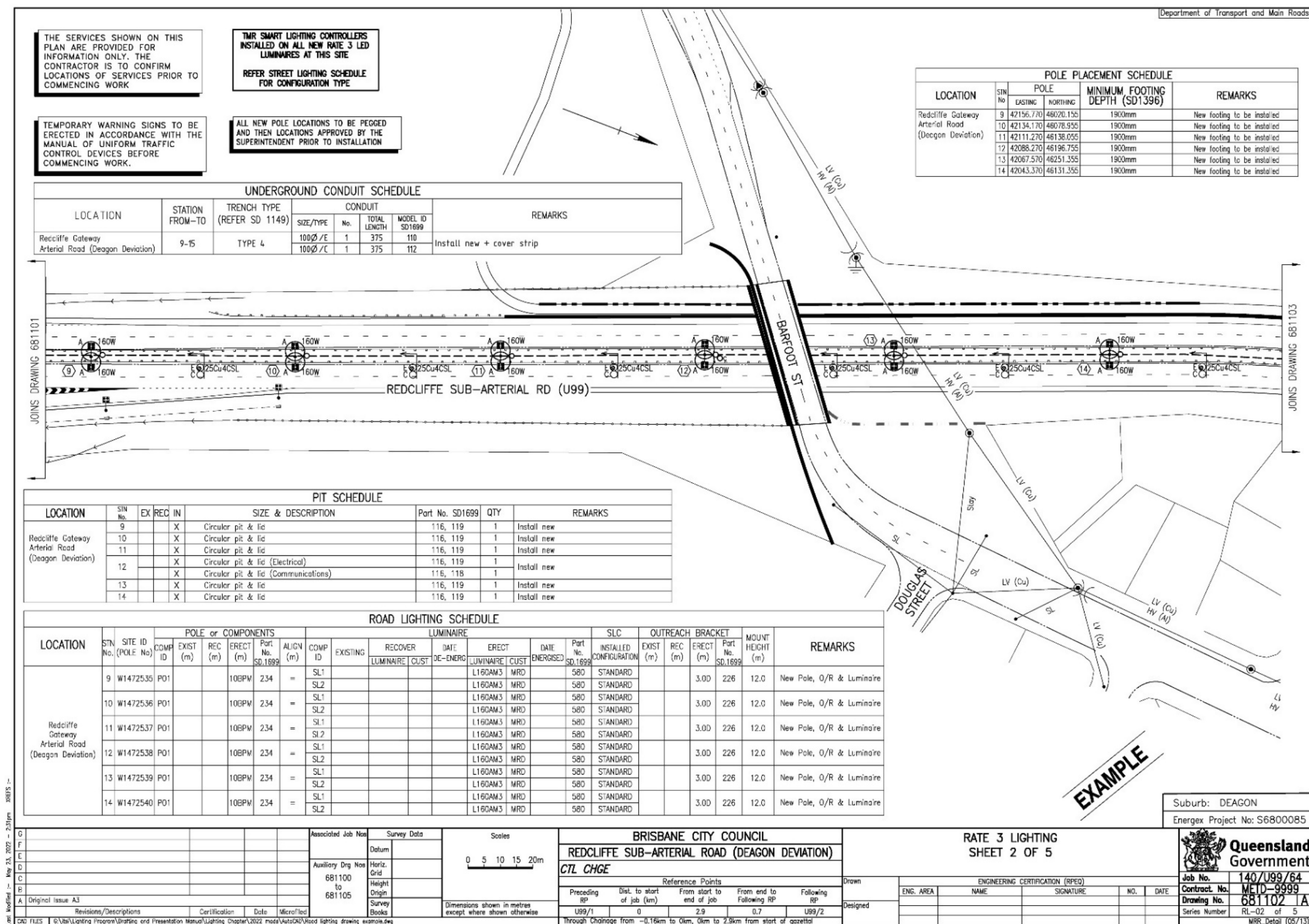




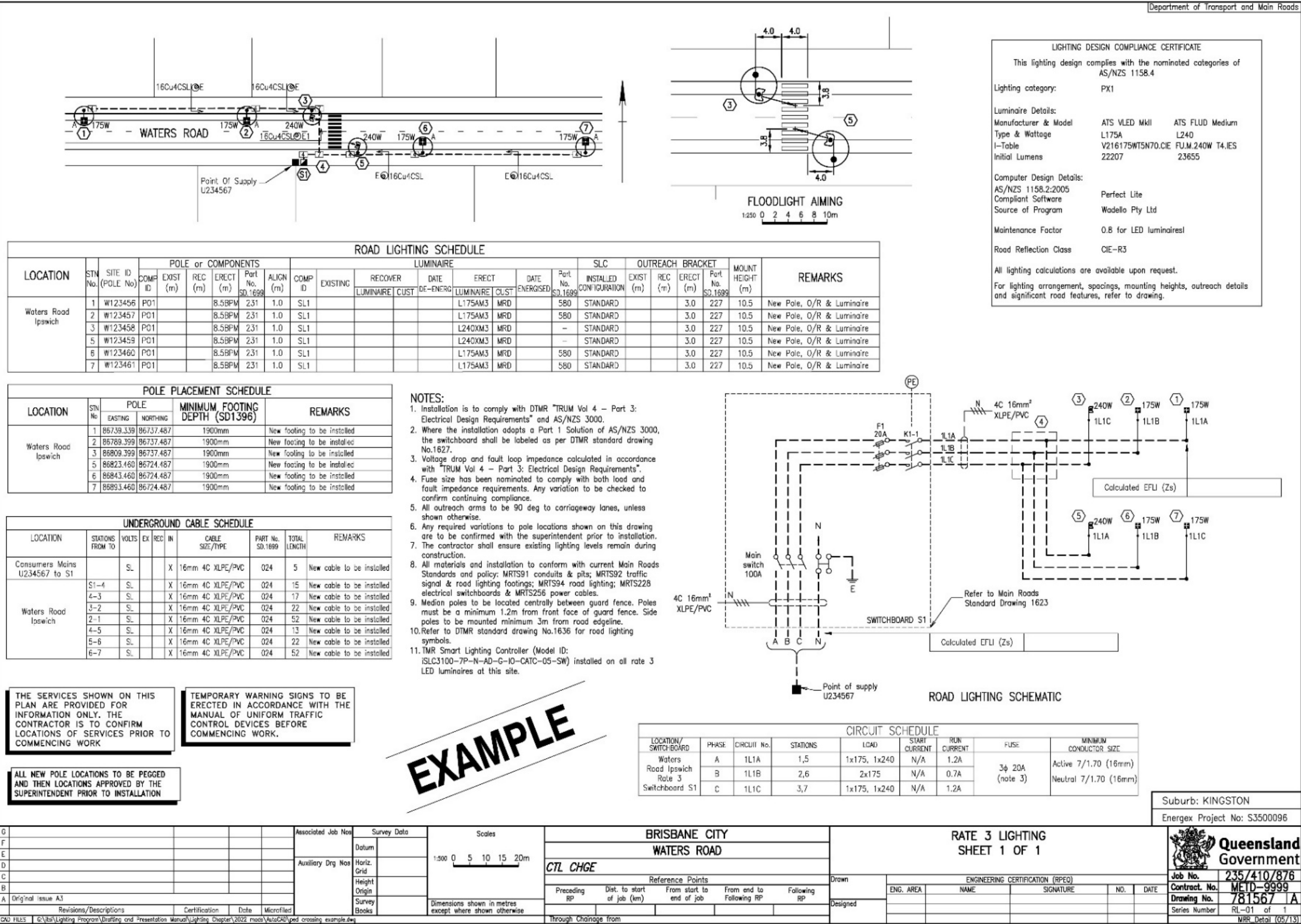








Figure 2.13.2.4(h) – Road lighting layout – pedestrian crossing – registered example





### 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																								
LOCATION	STN No.	SITE ID (POLE No)	POLE or COMPONENTS					LUMINAIRE										SLC		OUTREACH BRACKET			MOUNT HEIGHT (m)	REMARKS
			COMP ID	EXIST (m)	REC (m)	ERECT (m)	Part No. SD.1699	ALIGN (m)	COMP ID	EXISTING	RECOVER LUMINAIRE	DATE DE-ENERG	ERECT LUMINAIRE	DATE ENERGISED	Part No. SD.1699	INSTALLED CONFIGURATION	EXIST (m)	REC (m)	ERECT (m)	Part No. SD.1699				
Redcliffe Gateway Arterial Road (Deagon Deviation)	1	W1472530	PO1			10BPM	234	=	SL1				L160AM3	MRD	580	STANDARD					3.00	226	12.0	New Pole, O/R & Luminaire
	2	W1472531	PO1			10BPM	234	=	SL1				L160AM3	MRD	580	STANDARD					3.00	226	12.0	New Pole, O/R & Luminaire
	3	W2289	PO1	8.5SBM	8.5SBM				SL1	S250AM3	S250AM3	MRD				—	3.0	3.0					10.5	Remove pole, O/R & Luminaire
	4	W2278	PO1	8.5SBM	8.5SBM				SL1	S250AM3	S250AM3	MRD				—	3.0	3.0					10.5	Remove pole, O/R & Luminaire
	5	W1472532	PO1			10BPM	234	=	SL1				L160AM3	MRD	580	STANDARD					3.00	226	12.0	New Pole, O/R & Luminaire
	6	W1472533	PO1			10BPM	234	=	SL2				L160AM3	MRD	580	STANDARD					3.00	226	12.0	New Pole, O/R & Luminaire
	7	W1472534	PO1			10BPM	234	=	SL1				L160AM3	MRD	580	STANDARD					3.00	226	12.0	New Pole, O/R & Luminaire
	8	W2319	PO1	8.5SBM	8.5SBM				SL2	S250AM3	S250AM3	MRD				—	3.0	3.0					10.5	Remove pole, O/R & Luminaire

LOCATION	STN No.	SITE ID (POLE No)
Redcliffe Gateway Arterial Road (Deagon Deviation)	1	W1472530
	2	W1472531
	3	W2289
	4	W2278
	5	W1472532
	6	W1472533
	7	W1472534
	8	W2319

- **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.

POLE or COMPONENTS					
COMP ID	EXIST (m)	REC (m)	ERECT (m)	Part No. SD.1699	ALIGN (m)
PO1			10BPM	234	=
PO1			10BPM	234	=
PO1	8.5SBM	8.5SBM			
PO1	8.5SBM	8.5SBM			
PO1			10BPM	234	=
PO1			10BPM	234	=
PO1			10BPM	234	=
PO1	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 ID	EXISTING	RECOVER LUMINAIRE	CUST	DATE DE-ENERG	ERECT LUMINAIRE	CUST	DATE ENERGISED
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)	As required	None if dished prismatic	M (Transport and Main Roads) or L (local government)	3 or 2
H (metal halide)		A (aeroscreen)		
M (mercury vapour)		HM (high mast)		
L (Light Emitting Diode)		X (pedestrian xing floodlight)		
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.

SLC
INSTALLED CONFIGURATION
STANDARD
STANDARD
STANDARD
STANDARD
–
–
STANDARD
STANDARD
STANDARD
STANDARD
STANDARD
STANDARD
–

### 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				MOUNT HEIGHT (m)
EXIST (m)	REC (m)	ERECT (m)	Part No. SD.1699	
		3.0D	226	12.0
		3.0D	226	12.0
3.0	3.0			10.5
3.0	3.0			10.5
		3.0D	226	12.0
		3.0D	226	12.0
		3.0D	226	12.0
3.0	3.0			10.5

### 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
New Pole, O/R & Luminaire
New Pole, O/R & Luminaire
Remove pole, O/R & Luminaire
Remove pole, O/R & Luminaire
New Pole, O/R & Luminaire
New Pole, O/R & Luminaire
New Pole, O/R & Luminaire
Remove pole, O/R & Luminaire

- **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 PLACEMENT SCHEDULE					
LOCATION	STN No	POLE		MINIMUM FOOTING DEPTH (SD1396)	REMARKS
		EASTING	NORTHING		
Redcliffe Gateway Arterial Road (Deagon Deviation)	15	42022.570	46371.755	1900mm	New footing to be installed
	16	42010.370	46426.455	1900mm	New footing to be installed
	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. SD1699	QTY	REMARKS
Redcliffe Gateway Arterial Road (Deagon Deviation)	15			X	Circular pit & lid	116, 119	1	Install new
	16			X	Circular pit & lid	116, 119	1	Install new
	17			X	Circular pit & lid	116, 119	1	Install new
	18			X	Circular pit & lid	116, 119	1	Install new
	19			X	Circular pit & lid	116, 119	1	Install new
	20			X	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
				X	Circular pit & lid (Communications)	116, 118	1	Install new
	22			X	Circular pit & lid (Electrical)	116, 119	1	Install new
				X	Circular pit & lid (Communications)	116, 118	1	Install new
	23			X	Circular pit & lid (Electrical)	116, 119	1	Install new
				X	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.

UNDERGROUND CONDUIT SCHEDULE							
LOCATION	STATION FROM-TO	TRENCH TYPE (REFER SD 1149)	CONDUIT				REMARKS
			SIZE/TYPE	No.	TOTAL LENGTH	MODEL ID SD1699	
Redcliffe Gateway Arterial Road (Deagon Deviation)	15-21	TYPE 4	100#/E	1	285	110	Install new + cover strip
			100#/C	1	285	112	
	20-S1	TYPE 4	100#/E	1	25	110	Install new + cover strip
	S1-22	TYPE 4	100#/E	1	45	110	Install new + cover strip
	22-23	TYPE 1B	100#/E	1	285	110	Install new + cover strip
			100#/C	1	285	112	
	22-24	TYPE 4	100#/E	1	60	110	Install new + cover strip
	23-25	TYPE 4	100#/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 SCHEDULE								
LOCATION/ SWITCHBOARD	PHASE	CIRCUIT No.	STATIONS	LOAD	START CURRENT	RUN CURRENT	FUSE	MINIMUM CONDUCTOR SIZE
Redcliffe Sub-Arterial Road Rate 3 Switchboard S1	A	1L1A	2,7,11,14,17,21	12x160	N/A	8.28A	3 $\phi$ 25A (note 3)	Active 19/1.35(25mm)
	B	1L1B	1,6,10,13,16,19	12x160	N/A	8.28A		Neutral 19/1.35(25mm)
	C	1L1C	5,9,12,15,18	10x160	N/A	6.9A		
	A	1L2A	25,29,32,35	4x160	N/A	2.76A	3 $\phi$ 25A (note 3)	Active 7/1.70 (16mm)
	B	1L2B	24,27,30,33	4x160	N/A	2.76A		Neutral 7/1.70 (16mm)
	C	1L2C	25,28,31,34	4x160	N/A	2.76A		

- 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:

- 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.

UNDERGROUND CABLE SCHEDULE									
LOCATION	STATIONS FROM TO	VOLTS	EX	REC	IN	CABLE SIZE/TYPE	PART No. SD.1699	TOTAL LENGTH	REMARKS
Consumers Mains U234567 to S1		SL			X	16mm 4C XLPE/PVC	024	5	New cable to be installed
Waters Road Ipswich	S1-4	SL			X	16mm 4C XLPE/PVC	024	15	New cable to be installed
	4-3	SL			X	16mm 4C XLPE/PVC	024	17	New cable to be installed
	3-2	SL			X	16mm 4C XLPE/PVC	024	22	New cable to be installed
	2-1	SL			X	16mm 4C XLPE/PVC	024	52	New cable to be installed
	4-5	SL			X	16mm 4C XLPE/PVC	024	13	New cable to be installed
	5-6	SL			X	16mm 4C XLPE/PVC	024	22	New cable to be installed
	6-7	SL			X	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 sign-off 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 *Austrroads Guide to Traffic Management* Part 6; Part 9; Part 10.

The above documents, along with additional or supplementary considerations canvassed 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.

#### **2.14.3.2.10 U-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.



#### **2.14.3.2.12 Pits**

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.

#### **2.14.3.2.13 Controller 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.

#### **2.14.3.2.14 Pedestrian 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.

#### **2.14.3.2.15 Bicycle 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.

#### **2.14.3.2.16 Cable 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.

#### **2.14.3.2.18 Red 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.

#### **2.14.3.2.19 Services**

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

Department of Transport and Main Roads

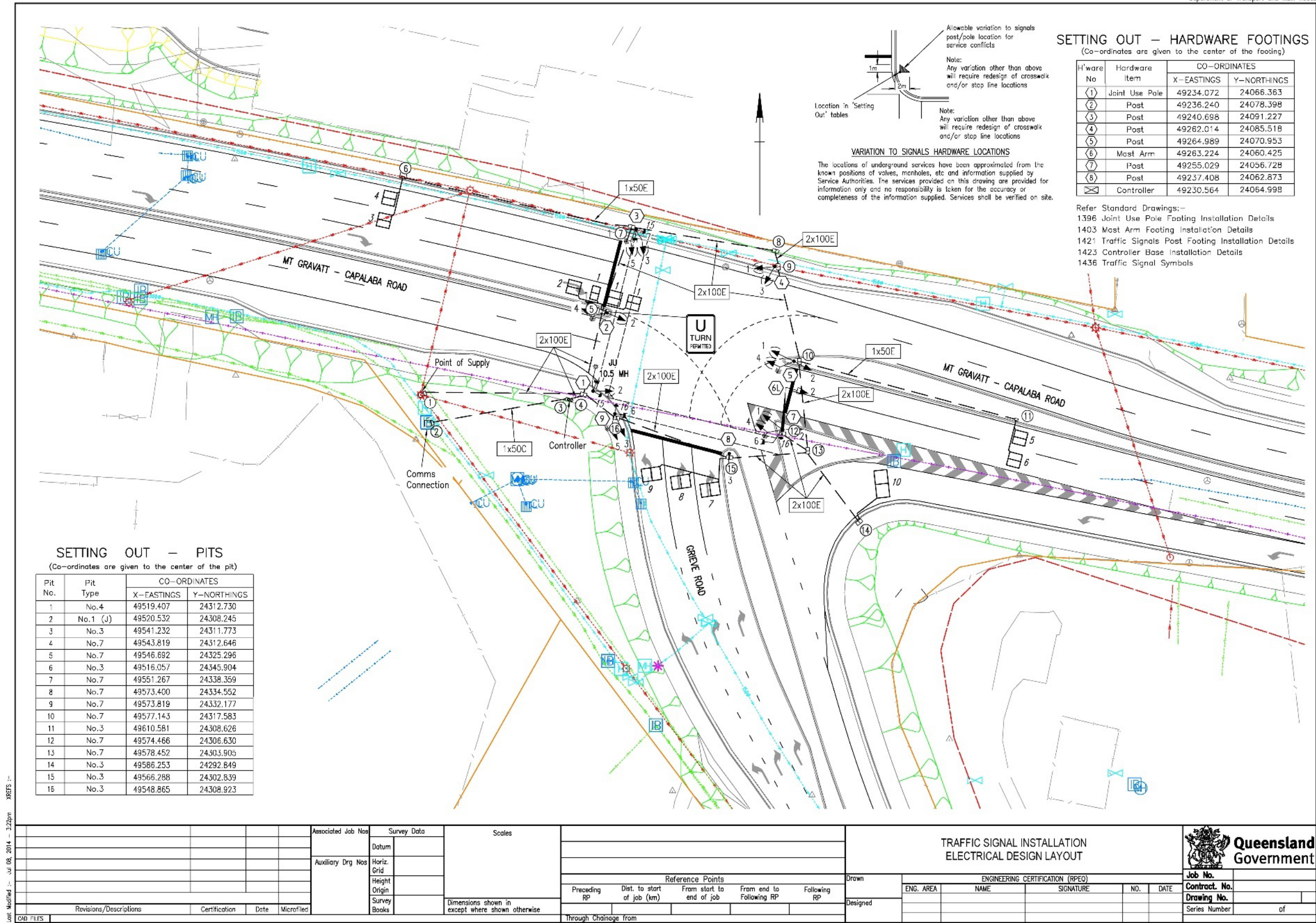




Figure 2.14.4(b) – Traffic Signals – Operations and Electrical – registered example 1

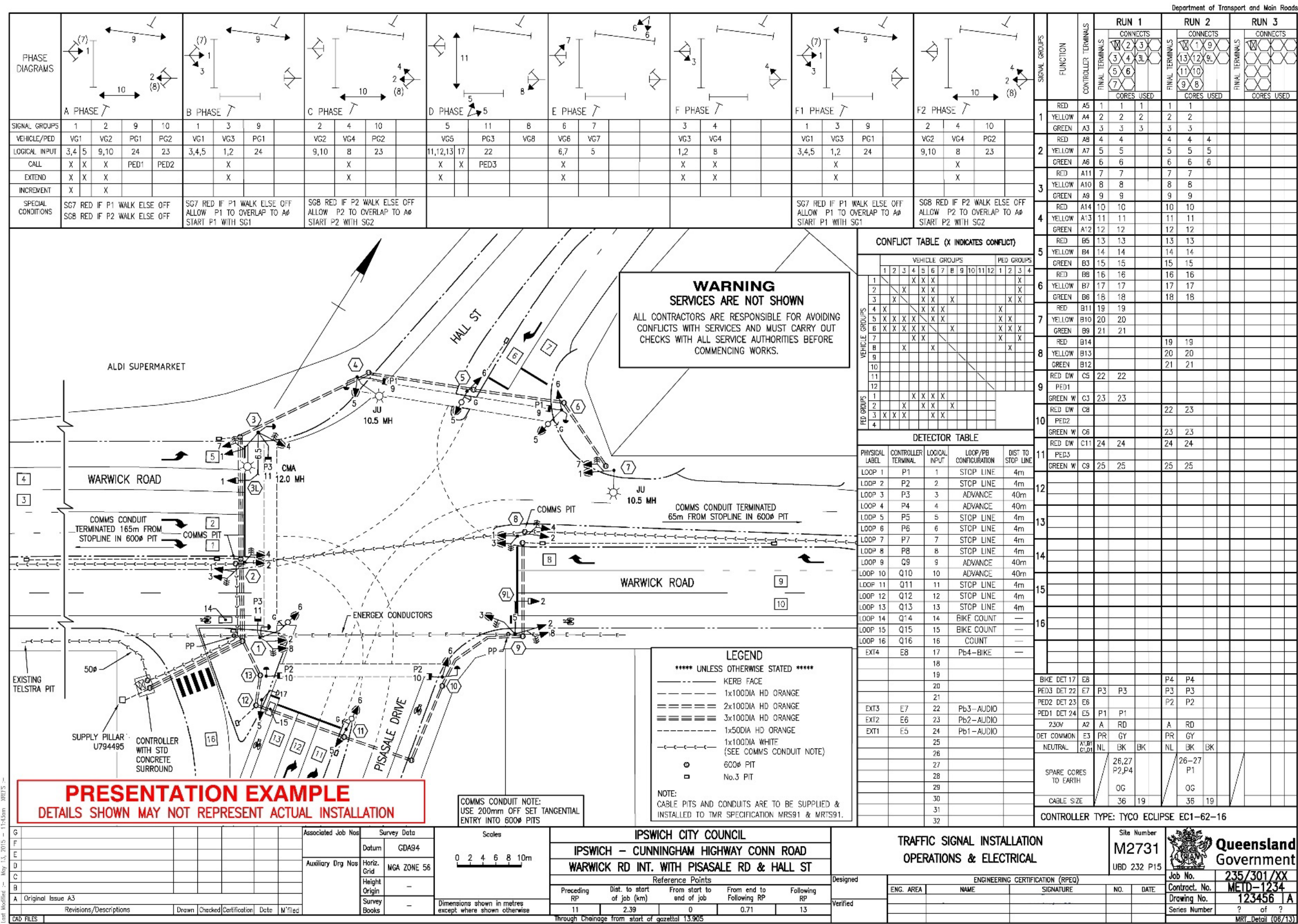
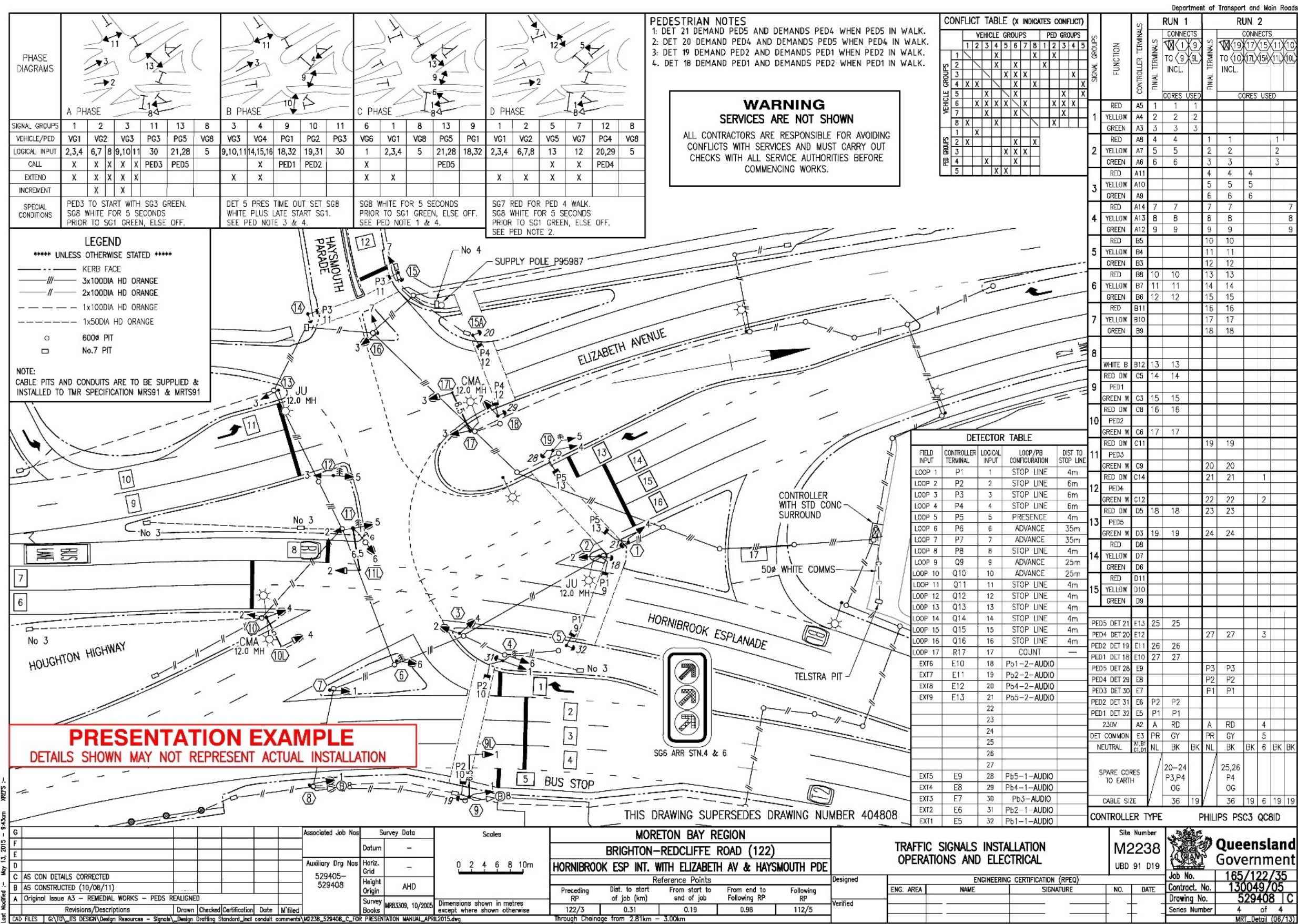




Figure 2.14.4(c) – Traffic Signals – Operations and Electrical – registered example 2









## **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**

Scales						LINE 1 _____				 <b>Queensland Government</b>
						LINE 2 _____				
						LINE 3 _____				
Reference Points					ENGINEERING CERTIFICATION (TYPE)				Job No.	
Preceding RP	Dist. to start of job (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									Drawing No.	
Through Chainage from									Series Number _____ of _____	

