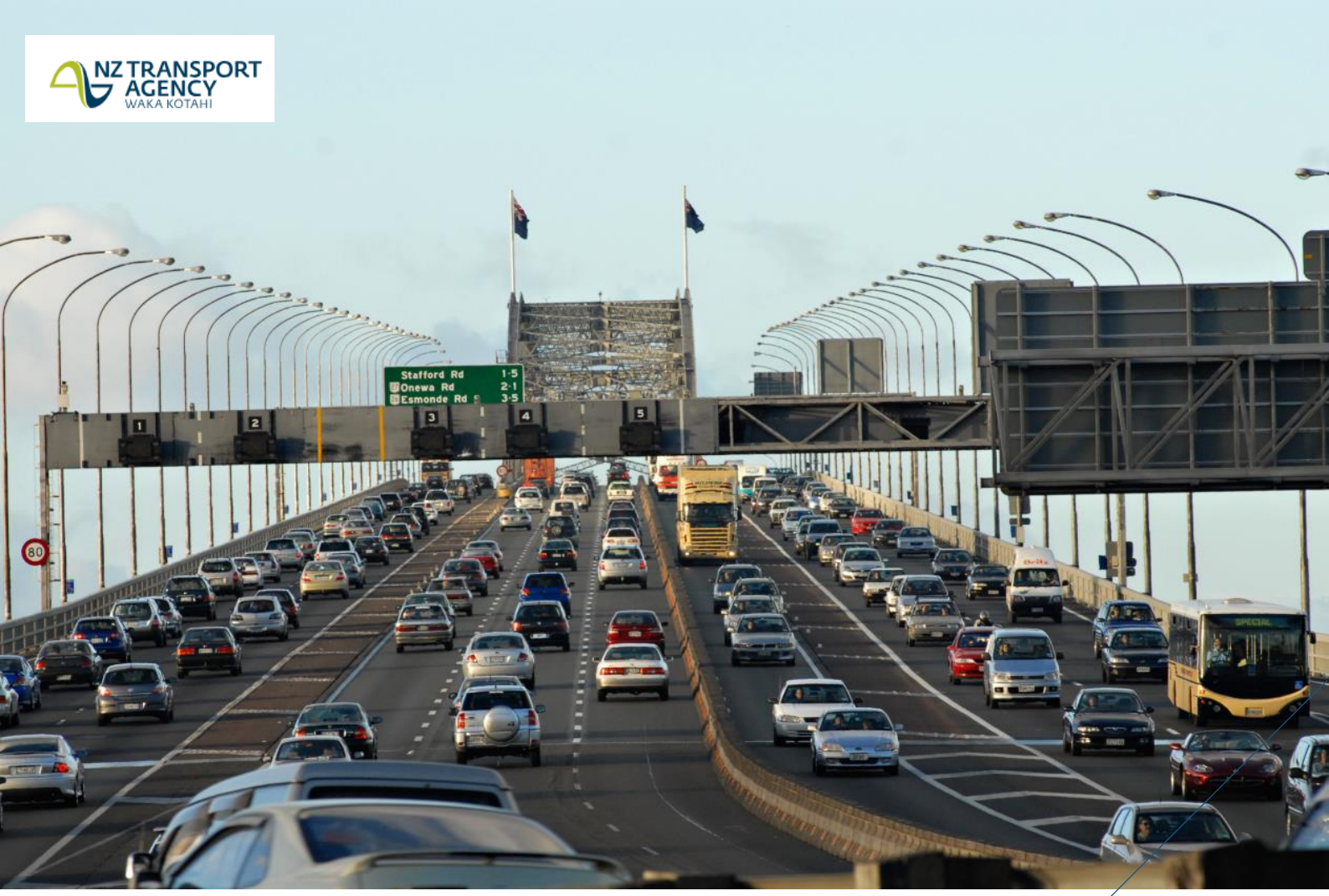
NZ TRANSPORT AGENCY
WAKA KOTAHI



TRAFFIC SIGNALS

Intelligent transport systems (ITS) delivery specification

27 MAY 2025
0.3

DOCUMENT STATUS: DRAFT

New Zealand Government

Disclaimer
NZTA has endeavoured to ensure material in this document is technically accurate and reflects legal requirements. However, the document does not override governing legislation.

NZTA does not accept liability for any consequences arising from the use of this document. If the user of this document is unsure whether the material is correct, they should refer directly to the relevant legislation and contact NZTA.

More information
If you have further queries, contact the Intelligent Transport Systems Standards and Specifications (ITS S&S) team via email: itsspec@nzta.govt.nz

More information about ITS is available on the NZTA website at https://www.nzta.govt.nz/its

This document is available on the NZTA website at https://www.nzta.govt.nz/itsspecs

Template version
2.0, 02/02/2024

Contents

List of tables

1 Overview

This section defines the purpose of the equipment within the operational system.

1.1 Scope

The scope of this specification is as follows:

i. Requirements for the procurement of Traffic Signals.
ii. Physical installation of Traffic Signals.

This delivery specification covers the best practice of installation, maintenance and upgrade of traffic signals.

1.2 Overview

The purpose of this document is to specify the requirements for the procurement of traffic signals by the RCA. In addition, this delivery specification details system integration requirements (such as installation protocols and commissioning) to ensure compliance with the RCA's operational and asset management systems.

This delivery specification shall be read in conjunction with the latest version of ITS design standard: *Traffic Signals.*

1.2.1 Regional requirements

Contractors shall refer to the RCA's regional special conditions (refer to SNUG specifications) for specific requirements.

1.2.2 NZTA ITS class

003 Signals. Equipment which provides visual instructions (often legally enforceable) to the users of the transport network.

Class definitions

2 Requirements

This section outlines what the equipment and systems need to do, and how they need to do it.

2.1 General

This section sets out the requirements of all signal equipment offered for supply and installation, whether for new sites, upgrades or through maintenance, including, the local signal controller, controller cabinet, uninterruptible power supply, detectors, lanterns, target boards, visors, poles and pole top assemblies, and push button assemblies.

2.1.1 Uninterruptible Power Supply (UPS) for Traffic Signals

Removed and consolidated in Section 2.8.

2.2 Signal equipment compliance and approvals

All traffic signal components shall comply with this specification and shall either:

i. Have specific requirements by the RCA, and found satisfactory in operation, or
ii. Be demonstrated in a working condition and to the RCA's requirements. The RCA shall give provisional approval if, in their opinion, the equipment is fit for purpose and is able to be connected to the Sydney co-ordinated adaptive traffic system (SCATS) traffic management system (if required to be connected to SCATS). See section **Error! Reference source not found.**.

The equipment shall also comply with all relevant electrical regulations and local power supply authority's requirements.

2.2.1 Provisional approval

Provisional approval for non-complying equipment shall be given by the RCA, providing that the proposed equipment meets all specified requirements, regional special conditions (refer to SNUG specifications website), including safety and other regulatory requirements, and the latest ITS design standard: *Traffic Signals*.

Equipment with provisional approval is required to operate in accordance with this specification, and the associated regions' special conditions. This will not remove the Contractor's maintenance obligations detailed within this specification or as amended by a specific clause in the associated RCA's Regional Special Conditions to this ITS delivery specification. Equipment with provisional approval shall require maintaining for a longer period than one year. The Contractor will be notified of this period when granted provisional approval. Maintenance, at no cost to the RCA, will be required until full approval for the equipment is given.

In general, equipment will be required to operate under normal working conditions without failure for a period of 12 months. This applies to one-off, or a multiple number, of units.

2.2.2 Guarantee / warranty period

Unless specified elsewhere in this specification, all equipment and hardware supplied or installed shall be guaranteed by the manufacturer against faulty materials and workmanship for a minimum period of one year from the date of commissioning.

Where there is a difference between the main contract's defects and liability requirements and this specification, the longer time period shall apply.

Exceptions to the above include: traffic signal controller components (as per manufacturer), UPS controller (as per manufacturer), UPS Batteries (five years), poles, and painting (ten years).

LED (lamp) modules shall have a five-year guarantee period. For new installations, the guarantee period shall commence from the date of commissioning. For replacement modules, the guarantee period shall commence from the date of installation of the LED (lamp) module.

All guarantee and warranty work must be done at no cost to the asset owner, or their representative.

See section 5.20 for cost liabilities for any failure or fault during the contract maintenance or defects liability period.

2.3 Traffic signal controller

2.3.1 AS 2578:2009 – Traffic signal controller

Note: AS 2578:2009 has been withdrawn with no replacement. As such the latest version is still being referenced for the time being.

Subject to the following special conditions (Section 2.3.2), the traffic signals controller shall comply with AS 2578. This includes all aspects of the controller, cabling, mounting, cabinet, and logic rack as detailed in AS 2578, including the provision of options as detailed in Appendix A of AS 2578.

2.3.2 New Zealand special conditions to AS 2578:2009

The following amendments shall be made to AS 2578 for supply and installation in New Zealand under P43. The numbers referred to are the clause numbers in AS 2578.

1.4.10 - Additional requirement for New Zealand

In accordance with AS/NZS 3000, the RCD supplied shall meet the conditions of 2.6.2.2 of AS/NZS 3000 for New Zealand installations.

2.3.3 - Additional requirement for New Zealand

The controller should have ventilation grilles in the base, above the finished ground level, and below the gland plate as detailed in 2.3.4. A recommended option is to fit a 'pedestal' between the base and the controller cabinet. This pedestal shall be at least 100 mm tall, and the same width and depth as the controller cabinet and base.

2.3.4 - Additional requirement for New Zealand

A gland plate and removable access panel shall be fitted at the bottom of the controller cabinet. A suitable example is shown in this specification Appendix L. Any unused cable entries shall be 'plugged' with plugs that can be easily removed. The glands, gland plate, and access panel shall prevent entry of vermin and so on into the bottom of the controller cabinet with all gaps to be sealed with RTV silicon to stop insects entering the cabinet.

The access panel shall be installed to allow easy removal for maintenance tasks in the bottom of the cabinet.

2.3.7 – For New Zealand delete Figure 2.5.

2.3.7 – Additional requirement for New Zealand as per NOTE.

The purchaser requirement for New Zealand cabinet locking is as follows:

i. Recessed handle(s);
i. Three-point locking at top, bottom, and side;
ii. A single-key mechanism; with the lock keyed for FS880, unless specified by the local RCA's regional amendments to P43.

2.3.12 – Change requirement for New Zealand

Replace second paragraph with:
The equipment shelf shall be mounted not less than 390 mm below the top of the door opening, and this shelf shall be the width of the controller cabinet.

Clause 2.3.12 – Additional requirement for New Zealand
The equipment shelf shall be sufficiently deep enough to hold the logic module but shall have at least 50 mm clearance from the front face to the inside of the door.

New clause for New Zealand
Communications socket outlet and MCB
A circuit breaker shall be installed in the 'spare position' defined in AS2578:2009, Section 2.5.11(f). This circuit breaker shall be rated at 16 A, Type C, with a fault-make load-break fault current rating not less than 8 kA and shall control a new double-socket outlet specifically for communications and camera equipment, where the 230 V power for such equipment is supplied by 3-pin plug. The communications equipment socket outlet shall be clearly labelled 'Communications equipment only – NOT RCD PROTECTED'. RCD protection shall not be provided for this socket.

New clause for New Zealand
Stand-by generator connection
The controller housing shall be fitted with all of the facilities required for the connection of an external generator as specified in AS 2578. The controller housing connector for the external generator shall be a male three-pin (flat) 15A connector complying with AS 3112.

It is desirable that the 'presence of power' indicator lights specified in AS 2578 are green to indicate mains supply and yellow to indicate generator supply. The indicator lights should have a design life of at least 15 years.

New clause for New Zealand

Street lighting power

Where there is a power supply to street-lighting mounted on a shared traffic signal pole, it must be fed through the traffic signals control cabinet.

The street-light power circuit shall be supplied through the traffic signal controller mains power isolation switch.

A dedicated MCB shall be provided and shall be installed in the 'spare position' defined in AS2578:2009, Section 2.5.11(f). Where the detector' MCB detailed in AS2578:2009 Section 2.5.11 (d), is not being utilised and if suitably rated, it may be reassigned as the street-lighting circuit protection, in which case it shall be clearly relabelled

Appendix I, Figure R01 shows an example of street-lighting fed through the traffic signal controller.

New clause for New Zealand

Electricity revenue meter

Each electricity retailer and each electricity lines company have slight variations with their electricity revenue meter requirements. For regional specifics, consult the local RCA's regional amendments to P43.

2.13.1 – Change requirement for New Zealand

Replace the entire paragraph with:

Conformance with New Zealand communication requirements

Any device designed or intended for connection to a telecommunications network shall comply with the applicable requirement:

i. Telepermit requirements - Any device to be directly connected to the Chorus network shall display the New Zealand Telepermit label. For more information visit http://www.telepermit.co.nz.
ii. Radio requirements – Any wireless device shall comply with the (New Zealand) Radiocommunications Act. For more information visit http://www.rsm.govt.nz.

2.18 – NOTE

The service light is a standard requirement for all New Zealand controllers.

2.22.5 (b) – change requirement for New Zealand

Replace entire requirement with 'Telepermit label and PTC number'.

2.3.3 Controller firmware

Prior to testing and installation, the following requirements shall be met:

i. The controller shall be compliant with the Roads and Maritime Services (RMS) TSC4 specification;
ii. The controller (including logic rack and all other modules) shall have the current manufacturer software, firmware, and hardware updates applied at the time of installation.

2.3.4 SCATS compliance and TRAFF version

Where the controller is to be connected to SCATS, the following conditions apply:

i. The controller shall be running the latest version of Client approved firmware for that controller model, notwithstanding, the minimum software version must be VC6,

ii. A copy of the RMS SCATS compatibility certificate for that model of controller & firmware shall be supplied to the RCA Traffic Signal Engineer, if requested or not previously supplied.

2.3.5 New controller types

Where a contractor proposes to install a new controller type not previously installed in the area of the RCA, the following conditions shall be met:

i. Written approval shall be obtained from the RCA Traffic Signal Engineer;
ii. The supplier (or their agent) shall offer to make a presentation on the controller to the RCA Traffic Signal Engineer and provide a loan logic rack at no charge to allow the RCA Traffic Signal Engineer and maintenance contractor, to test the controller and become familiar with it;
iii. The supplier (or their agent) shall provide a training course to the RCA's existing maintenance contractor, at no charge to the engineer or the maintenance contractor;
iv. If the new controller requires special configuration tools, or will not work with the RCA's maintenance contractor's HHT, the supplier (or their agent) shall provide all equipment required to allow full HHT operation with the controller. This may include computer hardware & software, or a new HHT, as required by the RCA Traffic Signals Engineer to integrate with the operations of the current maintenance contractor;
v. The RCA Traffic Signal Engineer has the final right to deny installation of any controller type in their area.

2.3.6 Communications 'Top Hat' Cabinets

Communications top-hat cabinets must be installed at all sites unless specifically requested by the RCA Traffic Signal Engineer.

This must include the installation of a fixed rack shelf to allow installation of communications hardware.

With reference to section 2.3.2, the communications socket outlet circuit must terminate in a PCU (permanent connection unit), and be connected to a suitable rack-mounted power rail. This power rail must include LED's to indicate that power is available, and earthing is present.

2.3.7 ELV (Extra Low Voltage)

All new sites must be ELV sites. To clarify, this means that MEN Mains Voltage is only present in the signal controller cabinet, with all site cabling and equipment meeting the ELV requirements.

Where dimming is to be used, this must be done as 'dim by wire'.

Where 230v streetlighting is installed on JUSP's, ELV step-up transformers must be used at the Montrose box. Specific requirements for this can be found in the WK / NZTA 'Specification for Streetlights at ELV sites' (linked in Appendix P).

Consideration must be given to ensure voltage drop requirements are not exceeded at large ELV sites.

2.4 Signal lanterns

2.4.1 General

The requirements for traffic signal lanterns including cowls, visors, and louvres shall comply with the AS/NZS 2144, including amendments as issued from time to time, with the exception that all new traffic signal lanterns shall be supplied with LED lamps.

2.4.2 Signal sizes

The nominal size of pedestrian and general-purpose signals, as referred to in AS 2144, shall be 200 mm.

The nominal size of extended range signals, as referred to in AS 2144, shall be 300 mm.

Extended range signals shall be used on all overhead mast arm displays and on high speed approaches or as directed by the RCA Engineer.

2.4.3 LED lanterns

All LED lanterns, visors, louvres and target boards shall comply with this specification. In addition LED lanterns shall have an independent NATA certified laboratory report confirming compliance with AS 2144.

This must be supplied to the RCA Traffic Signal Engineer on request.

2.4.4 Lantern body construction

Lantern bodies must be compliant with AS2144. They must be recyclable in New Zealand, and have an anticipated lifespan of at least 20 years. They must be installed to the manufacturers' installation instructions.

The lantern doors shall be capable of being hinged on both the left and right without the need for tools. Lantern doors shall be able to be replaced without the need to disturb the lantern mountings.

2.4.5 Visors (cowls)

Each visor shall fit tightly against the door and shall not permit any perceptible filtration of light between the door and the visor.

All visors shall be made from plastic.

Unless specified elsewhere, all visors shall be one of the following:

i. Open type visor – For use on primary lanterns;
ii. Closed type visor – For use on secondary or tertiary lanterns;
iii. Pedestrian visor – Each standard 200 mm diameter pedestrian lantern shall be fitted with an approved rectangular visor.

2.4.6 Target boards (backing boards)

Target boards shall be fitted to each vehicle lantern supplied. The target boards shall be as specified in AS 2144, and shall be constructed using type 5005 aluminium alloy with a minimum thickness of 1.6 mm.

Each target board shall be fully interchangeable in accordance with the criteria recommended in Appendix F of AS2144. The surface treatment shall be baked enamel (black).

All target boards shall incorporate a white border as detailed in AS2144.

2.5 Poles and pole terminal assemblies

2.5.1 Traffic poles

The design requirements for all traffic poles shall be in accordance with AS/NZS 4676 and AS/NZS 4677.

Design of the components for strength will be in accordance with the parameters set out in (a) to (g) below.

Only poles and arms in accordance with the drawings in Appendix C are to be installed. Variations from these standards will require written approval from the RCA's Traffic Signals Engineer.

All traffic poles, including mast arm poles, standard traffic signal and hinged traffic signal poles, JUMA, JUSP, ground planted, flange based, or flange based stub shall be designed in accordance with AS/NZS 1170.0 and AS/NZS 1170.1, and include a 10-year structural guarantee.

Additionally, the following specific design parameters are to be included:

i. Design working life – 50 years;
ii. Importance level – 2;
iii. Wind region – Use code for region where traffic signals are to be installed;
iv. Terrain/height multiplier – 2;
v. Shielding multiplier – 1;
vi. Hill shape multiplier – 1;
vii. Lee zone multiplier – 1 (to a maximum of 1.35).

All JUSP, JUMA, and mast arm poles with curved outreach arms shall have a 10-degree upward tilt on the outreach arm. In addition, poles and arms shall comply with all dimensions shown in Appendix C. The minimum spigot diameter on JUSP and JUMA poles shall be 42 mm outside diameter (OD). In the case of the JUMA and JUSP poles, the street lighting luminaire fitted to the outreach arm shall not exceed 0.15 m^2 in sail area and have a mass of no more than 15.0 kg. The tilt angle shall be detailed on the drawings.

All fixtures and fittings are detailed (traffic signals, pedestrian signals, street lights, signage, and any other fittings or fixtures required for the specific installation) along with the height at which their weight and windage is to be calculated as a minimum. Drag coefficients are to be in accordance with Table E4 of AS/NZS 4676.

The JUSP pole door cavity/fuse opening shall be of a suitable weatherproof design and shall be positioned to permit safe access for maintenance (not facing the street/traffic lane). The ideal position would be to allow the technician to view oncoming traffic. The cover plate shall be secured by a minimum of two child and vandal resistant 304 grade stainless steel fasteners and will require a specialised tool to remove the fasteners for maintenance.

In the case of octagonal JUSP poles, the door cavity/fuse opening shall be a standard size of 300 mm x 140 mm and be positioned 600 mm (to the base of the opening) above the finished ground level. In the case of the

JUMA pole, the door cavity/fuse opening for the street light isolation shall be a standard size of 180 mm x 80 mm and be positioned just below the mounting flange for the street light outreach arm.

All steel tube used for manufacture of the 5.1 m traffic light poles shall be a minimum of 100 nb (nominal bore) CHS (Circular Hollow Section) to C250LO in accordance with AS/NZS 1163.

Pole strengths are based on NZS 3404. Steel section strength requirements apply to the base of the pole at the top of the concrete footing.

All welding shall be carried out in accordance with AS/NZS 1554.1 *Welding of steel structures*, with welders qualified to AS/NZS 2980 *Qualification of welders for fusion welding of steels*. Inspection certificates by a duly qualified independent inspection company are to be supplied for each batch manufactured.

Suitable mounting points for a fall restraint system shall be provided for all new poles.

2.5.1.1 Pole identification

Poles shall be permanently marked (prior to painting) by way of indentation stamp to indicate date of manufacture (dd/mm/yyyy) and the name of the manufacturer. This indentation stamp shall be located immediately under the lower pedestrian mounting lug. Arms are to be identified in the same manner with the location being on the outer surface, immediately above where the arm connects to the pole. The indentation stamp letter and number size is to be of a size suitable to be easily identified. Lettering shall have a minimum height of 7 mm and a maximum height of 14 mm. All marking is to be applied prior to painting.

2.5.1.2 Pole Finish

All JUMA, JUSP, and mast arm poles and arms shall be finished, both internally and externally, in accordance with AS/NZS 4680 *Hot-dip galvanized (zinc) coatings on fabricated ferrous articles*. Ready galvanised steel, spray on galvanising or thermal zinc will not be accepted. In addition, pole coatings shall be in accordance with AS/NZS 2312.1 *Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings*.

Pole coatings shall be certified to Category C4 for a 10-year warranty to first maintenance.

2.5.1.3 Pole Installation

Each pole type will require a PS1 certificate to be issued by a suitably qualified Chartered Professional Engineer. This certificate shall include the specific design details for both the pole and, when requested, the foundation details, and will be supplied at time of tender.

Mounting of the poles are of three possible types – ground planted, concrete pad or retention socket.
All new sites must use an approved retention socket & foundation system for all poles, unless pole-specific conditions require different installation considerations (eg mastarms). If a retention socket is not to be used, specific permission must be obtained by the RCA Traffic Signal Engineer.

Ground planted poles are an extension of the pole below the finished ground surface. The length below ground will vary depending on the model of pole being installed and ground conditions in the location. The minimum soil bearing capacity shall be 100 kPa with minimum ultimate shear capacity of 40 kPa. A site specific foundation design will be required for any capacities less than 100 kPa and 40 kPa.

Concrete pad mounted poles will typically be of a flange-based type. These poles will require a concrete pad or pile to be constructed that will include during pouring the use of a suitable holding down bolt cage. Pads and piles are typically used in locations where the ground conditions are not stable enough to maintain overturning resistance.

Retention sockets are installed in the ground utilising various foundation designs to suit the available depth and ground conditions. The pole can be cabled at ground level and is then slotted into the ground socket reducing the H&S risk of working at height. In the event of a knockdown the pole can be replaced. Typical foundation details can be sourced from the retention socket suppliers, however each design should be checked for suitability depending on ground conditions.

The installer must produce a PS3 as part of the final as-built documentation to declare the poles have been installed according to the manufacturers requirements and design.

2.5.2 Pole terminal assemblies

2.5.2.1 Switch terminations (terminal assemblies)

The terminal assembly shall consist of sufficient 2.5 mm 2-in-2-out knife edge disconnect terminals for the number of cores to be terminated. The terminals shall be spring loaded screw locked incorporating a screw and spring-tensioned system or have a minimum of one screw per cable core. The neutral and earth terminals shall be double through terminals to facilitate a greater number of terminations. The terminals shall be mounted on aluminium rails and end clamps shall be provided at each end of the rail. Each terminal shall be clearly labelled.

2.5.2.2 Neutral terminations

The terminals shall meet the requirements of 2.5.2.1, except that they shall not use switch terminations.

2.5.2.3 Earth terminations

The earth bus bar shall provide ten outputs with connectable cross-sections measuring 10 mm2 and 16 mm2 configured alternately. The bar shall be rail mounted and have a rated voltage of 450 V and be rated IP20. The insulating material shall meet IEC 60998 Part 1 and Part 2-1.

2.5.2.4 Five metre pole termination (terminal assembly unit)

The top of each standard 5 m pole shall be fitted with a terminal assembly unit and cover meeting the requirements as shown in Appendix C: 5 Metre Pole Top Assembly.

The pole top and full Upper Mounting Bracket (UMB) shall be a combined unit, complete with cable terminal and lantern lead supports, and a finial cap capable of being fastened into position so that it cannot be removed if the securing bolts are loose.

The finial cap shall be made of plastic and constructed to fit snugly over the pole top to minimise the ingress of dirt and grime. The finial cap shall be secured to the UMB by a wire lanyard to prevent it from blowing away if not fastened correctly. Do not use metal finial caps.

All nuts, washers, bolts, and fasteners shall be galvanised, and the pole top/mounting bracket shall be constructed in a non-corrosive material.

2.5.2.5 Mast arm pole termination

All mast arm poles shall have a terminal assembly box (Montrose box) mounted no lower than 3.5 m from the adjacent ground level.

The box shall be constructed from aluminium, stainless steel or polycarbonate with minimum dimensions of 400 mm x 350 mm x 120 mm rated to lP65. The box must be suitable for its location and have a design life of a minimum of 10 years. It shall be bolted to the pole and shall include a rubber seal or gland between the box and the pole metalwork to create a waterproof seal. Cables from the pole must have a drip loop in the pole before entering the Montrose box. This is to ensure any moisture running down the cable does not enter the terminal assembly box.

The lantern leads shall enter through the underside of the box. No holes will be permitted in the box that will allow condensation or moisture to enter.

All cables shall be terminated in accordance with the details shown on the cable termination chart (see

Appendix G: Cable Termination Chart Example for example). If possible, ELV streetlights should be installed, but where the pole includes a 230v streetlight, the step-up transformer will be located in the terminal assembly box. In this case, a danger high voltage label must be fitted to the outside of the terminal assembly box as per the Specification for Streetlights at ELV sites (refer to Appendix Q: 230v Streetlights on ELV Controllers). For more details see section Error! Reference source not found..

For more details see 2.3.7 (link provided in Appendix P).

2.5.2.6 Pole Warning Label

All new traffic signal poles shall be fitted with a permanent warning label “Danger Live Wires”. The label is to be fitted at the base of each new pole following installation. For existing poles, a suitably worded label is to be attached following any work being undertaken on the pole or mounted equipment.

2.6 Pedestrian and cycle detection

2.6.1 Pedestrian push button assemblies

Pedestrian push-button assemblies shall contain audio and tactile facilities and shall comply with AS 2353 *Pedestrian push button assemblies*.

