



Christchurch Transport Operations Centre

# CTOC Regional Special Conditions

Supplementing P43 Specification for Traffic Signals

(This revision released 10 June 2020)

TRIM Reference 20/720788

<https://ccc.govt.nz/consents-and-licences/construction-requirements/traffic-signal-operation-and-design/>

CTOC Regional  
Special Conditions





# Table of Contents

Table of Contents.....	3
Introduction.....	6
Purpose .....	6
Reference Documents.....	6
Intellectual Property .....	7
Outcomes .....	7
Health and Safety.....	7
Intent.....	7
Definitions .....	8
Abbreviations .....	9
Contacts .....	10
Revision Details.....	11
Regional Special Conditions .....	15
Section 2.1 – General Signal Requirements .....	15
Section 2.2.3 – Maintenance while under Construction.....	15
Section 2.3 – Traffic Signal Controller & Cabinet.....	15
Section 2.3.2 – Generator Socket .....	15
Section 2.3.2 – Street Lighting Control.....	15
Section 2.3.4 – SCATS compliance and TRAFF version.....	16
Section 2.4.4 – Lantern Body construction.....	16
Section 2.4.5 – Visors (Cowls).....	16
Section 2.5 – Poles.....	16
Section 2.5.1.3 – Pole Installation.....	16
Section 2.5.1.4 – Type 8 Hinged Poles .....	16
Section 2.5.2.5 – Mastarm Pole Terminations.....	16
Section 2.6.3(c) – Cyclist Call Button.....	17
Section 3.3 – Supply of Electric Power .....	17
Section 3.5. – Electrical Wiring .....	17
Section 3.6 1 – Controller Cabinet Label .....	17
Section 3.7 – Controller Terminations .....	17
Section 3.9 – Location of Poles with Cycle Rails.....	17
Section 3.9.1 – Poles Installation .....	17
Section 3.10.4 – Covering of Lanterns.....	17
Section 3.11 – Inductive Loops.....	17
Section 3.11.1 – Loop Testing.....	18
Section 3.13(a) – Painting Schedule (Cycle Call Boxes).....	18
Section 3.13(b) – Painting Schedule (Standard Poles and Mastarm Poles).....	18
Section 3.13(b) – Painting Schedule (Other Items).....	18
Section 3.15.3 – Software (Personality) Requirements .....	18

Section 3.15.4 – Commissioning.....	18
Section 3.16 – As-built documentation to be provided within controller cabinet.....	19
Section 4.4.1 – Ducting .....	19
Section 4.4.4 – Loop Feeder Cable .....	19
Section 4.4.5 – Mains Power Supply.....	19
Section 4.4.5.1 – Power Demarcation Pillar .....	19
Section 4.4.6 – Earthing .....	19
Section 4.4.7 – Network Wiring.....	19
Section 4.4.8 – Traffic Observation Cameras & Pedestrian Detection Cameras.....	20
Section 4.7 – Kerbside Junction and Carriageway Loop Boxes .....	20
Section 4.8 – Labelling of Cables.....	21
Section 4.10 – Surplus Equipment .....	21
Design Requirements.....	22
The following sections reference the previous section numbers and will eventually be removed from this document and placed into a Design Requirements document. For all exceptions to Standard Practise, contact CTOC for direction/advice.....	
Section 2.2.3 –CCTV Camera and SCATS Licences .....	22
Section 2.2.4 – Signal Plan Requirements .....	22
Section 2.3.2 – Special Output Board .....	22
Section 2.4 – Signal Lanterns.....	22
Section 2.5 – Signal Poles.....	22
Section 2.5.1.3 – Pole Installation.....	22
Section 3.3 – Supply of Electric Power .....	22
Section 3.5.4 – Cable Run Allocation .....	23
Section 3.6 – Controller Cabinet.....	23
Section 3.6.2 – Communications Cabinet.....	23
Section 3.9.2 – Pole Locations.....	24
Section 3.9.3 – Pole Numbering .....	24
Section 3.9.4 – Pole Mounted Street Name Plates.....	24
Section 3.18 – Rail Interface and Warning Signals.....	24
Section 4.4.2 – Signal Duct Access Chambers.....	24
Section 4.4.9 – Network Radios.....	24
Section 4.4.10 – Communications Ducting.....	25
Appendices.....	26
Appendix A – CTOC Inductive Loop Details .....	<a href="#">27</a>
Appendix C – Poles as per the attached drawings.....	29
Appendix G – CTOC Commissioning Sheet .....	31
Appendix M – Cyclist Call Button .....	33
Appendix O – Traffic Signal Pole Location Relative to Kerb Cutdown .....	35
Appendix P – Vehicle Detector Loop Settings and Measurements Record .....	37
Appendix Q – Access Chamber and Cover.....	39