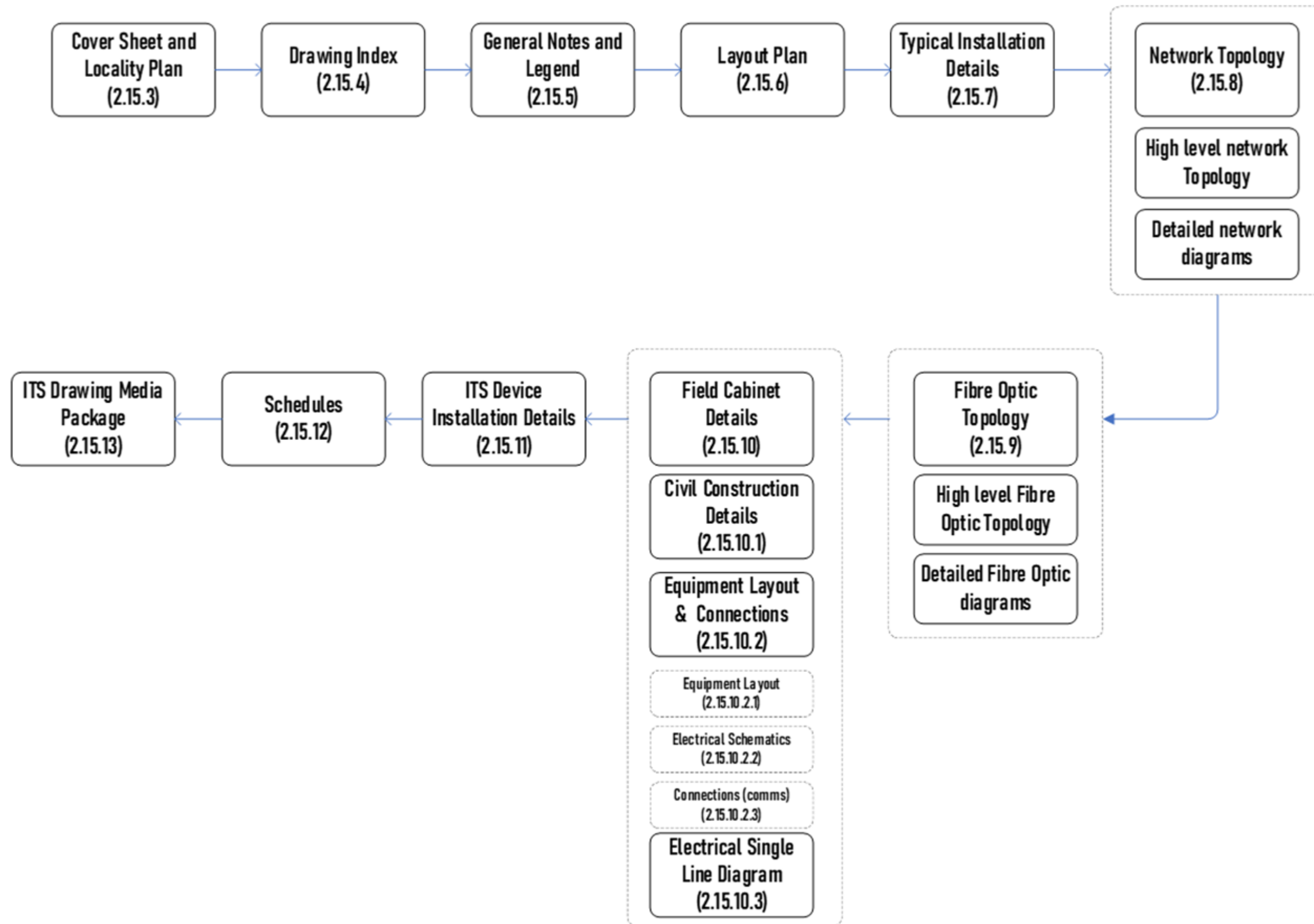
**Table 2.15.2 – ITS drawing sheet title block format**

ITS drawing Category	Title Block Format	Example
Cover Sheet and Locality Plan	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> Cover Sheet and Locality Plan <b>Line 3:</b> "Relevant sub-heading"	Intelligent Transport System – Project wide Cover Sheet & Locality Plan
Drawing Index	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> Drawing Index <b>Line 3:</b> "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide Drawing Index Sheet 1 of 1
General Notes and Legend	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> General Notes and Legend <b>Line 3:</b> "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide General Notes and Legend Sheet 1 of 2
Layout Plan	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> Layout Plan <b>Line 3:</b> "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide Layout Plan Drawing Key – Sheet 1 of 3
Typical Installation Details	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> Typical Installation Details <b>Line 3:</b> "Relevant sub-heading" – Sheet X of Y	Intelligent Transport System – Project wide Typical Installation Details Sheet 1 of 1
Network Topology	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> Network Topology <b>Line 3:</b> "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	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> Fibre Optic Topology <b>Line 3:</b> "Relevant sub-heading" – Sheet X of Y	
Field Cabinet Details	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> Field Cabinet Details <b>Line 3:</b> "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	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> {ITS Device Name} Installation Details <b>Line 3:</b> "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	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> General {equipment / device name} schedule <b>Line 3:</b> "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	<b>Line 1:</b> Intelligent Transport System – "Scope" or "Site ID", or "Location" <b>Line 2:</b> User defined title <b>Line 3:</b> "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

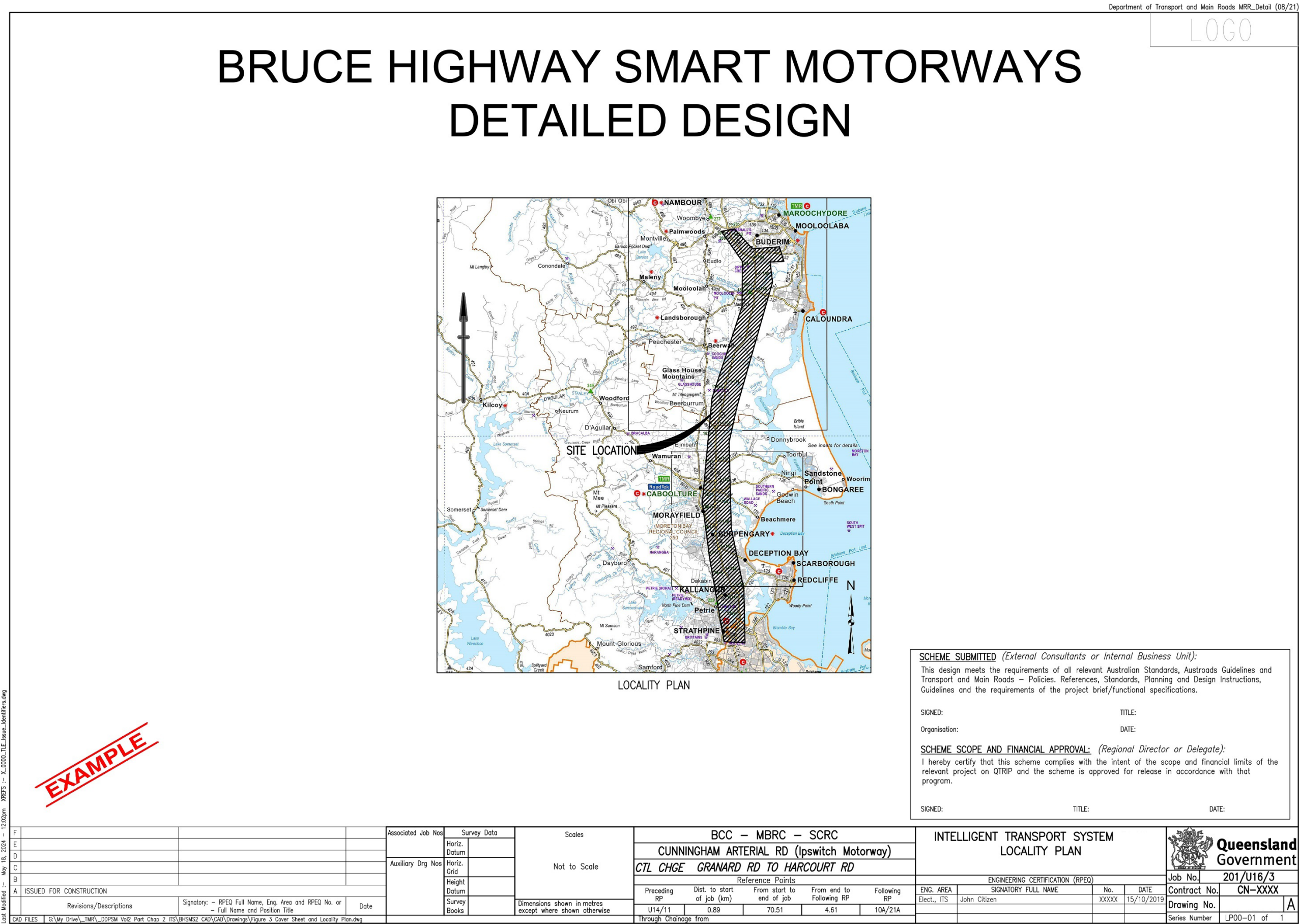


Figure 2.15.5(b) – Drawing Index example

Department of Transport and Main Roads MRR\_Detail (08/21)


LOGO

DRAWING INDEX – GLOBAL

Drawing Number	Revision	Date	Series Number	Drawing Description
891291	A	07/08/21	LP00-01 of 01	LOCALITY PLAN
891292	U	24/04/24	D100-01 of 09	DRAWING INDEX SHEET 1
891293	F	24/04/24	D100-02 of 09	DRAWING INDEX SHEET 2
891525	F	26/07/23	D100-03 of 09	DRAWING INDEX SHEET 3
891601	C	28/07/22	D100-04 of 09	DRAWING INDEX SHEET 4
891642	B	24/08/21	D100-05 of 09	DRAWING INDEX SHEET 5
891727	E	05/03/24	D100-06 of 09	DRAWING INDEX SHEET 6
891811	F	08/11/23	D100-07 of 09	DRAWING INDEX SHEET 7
891849	F	31/05/23	D100-08 of 09	DRAWING INDEX SHEET 8
891959	E	01/08/22	D100-09 of 09	DRAWING INDEX SHEET 9
891294	A	07/08/21	DK00-01 of 02	DRAWING KEY DIAGRAM GA AND PU SERIES
891295	A	07/08/21	DK00-02 of 02	DRAWING KEY DIAGRAM PAM LOCATIONS
891296	A	07/08/21	CL00-01 of 10	CONTROL LINE AND SETOUT DETAILS SHEET 1
891297	A	07/08/21	CL00-02 of 10	CONTROL LINE AND SETOUT DETAILS SHEET 2
891298	A	07/08/21	CL00-03 of 10	CONTROL LINE AND SETOUT DETAILS SHEET 3
891299	A	07/08/21	CL00-04 of 10	CONTROL LINE AND SETOUT DETAILS SHEET 4
891300	A	07/08/21	CL00-05 of 10	CONTROL LINE AND SETOUT DETAILS SHEET 5
891301	A	07/08/21	CL00-06 of 10	CONTROL LINE AND SETOUT DETAILS SHEET 6
891302	A	07/08/21	CL00-07 of 10	CONTROL LINE AND SETOUT DETAILS SHEET 7
891303	A	07/08/21	CL00-08 of 10	CONTROL LINE AND SETOUT DETAILS SHEET 8
891304	A	07/08/21	CL00-09 of 10	SETOUT TABLES SHEET 1
891305	A	07/08/21	CL00-10 of 10	SETOUT TABLES SHEET 2
891306	B	17/06/22	NL00-01 of 05	GLOBAL NOTES SHEET 1
891307	C	16/09/22	NL00-02 of 05	GLOBAL NOTES SHEET 2
891308	A	07/08/21	NL00-03 of 05	GLOBAL NOTES SHEET 3
891309	A	07/08/21	NL00-04 of 05	GLOBAL NOTES SHEET 4
891310	A	07/08/21	NL00-05 of 05	GLOBAL NOTES SHEET 5
891311	A	07/08/21	GD00-01 of 17	GENERAL DETAILS SHEET 1
891312	A	07/08/21	GD00-02 of 17	GENERAL DETAILS SHEET 2
891313	A	07/08/21	GD00-03 of 17	GENERAL DETAILS SHEET 3
891314	A	07/08/21	GD00-04 of 17	GENERAL DETAILS SHEET 4
891315	A	07/08/21	GD00-05 of 17	GENERAL DETAILS SHEET 5
891316	A	07/08/21	GD00-06 of 17	GENERAL DETAILS SHEET 6
891317	A	07/08/21	GD00-07 of 17	GENERAL DETAILS SHEET 7
891318	A	07/08/21	GD00-08 of 17	GENERAL DETAILS SHEET 8
891319	A	07/08/21	GD00-09 of 17	GENERAL DETAILS SHEET 9
891320	A	07/08/21	GD00-10 of 17	GENERAL DETAILS SHEET 10
891321	A	07/08/21	GD00-11 of 17	GENERAL DETAILS SHEET 11
891322	B	22/06/23	GD00-12 of 17	GENERAL DETAILS SHEET 12
891323	A	07/08/21	GD00-13 of 17	GENERAL DETAILS SHEET 13
891324	B	17/06/22	GD00-14 of 17	GENERAL DETAILS SHEET 14
891325	A	07/08/21	GD00-15 of 17	GENERAL DETAILS SHEET 15
891326	A	07/08/21	GD00-16 of 17	GENERAL DETAILS SHEET 16
891327	B	17/08/23	GD00-17 of 17	GENERAL DETAILS SHEET 17
891328	A	07/08/21	DD00-01 of 05	DRAINAGE DETAILS SHEET 1
891329	A	07/08/21	DD00-02 of 05	DRAINAGE DETAILS SHEET 2
891330	A	07/08/21	DD00-03 of 05	DRAINAGE DETAILS SHEET 3
891331	A	07/08/21	DD00-04 of 05	DRAINAGE DETAILS SHEET 4
891332	A	07/08/21	DD00-05 of 05	DRAINAGE DETAILS SHEET 5
891333	B	08/11/23	IT00-NL-01 of 03	ITS NETWORK LEGEND SHEET 1
891334	A	07/08/21	IT00-NL-02 of 03	ITS NETWORK LEGEND SHEET 2
891335	A	07/08/21	IT00-NL-03 of 03	ITS NETWORK LEGEND SHEET 3
891336	C	31/08/21	IT00-NW-01 of 01	ITS NETWORK TOPOLOGY HIGH LEVEL
891337	A	24/08/21	IT01-NW-01 of 50	ITS NETWORK TOPOLOGY SHEET 1
891338	C	31/08/21	IT01-NW-02 of 50	ITS NETWORK TOPOLOGY SHEET 2
891339	A	07/08/21	IT01-NW-03 of 50	ITS NETWORK TOPOLOGY SHEET 3
891340	A	07/08/21	IT01-NW-04 of 50	ITS NETWORK TOPOLOGY SHEET 4
891341	A	07/08/21	IT01-NW-05 of 50	ITS NETWORK TOPOLOGY SHEET 5
891342	A	07/08/21	IT01-NW-06 of 50	ITS NETWORK TOPOLOGY SHEET 6
891343	A	07/08/21	IT01-NW-07 of 50	ITS NETWORK TOPOLOGY SHEET 7
891344	A	07/08/21	IT01-NW-08 of 50	ITS NETWORK TOPOLOGY SHEET 8
891345	A	07/08/21	IT01-NW-09 of 50	ITS NETWORK TOPOLOGY SHEET 9

Drawing Number	Revision	Date	Series Number	Drawing Description
891346	A	07/08/21	IT01-NW-10 of 50	ITS NETWORK TOPOLOGY SHEET 10
891347	A	07/08/21	IT01-NW-11 of 50	ITS NETWORK TOPOLOGY SHEET 11
891348	A	07/08/21	IT01-NW-12 of 50	ITS NETWORK TOPOLOGY SHEET 12
891349	A	07/08/21	IT01-NW-13 of 50	ITS NETWORK TOPOLOGY SHEET 13
891350	A	07/08/21	IT01-NW-14 of 50	ITS NETWORK TOPOLOGY SHEET 14
891351	A	07/08/21	IT01-NW-15 of 50	ITS NETWORK TOPOLOGY SHEET 15
891352	A	07/08/21	IT01-NW-16 of 50	ITS NETWORK TOPOLOGY SHEET 16
891353	A	07/08/21	IT01-NW-17 of 50	ITS NETWORK TOPOLOGY SHEET 17
891354	A	07/08/21	IT01-NW-18 of 50	ITS NETWORK TOPOLOGY SHEET 18
891355	A	07/08/21	IT01-NW-19 of 50	ITS NETWORK TOPOLOGY SHEET 19
891356	A	07/08/21	IT01-NW-20 of 50	ITS NETWORK TOPOLOGY SHEET 20
891357	A	07/08/21	IT01-NW-21 of 50	ITS NETWORK TOPOLOGY SHEET 21
891358	A	07/08/21	IT01-NW-22 of 50	ITS NETWORK TOPOLOGY SHEET 22
891359	A	07/08/21	IT01-NW-23 of 50	ITS NETWORK TOPOLOGY SHEET 23
891360	A	07/08/21	IT01-NW-24 of 50	ITS NETWORK TOPOLOGY SHEET 24
891361	A	07/08/21	IT01-NW-25 of 50	ITS NETWORK TOPOLOGY SHEET 25
891362	A	07/08/21	IT01-NW-26 of 50	ITS NETWORK TOPOLOGY SHEET 26
891363	A	07/08/21	IT01-NW-27 of 50	ITS NETWORK TOPOLOGY SHEET 27
891364	A	07/08/21	IT01-NW-28 of 50	ITS NETWORK TOPOLOGY SHEET 28
891365	B	08/11/23	IT01-NW-29 of 50	ITS NETWORK TOPOLOGY SHEET 29
891366	A	07/08/21	IT01-NW-30 of 50	ITS NETWORK TOPOLOGY SHEET 30
891367	A	07/08/21	IT01-NW-31 of 50	ITS NETWORK TOPOLOGY SHEET 31
891368	A	07/08/21	IT01-NW-32 of 50	ITS NETWORK TOPOLOGY SHEET 32
891369	C	16/03/23	IT01-NW-33 of 50	ITS NETWORK TOPOLOGY SHEET 33
891370	A	07/08/21	IT01-NW-34 of 50	ITS NETWORK TOPOLOGY SHEET 34
891371	A	07/08/21	IT01-NW-35 of 50	ITS NETWORK TOPOLOGY SHEET 35
891372	A	07/08/21	IT01-NW-36 of 50	ITS NETWORK TOPOLOGY SHEET 36
891373	A	07/08/21	IT01-NW-37 of 50	ITS NETWORK TOPOLOGY SHEET 37
891374	A	07/08/21	IT01-NW-38 of 50	ITS NETWORK TOPOLOGY SHEET 38
891375	C	31/08/21	IT01-NW-39 of 50	ITS NETWORK TOPOLOGY SHEET 39
891376	B	31/08/21	IT01-NW-40 of 50	ITS NETWORK TOPOLOGY SHEET 40
891377	A	07/08/21	IT01-NW-41 of 50	ITS NETWORK TOPOLOGY SHEET 41
891378	A	07/08/21	IT01-NW-42 of 50	ITS NETWORK TOPOLOGY SHEET 42
891379	A	07/08/21	IT01-NW-43 of 50	ITS NETWORK TOPOLOGY SHEET 43
891380	A	07/08/21	IT01-NW-44 of 50	ITS NETWORK TOPOLOGY SHEET 44
891381	B	31/08/21	IT01-NW-45 of 50	ITS NETWORK TOPOLOGY SHEET 45
891382	A	07/08/21	IT01-NW-46 of 50	ITS NETWORK TOPOLOGY SHEET 46
891383	A	07/08/21	IT01-NW-47 of 50	ITS NETWORK TOPOLOGY SHEET 47
891384	A	07/08/21	IT01-NW-48 of 50	ITS NETWORK TOPOLOGY SHEET 48
891385	C	31/08/21	IT01-NW-49 of 50	ITS NETWORK TOPOLOGY SHEET 49
891386	B	31/08/21	IT01-NW-50 of 50	ITS NETWORK TOPOLOGY SHEET 50
891387	A	07/08/21	IT00-FS-01 of 45	ITS NETWORK FIBRE SPLICING SHEET 1
891388	A	07/08/21	IT00-FS-02 of 45	ITS NETWORK FIBRE SPLICING SHEET 2
891389	A	07/08/21	IT00-FS-03 of 45	ITS NETWORK FIBRE SPLICING SHEET 3
891390	A	07/08/21	IT00-FS-04 of 45	ITS NETWORK FIBRE SPLICING SHEET 4
891391	A	07/08/21	IT00-FS-05 of 45	ITS NETWORK FIBRE SPLICING SHEET 5
891392	B	24/08/21	IT00-FS-06 of 45	ITS NETWORK FIBRE SPLICING SHEET 6
891393	C	31/08/21	IT00-FS-07 of 45	ITS NETWORK FIBRE SPLICING SHEET 7
891394	A	07/08/21	IT00-FS-08 of 45	ITS NETWORK FIBRE SPLICING SHEET 8
891395	A	07/08/21	IT00-FS-09 of 45	ITS NETWORK FIBRE SPLICING SHEET 9
891396	A	07/08/21	IT00-FS-10 of 45	ITS NETWORK FIBRE SPLICING SHEET 10
891397	A	07/08/21	IT00-FS-11 of 45	ITS NETWORK FIBRE SPLICING SHEET 11
891398	A	07/08/21	IT00-FS-12 of 45	ITS NETWORK FIBRE SPLICING SHEET 12
891399	A	07/08/21	IT00-FS-13 of 45	ITS NETWORK FIBRE SPLICING SHEET 13
891400	A	07/08/21	IT00-FS-14 of 45	ITS NETWORK FIBRE SPLICING SHEET 14
891401	A	07/08/21	IT00-FS-15 of 45	ITS NETWORK FIBRE SPLICING SHEET 15
891402	A	07/08/21	IT00-FS-16 of 45	ITS NETWORK FIBRE SPLICING SHEET 16
891403	A	07/08/21	IT00-FS-17 of 45	ITS NETWORK FIBRE SPLICING SHEET 17
891404	A	07/08/21	IT00-FS-18 of 45	ITS NETWORK FIBRE SPLICING SHEET 18
891405	A	07/08/21	IT00-FS-19 of 45	ITS NETWORK FIBRE SPLICING SHEET 19
891406	A	07/08/21	IT00-FS-20 of 45	ITS NETWORK FIBRE SPLICING SHEET 20
891407	A	07/08/21	IT00-FS-21 of 45	ITS NETWORK FIBRE SPLICING SHEET 21

Continued on Series No. D100-02

Associated Job Nos		Survey Data		Scales	BCC – MBRC – SCRC					INTELLIGENT TRANSPORT SYSTEM					Queensland Government
Auxiliary Drg Nos		Horiz. Datum			CUNNINGHAM ARTERIAL RD (Ipswich Motorway)					DRAWING INDEX					
		Horiz. Grid			CTL CHGE GRANARD RD TO HARCOURT RD					SHEET 1 of 1				Job No.	201/U16/3
		Height Datum			Reference Points					ENGINEERING CERTIFICATION (RPEQ)				Contract No.	CN-XXXX
		Survey Books			Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP	ENG. AREA	SIGNATORY FULL NAME	No.	DATE	Drawing No.	A
					U14/11	0.89	70.51	4.61	10A/21A		John Citizen	XXXXX	15/10/2019	Series Number	D100-01 of 9
					Through Chainage from										

REVISIONS

No.	Description	Date
1	ISSUED FOR CONSTRUCTION	

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

Date

CAD FILES

G:\My Drive\TMR\DDPSM Vol2 Part Chap 2 ITS\BHSMS2 CAD\CAD\Drawings\Figure 4 Drawing Index.dwg



### 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.

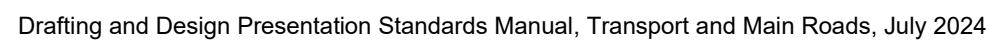




Figure 2.15.7(b) – ITS Layout (example 2 – aerial imaging)

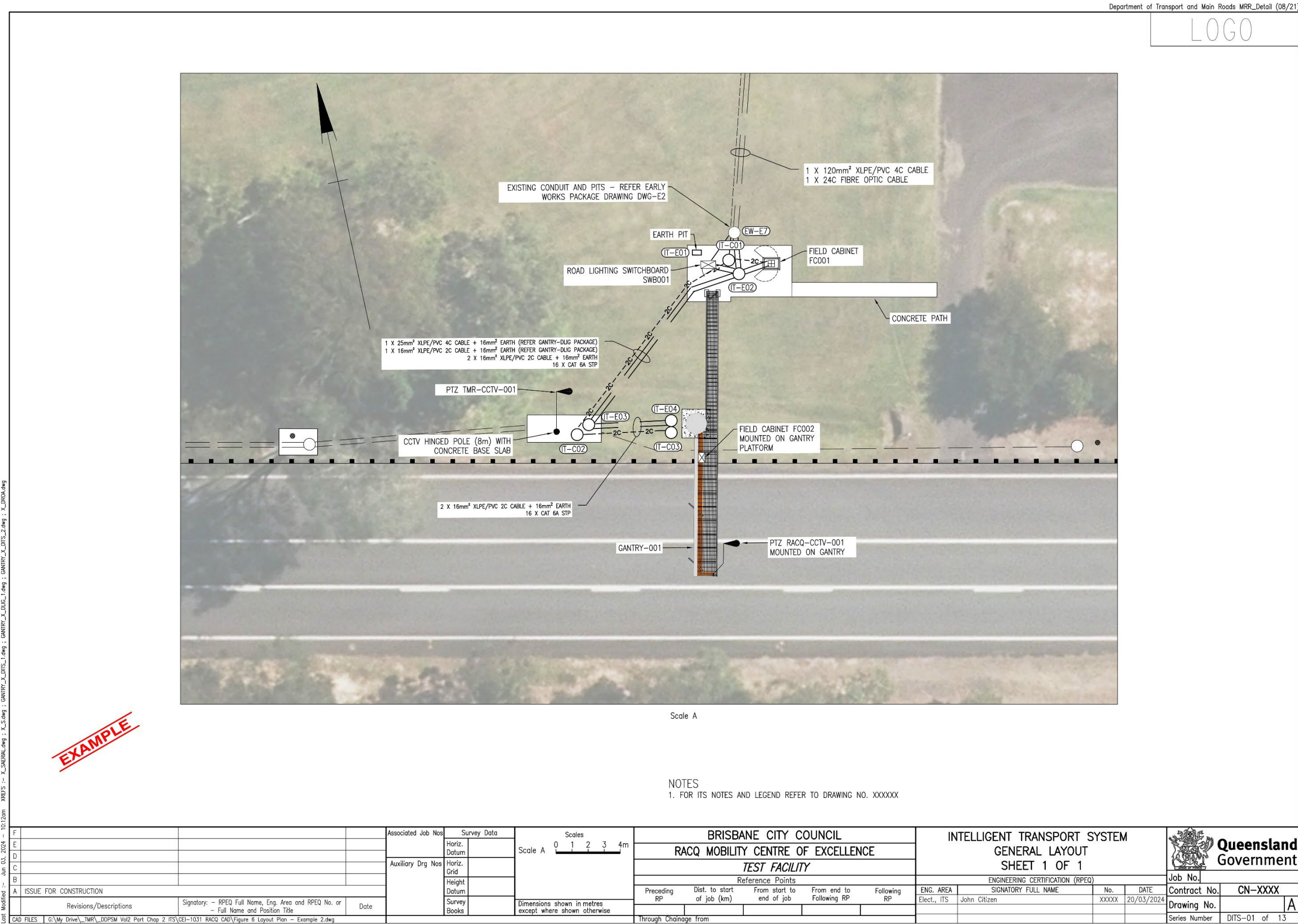
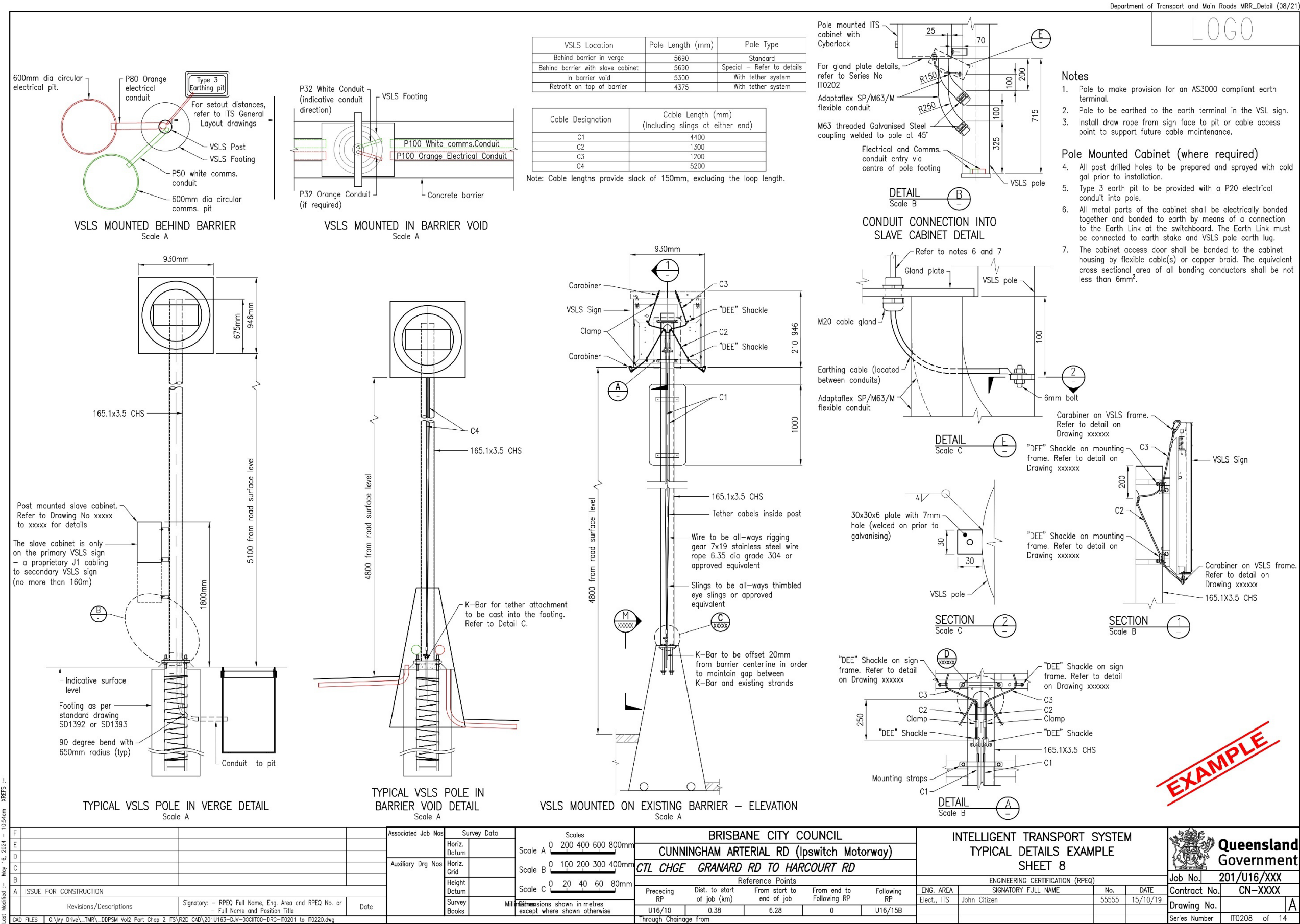








Figure 2.15.7(d) – ITS typical installation details – example



### 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.



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Legend

- 10Gbps Fibre Link
- 1Gbps Fibre Link
- 100Mbps Fibre Link
- 1Gbps CAT6 Ethernet (Copper) Link
- 10/100Mbps Ethernet (Copper) Link
- L3 P2P iBGP (1Gbps)
- L3 P2P eBGP (10Gbps)
- Serial connections

IE4010 and IE5000 MGMT IPs (Summary)

- MIM-701-DDS-01:XX.XX.XX.XX.6/XX (MIM701NC IE5000)
- MIM-720-DDS-01:XX.XX.XX.XX.29/XX (MIM721NC IE5000)
- MIM-701-DAS-01:XX.XX.XX.XX.217/XX (MIM701NC IE4000)
- MIM-720-DAS-01:XX.XX.XX.XX.209/XX (MIM721NC IE4000)
- MIM-712-DAS-01:XX.XX.XX.XX.241/XX (MIM712NC IE4000 #1)
- MIM-712-DAS-02:XX.XX.XX.XX.222/XX (MIM712NC IE4000 #2)

Sub-Loop Segmentation Notes:

In accordance with industry best practice, the number of serially connected L2 switches should be limited to seven (7) devices. This is to optimally support resilience capability through the use of spanning tree protocol. Practically, this number should not be more than 12 devices connected in a series.

