Technical Specification

Transport and Main Roads Specifications
MRTS97 Mounting Structures for Roadside Equipment

July 2025

Queensland Government

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Contents

1 Introduction

This Technical Specification provides the structural requirements for the design and manufacture of mounting structures owned by the department for Rate 3 road lighting, pathway lighting, traffic signals, and Intelligent Transport System (ITS) equipment mounting structures.

> For Rate 1 or 2 road lighting poles, refer to the relevant Electricity Entity policies, standards, and specifications.
>
> For mast arms owned by the department, refer to the latest versions of Standard Drawings 1711-1716 and Australian Standard AS 2339 *Traffic signal posts, mast arms and attachments*.
>
> For specialist road safety poles, refer to TN189 *Generic Road Safety Camera Poles*.

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other departmental Technical Specifications, departmental Standard Drawings and Australian Standards as appropriate.

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

2 Definition of terms

The terms defined in MRTS01 *Introduction to Technical Specifications* apply to this Technical Specification. Additional terminology relevant to this Technical Specification is defined in Table 2 below.

Table 2 – Definition of terms

Term	Definition
Rate 3 lighting	Public lighting supplied, installed, owned, and maintained by the Department of Transport and Main Roads
ITS	Intelligent Transport System
SD	Standard Drawing
SCR	State Controlled Road

3 Referenced documents

The requirements of the referenced documents listed in Table 3 below apply to this Technical Specification. Where there are inconsistencies between this Technical Specification and the referenced documents, the requirements specified in this Technical Specification shall take precedence. Additionally, Table 3 lists the department's Standard Drawings referenced in this Technical Specification and/or relevant to the design and manufacture of mounting structures for roadside equipment.

Table 3 – Referenced documents

Reference	Title
AGRD06	*Austroads Guide to Road Design Part 6: Roadside Design Safety and Barriers*
AS/NZS 1158.1.2	*Lighting for roads and public spaces Vehicular traffic (Category V) lighting – Guide to design, installation, operation and maintenance*

Reference	Title
AS/NZS 1170.0	*Structural design actions, Part 0: General principles*
AS/NZS 1170.2	*Structural design actions, Part 2: Wind actions*
AS/NZS 1554.1	*Structural steel welding, Part 1: Welding of steel structures*
AS/NZS 1594	*Hot-rolled steel flat products*
AS 1798	*Lighting poles and bracket arms – Recommended dimensions*
AS 2339	*Traffic signal posts, mast arms and attachments*
AS 3600	*Concrete structures*
AS/NZS 3678	*Structural steel – Hot-rolled plates, floorplates and slabs*
AS/NZS 3845.2	*Road safety barrier systems and devices, Part 2: Road safety devices*
AS 4100	*Steel structures*
AS 4600	*Cold-formed steel structures*
MRTS01	*Introduction to Technical Specifications*
MRTS50	*Specific Quality System Requirements*
MRTS78	*Fabrication of Structural Steelwork*
MRTS94	*Road Lighting*
MRTS200	*General Requirements for Intelligent Transport Systems (ITS) Infrastructure*
TN189	*Generic Road Safety Camera Poles*
SD1335	*Road Lighting – Pedestrian Crossing Floodlight Mounting Bracket Outreach Mount (Option 2)*
SD1336	*Road Lighting – Pedestrian Crossing Floodlight Mounting Bracket Spigot Mount (Option 1)*
SD1370	*Road Lighting – General Arrangements*
SD1371	*Road Lighting – Base Plate Mounted Pole*
SD1372	*Road Lighting – Slip Base Pole*
SD1375	*Road Lighting – High Mast Pole*
SD1376	*Road Lighting – Base Plate Mounted Pole with Pedestrian Crossing Floodlight*
SD1377	*Traffic Signal / Road Lighting – Joint Use Traffic Signal and Road Lighting Pole*
SD1389	*Slip Base Pole Male / Female Connectors Installation Details*
SD1420	*Traffic Signals – General Arrangement*
SD1428	*Traffic Signals – Traffic Signal Post Base Mounted*
SD1682	*Pathway Lighting – Typical Lighting Requirements for Off-Road Pathways*
SD1708	*Traffic Signals – Sensor Extension to Traffic Signal Post*
SD1711	*Traffic Signals / Road Lighting – Circular Combination Mast Arm U Series – Information for Ordering Purpose*
SD1712	*Traffic Signals / Road Lighting – Circular Mast Arm Fabrication Details*
SD1713	*Traffic Signals / Road Lighting – Circular Mast Arm Type U1 – Post Without Luminaire Spigot – Assembly and Details*
SD1714	*Traffic Signals / Road Lighting – Circular Combination Mast Arm Type U2 – Post with Luminaire Spigot – Assembly and Details*

Reference	Title
SD1715	*Traffic Signals / Road Lighting – Circular Mast Arm Outreach – 2.5 m, 5.0 m and 6.5 m – Assembly and Details*
SD1716	*Traffic Signals / Road Lighting – Circular Combination Mast Arm Luminaire Transition Piece – Assembly and Details*
SD1755	*Slip Base Tethering System for Transport and Main Roads Rate 3 Lighting Poles*

4 Rate 3 road lighting mounting structures

Mounting structures shall be categorised as one of the following and comply with the noted Standard Drawings and figures:

a) Main structure types:

   i. base plate mounted poles (Figures B3 and B4, SD1370 *Road Lighting – General Arrangements* excluding mast arm and SD1371 *Road Lighting – Base Plate Mounted Pole*)

   ii. base plate mounted Joint Use Poles (JUP) (Figures B3 and B4, SD1370 excluding mast arm and SD1377 *Traffic Signal / Road Lighting – Joint Use Traffic Signal and Road Lighting Pole*)

   iii. impact reducing poles as slip base mounted poles (Figures B5 and B6, and SD1370 excluding mast arm and SD1372 *Road Lighting – Slip Base Pole*)

   iv. impact reducing poles as energy absorbing poles, and

   v. base plate mounted hinged poles (Figure B7).

b) Other structure types

   i. high mast poles (SD1370 excluding mast arm and SD1375 *Road Lighting – High Mast Pole*)

   ii. pedestrian crossing flood light poles (SD1370 excluding mast arm, SD1376 *Road Lighting – Base Plate Mounted Pole with Pedestrian Crossing Floodlight*, and SD1335 *Road Lighting – Pedestrian Crossing Floodlight Mounting Bracket Outreach Mount (Option 2)* or SD1336 *Road Lighting – Pedestrian Crossing Floodlight Mounting Bracket Spigot Mount (Option 1)*)

   iii. base plate mounted bespoke solar poles, and

   iv. slip base mounted bespoke solar poles.

c) Pathway lighting mounting structures

   i. base plate mounted poles with integral outreach (Figure B8 and SD1682 *Pathway Lighting – Typical Lighting Requirements for Off-Road Pathways*)

   ii. base plate mounted hinged poles with integral outreach (Figure B9 and SD1682), and

   iii. base plate mounted poles fitted with solar panel (Figure B10).

d) Traffic signal mounting structures

   i. posts round cross section (SD1420 *Traffic Signals – General Arrangement* and SD1428 *Traffic Signals – Traffic Signal Post Base Mounted*), and

   ii. posts square cross section (refer AS 2339).

e) ITS equipment mounting structures

   i. camera mounting adaptor on mast arm outreach (Figure B11)

   ii. camera post and mounting adaptor on traffic signal mast arm post (Figures B12 and B13)

   iii. base plate mounted hinged camera poles (Figure B14), and

   iv. sensor extension to traffic signal post (SD1708 *Traffic Signals – Sensor Extension to Traffic Signal Post*).

5 Quality system requirements

5.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points, Witness Points and Milestones applicable to this Technical Specification are summarised in Table 5.1. There are no Witness Points or Milestones defined.

Table 5.1 – Hold Points, Witness Points, Milestones

Clause	Hold Point	Witness Point	Milestone
6.4	1. Design Approval		

Note: Manufacturing Hold Points are listed in MRTS78 *Fabrication of Structural Steelwork*.

6 Design requirements

6.1 General

Design life for poles, posts, luminaire outreaches and outreach extensions, equipment mounting frames, brackets, extension posts and adaptors shall be 50 years.

Design parameters are stated in Appendix A Tables A1 to A7 of this Technical Specification.

All structures shall be designed to withstand, without permanent deformation, the worst combination of the following loadings:

a) dead load of the pole, or post, and its attached components and equipment

b) wind load on the pole, or post, and its attached components and equipment, and

c) load applied by any aerial supply cables.

The design strength of poles and posts including foundation shall be calculated in accordance with the requirements of AS/NZS 1594 *Hot-rolled steel flat products*, AS 3600 *Concrete structures*, AS/NZS 3678 *Structural steel – Hot-rolled plates, floorplates and slabs*, AS 4100 *Steel structures*, and AS 4600 *Cold-formed steel structures*, as appropriate.

6.2 Wind loading

The design wind loads shall be determined from the methods detailed in AS/NZS 1170.2 *Structural design actions, Part 2: Wind actions* using the design wind V_{design} as stated in Table 6.2.2.

Table 6.2 – Design wind speed

Vertical height (m)	V_{design} (m/s)	
	V_s Serviceability	V_u Ultimate
20	30	60
15	29	57
10	27	53
5	25	50
<3	24	48

The drag coefficients to be adopted in the design are:

- 1.0 for luminaires
- 1.2 for outreach arms
- 1.0 for traffic signals and cameras
- 1.5 for solar panels, and
- as per AS 1170.2 for other elements.

Design ultimate wind velocities shown in Table 6.2 were derived as follows:

- From AS 1170.2 Table 3.1(A), Region B1 wind speed for average recurrence interval $R = 250$ years is computed from $V_R = 106 - 92R^{-0.1}$. Hence $V_{R=250} = 53\ m/s$.
- Even though Region C is in the State of Queensland, Region B1 regional wind speed was selected for pole design in this Technical Specification. The wind speeds shown in Table 6.2 has been used for over 2 decades, and adopting the regional wind speed of Region C is considered to lead to overdesign.

6.3 Load combinations

Load combinations of dead loads, live loads and wind loads for design purposes shall be in accordance with AS/NZS 1170.0 *Structural design actions, Part 0: General principles*.

6.4 Design approval

Alternative product designs which do not comply with the figures in this Technical Specification, the department's Standard Drawings, or the Issued-for-Construction Project Drawings shall not be used without approval from the department. These alternative, proprietary designs shall comply with this Technical Specification and be submitted for consideration and approval.

Alternative product designs shall be submitted to Engineering and Technology (E&T) (Structures) for consideration and approval. All product details shall be provided.

All pole designs shall be supplied with the following information:

a) RPEQ Certified Engineering drawings

b) full detailed calculations RPEQ certified, including structural analysis and design, and

c) Category of pole (Clause 4).

Designs shall be generic as far as possible, that is, suited to a range of heights, and attachment size, weight and configuration.

Generic (non-project specific) design approval allows for one assessment by E&T (per pole type), with project teams then checking the exact configuration fits within the design scope.

Submissions should be made to ET_Structures_ProductsAndSuppliers@tmr.qld.gov.au.

Mounting structures shall not be supplied to the project until E&T approval has been achieved and evidence of such submitted to the Administrator. **Hold Point 1**

Note: This Hold Point and design assessment relate only to the structural components. Functional requirements (e.g. MRTS200 *General Requirements for Intelligent Transport Systems (ITS) Infrastructure*) and project-specific requirements will still need to be assessed.

6.5 Standard requirements for road and pathway lighting poles

For standard light poles / main structure type outlined in Clause 4 of this Technical Specification:

- The design parameters for these 4 main structure types are shown in Table A1.
- The design parameters for the mounting devices associated with the main structure types are shown in Table A2 and A3.

For other structure types: high mast, pedestrian crossing flood lights and bespoke solar poles as outlined in Clause 4, the design parameters are shown in Table A4.