Appendix R – Streetlight Connections ..... 41  
Appendix S – UFB Fibre Connections ..... 43  
Appendix T – Signal Duct Access Chamber ..... 45  
Appendix U – Carriageway Loop Box ..... 47  
Appendix V – Fault Response Times ..... 49  
Appendix W – CTOC UPS Installation Specification (New Appendix) ..... 51  
Appendix X – Intellectual Property (New Appendix) ..... 53

## *Introduction*

CTOC is a joint venture between CCC, NZTA and ECan. CTOC are empowered by these organisations to operate and manage relevant traffic signals and other technology on the road network.

CTOC has a working relationship with other partners, which enable it to provide consistency of operation and design of on road technology across the wider Canterbury region, and is nationally consistent with other TOCs.

## *Purpose*

This purpose of the “CTOC Regional Special Conditions” is to supplement the current “P43 Specification for Traffic Signals 2018”. It is to define the regional special requirements as required by the Christchurch Transport Operations Centre (CTOC).

These special conditions apply for any Traffic Management infrastructure and any signals work being done at any intersection where the intention is to connect that intersection to the SCATS system as operated by CTOC.

## *Reference Documents*

The special conditions are recognised in the P43 Specification for Traffic Signals 2018 in Section 1.2 of that document. All requirements in this document supplement and over-ride the conditions of the P43 Specification for Traffic Signals 2018, and are therefore the priority when compared against each other. However, this document is supplementary to the P43 Specification for Traffic Signals 2018, and both documents must be used together.

Other referenced documents are:

- CTOC Maintenance Contract
- Christchurch City Council Construction Standard Specification (CSS)
- Christchurch City Council Infrastructure Design Standard (IDS)
- Council and NZTA roading policies and bylaws, including road safety policy
- The Australian & New Zealand Road Lighting Standard AS/NZS1158 series
- Electricity Act 1992, Electricity Safety Regulations 2010 and AS/NZS 3000
- Electrical Installations – Periodic Verification AS/NZS 3019
- Resource Management Act 1991
- Electricity Network Owner’s Requirements, including the Electricity Industry Safety Manual (SM-EI) and WorkSafe requirements
- Radio communications (Radio) Regulations (interference with radio and televisions, etc)
- Department of Labour and Occupational Safety and Health requirements
- Utilities Access Act 2010
- National Code for Utility Operators’ Access to Transport Corridors (November 2011)
- The Building Act 2004
- Christchurch City Council Schedule of Local and Special Conditions to the National Code of Practice for Utility Operator’s Access to Transport Corridors (November 2011)
- CTOC Regional Special Conditions
- CCC Asset Lifecycle Management - Disposal Process. Document location TRIM 18/868198 - <http://intranet.ccc.govt.nz/Teams/CityServices/AssetManagement/SitePages/Asset%20Lifecycle%20Management%20-%20Disposal%20Process.aspx>
- [P43 Traffic Signals Spec 2015-08-03] (Second Edition, Amendment 2, NZTA P43 2018)
- CTOC UPS Specification
- Health and Safety at Work Act 2015 (HSWA)
- TMP Service Agreement Cover Notes: <http://MyWorksites.co.nz/downloads/tmp-cover-notes/>
- CCC BLANK 102021-44 (1067162-1) Data Access and Privacy Agreement.docx

## *Intellectual Property*

CTOC has requirements relating to Intellectual Property from its partner organisations. The requirements for each organisation can be found at the following locations or documents:

Christchurch City Council has Intellectual Property clauses in all its contracts

- CCCS (see appendices for example) This includes all workings and other items used as part designing the finished products

NZ Transport Agency

- As per standard contracts TBA

ECan

- As per standard contracts TBA

## *Outcomes*

It is the responsibility of the signals contractor to ensure that they are using the most current document version. Any variation or departure from either document will require CTOC approval. CTOC's decision will be final. Where work is done to an older version of this document, any required improvement to meet the current requirements will be at the cost of the Signals Contractor, Project or Consultancy.