General Notes:

- Network equipment to use existing NTP & DNS sources - to be provided by Metro District
- District to determine configuration, syslog, monitoring / alerting service arrangements (Adelaide St Nagios)
- Use of existing ITB managed AAA / RADIUS for integrated remote authentication is to be explored with ITB team.
- DHCP snooping to be used to define authorised DHCP servers as per the Field IP address allocation definition.
- Design based on /26 IP block allocation per individual VLAN. Proposed IP block for the entire system (including reserved space for additional VLANs) is 4 class C networks - separate document (IP address deployment plan) provided for assessment / peer review / endorsement.
- ACL is to be applied on distribution L3 Switches to prevent intra subnet (VLAN) routing (i.e. to block communication between field VLANs).
- Link fibre loss budgets - Link loss tests are to be carried out from R2D end nodes back to BMTMC & HALTC (or intermediate network devices) once these are connected. Appropriate SFP and attenuators will then be procured.
- All unused ports shut down.
- District configuration to include SNMP

Spanning Tree Notes:

Selected spanning tree protocol is 802.1s, Multiple Instance Spanning Tree (MIST or MST).

MST Bridge priority is as follows:

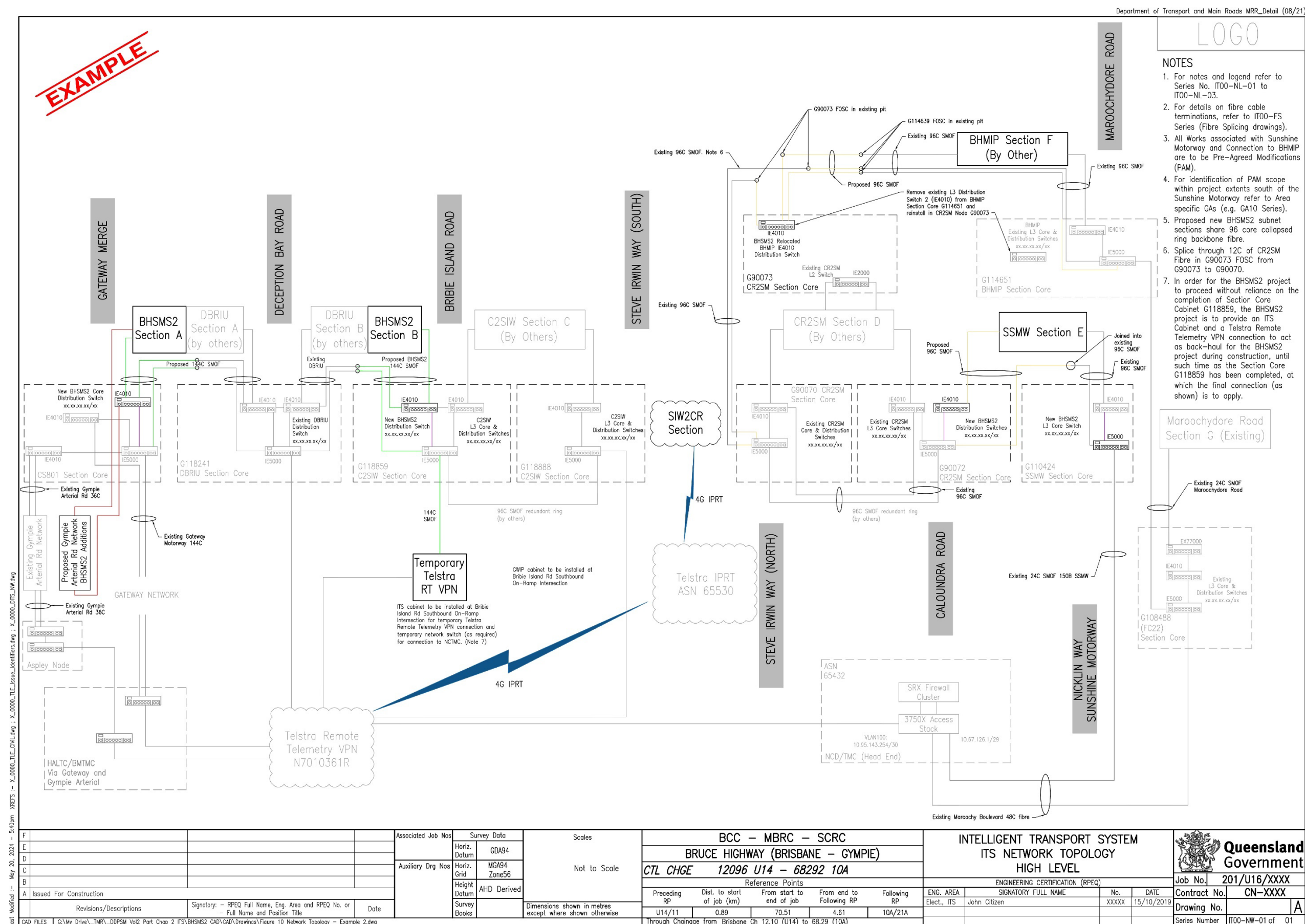
- R2D East & R2D West Network Segments (Loops 1 & 2)
  - Root bridge priority - 4096 (MIM712NC Node Cabinet - L3 Switch 2)
  - Backup root bridge 1 priority - 8192 (MIM701NC Node Cabinet - L3 distribution Switch)
- R2D Managed Motorway Network Segment (Loop 3)
  - Root bridge priority - 4096 (MIM720NC Node Cabinet - L3 distribution Switch)
  - Backup root bridge 1 priority - 8192 (MIM712NC Node Cabinet - L3 Switch 1) Root bridge priority - 4096 (L3 Switch Stack)

All L2 switches, other than those designated as MST backup bridges (i.e. if used), should be configured to never become root bridge e.g. during deployment a root bridge priority of 28672 could be assigned to each of those switches during initial configuration. 28672 is also lower than the default MST priority to prevent any attached rogue switches from becoming MST bridge on connected ports.

LOGO



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



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### 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)

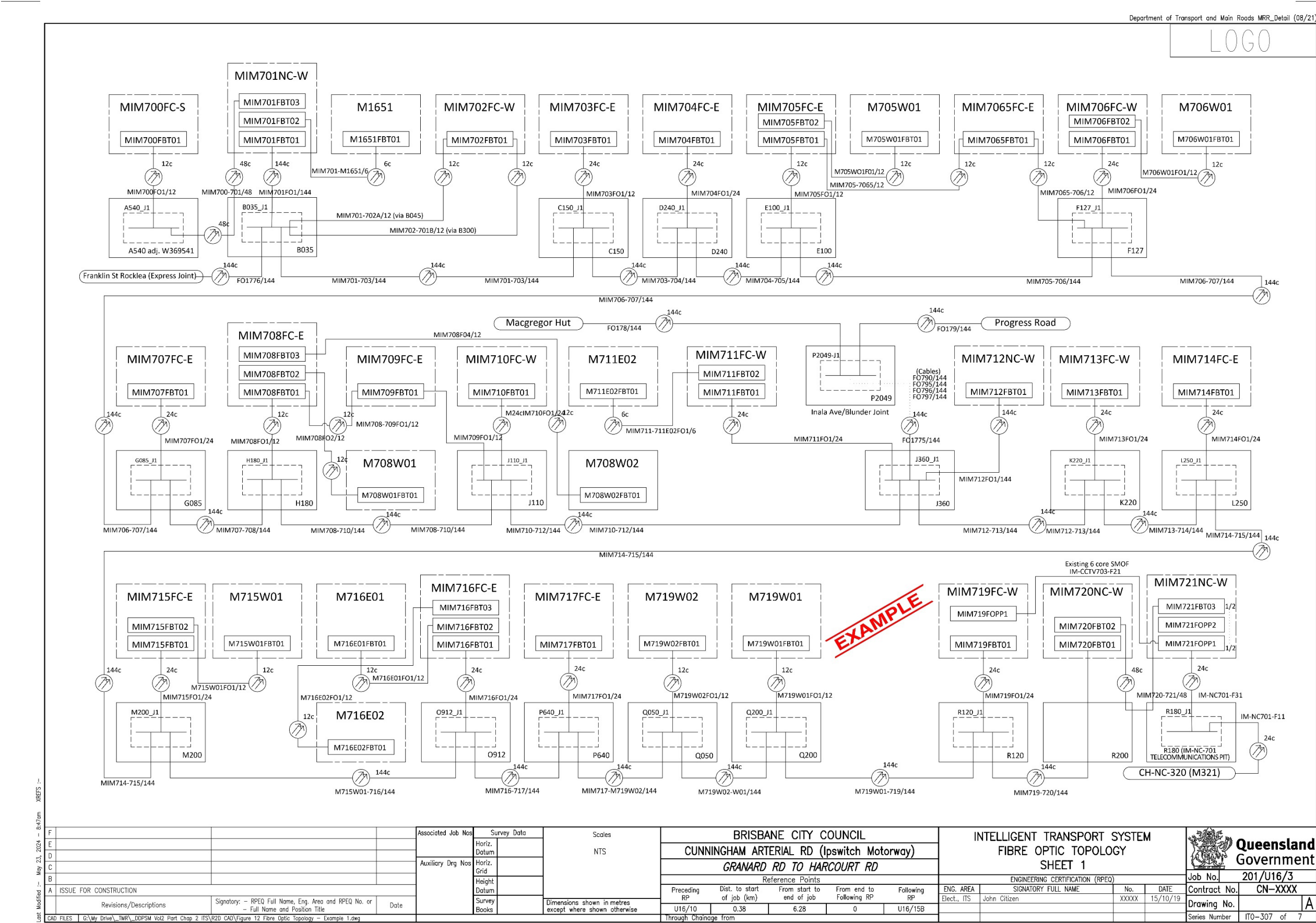




Figure 2.15.9(b) – Fibre Optic Topology (example 2)

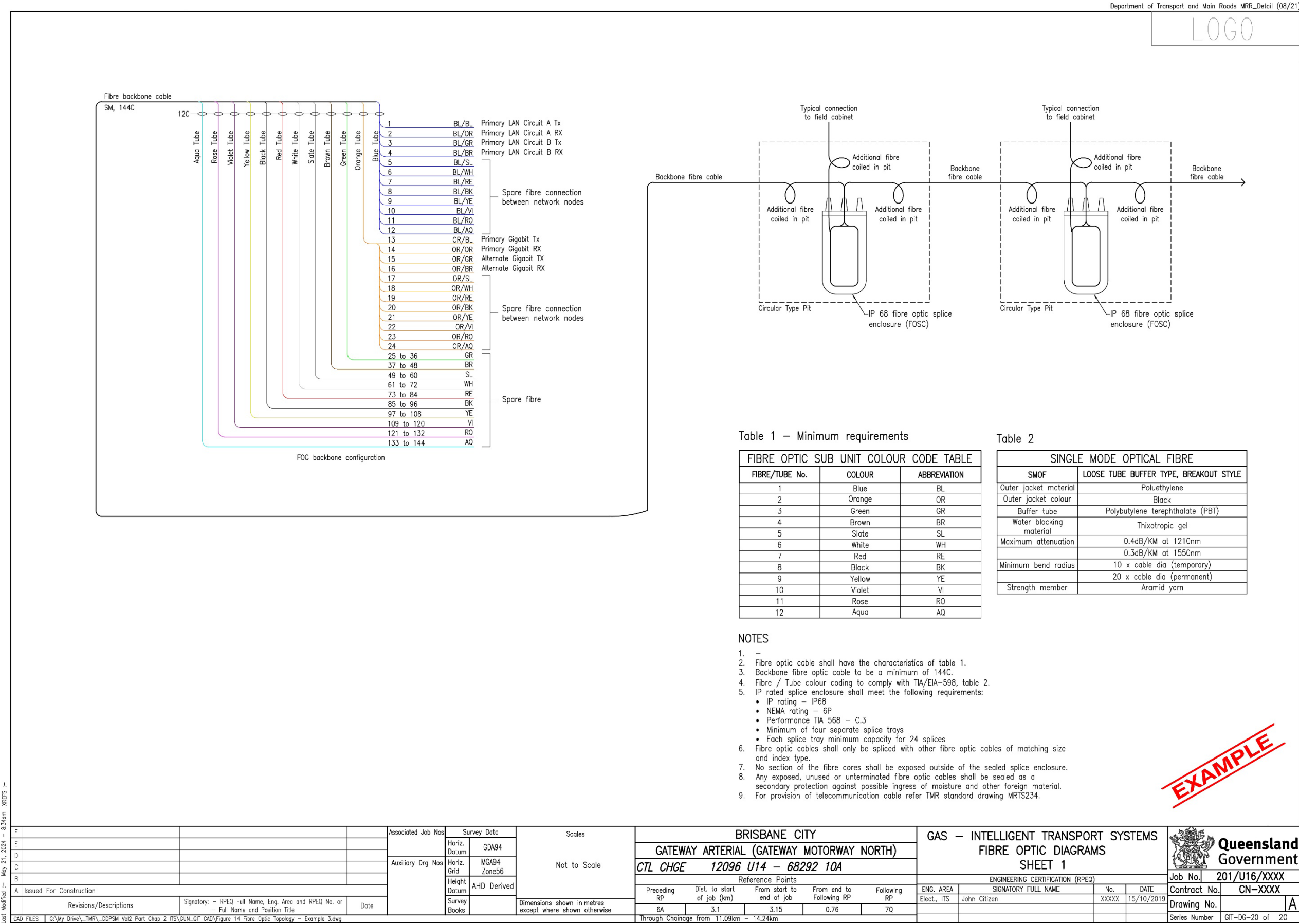
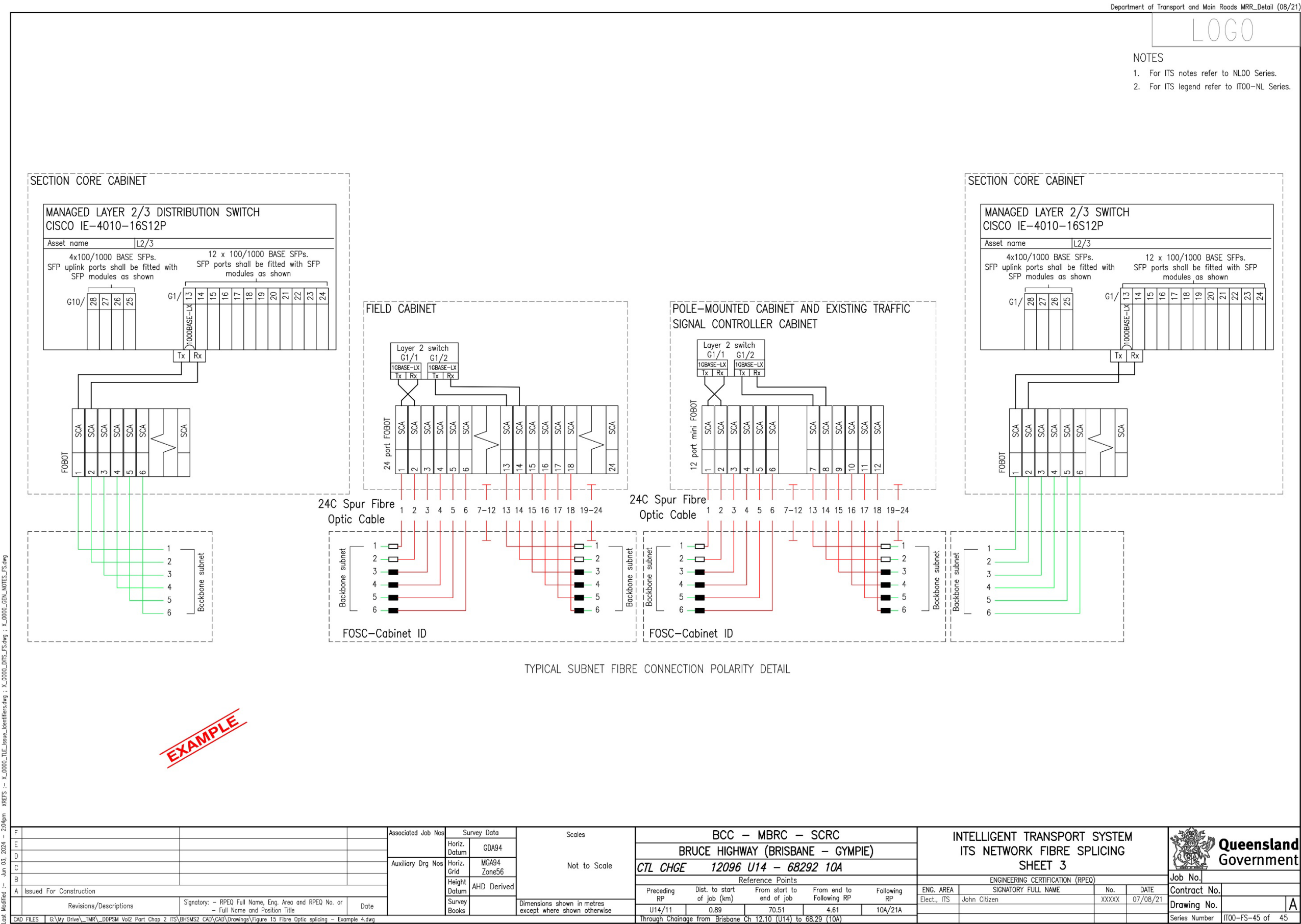


Figure 2.15.9(c) – Fibre Optic Topology (example 3)



### **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.

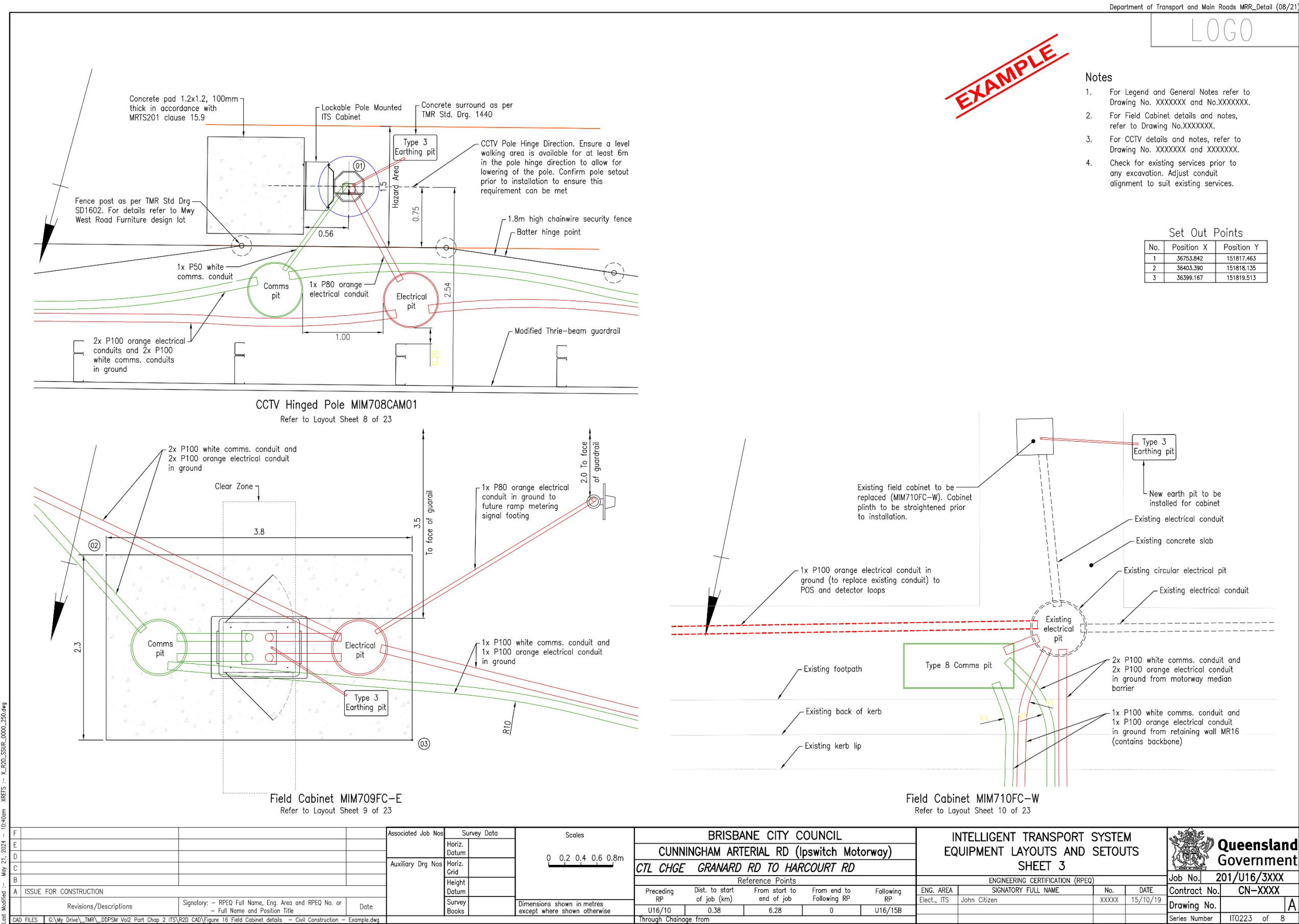
Pit and conduit detail shall include display of location, the transition from underground conduits into concrete barrier, on embankments and batters, or transition from underground conduits to surface mounted conduits, or conduit transition from verge into barrier and any other structure.