In addition, the following requirements shall be met:

i. The call box shall provide an audible locating and ‘WALK’ signal;
ii. The audible locator shall incorporate ambient noise control;
iii. The tactile function shall be continually operational; however, the audio signal should be able to be muted by time of day.

2.6.2 In ground or above ground pedestrian detection

All in ground (IGD), above ground (AGD), and related equipment shall be approved by the RCA before installation.

2.6.2.1 In ground pedestrian detection

In-ground pedestrian detection systems are currently not accepted as the means for pedestrian detection at new installations.

2.6.2.2 Above ground pedestrian detection

All overhead detection units shall be located such that they are able to cover the required area of detection and shall be compatible with the traffic signal controller detection and operation.

2.6.3 Cycle push-button assemblies

Cycle push-button assemblies shall be the same as the pedestrian push-button assemblies except that:

i. They shall be coloured blue;
ii. The audio and tactile facilities are not required;
iii. The embossed arrow disc shall be replaced with a cycle indication disc;
iv. They shall incorporate a visual call accept signal.

If the cycle phase call is automatic, the push button can be replaced by a blank disc if desired. Where a push button is fitted, it must be connected, and call the cycle phase.

An image of a cycle push-button with call accept can be found in Appendix N: Cycle Push Buttons – Informative.

2.7 Inductive loop detectors (vehicle and cycle)

Inductive loop detectors shall be either preformed or saw cut on site.

Where preformed loops are to be installed they shall have site specific approval of the RCA. Each preformed loop shall be constructed to meet the dimensions and lane offsets as in the diagram in Appendix B: Inductive Loop Layout Details.

Where non-inductive detection technology is to be used (such as camera technology) it shall have site-specific approval by the RCA.

2.7.1 Cycle Detection

2.7.1.1 Induction loops

The current compliant controller hardware is not supplied to detect cyclists with accuracy. The modern materials of today's bicycles do not create a sufficient inductance change in the loop flux to change the loops oscillating frequency.

At critical sites above ground detection has been shown to be more effective.

2.7.1.2 External cycle detection

To detect cyclists with better accuracy, the use of overhead detection shall be used. Install an external device dedicated and configured to detect just bicycles, and the input signal configured into the personality software and presented to the controller as an EXTERNAL INPUT. There are various such devices and the Contractor should work with the RCA in selecting the most suitable device for the location.

2.8 Signal Cabinets

The glands, gland plate, and access panel shall prevent entry of vermin and so on into the bottom of the controller cabinet with all gaps to be sealed with RTV silicon to stop insects entering the cabinet.

2.9 Uninterruptible Power Supply (UPS) for Traffic Signals

2.9.1 General

2.9.1.1 Purpose

An Uninterruptible Power Supply (UPS) system for traffic signals provides emergency auxiliary power to traffic signals during a power outage, providing both a safe and efficient journey for road users in these events. In addition, UPS systems have also proved to extend the life of the traffic controller by reducing the adverse effects of brownouts and maintaining a consistent flow of current to the traffic controller.

2.9.1.2 Factors for UPS Prioritisation

Appendix P: UPS Prioritisation Chart, serves as a guide when prioritising the installation of UPS systems at signalised intersections. The factors and weightings included in the appendix used as a reference to assist individual Contractor's in making an assessment when prioritising the installation of UPS systems at signalised intersections.

2.9.1.3 UPS Standard Baseline

UPS selection must comply with AS 5715:2015 Uninterruptible power systems (UPS) for roadside devices.

Where a Contractor proposes to install a new UPS type not previously installed in the area of the RCA, the Contractor is to seek approval from the RCA and follow the approval procedure below:

i. Written approval shall be obtained from the RCA;
ii. The Contractor shall offer to make a presentation on the equipment to the RCA,
iii. The Contractor shall provide a training course to the RCA's existing maintenance Contractor, at no charge to the engineer or the maintenance Contractor;

If the new equipment requires special configuration tools, the Contractor (or their agent) shall provide all equipment required to allow full operation. This may include computer hardware & software, as required by the RCA to integrate with the operations of the current maintenance Contractor;
The RCA has the final right to deny installation of any equipment type in their area.

2.9.2 New Zealand Specific Requirements to AS 5715:2015

The following are specific requirements of the UPS system, and are as listed in AS5715:2015 in Appendix E: Ground Plant Pole – Duct Access Details.

Each requirement is specified here or where relevant specified by the RCA.

In general, the UPS system:
UPS topology – shall utilise a line-interactive topology
Load capacity – as specified by the RCA
Load support time – should have a minimum load support time of 5 hours
The rating of the plug for the generator connection, as either 10 A or 15 A – the fuse shall be specified by the RCA
Battery type – shall be proposed by the Contractor and require approval by the RCA
Battery shelving option – shall be subject to approval by the RCA
Housing material – shall comply with the housing requirements for traffic signal controllers detailed in this specification
Housing colour – shall comply with the housing requirements for traffic signal controllers detailed in this specification
Dimensions for non-standard housing – shall comply with the housing requirements for traffic signal controllers detailed in this specification
Type of door lock required for UPS housing – shall comply with the lock requirements for traffic signal controllers detailed in this specification.

2.9.3 Additional Clauses to AS 5715:2015 for New Zealand

2.9.3.1 Suitability of UPS systems with non-LED traffic signal lanterns

UPS Systems are only intended for use with LED traffic signal lanterns due to the low energy consumption of LEDs. Other forms of traffic signals are not considered compatible for UPS systems without upgrading to LEDs prior to the installation of a UPS system.

2.9.3.2 Suitability of UPS systems with auxiliary equipment

Where additional auxiliary equipment such as CCTV, comms routers or signs are to be connected to the UPS it is necessary to ensure that the UPS can manage the additional loads necessary.

2.9.3.3 UPS Software requirements

The UPS system shall be connected to the traffic signals controller, with the UPS software allowing the RCA Traffic Signals Engineer to use SCATS (Sydney Co-ordinated Adaptive Traffic System) flags to indicate different UPS states. The UPS software shall include direct remote monitoring, such that the TOC and RCA shall be able to remotely log into the UPS device for fault checking and monitoring via means determined by the RCA engineer. The minimum required outputs are listed in Appendix Q, which is an extract from AS 5715:2015 Cl4.6.

2.9.3.4 Relocation of the Generator Connection

The UPS system shall comply with AS 5715:2015 Cl5.3.16 Stand-by generator connection. Where a UPS system is installed, the traffic signals controller generator connection is to be modified, such that the portable power generation is to be connected to the UPS controller rather than the traffic signal controller.

2.9.3.5 Cabinet

All components of the UPS system shall be fully contained in a single UPS system cabinet. All components of the UPS cabinet (e.g. doors, hinges, locks etc.) shall comply with relevant New Zealand standards and clauses in this specification for traffic signal controller cabinets.

Where a UPS system is to be installed at a new signalised intersection, all components may be contained in the Signal Controller cabinet, subject to the approval of the RCA Traffic Signal Engineer.

2.9.3.6 Electrical Components

All electrical components including cabling equipment of the UPS system shall comply with relevant New Zealand standards and clauses in this specification.

2.9.3.7 Additional Signage Requirements

Additional signage and warning signs are to be placed in the traffic signals controller cabinet, the UPS system cabinet, and the mains power line. These signs shall alert all personnel that during maintenance, power from the UPS system may still be live, even though power from the mains has been turned off.

2.9.3.8 Testing, Commissioning and Maintenance

The UPS system shall comply with Clause 2.9 and relevant Subclauses of 3.15 of this specification with respect to testing, commissioning and acceptance of the UPS system.

As a minimum, an annual test shall be undertaken to ascertain the condition of the batteries, to check that the stored energy is within the anticipated energy range to operate the intersection for the desirable minimum duration as defined by the RCA Traffic Signals Engineer in section 2.9.2.

2.10 Testing of equipment

All signal equipment supplied or installed, including the signal controller, UPS, load switching equipment, cable terminals, plugs, and so on, shall be fully tested under simulated working conditions before being installed on site.

For acceptance and testing during installation, see Section 5.155.15.

3 Performance requirements

This section outlines the reliability and availability requirements of equipment which may require independent certification and/or declarations of conformity for the core subject area.

3.1 General

Unless specified elsewhere in this specification, all equipment and hardware supplied or installed shall be guaranteed by the manufacturer against faulty materials and workmanship for a minimum period of [1] year from the date of commissioning.

The guarantee period commences from the date of commissioning and not the date of manufacture or installation. These are detailed in section 3.2.

Where there is a difference between the main contract's defects and liability requirements and this specification, the longer time period shall apply.

3.2 Traffic Signal Equipment

Table 1 below provides traffic signal equipment guarantee/warranty periods.

Table 1 Guarantee period of traffic signal equipment

Equipment	Guarantee period / warranty
Surface coatings	10 years (except if degradation occurs due to vandalism)
LED (lamp) modules	5 years
Lantern body construction	20 years
Traffic poles	50 years
Pole coatings/finish	10 years (till first maintenance)
Montrose box	10 years
Traffic signal controller components	As per manufacturer
UPS controller	As per manufacturer
UPS batteries	5 years
UPS system	Minimum load support time of 5 hours
Stand-by generator – indicator lights	At least 15 years

4 Technical requirements

This section outlines specific technical and physical constraints for the equipment.

Table 2 Technical requirements of traffic signal equipment

Item	Requirements	Reference
General-purpose and pedestrian signals	200mm or 300mm	Shall be compliant with AS2144
Extended range signals	300mm	Shall be compliant with AS2144
LED lanterns	Have an independent NATA certified laboratory report confirmed compliance	Shall be compliant with AS2144
Lantern body	As per 'Reference' column	Shall be compliant with AS2144
Visors (cowls)	Made from plastic	N/A
Pedestrian visor	200mm diameter shall be fitted with an approved rectangular visor	Shall be compliant with AS2144
Target boards (backing boards)	• Made of type 5005 aluminium alloy (minimum thickness of 1.6mm) • Surface border shall be baked enamel (black) • White border	Shall be compliant with AS2144
Lantern mounting equipment	Mounting brackets, bolts, nuts, and mounting hardware shall comply with section 6.	Shall be compliant with AS 2339:2017
Traffic poles	As per 'Reference' column	Shall be compliant with: • AS/NZS 4676 • AS/NZS 4677 • AS/NZS 1170.0 • AS/NZS 1170.1
Traffic poles – fixture and fittings	Drag coefficients are in accordance with Table E4	Shall be compliant with AS/NZS 4676
Traffic poles - JUSP and JUMA poles	• 10-degree upward tilt on the curved outreach arm • 42 mm minimum spigot outside diameter • street lighting luminaire fitted to the outreach arm shall not exceed 0.15 m^2 in sail area and have a mass of no more than 15.0 kg	Shall be compliant with AS/NZS 1170.0 and AS/NZS 1170.1

Traffic poles – octagonal JUSP	Door cavity/fuse opening shall be 300mm x 140mm	As above
Traffic poles – JUMA	Door cavity/fuse opening for the street light isolation shall be 180mm x 80mm	As above
Traffic poles - mast arm poles	10-degree upward tilt on the curved outreach arm	Shall be compliant with AS/NZS 1170.0 and AS/NZS 1170.1
Traffic poles – steel tube	Used for manufacture of 5.1m traffic poles shall be a minimum of 100 nb	Shall be compliant with AS/NZS 1163
Traffic poles – strength	Requirements as per NZS which apply to the base of the pole at the top of the concrete footing	Shall be compliant with NZS 3404
Pole identification	• stamp indentation indicating date of manufacture • lettering shall have a minimum height of 7mm and maximum of 14mm	N/A
Pole finish	JUMA, JUSP and mast arm poles and arms shall be finished externally and internally.	Shall be compliant with AS/NZS 4680 (for JUMA, JUSP and mast arms) and pole coatings shall comply with AS/NZS 2312.1
Pole and foundation details	PS1 certificate to be issued by a suitably qualified Chartered Professional Engineer	N/A
Ground planted poles – foundation details	Minimum soil bearing capacity shall be 100 kPa with minimum ultimate shear capacity of 40 kPa. A site specific foundation design will be required for any capacities less than 100 kPa and 40 kPa.	N/A
Pole terminal assembly	2.5mm 2-in-2-out knife edge disconnect terminals for the number of cores to be terminated are required	
Earth terminals	The earth bus bar shall provide ten outputs with connectable cross-sections measuring 10 mm^2 and 16 mm^2 configured alternately. Insulating material shall comply with Part 1 and Part 2-1 of the reference	Shall be compliant with IEC 60998

Five metre pole termination - Finial cap	Made from plastic	N/A
Five metre pole termination – nuts, washers, bolts, fasteners	Shall be galvanised.	N/A
Five metre pole termination – pole top/mounting bracket	Shall be made from a non-corrosive material	N/A
Mast arm pole termination – box	• Shall be aluminium, stainless steel or polycarbonate • Minimum dimensions of 400mm x 350mm x 120mm	Must comply with IP65
Cycle push-button assemblies	• Shall be coloured blue • Shall have a cycle indication disc	Appendix N: Cycle Push Buttons – Informative
Controller cabinet – pedestal	Shall be at least 100mm tall and same width and depth as the controller cabinet and base	N/A
Controller firmware	As per 'Reference' column	Shall be compliant with the Roads and Maritime Services (RMS) TSC4 specification
UPS	As per 'Reference' column	Shall comply with AS 5715:2015

5 Installation requirements

This section sets out requirements for the installation and commissioning of signal equipment including the controller, cabinet, vehicle and pedestrian signals, call boxes, detection equipment, and detector loops. It also addresses the painting of equipment.

5.1 General

The Contractor warrants that:

i. The equipment shall be installed in accordance with the manufacturer's instructions, all applicable laws and standards, and the reasonable instructions of the RCA,
ii. The equipment shall not malfunction for a minimum period of as defined in Section **Error! Reference source not found.**, from the date of commissioning.

5.2 Temporary traffic management

The Contractor shall be responsible for the supply and erection of all necessary barricades, warning notices, lights, and so on, as required under section 5.7.2 of NZS 3910 *Conditions of contract for building and civil engineering construction* and the *NZTA Code of Practice for Temporary Traffic Management NZGTTM*, or any other specific documents that the RCA provides.

The Contractor shall obtain approval from the RCA to be able to work on the roadway under the RCA's control.

5.3 Supply of communications & electric power

The RCA shall have an approved communications provider, or an engineered communications solution. The Contractor must be fully aware of the communications requirements for every job, and shall seek clarification from the RCA on these details well in advance of starting site works.

The Contractor shall be responsible for arranging, with the RCA's power supply company, the provision of a power meter (if required) and the switching on of power to the signal control cabinet. The Contractor shall pay all costs (including fees) associated with this work, obtain all necessary permits, and shall provide the certificate of compliance to the engineer on completion of the works.

*Please note these costs can be variable, and need to be addressed by the primary Contractor.

5.4 Waterproofing

All equipment below ground level shall be required to withstand immersion in ground water or other corrosive agents on or beneath roads and therefore, shall permit continuous operation without fault.

5.5 Electrical wiring

All electrical work shall be completed in accordance with AS/NZS 3000.

5.5.1 Pole top cable terminations

All cables shall be brought up the interior of the signal pole or mast arm, and terminated on the specified terminal assemblies. All cables shall be firmly supported at the point of termination in such a manner that the weight of the cable shall not impose mechanical strain on the electrical connections.

The cores of each cable are consecutively numbered on the core insulation and each core shall be terminated into the terminal labelled with the same number.

Where a 36 core cable is not used (generally in existing installations), and there is more than one cable coming into a pole, then the largest cored cable or cable labelled ‘A’ (see Section 5.19.8) shall start at terminal 1 with the smaller cables following on. Eg. with a 25 plus a 12 core cable, core 1 of the 25 core shall be terminated into terminal 1 with core 1 of the 12 core terminating into terminal 26. It is not necessary to label each core when using a single multi core cable and when each core terminates in its corresponding terminal. However, when two or more cables are terminated all cores shall be labelled.

The cable sheath shall be removed for an adequate length with due precautions being taken not to damage the insulation of the individual cores. The cable cores shall be neatly formed and laced to allow individual conductors to be connected to the appropriate numbered terminal in accordance with the approved cable termination chart (see

Appendix G: Cable Termination Chart Example for example). The cores of different cables shall not be laced together.

The bunching and tying of cores shall be arranged such that all terminal labelling remains visible, and individual cores may be conveniently disconnected from any terminal for subsequent maintenance. All cable cores, including spares, shall be allocated terminals, and shall be terminated within the pole top.

5.5.2 Earthing (bonding)

All metal components shall be individually earthed in accordance with AS/NZS 3000, using a minimum size earthing cable of 4.0 mm^2. Particular attention shall be given to poles (including mast arms), callboxes, finial caps, metal bodied signals, unused cable cores, controller and cabinet, mast arm termination box, and audio tactile driver box.

All unused cable cores shall be bonded to earth in the controller cabinet.

5.5.3 Cable termination chart

For all new installations, a cable termination chart (see

Appendix G: Cable Termination Chart Example for an example) shall be completed prior to termination of cables onsite and supplied to the RCA.

At existing sites, the Contractor shall amend the existing cable termination chart supplied by the RCA. If no cable termination chart exists, the Contractor shall be required to produce one from existing cable documentation as appropriate.

All cabling, both at the controller cabinet and at the pole, shall comply with the details of the cable termination chart.

5.6 Controller cabinet

The controller cabinet shall be securely fixed to a concrete foundation or preformed base with, at minimum, four hot dipped galvanised bolts (minimum size M12) such that the cabinet is aligned true to the vertical and cannot be rocked from side to side. Where a standard preformed base is not to be used, the foundation details shall be supplied to the RCA for approval.

Where the cabinet is not surrounded by concrete or asphalt, a 300 mm wide concrete apron shall be provided around the base of the controller. The apron shall be 100 mm thick and be widened to 900 mm on the side adjacent to the door. The apron shall be installed to provide drainage away from the controller to the adjacent ground and to maintain a comfortable working platform.

5.7 Controller terminations

All cables entering the controller cabinet shall be securely supported at their outer sheath to ensure that no mechanical strain is transmitted to the electrical connections. The individual cores shall be neatly formed, and positioned such that access to housing terminals is not obstructed and terminal designations are not obscured. Each cable shall be individually labelled in accordance with its designation as shown on the approved cable termination chart.

All field wiring terminals in the controller cabinet shall be vertically mounted with sufficient terminals to cater for the maximum number of signal group outputs within the logic rack. Each signal group (both pedestrian and vehicle groups) shall be provided with three terminal groups. Each group shall consist of two 2-in/2-out spring loaded screw locked terminals designed for 2.5 mm^2 cable.

Terminal separation plates shall be used between each signal group and end clamps shall be used at each end of the rail.

An additional non-switched terminal unit shall be used and located on the left-hand side of the gear plate. This unit shall include three terminal blocks for both earth and neutral, plus one separate terminal block for general purpose (GP) phase (wired through the GP circuit breaker), detector returns, pedestrian buttons, special inputs and outputs, and so on.

The terminals shall be grouped together with the earth and neutral at the bottom, then any 230 V supplies and then the low voltage supplies at the top. A terminal separation plate shall be used between the earth and neutral terminals and between the 230 V and low voltage terminals.

Each terminal shall be clearly labelled with its function using labels supplied by the terminal manufacturer. There shall be a schematic wiring diagram provided within the controller (generally on the inside of the controller door) it shall provide a true representation of the physical on site wiring configuration.

5.8 External vehicle loop detector units

For all new signal installations, the detector units shall be located in the controller cabinet.

In special cases, or where an existing installation is involved, detector equipment shall be accommodated in weatherproof boxes attached to the signal pole nearest to the loop. Attachment of detector units to poles on medians or small islands shall be avoided. Pole-mounted detector units shall be mounted so personnel can access them from a ladder placed on the footpath.

The power supply for all detectors that are mounted external to the controller shall be taken from a 230/240VAC source that is not interrupted by the master relay when the controller is entering in lamp active off mode.

The connection of the loop feeder cable to the detector rack shall be carried out through terminals to allow easy isolation of the loop/loop feeder side of the circuit for testing purposes. The terminals shall be suitable for low voltage and therefore standard disconnect terminals are not appropriate. The terminals shall be mounted vertically down the left-hand side of the gear plate. The terminal rail shall be long enough to mount sufficient terminals for 24 detectors.

The terminals shall be labelled with the on-street detector number.

The loop feeder shall be securely clamped with clamping bars to the gear plate.

5.9 Pole locations and installation

All poles shall be sited in accordance with the approved design drawing with the appropriate clearances.

Prior to installation, the pole locations shall be marked on site and their locations approved by the RCA. Where services are suspected potholes should be dug to confirm the locations are viable prior to requesting RCA approval. When requesting approval for poles mounted with pedestrian call boxes, both sides of the crossing should be approved together. Potholes shall be temporarily reinstated if necessary.

Poles shall be positioned to ensure that no part of the signal lantern or backing board is closer than 300 mm to the face of the kerb or possible vehicle body track considering the road camber.

Where a pole is fitted with a cycle call button or call-accept, the pole must be located at least 900mm back from the kerb to ensure the cycle wheels stay off the roadway.

Where not surrounded by concrete or asphalt, the pole shall have a 500 mm^2, 150 mm deep, 20 Mpa concrete surround. The concrete surround shall be sufficient in width to ensure that the ducting finishes within the area of the concrete, in order to protect all cabling (refer to Appendix E: Ground Plant Pole – Duct Access Details).

Concrete pad mounted poles will be a flange-based type. These poles require a concrete pad or pile to be constructed that will include during pouring the use of a suitable holding down bolt cage. Pads and piles shall be used in locations where the ground conditions are not stable enough to maintain overturning resistance.

Retention sockets are installed in the ground utilising various foundation designs to suit the available depth and ground conditions. The pole shall be cabled at ground level and is then slotted into the ground socket reducing the Health and Safety risk of working at height. In the event of a knockdown the pole shall be replaced. Foundation details can be sourced from the retention socket Contractors, however each design should be checked for suitability depending on ground conditions.

The Contractor must provide a PS3 as part of the final as-built documentation to declare the poles have been installed according to the manufacturers requirements and design.

5.10 Signal lanterns

5.10.1 Lantern mounting supports, brackets and straps

All lantern mounting brackets, bolts, nuts, and mounting hardware shall comply with the section 6 of AS 2339:2017 *Access covers and grates*.

All lower lantern nut and bolt assemblies shall be installed complete with a locking mechanism as detailed in the section 6.2.3 of AS 2339. Refer to Appendix O: Mounting Strap Locking Mechanism for locking mechanism installation.
Where more than a single column of lanterns are installed on one strap back to the pole, each end of the strap must have a locking mechanism fitted.

Each vehicle/pedestrian lantern group shall be mounted individually.

All signals attached to pole top assemblies shall have their leads securely fixed to the assembly using clamping bolts, nuts, and washers or studs not less than 10 mm in diameter.

Each signal lantern shall be attached to its mounting brackets by galvanised steel mounting straps of sufficient length to permit the lantern to be adjusted laterally which provides an adequate signal indication and vertically to conform to the approach gradient. Straps shall comply with Error! Reference source not found.Error! Reference source not found..

Table Lantern Mounting Strap Dimension

Strap length (mm)	Strap thickness (mm min)
Up to 150	3
151 to 250	5
251 to 400	6

Straps shall be in a continuous length without joints, and one strap shall not be hung off another strap.

5.10.2 Lantern leads

The lantern leads shall:

i. Be covered with a continuous 15 mm flexible hose from their exit point from the lantern to the clamping point on the UMB;
ii. The pole-connecting end of the hose shall be prepared to enable it to be firmly clamped in a recess in the pole top assembly without undue distortion or crushing of the hose;
iii. When hanging freely, the lantern lead shall extend down to approximately the halfway point of the lantern, forming a u bend, so water drains away from the lantern body entry point.

5.10.3 Siting of signal lanterns

5.10.3.1 Siting and alignment

Each lantern shall be sited and aligned in accordance with Austroads Guide to Traffic Engineering Management Part 10 – Traffic Control and Communication Devices.

5.10.3.2 Lantern mounting height

Except where the tertiary or secondary lanterns are mounted within 10 m of the vehicle limit line, all vehicle lanterns shall have a mounting height of 4.1 m, measured to the top mounting bracket of lantern.

Where low level tertiary or secondary signal lanterns are located within 10 m from the vehicle limit line, the mounting height shall be 3.1 m, measured to the top of the mounting bracket of the lantern.

The minimum clearance from ground level to the bottom of a target board for signals restricted by an overhead obstruction is to be 2 m.

The minimum clearance from the road surface to the bottom of the target board for overhead lanterns is to be 5.3 m. The maximum clearance shall be 5.8 m.

Where the position of the signal poles as installed does not allow the recommended positioning or appropriate visibility to be achieved, the Contractor shall notify the RCA before installing the lantern.

5.10.4 Covering of lanterns

Immediately following installation and during periods when the lanterns are not in use they shall be securely covered to completely obscure them while being installed or when not in use.

The lanterns shall be covered using a shroud as detailed in Appendix F: Lantern Shroud Details – Informative.

Where commissioning will take place within one day of lantern installation, the engineer may allow a dispensation from this requirement but otherwise shrouding shall be necessary for the full period from installation until commissioning.

5.10.5 Lantern body construction

They must be installed to the manufacturers' installation instructions.

5.10.6 Visors (cowls)

Each visor shall fit tightly against the door.

5.11 Inductive loops

Inductive loops shall be positioned to record the specified output from vehicles passing or occupying the positions indicated on the appropriate plans and to the dimensions and locations shown in Appendix B: Inductive Loop Layout Details.

The Contractor shall mark the required position of the inductive loop on the ground and inspect the road surface to ensure that the site conditions, including seal conditions and roadway integrity, will in no way reduce the operational performance of the detection equipment. If the Contractor considers that the conditions are not satisfactory, they shall notify the RCA before installing the detector loops. The Contractor shall notify the engineer prior to closing the traffic lanes for the purpose of installing the loops so that the engineer shall attend the site to carry out installation inspections.

The inductive loop wire shall consist of single core polypropylene insulated cable with a nominal cross-sectional area of 1.5 mm^2 complying with AS/NZS 2276.3 *Loop cable for vehicle detectors*.

The cable shall be laid in one continuous unjointed length, laying it twice around each loop as shown in Appendix B: Inductive Loop Layout Details. Tails for up to two loops, (four wires) shall be laid in the same slot. As required in Appendix B: Inductive Loop Layout Details, and to permit future use under SCATS or to allow the loops to be split in the event of damage, the front pair and back pair of loops should be wired with a connecting wire passing through the toby box. This connecting wire shall remain continuous and shall be approximately 0.8m in length.

In general, the detector loop wire shall be installed in a saw cut slot that is approximately 5 mm wide and 40 mm deep to provide a minimum top cover to the wire of 12 mm. All saw cuts shall be straight and shall extend past the loop corners to ensure the full depth of cut throughout. Prior to placing the loop wire, the slot shall be dried, cleaned and free of debris using compressed air or wet vacuum to provide a smooth bed for the wire.