6.6 Additional requirements for road and pathway lighting poles

6.6.1 Aerial connection

In addition to the wind loading, base plate mounted road lighting poles fitted with aerial supply cables shall be designed to withstand an ultimate static force of 1 kN exerted by the aerial cable.

The aerial connection shall be applied horizontally in any direction 125 mm below the spigot line on poles up to 10 m high and 3125 mm below the spigot line on poles exceeding 10 m high.

6.6.2 Deflection of lighting poles (including hinged poles for lighting)

The deflection of the pole from the vertical position under serviceability limit state shall be calculated according to AS/NZS 1170.2 and shall not exceed 4% of the vertical section height of the pole measured at the base of the outreach arm fixing spigot.

6.6.3 Hinged poles

Hinged poles shall be base plate mounted type with an underground power supply.

Hinged poles have 2 applications – lighting (Figures B7 or B9) and closed-circuit TV (CCTV) (Figure B14). The top of the pole shall consist of either:

- spigot for luminaire headframe, or
- a spigot to support a camera-mounting adaptor that supports the pan / tilt CCTV camera unit.

An access hatchway shall be located such that it is unobstructed by the hinged section of the pole, that is, perpendicular to the swing direction. The hatchway size shall be:

- 600 mm x 150 mm on 350 mm pitch circle diameter (PCD) poles, or
- 600 mm x 230 mm on 500 mm PCD poles.

The top of the hatchway shall be a maximum of 1500 mm above the base of the pole. The mast arm shall be above the access hatch. The tilt pole complete with luminaries or cameras shall be such that the outreach spigot or camera mounting plate when lowered shall be at a height of between 1200 mm and 1400 mm above the pole base.

The pole shall be designed to ensure that any equipment or cabling installed on it cannot encounter the pole's base. Pulling eyes shall be located on the apron and at the pole base so that a rope may be used to raise the hinged section and regulate the lowering speed of the hinged section.

The pole shall have 2 independent latching systems to hold the apron in place, each of sufficient strength to restrain the pole from lowering. One system shall comprise a tamper-proof stainless steel bolt of appropriate strength to hold the flap rigidly to the pole free from movement.

This lock down retaining bolt shall be located between 900 mm and 1500 mm above the pole base.

The other system shall comprise a lug welded to the inside face of the flap and protruding through the lower pole section when in the upright position. The lug shall have a hole through it to allow for padlock. It shall be possible to install the padlock to the inside of the pole via the hatchway.

Counterweights of appropriate mass shall be provided for different hinged pole sizes to achieve rotational balance. Individual counterweights shall not have a mass greater than 10 kg.

The fabricator shall attach a sticker inside the apron showing the counterweight table related to the permissible equipment attachable on the pole top spigot.

The connecting pin and the lower section of the swing arm shall be designed to resist shear forces and bending moment generated by dead, live and wind loads. The pivot hinge shall be adequately welded to the base section of the pole.

In addition to MRTS200 *General Requirements for Intelligent Transport Systems (ITS) Infrastructure*, the access area nominated by the manufacture for lowering and raising the hinged poles shall be provided.

6.6.4 Outreach arms, extensions, and head frames

All outreach arms and extensions shall be designed to withstand, without permanent deformation, the worst combination of the following loadings:

a) dead load due to outreach arm, extension, and luminaire, and

b) wind load on outreach arm, extension, and luminaire.

All luminaire head frames shall be designed to withstand, without permanent deformation, the worst combination of the following loadings:

a) dead load due to luminaire head frame and luminaire, and

b) wind load on luminaire head frame and luminaire.

Design strength of an outreach arm and extension, and luminaire head frame, shall be calculated in accordance with the requirements of AS 4100, as appropriate.

Design parameters are detailed in Table A2. The wind loading shall be determined in accordance with Clause 6.2.

Load combinations shall be determined by the method detailed in Clause 6.3.

An outreach arm shall be designed so that, under dead load with luminaire and outreach arm extension, where fitted, the luminaire fixing spigot, spigot angle shall not be less than 5 degrees nor greater than 7 degrees.

The deflection of the outreach arm when fitted to a fixed non-deflecting spigot, under the serviceability limit state, shall be calculated in accordance with AS/NZS 1170.2 and shall not exceed 4% of the nominal horizontal outreach length.

6.6.5 Solar lighting and or camera poles

6.6.5.1 Solar panels fitted on standard lighting poles

Solar panels and brackets shall not be fitted to the main structure types, Clause 4(a), on the state-controlled road network.

6.6.5.2 Bespoke base plate mounted solar pole with luminaire and/or camera

This Technical Specification does not mandate the geometry and weight of the attachments such as solar panels, brackets, luminaire, cameras and other ITS devices.

The base plate or slip base mounted solar pole shall be designed to withstand, without permanent deformation, the worst combination of the following loads:

- dead load of the pole and all the attachments
- wind load on the pole and on its attachments (wind load shall be as per Clause 6.2), and
- the solar pole shall be designed based on the worst orientation of the solar panel such that the sail area attracts the highest wind load.

The solar bracket design shall comply with this standard using wind speeds to Table 6.2.2.

6.6.5.3 Bespoke slip base mounted solar pole with luminaire

This Technical Specification restricts the use of bespoke slip base mounted solar poles to 7.0 m and 8.5 m only. One single outreach arm with or without extension is permitted in these 2 heights and the design parameters are outlined in Table 6.6.5.3.

Table 6.6.5.3 – Design parameters

Design parameters	Value
Solar Panel Dimension	1500 x 650 x 35 mm
Solar panel weight including the steel frame	40 kg
	Solar Panel Weight = 15 kg
	Steel frame weight = 25 kg
Angle of installation	20-50 degrees depending on the latitude (worst case to be considered)
Luminaire weight	15 kg
Luminaire sail area	0.17 m²

The bespoke slip base mounted pole design shall confirm that the centre of gravity of the solar pole complies to Section 7.3 of the *Austroads Guide to Road Design* Part 6 such that:

- The height of the centre of gravity shall be further than 2.8 m from the lower end of the detached solar pole. This will reduce the likelihood of the solar pole falls on the roof of a vehicle during impacts at 100 km/h.

"Crash worthiness of a slip based solar pole is not confirmed via a crash test. The acceptance was granted based on a desk top study carried out by Prof. Rod Troutbeck, Assessment of slip-based poles with attached solar panels." – Report prepared for the Queensland Department of Main Roads, 14 February, 2007.

6.6.6 Pathway lighting poles

Pathway lighting poles falls into 3 categories as outlined in Clause 4(c) of this Technical Specification.

Design parameters for pathway lighting poles are detailed in Table A5.

Design parameters for pathway solar lighting poles are shown in Table A6.

Pathway lighting poles and pathway solar lighting poles shall not be interchangeable.

6.7 Requirements for ITS mounting structures on traffic signal posts and mast arms

Traffic signal general arrangements are shown in SD1420.

6.7.1 CCTV cameras and other ITS devices

Total weight of device including the bracket shall be 20 kg and the sail area shall be 0.11 m².

6.7.2 CCTV camera on traffic signal mast arm

CCTV camera mounting adaptor shall be connected to the traffic signal mast arm as shown in Figure B11.

6.7.3 CCTV camera on a pole

CCTV camera mounting adaptor on a pole shall be connected on a traffic signal mast arm as shown in Figures B12 and B13.

6.7.4 Hinged poles for CCTV camera

Design parameters for hinged poles for CCTV camera are defined in Table A7.

CCTV camera on a hinged pole as shown in Figure B14 shall confirm to Clause 6.6.3 of this Technical Specification.

The deflection of the pole from the vertical position under serviceability limit state shall be calculated according to AS/NZS 1170.2 and shall not exceed 1% of the vertical section height of the pole measured at the base of the outreach arm fixing spigot.

6.8 Impact reducing poles

Poles that reduce impact severity are classified into the following 2 categories:

1. Slip base or breakaway
2. Energy absorbing or yielding.

> *"The energy-absorbing poles differ from the slip-base type poles in that, in a vehicle impact, they remain attached to the base structure and absorb any impact energy by progressively deforming and entrapping the impacting vehicle. The deformation of the pole is controlled by a 'designed' weakening of the pole stem over the lower length."* – Clause B4.2.3 in AS/NZS 1158.1.2 *Lighting for roads and public spaces Vehicular traffic (Category V) lighting – Guide to design, installation, operation and maintenance*.

6.8.1 Slip base pole and mount design requirements

All slip base mounts shall be designed to withstand without permanent deformation for the worst combination of the following loadings:

a) dead load due to pole, outreach arm, extension, luminaire and solar panels

b) wind load on pole, outreach arm, extension, luminaire and solar panels, and

c) confirm to the requirements of this Technical Specification and Figures B5 and B6 shown in Appendix A.

The wind loading shall be determined in accordance with Clause 6.2.

Load combinations shall be determined in accordance with Clause 6.3

Design parameters for slip base mount are detailed in Table A3.

The design strength of poles and mounts shall be calculated in accordance with the requirements of AS 4100, AS 3600, AS/NZS 1594, and AS/NZS 3678.

Slip-base poles behave as follows:

- the pole is expected to detach from the base, and
- any reusable breakaway features such as the base expected to remain intact or undamaged.

The pole design shall include an electrical disconnect method complying with SD1389 *Slip Base Pole Male / Female Connectors Installation Details*.

Slip base pole designs that are different to the designs contained in this Technical Specification shall be crash tested and documented in accordance with AS/NZS 3845.2 *Road safety barrier systems and devices, Part 2: Road safety devices*.

6.8.2 Energy absorbing poles design requirements

Energy absorbing poles shall simultaneously satisfy the following 2 requirements:

- structural stability due to the wind loading in accordance with Clause 6.2, and
- proven crash worthiness as per AS/NZS 3845.2, and Clause 6.8.2.2 of this Technical Specification.

6.8.2.1 Durability Requirements for energy absorbing poles

Energy absorbing poles shall not be buried below ground.

> Buried poles surrounded by granular material will eventually be saturated with water causing corrosion.
>
> Departmental inspections have revealed that failures due to corrosion mainly in buried poles occur at the pole / ground interface. In the event of an accident the pole footings are excavated and reconstructed together with the replacement of the pole. This is un-economical. Hence any footing proposal shall avoid buried poles.

6.8.2.2 Crash performance testing for energy absorbing poles

The pole supplier shall supply evidence of full-scale impact testing, carried out by a NATA accredited laboratory in the field of Mechanical Testing and Calibration. The test shall be based on the requirements of AS/NSZ 3845.2 (Road Safety Barrier Systems and Devices, Part 2, Road Safety Devices), Section 9.3.2. Pole systems tested to other protocols may be assessed as per AS/NZS 3845.2. **Hold Point 2**

- The pole shall be designed to deform progressively upon vehicle impact, collapsing in a predictable and safe manner to minimise the risk of injury to occupants of the impacting vehicle or other vehicles on the road.
- The base of an energy absorbing pole shall remain attached to the footing after impact, the footing shall not be reused.
- One test is required at 80 km/h by vehicles with a mass of 1100 kg.
- The test is to evaluate vehicle stability and trajectory, as well as the trajectory of the pole.
- Electrical wiring for poles, lighting and or other electrical purpose shall not present a hazard in terms of electrocution or sparks lighting any spilt flammable liquids when impacted.
- The pole design shall also include an electrical disconnect.
- Any attachments to the pole, hatchways and luminaires, shall remain secured to the pole during and after impact.
- The access hatchway shall be designed to prevent becoming a projectile during vehicle impact.

6.9 Poles on bridge structures

Road lighting poles on bridges more than 10 m above ground (measured from the soffit of the light pole base to the ground) shall be designed for wind loading using the actual height above ground to determine the wind load.

For all the other cases, light poles on bridge shall be designed in accordance with the requirements of Clause 6.