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

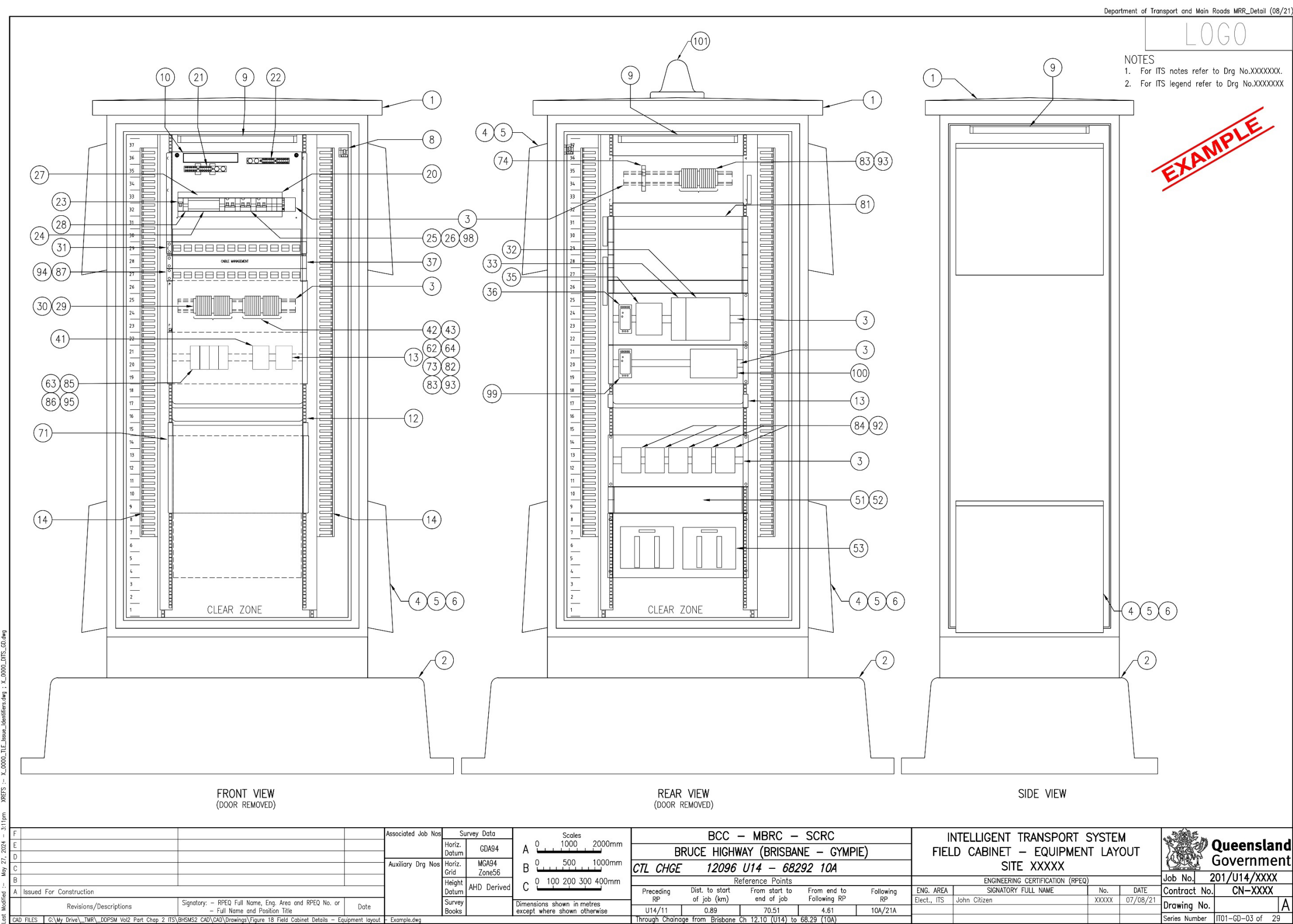


Figure 2.15.10.2.3(b) – Field cabinet equipment schedule - example

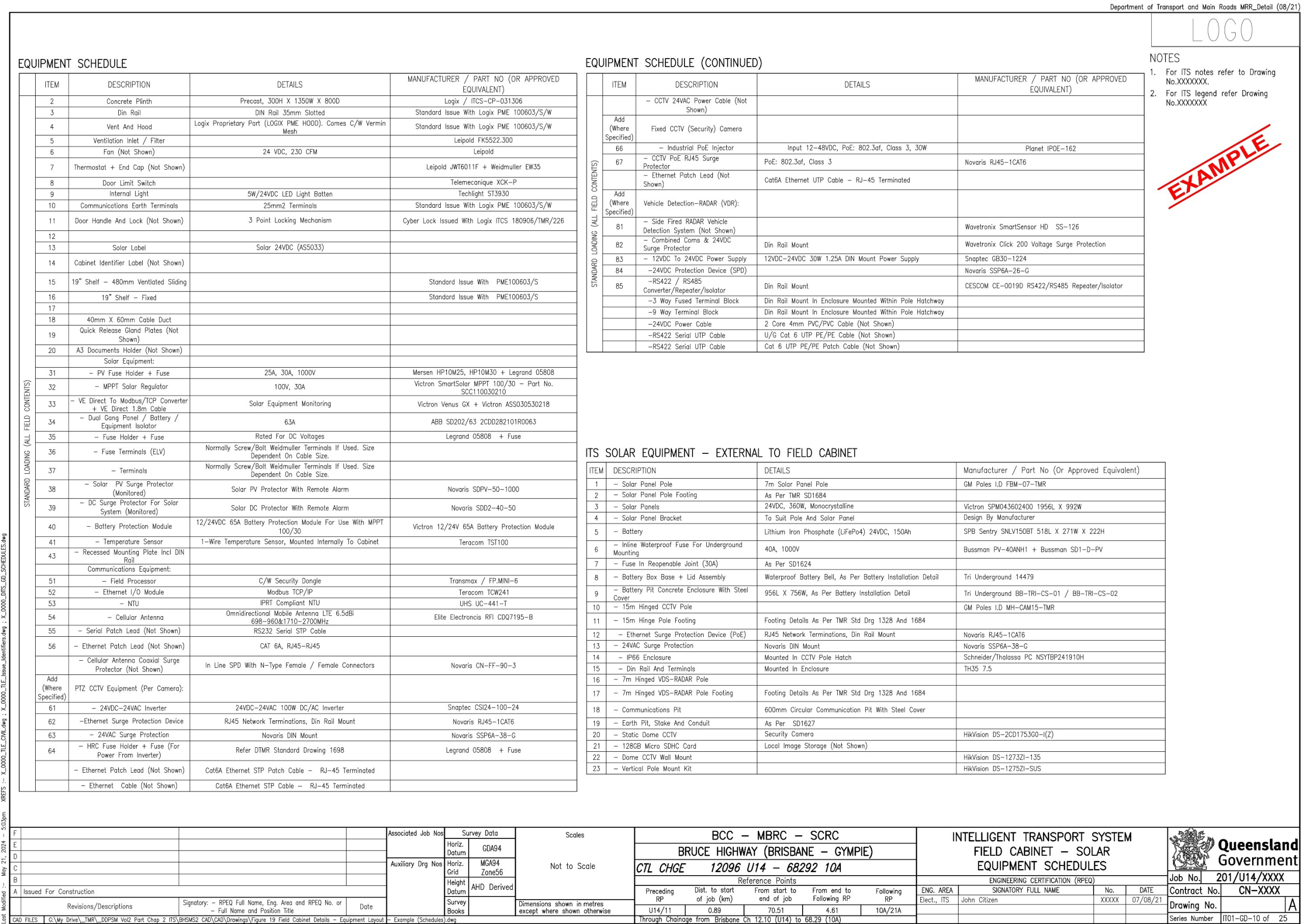
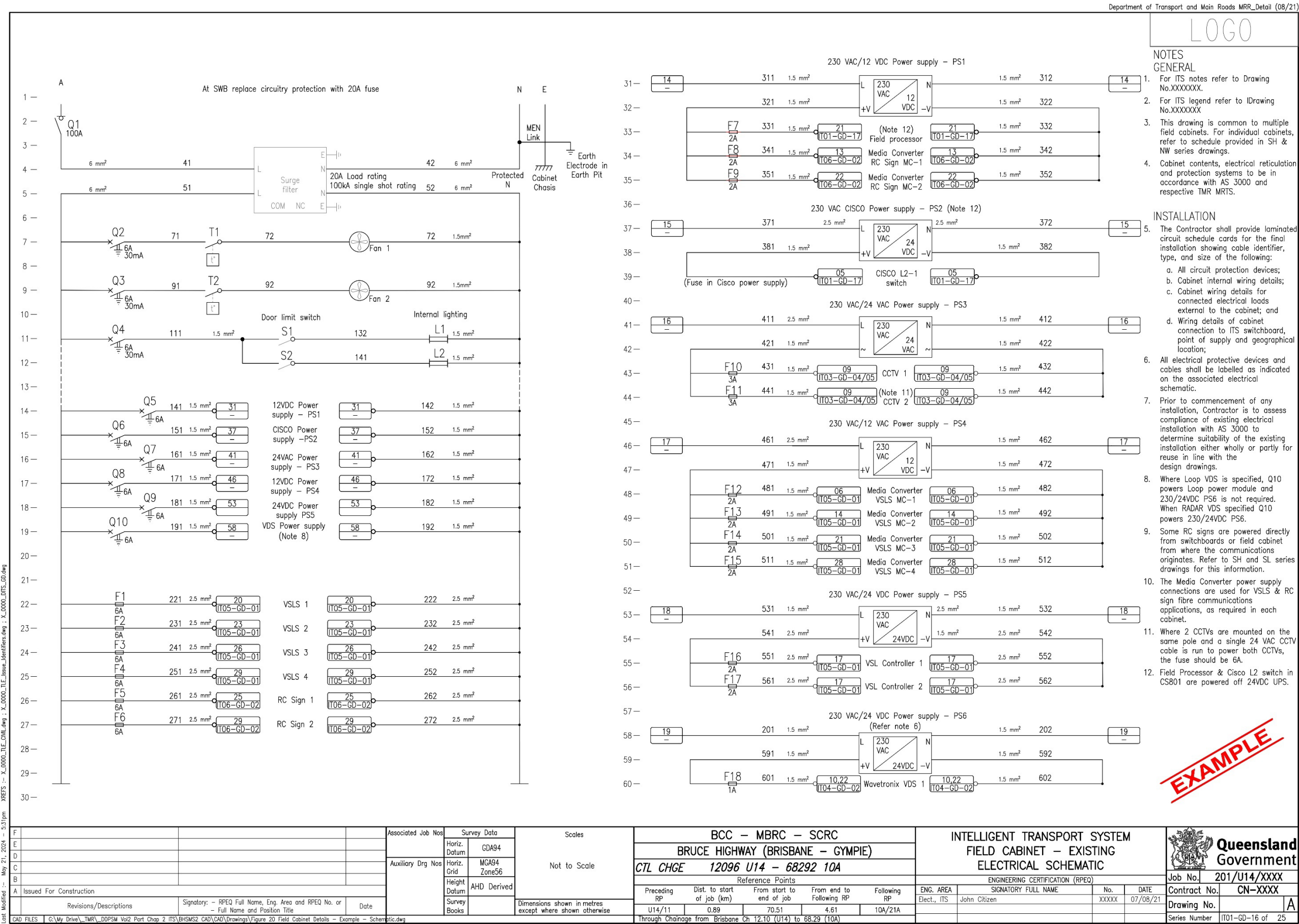




Figure 2.15.10.2.3(c) – Field cabinet electrical schematic example





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### 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)**

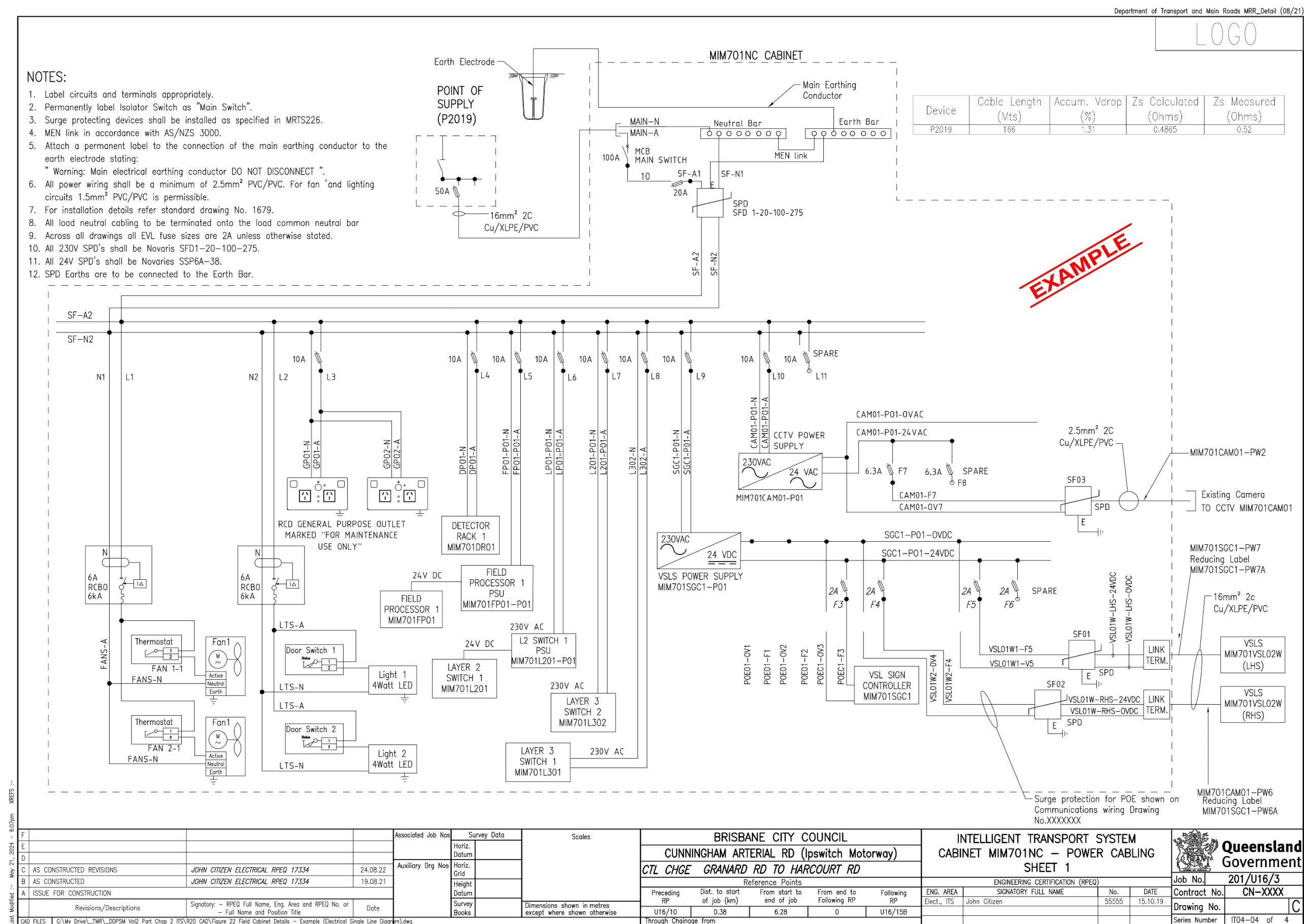
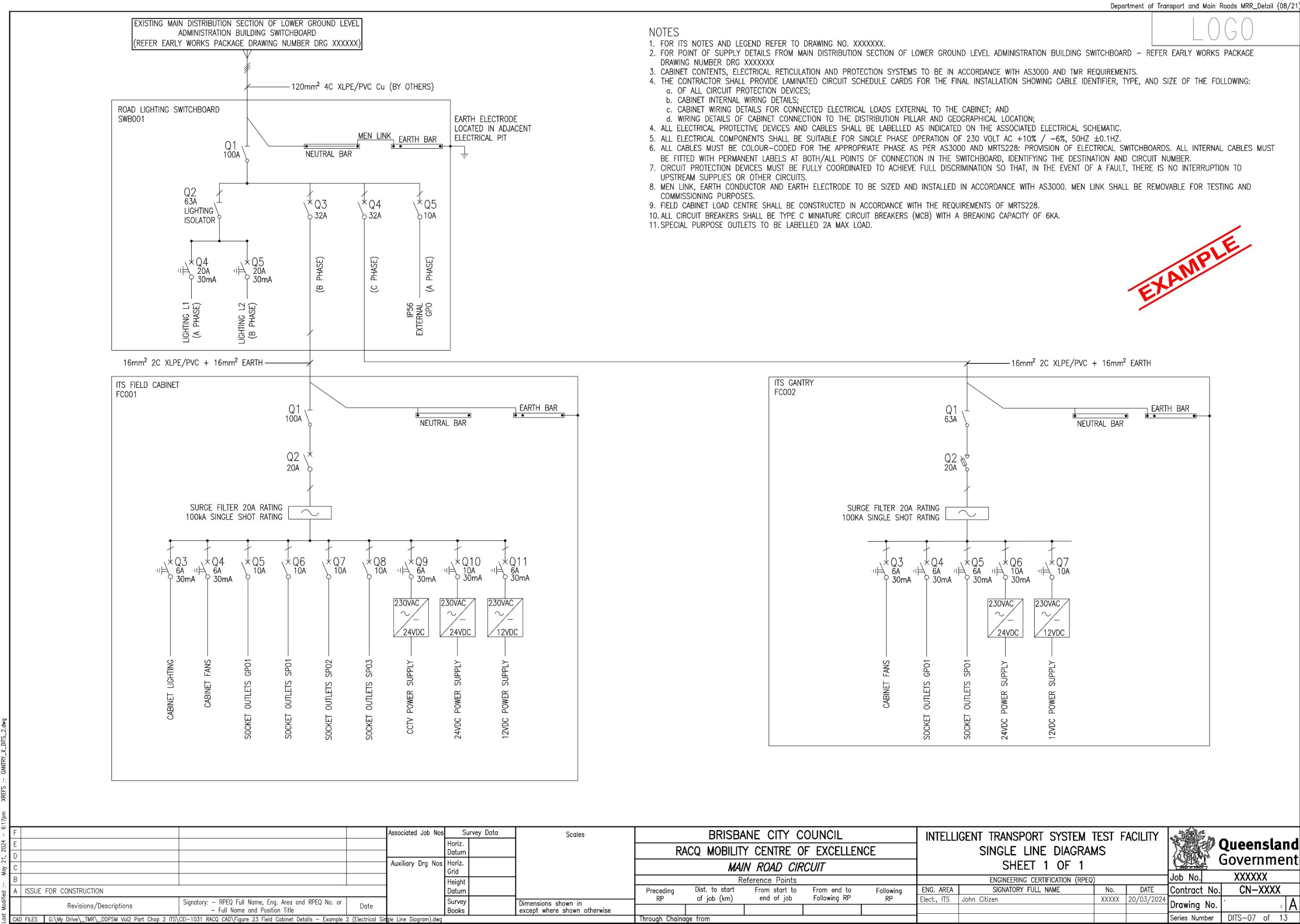




Figure 2.15.10.3(b) – Electrical single line diagram (example 2 - Gantry)



**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)

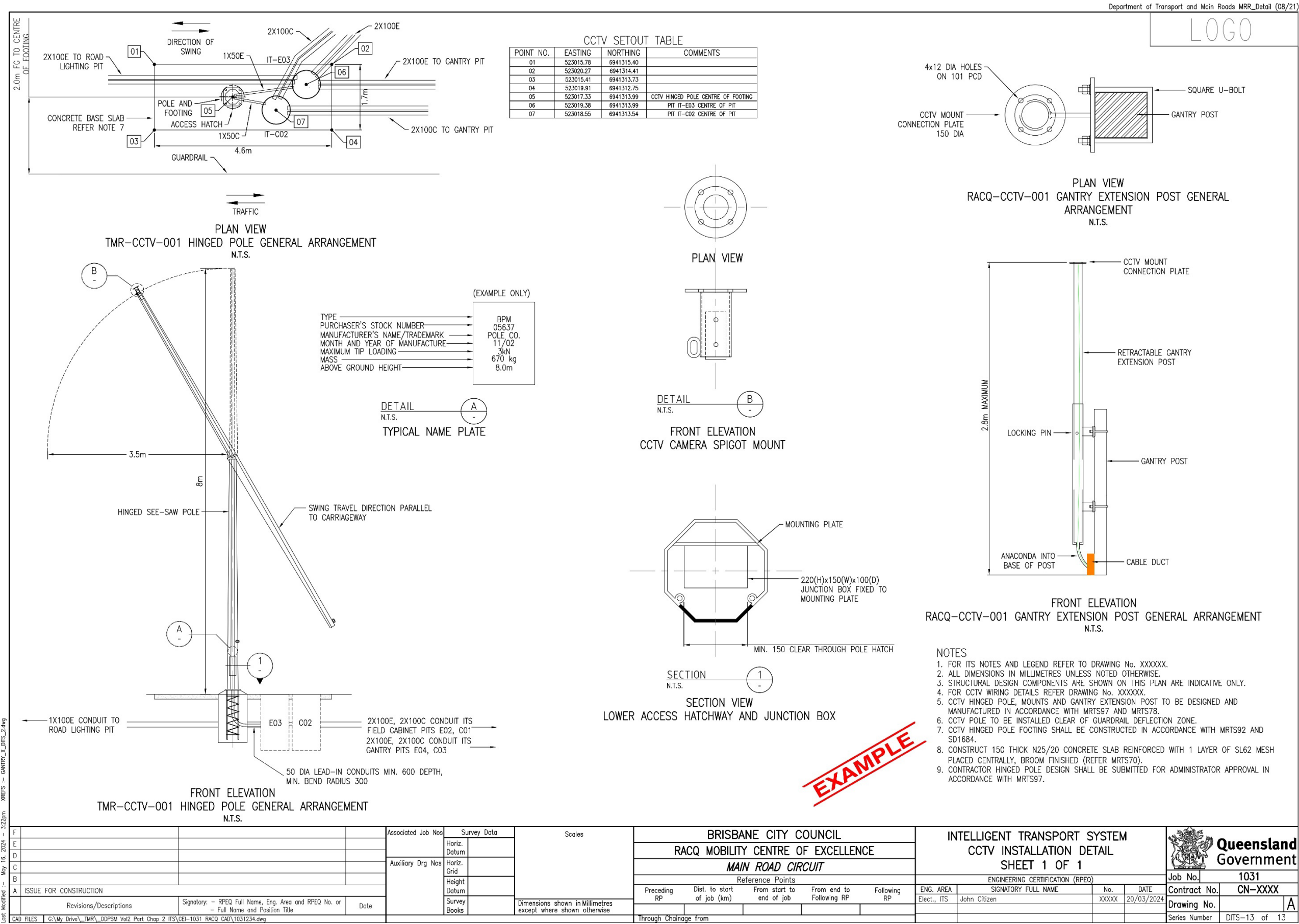
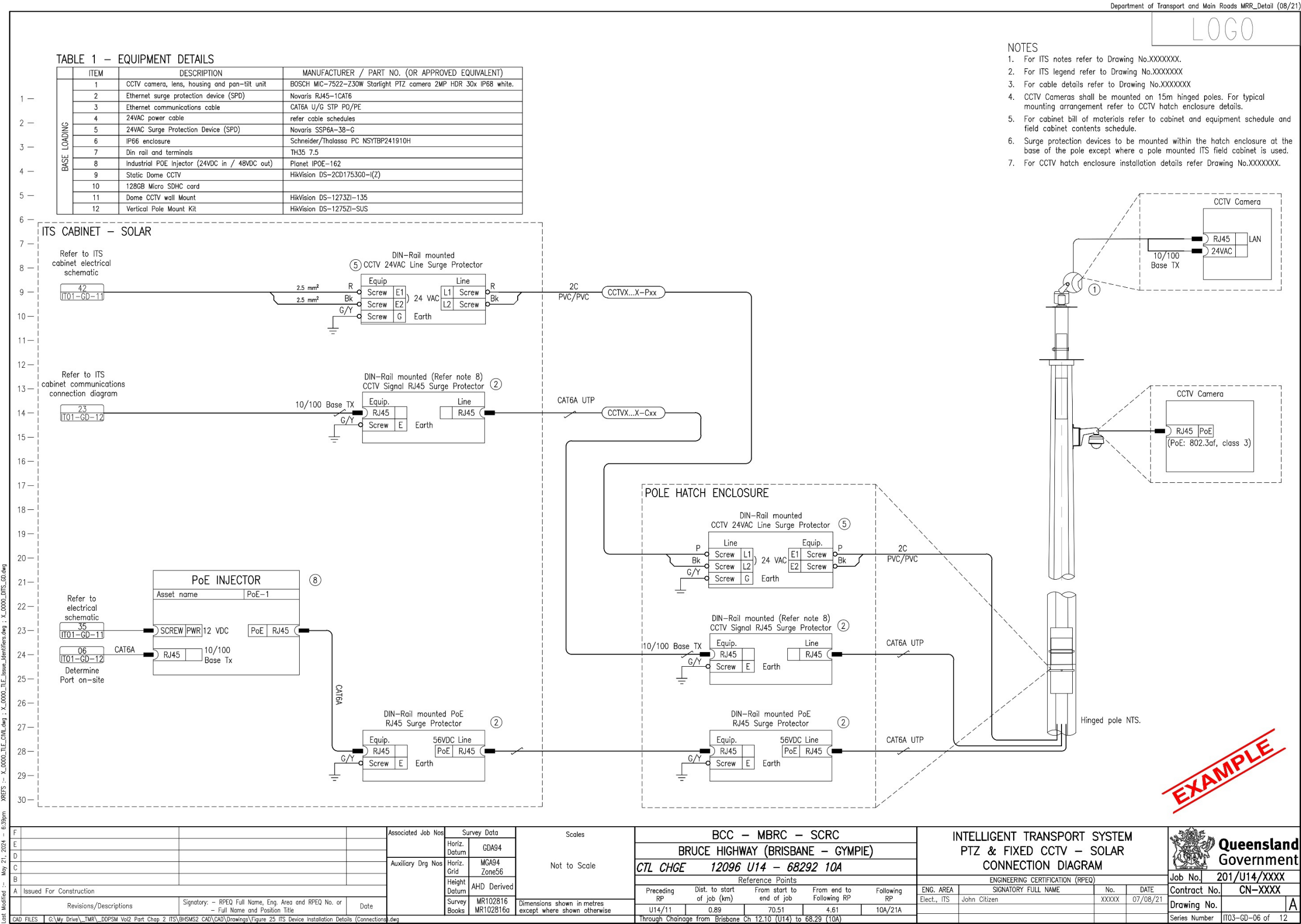




Figure 2.15.11(b) – CCTV installation detail showing connections (example)



**Table 2.15.11 – ITS device details required in drawing**

<b>ITS Category</b>	<b>Examples and Specifications</b>	<b>Additional information required in device installation drawing</b>
ITS-Electronic Signs	VMS – MRTS202 VSL / LUMS – MRTS206 Road Condition Information Signs – MRTS216 Ramp Signs – MRTS217 Vehicle Activated Signs – VAS School Zone Signs – MRTS222 Changeable Message Signs – MRTS227 eTCS – MRTS229	For Electronic signs (such as VSLs / LUMS and RC signs), details to be included as follows: <ul style="list-style-type: none"> <li>• Site or Device IDs (STREAMS Name)</li> <li>• UID detail and DIP Switch settings (manufacturer specified)</li> <li>• Labelling of Serial cables, Ethernet cables and ribbon cables</li> <li>• A table showing the permissible frame combinations configured on the group controller (for VSL) or the RC1 sign controller</li> </ul>
ITS-Environmental Sensors	Weather Monitors / Sensors – MRTS231 Flood Monitors / Sensors – MRTS233	For Environmental sensors, details to be included as follows: <ul style="list-style-type: none"> <li>• Site or Device IDs (STREAMS Name)</li> <li>• UID detail (manufacturer specified)</li> <li>• Labelling of Serial cables, Ethernet cables and ribbon cables</li> <li>• A table showing the sensor settings and event trigger points</li> </ul>
ITS-Traffic Sensing and Data Collection	Weigh-in-Motion system – MRTS203 Vehicle Detectors – MRTS204 Wireless Traffic Sensors e.g. Bluetooth – MRTS214 Imaging (CCTV) – MRTS255 ANPR – MRTS250 Counters and Classifiers – MRTS251 Feeder and Loop cables – MRTS257	For Traffic sensing and data collection devices, details to be included as follows: <ul style="list-style-type: none"> <li>• Site or Device IDs (STREAMS Name)</li> <li>• Sensor number (e.g. Loop / Piezo Number / Radar)</li> <li>• Lane ID</li> <li>• Labelling of Serial cables, Ethernet cables, ribbon cables and Loop feeder cables</li> <li>• A table showing the permissible frame combinations configured on the group controller (for VSL) or the RC1 sign controller</li> </ul>

#### **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

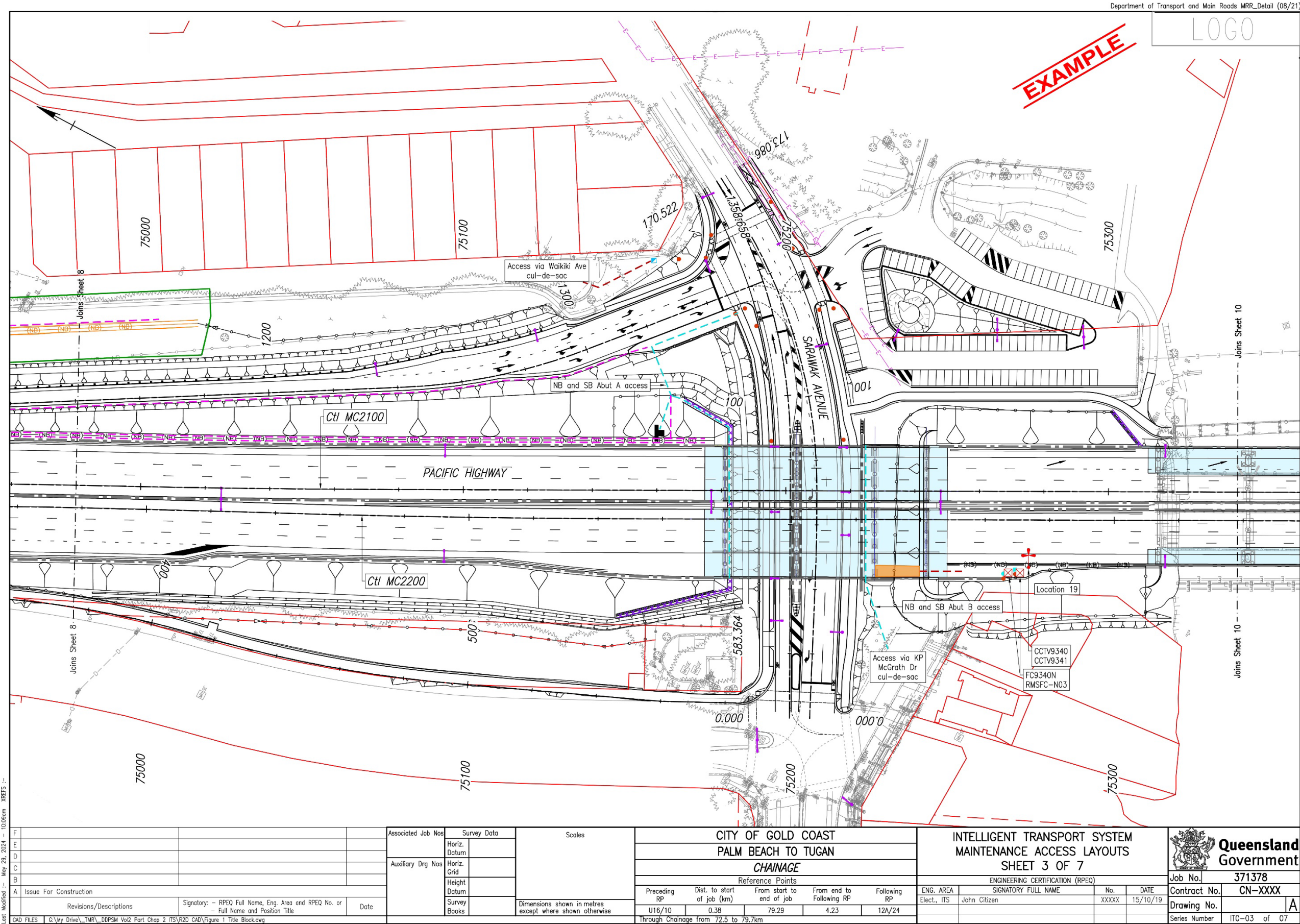




Figure 2.15.12(b) – ITS equipment connection schedule example 1

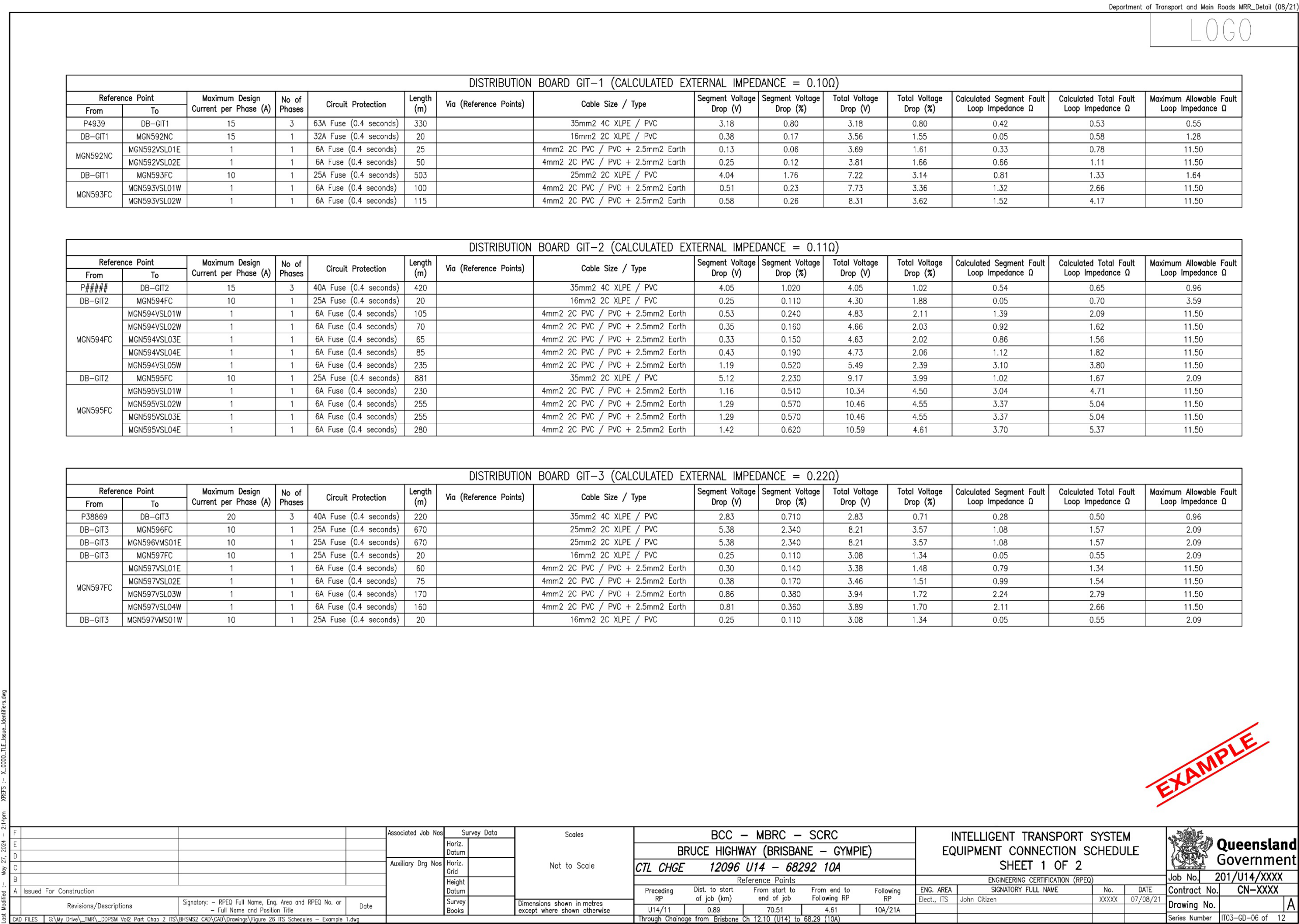
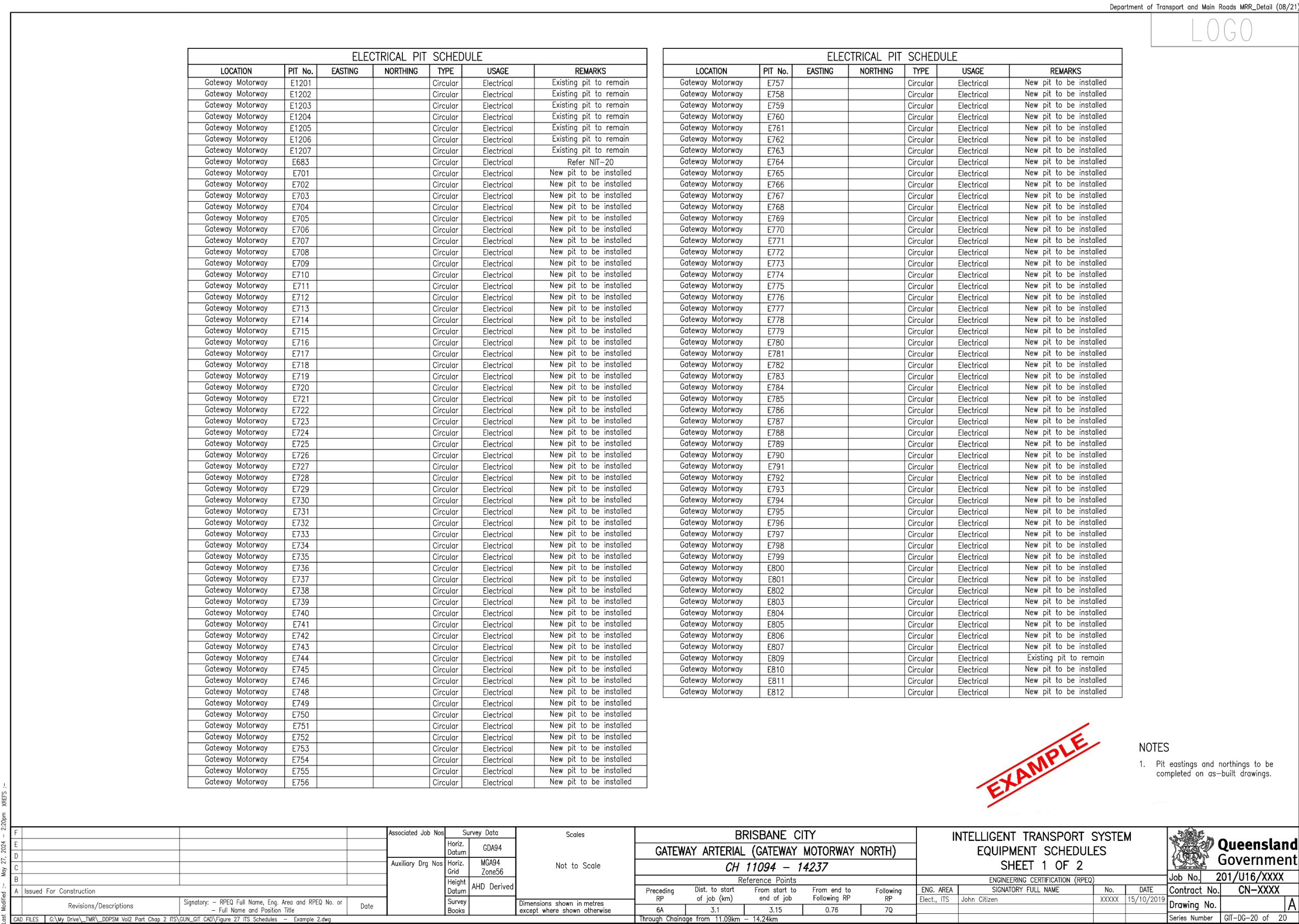