Contact the CTOC RTO for the latest version of this document. Electronic versions of the tables and charts are also available on request.

## *Health and Safety*

When working on or near signals equipment the Contractor must comply with the current CTOC Health and Safety Policies (TRIM Ref 18/168290) available from CTOC on request and the Health and Safety Act 2015 requirements. They are reminded they must follow good practice and CTOC must be notified of near misses and incidents.

## *Intent*

The Intent of this document is to provide guidance on:

- Quality Design Requirements
- Clarity on Methodology Expectations
- Consistency of Construction Methods
- Continually apply "lessons Learned"

If there is any doubt or conflict, please contact CTOC.

The expected outcome is to provide a high quality and functional product at a reasonable cost for the public.

CTOC welcomes constructive input from all parties to continually improve this document.

## Definitions

For the purpose of this specification, unless inconsistent with the context, the following definitions apply.

Engineer	As Per NZS 3910 “Conditions of contract for building and Civil engineering construction”
CTOC	CCC, ECan, NZTA Authorised Agency Representative
Contractor	As Per NZS 3910 “Conditions of contract for building and Civil engineering construction” Contractor, Consultant or Project Team
City Centre	The area within the four avenues
Detector	A detection device such as an inductive loop, camera, radar or microwave etc. used to provide inputs to the traffic signal controller
Montrose Box	Pole mounted Termination Box
RCA Traffic Signal Engineer Also referred to as Signal Engineer	<p>The RCA Traffic Signal Engineer(s) is ultimately responsible for traffic signals for the RCA. This is a technical person, and is not generally associated with the contract.</p> <p>The Traffic Signal Engineer will be operating the installation once it is completed.</p> <p>RCA's have delegated this responsibility to Transport Operations Centres (TOC's).</p> <p>It is the traffic signal contractor's responsibility to verify whom the RCA Traffic Signal Engineer is before any work commences.</p>

## Abbreviations

Abbreviations used in this specification have the following meaning.

Capex	Capital Expenditure
CAT6	Category 6 (network cable see 4.4.7)
CCC	Christchurch City Council
CCCS	Conditions of Contract for Consultancy Services
CoC	Certificate of Compliance
CSS	Christchurch City Council Construction Standard Specification
CCTV	Closed Circuit Television
CIS	Controller Information Sheet
CLB	Carriageway Loop Box
CTOC	Christchurch Traffic Operations Centre
Downer	Downer NZ Ltd (Contractor)
ECan	Environment Canterbury
ELV	Extra Low Voltage
ESC	Electrical Safety Certificate
FH	Fulton Hogan Ltd (Contractor)
HRC	High Rupturing Capacity
IPL	IPL Group
JUSP	Joint Use Signal and Streetlight Pole
KJB	Kerbside Junction Box
MCB	Miniature Circuit Breaker
NZTA	New Zealand Transport Agency
PDP	Power Demarcation Pillar
Opex	Operational Expenditure
RCA	Road Controlling Authority
RCD	Residual Current Device
RJ45	Registered Jack #45 (network socket)
RMS VC6	Roads and Maritime Services Controller Version 6 (2017 updated)
ROI	Record of Inspection
RTO	Real Time Operations (part of CTOC)
SCATS	Sydney Co-ordinated Adaptive Traffic System (software)
TCS	Traffic Control Systems Ltd (Contractor)
TRIM	CCC Documents Record System
UFB	Ultra-Fast Broadband
UPS	Uninterrupted Power Supply

## Contacts

### **CTOC Real Time Operations**

Christchurch Transport Operations Centre (CTOC)  
53 Hereford Street  
PO Box 73014  
Christchurch 8154  
+64 3 941 8620 (Duty Phone)  
signals@tfc.govt.nz

### **Example of SCATS Professionals**

Advanced Traffic Solutions Ltd

Transport Network Optimisation Ltd

Spelectronics Ltd

UTD Ltd

### **Contractors**

Downer NZ Ltd  
397 McLeans Island Road  
Harewood  
Christchurch 8051  
+64 3 359 0700