If unable to reuse the existing saw cut when re-cutting loops, the new saw cut shall be at least 300 mm away from the old saw cut to minimise road surface damage. If the saw cut for the loop tails is to go through the kerb, then it should go through an existing mortar joint to minimise unsightly appearances.

The loop wire shall be ‘rolled’ into the slot without damaging the insulation. A thin disc shall be used, such as a modified saw blade but not a screwdriver. Special care shall be taken at the corners to ensure the wire is curved rather than bent.

Each loop shall be wired as shown in Appendix B: Inductive Loop Layout Details.

Immediately following the installation of the loop wire, and prior to sealing, an insulation resistance test shall be performed. The loop should have a resistance to earth of not less than 10 mega-ohms. Sealing shall be done immediately following the completion of the loop insulation test.

The loop wire slot shall be sealed with an approved flexible epoxy sealant, ensuring a continuous seal over the complete length of the loop and loop tails. The sealant shall be finished flush to the road surface and suitably sanded.

Where the loop tail is cut through the kerb and channel the tails shall be inserted in a saw cut slot that is approximately 5 mm wide made with a minimum 450 mm diameter blade. The saw cut kerb and channel shall be sealed with a sand cement mortar.

Due to noise and traffic flow conditions, the RCA shall *take into account adjacent properties and restrict the time at which detector loops* shall *be installed.*

5.11.1 Loop testing

All loops shall be tested by measuring the insulation to ground (earth) and the results recorded on the commissioning sheet. A 500 V test shall be taken from the isolated conductors down to earth and a result of not less than 10 megaohms will be acceptable.

The loops should have a minimum Q value of 15 when measured in the JB.

5.11.2 Saw cutting

The Contractor shall place filters (or catchpits) or wet vacuum to ensure that no solid matter enters any waterway as a result of the saw cutting operation.

On completion of the installation the Contractor shall ensure that the surrounding area is swept clean of all sand and debris. This material shall be suitably disposed of.

Preformed loops shall be installed according to the manufacturer’s details and retain the correct shape and dimensions as shown on Appendix B: Inductive Loop Layout Details, when installed.

5.11.3 Loop feeder connections

The convention for terminating the loops shall be undertaken when multi-pair feeder cables are used, this requires,

i. Pair 1 connected to the kerbside detector loop;
ii. All remaining connections numbered consecutively from the kerb.

All unused pairs shall be sealed in a similar method to the loop connections.

The Contractor shall make a clean, dry, waterproof electrical connection between the loop tails and the loop feeder wires. The connection shall be located within a kerb side junction box or nearby prescribed junction point. The feeder cable sheathing shall be sealed to ensure that no water may enter into the cable.

5.11.4 Cycle induction loops

Care must be demonstrated when installing cycle induction loops. Each loop contains a sufficient wire length to create a detectable flux change for the detector card to read. 24m of cable within the loop is deemed the minimum, this requires six or more turns of cable within a loop.

Once installed the sensitivity adjustment is the only adjustment to allow a user to fine tune cycle detection. The maintenance engineer should utilise an aluminium wheel in order to test cycle loops, The maintenance engineer should ensure that the sensitivity is not set so high as to be triggered by vehicles in adjacent lanes.

5.12 Pedestrian and cycle push button assembly

The push button assembly shall be mounted so that the underside of the assembly is 900 mm above the pavement.

Unless specifically detailed, the pedestrian assembly shall be located in accordance with the section titled “Tactile Ground Surface Indicators (TGSI)” of Guidelines for facilities for blind and vision impaired pedestrians (RTS 14), that is, so that the front of the assembly is perpendicular to the pedestrian crossing lines and oriented with the arrow pointing towards the pole on the opposite side of the crossing, which is straight up.

On non-staggered medians, the assembly shall be oriented parallel to pedestrian lines with a double headed arrow disc that has the arrow pointing parallel to the ground.

The cycle assembly should be located so that the front of the assembly is perpendicular to the pedestrian crossing lines, where this is not possible, refer to the RCA.

Wiring for the call-accept is required for cycle call boxes.

5.12.1 Covering of push buttons

Immediately following installation and during periods when the pushbuttons are not in use, they shall be securely covered to completely obscure them.

5.12.2 Pedestrian Facilities - Instructions for Use

Most RCAs require the installation of a pedestrian instruction plate above the push button. These plates must be requested from the RCA at least 8 weeks before commissioning, and must be installed prior to commissioning. Consideration must be taken to ensure the cable inside the pole is not damaged during installation. Ensure information is not being covered by pop rivets.

5.13 Painting and surface coating of equipment

All surface coatings shall carry a 10-year guarantee from their date of installation except where the degradation is caused by vandalism.

The Contractor shall supply the RCA with the paint manufacturers' documentation specifying the maintenance requirements for surface-coated equipment.

All painting of signal poles and equipment shall be as stated in Table 3Error! Reference source not found..

Table 3 Painting and surface coating of equipment

(A) General Requirements	
i.	All new poles shall be pre-coated prior to delivery on site
ii.	All coatings shall be applied in strict accordance with the manufacturer's recommendations
iii.	No painting shall be carried out in wet, foggy, frosty, windy, or dusty weather
iv.	The colour yellow described in this specification shall be colour number Y14 Golden Yellow as described in AS2700 *Colour Standards for General Purposes* (Altex Standard Factory Colour Golden Yellow is acceptable).
(B) Painting Schedule	
Standard poles	Where the speed limit is below 70km/hr -

	Any colour as permitted by TCD rules, **And** Where the speed limit is 70km/hr or above - Gloss yellow to the pole top, or as specified in the local RCA's regional amendments to NZS 5431 Specification for traffic signals.
Overhead and joint use poles	Where the speed limit is below 70km/hr - Any colour as permitted by TCD rules, **And** Where the speed limit is 70km/hr or above - Unless specified in the local RCA's regional amendments to NZS 5431, all overhead or joint use poles shall be painted gloss yellow to the level of the top mounting bracket supporting the low level vehicle lantern. The remainder of the pole is to be left unpainted.
Lanterns:	
Signal face	Gloss black
Signal housing	Gloss black
Target boards	Flat black
Signal visors	Flat black (internally) Gloss black (externally)
Illuminated signs:	
Sign face	Gloss black
Sign housing	Gloss black
Sign visors	Flat black (internally) Gloss black (externally)
Pedestrian call boxes	Gloss black
Cycle call boxes	Gloss blue – Dulux "True Blue" shade 2821 or equivalent
Other items (such as pole caps, detector boxes)	Golden Yellow or as specified by the local RCA's regional amendments

5.14 Special tools and keys

The Contractor shall supply to the RCA one set of any special tools necessary to efficiently adjust and operate the equipment. This equipment will not be required if previously supplied to the RCA. The controller key type will be an FS880 or as specified in the local RCA's regional amendments.

5.15 Acceptance and testing

On completion of the work, the equipment is to be left clean, free from dirt, dust, and paint blemishes. All services, equipment, and fittings shall be in proper working order and in good condition in accordance with this specification.

5.15.1 Pre-commissioning tests

When the Contractor has satisfied all of the requirements of the power supply authority and considers that any particular part of the contract is ready for commissioning, the pre-commissioning checks as set out in

Appendix H: Site Acceptance Test, shall be performed in the presence of the RCA and/or their representative.

The Contractor shall provide an electrical certificate of compliance to the engineer prior to the pre-commissioning check.

5.15.2 Earthing and earth impedance test

The Contractor is to undertake an earth impendence test to AS/NZS 3000 and submit results in a report as part of their pre-commissioning checks. The tests shall include the following:

i. Earth resistance test-continuity of main earth conductor;
ii. Insulation resistance test for insulation;
iii. Earth resistance test for other earthed and equipotential bonded parts;
iv. Consumer's main test – polarity and connections;
v. Final sub-circuit test – polarity and connections;
vi. Earth fault loop impedance test; and
vii. Verification of residual current devices (if fitted).

5.15.3 Software (personality) Testing

Checking of the Controller Information Sheet (CIS) and testing of the software (SFT) should be done by an independent experienced signals practitioner. Both the CIS & SFT should be checked, with a CIS / SFT test sheet completed as evidence.

The SFT testing should confirm that the software complies with the operation/functionality as specified in the CIS and involves testing the SFT in a simulator (a tool called "WinTraff" developed by SCATS Australia). This includes testing that the signal groups operate in the correct phases, operation of overlapping movements, detectors call/extend the correct phases, pedestrian/cycle protection, and any other special features specified. Testing shall include SCATS testing, if appropriate for functionally.

Bench testing of the SFT checks that the software runs correctly on a physical controller and is completed by the signals Contractor, who completes the Controller bench testing form. The bench test should also ensure all conflicts are proven by physically inducing conflicts within the controller (and the person doing the bench testing should confirm that the conflict matrix as provided in the CIS is correct).

Installation of the software should not occur at the site until all testing has been completed and the software is operating in the manner specified in the CIS and that the operation is safe. When the new software is installed, prior to the traffic signals being commissioned, a full "flash test" should be completed as part of the Site Acceptance Test (SAT) which ensures the signals have been built in accordance with the national traffic signal specification.

Refer to the SNUG website for further information about the testing process and proformas.

5.15.4 Controller bench test

The Contractor shall be required to confirm for themselves that the controller software (personality) has been programmed to operate in a safe manner and to the requirements of the design drawings and controller

information sheet (CIS). If the Contractor identifies the software is not operating correctly or safely, or there are discrepancies between the design drawings and the CIS, then they shall immediately inform the engineer.

The traffic signal Contractor shall complete a FULL bench testing of the controller software (personality) at least one week prior to the proposed commissioning date of the signal installation or intersection upgrade.

All bench testing shall be based on the operation as specified in the latest revision of the CIS, signal design drawing, and controller software (SFT) file.

The bench testing shall be undertaken using a similar controller operating under the same version of the background (TRAFF) software as will be installed in the controller on site.

The bench testing shall include but not be limited to:

i. Confirmation that all detectors call and extend the relevant phases;
ii. Confirmation that the correct signal displays/output groups are activated in the relevant phases;
iii. Confirmation that each signal group output has been configured as either a Major, Minor, or Pedestrian output in accordance with the CIS;
iv. Confirmation that all conflicting signal group outputs (both pedestrian and vehicle) cause the controller to go into fault mode by physically inducing conflicting outputs. The Contractor shall be required to confirm that the conflict matrix detailed in the CIS is correct and that the conflict matrix programmed into the controller personality is the same as that shown in the CIS;
v. Confirmation that all time settings are consistent between the software and the CIS;
vi. Confirmation that the controller shall operate under Flexilink mode of control;
vii. Confirmation that any special logic requirements work as specified; and
viii. Confirmation that any special facility flags (such as Z-, Z+, and any XSF bits) operate as specified.

The Contractor installing the software shall submit completed and signed forms five working days prior to commissioning the site verifying that the traffic signal controller personality has been FULLY bench tested. A copy of the controller bench testing form is in Appendix I: Controller Bench Testing Form.

The Contractor shall notify the RCA at least 24 hours prior to the bench testing being undertaken so that the RCA shall be present when the testing is being completed.

5.15.5 Commissioning

When the RCA or their representative is satisfied that the signals are installed and operating in accordance with this specification, they will direct and supervise the commissioning of the signals.

The Contractor shall notify the RCA 48 hours prior to commissioning the installation. Commissioning shall occur outside of the peak traffic periods at a time specified by the engineer. No commissioning shall take place on a Friday or the day before a public holiday.

Unless approved by the RCA, commissioning will not be allowed until the controller has been installed on site and has had continuous SCATS communications for at least 48 hours.

An example of a commissioning check sheet for a new installation is in Appendix K: New Intersection Commissioning Form.

5.16 As-built documentation to be provided

At the time of commissioning, a copy of items (i) and (ii) below, shall be provided in the controller cabinet along with a log book and a copy of the CIS.
Within two weeks of commissioning, a laminated copy of (i), (ii), and the CIS sheet shall be inserted into the document pocket inside the controller cabinet.

The Contractor shall also supply in both electronic and hardcopy the following within two weeks of commissioning:

i. As-built plan showing the final locations of all cables (including power supply), ducting, poles, access chambers, JB, loops, lantern displays, and cabinets if they are different from the construction drawing;
ii. A completed cable termination chart (in spreadsheet format). Refer to the layout in

iii. Appendix G: Cable Termination Chart Example;
iv. A completed traffic signal asset collection form (see Appendix L: RAMM Asset Data Form) for RAMM;
v. Results of all earth loop impedance testing carried out on all traffic signal poles and cabinets shall be supplied to the RCA prior to commissioning (Appendix N: Cycle Push Buttons – Informative). The results shall be signed by the technician who carried out the testing;
vi. A log book. The log book shall be completed every time anyone attends site, and shall detail the reason for attending site and a brief description of the work carried out. Each entry shall be dated and signed; and
vii. A signed and completed copy of the electrical Certificate of Compliance and Record of Inspection (RoI).

5.17 Procedure for turning off signals

Where it is necessary to switch a controller either off, to flashing yellow, to take the site off-line, or to switch the signal displays off, notice shall be given to the appropriate RCA. The RCA shall be notified immediately prior to such action being taken and immediately after the controller and communications are fully operational again. This shall be recorded in the control cabinet log book.

When a signalised intersection is planned to be turned off, or switched to flashing yellow, for more than ten minutes, the Contractor shall ensure that the RCA's engineer is informed so that arrangements for alternative control of the intersection are made as necessary. Once the RCA has been notified, the Contractor can proceed with turning off the signals, unless specifically requested to wait for further assistance. The Contractor shall adhere to an approved traffic management plan (TMP).

At no time during planned works shall an intersection be left unattended with the signals off unless an approved TMP is in place. Also, at no time shall any warning signs or shrouds that indicate that the signals are not in operation be in place on any street or road when the signals are working.

When there is an unplanned outage of a signalised intersection (such as the result of a controller fault or accident), the Contractor shall immediately assess the problem and where necessary make the site electrically safe. If the signals can then be repaired and made operational (either fully or at least flashing yellow) within one hour, and can be done so safely and without the need to work in a live lane, then the Contractor is to proceed immediately with the repairs using a previously approved TMP that relates to the particular type and location of the work. Refer to RCA's regional amendments to this ITS delivery specification if operational repairs will take longer than 1 hour, or where work needs to occur within a live lane.

The Contractor, where possible, shall arrange the work so that the signals will be switched off or set to flashing yellow for the shortest possible time. Therefore, work on the signals shall be continuous, until they are switched back to normal control. If a site is under approved temporary traffic management (as set out in an approved TMP), then it will normally be acceptable to turn the signals back on with a reduced number of signal displays. Assuming good visibility of lanterns, the minimum number of displays on any approach shall be:

i. Primary or dual primary plus secondary; or
ii. Primary or dual primary plus tertiary.

The intention to operate the signals with reduced displays shall be highlighted in the TMP, which should detail each approach where displays will be reduced. The RCA's regional amendments to this ITS delivery specification shall set out additional requirements.

5.18 Pole locations and installation

All poles shall be sited in accordance with the approved design drawing with the appropriate clearances.

Prior to installation, the pole locations shall be marked on site and their locations approved by the RCA. Where services are suspected, potholes should be dug to confirm the locations are viable prior to requesting RCA approving. When requesting approval for poles mounted with pedestrian call boxes, both sides of the crossing should be approved together. Potholes shall be temporarily reinstated if necessary.

Poles shall be positioned to ensure that no part of the signal lantern or backing board is closer than 300 mm to the face of the kerb or possible vehicle body track considering the road camber.
Where a pole is fitted with a cycle call button or call-accept, the pole must be located at least 900mm back from the kerb to ensure the cycle wheels stay off the roadway.

5.19 Cabling and Civil Works

5.19.1 General

This section sets out the requirements for the supply and installation of all cabling including multicore cable, loop feeder cable, ducting, trenching and backfilling. It also addresses the installation of junction boxes, poles, and the controller base.

5.19.2 Cable diagram

Cable sizes and approximate duct positions shall be found on the schematic cable diagram on the signal drawing but the Contractor should confirm that the cabling and ducting shown is adequate for the signals equipment depicted on the same drawing.

5.19.3 Trenching

All trenching and restoration work shall be in accordance with the RCA's specification. A detailed TMP shall be approved before work commences.

Open cut trenching across carriageways shall be carried out only between the hours approved by the engineer.

5.19.4 Cabling, ducting, and signal duct access chambers

5.19.4.1 Ducting

Ducting shall be installed from the controller to all signal duct access chambers, between chambers, and from the chamber to the signal pole in the locations indicated on the drawings.
The duct lines shall link all chambers in a complete ring to facilitate multiple cable run options.

In open cut trenching, ducting for all multi-core cables shall use 100 mm diameter orange PVC electrical burial-grade conduit, and shall be continuous between access chambers and from access chamber to within 300 mm of the base of each pole. The ducts shall be placed no less than 600 mm and no more than 1000 mm below finished ground level. Where site specific conditions require the ducts to go shallower or deeper, special permission must be obtained from the RCA, and the depth must be marked on the as-built ducting plans.

All thrusted ducting shall be continuous without any joints and shall comply with the Electricity (Safety) Regulations 2010 (SR 2010/36).

The minimum number of ducts from the controller and between access chambers is three x 100mm ducts for open cut trenching, or two x 100mm ducts for thrusted ducting. The Contractor shall identify the number of cables required and electrical segregation.

All ducting shall be installed complete with draw wires to facilitate pulling through of cables. The draw wire will remain in place on completion of cabling for future use and must always be replaced when used. Where bends are required in the ducting to avoid obstacles, sweeping or 45 degree bends must be used with a minimum bend radius of 900mm for 50mm & 100mm ducts. Flexible piping must not be used unless it has a smooth inside wall without corrugations, is burial grade rated, is orange, and meets the 900mm bend radius requirements.

Ducting for loop feeder cables shall be a minimum 50 mm diameter orange PVC electrical burial-grade conduit laid to a depth of not less than 300mm. It shall be continuous between the KJB and the closest access chamber. For more details on JB installation, see Section 5.19.7.

Where ducting pipes need to be joined, they shall be jointed with manufacturer approved PVC cement.

Communications ducting should comply with the local RCA's requirements.

5.19.4.2 Pole access ducting

Access from the ducting to the signal pole for ground plant or flange mounted poles shall be as shown in Appendix E: Ground Plant Pole – Duct Access Details.

5.19.4.3 Signal duct access chambers

Chambers shall be at least 2 m clear of the carriageway and clear of all pedestrian paths. A chamber is also to be provided immediately adjacent to the controller base.

Chambers shall not be located along pedestrian desire lines.

Chambers shall not be installed in the carriageway.

All duct access chambers shall be concrete and manufactured in accordance with NZS 3109 *Concrete construction* and AS/NZS 4058 Precast concrete pipes, with surfaces finishes to NZS 3114 *Specification for concrete surface finishes*. Where Contractors have chambers manufactured from alternative materials, they shall seek prior written approval from the RCA before tender/installation.

All ducting shall be cut back to 100mm from the inside of the chamber wall and shall be sealed by applying a sand cement or epoxy mortar.

All covers are to be a minimum Class B as defined in AS 3996 *Access covers and grates*. Any chamber lid that is subject to possible traffic loading or installed in the carriageway are to be Class D.

Where the chamber is installed in a grassed berm, the lid of the chamber shall be encased by a concrete surround, a minimum of 300 mm wide by 100 mm deep and using 25 MPa concrete.

5.19.4.4 Signal multi-core cable

All cables shall be installed in the appropriate ducting as specified in section 5.19.4.

The multicore cable shall be a purpose designed traffic signal cable externally insulated with orange sheathing with the internal individual core insulation being PVC coloured as described below. The external sheathing shall be marked to indicate its use in the installation of traffic signals. The cable shall comply with AS/NZS 2276.1 *Multicore power cables* except as amended in section 5.19.

The cable shall be in a continuous length from the controller to the pole and from pole to pole. Joints between poles will not be accepted in new works. A minimum of 2.0 m of cable slack shall be left at the controller base and a minimum of 1m in the chambers on all cable runs.

At existing installations where cable is to be replaced, similar cabling and cores as are already installed may be used.

Cabling shall not be installed into the ducting until backfilling of trenches has been completed.

5.19.4.5 Amendments to AS/NZS 2276.1

The following amendments shall be made to AS/NZS 2276.1:

a) Remove requirement for external sheathing to be PVC. The sheathing used shall be suitable to be used in submerged conditions;
b) 36 or 37 Core Cable core requirements and colours
   i. 27x 1.5 mm2 cores coloured white and consecutively numbered from 1 to 27 for signal group displays;
   ii. 4x 1.5 mm^2 cores coloured violet, labelled ‘ELV ONLY’ and consecutively numbered p1, p2, p3, p4;
   iii. 1x 2.5 mm^2 core coloured black;
   iv. 1x 4 mm^2 core coloured green/yellow for earth;
   v. 1x 1.5 mm^2 core coloured red as a general 230 V phase (for audio tactile, illuminated signs, cameras, and so on);
   vi. 1x 1.5 mm^2 core coloured grey as a detector return for push buttons;
   vii. 1x orange 1.5 mm^2 core used for street lighting feed (optional in 37 core cable).

a) 19 Core Cable core requirements and colours
   i. 16x 1.5 mm^2 cores coloured white and consecutively numbered from 1 to 27 for signal group displays;
   ii. 2x 1.5 mm^2 cores coloured violet, labelled ‘ELV ONLY’ and consecutively numbered 1 & 2;

iii. 1x 2.5 mm^2 core coloured black;
iv. 1x 2.5 mm^2 core coloured green/yellow for earth;
v. 1x 2.5 mm^2 core coloured grey for detector return for push buttons.

5.19.4.6 Loop feeder cable

The feeder cable shall be a twisted pair and be terminated on the appropriate field terminals.

The maximum number of pairs per cable is four. Each pair should be labelled with factory indelible numbering on the cores, or colour coded for multi-pair cables as detailed below:

Pair 1 – Blue and white/Blue
Pair 2 – Orange and white/Orange or Red and white/Red
Pair 3 – Green and white/Green
Pair 4 – Black and white/Black

Cable pairs must be individually shielded.

All spare pairs are to be separated away from active pairs and all shield braids shall be connected to a common protective earth point at the controller.

The unshielded section of the feeder cable pairs shall remain twisted from the point they leave the cable shield to where they enter the field terminals with the length of unshielded cable being as short as possible. All shields shall be connected to a single common functional earth point at the controller.

The feeder cable shall comply with AS/NZS 2276.2 *Feeder cables for vehicle detectors*, except pairs shall be colour coded as above, and the overall external diameter will exceed 10mm.

At least 1.8 m of cable slack shall be left at the controller base, one turn in each access chamber and a minimum of 0.5 m curled up inside the junction box (JB).

5.19.4.7 Loop feeder cable testing

All feeder cables shall be tested by measuring the insulation to ground (earth) and the results recorded on the commissioning sheet. A 500 V test shall be taken from the isolated conductors down to earth and a result of not less than 10 megohms will be acceptable. The resistance of the feeder cable and connected loop, when measured at the controller, shall be no more than 10 megaohms.

5.19.4.8 Mains power supply

The Contractor shall be responsible for negotiating with the local electricity network provider for the supply of a mains power cable into the signal control cabinet.

5.19.4.9 Earthing

The earth pin and wiring connection shall be located in a protected enclosure not readily accessible to the public.

5.19.4.10 Fibre

Running fibre through signal access ducts should be avoided and if this is required confirmation shall be sought from the RCA.

5.19.5 Installation of signal poles and mast arm/JUMA/JUSP poles

Signal poles shall be erected as detailed in Appendix C: 5 Metre Pole Top Assembly. Each pole shall be plumbed vertically to a tolerance of 10 mm per 5.0 m length.

For poles up to 5 m, all concrete footings shall have a 28-day compressive strength of at least 20 MPa. Footings for all other poles shall be as per the manufacturer's pole foundation design requirements.

Signal poles shall be in locations shown on the signal plan. These locations are only indicative and final locations will need to be marked out and agreed to with the RCA. The RCA shall approve any changes to the designed pole positions. Due to the requirement to ensure push buttons are within tolerance of the cross walk, it is advisable to pot hole all the poles for a pedestrian crossing for approval before installation, to minimise the impact of utilities. Pot holes are to be temporarily reinstated following inspection and approval, temporary board covers are not acceptable where pedestrian access is permitted.

For traffic signal installations on heavy haulage routes, any signal poles in central islands, or poles that restrict the width to below the heavy haulage route requirements, shall be fold down type as detailed in figure C5 or C6 in Appendix D: Signal Pole Details.

The Contractor shall confirm on site that the location of all poles meets the clearance requirements to existing electrical supply services, both underground and overhead, as set out in NZECP 34 *New Zealand code of practice for electrical safe distances*.

5.19.6 Controller base

The controller base shall be constructed to provide a solid non-rocking platform on which the controller shall be placed.

The base shall be constructed using reinforced concrete with a 28-day compressive strength of 20 MPa.

The RCA or their representative shall mark the exact position of the base on site.

5.19.7 Junction boxes

Junction boxes (JB) shall be constructed from plastic, cast, or sheet aluminium and shall be no smaller than 300 mm long by 200 mm wide by 150 mm deep.

The JB shall be fitted with a firm fitting non-skid lid secured to the base and the lid shall lie flush with the top of the box.

Each JB shall be installed at the locations indicated on the drawing. Where possible it should be located adjacent to the primary signal pole. The JB shall be at least 1m from the back of the kerb, and shall be level with the surrounding ground surface level.

A suitably sized duct must be fitted from the roadway back to the JB. This duct must be straight, and be in a direct line from the JB to the roadway. It is recommended that a Carriageway Loop Box (CLB) is installed flush with the road surface to access this duct.

Where there is no concrete kerbing present, the JB shall be located as close to the carriageway.

JB shall be bedded on 100 mm of free draining material and surrounded by 150 mm wide by 150 mm deep concrete haunching. The junction box lid and haunching shall be flush with the surrounding ground level.

The junction box and installation shall be capable of withstanding being run-over by a heavy vehicle.

5.19.8 Labelling of cables

All multicore cabling shall be clearly labelled at both ends with the cable run number. The cable shall be numbered so that cable 1 goes to pole 1, cable 2 goes pole 2, and so on. When there are two or more identical cables laid between poles, one cable shall have its label followed by the letter A (for example, P6A) which shall have terminal numbers starting at 1. The second cable shall be labelled B (for example, P6B) and start at the next available terminal, and so on.

All loop feeder cable shall be labelled at both ends with the appropriate detector loop number.

The approved method for labelling all cables is using a heavy duty PVC marker, white or yellow with black moulded or engraved lettering. This marker is to be of the non-split type that completely encircles the cable core.

5.19.9 Cabling documentation

All new or modified traffic signal ducting and cabling is required to be recorded for inclusion on the appropriate cable diagram.

Any Contractor installing or modifying traffic signal ducts or cables shall notify the RCA a minimum of 24 hours prior to backfilling any trenches in which new or modified ducts/cabling have been installed so that the cables are independently sighted and recorded. No inspections will be carried out outside of normal working hours except by prior arrangement with the RCA.