Figure 2.15.12(c) – Equipment schedules example 2





### **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:

1. 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 m<sup>2</sup>) / 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 (m<sup>2</sup>)
- 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

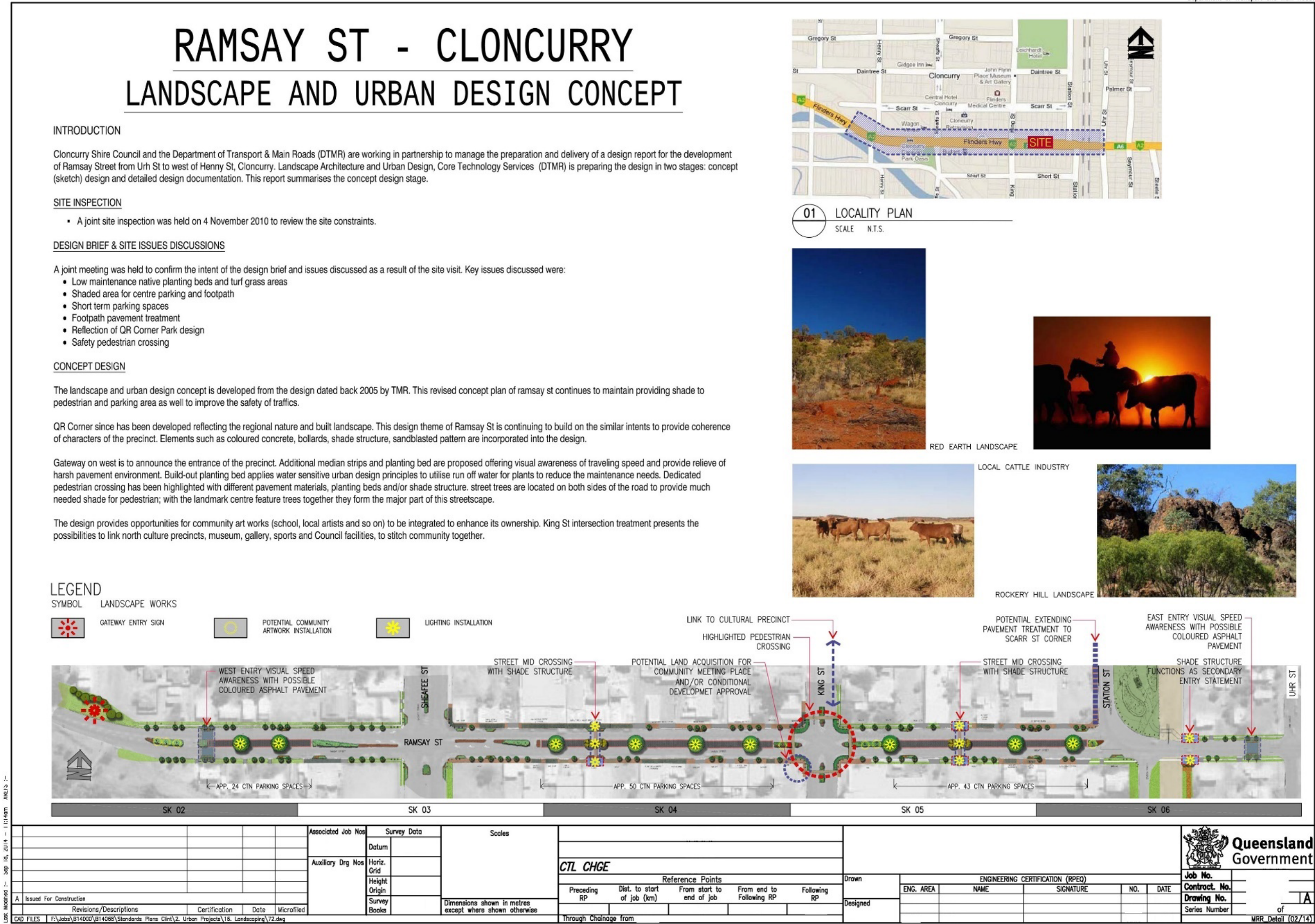




Figure 2.16.4(b) – Landscaping layout and details – generic example 2

Department of Transport and Main Roads

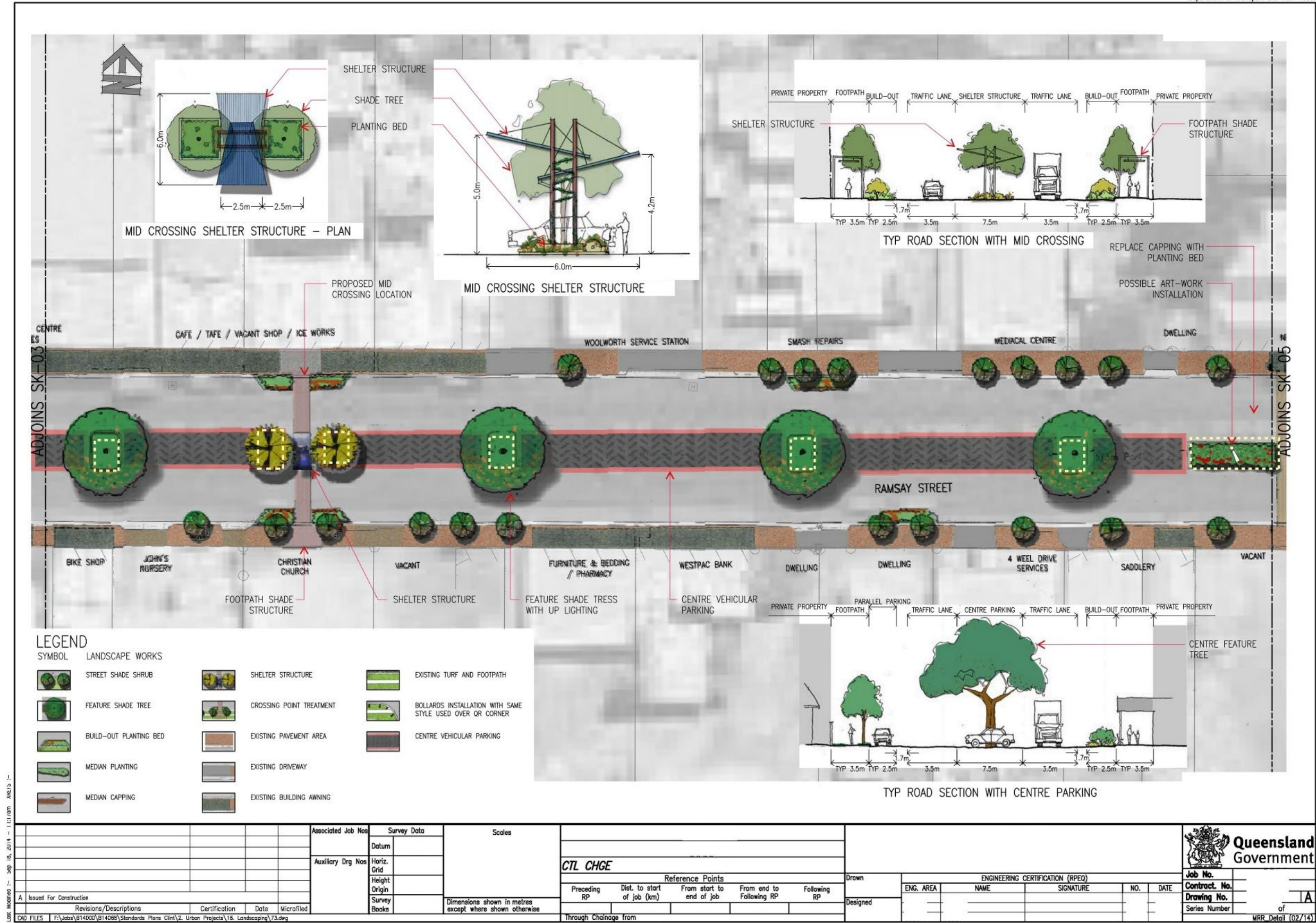


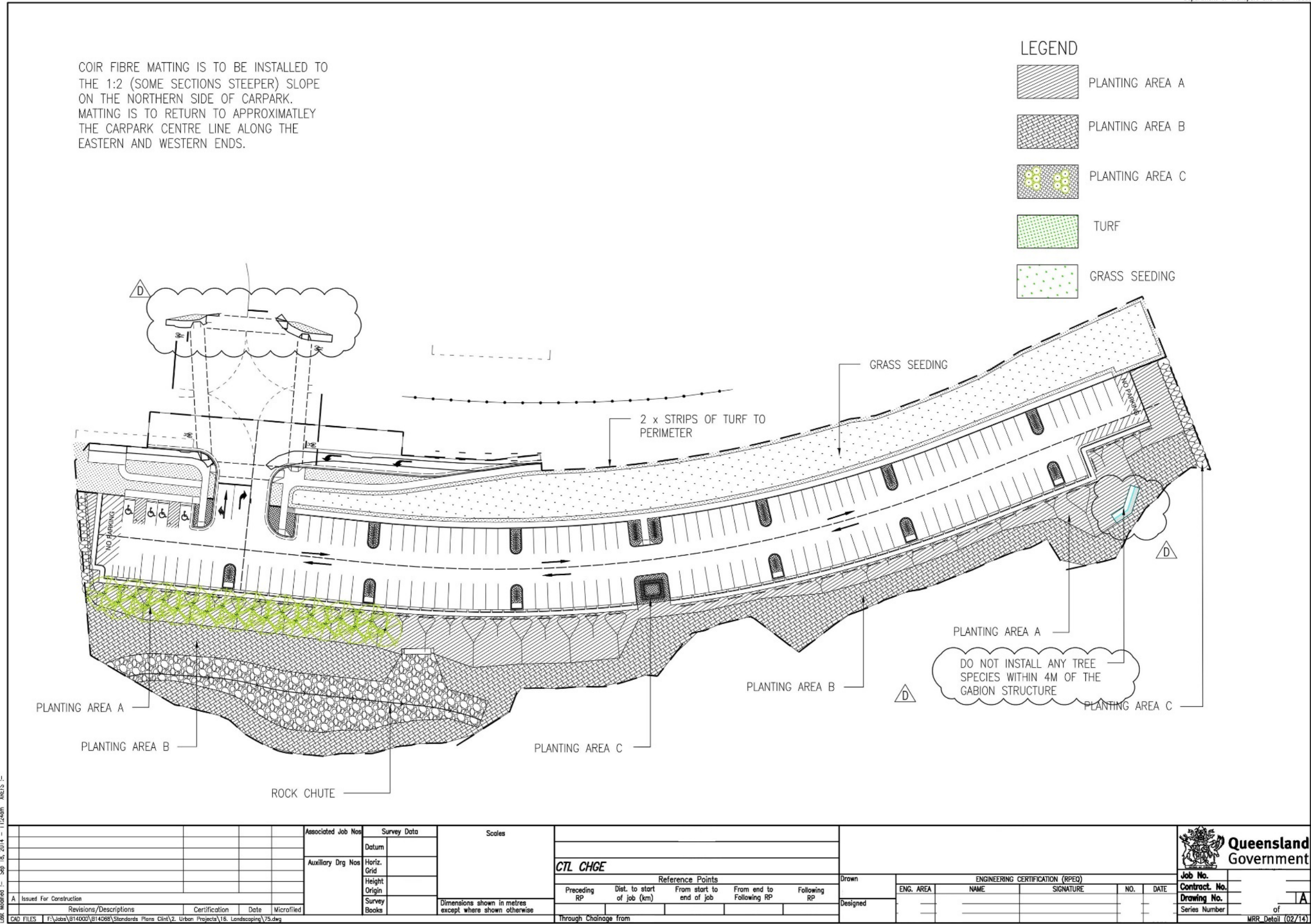






Figure 2.16.4(d) – Landscaping layout and details – generic example 4

Department of Transport and Main Roads





Last Modified :- Dec 17, 2014 - 10:42am XRLFS :-



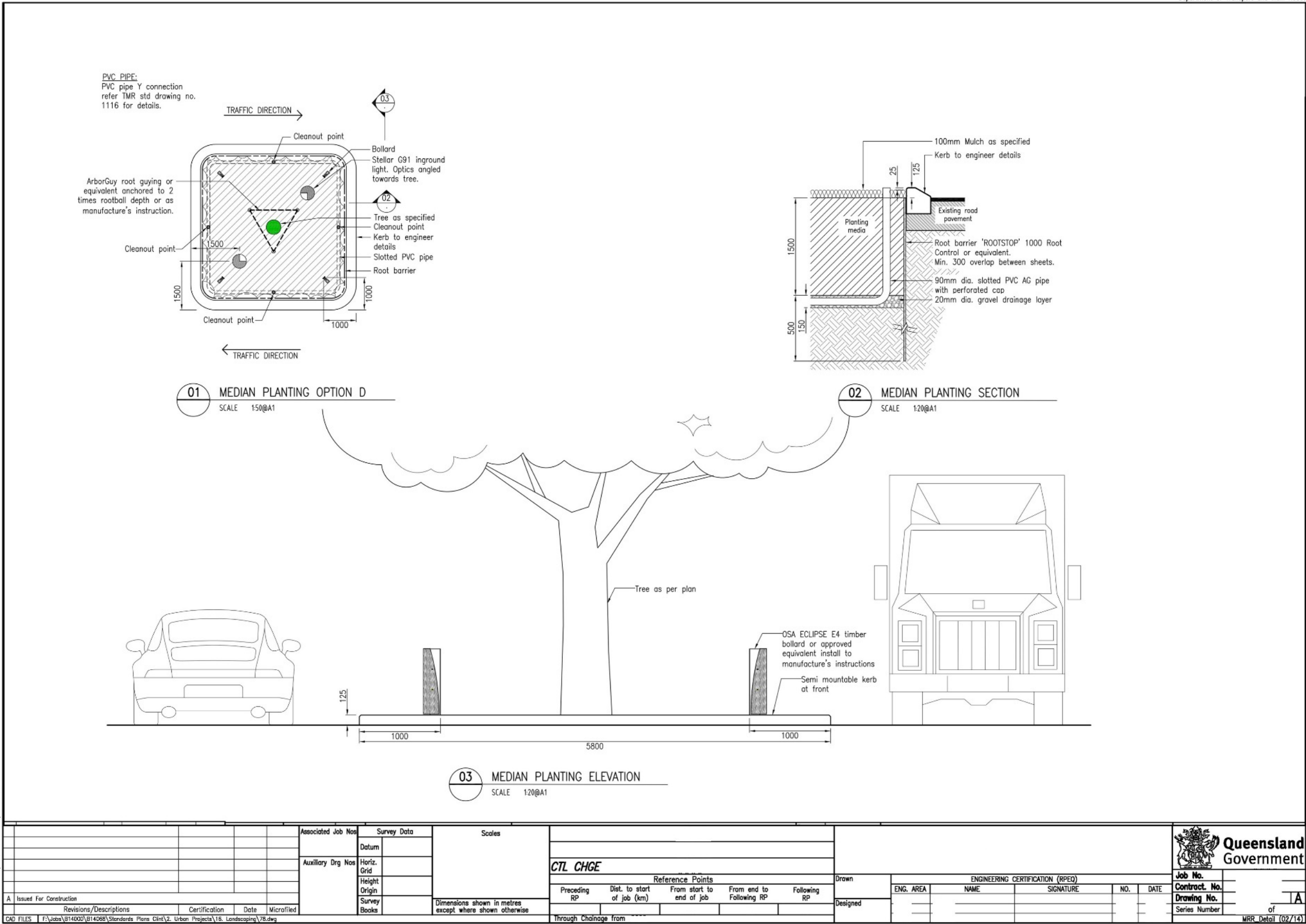


Department of Transport and Main Roads



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

Department of Transport and Main Roads



Department of Transport and Main Roads





### **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.

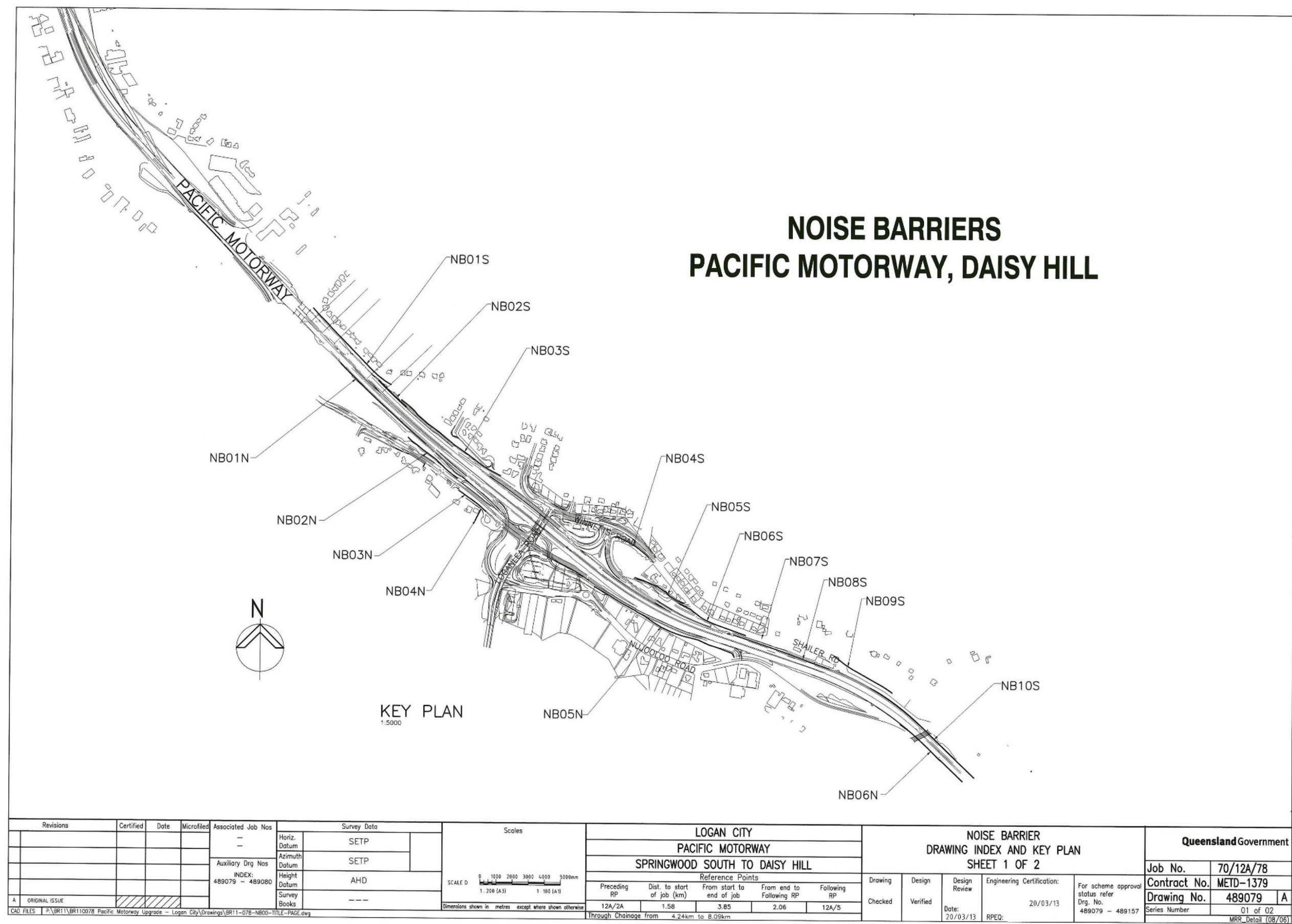
These drawings are to refer to other relevant standard drawings and standard specifications as they relate to the project specific requirements.

#### **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





### REFERENCE DRAWINGS

BR110078NB00N001	489079	NOISE BARRIER DRAWING INDEX & KEY PLAN SHEET 1 OF 2	BR110078NB05N09	489105	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB03S04	489131	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB09S01	489157	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB00N002	489080	NOISE BARRIER DRAWING INDEX & KEY PLAN SHEET 2 OF 2	BR110078NB05N10	489106	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB03S05	489132	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB09S02	489158	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N01	489081	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB05N11	489107	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB03S06	489133	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB09S03	489159	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N02	489082	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB05N12	489108	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB03S07	489134	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB09S04	489160	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N03	489083	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB05N13	489109	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB04S01	489135	NOISE BARRIER NB04S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB09S05	489161	NOISE BARRIER NB09S (SHAILER RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB01N04	489084	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB06N01	489110	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO LONG SECTION	BR110078NB04S02	489136	NOISE BARRIER NB04S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB10S01	489162	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N05	489085	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB06N02	489111	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO LONG SECTION	BR110078NB04S03	489137	NOISE BARRIER NB04S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB10S02	489163	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N06	489086	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB06N03	489112	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO LONG SECTION	BR110078NB05S01	489138	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB10S03	489164	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB01N07	489087	NOISE BARRIER NB01N (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB06N04	489113	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO LONG SECTION	BR110078NB05S02	489139	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB10S04	489165	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB02N01	489088	NOISE BARRIER NB02N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB06N05	489114	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB05S03	489140	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB10S05	489166	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB02N02	489089	NOISE BARRIER NB02N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB06N06	489115	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB05S04	489141	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB10S06	489167	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTIONS
BR110078NB02N03	489090	NOISE BARRIER NB02N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB06N07	489116	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB05S05	489142	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB10S07	489168	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB02N04	489091	NOISE BARRIER NB02N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB06N08	489117	NOISE BARRIER NB06N (PACIFIC MWY, DAISY HILL) FOR FENCO CROSS SECTION	BR110078NB05S06	489143	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB10S08	489169	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO CROSS SECTION, NOTES AND DETAILS
BR110078NB03N01	489092	NOISE BARRIER NB03N (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB01S01	489118	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB05S10	489144	NOISE BARRIER NB05S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB10S09	489170	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS
BR110078NB03N02	489093	NOISE BARRIER NB03N (SHAILER RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB01S02	489119	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB06S01	489145	NOISE BARRIER NB06S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB10S10	489171	NOISE BARRIER NB10S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION
BR110078NB03N03	489094	NOISE BARRIER NB03N (SHAILER RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB01S03	489120	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB06S02	489146	NOISE BARRIER NB06S (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
BR110078NB04N01	489095	NOISE BARRIER NB04N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB01S04	489121	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB06S03	489147	NOISE BARRIER NB06S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION			
BR110078NB04N02	489096	NOISE BARRIER NB04N (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB01S05	489122	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB08S04	489148	NOISE BARRIER NB08S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION			
BR110078NB05N01	489097	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB01S06	489123	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB08S05	489149	NOISE BARRIER NB08S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS			
BR110078NB05N02	489098	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB01S07	489124	NOISE BARRIER NB01S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB07S01	489150	NOISE BARRIER NB07S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION			
BR110078NB05N03	489099	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB02S01	489125	NOISE BARRIER NB02S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB07S02	489151	NOISE BARRIER NB07S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION			
BR110078NB05N04	489100	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB02S02	489126	NOISE BARRIER NB02S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB07S03	489152	NOISE BARRIER NB07S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION			
BR110078NB05N05	489101	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB02S03	489127	NOISE BARRIER NB02S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB07S04	489153	NOISE BARRIER NB07S (WINNETTS RD, DAISY HILL) FOR FENCO SECTION AND DETAILS			
BR110078NB05N06	489102	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO SECTION AND DETAILS	BR110078NB03S01	489128	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB08S01	489154	NOISE BARRIER NB08S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION			
BR110078NB05N07	489103	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB03S02	489129	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB08S02	489155	NOISE BARRIER NB08S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION			
BR110078NB05N08	489104	NOISE BARRIER NB05N (WESTERN SERVICE RD, DAISY HILL) FOR FENCO CROSS SECTIONS	BR110078NB03S03	489130	NOISE BARRIER NB03S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION	BR110078NB08S03	489156	NOISE BARRIER NB08S (WINNETTS RD, DAISY HILL) FOR FENCO PLAN AND ELEVATION			

Revisions		Certified	Date	Microfiled	Associated Job Nos	Survey Data		Scales		LOGAN CITY PACIFIC MOTORWAY SPRINGWOOD SOUTH TO DAISY HILL				NOISE BARRIER DRAWING INDEX AND KEY PLAN SHEET 2 OF 2				Queensland Government		
					—	Horiz. Datum	SETP													
					—	Azimuth Datum	SETP													
					INDEX: 489079 — 489080	Height Datum	AHD													
						Survey Books	— — —													
A ORIGINAL ISSUE										Reference Points				Drawing	Design	Design Review	Engineering Certification:	For scheme approval status refer Drg. No. 489079 — 489157	Job No.	70/12A/78
								Dimensions shown in metres except where shown otherwise		Preceding RP      Dist. to start of job (km)      From start to end of job      From end to Following RP      Following RP 12A/2A      1.58      3.85      2.06      12A/5				Checked	Verified	Date: 20/03/13	RPEQ:	20/03/13	Contract No.	METD-1379
CAD FILES P:\BRT\1\BRT10078 Pacific Motorway Upgrade - Logan City\Drawings\BRT11-078-NB00-TITLE-PAGE.dwg										Through Chaining from 4.24km to 8.09km								Drawing No.	489080	A
																		Series Number	02 of 02	MR Detail (RM/MS)