Fulton Hogan Ltd - Electrical  
PO Box 16064  
Hornby  
Christchurch 8441  
+64 3 336 5100

Traffic Control Systems Ltd  
106 Wigram Road  
PO Box 9151  
Christchurch  
+64 3 338 2305

### **CTOC Approved Pole Supplier**

Spunlite Poles Ltd  
611 Halswell Junction Road  
Hornby South  
Christchurch 8042  
+64 3 349 7853

### **CTOC Traffic Signals Maintenance Contractor**

Traffic Control Systems Ltd  
106 Wigram Road  
PO Box 9151  
Christchurch  
+64 3 338 2305

## Revision Details

Revision No.	Date	Section	Name	Description
2.0	30-11-2017	Table of Contents Introduction Intent Definitions Abbreviations Contacts 2.1 2.3.2 2.3.2 2.3.4 2.5 2.5.1.3 2.6.3(c) 3.5.4 3.6.1 3.6.2 3.7 3.9.1 3.9.2 3.9.3 3.10.4 3.11 3.11.1 3.13(b) 3.15.4 3.16 3.18 4.4.1 4.4.2 4.4.4 4.4.5 4.4.7 4.4.8 4.4.9 4.8 4.10 Appendix A Appendix C Appendix G Appendix O Appendix P Appendix Q Appendix R Appendix S Design Requirements	Jeff Owen	Added Table Updated Added Intent clause Added clause Added clause Added clause Added Pole Fixtures Added requirement for Generator Socket Amended clause Added requirement for VC6 compliant controller Amended Poles clause Added requirements for Pole Installation Amended clause Added clause Added Controller label Added Communication cabinet clause Added note for cable labelling Added requirements for warning labels Added clause Added clause Amended clause Amended clause Loop test requirements amended Amended clause Amended clause Amended clause Amended Ducting requirements Amended clause Amended Loop Feeder Cable requirements Amended Power Demarcation Pillar requirements Amended clause Amended clause Added clause Amended Labelling of Cables notes Amended clause Amended Appendix Added Appendix Added Appendix Added Appendix Added Appendix Added Appendix Added Appendix Added Appendix Added Clause

Revision No.	Date	Section	Name	Description
2.01	29-06-2018	Table of Contents 2.3.2 2.3.4 2.5.1.3 2.5.1.4 3.3 4.4.5 4.4.5.1 4.4.8  Design Requirements  2.5.1.3 3.18 4.4.9 4.4.10  Appendix A Appendix C Appendix P Appendix Q Appendix T	Jeff Owen	Table Updated Amended clause Amended clause for VC6 controllers Amended clause New clause hinged poles Amended clause Amended clause Amended clause Amended clause  Amended clause Amended clause Renumbered clause Renumbered clause  Amended Appendix Amended Appendix Amended Appendix Amended Appendix New Appendix

Revision No.	Date	Section	Name	Description
2.02	31-01-2019	Introduction Purpose Reference Documents Outcomes Health & Safety Contacts 2.2.3 2.3.2 2.4.5 2.5 2.5.1.3 2.5.1.4 2.6.3(c) 3.5 3.11 3.15.3 4.4.1 4.4.4 4.4.5 4.4.8 4.7  Design Requirements  2.2.3 2.2.4 3.3 3.9.4  Appendices Appendix A Appendix C Appendix M Appendix U Appendix V	Jeff Owen	Amended Added Added Added Amended Amended clause Amended clause Amended clause Amended clause P43 date amended Amended clause Amended clause Amended clause New clause Amended clause  Amended clause  Models amended New clause  New clause New clause Amended clause New clause  Labelling and P43 date amended Amended to Appendix C Amended to Appendix A New Appendix New Appendix New Appendix

Revision No.	Date	Section	Name	Description
2.03	05-11-2019	Regional Special Conditions Design Requirements Appendix W Appendix X	Jeff Owen	Various Updates  Various Updates New Appendix New Appendix
2.03.1	10-6-2020	Interim update - not full release. Specific to Traffic Signals Service Contract 2.5.1.3 2.3 2.3.2 3.3 4.4.8	Ray Young	Various Updates  Pole Installation types ELV requirements on new installations Generator Socket requirements Supply of Electric power –Compliance paperwork Traffic Observation Cameras