5.20 Maintenance of new work during DLP

5.20.1 Fault attendance

All callouts to faults reported during the contracts Defects Liability Period (DLP) or whilst the installation is under maintenance, or during the equipment guarantee period, shall initially be attended by the local RCA's Maintenance Contractor through the RCA's normal fault attendance process.

Whilst the installation is in the DLP, or similar periods, the Contractor who installed the signals (installation Contractor) shall be required to provide the contact details of a suitably qualified technician who is contactable 24 hours per day and 7 days per week to assist the RCA's Maintenance Contractor to resolve the fault. The contact details shall be provided on a laminated sheet inside the controller cabinet. This sheet shall also contain the expiry date of the DLP.

On attendance to site, the Maintenance Contractor shall inform the installation Contractor that they are attending a fault. The Maintenance Contractor is responsible for getting the signals operational as quickly as possible. The installation Contractor shall be required to provide all assistance to ensure that the signals are operational as quickly as possible by either attending the site immediately after they are contacted or directing the Maintenance Contractor on how the fault shall be remedied (by phone calls and providing documentation).

If the fault is likely to take longer than four hours to remedy, the Maintenance Contractor must make the site safe, and discuss the further course of action with the RCA.
The RCA can direct the Maintenance Contractor to continue the repair, or require the Installation Contractor to urgently attend site and complete the repairs under DLP.

All costs incurred by the Maintenance Contractor for faults covered during the DLP or similar periods will be invoiced to the RCA under the conditions of the existing maintenance contract for callouts. The RCA must be reimbursed by the signals installation Contractor.

At the end of the DLP/guarantee period, the equipment shall be handed over in full working order with no defects of any kind. Should defects exist, whether in control equipment, detectors, or signal hardware or in any part of the equipment supplied, these shall be made good by the Project at no cost to the RCA.

5.20.2 Repairs and maintenance during construction

During construction, the site will have different maintenance requirements than during normal operation. Lanterns require more frequent cleaning due to dust, and review of lantern alignment is important with traffic lanes being shifted.

If any Traffic Management is applied in the intersection, or the approaches to the intersection, the signals are under the duty of care of the Project. The Project is responsible for all maintenance and repairs during this period. This includes repairs of any damage done to the signals infrastructure by construction crews or the public.

Where the Project clearly proves the damage was not caused by interference from the Project, this must be discussed in good faith with the RCA.
The signals Contractor must collect all evidence that shall be used by the RCA to attempt cost recovery.

5.20.3 Preventative maintenance during DLP period

It will be the responsibility of the Project to arrange any preventative maintenance during DLP. As a minimum, preventative maintenance should be undertaken by the installing Contractor within a month of the scheduled hand over to maintenance. Records of this maintenance will be provided to the RCA at hand over as evidence of the asset condition.

6 Appendix A: New Zealand special conditions to AS 2578:2009

6.1.1 Special conditions to AS 2578:2009

The following amendments shall be made to AS 2578:2009 for supply and installation in New Zealand under this ITS delivery specification. The numbers referred to are the clause numbers in AS 2578.

6.1.1.1 Clause 1.4.10 – Additional requirement for New Zealand

In accordance with AS/NZS 3000 Electrical Wiring Regulations, the RCD supplied shall meet the conditions of section 2.6.2.2 in AS/NZS 3000 for New Zealand installations.

6.1.1.2 Clause 2.3.3 – Additional requirement for New Zealand

The controller shall be supplied with ventilation grilles in the base, above the finished ground level, and below the gland plate as detailed in section **Error! Reference source not found.**. Refer to section 3. A 'pedestal' shall be installed between the base and the controller cabinet. This pedestal shall be 100 mm tall, and the same width and depth as the controller cabinet and base.

6.1.1.3 Clause 2.3.4 – Additional requirement for New Zealand

A gland plate and removable access panel shall be installed at the bottom of the controller cabinet. Refer to Appendix M: Controller Gland Plate – Informative for an example. Any unused cable entries shall be 'plugged' with plugs that are easily removed. The glands, gland plate, and access panel shall prevent entry of vermin and so on into the bottom of the controller cabinet with all gaps to be sealed with RTV silicon to stop insects entering the cabinet.

The access panel shall be installed for easy removal for maintenance tasks in the bottom of the cabinet.

6.1.1.4 Clause 2.3.7 – For New Zealand delete Figure 2.5.

6.1.1.5 Clause 2.3.7 – Additional requirement for New Zealand as per NOTE.

The purchaser requirement for New Zealand cabinet locking is as follows:

i. Recessed handle(s);
ii. Three-point locking at top, bottom, and side;
iii. A single-key mechanism; with the lock keyed for FS880, unless specified by the local RCA's regional amendments to this ITS delivery specification.

6.1.1.6 Clause 2.3.12 – Change requirement for New Zealand

Replace second paragraph with –
The equipment shelf shall be mounted not less than 390 mm below the top of the door opening, and this shelf shall be the width of the controller cabinet.

6.1.1.7 Clause 2.3.12 – Additional requirement for New Zealand

The equipment shelf shall be deep enough to hold the logic module but shall have at least 50 mm clearance from the front face to the inside of the door.

6.1.1.8 New clause for New Zealand

Communications socket outlet and MCB
A circuit breaker shall be installed in the 'spare position' defined in section 2.5.11(f) in AS2578:2009. This circuit breaker shall be rated at 16 A, Type C, with a fault-make load-break fault current rating not less than 8 kA and shall control a new double-socket outlet specifically for communications and camera equipment, where the 230 V power for such equipment is supplied by 3-pin plug. The communications equipment socket outlet shall be clearly labelled 'Communications equipment only – NOT RCD PROTECTED'. RCD protection shall not be provided for this socket.

6.1.1.9 New clause for New Zealand

Stand-by generator connection
The controller housing shall be installed as specified in AS 2578. The controller housing connector for the external generator shall be a male three-pin (flat) 15A connector complying with AS/NZS 3112 Approval and test specification – plugs and socket-outlets.

The 'presence of power' indicator lights specified in AS 2578 are green to indicate mains supply and yellow to indicate generator supply. The indicator lights shall have a design life of at least 15 years.

6.1.1.10 New clause for New Zealand

Street lighting power
Where there is a power supply to street-lighting mounted on a shared traffic signal pole, it must be fed through the traffic signals control cabinet.

The street-light power circuit shall be supplied through the traffic signal controller mains power isolation switch.

A dedicated MCB shall be provided and shall be installed in the 'spare position' defined in section 2.5.11(f) in AS2578:2009. Where the detector' MCB detailed in section 2.5.11 (d) in AS2578:2009, is not being utilised and if suitably rated, it shall be reassigned as the street-lighting circuit protection and it shall be clearly relabelled.

Appendix I, Figure R01 shows an example of street-lighting fed through the traffic signal controller.

6.1.1.11 New clause for New Zealand

Electricity revenue meter
Each electricity retailer and each electricity lines company have slight variations with their electricity revenue meter requirements. For regional specifics, consult the local RCA's regional amendments to this ITS delivery specification.

6.1.1.12 Clause 2.13.1 – Change requirement for New Zealand

Replace the entire paragraph with –

Conformance with New Zealand communication requirements

Any device designed or intended for connection to a telecommunications network shall comply with the applicable requirement:

i. Telepermit requirements - Any device to be directly connected to the Chorus network shall display the New Zealand Telepermit label. For more information visit http://www.telepermit.co.nz.
ii. Radio requirements – Any wireless device shall comply with the (New Zealand) Radiocommunications Act. For more information visit http://www.rsm.govt.nz.

6.1.1.13 Clause 2.18 – NOTE

The service light is a standard requirement for all New Zealand controllers.

6.1.1.14 Clause 2.22.5 (b) – change requirement for New Zealand

Replace entire requirement with 'Telepermit label and PTC number'.

6.1.2 Additional Clauses for AS 2578:2009

6.1.2.1 Suitability of UPS systems with non-LED traffic signal lanterns

UPS Systems shall be used with LED traffic signal lanterns. Other forms of traffic signals are not considered compatible for UPS systems without upgrading to LEDs prior to the installation of a UPS system.

6.1.2.2 Suitability of UPS systems with auxiliary equipment

Where additional auxiliary equipment such as CCTV, comms routers or signs are to be connected to the UPS it is necessary to ensure that the UPS can manage the additional loads necessary.

6.1.2.3 UPS Software requirements

The UPS system shall be connected to the traffic signals controller, with the UPS software allowing the RCA to use SCATS (Sydney Co-ordinated Adaptive Traffic System) flags to indicate different UPS states. The UPS software shall include direct remote monitoring, such that the RCA shall be able to remotely log into the UPS device for fault checking and monitoring via means determined by the RCA. The minimum required outputs are listed in Appendix Q, which is an extract from AS 5715:2015 Cl4.6.

6.1.2.4 Relocation of the Generator Connection

The UPS system shall comply with AS 5715:2015 Cl5.3.16 Stand-by generator connection. Where a UPS system is installed, the traffic signals controller generator connection is to be modified, such that the portable power generation is to be connected to the UPS controller rather than the traffic signal controller.

6.1.2.5 Cabinet

All components of the UPS system shall be fully contained in a single UPS system cabinet. All components of the UPS cabinet (e.g. doors, hinges, locks etc.) shall comply with relevant New Zealand standards and clauses in this specification for traffic signal controller cabinets.

Where a UPS system is to be installed at a new signalised intersection, all components may be contained in the Signal Controller cabinet, subject to the approval of the RCA.

6.1.2.6 Electrical Components

All electrical components including cabling equipment of the UPS system shall comply with relevant New Zealand standards and clauses in this specification.

6.1.2.7 Additional Signage Requirements

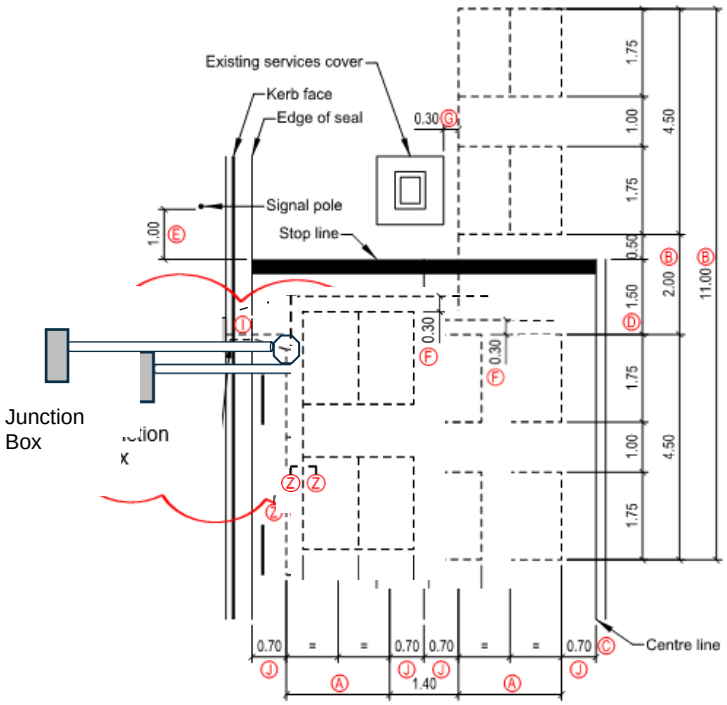
Additional signage and warning signs shall be placed in the traffic signals controller cabinet, the UPS system cabinet, and the mains power line. These signs shall alert all personnel that during maintenance, power from the UPS system shall still be live, even though power from the mains has been turned off.

6.1.2.8 Testing, Commissioning and Maintenance

The UPS system shall comply with Clause 2.9 and relevant Subclauses of 3.15 of this specification with respect to testing, commissioning and acceptance of the UPS system.

An annual test shall be undertaken to ascertain the condition of the batteries, to check that the stored energy is within the anticipated energy range to operate the intersection for the desirable minimum duration as defined by the RCA in section **Error! Reference source not found.**.

7 Appendix B: Inductive Loop Layout Details



Standard 4.5m Stopline Loop
With Right Turn Call Loop

Notes:

Ⓐ Dimension derived from the lane width stated on the design plan.

Ⓑ Distance between the loops will depend on geometry layout and right turn filtering position of vehicle.

Ⓒ 0.7m distance to be 0.5m when the loop and lane is separated more than 0.5m using for example a median or painted lines

Ⓓ Distance 1.5m from stop line (F.S.L.) unless otherwise stated on the design plan.

Ⓔ Distance between 1.0-3.0m from primary pole location unless otherwise stated on the design plan.
Where no details have been supplied it shall be 1.0m.

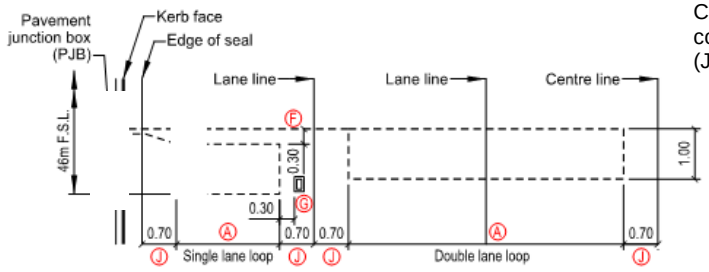
Ⓕ Feeders shall all be in separate slots, one slot per loop pair to kerb face and be a minimum of 0.3m apart from other slots.

Ⓖ Service covers shall be at least 0.3m from any loop cable slot.

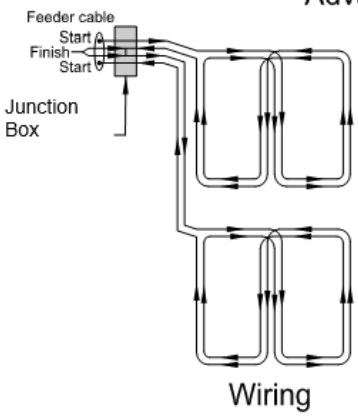
Ⓗ As built information to show locations of loop feeder cables in relation to the site equipment including pole, kerb faces, medians, service covers, distance to the stop line shall be recorded on the as built in metres from stop line (F.S.L.) to start of loop.

Carriageway Loop Box (CLB), or start of conduit feeding under kerb to Junction Box (JB).

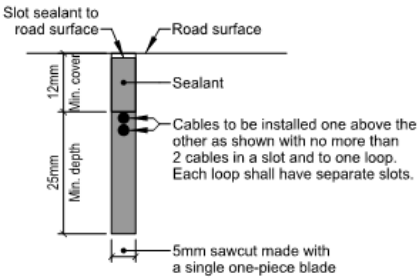
Ⓙ Offset loops 0.7m from the road lane markings adjacent to the loop, where lane loop is adjacent to kerb face use edge of seal to offset 0.7m to loop.



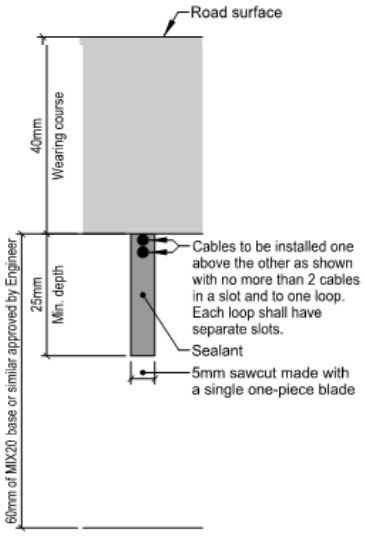
Advance Loop



Wiring



Existing Road Surfaces
Section Z-Z

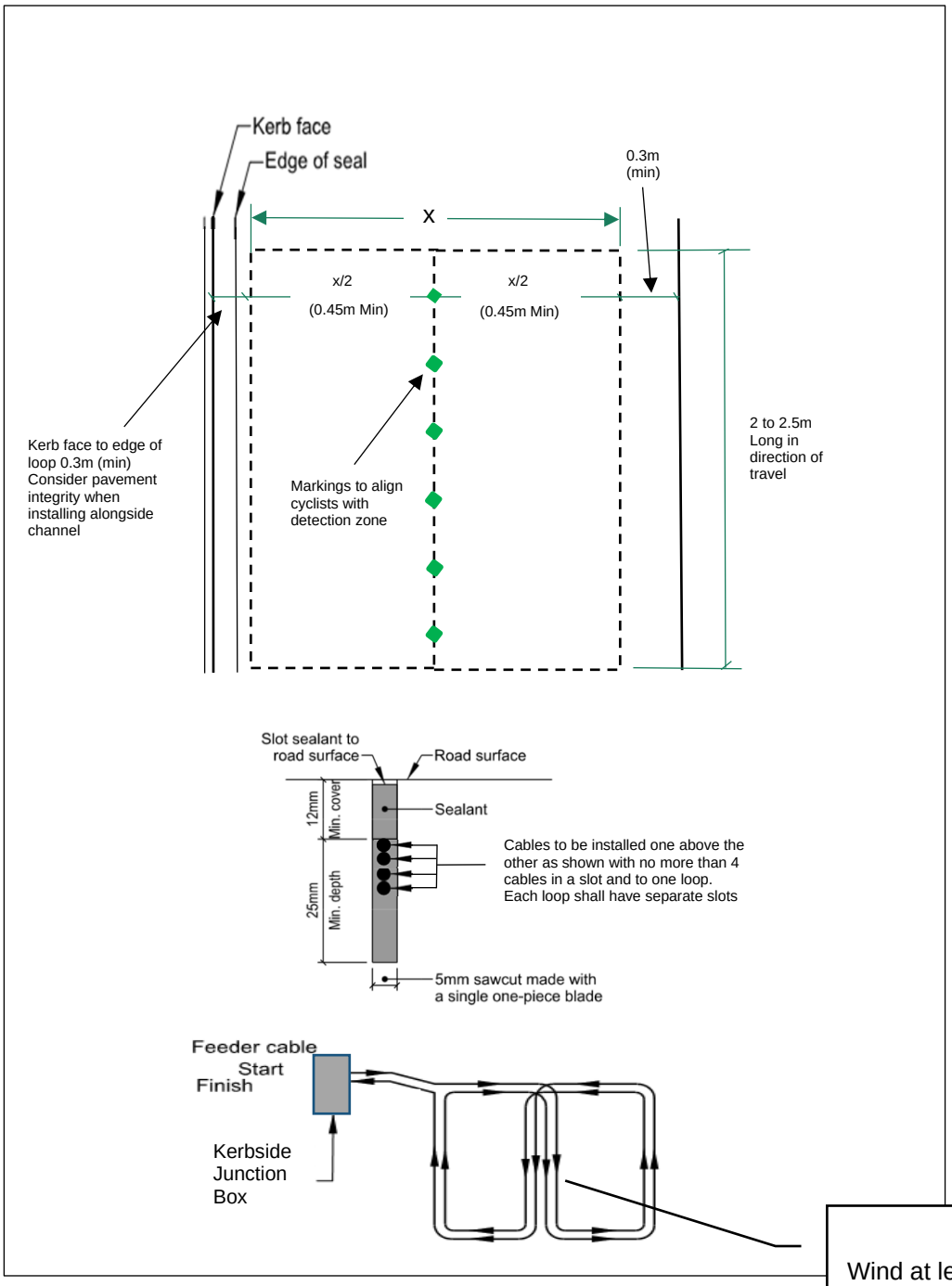


Newly Constructed
Road Surfaces
Section Z-Z

Wiring Rules:

1. Mark 'start' at end of cable.
2. Start of in a clockwise direction on entry from kerb face.
3. Form two 'figure 8' patterns for each loop section.
4. Change direction at the centre (longitudinal) cut to make a 'figure 8' pattern.

Figure A01 – Vehicle loop details



CYCLE LOOP CABLE DETAIL

Wind at least double this diagram (ie have at least 8 cables through the centre cut)

Figure A02 – Cycle loop details

8 Appendix C: 5 Metre Pole Top Assembly

Figure B01 – Pole Top Assembly

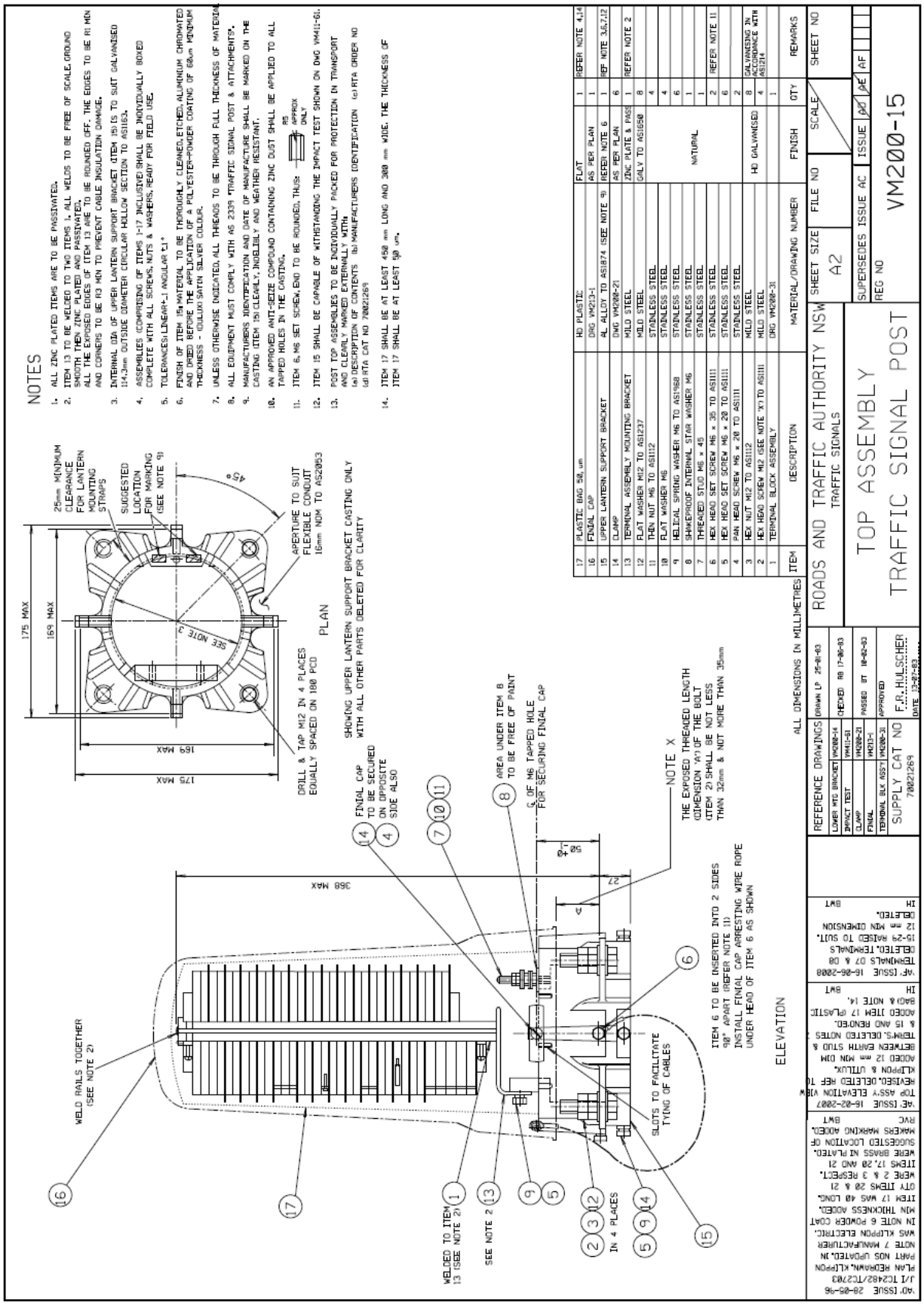
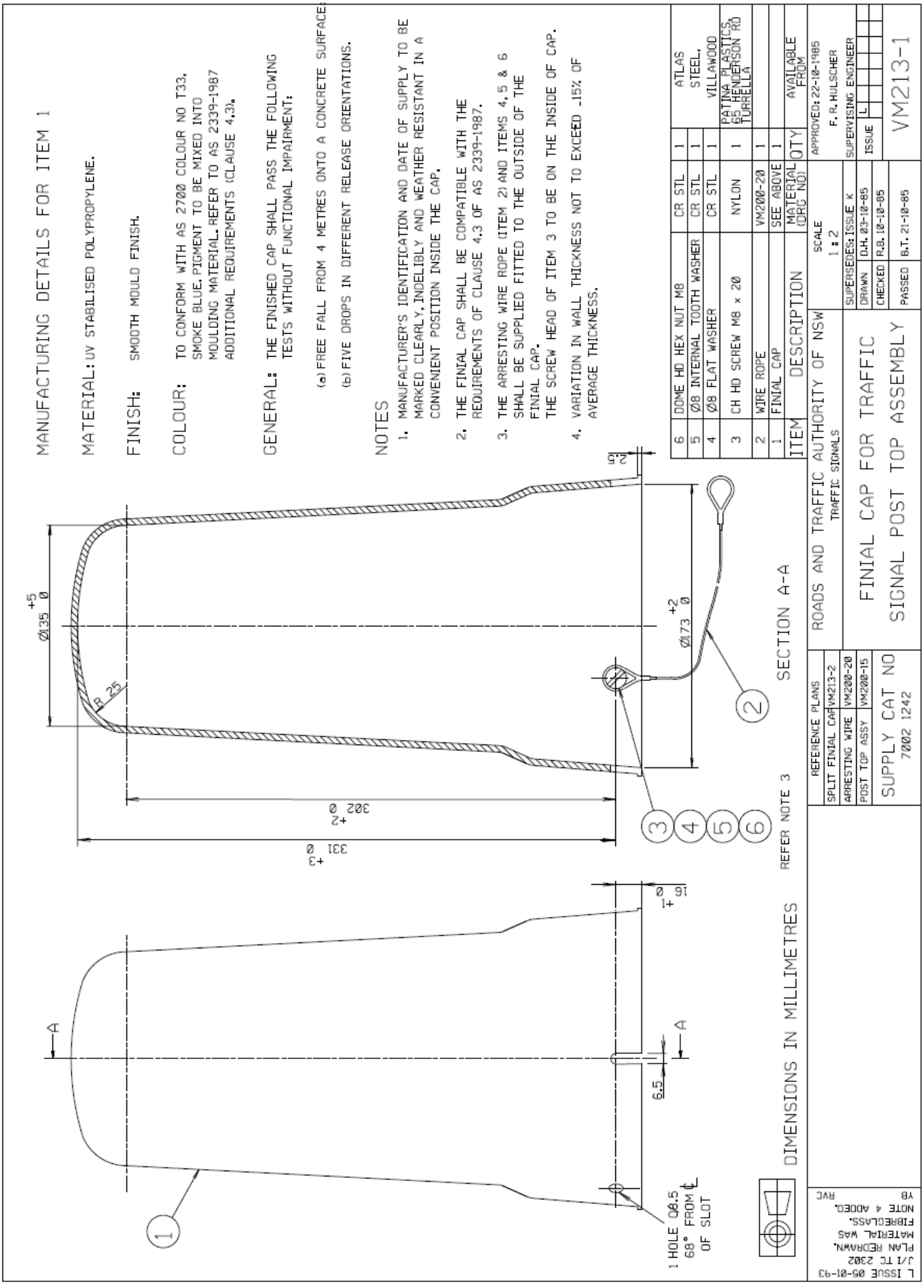


Figure B02 – Pole Top Assembly



9 Appendix D: Signal Pole Details

Figure C01 – Type 1 NASSRA Pole Ground Plant

Figure C02 – Type 1 NASSRA Pole Retention Socket

Figure C03 – Type 2 Combined CCTV Pole Ground Plant

Figure C04 – Type 2 Combined CCTV Pole Retention Socket

Figure C05 – Type 8 Hinged NASSRA Pole Ground Plant

Figure C06 – Type 8 Hinged NASSRA Pole Retention Socket

Figure C07 – Type 0 Extension Signals Pole Ground Plant Ground Plant

Figure C08 – Type 11 Cycle NASSRA Pole with Cycle Hoop - Retention Socket

Figure C09 – Octagonal JUSP Pole Ground Plant

Figure C10 – Octagonal JUSP Pole Flange Mount

Figure C11 - Deleted

Figure C12 –Urban JUSP Retention Socket

Figure C13 – Type 3s & 5s JUMA - CCTV - Flange Mount

Figure C14 – Type 3, 5, & 7 JUMA Columns – Street Light Extension - Flange Mount

Figure C15 – Type 9 Cycle Mastarm Columns - Flange Mount

Figure C16 - Deleted

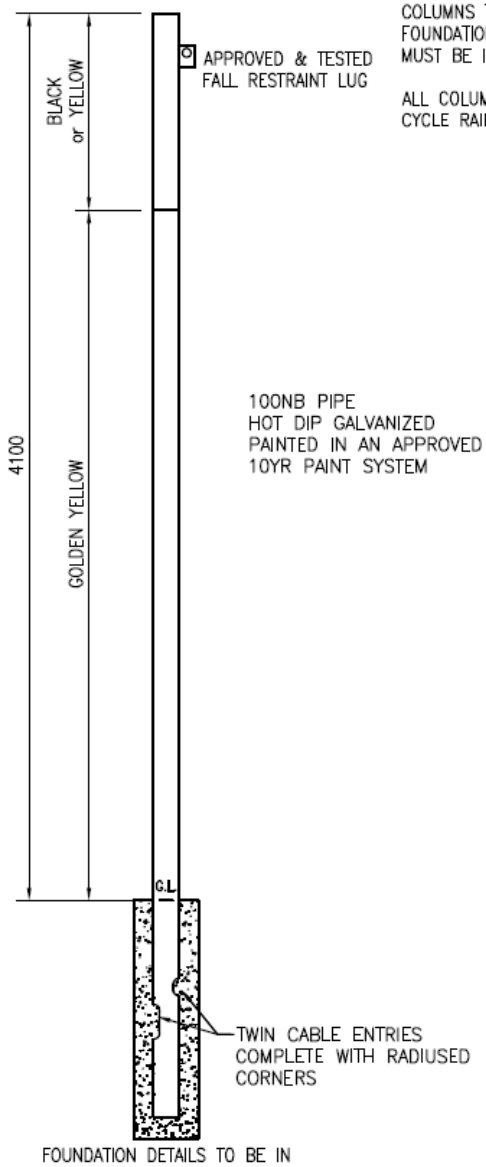
Figure C17 – Type 1 NASSRA Pole Cycle Hold Rail Ground Plant

Figure C18 – Pedestrian Stub Pole Cycle Hold Rail Ground Plant

STRUCTURAL NOTES
- MINIMUM ALLOWABLE SOIL BEARING PRESSURE SHALL BE 100 Kpa.
- CLIENT TO PROVIDE ORIENTATION AND LOCATION.
- CONTRACTOR TO CHECK LOCATION OF ALL SERVICES BEFORE COMMENCING WORK.
- PROVIDE CONDUIT FOR CABLE ENTRY AS REQUIRED.