6.9.1 Lampstand brackets design parameters

Road lighting poles to be located on a bridge structure shall be mounted on a lamp stand bracket. The lamp stand bracket shall be designed to resist the base loads from a 13 m light pole.

The deflection of the lamp stand bracket from the vertical position under serviceability limit state for a 13 m light pole shall not exceed 5 mm.

6.10 Materials

6.10.1 Steel grade and minimum steel thickness

Steel used in the construction of poles, outreach arms and extensions shall comply with the requirements listed in Table 6.10.1.

Table 6.10.1 – Steel requirements for poles and ancillary equipment

Item description	Steel grade (MPa)	Steel thickness
Pole – base plate mounted	250 minimum	3 mm minimum
Pole – slip base	250 minimum	3 mm minimum
Hinged Pole	250 minimum	3mm minimum
Pole – Energy absorbing	250 minimum	3 mm minimum
Luminaire outreach arm	250 minimum	3 mm minimum
Luminaire outreach arm extension	350 minimum	3 mm minimum
Luminaire head frame	250 minimum	3 mm minimum
Slip base mount	250 minimum	as per the drawings
Lampstand bracket base	250 minimum	as per the drawings
Lampstand bracket post	350 minimum	3 mm minimum
Camera mounting adaptor	250 minimum	3 mm minimum

Steel shall be in accordance with AS/NZS 1594 and/or AS/NZS 3678. Poles posts, outreach arms, outreach arm extensions, luminaire headframes and slip base mounts shall be fabricated in accordance with MRTS78 *Fabrication of Structural Steelwork*.

Pole designs using alternative materials may be assessed as innovations under departmental procedures. Contact ET_Structures_ProductsAndSuppliers@tmr.qld.gov.au.

7 Fabrication

7.1 Fabrication requirements

All steelworks shall be fabricated in accordance with the approved Engineering drawings and MRTS78 *Fabrication of Structural Steelwork*.

MRTS78 *Fabrication of Structural Steelwork* requires that Structural Steelwork shall be fabricated only by a fabricator who is registered by the Department of Transport and Main Roads. Tolerances shall be in accordance with AS 1798 *Lighting poles and bracket arms – Recommended dimensions* unless otherwise shown in the drawings.

All steelworks shall be hot dipped galvanised after fabrication as specified in MRTS78 *Fabrication of Structural Steelwork*. The size of components shall be checked prior to fabrication to ensure that they can be hot-dipped galvanised after fabrication. Double dipping shall be allowed.

Welding shall be in accordance with AS/NZS 1554.1 *Structural steel welding, Part 1: Welding of steel structures*.

Steel connections shall be sealed on all faces to stop the ingress of water and galvanising acids which causes corrosion at interfaces. Where access for welding is available to one side of a joint only, a full penetration butt weld shall be used.

7.2 Pole identification

All steel assemblies shall be permanently and legibly identified by means of a stainless steel or aluminium plate. The marking plate shall be stamped and located as shown in the drawings and full details of the plate and method of fixing shall be provided.

In addition to the above requirement for marking, all joint use traffic signal and road lighting poles shall have a warning plate permanently and legibly identified, by means of a stainless steel or aluminium plate. The warning plate shall be stamped and located as shown in the drawings and full details of the plate and method of fixing shall be provided.

7.3 Slip base mounts

All slip base mounts shall be constructed in steel in accordance with the requirements shown in the drawings and this Technical Specification. Electrical components used for the disconnect mechanism shall be as shown on SD1389.

The slip base pole adaptor assembly shall include 3 x M36 bolts, nuts, washers and shear washers.

Each slip base pole shall include a slip base clamping bolt tethering system as shown on Standard Drawing SD1755 *Slip Base Tethering System for Transport and Main Roads Rate 3 Slip base Poles*.

> The purpose of using the tethering system is to prevent clamping bolts from being projected at high speed or long distance from the pole when the pole slips upon vehicle impact.

Cable clamp brackets with associated set screw with half nut, flat washers, spring washer and wing nut shall be provided for both the slip base pole and mount.

7.4 Miscellaneous materials

Nuts, screws, bolts and washers, pole markings and all materials necessary to complete the installation of the pole shall be provided as required.

8 Handling, transport and storage

All items supplied shall be suitably packaged to ensure that the items are delivered undamaged giving due consideration to the methods and distance of transport and handling.

Handling (packaging) shall be in accordance with MRTS94 *Road Lighting*.

Appendix A: Design parameters

Table A1 – Road lighting pole design parameters

POLES			EQUIPMENT ON POLES									
Pole Type	**Vertical Section**		**Outreach Arm**			**Luminaire**		**Aerial Cable**		**Traffic Signals**		
	Height (m)	**Figure No.**	**Uplift**	**Type**	**Figure No.**	**Mass (kg)**	**Sail Area (m²)**	**Aerial Cable Connection Requirement**	**Max Loading (kN)**	**Type**	**Mass (kg)**	**Sail Area (m²)**
Base plate mounted	7.0	B3, B4	2 m	3 m double plus 2 x 1.5 m extensions	B1	2 x 15	2 x 0.17	Yes	1.0	N/A	N/A	N/A
	8.5											
	10.0											
	13.0											
Base plate mounted joint use	7.0	B3, B4	2 m	3 m double plus 2 x 1.5 m extensions	B1	2 x 15	2 x 0.17	No	N/A	2 x 6 300 mm incl. target boards plus pedestrian lantern	N/A	N/A
	8.5											
	10.0											
Slip base plate mounted clause	7.0	B5, B6	2 m	3 m double plus 2 x 1.5 m extensions	B1	2 x 15	2 x 0.17	No	N/A	N/A	N/A	N/A
	8.5											
	10.0											
	13.0											
Energy absorbing	7, 8.5,10		2 m	Double and single outreach up to 3 m	B1	2 x 15	2 x 0.17	No	N/A	N/A	N/A	N/A
Baseplate mounted hinged	10.0	B7	N/A	4-way adaptor luminaire head frame	B2	4 x 15	4 x 0.17	No	N/A	N/A	N/A	N/A
	13.0											

Table A2 – Outreach arms and extension and luminaire headframe design parameters

Component	Figure No	Outreach Arm	Equipment Attached to Outreach Arm or Headframe		
		Length (m)	Outreach Extension (m)	Luminaire	
				Mass (kg)	Sail Area (m²)
Single Outreach	B1	1.5	1.5	15	0.17
		3.0			
		3.0	N/A	2 x 15	2 x 0.17
Double Outreach		1.5	1.5	2 x 15	2 x 0.17
		3.0			
Outreach arm extension		1.5	N/A	15	0.17
Luminaire Head frame-1 way Adaptor	B2	0.3	N/A	15	0.17
Luminaire Head frame-2 way Adaptor				2 x 15	2 x 0.17
Luminaire Head frame-3 way Adaptor				3 x 15	3 x 0.17
Luminaire Head frame-4 way Adaptor				4 x 15	4 x 0.17

Table A3 – Slip base mount design parameters

Mount		Pole		Equipment on Poles								
				Outreach Arm		Luminaire		Aerial Cable		Traffic Signals		
Flange PCD (mm)	Figure No.	Vertical Section Height (m)	Figure No.	Type	Figure No.	Mass (kg)	Sail Area (m²)	Aerial Cable Connection Required	Max Loading (kN)	Type	Mass (kg)	Sail Area (m²)
350	B6	7.0	B5	3 m double plus 2 x 1.5 m extension	B1	2 x 15	2 x 0.17	N/A	N/A	N/A	N/A	N/A
		8.5										
500		10.0										
		13.0										

Table A4 – Design parameters for other structure types

Pole Type	Vertical Section		Outreach Arm			Luminaire		Solar Panel Plus Steel Frame		Aerial Cable		Traffic Signals		
	Height (m)	Figure No.	Uplift (m)	Type	Figure No.	Mass (kg)	Sail Area (m²)	Mass (kg)	Sail Area (m²)	Aerial Cable Connection Requirement	Max Loading (kN)	Type	Mass (kg)	Sail Area (m²)
High mast base plate or slip base mounted	10	SD1370 SD1375	2	1 Way	B2	15	0.17	N/A		Yes if baseplate mounted	1	N/A	N/A	N/A
				2 Way		30	2 x 0.17							
	13			3 Way		45	3 x 0.17							
				4 Way		60	4 x 0.17							
Pedestrian crossing flood light	7	SD1370 SD1376	2	3 m single	B1	2 x 15 plus bracket weight	2 x 0.17	N/A		No	N/A	N/A	N/A	N/A
	8.5													
	10													
Bespoke base plate mounted solar	Project and the designers to choose the required pole size and attachments such as solar panel size, weight, bracket, cameras and ITS devices									No	N/A	N/A	N/A	N/A
Bespoke slip base mounted solar	7.0		2	1.5 m / 3 m single plus 1.5 m extension	B2	1 x 15	1 x 0.17	40	0.98	No	N/A	N/A	N/A	N/A
	8.5													

Table A5 – Pathway lighting pole design parameters

POLE			Equipment on Poles									
POLE TYPE	Vertical Section		Outreach arm / integral			Luminaire		Aerial Cable		Traffic Signals		
	Height (m)	Figure No.	Uplift	Type	Figure No.	Mass (kg)	Sail Area (m²)	Aerial Cable Conn	Max Loading (kN)	Type	Mass (kg)	Sail Area (m²)
Base Plate Mounted non Hinged	6.5	B8 SD1682	N/A	0.5 single	B8 SD1682	7	0.08	No	N/A	N/A	N/A	N/A
Base Plater Mounted Hinged	5.0	B9 SD1682	N/A	0.5 Single	B9 SD1682	7	0.08	No	N/A	N/A	N/A	N/A

Table A6 – Pathway solar lighting pole design parameters

POLE			Equipment on Poles											
POLE TYPE	Vertical Section		Outreach arm			Luminaire		Solar Panel + Steel Frame		Aerial Cable		Traffic Signals		
	Height (m)	Figure No.	Uplift	Type	Figure No.	Mass (kg)	Sail Area (m²)	Mass (kg)	Sail Area (m²)	Aerial Cable Conn	Max Loading (kN)	Type	Mass (kg)	Sail Area (m²)
Base Plate Mounted	5.0	B10	2m	1.5 to 3 m single	N/A	7	0.08	40	0.98	No	N/A	N/A	N/A	N/A

Table A7 – Base plate mounted hinged CCTV pole design parameters

POLE												
POLE TYPE	Vertical Section		Outreach arm			Luminaire		CCTV Camera		Traffic Signals		
	Height (m)	Figure No.	Uplift	Type	Figure No.	Mass (kg)	Sail Area (m^2)	Mass Including Bracket (kg)	Sail Area (m^2)	Type	Mass (kg)	Sail Area (m^2)
Base Plate Mounted Hinged	8	B14	N/A	N/A		N/A	N/A	20	0.11	N/A	N/A	N/A
	10											
	12											
	15											

Appendix B: General arrangements of road lighting installations

Figures B1 to B10 and B14 are **NOT TO BE USED FOR MANUFACTURING**. Figures B11, B12 and B13 are Transport and Main Roads certified fabrication and assembly drawings and it is the responsibility of the user to obtain the most recent revision.