# *Regional Special Conditions*

## **Section 2.1 – General Signal Requirements**

Traffic control infrastructure is for the primary purpose of managing traffic and pedestrians. No auxiliary equipment shall be fitted/attached to this infrastructure without the express permission of CTOC. Installation of any approved product will not be permitted to interfere with the primary intent or maintenance of the traffic control infrastructure. Permission to utilise the infrastructure may be removed at any time without explanation and it is the responsibility of the original owner or installer to remove the device upon request from CTOC. Failure to remove within 5 days of written notification could result in CTOC instructing its service agent to remove the product, dispose of the product and then on-charge the relevant costs to the original owner.

Any damage suffered by third party devices fitted to traffic light infrastructure remains the responsibility of the installer/owner to replace or repair at their own cost. CTOC, NZTA, CCC and ECan do not accept any responsibility, liability, renewal costs or maintenance costs for any third party devices or products fitted to CTOC infrastructure.

## **Section 2.2.3 – Maintenance while under Construction**

Any signalised intersection or site that is under construction, being rebuilt or modified becomes under the control of the contractor that is carrying out this work. This requires the contractor to respond to any faults (24/7) that are received for the intersection or site. See Appendix V. This includes vandalism however, this will be determined on a case-by-case basis depending on the complexity of the work being undertaken. Please contact CTOC RTO for advice. After the intersection or site is commissioned/re-commissioned it will be handed back to the current traffic signal maintenance contractor. This does not remove the provisions in section 2.2.2 (Guarantee/Warranty period).

## **Section 2.3 – Traffic Signal Controller & Cabinet**

ELV is expected for new installations and full intersection renewals, and will be assessed on a case-by-case basis for partial intersection renewals and where any projects impact existing assets.

There are strict electrical requirements under AS/NZS3000. Contractors are reminded of these requirements including:

- Cable labelling across all cables and cores
- Gland plate bushes and sealing in bottom of cabinet
- Shield and covers over all exposed terminals
- Earth bonding as per AS/NZS3000
- Testing requirements as per AS/NZS3000
- Minimum registration requirements to open cabinet - Electrician
- PPE requirements as per working on electrical switchboard in any industrial environment i.e. glasses, long sleeve, fireproof plastic zip etc.

## **Section 2.3.2 – Generator Socket**

Any new controller, UPS or standalone CCTV/communications cabinet shall be fitted with a Generator Socket unless otherwise specified.

## **Section 2.3.2 – Street Lighting Control**

Where Joint Use Street-Lighting Poles are used at an intersection, the streetlights must be supplied from the signals controller as per 2.3.2 of P43. The switching requirements varies within each RCA. Some require the installation of a ripple control while others do not. If a ripple control is required then the signals contractor must supply and install a suitable ripple control (to be purchased from the local electricity lines company). A streetlight control switch must be supplied as detailed in Appendix R. The Street Light circuit must be protected with its own dedicated labelled MCB.

The streetlight control switch must be mounted to allow it to be accessible from the outside of the cabinet, in a location near the facility switch. The shaft of the switch must be recessed, and accessed through a weather proof 10mm diameter hole. This switch must be labelled with the three positions 'off', 'normal' and 'test'.

The control switch must be able to be operated by a flat-bladed screwdriver from the outside of the cabinet. The internal switch body must be protected from accidental contact by means of a cover  
The wiring from the switch must be double insulated, or protected against accidental contact from the side mounted cabinet switch to the electrical relay or contactor.

#### **Section 2.3.4 – SCATS compliance and TRAFF version**

The Traffic Signal Controller shall be RMS VC6 compliant unless specified otherwise by CTOC. Currently the only controller to meet this requirement is the Aldridge ATSC4. This requirement is due to corridor optimisation and increasing functional requirements. CTOC 'may' on request allow an alternative solution depending on the situation.

#### **Section 2.4.4 – Lantern Body construction**

Lantern bodies shall be constructed from aluminium only. Polycarbonate lantern bodies will not be permitted.

#### **Section 2.4.5 – Visors (Cowls)**

The fixing of the visor/cowl to the lantern body is to be by stainless steel screws. The plastic plugs that are supplied are not to be used.