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

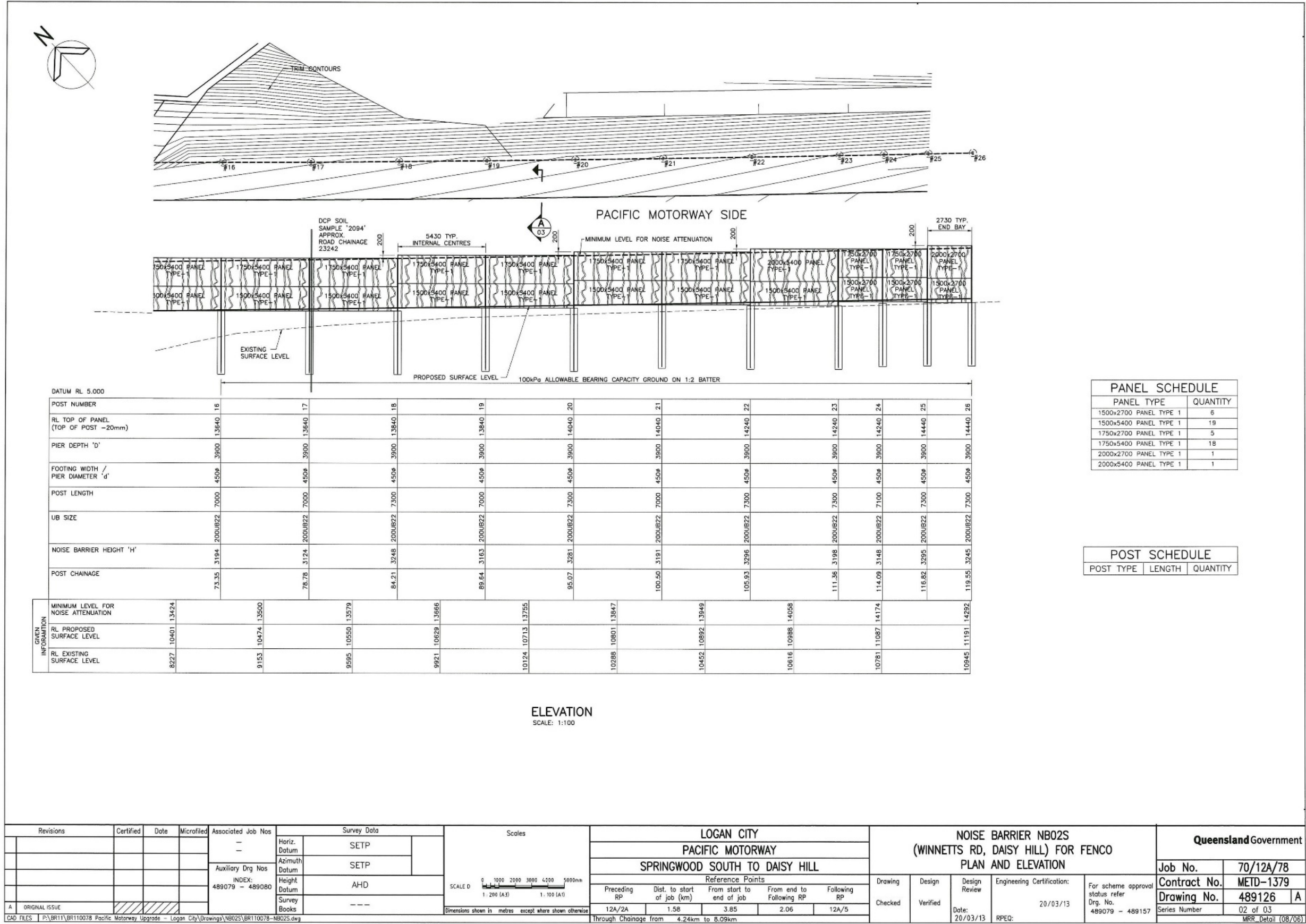
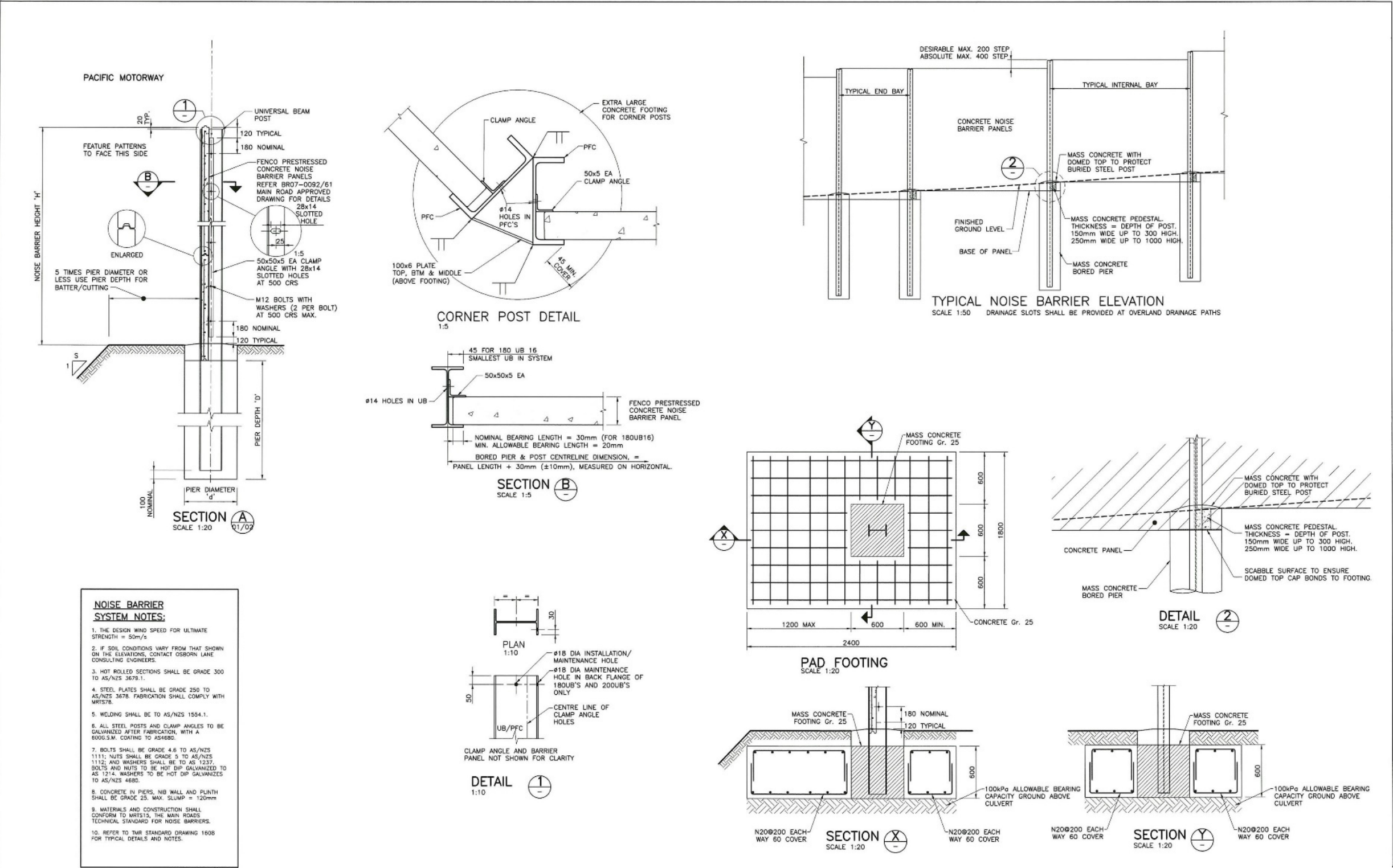




Figure 2.17(e) – Noise barrier – registered example – sheet 5 of 5





### **2.18 *Special treatment details***

The special treatment details drawing provides specific project details, for example driveway details, vehicle crossing points, footpath details, minor retaining 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