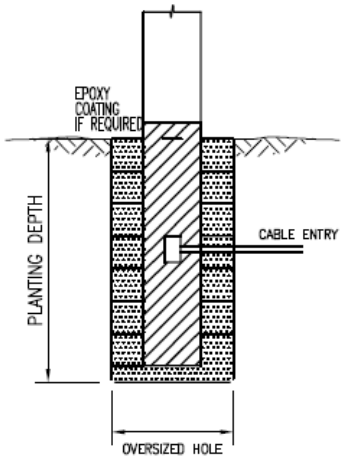
NOTE:
COLUMNS TO BE COMPLETELY HOT DIP GALVANIZED.
FOUNDATION DESIGN INFORMATION IS SUPPLIED AS A GUIDE ONLY AND MUST BE IN ACCORDANCE WITH THE COLUMNS PS1 AND GEOTECH REPORT.

ALL COLUMNS AVAILABLE WITH CYCLE RAIL ATTACHMENT BRACKETS.
CYCLE RAIL DESIGN DETAILED IN TYPE 11 DRAWING.



DESIGN PARAMETERS:

DESIGN WORKING LIFE	– 50 YEARS
IMPORTANCE LEVEL	– 2
WIND REGION	– 45 M/S
TERRAIN / HEIGHT MULTIPLIER	– 2
SHIELDING MULTIPLIER	– 1
HILL SHAPE MULTIPLIER	– 1
LEE ZONE MULTIPLIER	– 1 (TO A MAXIMUM OF 1.35)



TYPICAL GROUND PLANTED FOUNDATION

Rev	Amendment Description	By	Chk	Date
A	Initial issue	DE	–	08/16

DESIGN PARAMETERS:
Design Working Life: 50
Importance Level: 2
Wind Region: 45
Terrain Category: 2
Site Elevation:

PROJECT: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS
ADDRESS: WELLINGTON

PROJECT NUMBER: -

SHEET: C1

TITLE: TYPE 1 NASSRA POLE GROUND PLANT

DRG.SIZE: A4

SCALE: AS SHOWN

REVISION: A

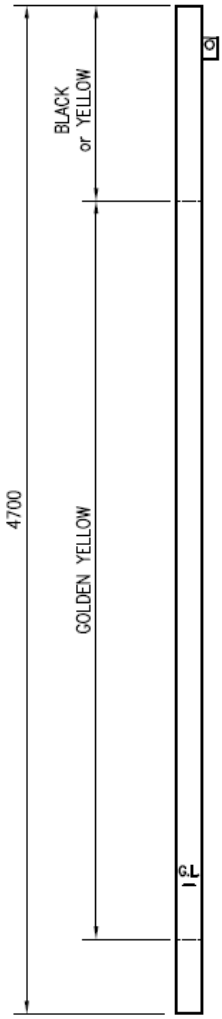
C:\Users\davidevans\National Pole Specification\Current Drawings\P43 National Traffic Specification Pole Drawings – 31.08.16.dwg

Figure C02 – Type 1 NASSRA Pole Retention Socket

STRUCTURAL NOTES
- MINIMUM ALLOWABLE SOIL BEARING PRESSURE SHALL BE 100 Kpa.
- CLIENT TO PROVIDE ORIENTATION AND LOCATION.
- CONTRACTOR TO CHECK LOCATION OF ALL SERVICES BEFORE COMMENCING WORK.
- PROVIDE CONDUIT FOR CABLE ENTRY AS REQUIRED.

NOTE:
COLUMNS TO BE COMPLETELY HOT DIP GALVANIZED.
FOUNDATION DESIGN INFORMATION IS SUPPLIED AS A GUIDE ONLY AND MUST BE IN ACCORDANCE WITH THE COLUMNS PS1 AND GEOTECH REPORT.

ALL COLUMNS AVAILABLE WITH CYCLE RAIL ATTACHMENT BRACKETS.
CYCLE RAIL DESIGN DETAILED IN TYPE 11 DRAWING.



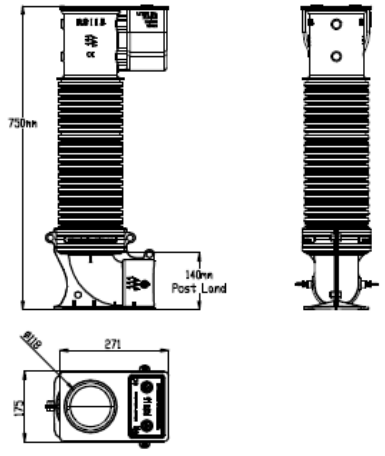
100NB PIPE
HOT DIP GALVANIZED
PAINTED IN AN APPROVED
10YR PAINT SYSTEM

DESIGN PARAMETERS:

DESIGN WORKING LIFE	– 50 YEARS
IMPORTANCE LEVEL	– 2
WIND REGION	– 45 M/S
TERRAIN / HEIGHT MULTIPLIER	– 2
SHIELDING MULTIPLIER	– 1
HILL SHAPE MULTIPLIER	– 1
LEE ZONE MULTIPLIER	– 1 (TO A MAXIMUM OF 1.35)

FOUNDATION DETAILS TO BE IN ACCORDANCE WITH SITE SPECIFIC DESIGN

Duckfoot



IPL RS114 RETENTION SOCKET PLAN

Rev	Amendment Description	By	Chk	Date
A	Initial issue	DE	–	08/16

DESIGN PARAMETERS:
Design Working Life: 50
Importance Level: 2
Wind Region: 45
Terrain Category: 2
Site Elevation:

PROJECT: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS
ADDRESS: WELLINGTON
PROJECT NUMBER: -
SHEET: C2
TITLE: TYPE 1 NASSRA POLE
IPL RS114 RETENTION SOCKET
DRG.SIZE: A4
SCALE: AS SHOWN
REVISION: A

C:\Users\davidevans\National Pole Specification\Current Drawings\P43 National Traffic Specification Pole Drawings – 31.08.16.dwg

Figure C03 – Type 2 Combined CCTV Pole Ground Plant

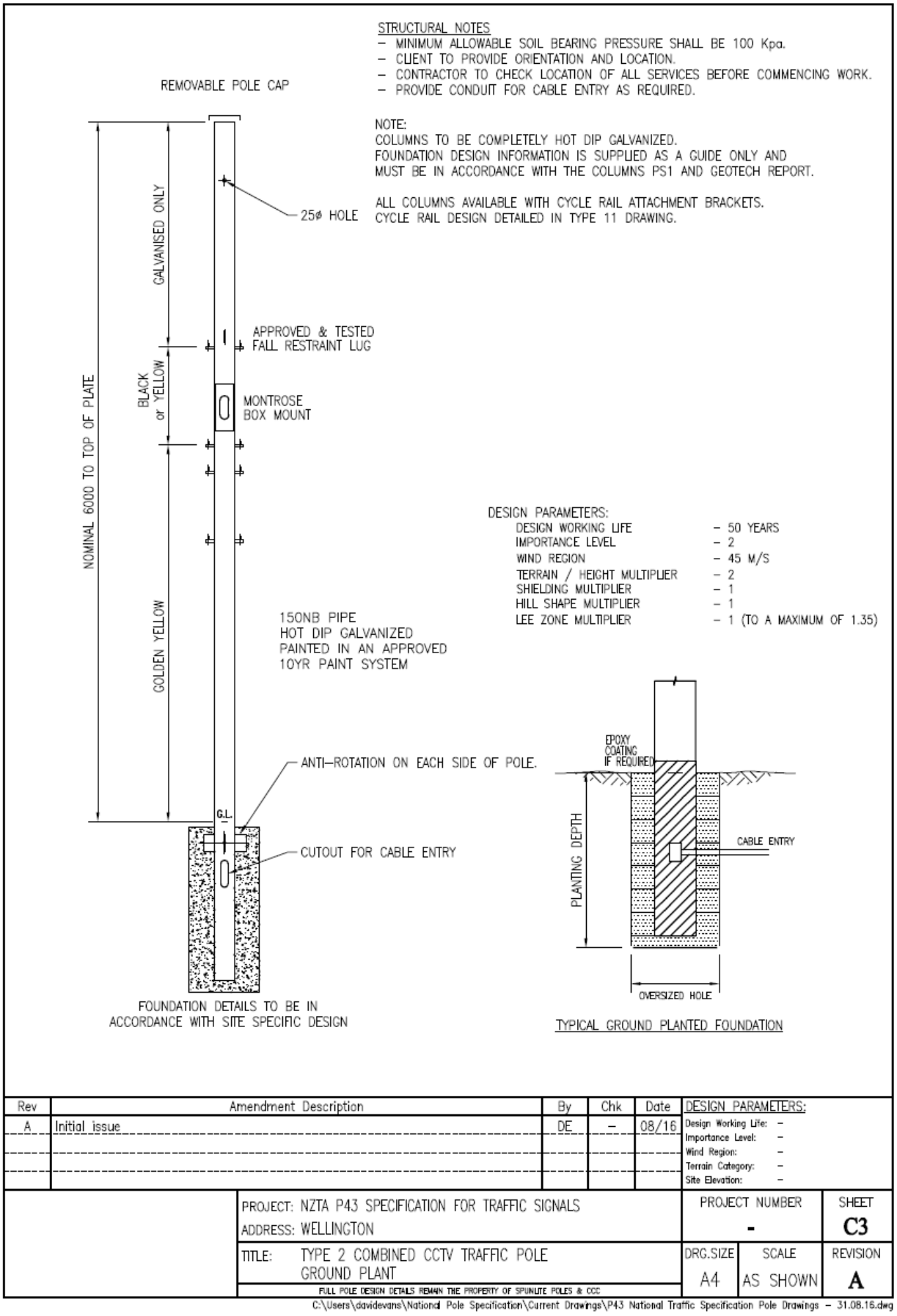


Figure C04 – Type 2 Combined CCTV Pole Retention Socket

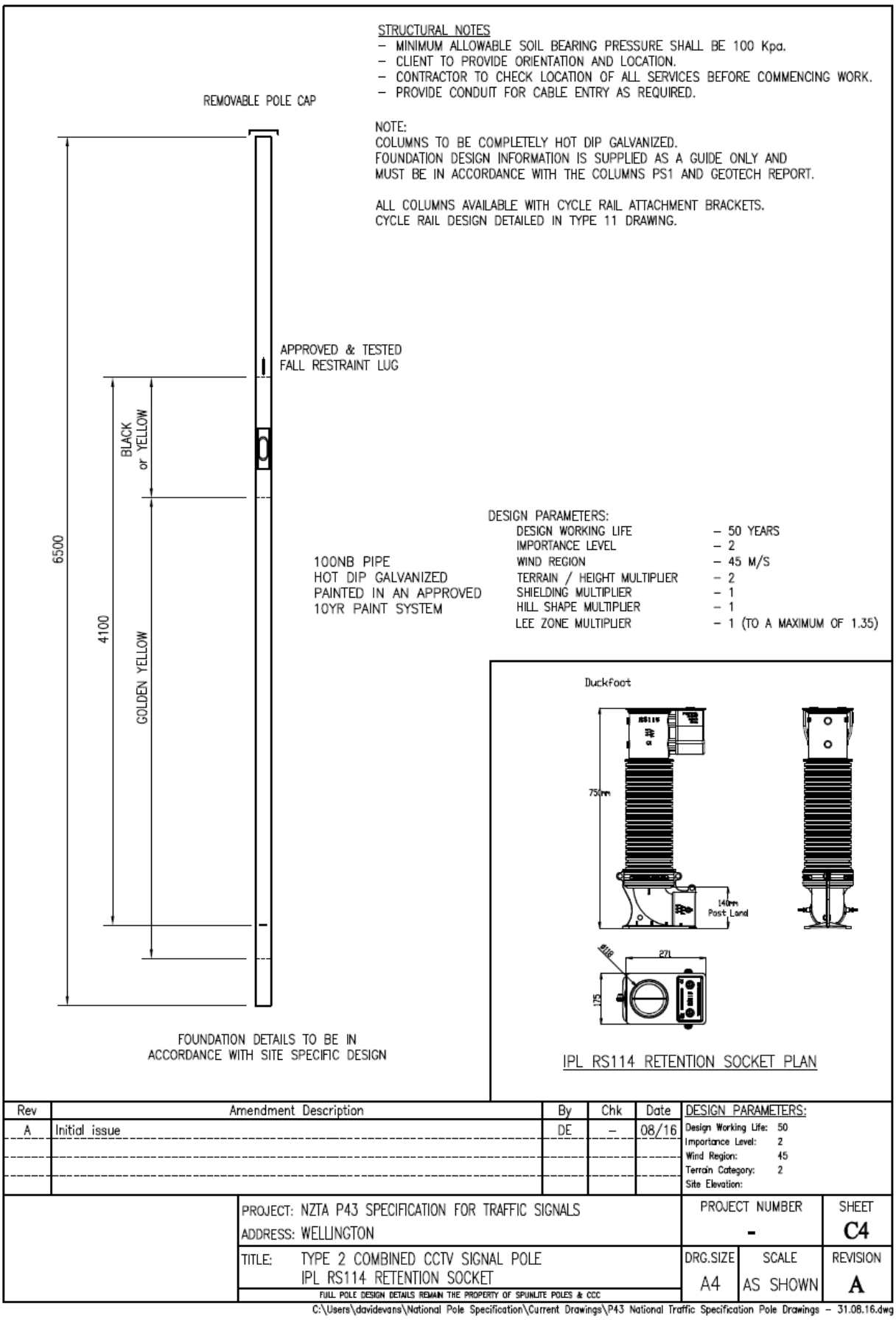


Figure C05 – Type 8 Hinged NASSRA Pole Ground Plant

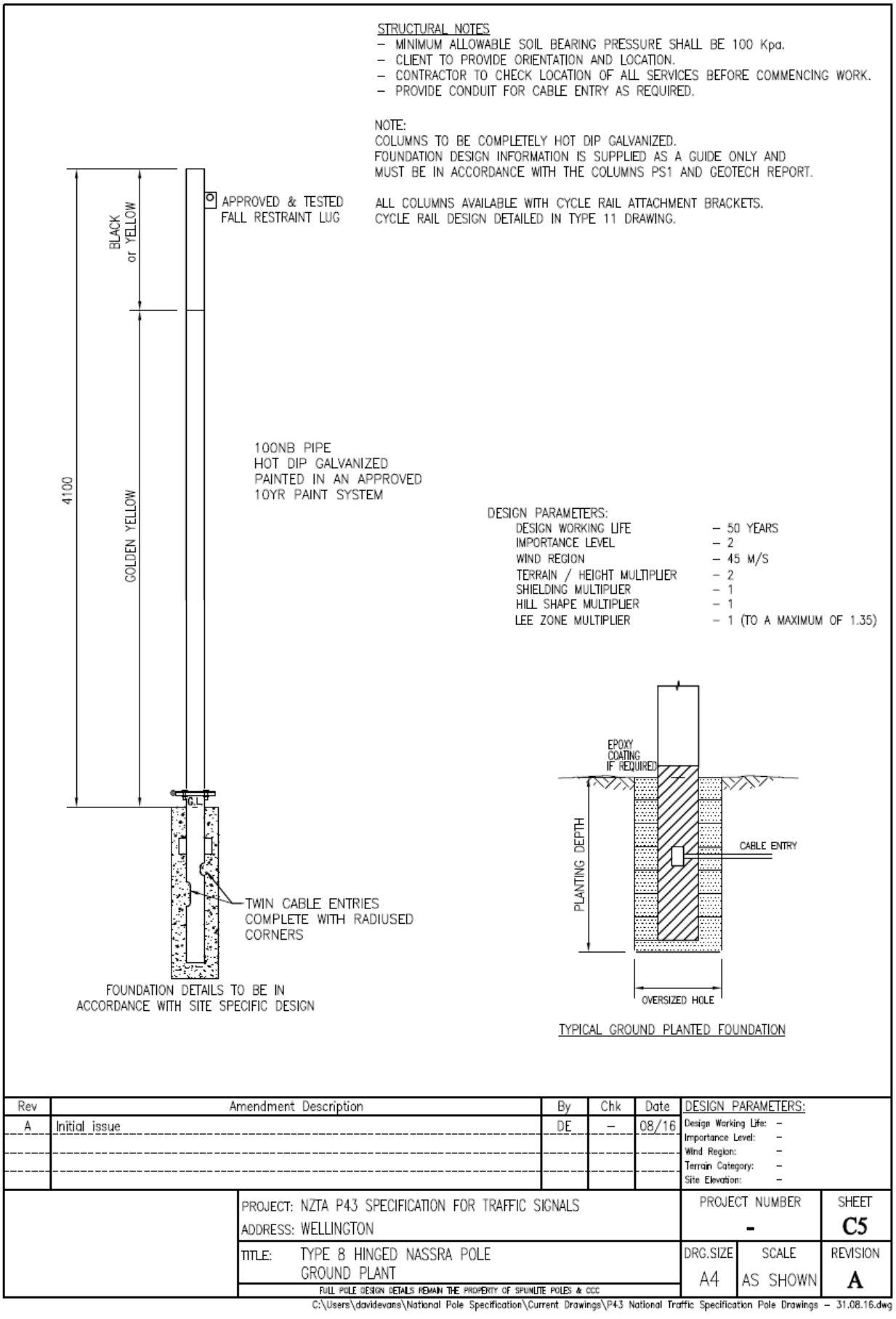


Figure C06 – Type 8 Hinged NASSRA Pole Retention Socket

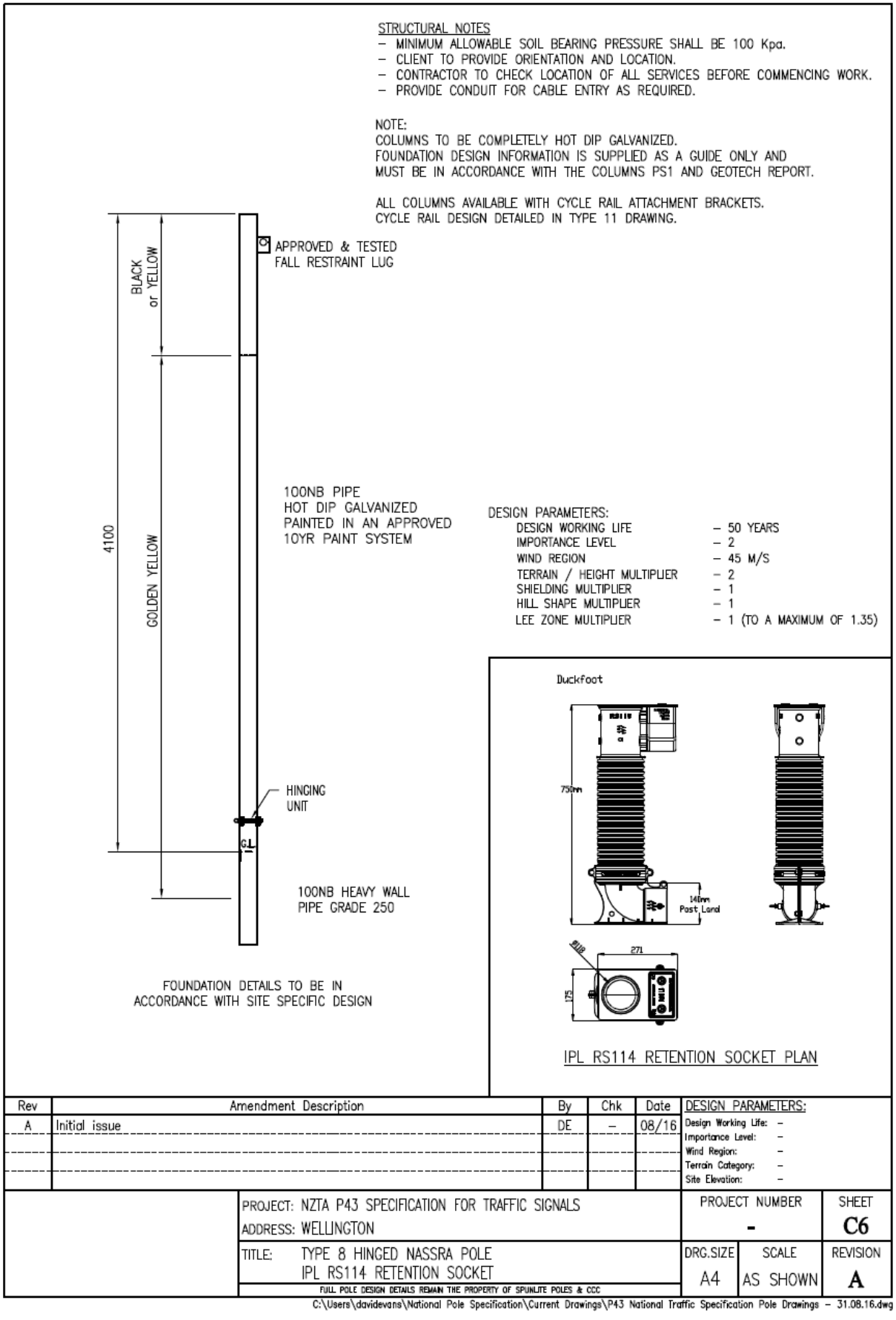
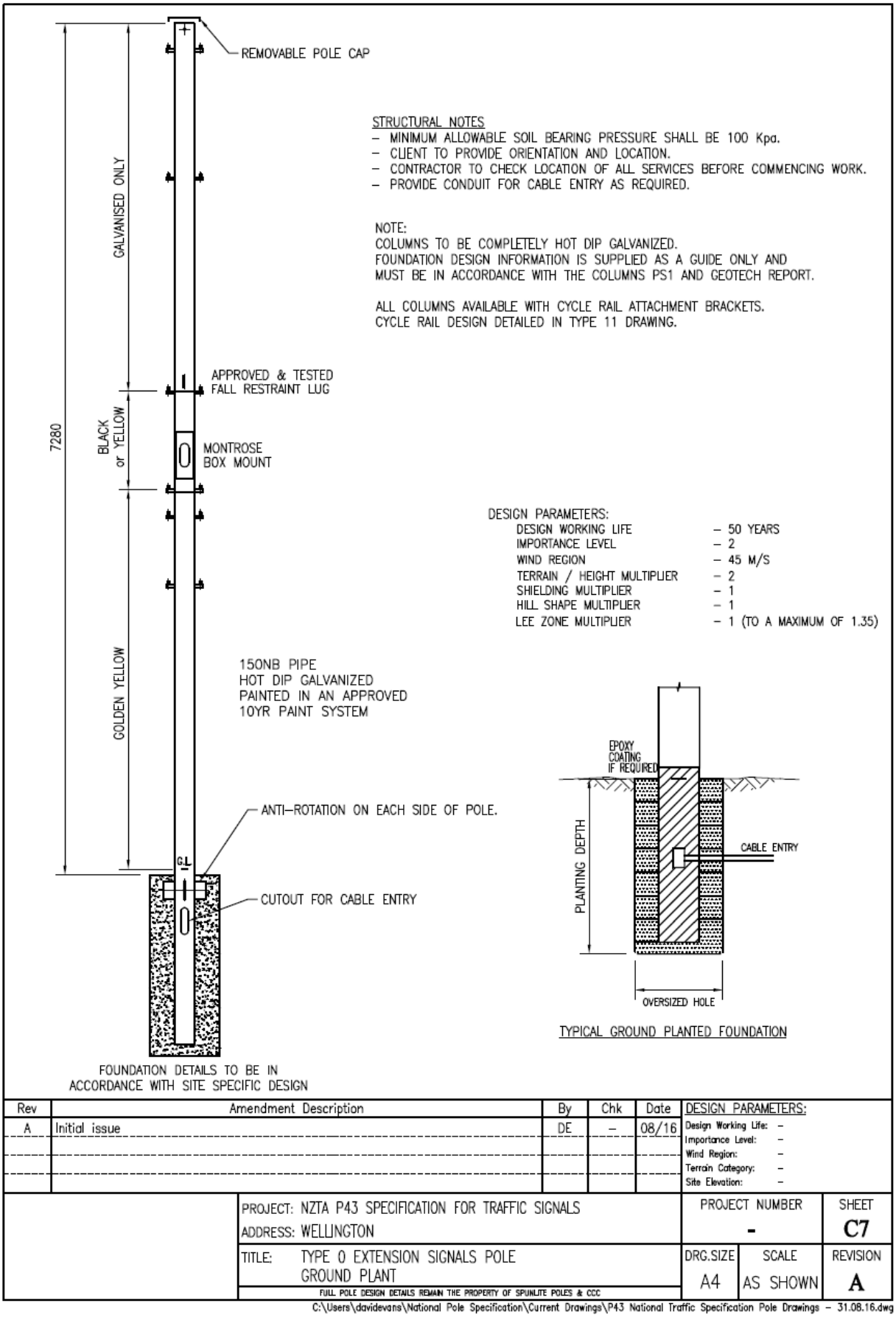