#### **Section 2.5 – Poles**

It is the responsibility of the signals contractor, consultancy or project to purchase the poles from the CTOC approved supplier. The signals contractor must give the supplier adequate notice to manufacture the pole order. CTOC has an approved supplier, see contacts. Other suppliers will be subject to testing and for quality before CTOC approval.

Appendix C shows the details of the poles, and provides suggestion foundation details only. It is up to the signals Project team, Contractor or Consultancy to provide a professionally engineered and approved (PS1) solution(s) for the foundation(s) and PS4 on completion. Any design must be suitable for the environmental and functional conditions as required in the P43 Specification for Traffic Signals 2018 Section 2.5. CCC has numerous existing options that can be explored to create a fit for purpose solution.

##### **Section 2.5.1.3 – Pole Installation**

CTOC will work with the Asset Owner to decide final appropriate design for general use of IPL Retention Sockets being fitted to Type 0, 1, 2, 8, 9 & 11 poles, or the use of Ground planting in those circumstances where sockets cannot be installed.

In some instances, retention sockets will be unable to be installed due to space issues. Various standard pole socket or other options are available on request from CTOC. CTOC will work with the Asset Owner to decide appropriate design.

##### **Section 2.5.1.4 – Type 8 Hinged Poles**

Type 8 Hinged Poles can be lowered to provide access and clearance for oversized loads (i.e. house removals). This type of pole is only able to be lowered and reinstated by the traffic signals maintenance contractor for the site. Any departure from this requirement can be requested through CTOC Real Time Operations. CTOC and TTM must approve prior, to allow time for CTOC operations to be prepared for road network issues.

##### **Section 2.5.2.5 – Mastarm Pole Terminations**

In addition to being constructed with aluminium or polycarbonate, the Montrose box can also be constructed of non-ferrous stainless steel. Where the Montrose box is manufactured of stainless steel, the minimum size must be 400mm x 300mm x 150mm.

### **Section 2.6.3(c) – Cyclist Call Button**

To clarify, the cyclist call button must use a red lens as the visual call accept signal. The disc embossed with the cycle symbol shall be blue. See Appendix M.

### **Section 3.3 – Supply of Electric Power**

Any new electrical work done inside the controller cabinet will require a new Code of Compliance to be carried out. The controller cabinet is to be treated the same as a switchboard in this instance, for the purposes of complying with EWRB (Electrical Wiring Regulations Board).

All new installations require an ROI, signed by an electrical inspector and a CoC signed by the electrician responsible for the electrical work. Any post installation new work will also require a CoC as it is prescribed electrical work. Any subsequent replacement/repair of previously certified new work will require an electrical safety certificate ESC signed by the electrician undertaking the work.

### **Section 3.5 – Electrical Wiring**

It is a requirement of CTOC to use 36-core cable wherever possible. When the installation is complete and fully functional, at least 4 cores in each cable are to be allocated as spare. This is to provide resilience in case of future core failure.

### **Section 3.6 1 – Controller Cabinet Label**

The controller cabinet shall be fitted with a standard electrical permanent warning label “Danger Live Wires” (from any electrical supplier). The label will be fitted at the base (plinth) of the cabinet on the side and location where the power enters the cabinet. For older cabinets a label can be applied during maintenance.

### **Section 3.7 – Controller Terminations**

Each core shall be individually labelled with its signal group and colour in accordance with its designation as shown on the approved cable termination chart e.g. SG7 Red, SG7 Yellow and SG7 Green etc. Pole top terminations will be labelled with the same convention.

Each cables outer sheath shall be permanently labelled with in the cabinet as to which pole it runs to and at the pole in the same convention.

Unused cable cores must be terminated in an earthing point (such as the earth bar).

### **Section 3.9 – Location of Poles with Cycle Rails**

Where a pole has a cycle handrail fitted, the pole must be located 900mm back from the face of the kerb to ensure the cycle wheels remain off the roadway while waiting.

### **Section 3.9.1 – Poles Installation**

All new traffic signal poles shall be fitted with a permanent warning label “Danger Live Wires”. The label will be supplied with the pole from the supplier. The label will be fitted at the base of each pole. For older poles, a suitably worded label will be used. This can be provided by CTOC on request and applied during maintenance.