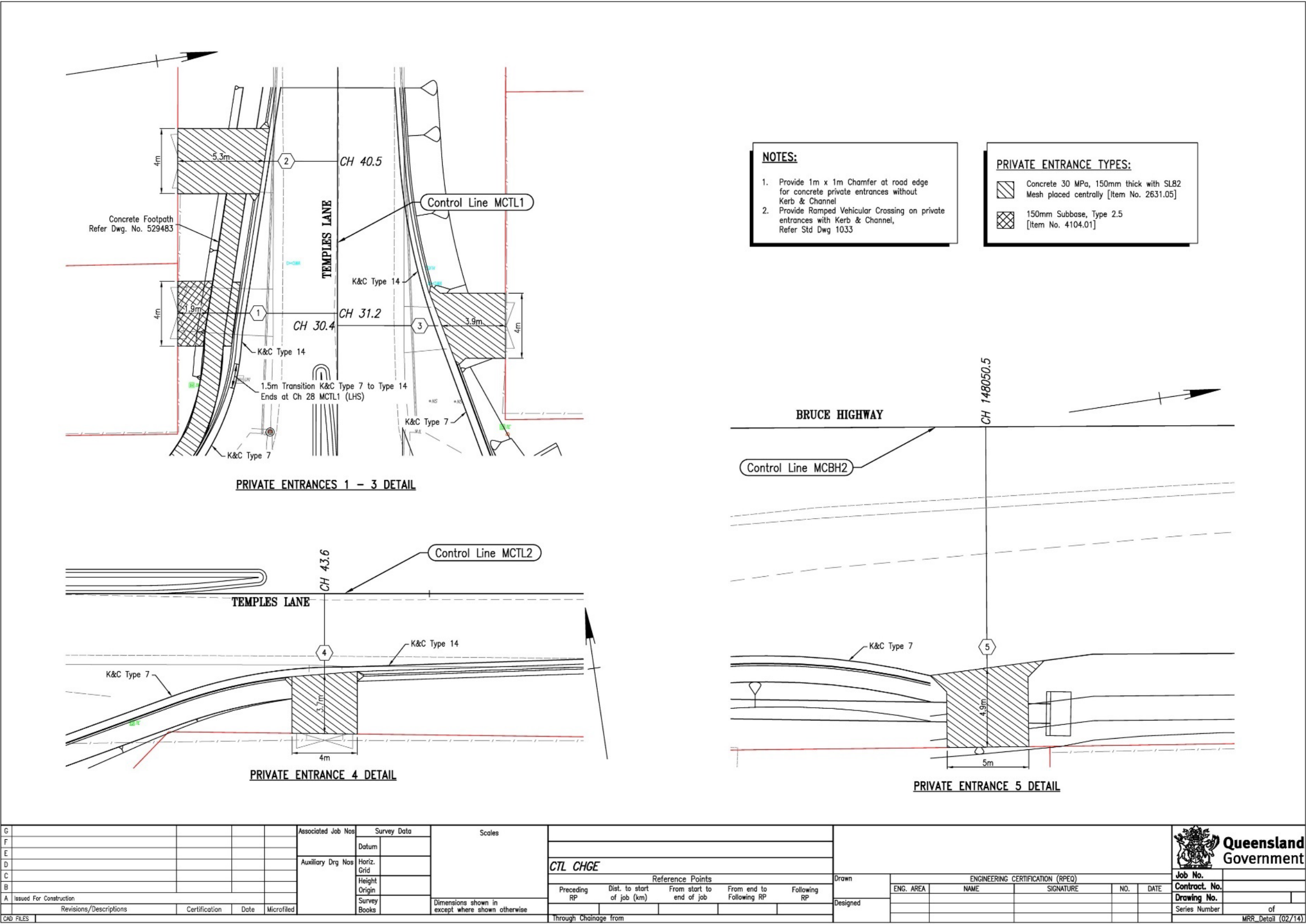


Figure 2.18(b) – Vehicle crossing details – generic example

Department of Transport and Main Roads

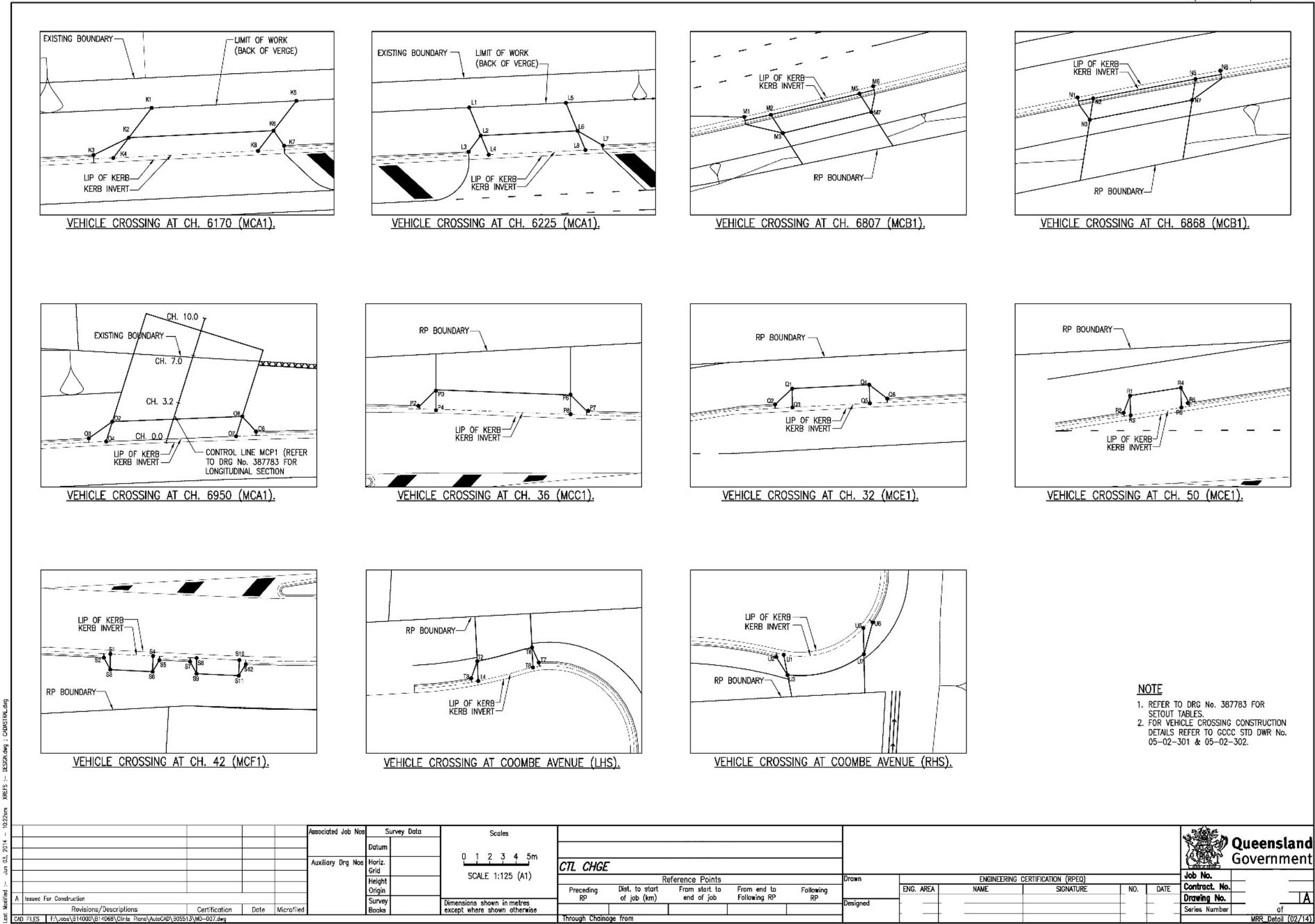




Figure 2.18(c) – Kerb ramp crossing details – generic example

Department of Transport and Main Roads

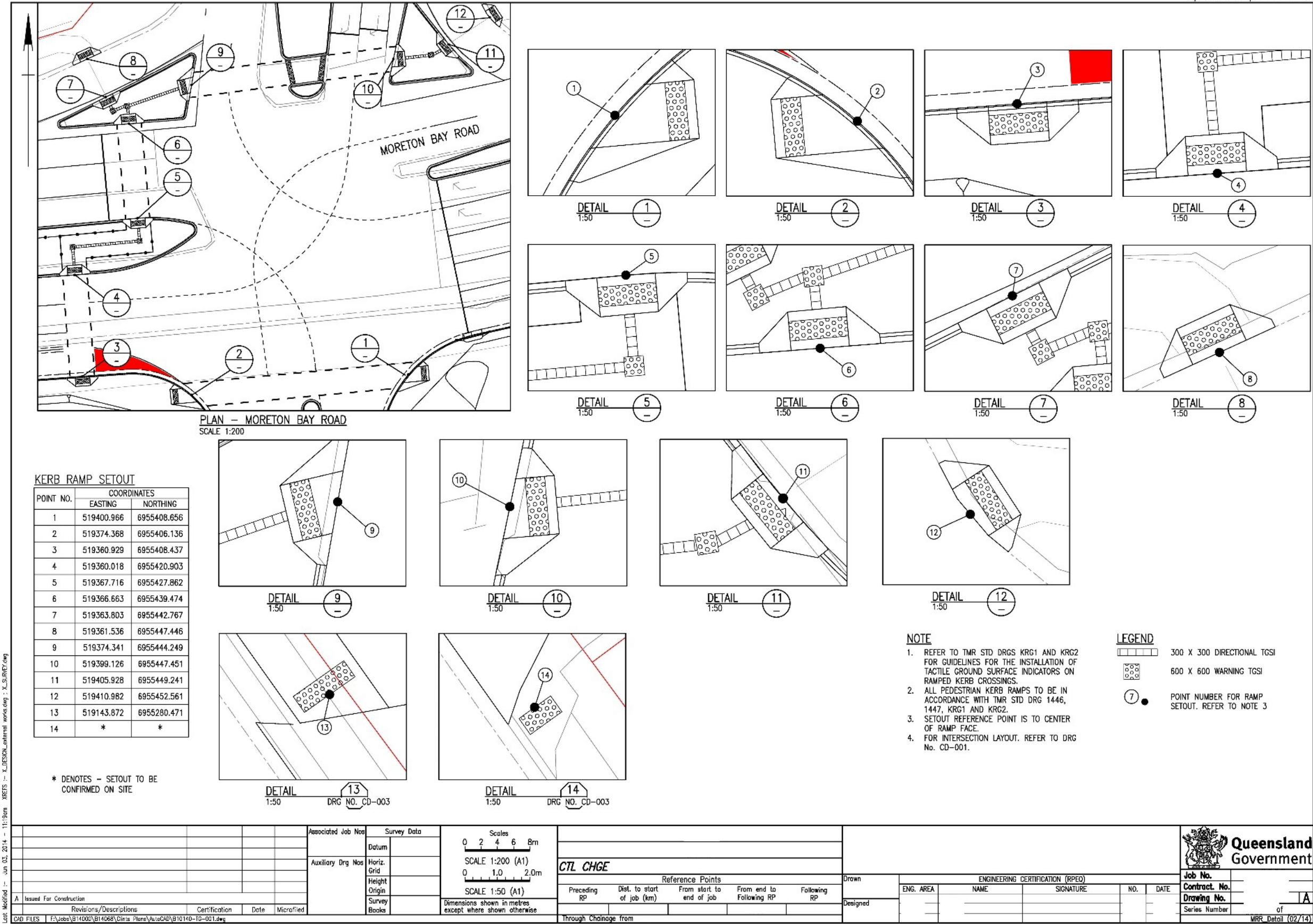


Figure 2.18(d) – Footpath details – generic example

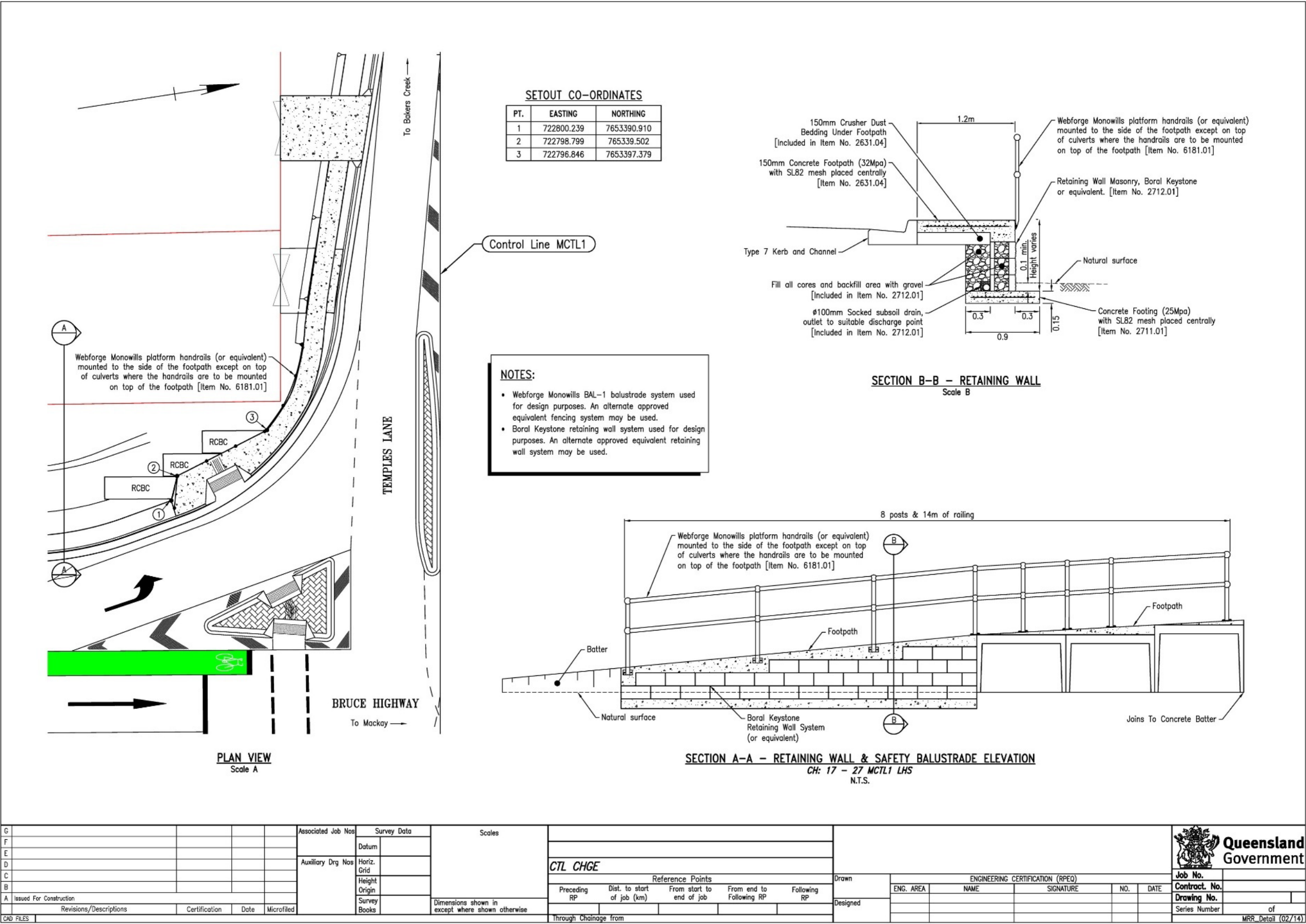




Figure 2.18(e) – Cycle lane facilities layout – generic example sheet 1 of 2

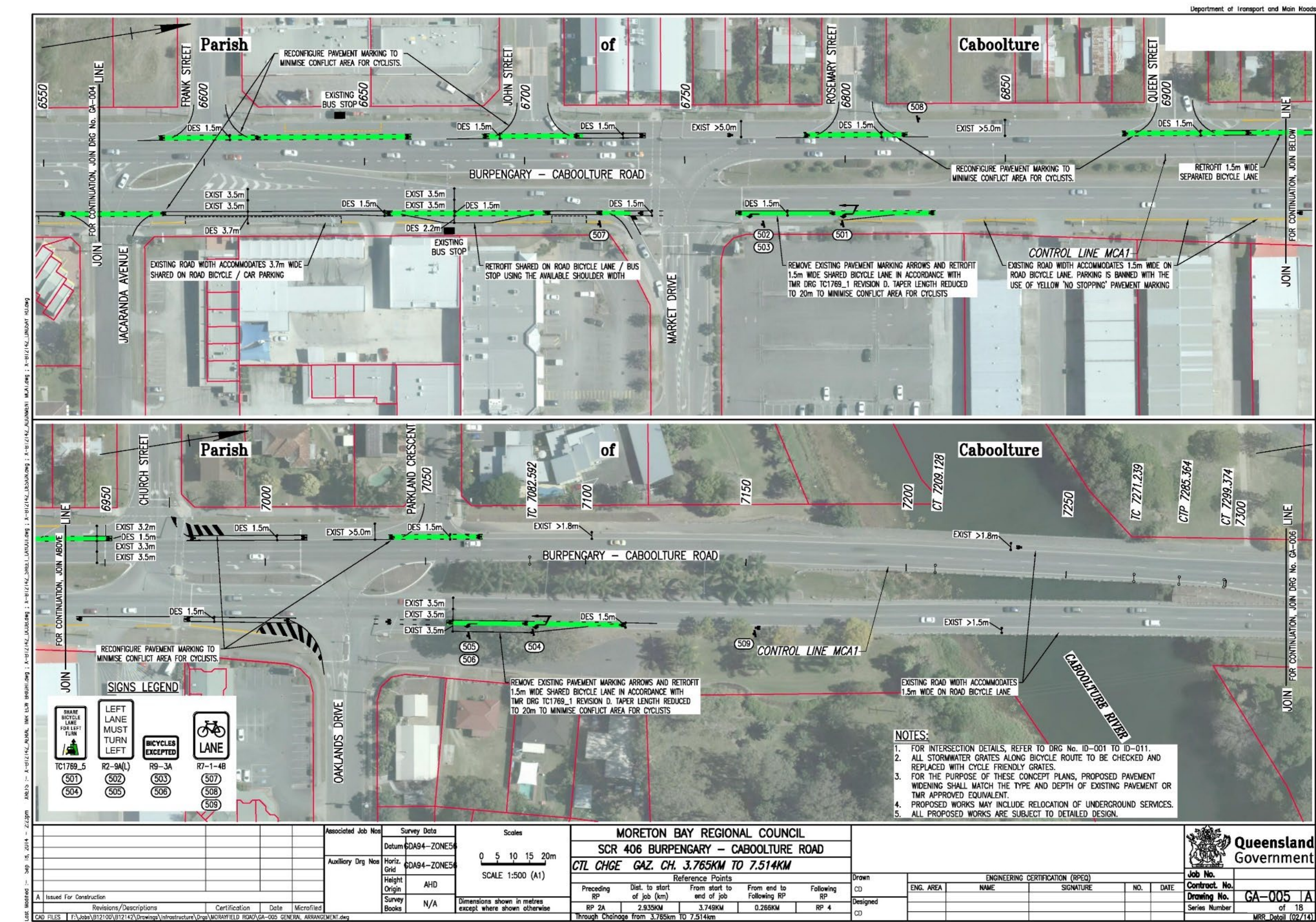




Figure 2.18(f) – Cycle lane facilities layout – generic example sheet 2 of 2

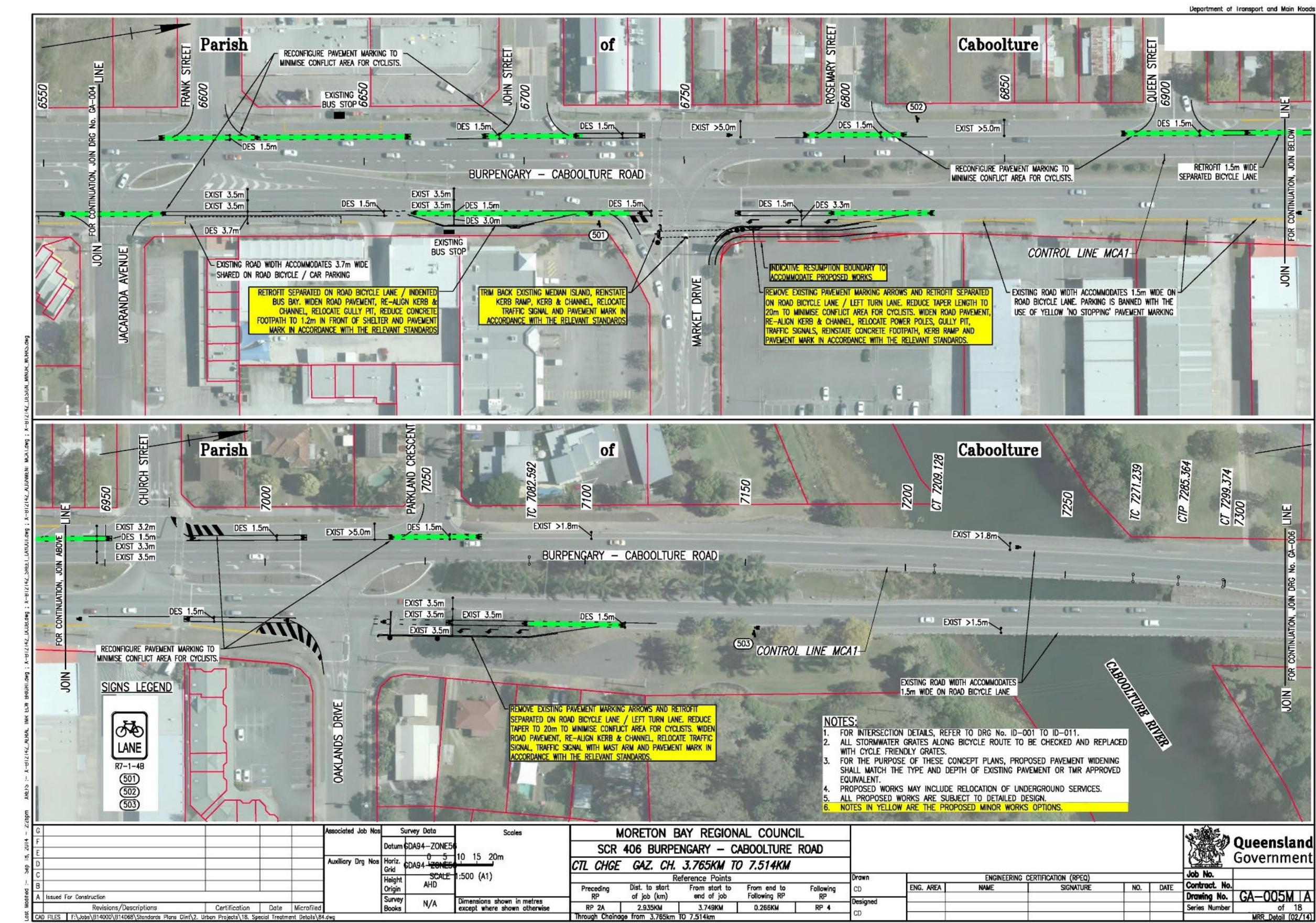




Figure 2.18(g) – Private access details – registered example

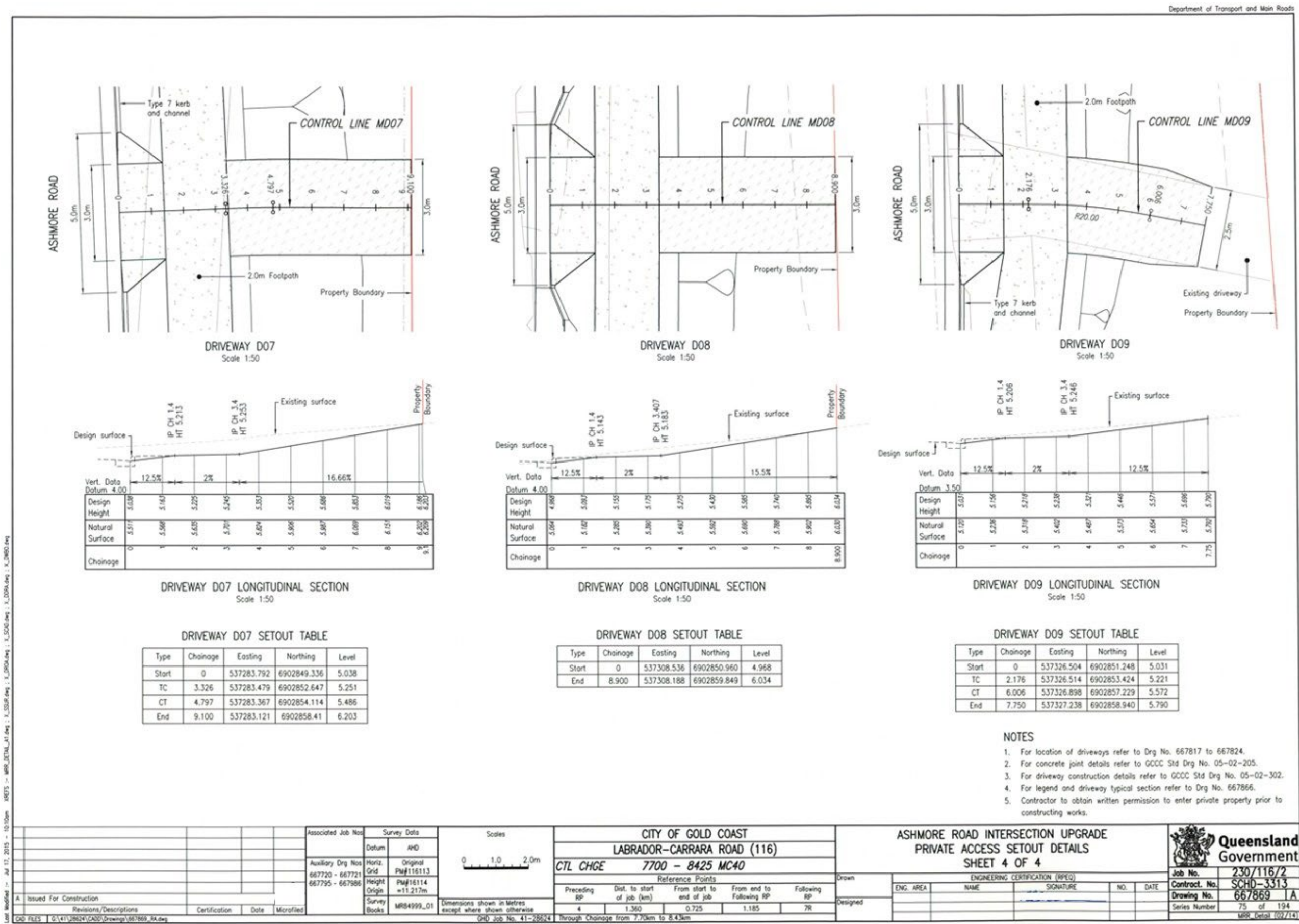
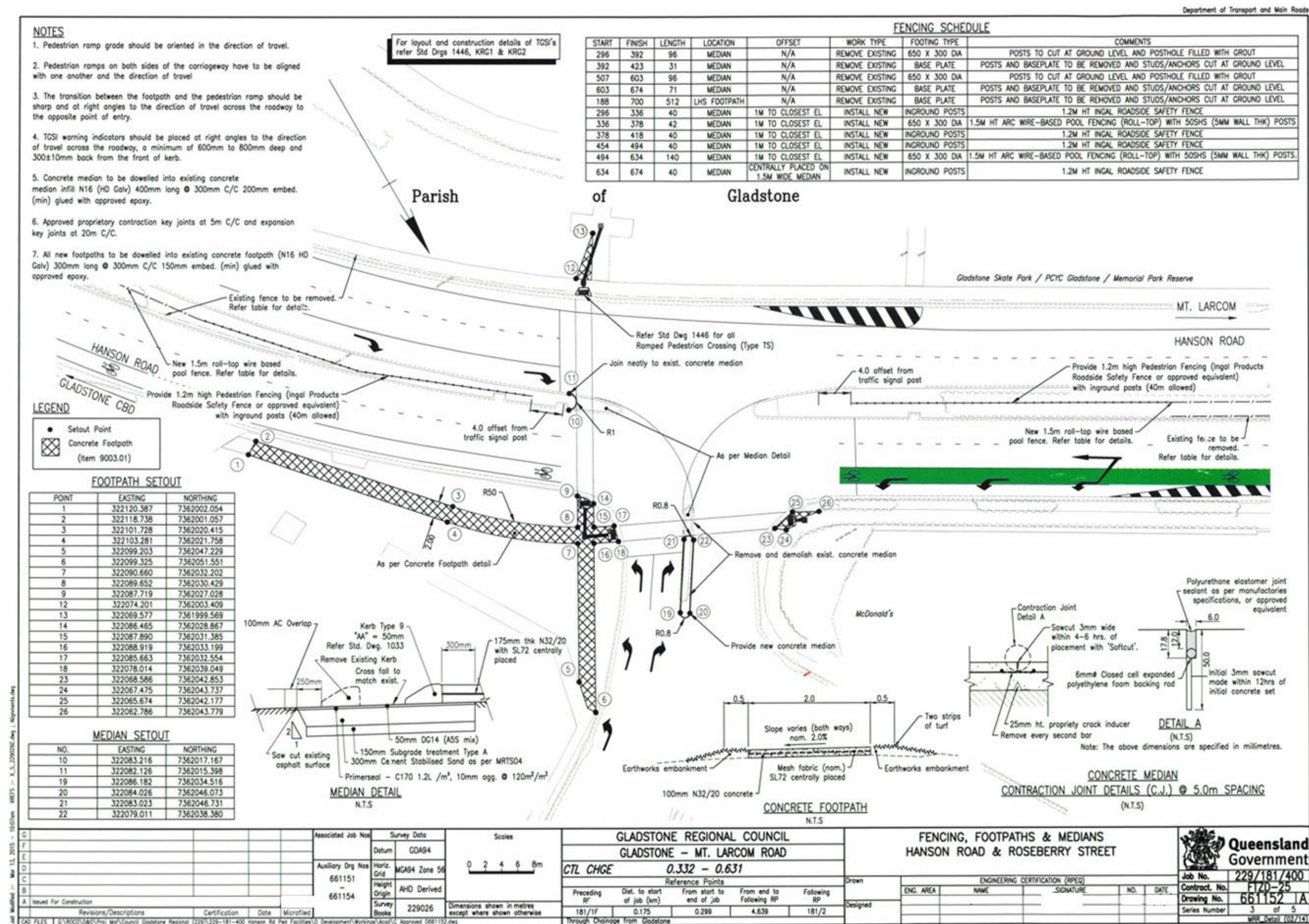




Figure 2.18(h) – Footpath details – registered example





### **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**

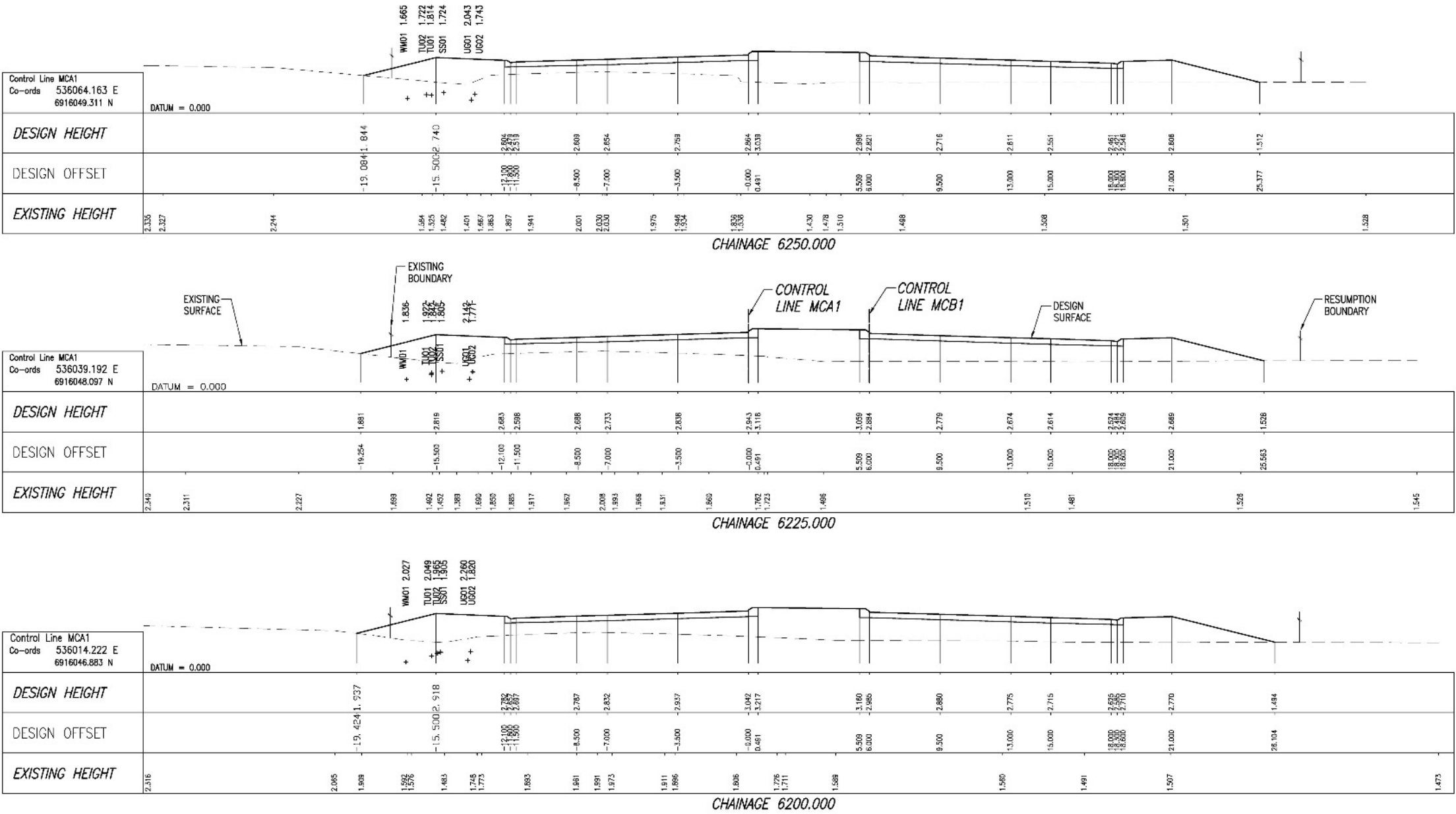
- Consider 1:100 at A1 or 1:200 at A3
- Natural scale (unless requested with Horizontal / Vertical distortion)

##### **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

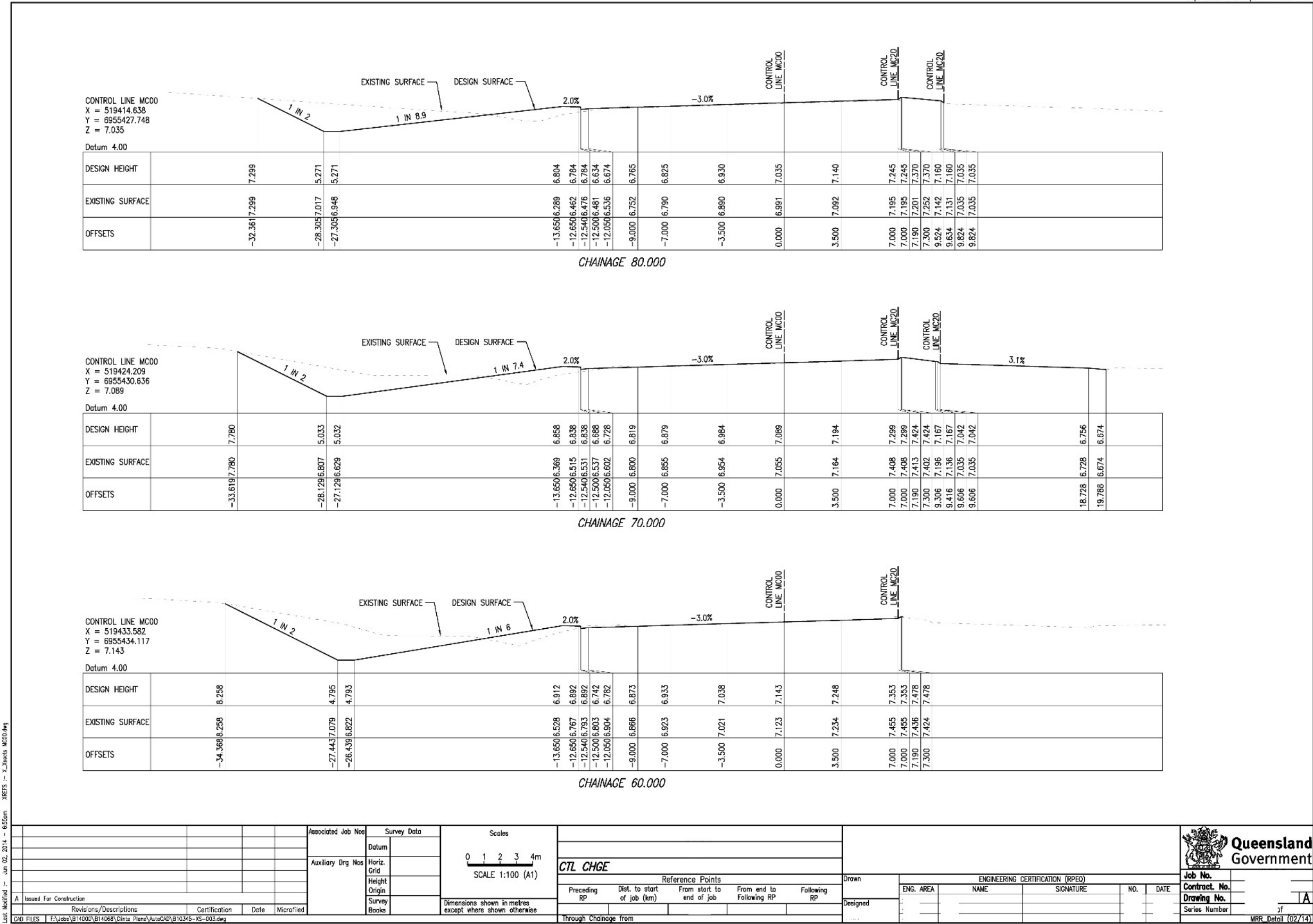
Department of Transport and Main Roads



Associated Job Nos		Survey Data		Scales		CTL CHGE		ENGINEERING CERTIFICATION (RPEQ)		Queensland Government	
Auxiliary Drg Nos		Datum		0 1 2 3 4m		Reference Points		NAME		Job No.	
		Horiz. Grid		SCALE 1:100 (A1)		Preceding RP		SIGNATURE		Contract No.	
		Height		Dimensions shown in metres except where shown otherwise		Dist. to start of job (km)		NO.		Drawing No.	
		Origin				From start to end of job		DATE		Series Number	
		Survey Books				From end to following RP				of	
A Issued For Construction		Certification		Date		Following RP				MRR Detail (02/14)	
Revisions/Descriptions		Date		Microfiled		Through Chainage from					
CAD FILES F:\Jobs\B14003\B14003\Drawings\AutoCAD\025513\XS-015.dwg											

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

Department of Transport and Main Roads







Associated Job Nos					Survey Data		Scales		Reference Points					ENGINEERING CERTIFICATION (RPEQ)					Job No.	
					Datum		0 1 2 3 4m		Preceding RP					ENGINEERING CERTIFICATION (RPEQ)					Contract No.	
					Auxiliary Drg Nos				Dist. to start of job (km)					NAME					Drawing No.	
									From start to end of job					SIGNATURE					Series Number	
									From end to Following RP					NO.					NO. of OF	
									Following RP					DATE					MRR_Detgill (02/14)	
A Issued For Construction																				
Revisions/Descriptions					Certification		Date													
CAD FILES																				



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

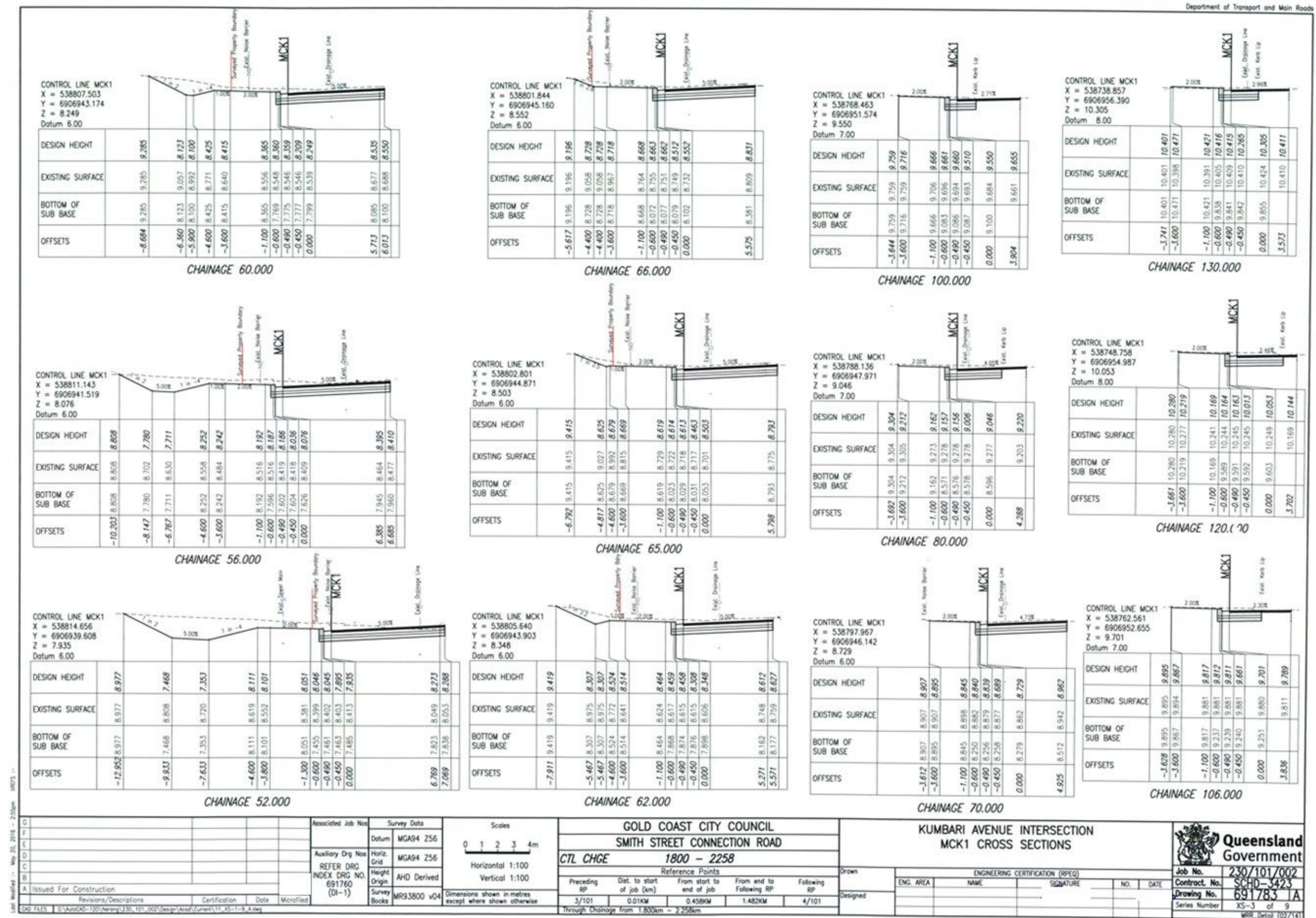
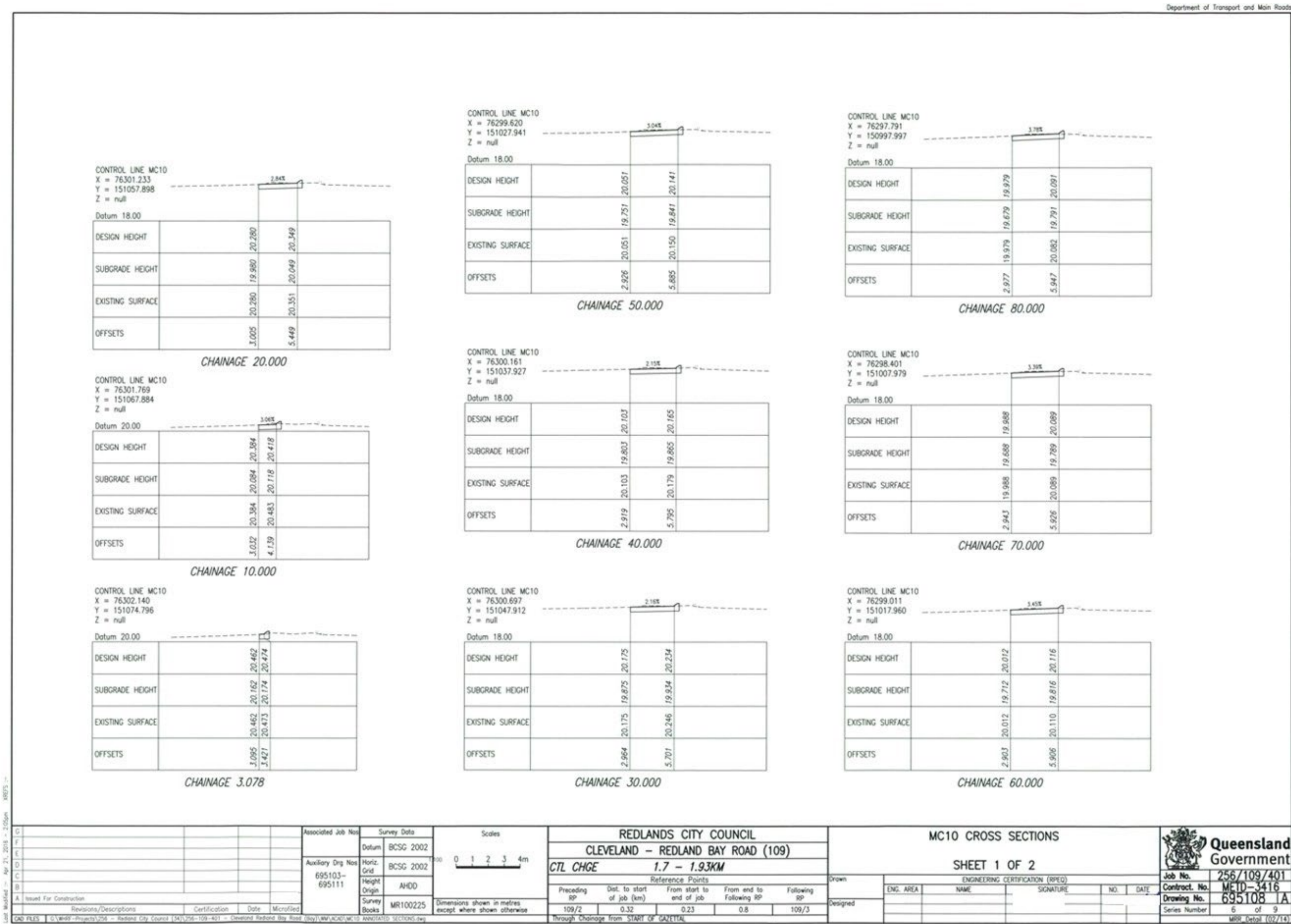




Figure 2.19(f) – Annotated cross sections – registered example 2



## **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.

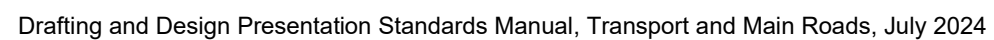




Figure 2.20(b) – Construction staging – generic example 1 – sheet 2 of 2

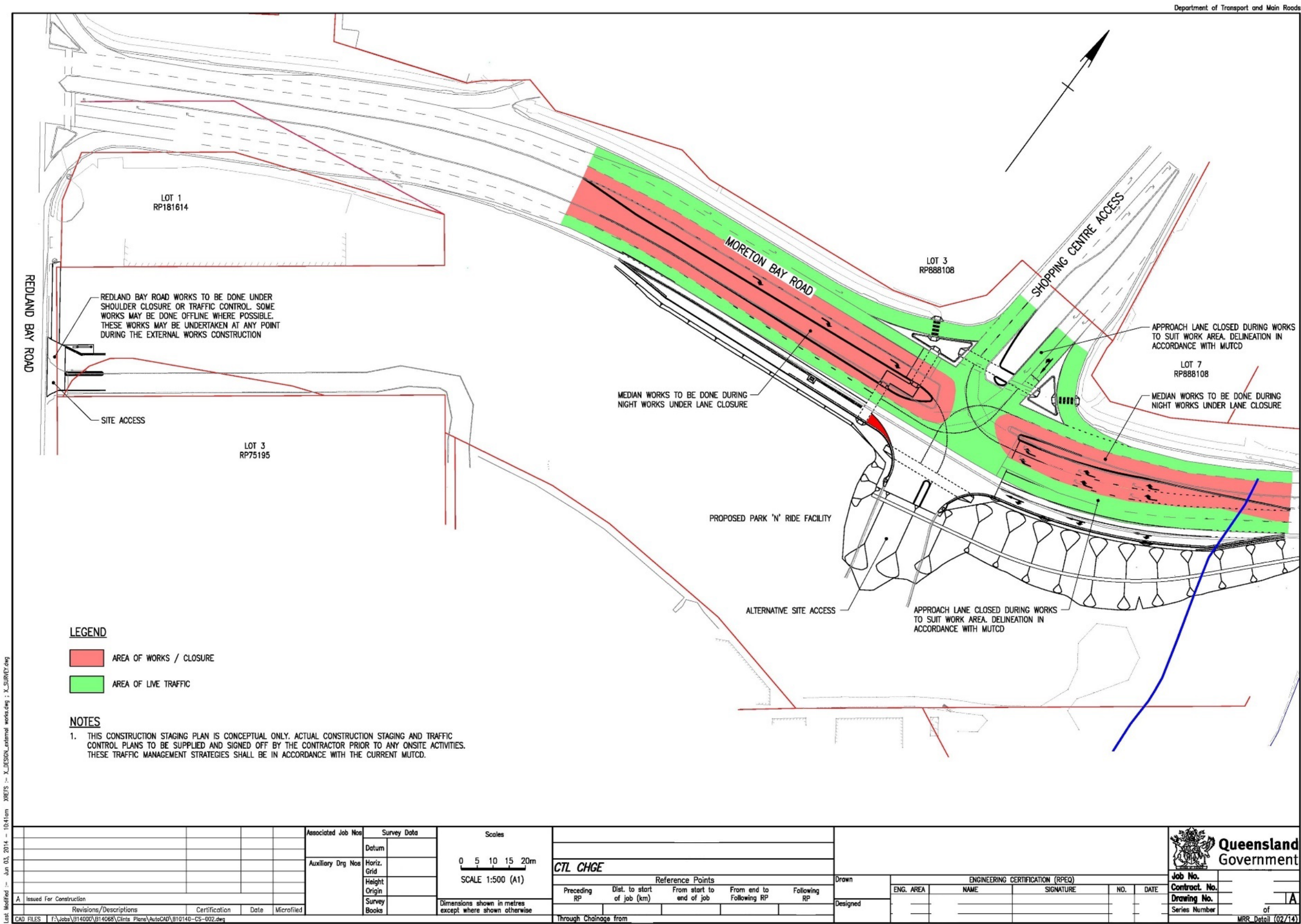
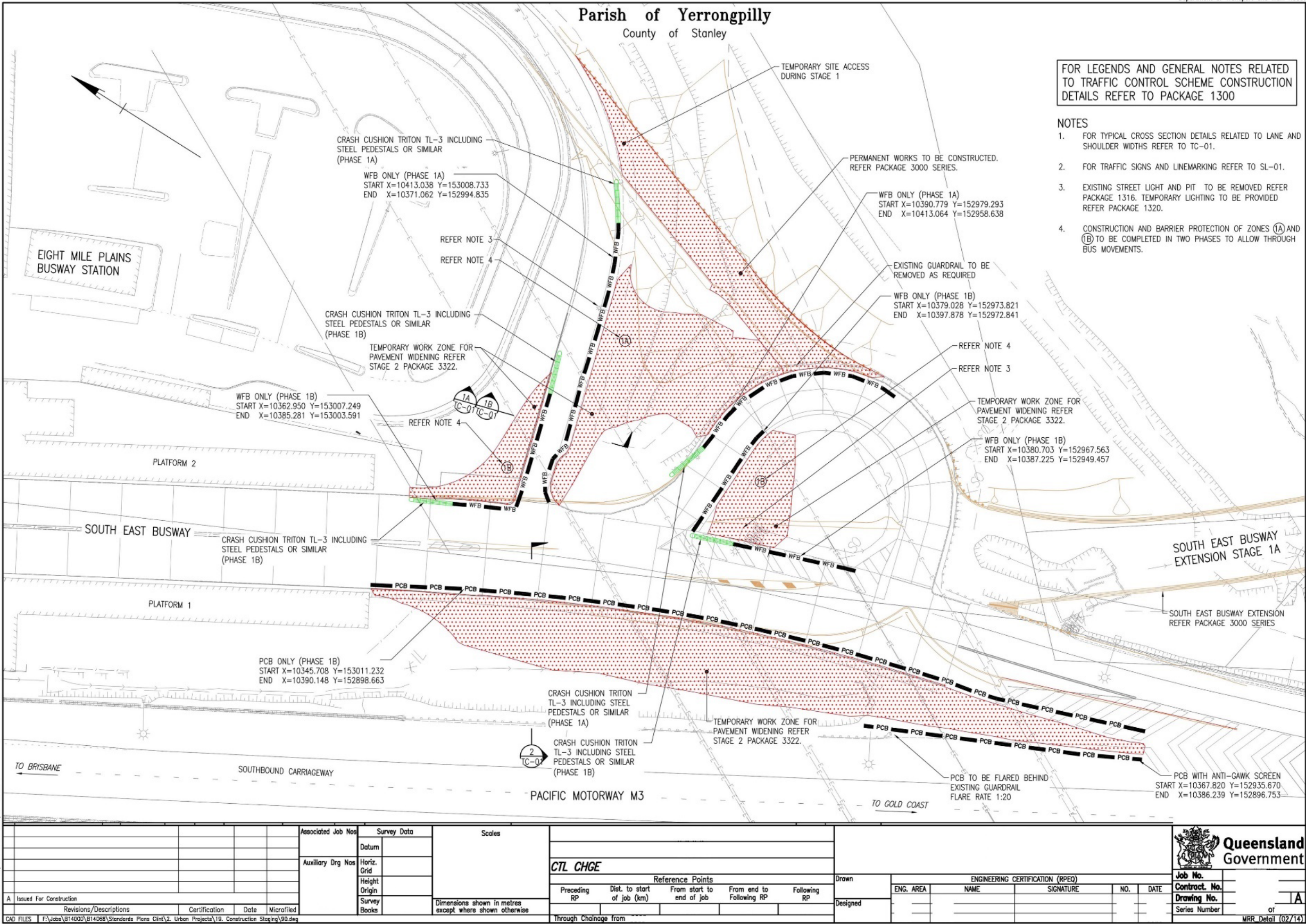