Figure C07 – Type 0 Extension Signals Pole Ground Plant Ground Plant



Rev	Amendment Description	By	Chk	Date
A	Initial issue	DE	–	08/16

DESIGN PARAMETERS:
Design Working Life: –
Importance Level: –
Wind Region: –
Terrain Category: –
Site Elevation: –

PROJECT: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS ADDRESS: WELLINGTON		PROJECT NUMBER -	SHEET C7
TITLE: TYPE 0 EXTENSION SIGNALS POLE GROUND PLANT		DRG.SIZE A4	SCALE AS SHOWN	REVISION A

C:\Users\davidevans\National Pole Specification\Current Drawings\P43 National Traffic Specification Pole Drawings – 31.08.16.dwg

Figure C08 – Type 11 Cycle NASSRA Pole with Cycle Hoop - Retention Socket

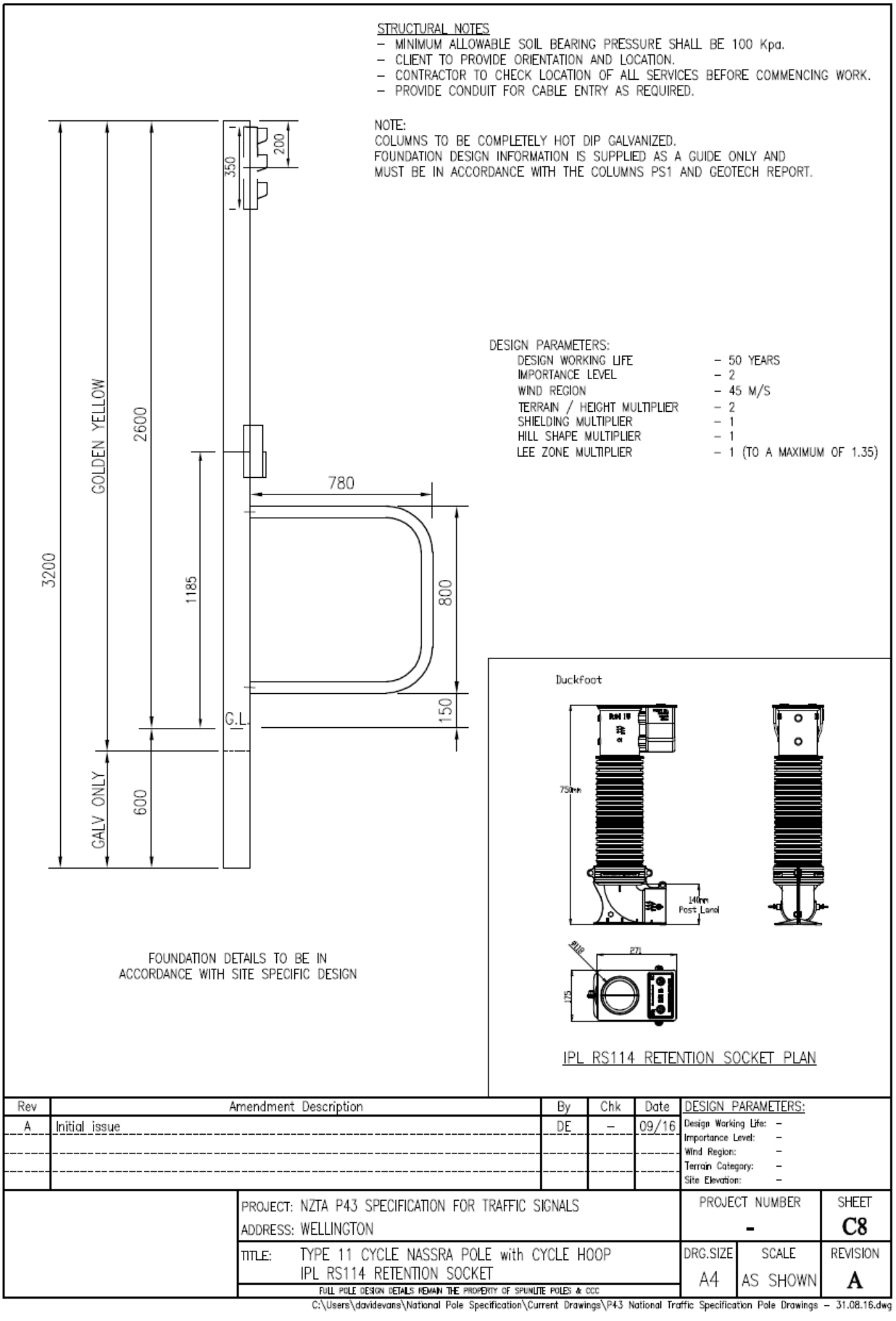
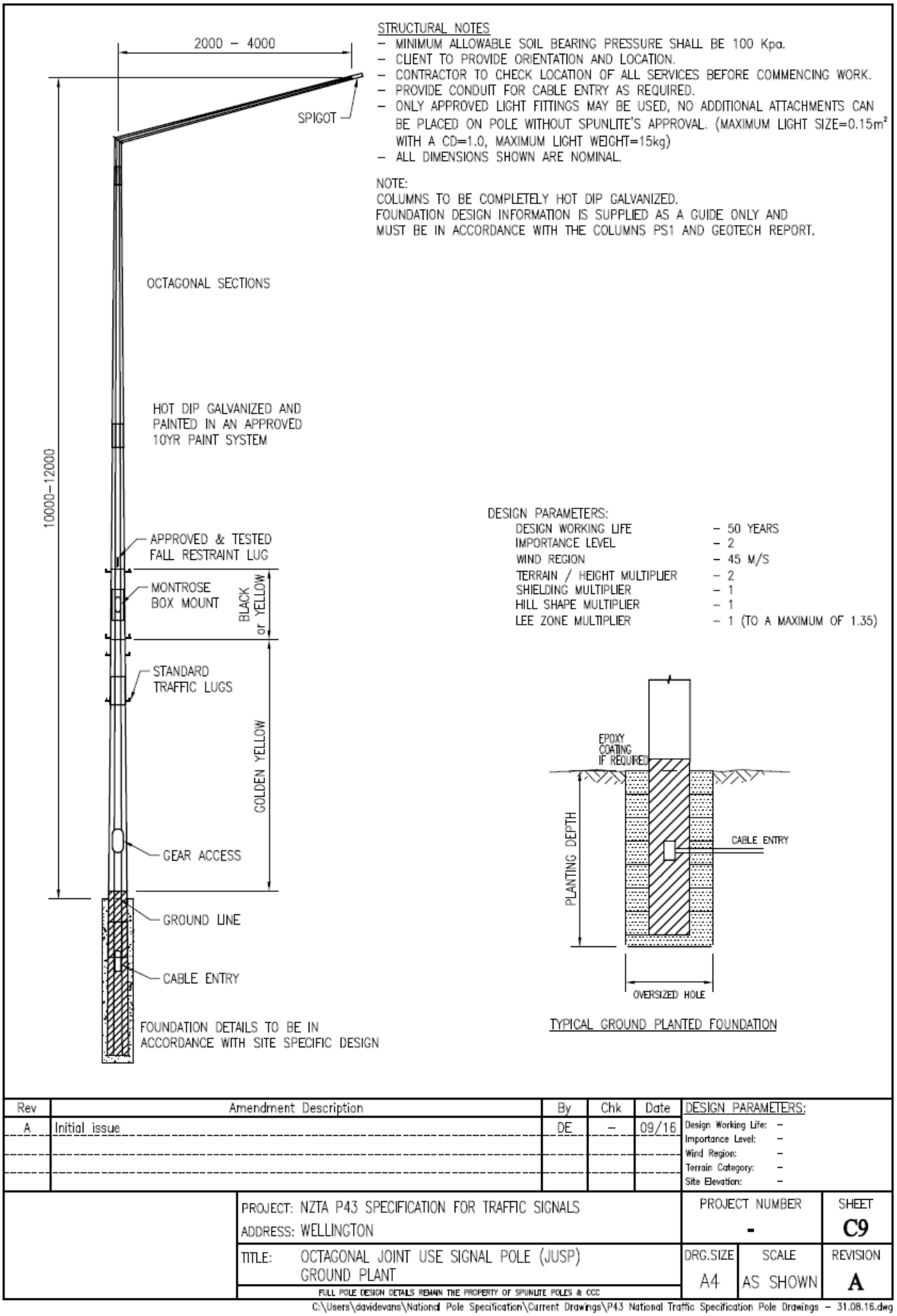


Figure C09 – Octagonal JUSP Pole Ground Plant



Rev	Amendment Description	By	Chk	Date
A	Initial issue	DE	–	09/16

DESIGN PARAMETERS:
Design Working Life: –
Importance Level: –
Wind Region: –
Terrain Category: –
Site Elevation: –

PROJECT: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS
ADDRESS: WELLINGTON

PROJECT NUMBER: -

SHEET: C9

TITLE: OCTAGONAL JOINT USE SIGNAL POLE (JUSP) GROUND PLANT

DRG.SIZE: A4 | SCALE: AS SHOWN | REVISION: A

FULL POLE DESIGN DETAILS REMAIN THE PROPERTY OF SPUNLITE POLES & CCC

C:\Users\davidevans\National Pole Specification\Current Drawings\P43 National Traffic Specification Pole Drawings – 31.08.16.dwg

Figure C10 – Octagonal JUSP Pole Flange Mount

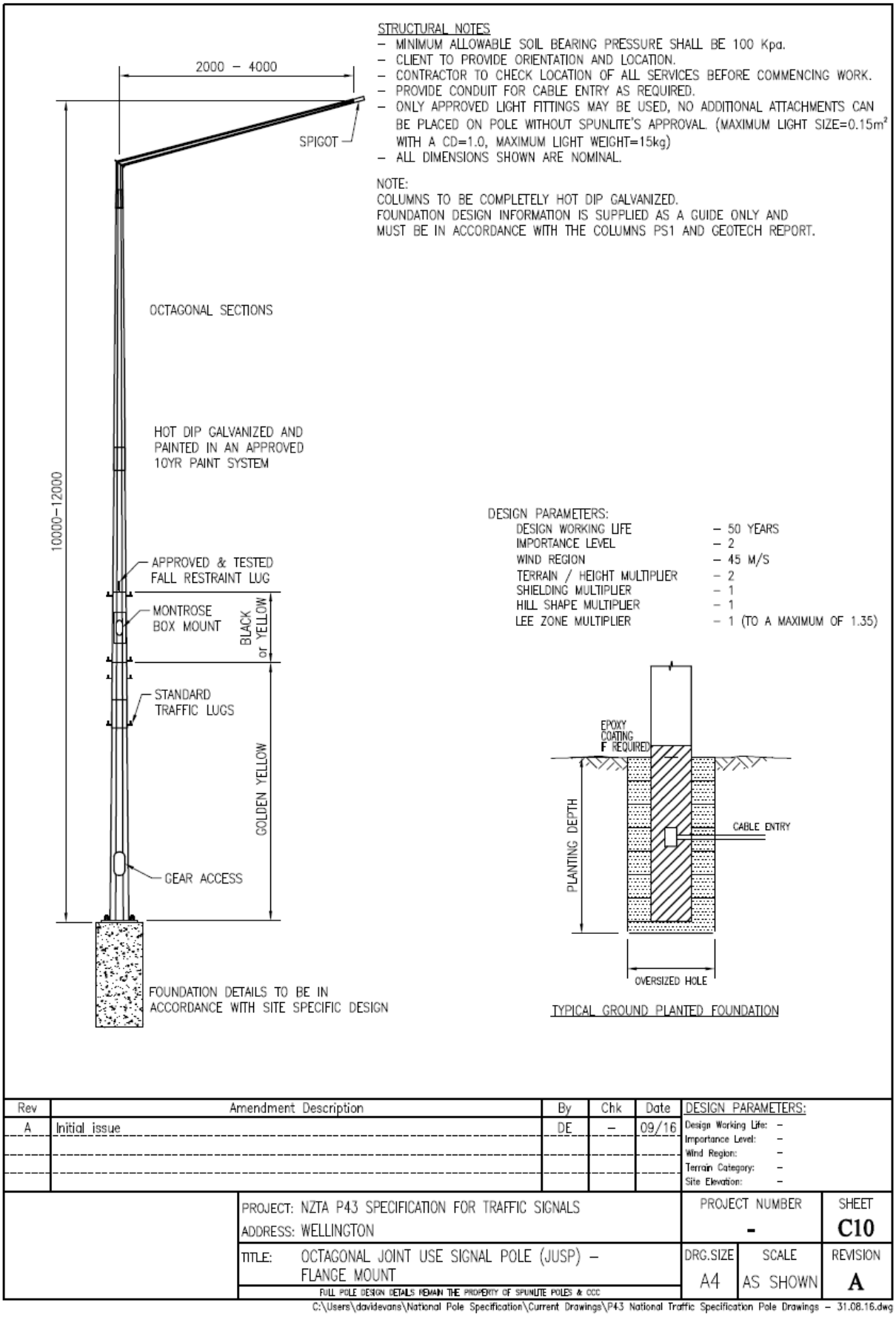


Figure C12 –Urban JUSP Retention Socket

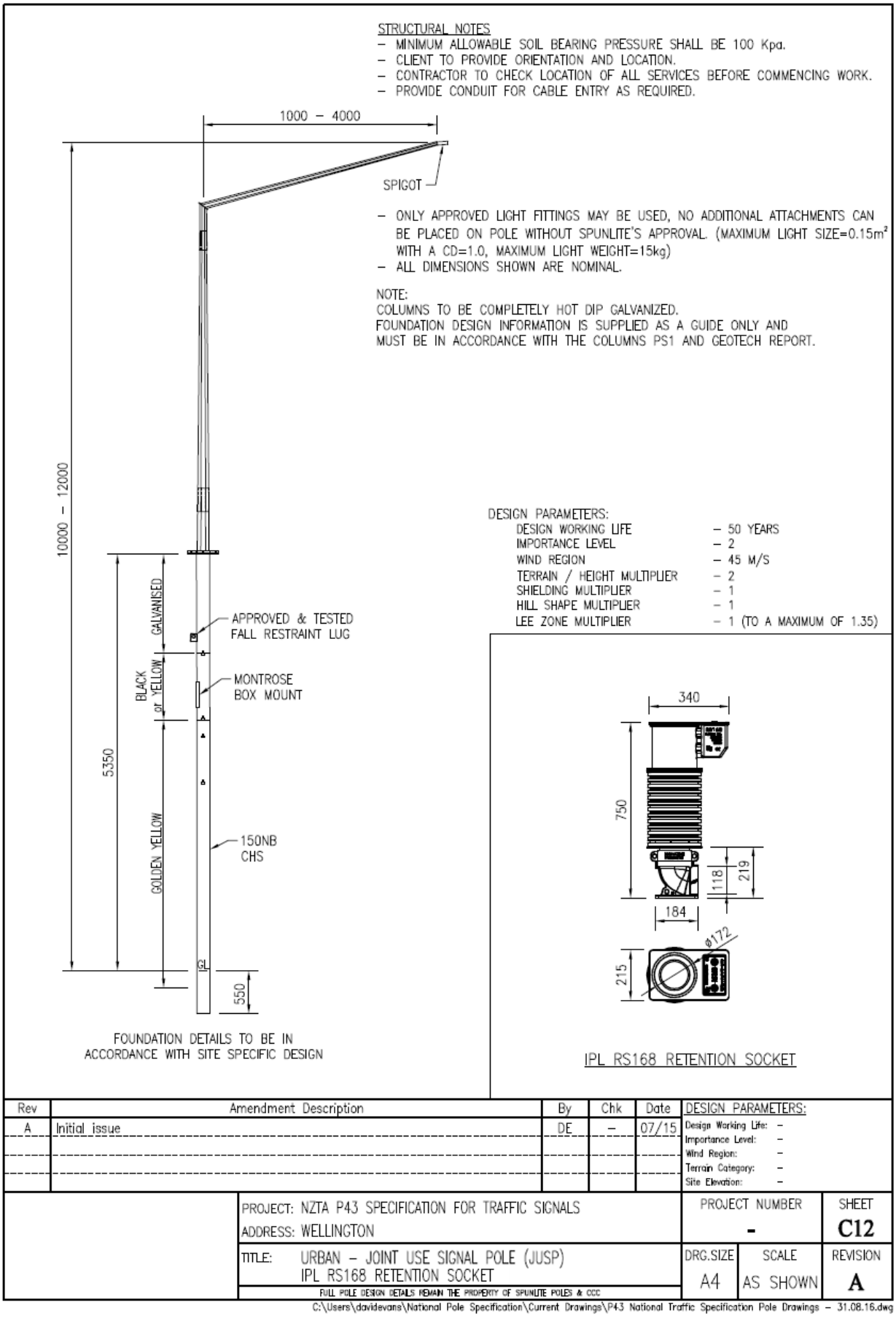
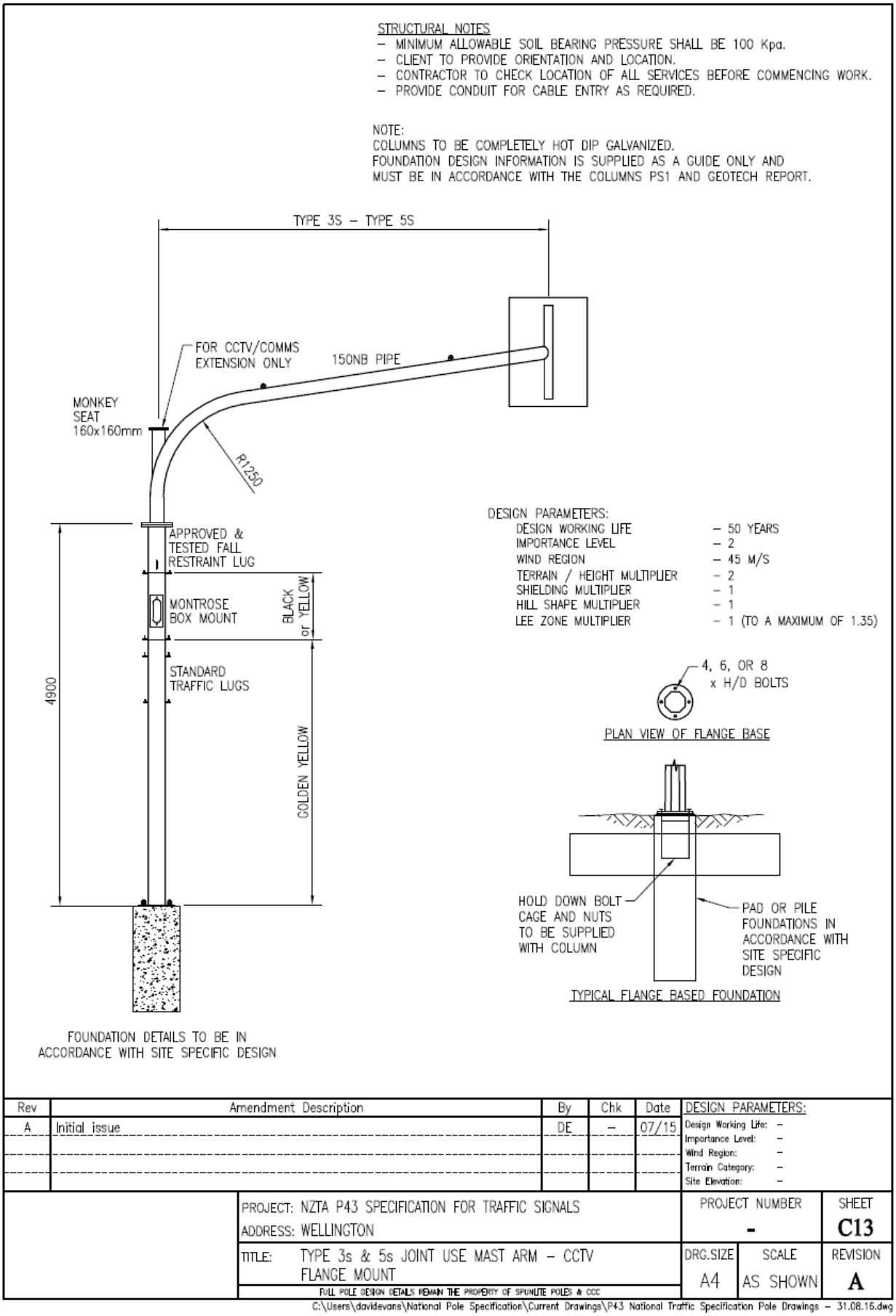


Figure C13 – Type 3s & 5s JUMA - CCTV - Flange Mount



Rev	Amendment Description	By	Chk	Date
A	Initial issue	DE	–	07/15

DESIGN PARAMETERS:
Design Working Life: –
Importance Level: –
Wind Region: –
Terrain Category: –
Site Elevation: –

PROJECT: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS
ADDRESS: WELLINGTON

PROJECT NUMBER: -

SHEET: C13

TITLE: TYPE 3s & 5s JOINT USE MAST ARM – CCTV FLANGE MOUNT

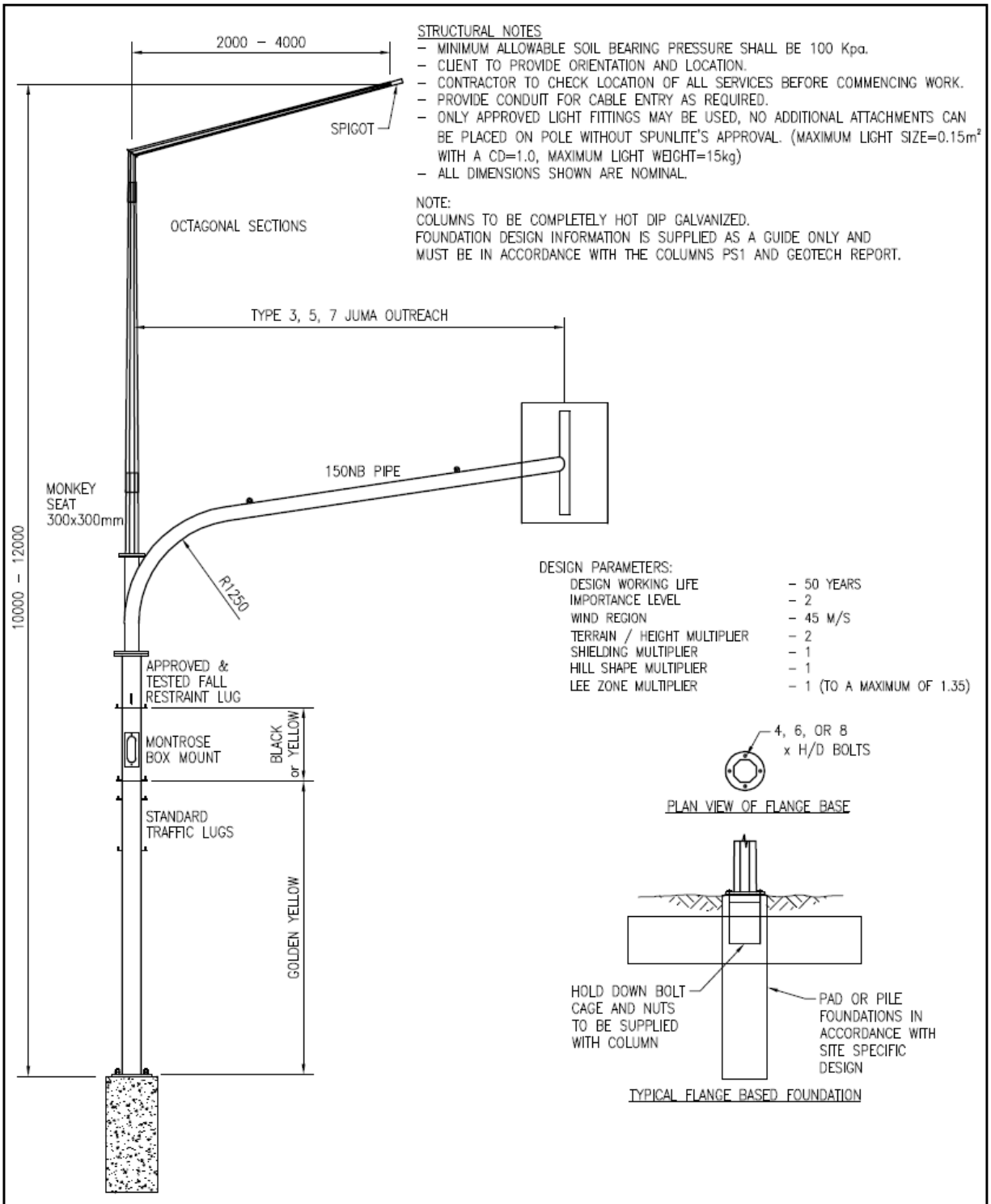
DRG.SIZE: A4

SCALE: AS SHOWN

REVISION: A

C:\Users\davidevans\National Pole Specification\Current Drawings\P43 National Traffic Specification Pole Drawings – 31.08.16.dwg

Figure C14 – Type 3, 5, & 7 JUMA Columns – Street Light Extension - Flange Mount



Rev	Amendment Description	By	Chk	Date
A	Initial issue	DE	–	07/15

DESIGN PARAMETERS:
Design Working Life: –
Importance Level: –
Wind Region: –
Terrain Category: –
Site Elevation: –

PROJECT: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS
ADDRESS: WELLINGTON