### **Section 3.10.4 – Covering of Lanterns**

For safety reasons, all unused lanterns must be covered including overhead lanterns. It is acceptable to use a light / mid colour blue cover, in addition to the requirement for the cover to be coloured yellow. It is a requirement that all covers used at the intersection are the same colour.

### **Section 3.11 – Inductive Loops**

The loop wire slot (saw cut) is general cut 40 mm deep into the road surface. This is to provide sufficient cover for the loop wires. In some cases, the existing pavement or wearing course will not have sufficient depth to accommodate the saw cut. Accordingly, the existing pavement may need to be deepened to stop the saw cut penetrating into the roads sub base. This is particularly pertinent to the installation of cycle loops in existing cycle/foot paths. This needs to be discussed in the design phase prior to construction.

The saw-cut leading from the KJB to the detector loop must only contain the cables associated with one detector loop. Loop tails must be twisted from the loop all the way back to the KJB. Where two loops go back to the same KJB, the loop wires must be installed into separate saw-cuts. Loop tails can only be combined from separate loops if each pair has been twisted separately. Twisting is to be a minimum of 5 twists per metre. Loop ends must be labelled as front or back, in or out.

The saw cut slots must be wide enough to allow no 90-degree sharp bends in the corners. The loop wire must be rolled into the saw cut using a suitable roller. Foam wedges are to be installed to hold the loop down and wire in place.

The loop wire slot shall be sealed with an approved heated flexible sealant (Tixophalte or equivalent), ensuring a continuous seal of at least 12mm over the complete length of the loop and loop tails. The sealant must be finished flush to the road surface and suitably sanded. The sealant must be checked after 4 weeks for flushness.

Contractors are reminded that prior to installing the loop wire, the slot shall be dried and cleaned and free of debris using a clearing knife to provide a smooth bed for the wire. The method of doing this is with compressed air.

The saw cut for loop feeders running back to the under kerb and channel ducting shall have a minimum separation between saw cuts of 300 mm and there shall be no more than 3 saw cuts. Where more than 3 saw cuts are required extra KJB and under kerb accesses are required at a different location.

No saw cuts are to be made into any Kerb, Kerb and Channel or the KJB.

### ***Section 3.11.1 – Loop Testing***

Q testing shall be undertaken for each loop (at the controller and KJB) and the results recorded in the controller cabinet logbook and RAMM.

A good Q value is approximately 28. The recorded q values must all be well within controller tolerances. See Appendix P.

### ***Section 3.13(a) – Painting Schedule (Cycle Call Boxes)***

The colour blue described in this specification for cycle call boxes shall be equivalent to Dulux “True Blue” shade 2821.

### ***Section 3.13(b) – Painting Schedule (Standard Poles and Mastarm Poles)***

The section of the pole from the lower vehicle lantern bracket, up to the finial cap, or where painting ends, must be painted black. The standard pole colour is yellow.

### ***Section 3.13(b) – Painting Schedule (Other Items)***

‘Other Items’ must be coloured black. This includes pole caps, detector boxes etc. The exception to this is Montrose boxes. A Montrose box can optionally be painted black, prefinished with a baked enamel, grey ‘hammerlite’ finish, or in the case of stainless steel, can be left unpainted.

### ***Section 3.15.3 – Software (Personality) Requirements***

CTOC have specific requirements for the preparation and production of personality files and the CIS. The contractor shall engage the CTOC approved programmer/SCATS personality writer, (contacts are available on request), directly to produce the required files. It should be noted that it may require several weeks to produce these files. It is the contractor’s responsibility to check the programmer availability and time frame. There must be evidence of personality software testing to show it is error free. Exceptions are to be approved by CTOC.

### ***Section 3.15.4 – Commissioning***

The signals contractor must advise the CTOC Operations Room about the project at least three months before connection is required to SCATS.

The signals contractor must advise the CTOC Operations Room a minimum of one week before SCATS communications will be available from the controller. This is to allow the intersection and communications to be setup in the SCATS system.

Traffic Signal commissioning will not be allowed until the controller, vehicle detectors, CCTV camera and pedestrian detection cameras (if applicable) have been installed and have had continuous error free communications to CTOC RTO systems for at least 48 hours.