Table B1 – Figures

Figure number	Title
Figure B1	Road lighting pole outreach arms and outreach arm extension
Figure B2	Road lighting pole luminaire headframe
Figure B3	Base plate mounted road lighting pole and joint use traffic signal and road lighting pole general arrangement – Sheet 1
Figure B4	Base plate mounted road lighting pole and joint use traffic signal and road lighting pole general arrangement – Sheet 2
Figure B5	Slip base road lighting pole general arrangement – Sheet 1
Figure B6	Slip base road lighting pole general arrangement – Sheet 2
Figure B7	Base plate mounted hinged road lighting pole general arrangement
Figure B8	Base plate mounted pathway pole with integral outreach
Figure B9	Baseplate mounted pathway hinged pole with integral outreach
Figure B10	Solar pathway lighting pole general arrangement
Figure B11	CCTV camera mounting adaptor on traffic signal mast arm outreach general assembly and details
Figure B12	CCTV camera post on traffic signal mast arm post general assembly and details
Figure B13	Camera mounting adaptor for CCTV-HSP
Figure B14	Base plate mounted hinged CCTV pole general arrangement

Figure B1 – Road lighting pole outreach arm and outreach arm extension

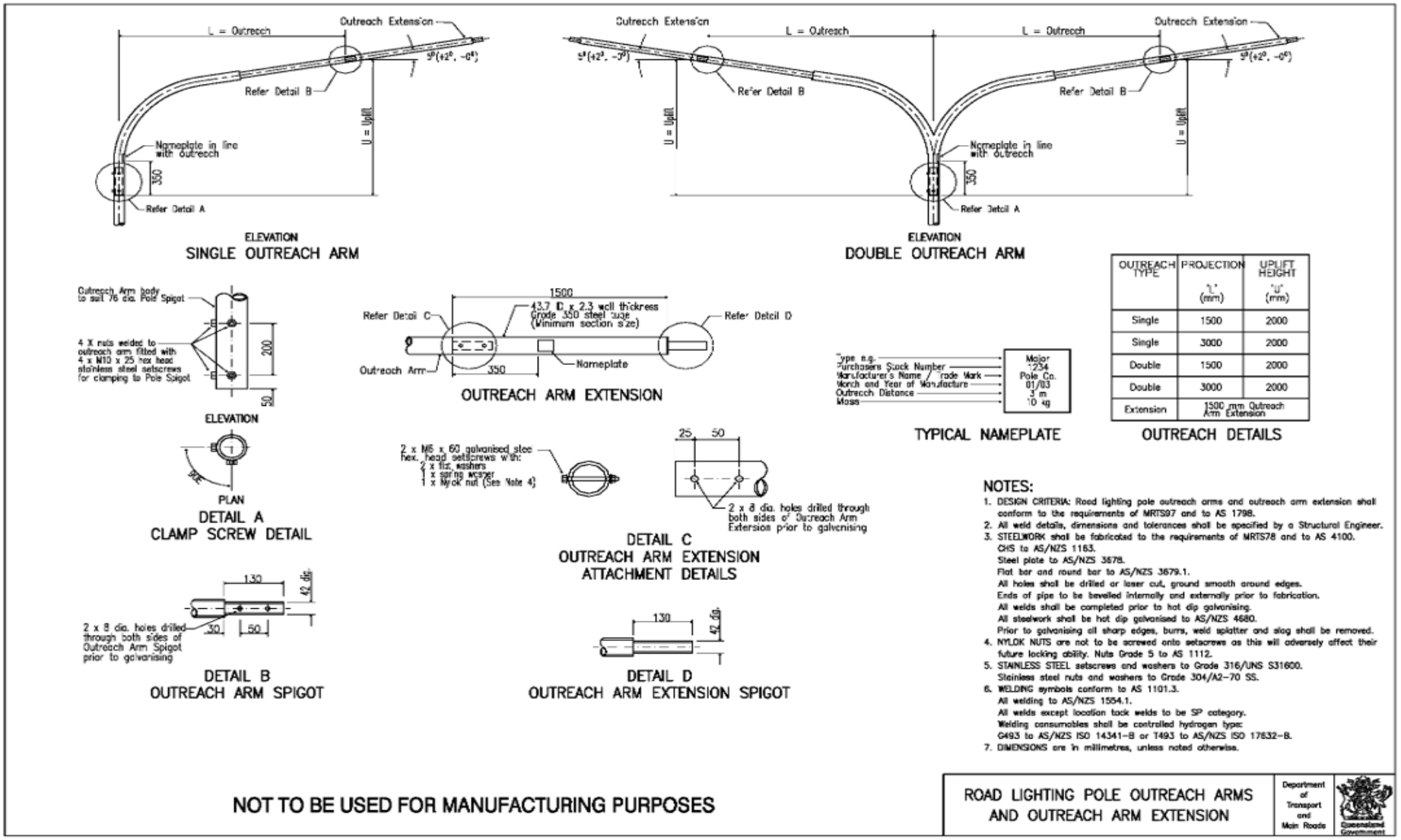


Figure B2 – Road lighting pole luminaire headframe

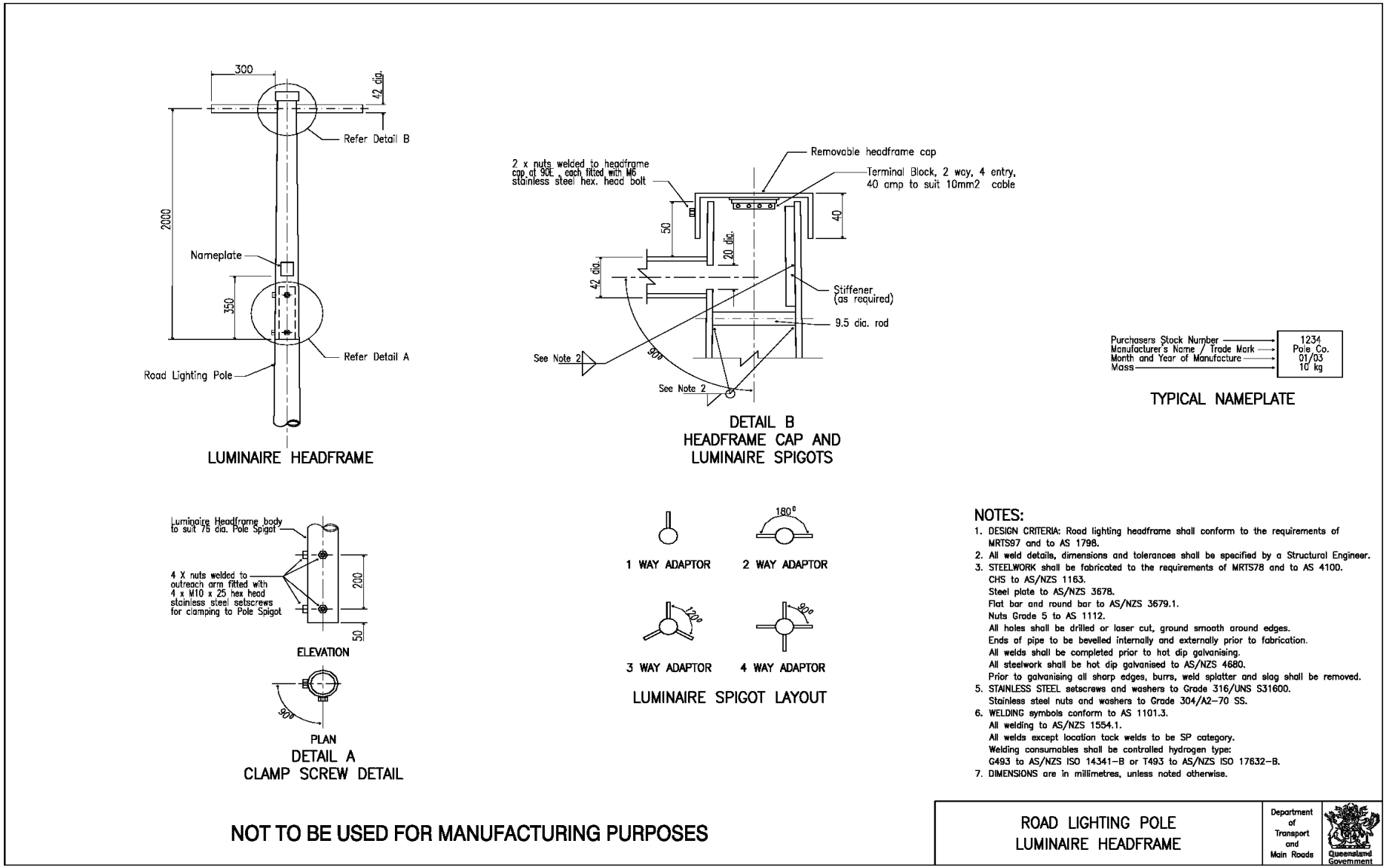
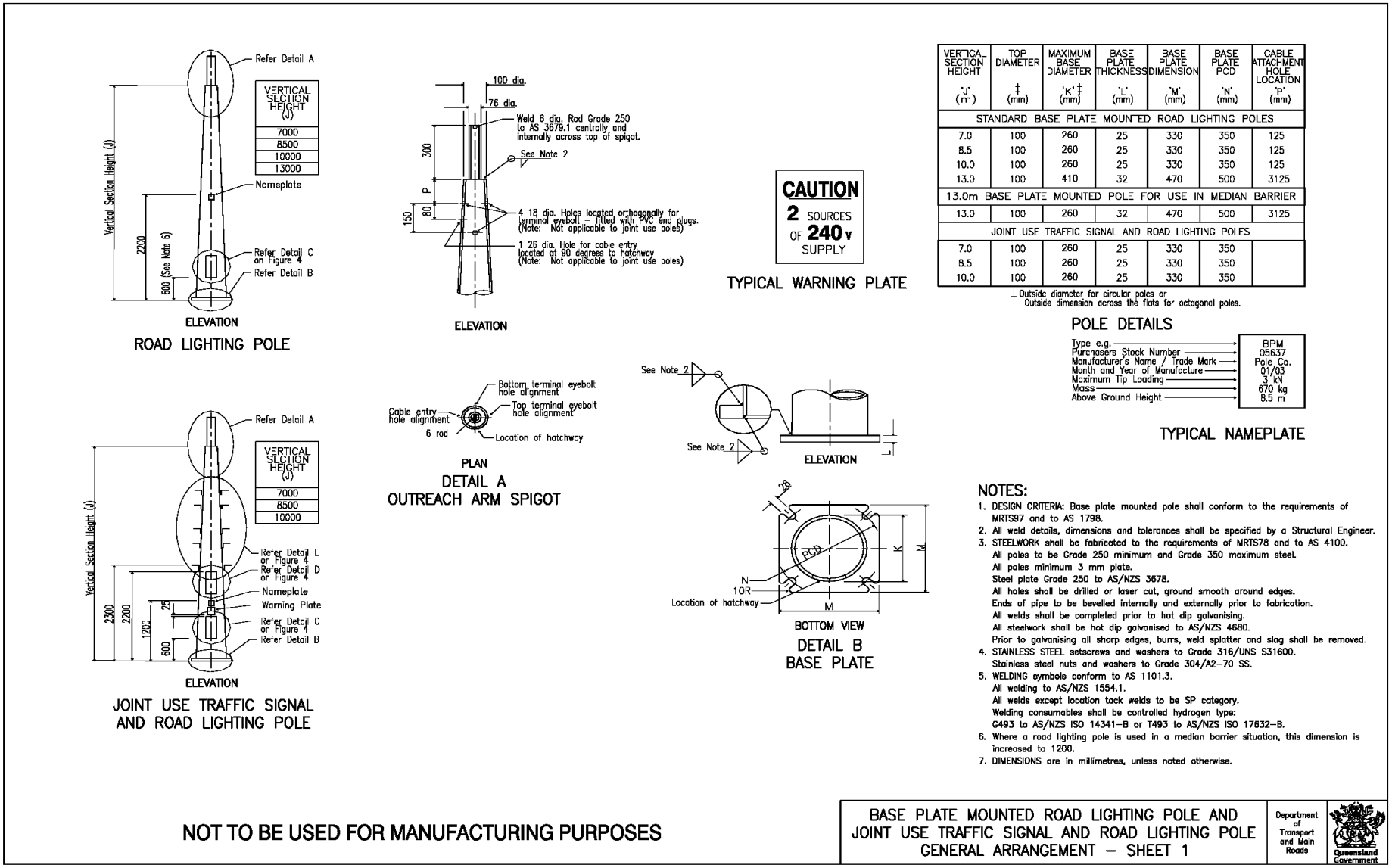


Figure B3 – Base plate mounted road lighting pole and joint use traffic signal and road lighting pole general arrangement – Sheet 1



VERTICAL SECTION HEIGHT 'J' (m)	TOP DIAMETER ‡ (mm)	MAXIMUM BASE DIAMETER 'K' ‡ (mm)	BASE PLATE THICKNESS 'L' (mm)	BASE PLATE DIMENSION 'M' (mm)	BASE PLATE PCD 'N' (mm)	CABLE ATTACHMENT HOLE LOCATION 'P' (mm)
STANDARD BASE PLATE MOUNTED ROAD LIGHTING POLES						
7.0	100	260	25	330	350	125
8.5	100	260	25	330	350	125
10.0	100	260	25	330	350	125
13.0	100	410	32	470	500	3125
13.0m BASE PLATE MOUNTED POLE FOR USE IN MEDIAN BARRIER						
13.0	100	260	32	470	500	3125
JOINT USE TRAFFIC SIGNAL AND ROAD LIGHTING POLES						
7.0	100	260	25	330	350	
8.5	100	260	25	330	350	
10.0	100	260	25	330	350	

‡ Outside diameter for circular poles or Outside dimension across the flats for octagonal poles.