PROJECT NUMBER: -

SHEET: C14

TITLE: TYPE 3, 5 & 7 JOINT USE MAST ARM (JUMA) FLANGE MOUNT with STREET LIGHTING EXTENSION

DRG.SIZE: A4 | SCALE: AS SHOWN | REVISION: A

C:\Users\davidevans\National Pole Specification\Current Drawings\P43 National Traffic Specification Pole Drawings – 31.08.16.dwg

Figure C15 – Type 9 Cycle Mastarm Columns - Flange Mount

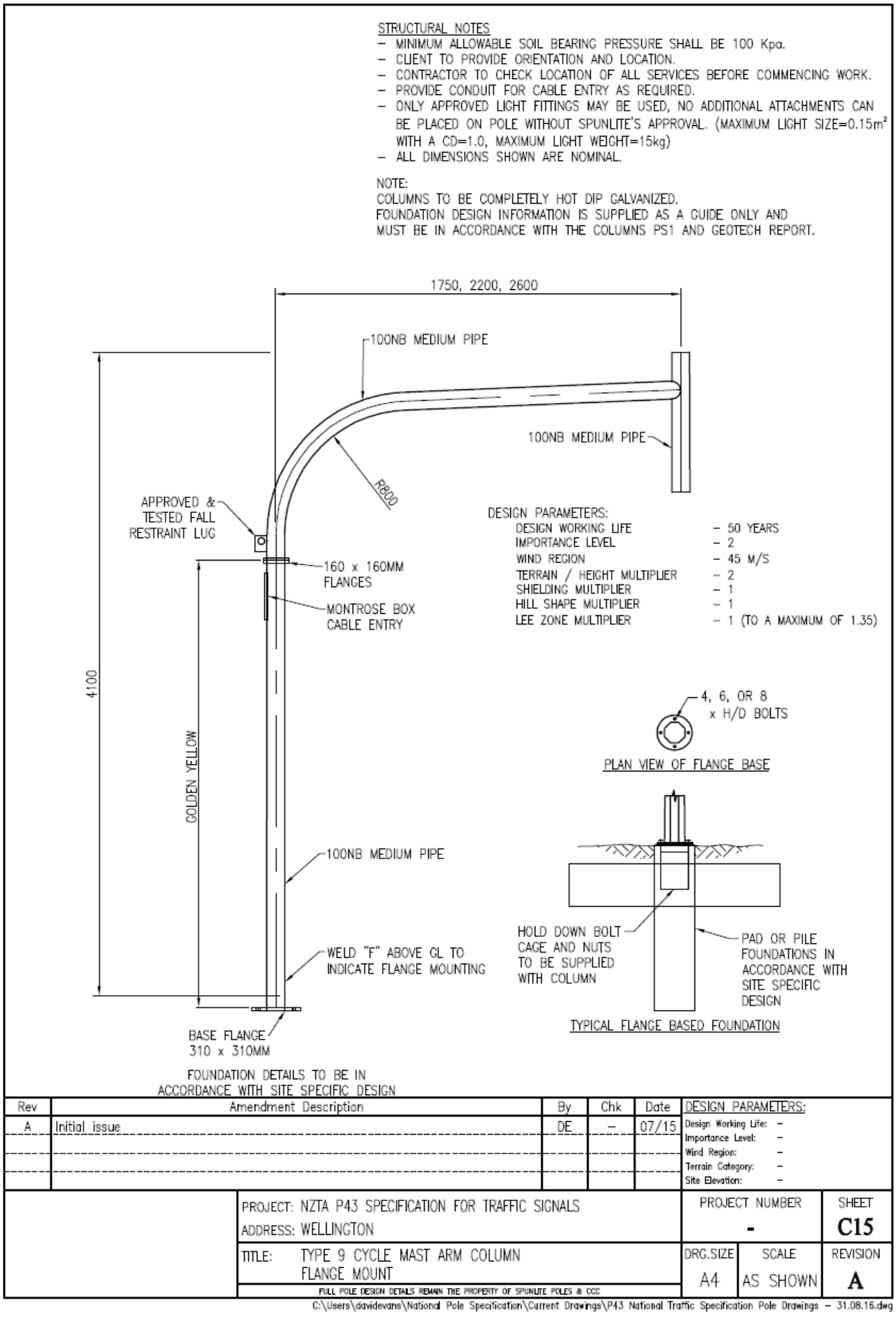


Figure C17 – Type 1 NASSRA Pole Cycle Hold Rail Ground Plant

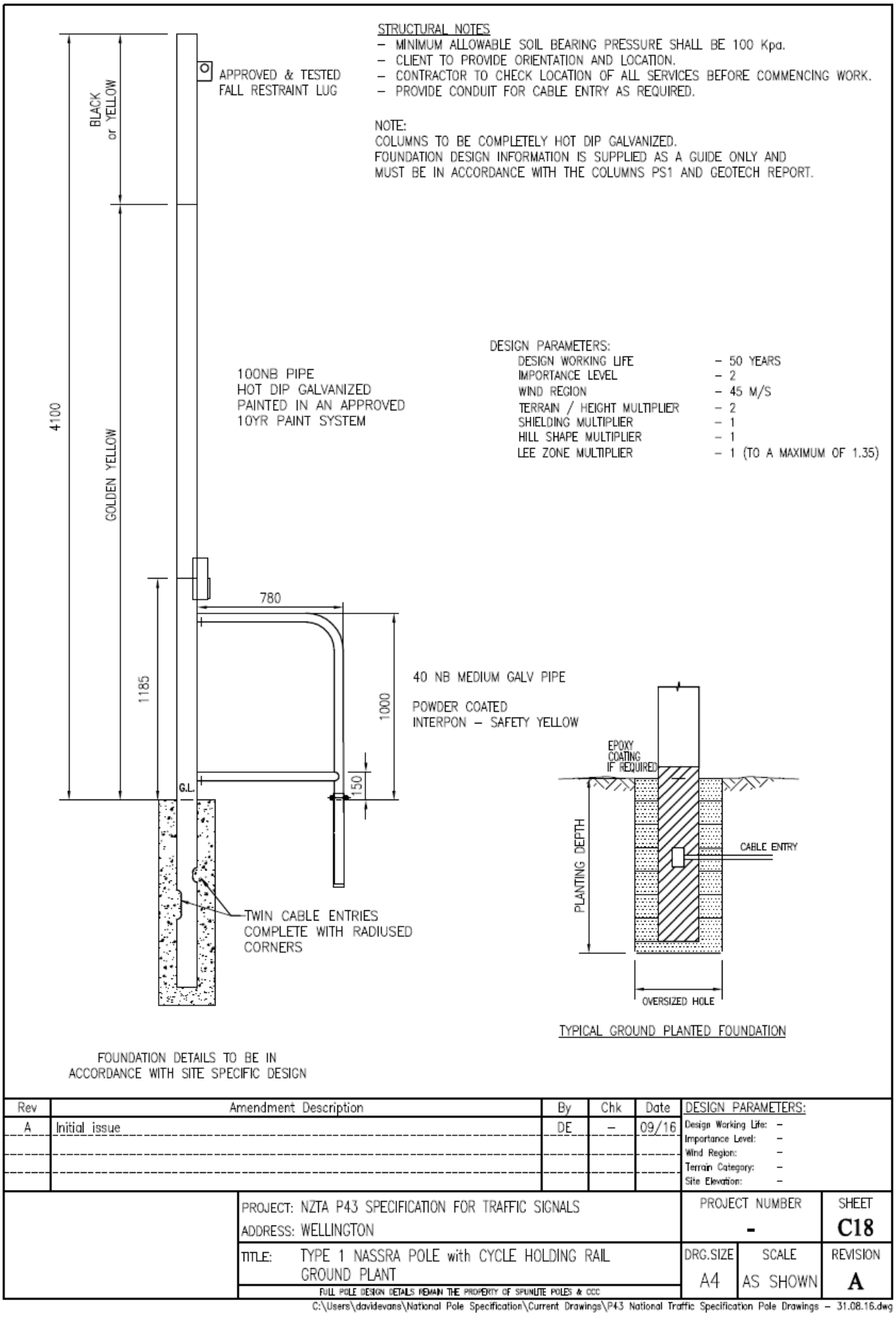


Figure C18 – Pedestrian Stub Pole Cycle Hold Rail Ground Plant

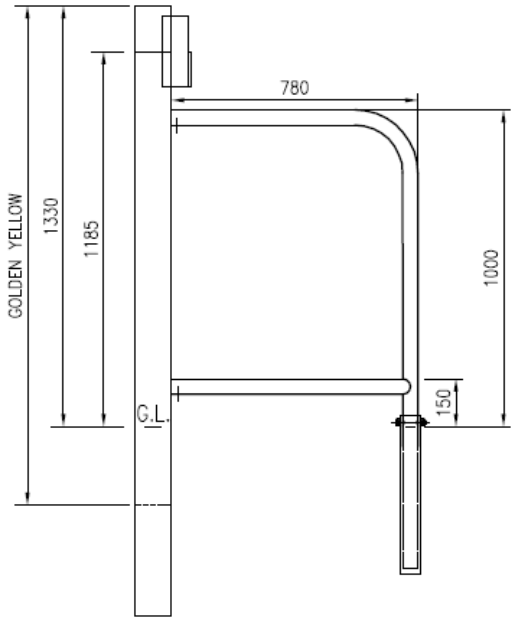
STRUCTURAL NOTES
- MINIMUM ALLOWABLE SOIL BEARING PRESSURE SHALL BE 100 Kpa.
- CLIENT TO PROVIDE ORIENTATION AND LOCATION.
- CONTRACTOR TO CHECK LOCATION OF ALL SERVICES BEFORE COMMENCING WORK.
- PROVIDE CONDUIT FOR CABLE ENTRY AS REQUIRED.

NOTE:
COLUMNS TO BE COMPLETELY HOT DIP GALVANIZED.
FOUNDATION DESIGN INFORMATION IS SUPPLIED AS A GUIDE ONLY AND
MUST BE IN ACCORDANCE WITH THE COLUMNS PS1 AND GEOTECH REPORT.

100NB PIPE
HOT DIP GALVANIZED
PAINTED IN AN APPROVED
10YR PAINT SYSTEM

DESIGN PARAMETERS:

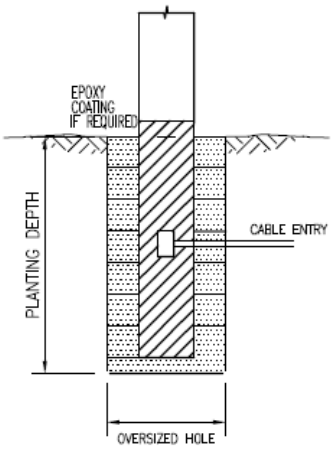
DESIGN WORKING LIFE	– 50 YEARS
IMPORTANCE LEVEL	– 2
WIND REGION	– 45 M/S
TERRAIN / HEIGHT MULTIPLIER	– 2
SHIELDING MULTIPLIER	– 1
HILL SHAPE MULTIPLIER	– 1
LEE ZONE MULTIPLIER	– 1 (TO A MAXIMUM OF 1.35)



40 NB MEDIUM GALV PIPE

POWDER COATED
INTERPON – SAFETY YELLOW

FOUNDATION DETAILS TO BE IN
ACCORDANCE WITH SITE SPECIFIC DESIGN



TYPICAL GROUND PLANTED FOUNDATION

Rev	Amendment Description	By	Chk	Date
A	Initial issue	DE	–	09/16

DESIGN PARAMETERS:
Design Working Life: –
Importance Level: –
Wind Region: –
Terrain Category: –
Site Elevation: –

PROJECT: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS
ADDRESS: WELLINGTON

PROJECT NUMBER: -

SHEET: C18

TITLE: PEDESTRIAN STUB POLE with HOLDING RAIL GROUND PLANT

DRG.SIZE: A4 | SCALE: AS SHOWN | REVISION: A

C:\Users\davidevans\National Pole Specification\Current Drawings\P43 National Traffic Specification Pole Drawings – 31.08.16.dwg

10 Appendix E: Ground Plant Pole – Duct Access Details

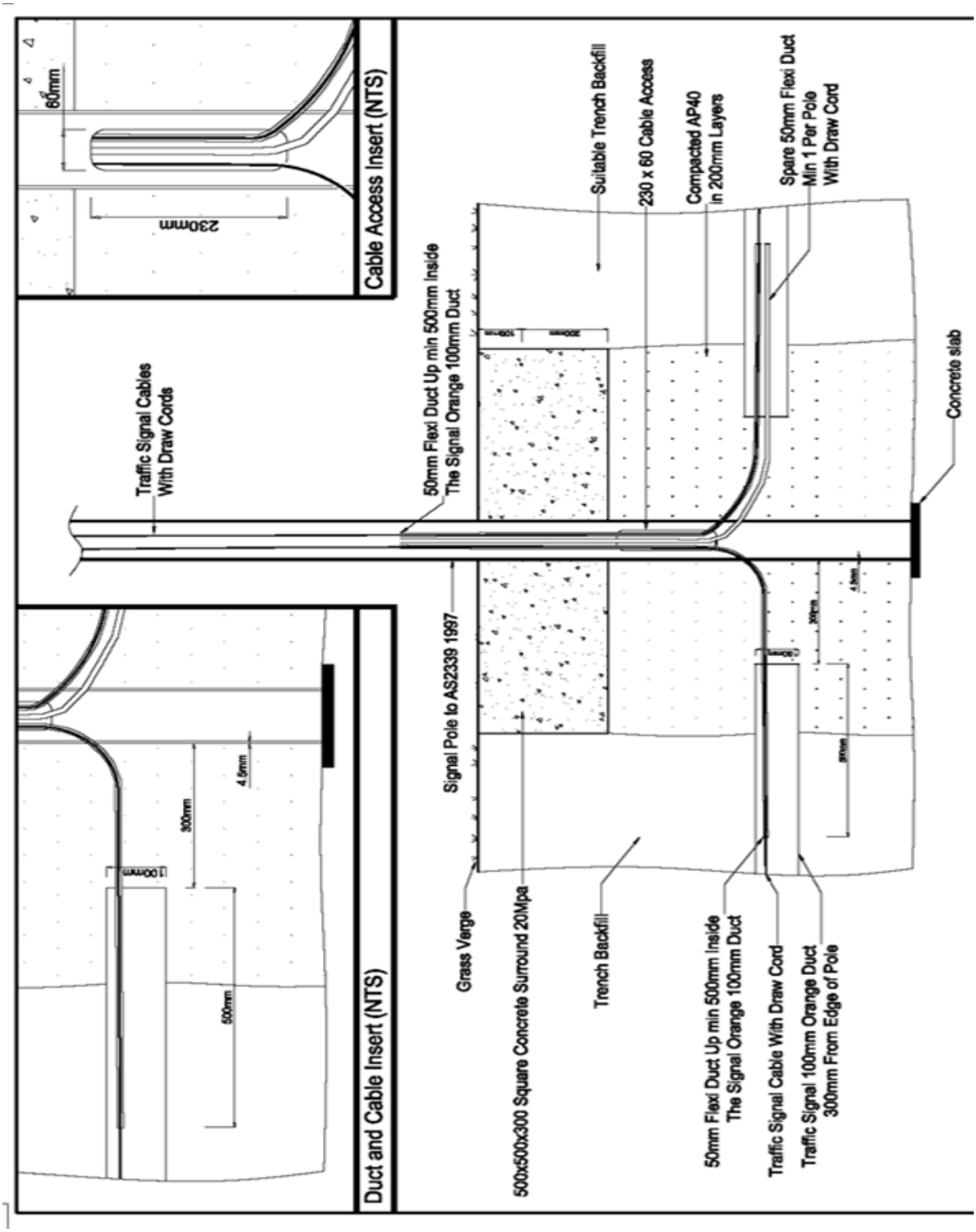
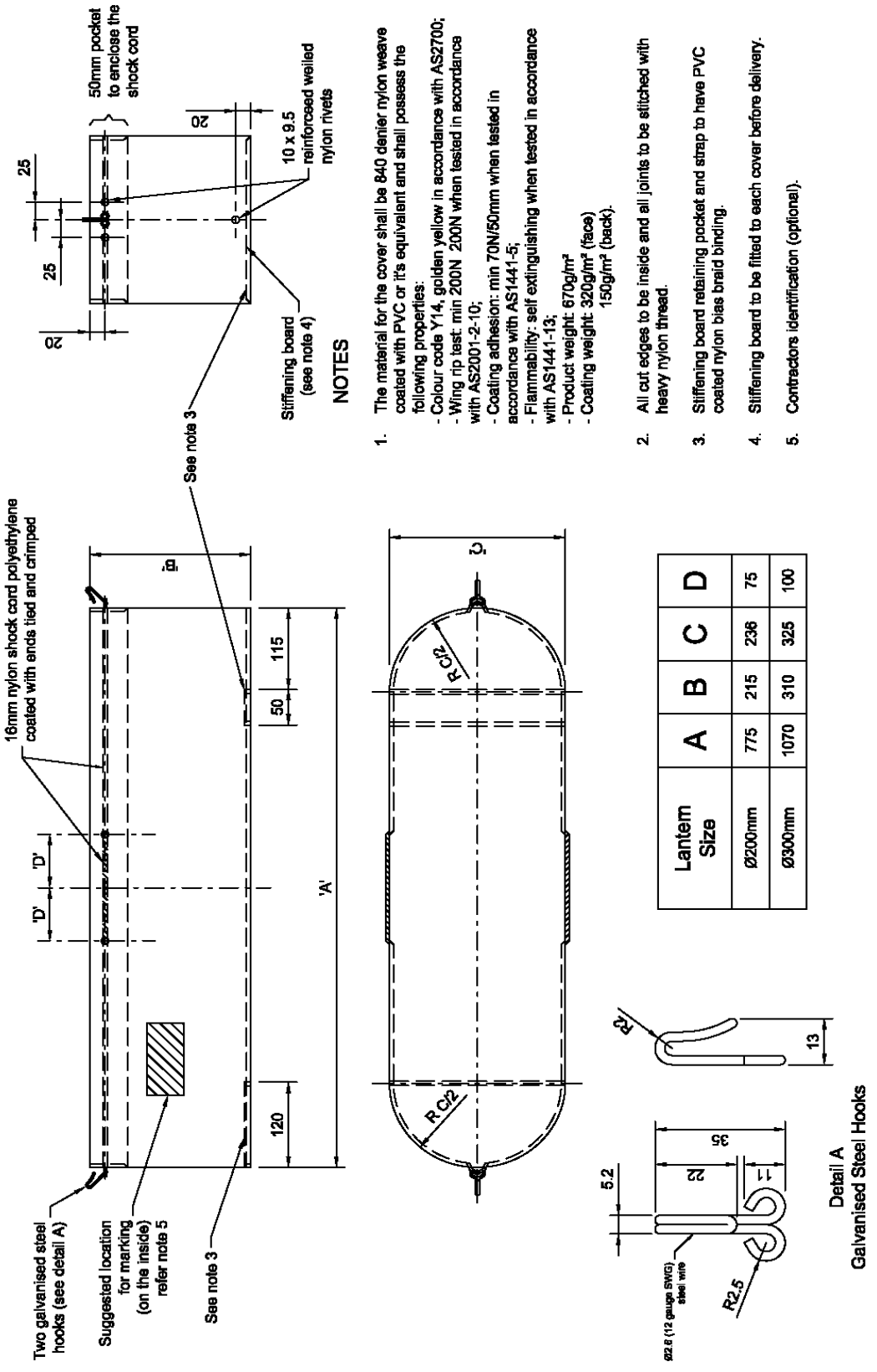


Figure D01 – Duct access details

11 Appendix F: Lantern Shroud Details – Informative



Lantern Size	A	B	C	D
Ø200mm	775	215	236	75
Ø300mm	1070	310	325	100

Figure E01 – Vehicle lantern shroud

12 Appendix G: Cable Termination Chart Example

C.C.C TRAFFIC SIGNAL CABLE CONNECTION CHART

INTERSECTION NO: 3 5 5
LOCATION: GRAHAMS/MEMORIAL
LAST UPDATED: OCT 2001

NOTE : TERMINAL NO. = CORE NO. UNLESS SHOWN OTHERWISE
ONLY ACTIVE CONNECTIONS & CHANGES IN CORE NO. SHOWN

		CABINET				POLE 1		POLE 2		POLE 3		POLE 4		POLE 5		POLE 6		POLE 7		POLE 8		POLE 9		POLE 10		POLE 11		POLE 12	
		T	To Pole No.:			T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:	T	To Pole:
Pole Number -		E	2	11	10	E		E		E		E		E		E		E		E		E		E		E		E	
Number of cores -		R	25	25	25	R		R		R		R		R		R		R		R		R		R		R		R	
Cable Direction -							11		C 3		2 4		3		6		5 7		6 8		7 9		8 10		C 9		C 1		
OUTPUT	A RED		1		1				1		1						1		1										
GROUP	A YEL		2		2				2		2						2		2										
1	A GRN		3		3				3		3						3		3										
OUTPUT			8	8	8		8		8										8		8								
GROUP			9	9	9		9		9										9		9								
2			10	10	10		10		10										10		10								
OUTPUT			11		11								11		11								11						
GROUP			12		12								12		12								12						
3			13		13								13		13								13						
OUTPUT			14	14	14								14		14								14		14				
GROUP			15	15	15								15		15								15		15				
4			16	16	16								16		16								16		16				
OUTPUT				19	17																		17		19				
GROUP																													
5				20	18																		18		20				
OUTPUT					19												19				19								
GROUP																													
6					20												20				20								
OUTPUT			21		21								21		21														
GROUP																													
7			22		22								22		22														
OUTPUT			17	17			17				17																		
GROUP																													
8			18	18			18				18																		
OUTPUT																													
GROUP																													
9																													
OUTPUT																													
GROUP																													
10																													
OUTPUT																													
GROUP																													
11																													
OUTPUT																													
GROUP																													
12																													
PB1 (9)	13			23	23																		23		23				
PB2 (10)	14				24												24				24								
PB3 (11)	15		25		25								25		25														
PB4 (12)	16		23	25			23				23																		
DET NO																													
DET NO																													
DET NO																													
DET NO																													
EARTH	(4)		4 4				4 4		4 4		4 4		4 4		4 4		4 4		4 4		4 4		4 4		4 4		4 4		
DET. RETURN	(5)		5 5				5 5		5 5		5 5		5 5		5 5		5 5		5 5		5 5		5 5		5 5		5 5		
PHASE	(6)																												
NEUTRAL	(7)		7 7				7 7		7 7		7 7		7 7		7 7		7 7		7 7		7 7		7 7		7 7		7 7		

Table F01 – Example cable termination chart

13 Appendix H: Site Acceptance Test

Intersection Name			
Site Number		**Date**	

CONTRACT NAME												
Contract Number												
Commencement Date												
Signals Contractor												
Civil Contractor												
CONTROLLER	**Y/N /NA**	**COMMENTS**										
MAKE & TYPE:	Make:			VC:				ELV: Yes/No				
SIGNAL GROUP SIZE / NO. OF	8		12		16		24		32			
DETECTOR CARD SIZE / NO. OF	8		12		16		24		32			
Communication Type/Number												
ICP Number												
DET CARD OPERATION CHECK												
LABELS (GLAND PLATE & CABLE LOOMS)												
LABELS (RCD'S & STREETLIGHTS)												
NUMBERING (SIGNAL GROUPS, DET CARD)												
Cable Glands Sealed												
SPARE SOCKETS WORKING												
CONTROLLER CABINET EARTHED												
Wiring Tidy												
Draw Cables Installed												
Vertical & Secure												
Door Seals and Locks												
Sticker(s)												
POLES	**Y/N /NA**	**COMMENTS**										
Correct Location												
Concrete Collar (500mm)												
Cables Terminated OK												
Painted / Powder Coating												
Sockets Installed												
Fold Down Poles Work												
Mast arm outreach length												
UMB & Finial Cap												
Ethernet & draw cables												
Pole Numbers Installed												
LANTERNS	**Y/N /NA**	**COMMENTS**										
Attached Securely												
Aligned Correctly												

Correct Heights		
Correct Aspects		
Correct Louvres / Visors		
Ped Lanterns correct		

Table G01 – Site acceptance sheet 1 of 3

Intersection Name			
Site Number		**Date**	

PED/CYCLE CROSSINGS	**Y/N /NA**	**COMMENTS**
PUSH BUTTONS:		
Install Correct Height (1.1m)		
Dynamic Audio Working		
Tactile Vibration Working		
Arrow Aligned to Crossing		
PB Light Indicator (If Fitted)		
Ped Detectors (if provided):		
Detectors Installed OK		
INSTRUCTION LABELS INSTALLED		
DETECTOR LOOPS	**Y/N /NA**	**COMMENTS**
LOOPS POSITIONED CORRECTLY		
SEALANT INSTALLED CLEANLY		
KJB 100MM CONCRETE SURROUND		
KJB drainage material		
Loop Joins with gel connectors		
>1.8m Slack in Contr Base		
>0.5m Slack in KJB		
CIVIL WORKS	**Y/N /NA**	**COMMENTS**
Correct Ducting as per Specs		
Chambers Level with Surface		
Duct Connections in Chamber		
1m Cable Slack in Chambers		
Duct Connections to Poles		
Road Surface Condition		
Pathway Surface Condition		
PRAM RAMPS INSTALLED		
Warning Tactiles Aligned		
Directional Pavers across paths		
Road Markings Correct		
Drainage, Esp at Crossings.		
Grass Berms Restored		
Sweeping Completed		
Correct Signage Installed		
Temp Advance Warnings		
DOCUMENTATION	**Y/N /NA**	**COMMENTS**
IN CONTROLLER (LAMINATED)		
C & I		

Impendence test report (non ELV)		
Intersection As-Built Drawing		
AGD Instruction Sheets		
Controller Information Sheets		
Log Book		

Table G01 – Site acceptance sheet 2 of 3

Intersection Name			
Site Number		**Date**	

OPERATIONS	**Y/N /NA**	**COMMENTS**
E-Prom Labelled (check sum)		
Lamps Off, Controller Ops		
SCATS Communication (24hrs)		
Check Fault Log, Clear.		
Full Start Up:		
Flash Test Each SG		
Flashing Ambers Working		
Check All Red (SPT=10s)		
Revision On Correct Phases		
All Default Phases Call		
Other Phases Call		
Ped Protection OK		
Ped detector zones (if installed)		
Special logic OK (check CIS) e.g. - Filtering - Hurry call - Separated ped input buttons - On-crossing detection - Ped reintroduction/WFG		
OTHER	**Y/N /NA**	**COMMENTS**
Camera connected & Working		
Cycle loop sensitivity (e.g. 0.05)		
Above Ground Detectors ok		

Table G01 – Site acceptance sheet 3 of 3 (continued)