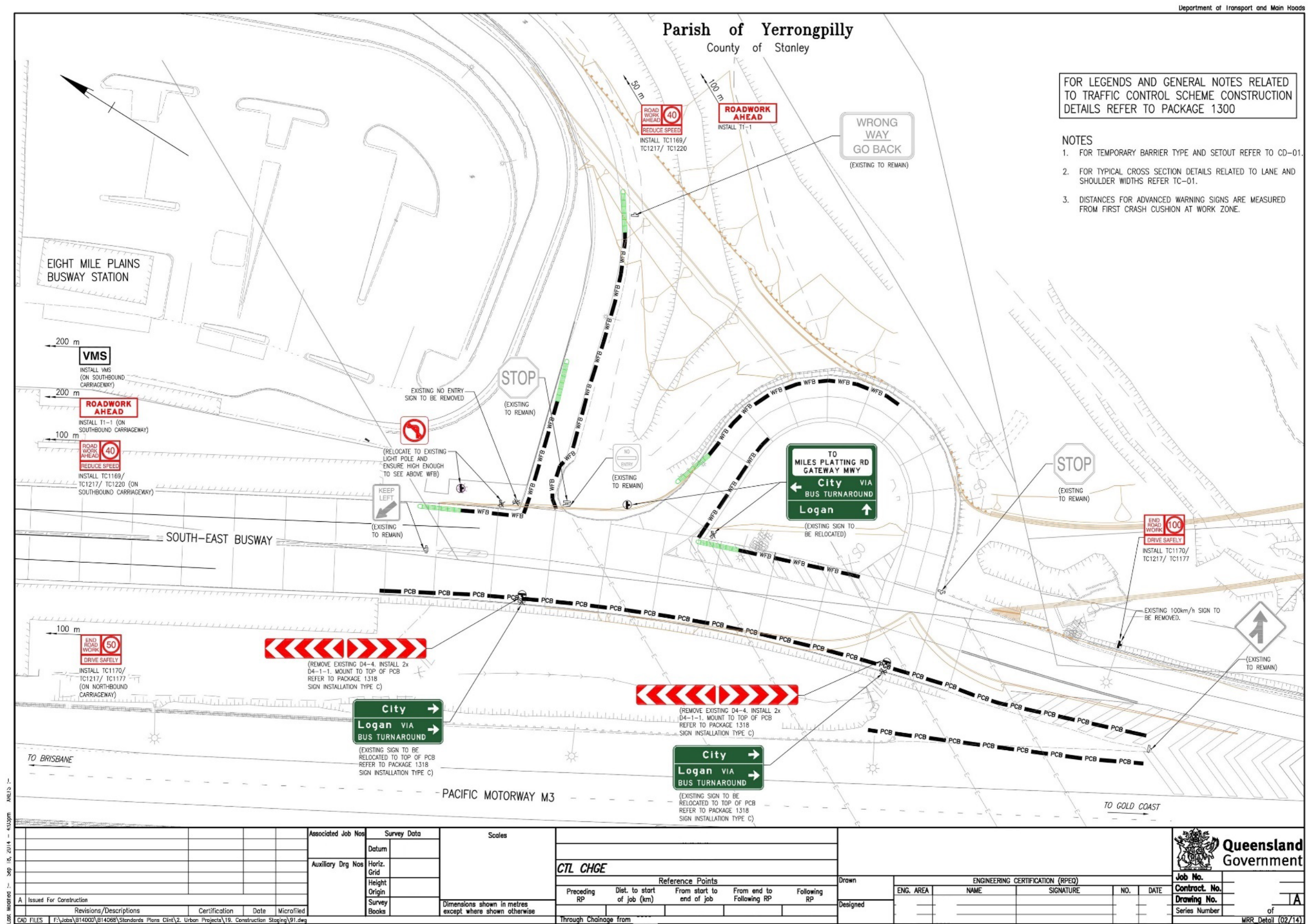
Figure 2.20(c) – Construction staging – generic example 2 – sheet 1 of 2

Department of Transport and Main Roads





**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:

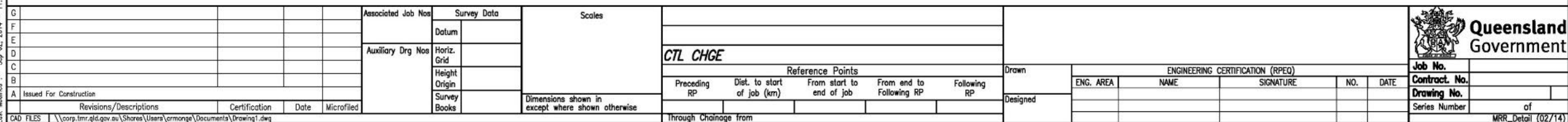
- Vegetation with associated legislative requirements: endangered, vulnerable or near threatened species, Type A plants, koala habitat, marine vegetation, etc.
- Vegetation or areas with fauna habitat values such as tree hollows, nests, logs etc.
- Vegetation with heritage value such as scar trees or trees with historical significance
- Other significant features as determined through environmental investigations.



## CLEARING AND GRUBBING









### 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* and MRTS52 *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

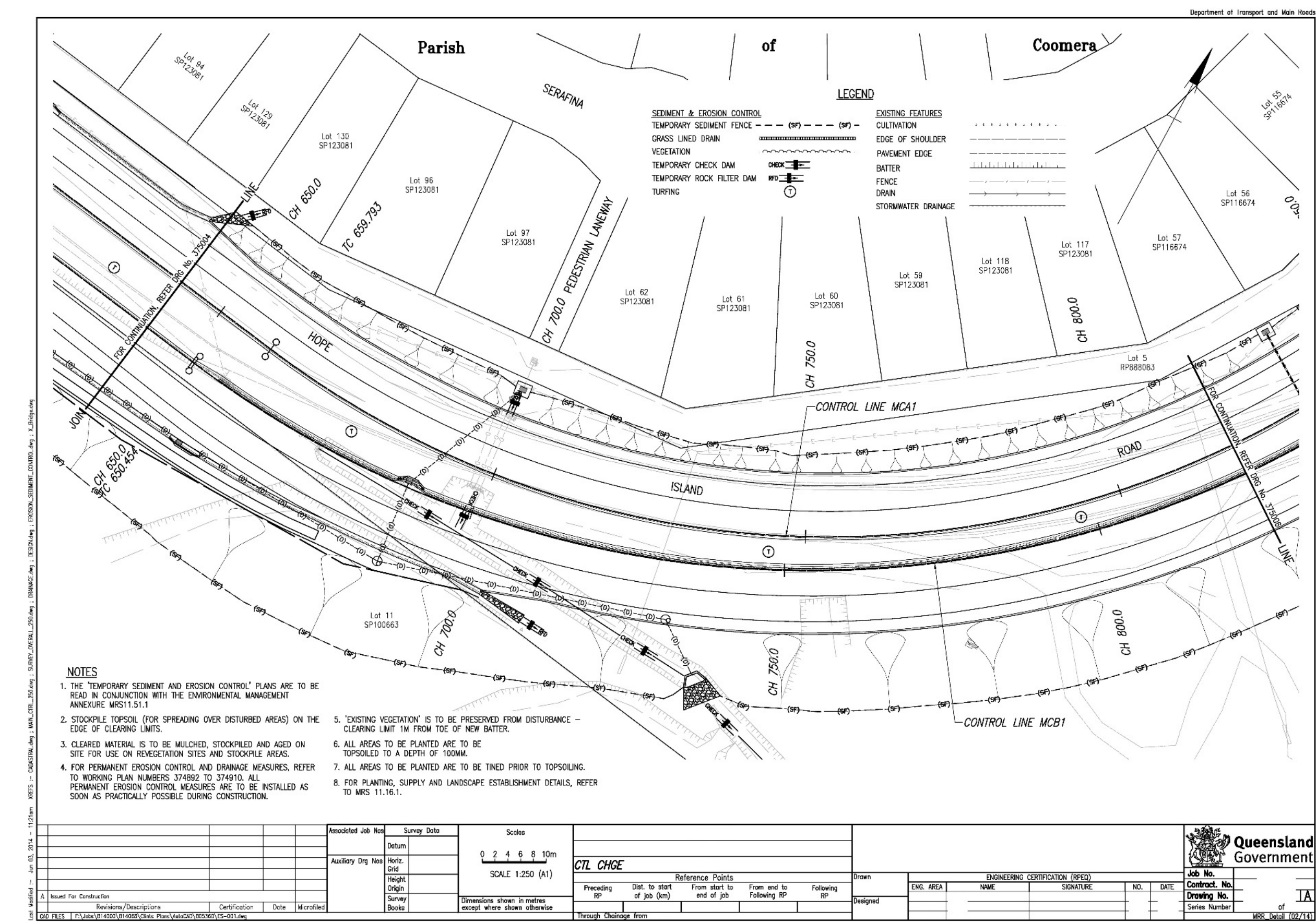




Figure 2.21.2(b) – Erosion and sediment control – generic example 2

Department of Transport and Main Roads

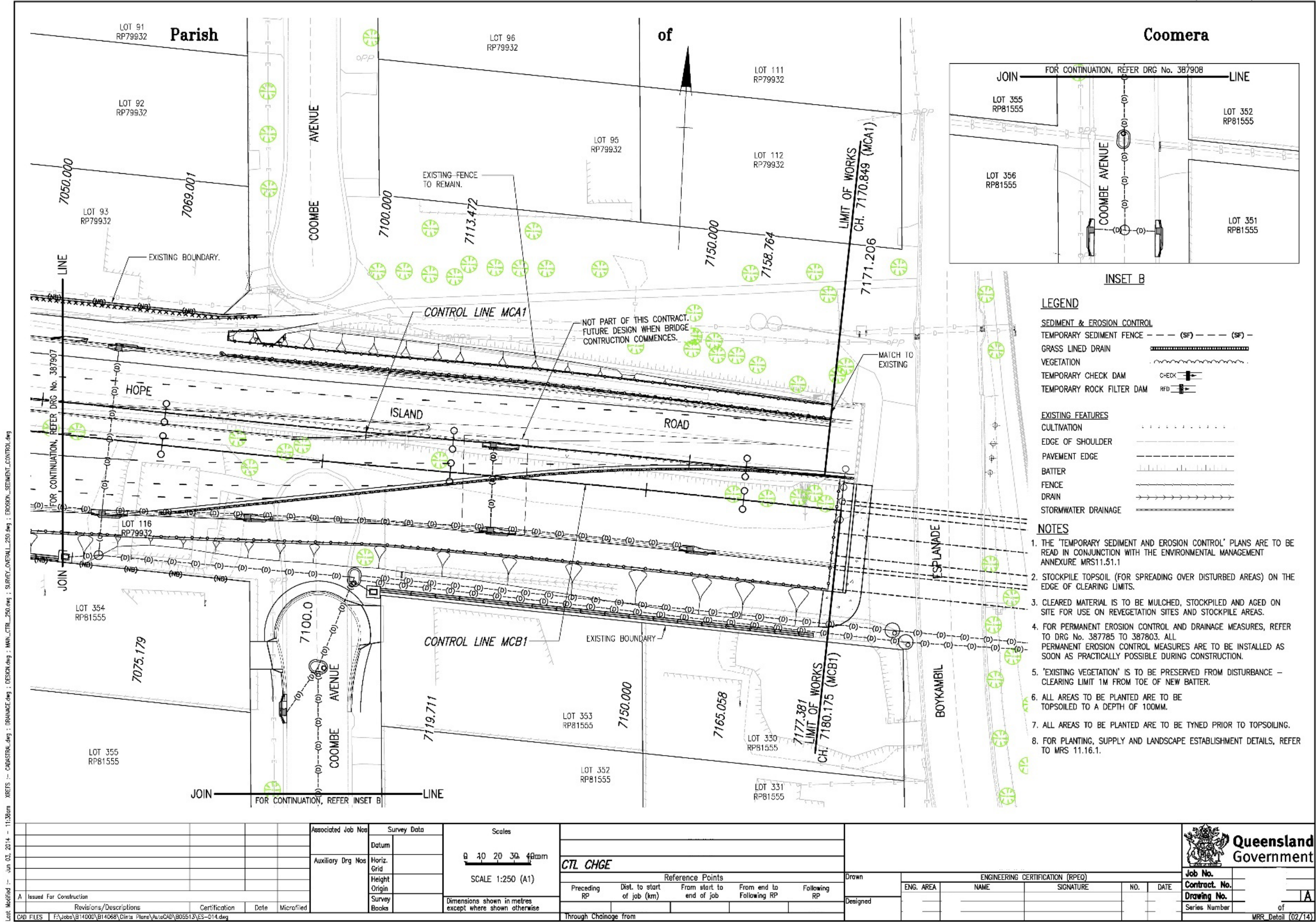




Figure 2.21.2(c) – Erosion and sediment control – registered example 1

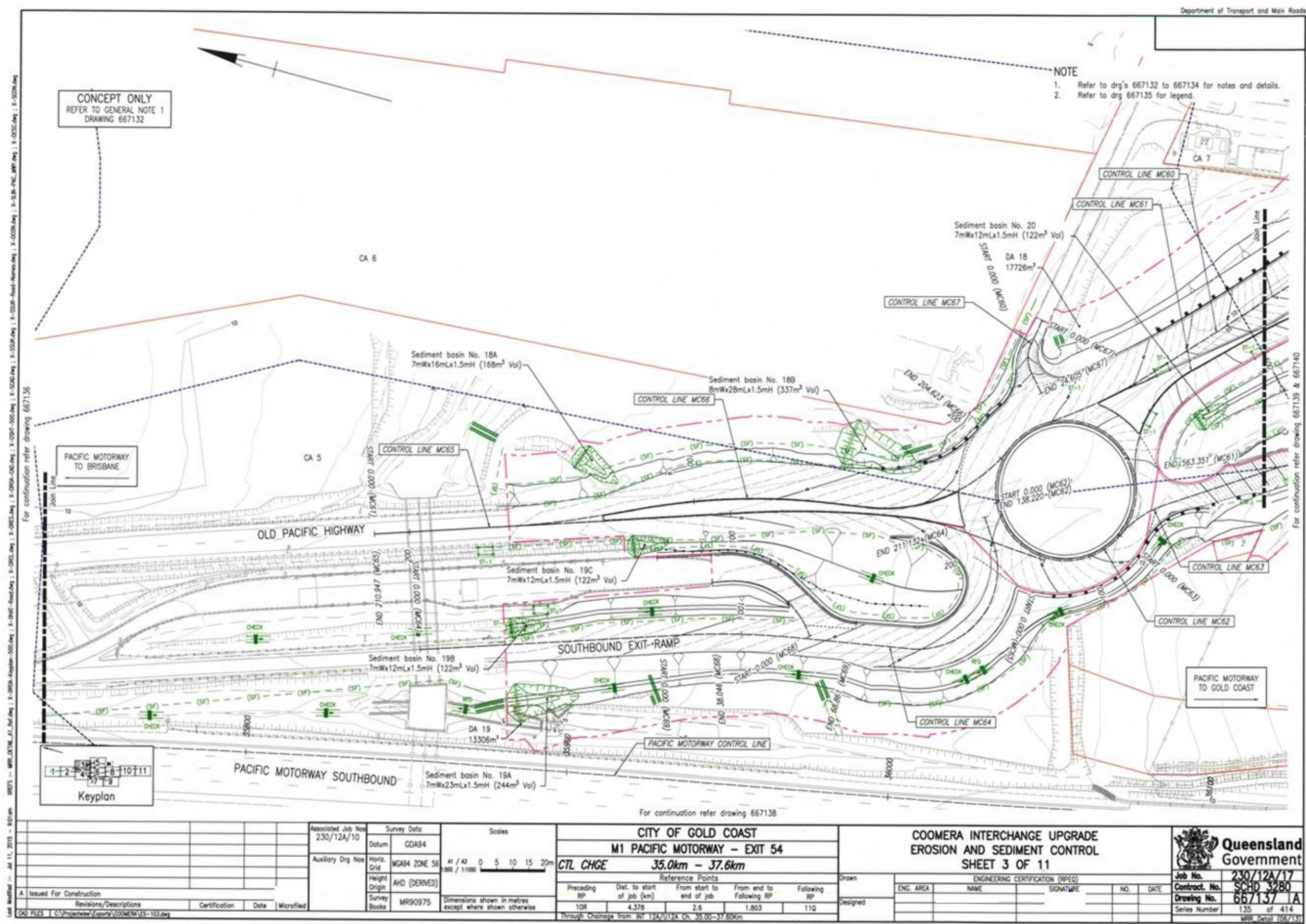
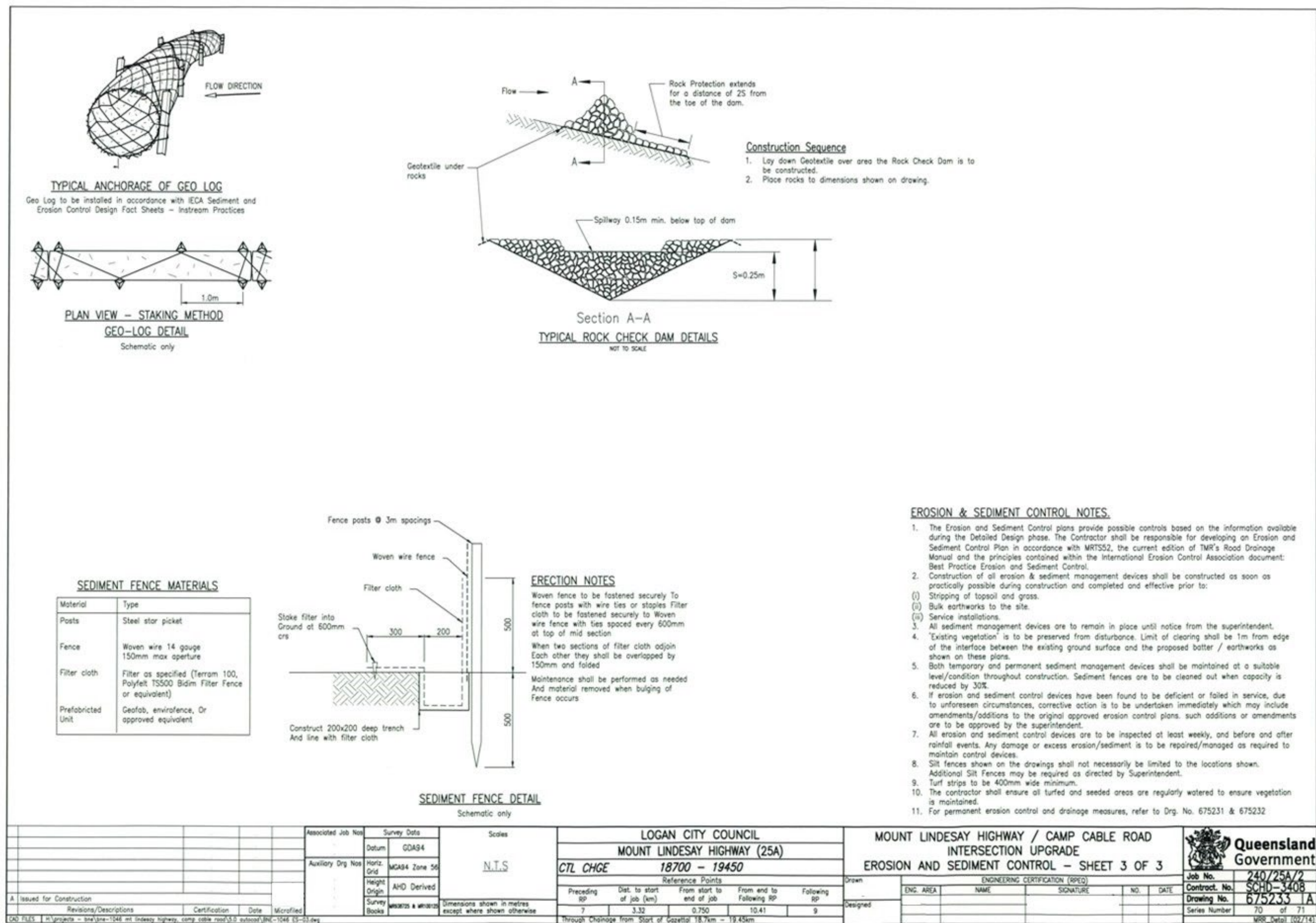




Figure 2.21.2(d) – Erosion and sediment control – registered example 2



## **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

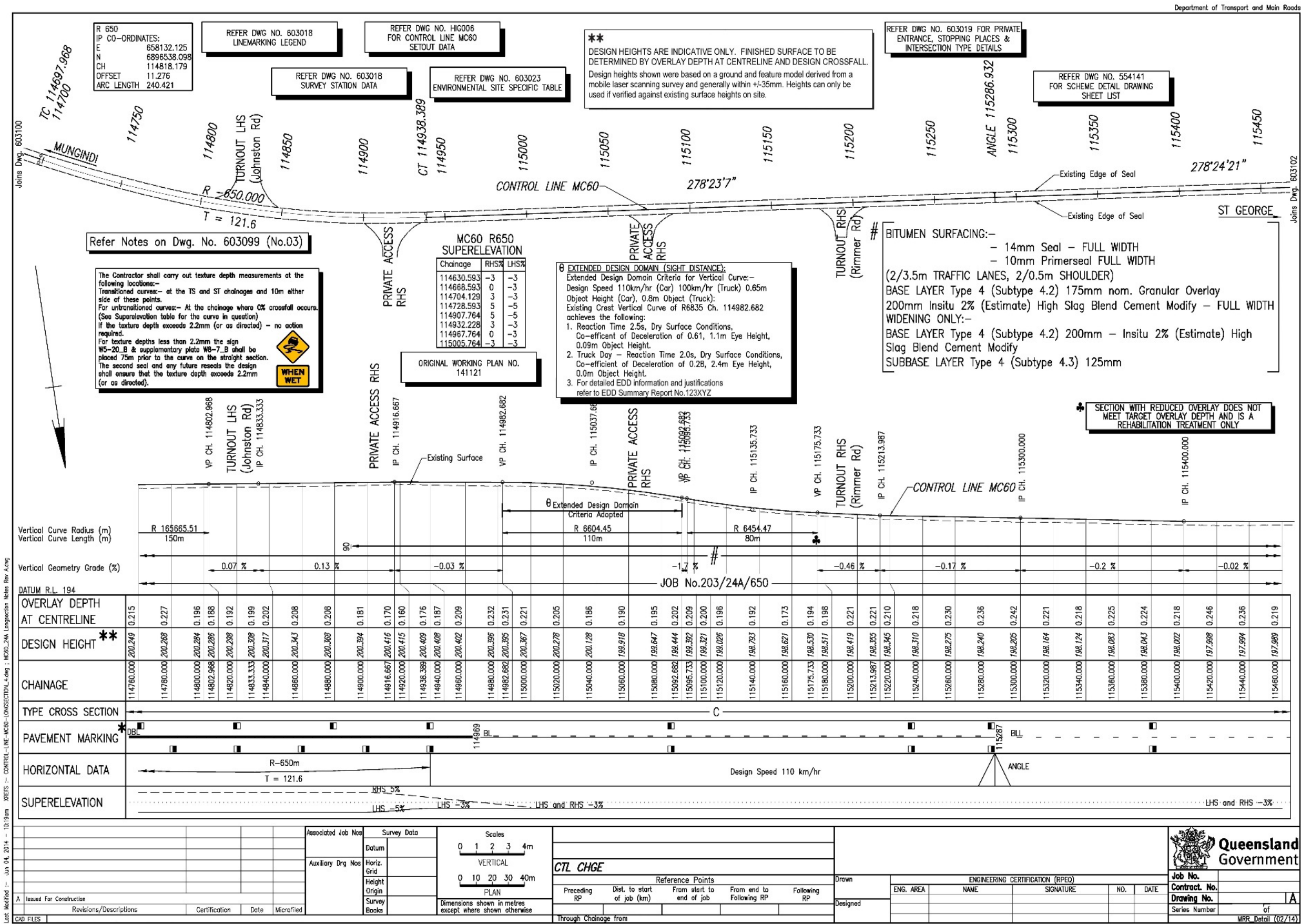
#### **Drawing**

- 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



Post Modified :- May 26, 2014 - 10:54am XREFS :-

**EDD CAPABILITY**

R1400 Crest Curve

Design Speed 80km/hr (70km/hr Advisory Speed  
Signs for adjacent R305 Horizontal Curve)

Rt = 1.5 seconds (Tight Horizontal Curves)

Norm Day (Wet)

SSD met. 1.15 – 0.4 Object Height

Manoeuvre Widening required – 1.5m

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 pavement and seal.  
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, 2008.  
Additional delineation will be provided by reducing the post spacing for REGP's. Appropriate pavement marking and crest warning signage will be provided.

CHAINAGE	CREST RADIUS	SPEED	MANOEUVRE WIDENING
5740	4000	110/100	1.5M
7100	4000	102/92	1.5M
7970	5400	110/100	-
9550	3300	110/100	2.5M
10140	3300	110/100	2.5M

- 1) Design speed above is car/truck.
- 2) Manoeuvre widening includes the concrete channel of concrete table drain (1 on 6 maximum).



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### **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**

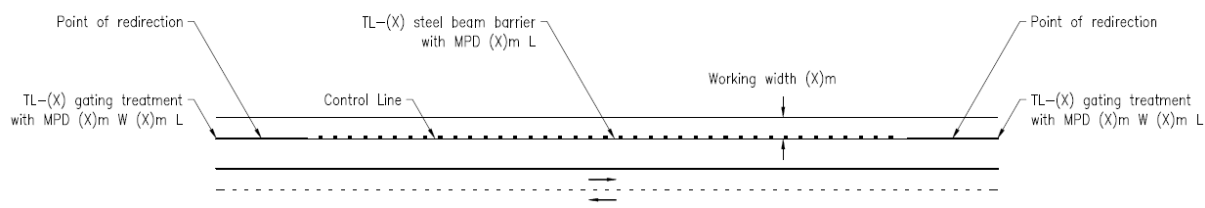
Specific products shall not to be named in design drawings. The design basis for the verified performance requirements shall be documented in the design development report.

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.