POLE DETAILS

Type e.g.	BPM
Purchasers Stock Number	05837
Manufacturer's Name / Trade Mark	Pole Co.
Month and Year of Manufacture	01/03
Maximum Tip Loading	3 kN
Mass	670 kg
Above Ground Height	8.5 m

TYPICAL NAMEPLATE

NOTES:

1. DESIGN CRITERIA: Base plate mounted pole shall conform to the requirements of MRTS97 and to AS 1798.
2. All weld details, dimensions and tolerances shall be specified by a Structural Engineer.
3. STEELWORK shall be fabricated to the requirements of MRTS78 and to AS 4100.
   All poles to be Grade 250 minimum and Grade 350 maximum steel.
   All poles minimum 3 mm plate.
   Steel plate Grade 250 to AS/NZS 3678.
   All holes shall be drilled or laser cut, ground smooth around edges.
   Ends of pipe to be bevelled internally and externally prior to fabrication.
   All welds shall be completed prior to hot dip galvanising.
   All steelwork shall be hot dip galvanised to AS/NZS 4680.
   Prior to galvanising all sharp edges, burrs, weld splatter and slag shall be removed.
4. STAINLESS STEEL setscrews and washers to Grade 316/UNS S31600.
   Stainless steel nuts and washers to Grade 304/A2–70 SS.
5. WELDING symbols conform to AS 1101.3.
   All welding to AS/NZS 1554.1.
   All welds except location tack welds to be SP category.
   Welding consumables shall be controlled hydrogen type:
   G493 to AS/NZS ISO 14341–B or T493 to AS/NZS ISO 17632–B.
6. Where a road lighting pole is used in a median barrier situation, this dimension is increased to 1200.
7. DIMENSIONS are in millimetres, unless noted otherwise.

NOT TO BE USED FOR MANUFACTURING PURPOSES

BASE PLATE MOUNTED ROAD LIGHTING POLE AND JOINT USE TRAFFIC SIGNAL AND ROAD LIGHTING POLE GENERAL ARRANGEMENT – SHEET 1

Department of Transport and Main Roads

Queensland Government

Figure B4 – Base plate mounted road lighting pole and joint use traffic signal and road lighting pole general arrangement – Sheet 2

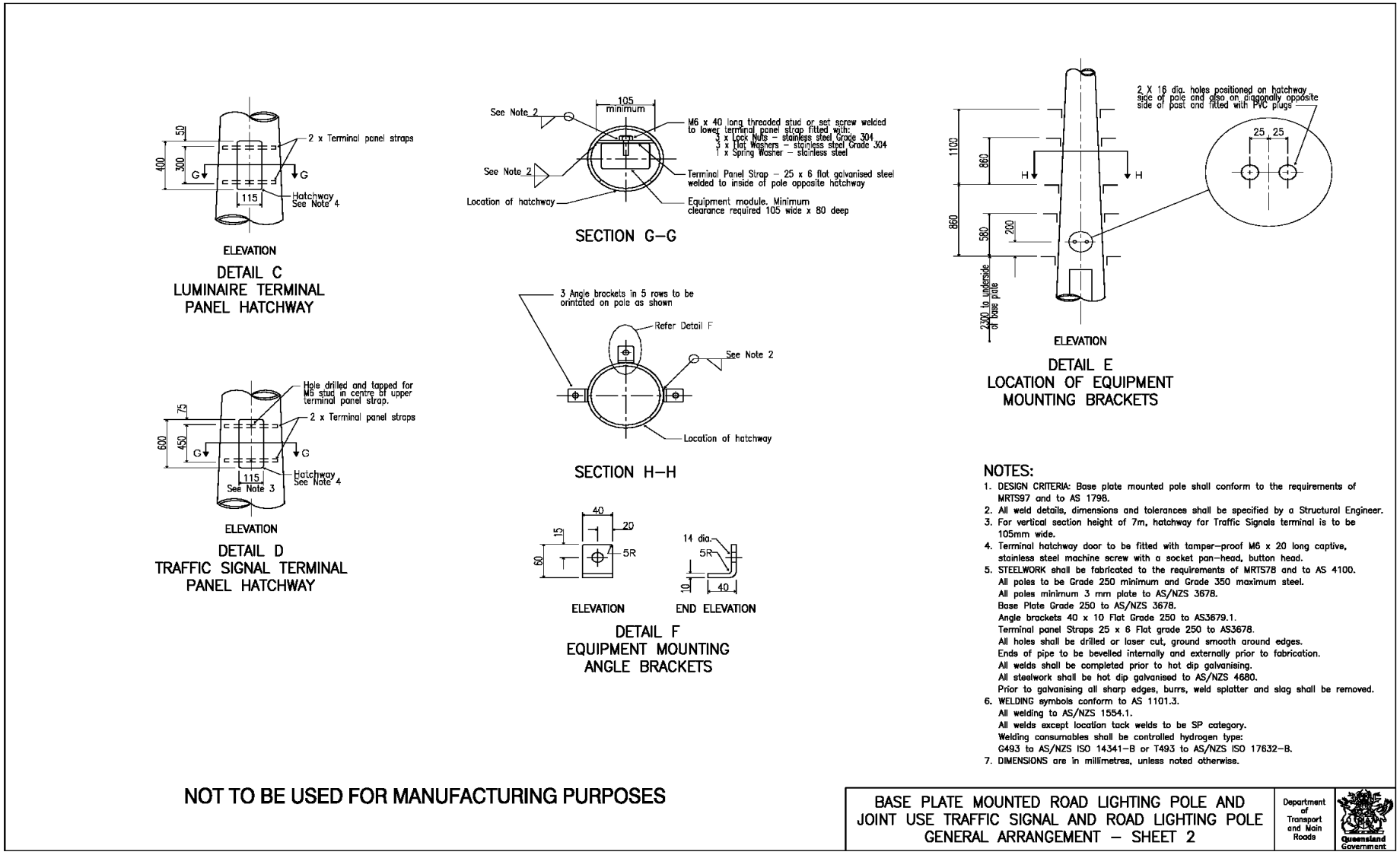
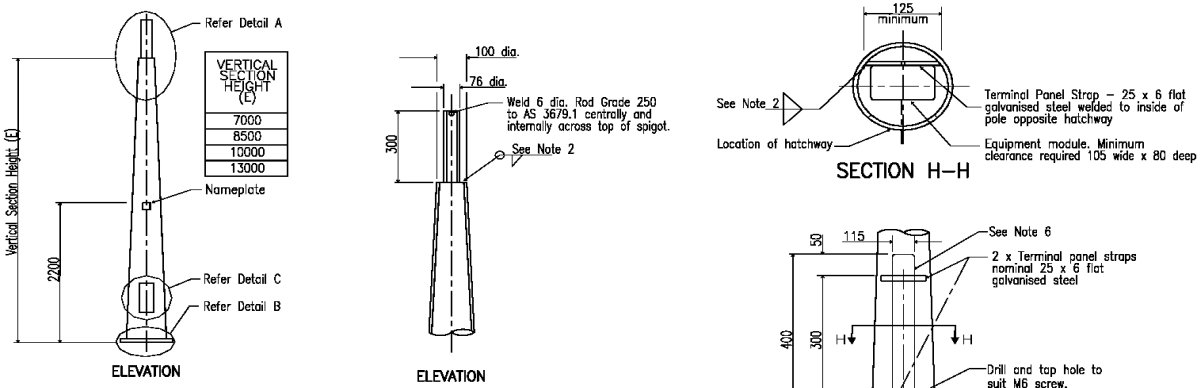


Figure B5 – Slip base road lighting pole general arrangement – Sheet 1



VERTICAL SECTION HEIGHT 'E' (m)	TOP DIAMETER ‡ (mm)	MAXIMUM BASE DIAMETER 'F'‡ (mm)	BASE PLATE DIAMETER 'G' (mm)	BASE PLATE PCD 'H' (mm)
ROAD LIGHTING POLES				
7.0	100	260	400	350
8.5	100	260	400	350
10.0	100	260	400	350
13.0	100	410	550	500

‡ Outside diameter for circular poles or Outside dimension across the flats for octagonal poles.

POLE DETAILS

Type e.g.	SPM
Purchasers Stock Number	05637
Manufacturer's Name / Trade Mark	Pole Co.
Month and Year of Manufacture	01/03
Maximum Tip Loading	3 kN
Mass	670 kg
Above Ground Height	8.5 m

TYPICAL NAMEPLATE

NOTES:

1. DESIGN CRITERIA: Slip base mounted pole shall conform to the requirements of MRTS97 and to AS 1798.
2. All weld details, dimensions and tolerances shall be specified by a Structural Engineer.
3. Terminal hatchway door to be fitted with tamper–proof M6 x 20 long captive, stainless steel machine screw with a socket pan–head, button head.
4. STEELWORK shall be fabricated to the requirements of MRTS78 and to AS4100.
   All poles to be Grade 250 minimum and Grade 350 maximum steel.
   All poles minimum 3 mm plate.
   Steel plate Grade 250 to AS/NZS 3678.
   Clamp brackets Grade 250 to AS/NZS 3678.
   All holes shall be drilled or laser cut, ground smooth around edges.
   Ends of pipe to be bevelled internally and externally prior to fabrication.
   All welds shall be completed prior to hot dip galvanising.
   All steelwork shall be hot dip galvanised to AS/NZS 4680.
   Prior to galvanising all sharp edges, burrs, weld splatter and slag shall be removed.
5. WELDING symbols conform to AS 1101.3.
   All welding to AS/NZS 1554.1.
   All welds except location tack welds to be SP category.
   Welding consumables shall be controlled hydrogen type:
   G493 to AS/NZS ISO 14341–B or T493 to AS/NZS ISO 17632–B.
6. DIMENSIONS are in millimetres, unless noted otherwise.