Site Acceptance Test (sat) – UPGRADE WORKS

Intersection Name									
Site Number		**Date**							
Signals Contractor									
Civil Contractor									
NEW CONTROLLER?	**CIRCLE: NO OR YES**								
Make & Type:	Make:		VC:				ELV: Yes/No		
SIGNAL GROUP SIZE / NO. OF	8		12		16		32		
Detector Card Size / No. of	8		12		16		32		
LABELS & NUMBERING									
CABINET EARTHED									
Wiring complete and tidy									
Stickers									
NEW POLES OR LANTERNS?	**CIRCLE NO OR YES. IF YES, ENTER POLE NO'S:**								
Correct Location									
Collar, coating, Finial Cap									
Pole Numbers Installed									
Lanterns have correct aspects									
Lantern alignment and visors									
Push buttons correct height									
Push button sound, indicator light									
NEW DETECTORS?	**CIRCLE NO OR YES. IF YES, ENTER DET NO'S:**								
Loops Positioned Correctly									
Sealant Installed Cleanly									
KJB surround, slack, wiring joints									
Check working on detector board									
NEW CHAMBERS?	**CIRCLE NO OR YES**								
Correct Ducting as per design									
Chambers Level, Duct connections									
1m Cable Slack									
CIVIL WORKS?	**TICK OR N/A FOR EACH ITEM**								
Road & Path Surface Condition									
Pram Ramps incl drainage									
Tactile Pavers									
Grass Berms									
Signage									
NEW SOFTWARE?	**CIRCLE NO OR YES**								
Flashing Amber, Phases Call									
Ped protection OK									
Operation OK incl special logic									
OTHER	**TICK OR N/A FOR EACH ITEM**								
SCATS comms									
Camera connected & Working									
New documentation (As-built, CIS)									

Intersection Name	

Site Number		Date	

REMEDIAL LIST

No.	Fault:	Action:	Completed Date:
Faults that need to be addressed before site can be switched on:			

Approved for switch on? YES / NO
If yes, has the site been commissioned? YES / NO

Traffic Signal Representative:

Sign: **Date:**

Signal Contractor:

Sign: **Date:**

HAND OVER TO RCA OPERATIONS WHEN SIGNED ABOVE

Table G01 – Site acceptance sheet 3 of 3 (continued)

14 Appendix I: Controller Bench Testing Form

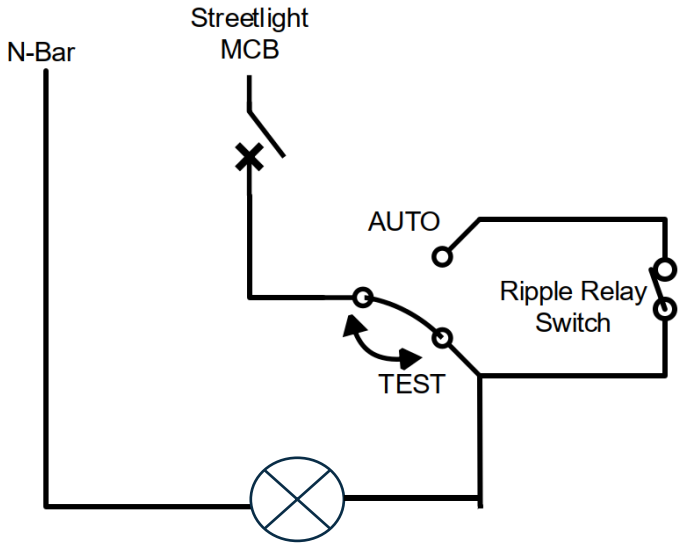
Intersection name		
Intersection identification	Controlling authority:	
	Intersection number:	
Personality file number		
Date Software / SFT created		
Name of PROM tester		
Date Software / SFT bench tested		
Software / SFT bench test	Pass	Fail

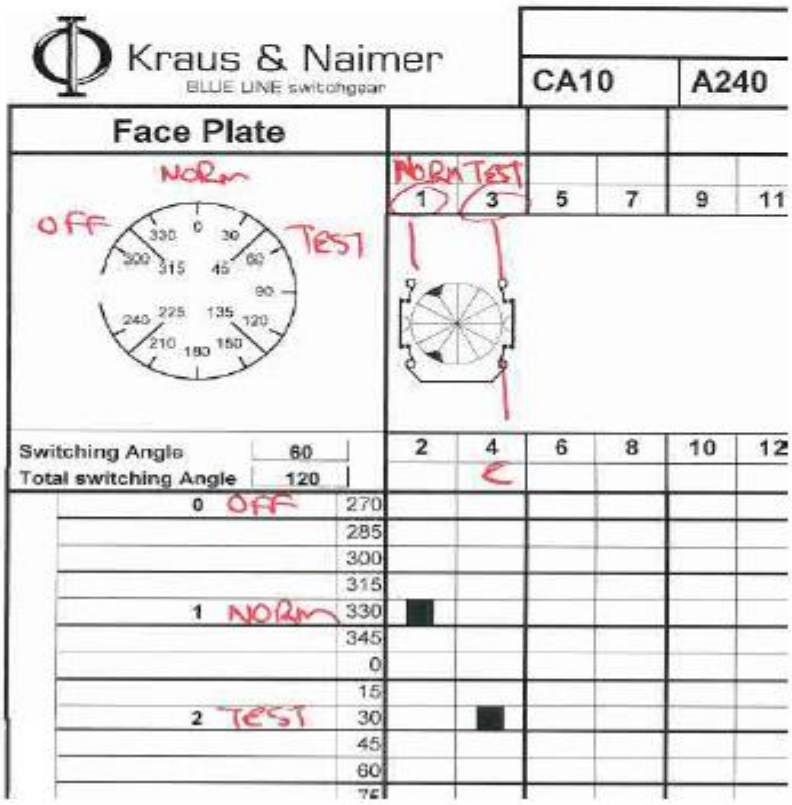
Test	Result/ comment	Signed
Time settings – Vehicle		
Time settings – Pedestrian		
Time settings – Presence		
Time settings – Special purpose		
Flexilink call data		
Filter operation		
Special logic		
Pedestrian Protection		
Calling detectors		
Phase movements		
Conflict matrix		
Ram version / Checksum No.		
Functionality		

Table H01 – Controller bench test form

15 Appendix J: Street-light Circuit Example

Figure I01 – Typical circuitry for street-lighting powered from a traffic signal controller.





16 Appendix K: New Intersection Commissioning Form

Table J01 – New installation acceptance (NIA) checklist follows on next page

Description	Evidence	Check
Traffic signal controller	RTA type approval – Module	
	RTA type approval – Housing	
LED aluminium lanterns	RTA type approval for each lantern type	
	NATA certified laboratory report	
Poles under 5.2 m	Comply with AS 2339	
	SUMB to be an RTA approved UMB	
Poles over 5.2 m	Engineers design and certificate of compliance	
Poles (posts)	Design certificate and a certificate of compliance from a suitable Chartered Professional Engineer (CPEng)	
RAMM collection sheet	Completed RAMM Asset Data Form (Appendix K)	
Test certificates	Original certificate of compliance	
	Bench testing laboratory statement/certificate with the test engineers signature	
	Comply with the Electricity (Safety) Regulations, AS/NZS 3000, and approved by the local power supply authority	
	Delivery dockets of concrete supply from a certified readymix plant	
Supply of electric power	The original of the certificate of compliance	
Producer statements/Hardware guarantees	Certified copy of products/equipment on a signed and dated paper with company letterhead, as well as a copy of the drawing for the products/equipment being certified	
Documentation	Instruction manual	
	Both two hardcopies and an electronic copy of controller information sheet and cable termination chart	
	Cabling and ducting record	
Reflector	Comply with AS 2144	
Visors and louvre	Comply with AS 2144	
Pedestrian push button assemblies	Comply with AS 2353	
	Approved push button units	
	Approved audio tactile driver and housing	
Vehicle loop detectors	Comply with AS 2703	
Detector loop wire	Comply with AS/NZS 2276.3	
Earthing/bonding	Comply with AS/NZS 3000:2018	
Switch/Earth termination	Comply with IEC 60947-7-1, IEC 60998-1, and IEC 60998-2-1	
As-built drawings	Supplied as hardcopy and in AutoCAD.DWG formats	
C & I	Hard copy and spreadsheet formats	
Keys	Two full sets	

17 Appendix L: RAMM Asset Data Form

Int #			Date:				Int Name								
			Road the pole is on				Lantern								
			Target board												
Item	Pole No.	Pole Mount (G.p., Flange, etc.)	No. of aspects	Road name – Material (plastic or metal)	Size	Condition ratings	Level (OH or LL)	Type (Pri, Sec, Tert, Ped)	Manufacturer	Lantern body (metal or plastic)	Display (Thru, LT, RT, Ped, T&RT, T&LT, L&RT)	No. of aspects	Lens size	Lamp type (QH, LED)	

Table K01 – Asset information form

18 Appendix M: Controller Gland Plate – Informative

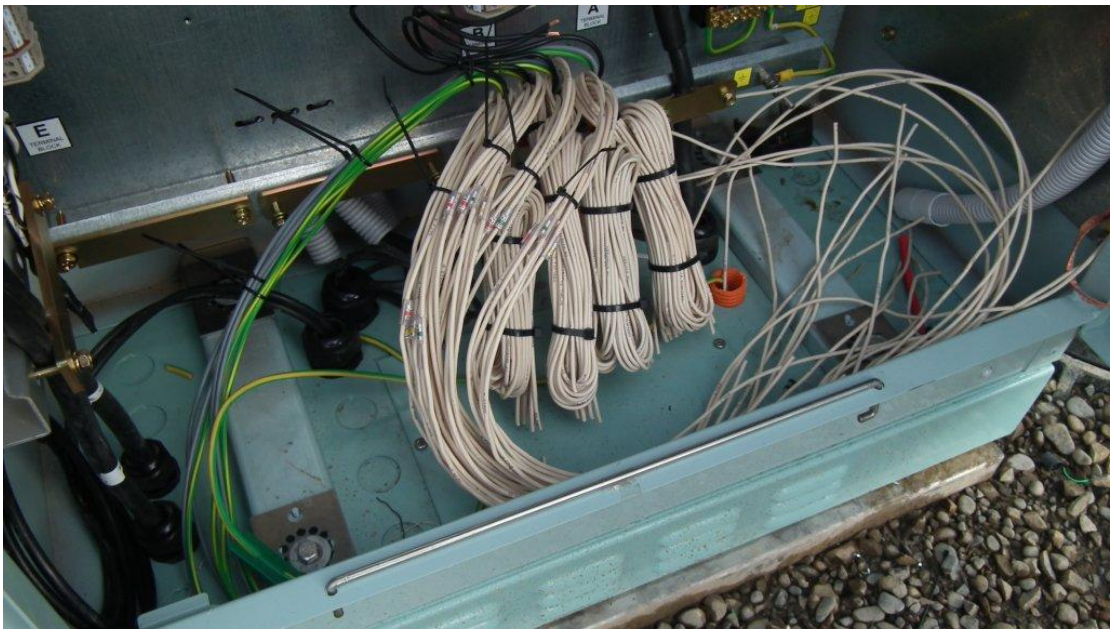


Figure L01 –Bottom of controller with gland plate fitted and access panel fitted

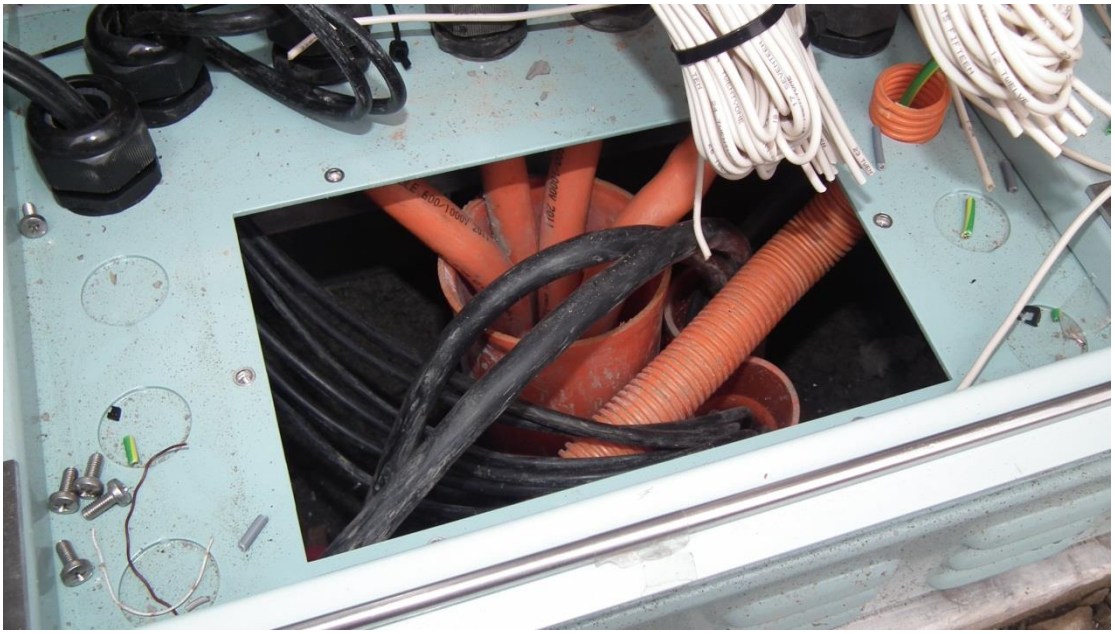


Figure L02 –Bottom of controller cabinet with gland plate access panel removed

19 Appendix N: Cycle Push Buttons – Informative

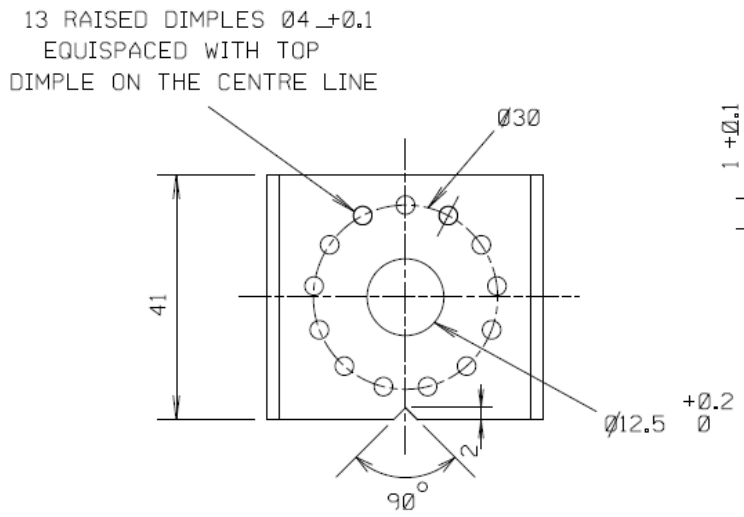
Figure M01 – Cycle call unit with small call accept indicator .

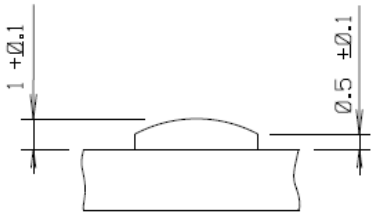
*** Note, where automatic cycle detection is used, the pushbutton can be replaced with a blank. If a push-button is fitted, it MUST trigger a cycle phase call.**

Figure M01 – Cycle Push Button with cycle disc and call-accept

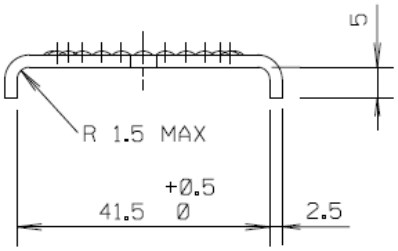
20 Appendix O: Mounting Strap Locking Mechanism

Figure N01 –Mounting Strap Locking Mechanism (Dimple Washer)





DIMPLE PROFILE
SCALE 5 : 1



NOTES

1. REMOVE SHARP EDGES & CORNERS.
2. MATERIAL: STAINLESS STEEL GRADE 304 2B DULL.
3. FINISH: NATURAL.
4. TOLERANCE UNLESS OTHERWISE STATED:
   - GENERAL DIMENSIONS ±0.5mm
   - ANGULAR ±1°

DIMENSIONS IN MILLIMETRES

A ORIGINAL ISSUE	
B ISSUE 19-06-95 J/I TC 2710 THICKNESS 2.5 WAS 2 & 'Vee' POSITION ALTERED. EB RVC BWT	
C ISSUE 09-08-95 J/I TC2728 LENGTH WAS 42. WIDTH WAS 41. TOLERANCES ADDED RVC BWT	
D ISSUE 05-03-96 J/I TC2802 CAT NO PUT ON PLAN. RVC BWT	
E ISSUE 23-04-96 JI TC2817. WIDTH WAS 41.3 + 0.2 - 0. R 1.5 MAX ADDED. RVC BWT	

REFERENCE DRAWINGS	
MOUNT STRAP	VM012-7
LOWER MTG BKT	VM200-14

RTA SUPPLY CAT NO
18233542

ROADS AND TRAFFIC AUTHORITY OF NSW
TRAFFIC SIGNALS

SCALE
1 : 1 OR AS SHOWN

APPROVED:
T YUNG
MANAGER STDS & QUALITY

STANDARD LOCK WASHER FOR LANTERN MOUNTING STRAP AND LOWER MOUNTING BRACKET

SUPERSEDES:	
DRAWN	EB 7-03-95
CHECKED	BWT
PASSED	BWT 17-05-95

ISSUE A B C D E

VM200-24

21 Appendix P: UPS Prioritisation Chart

Factors	Description	Weighting	Max Points	Total
Intersection Factors				
a. Intersection Legs	Where an intersection has more than 4 legs, add 1 point	20	1	20
b. Right Turn Bays	For each right turn lane at the intersection, add 1 point (maximum 4)	2.5	4	10
c. Geometry	Where an intersection has poor sight distance, e.g. irregular horizontal geometry or steep gradients, add 1 point	15	1	15
d. Speed	Where the posted speed limit of any leg is equal or greater than 60km/h, add 1 point	25	1	25
e. AADT	Where the total AADT of the intersection exceeds: 10,000, add 1 point; 20,000, add 2 points; 30,000, add 3 points; 40,000, add 4 points	10	4	40
f. Pedestrians / Cycles	If the combined pedestrian / cyclist count exceeds 100 in any hour, add 1 point	25	1	25
Historical Factors				
g. Power Outage	For each power related signal outage longer than 15 minutes within the last 5 years, add 1 point (maximum 5)	10	5	50
h. Crashes	For each serious or fatal crash within the last 5 years at the intersection, add 1 point (maximum 3)	20	3	60
Proximity Factors				
i. Rail Crossing (inc Lightrail)	If there is a rail grade crossing within 50m of the intersection, add 1 point	10	1	10
j. Children	If the signals are heavily used by children (e.g. proximity to a school), add 1 point	30	1	30
k. Other Traffic Signals	If another signalised intersection is not within 3km of the intersection, add 1 point	10	1	10
Other Factors				
l. Evacuation / Emergency Route	If the intersection is on an evacuation or emergency route, add 1 point	40	1	40
m. Truck Route	If the intersection is on a main truck route, add 1 point	5	1	5
n. Non – Filter RT	If the intersection has non-filter RT across multiple lanes add 1 point	10	1	10
Total				**350**

Table O01 – UPS Prioritisation Chart

Where the total exceeds 150, provision of a UPS system is highly recommended.

Where the total exceeds 100, provision of a UPS system should be considered.

Where the total does not exceed 100, provision of a UPS system is not considered to be warranted.

22 Appendix Q: 230v Streetlights on ELV Controllers

Link to NZTA Specification for Streetlight Connection at ELV Traffic Signal Sites – https://snug.org.nz/wp-content/uploads/2023/07/10.2_ELV_StreetLights.pdf

23 References

This section lists all external and NZTA references included in this document.

23.1 Industry standards

Standard number/name
NZS 3109 Concrete construction
NZS 3114 Specification for concrete surface finishes
NZS 3404 Steel structures standard (Parts 1 & 2)
NZS 3910 Conditions of contract for building and civil engineering construction
NZS 5431 Specification for traffic signals **(withdrawn but not replaced)**
AS/NZS 1170.0:2002 Structural design actions - General principles
AS/NZS 1170.1:2002 Structural design actions - Permanent, imposed and other actions
AS/NZS 1163 Cold-formed structural steel hollow sections
AS/NZS 1554.1:2014 Structural steel welding - Welding of steel structures
AS/NZS 2276.1 Cables for traffic signal installations – Multicore power cables
AS/NZS 2276.2 Cables for traffic signal installations - Feeder cables for vehicle detectors
AS/NZS 2276.3 Cables for traffic signal installations - Loop cable for vehicle detectors
AS/NZS 2312.1:2014 Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings – Paint coatings
AS/NZS 2980 Qualification of welders for fusion welding of steels
AS/NZS 3000 Electrical wiring regulations
AS/NZS 4058 Precast concrete pipes
AS/NZS 4676 Structural design requirements for utility services poles **(withdrawn 2017 but not replaced)**
AS/NZS 4677 Steel utility services poles
AS/NZS 4680 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 5131 Structural steelwork – Fabrication and erection
IEC 60947 Low-voltage switchgear and control gear - Part 7-1 Ancillary equipment – Terminal blocks for copper conductors
IEC 60998.1:2002 Connecting devices for low-voltage circuits for household and similar purposes - General requirements
IEC 60998.2.1:2002 Connecting devices for low-voltage circuits for household and similar purposes - Particular requirements for connecting devices as separate entities with screw-type clamping units
AS 2144 Traffic signal lanterns
AS 2339 Traffic signal posts and attachments

Standard number/name
AS 2353 Pedestrian push button assemblies
AS 2578 Traffic signal controllers **(withdrawn 2019 but not replaced)**
AS 2700 Colour Standards for General Purposes
AS 2703 Vehicle loop detector sensors
AS 3996 Access covers and grates
AS5715 Uninterruptible power systems (UPS) for roadside devices

23.2 NZTA standards, specifications and resources

23.2.1 Standards and specifications

See the NZTA website for the latest versions of the ITS S&S listed below.

Document name

23.2.2 Resources

Document name/code
Code of practice for temporary traffic management (CoPTTM) New Zealand Transport Agency
Compliant Controller Specification (RMS TSC/4)
Guidelines for facilities for blind and visually impaired pedestrians (RTS 14)
Guide to Traffic Management Part 10: Traffic Control and Communication Devices (AGTM10-19) Austroads
New Zealand code of practice for electrical safe distances (NZECP 34)
Next Generation Traffic Signal Controllers – Transport and Main Roads – Queensland (MRTS252)
Pedestrian planning and design guide, New Zealand Transport Agency
The Supply and Installation of Traffic Signal Controllers, Vic Roads (TCS 016)

23.3 Legislation

Name
Electricity (Safety) Regulations 2010 (SR 2010/36)

23.4 Other resources

Name	Website Link
NZECP 34 New Zealand code of practice for electrical safe distances	
SNUG specifications	https://snug.org.nz/specifications/

23.5 ITS standard drawings

See the NZTA website for the latest versions of the ITS standard drawings listed below.

Drawing number

24 Terminology used in this document

Term	Definition
DRAFT	The document is being written and cannot be used outside of NZTA.
FINAL DRAFT (pending ratification)	The document has been finalised and is pending approval and ratification by NZTA. It can be used for procurement at this status.
RATIFIED	The document is an official NZTA document. NZTA projects and other road controlling authorities connected to NZTA back-end systems must include this document in the contracts. The obligation to follow the requirements in this document would come from the inclusion of the S&S document in the contract.
RETIRED	The document is obsolete, and/or superseded.
Definitions	
Asset Handover	The date defined in the installation contract where the warranty period commences.
Brownout	Where the voltage drops to below the minimum allowable supply threshold.
Commissioning	The act of final acceptance of the signal installation, switching on the signals following site acceptance testing.
Commissioning date	The date that all the following have occurred – SAT has been completed, successful completion of full operational tests by the RCA, and the traffic signals are left operating for public use.
Contractor	As Per NZS 3910.
Engineer	As Per NZS 3910 *Conditions of contract for building and civil engineering construction.*
RCA	The RCA is ultimately responsible for traffic signals. This person is a technical person and is not generally associated with the contract. They are the Traffic Signal Engineer who will be operating the installation once it is completed. Larger RCA's have delegated this responsibility to Transport Operations Centres (TOC's). It is the traffic signal Contractor's responsibility to verify who the RCA Traffic Signal Engineer is before any work commences.
Abbreviations	
AS	Australian Standard
CIS	Controller Information Sheet
CLB	Carriageway Loop Box
DLP	Defects Liability Period
ELV	Extra Low Voltage
HHT	Hand Held Terminal
JUMA	Joint Use signal Mast Arm pole
JUSP	Joint Use signal and Streetlight Pole

Term	Definition
KJB	Kerbside junction box
LED	Light Emitting Diode
MCB	Miniature Circuit Breaker
MPa	Megapascals
NATA	National Association of Testing Authorities (Australia)
NZS	New Zealand Standard
NZTA	New Zealand Transport Agency Waka Kotahi
PROM	Programmable Read-Only Memory (controller configuration)
PVC	Polyvinylchloride
RAMM	Road Assessment and Maintenance Management
RCA	Road Controlling Authority
RCD	Residual Current Device
RMS	Roads & Maritime Services (the developers of SCATS)
SCATS	Sydney Co-ordinated Adaptive Traffic System
SPT	Special Phase Time
TMP	Traffic Management Plan
TRAFF	Internal Operating System for Traffic Signal Controller
UMB	Upper Mounting Bracket
UPS	Uninterruptible Power Supply
V	Volts

25 Content to be redirected

This section records any circumstances where content from this document will be reclassified and moved into future documents. This table is then updated with a reference to the new location.

Section reference	Section name	Future document	Class

26 Document control

26.1 Document information

Document number	ITS-SPEC-TRAFFIC SIGNALS-XXXXX
Previous document number/s (if applicable)	
Document status DRAFT | FINAL DRAFT | RATIFIED | RETIRED	FINAL DRAFT
[IF RETIRED] New document details	
Online ISBN	
Document availability	The controlled version of this document can be accessed from https://www.nzta.govt.nz/roads-and-rail/intelligent-transport-systems/standards-and-specifications/its-current-interim-and-legacy-standards-and-specifications

26.2 Document owner

Role	ITS S&S Steering Committee
Organisation	NZTA

26.3 Document approvers

This table shows a record of the approvers for this document.

Approval date	Approver	Role	Organisation
DD/MM/YYYY			

26.4 Full version history

This table shows the full history of changes made to this document, both minor and major, in chronological order, since the document was first authored.

Minor versions are numbered 0.1, 0.2 etc until such point as the document is approved and published, then it becomes 1.0 (major version). Subsequent edited versions become 1.1, 1.2 etc, or if it's a major update 2.0, and so on.

Version	Date	Author	Role and organisation	Reason
0.1	10/02/2025	Alex Lumsdon Alyssa Greaney	Associate - Transportation Engineering Transport Planner	Initial Draft
0.2	19/02/2025	Alex Lumsdon Alyssa Greaney	Associate - Transportation Engineering Transport Planner	Draft for Expert Panel Consultation
0.3	27/05/2025	James Ellison Alex Lumsdon Alyssa Greaney	Principal – Transportation Engineering Associate - Transportation Engineering Transport Planner	Draft for Industry Consultation