NOT TO BE USED FOR MANUFACTURING PURPOSES

SLIP BASE ROAD LIGHTING POLE GENERAL ARRANGEMENT – SHEET 1

Department of Transport and Main Roads

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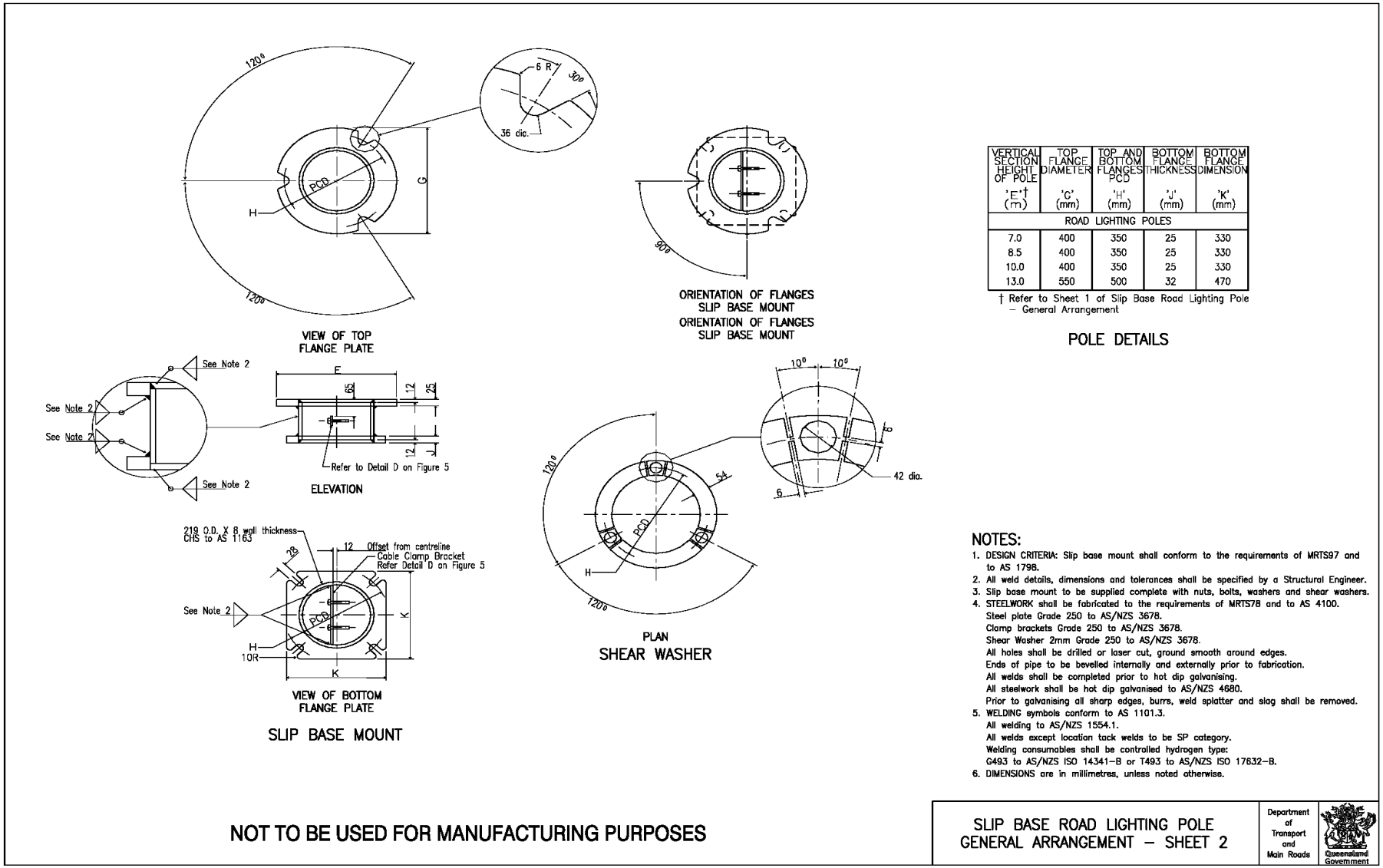
Figure B6 – Slip base road lighting pole general arrangement – Sheet 2



VERTICAL SECTION HEIGHT OF POLE 'E'† (m)	TOP FLANGE DIAMETER 'G' (mm)	TOP AND BOTTOM FLANGES PCD 'H' (mm)	BOTTOM FLANGE THICKNESS 'J' (mm)	BOTTOM FLANGE DIMENSION 'K' (mm)
ROAD LIGHTING POLES				
7.0	400	350	25	330
8.5	400	350	25	330
10.0	400	350	25	330
13.0	550	500	32	470

† Refer to Sheet 1 of Slip Base Road Lighting Pole – General Arrangement

POLE DETAILS

NOTES:

1. DESIGN CRITERIA: Slip base mount shall conform to the requirements of MRTS97 and to AS 1798.
2. All weld details, dimensions and tolerances shall be specified by a Structural Engineer.
3. Slip base mount to be supplied complete with nuts, bolts, washers and shear washers.
4. STEELWORK shall be fabricated to the requirements of MRTS78 and to AS 4100.
   Steel plate Grade 250 to AS/NZS 3678.
   Clamp brackets Grade 250 to AS/NZS 3678.
   Shear Washer 2mm Grade 250 to AS/NZS 3678.
   All holes shall be drilled or laser cut, ground smooth around edges.
   Ends of pipe to be bevelled internally and externally prior to fabrication.
   All welds shall be completed prior to hot dip galvanising.
   All steelwork shall be hot dip galvanised to AS/NZS 4680.
   Prior to galvanising all sharp edges, burrs, weld splatter and slag shall be removed.
5. WELDING symbols conform to AS 1101.3.
   All welding to AS/NZS 1554.1.
   All welds except location tack welds to be SP category.
   Welding consumables shall be controlled hydrogen type:
   G493 to AS/NZS ISO 14341–B or T493 to AS/NZS ISO 17632–B.
6. DIMENSIONS are in millimetres, unless noted otherwise.

NOT TO BE USED FOR MANUFACTURING PURPOSES

SLIP BASE ROAD LIGHTING POLE GENERAL ARRANGEMENT – SHEET 2

Department of Transport and Main Roads

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Figure B7 – Base plate mounted hinged road lighting pole general arrangement

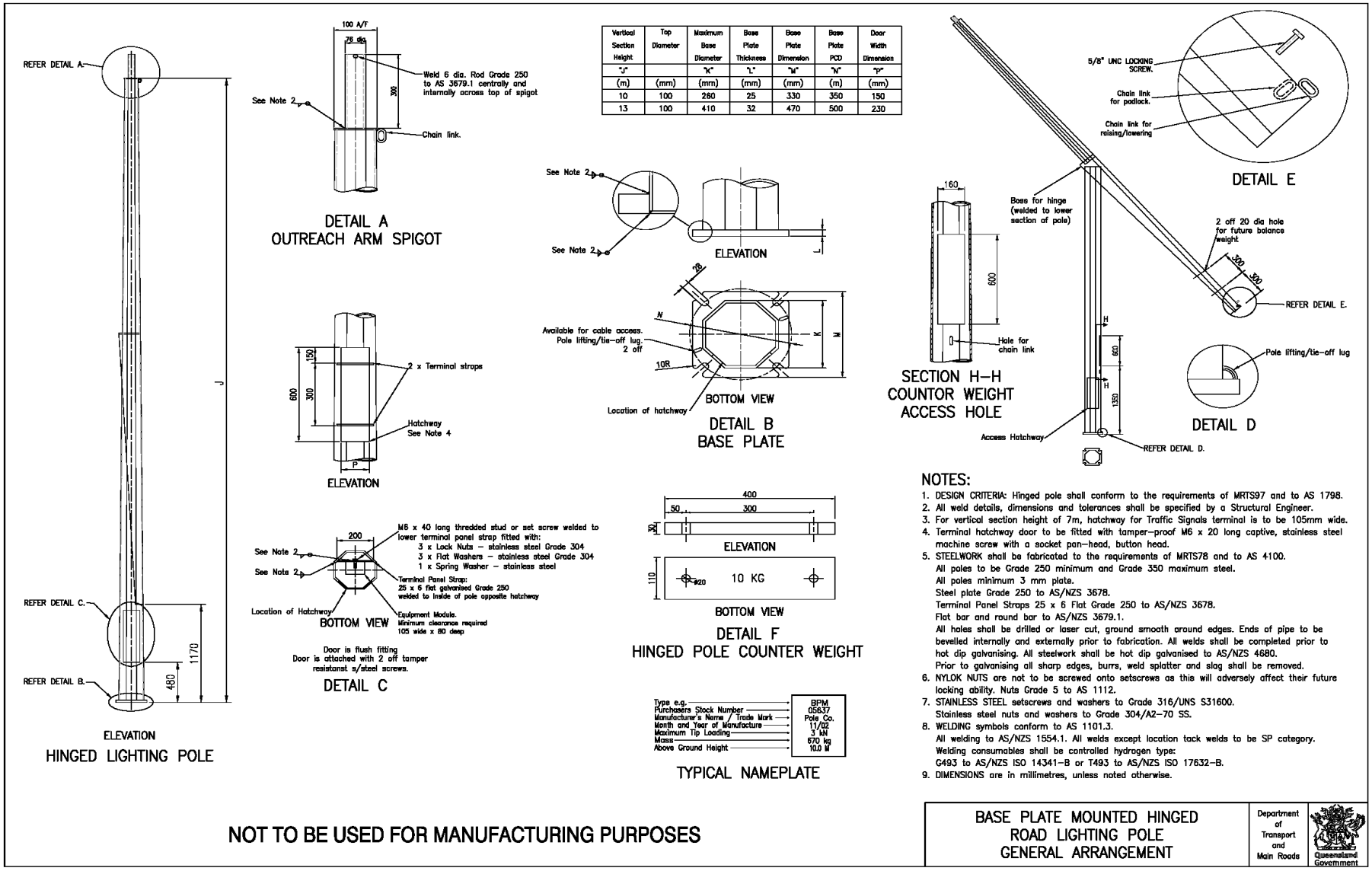


Figure B8 – Baseplate mounted pathway pole with integral outreach

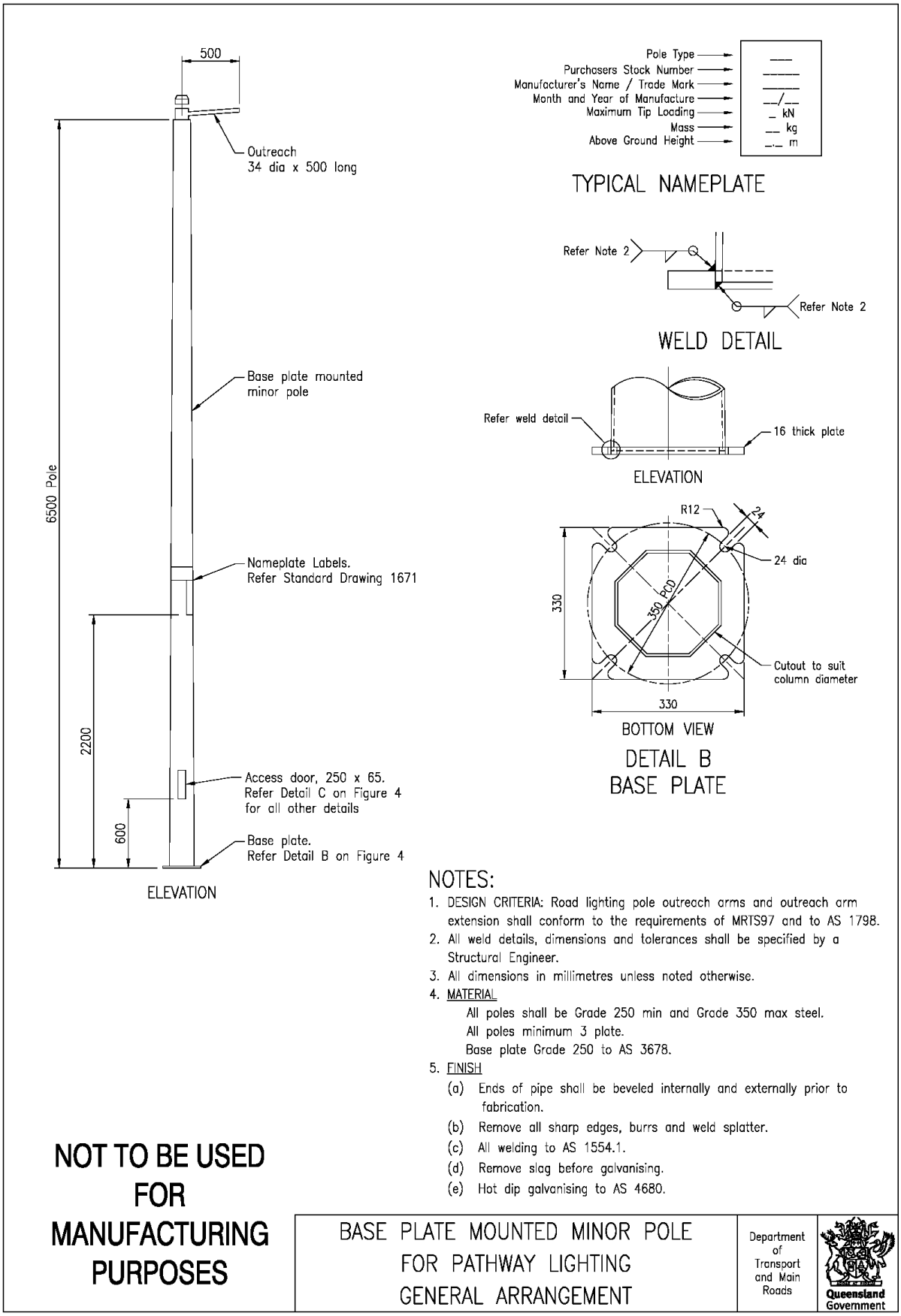


Figure B9 – Baseplate mounted pathway hinged pole with integral outreach

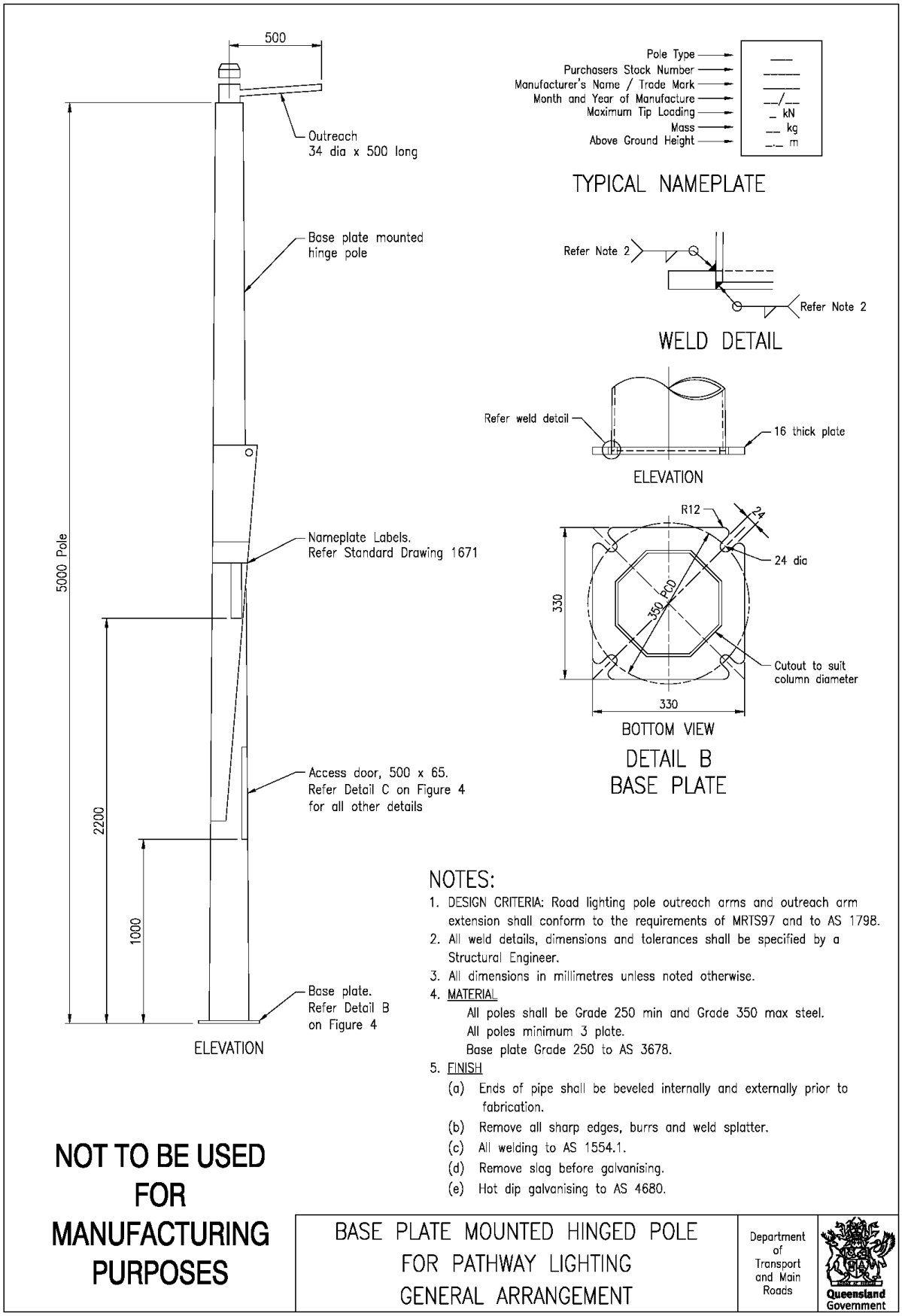


Figure B10 – Solar pathway lighting pole general arrangement

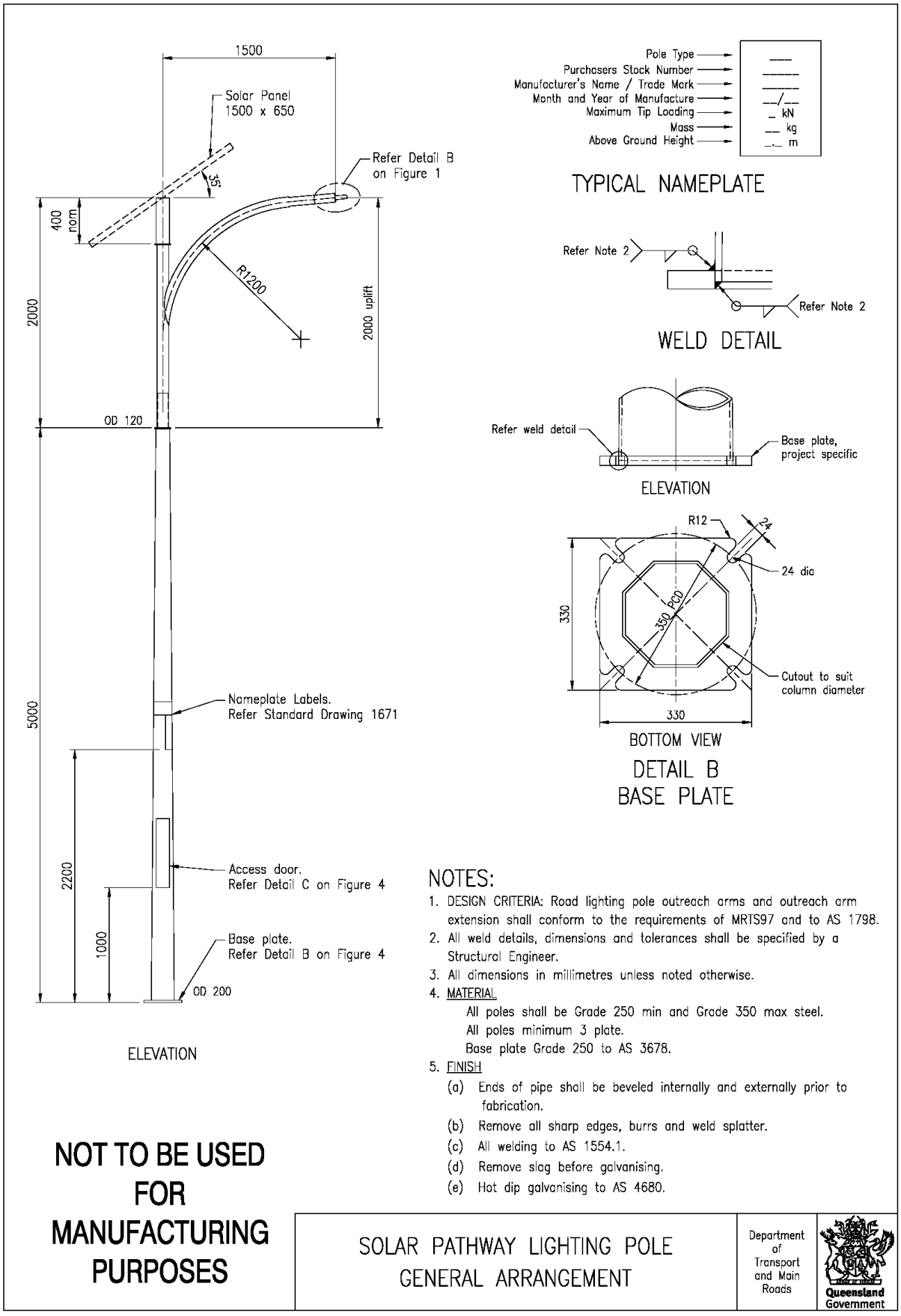
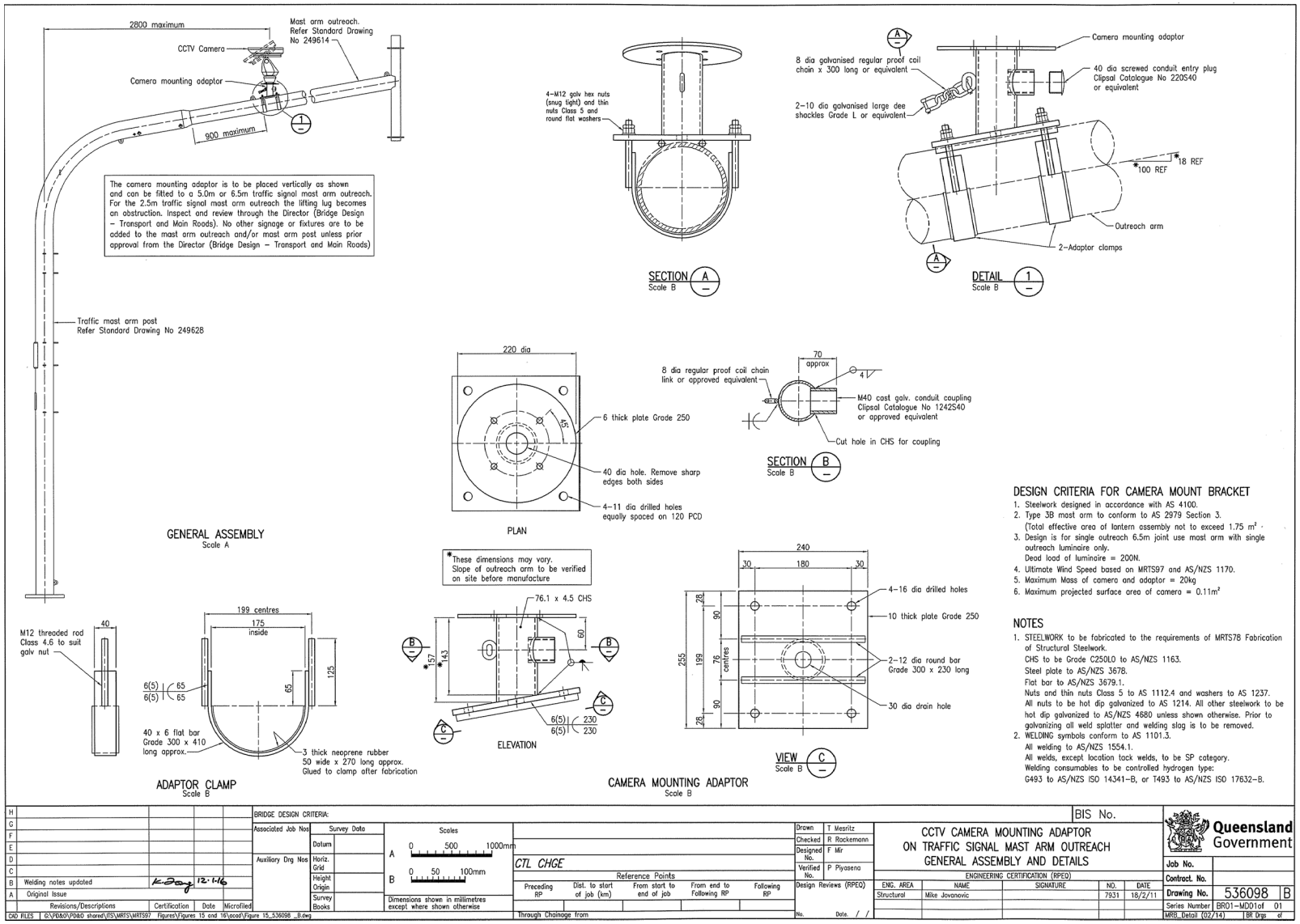


Figure B11 – CCTV camera mounting adaptor on traffic signal mast arm outreach general assembly and details



DESIGN CRITERIA FOR CAMERA MOUNT BRACKET

1. Steelwork designed in accordance with AS 4100.
2. Type 3B mast arm to conform to AS 2979 Section 3.
   (Total effective area of lantern assembly not to exceed 1.75 m^2 .
3. Design is for single outreach 6.5m joint use mast arm with single outreach luminaire only.
   Dead load of luminaire = 200N.
4. Ultimate Wind Speed based on MRTS97 and AS/NZS 1170.
5. Maximum Mass of camera and adaptor = 20kg
6. Maximum projected surface area of camera = 0.11m^2

NOTES

1. STEELWORK to be fabricated to the requirements of MRTS78 Fabrication of Structural Steelwork.
   CHS to be Grade C250L0 to AS/NZS 1163.
   Steel plate to AS/NZS 3678.
   Flat bar to AS/NZS 3679.1.
   Nuts and thin nuts Class 5 to AS 1112.4 and washers to AS 1237.
   All nuts to be hot dip galvanized to AS 1214. All other steelwork to be hot dip galvanized to AS/NZS 4680 unless shown otherwise. Prior to galvanizing all weld splatter and welding slag is to be removed.
2. WELDING symbols conform to AS 1101.3.
   All welding to AS/NZS 1554.1.
   All welds, except location tack welds, to be SP category.
   Welding consumables to be controlled hydrogen type:
   G493 to AS/NZS ISO 14341–B, or T493 to AS/NZS ISO 17632–B.

H				
G				
F				
E				
D				
C				
B	Welding notes updated	K.Day	12.1.16	
A	Original Issue			
	Revisions/Descriptions	Certification	Date	Microfiled

BRIDGE DESIGN CRITERIA:

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

Auxiliary Drg Nos

Scales: A 0 500 1000mm; B 0 50 100mm

Dimensions shown in millimetres except where shown otherwise

CTL CHGE

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

Through Chainage from

Drawn T Mesritz; Checked R Rockemann; Designed F Mir; Verified P Piyasena; Design Reviews (RPEQ) No. Date. / /

CAD FILES G:\PD&O\PD&O shared\ITS\MRTS\MRTS97 Figures\Figures 15 and 16\acad\Figure 15_536098 _B.dwg

BIS No.

CCTV CAMERA MOUNTING ADAPTOR ON TRAFFIC SIGNAL MAST ARM OUTREACH GENERAL ASSEMBLY AND DETAILS

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	NO.	DATE
Structural	Mike Jovanovic		7931	18/2/11

Queensland Government

Job No.

Contract. No.

Drawing No. 536098 B

Series Number BR01–MD01 of 01

MRB_Detail (02/14) BR Drgs of

Figure B12 – CCTV camera post on traffic signal mast arm post general assembly and details

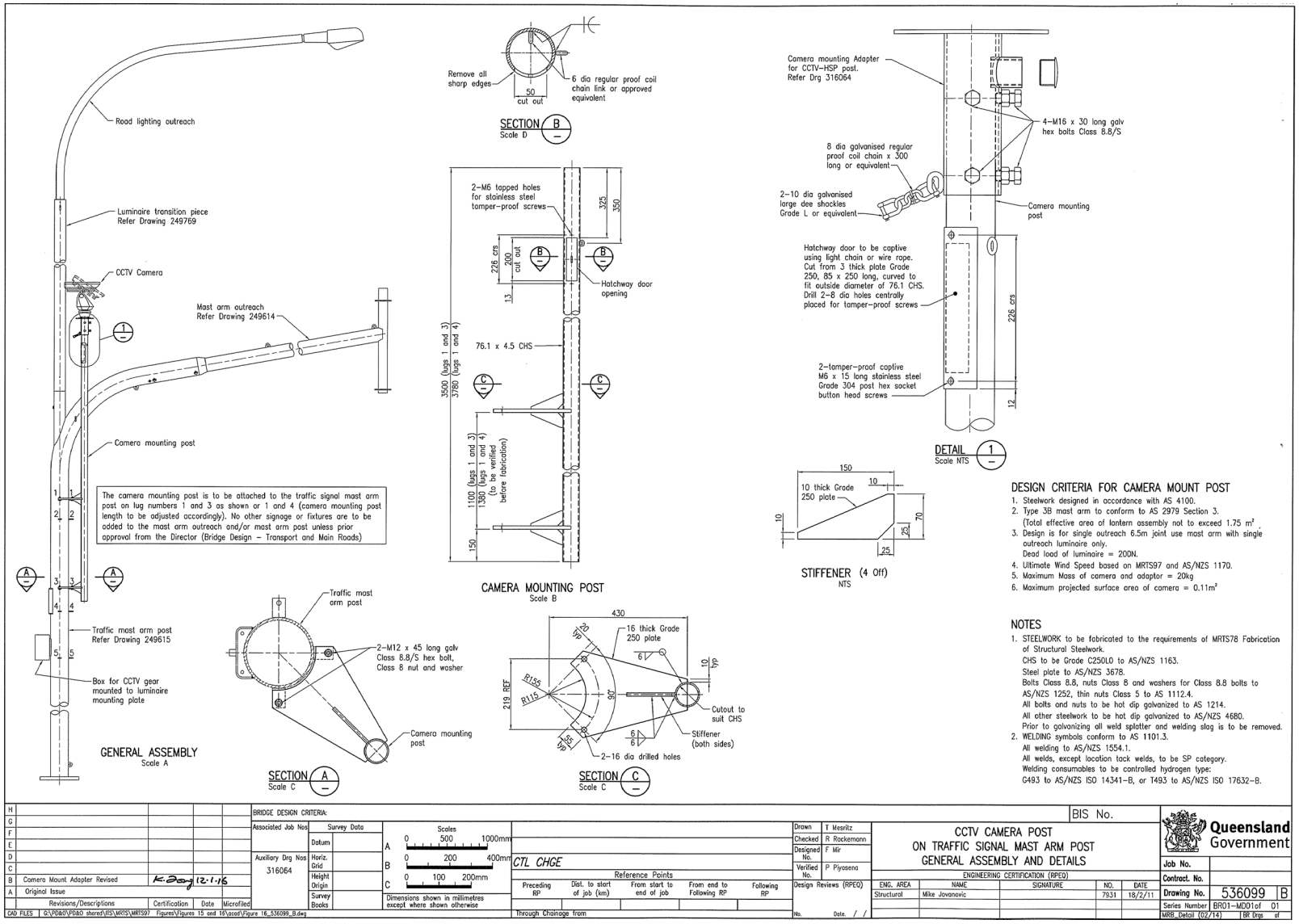


Figure B13 – Camera mounting adaptor for CCTV-HSP

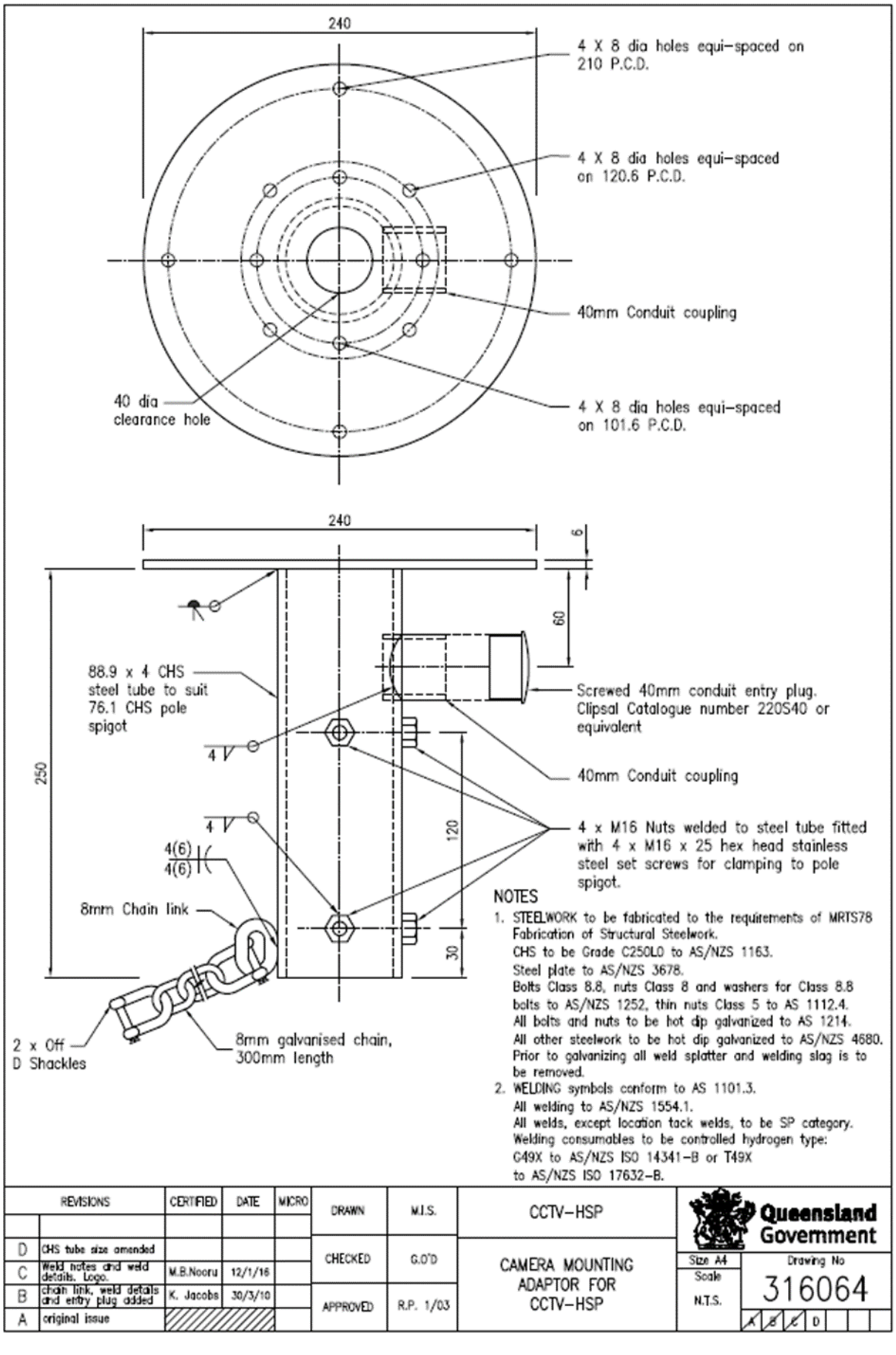


Figure B14 – Base plate mounted hinged CCTV pole general assembly