### **Section 3.16 – As-built documentation to be provided within controller cabinet**

A Cable Termination Chart template in electronic format is available on request from the CTOC Operations Room. It must be laminated and placed in cabinet door (with its document TRIM number). In addition to the Traffic Signals layout plan, cable termination chart, CIS, logbook and the Loop Settings Record (Appendix P) shall also be laminated and placed in cabinet door. This is part of commissioning sign off requirements.

### **Section 4.4.1 – Ducting**

The preferred method of installing ducts is by open cut trenching. Where there is a preference to duct by under-ground thrusting or drilling, approval must be obtained in writing from CTOC. The minimum number of ducts to be installed from the controller and between access chambers is three (3). All ducting must be reasonably straight between access points to allow cables without kinks. No tight 90deg bends allowed and any radius bends or direction changes must be in the largest format possible. Note that NZTA Infrastructure stipulate ducting depths of 1.5 m across highways. CTOC suggest any deviation from this will require direct discussion with regional NZTA office as part of the Carriage Access Request (CAR).

The preferred point of access into the chamber is through the chamber side wall. The duct should ideally enter through the wall at 90 degrees and protrude a minimum of the diameter of the duct into the chamber. The duct should be position through the side wall so that a well in the bottom of the chamber is provided. This should be a minimum of 200 mm to the bottom of the duct. There will be cases where the ducts may enter the chamber through the granular base. The duct should protrude into the chamber a minimum of 200 mm. See Appendix T.

### **Section 4.4.4 – Loop Feeder Cable**

All loops in a given traffic lane must be wired in series. The best way to achieve this is to connect one leg of each loop together with a soldered twisted joint in the kerbside junction box (KJB). The joint must also be encased in a glue impregnated heatshrink sleeve. The other ends of the loop feeder will go back to the controller. Loops are directional and must be connected in a suitable configuration to meet operational specifications. See Appendix A.

### **Section 4.4.5 – Mains Power Supply**

Each RCA has a nominated electricity retailer. All new connections must be made with the appropriate electricity retailer for the RCA. For further information on the new connection requirements, contact CTOC Real Time Operations.

#### **Section 4.4.5.1 – Power Demarcation Pillar**

In general, power to the controller cabinet from the Orion Network (provider not retailer) will be supplied from an existing power boundary box, if one exists within approximately 10m of the controller cabinet. If one does not exist then a power demarcation pillar (PDP) between the Orion network and the controller cabinet shall be installed no closer than 2m and not further than 5m from the cabinet and generally against an adjacent boundary. The goal is to reduce likelihood of accidental damage.

The PDP shall consist of the GYRO Plastics Ltd EP1R Underground Distribution Pillar, colour black, except the 63A fuse shall be replaced with an HRC 32A FW fuse carrier and base.

Documentation must be provided in the controller cabinet where the power is supplied from i.e. the boundary box or PDP location. Ideally, this will be shown on a site plan.

### **Section 4.4.6 – Earthing**

Main-Earth pins (earth-stakes) are not permitted at new intersections. New intersections must use a buried-earth wire meeting the requirements of NZS3000.

### **Section 4.4.7 – Network Wiring**

CTOC have specific requirements for the provision of the data-network connection between the CCC network, and the intersection. Data network equipment and connection can only be done by a network contractor specifically approved by CTOC. The signals contractor must engage the CTOC approved network contractor directly. The contact details for the network contractor can be obtained from the CTOC Operations Room on 03 941 8620. The signals contractor must notify the CTOC approved network contractor at least six weeks prior to requiring their services.

Some external network providers require three months lead time to make connections. It is the signal contractor's job to notify CTOC in advance of the lead-time.

All network devices must be wired with two CAT6 network cables, one for use and one as a redundant spare. Network cables installed below ground must be grease-filled, burial grade. Where Ubiquiti radio is used, the network cables must also have an over-all screen. The CTOC approved network contractor will advise of the cabling requirements following completion of the network testing and design for the site. It is a requirement of the signals contractor to engage the CTOC network contractor to undertake radio signal checks prior to signals poles being ordered. Results must be communicated back to CTOC prior to commencement. CTOC can provide list of approved installers on request.

The signals contractor must terminate the network cables in the controller cabinet in suitable RJ45 sockets. These sockets must be mounted without producing any holes through the outside of the controller cabinet. Where the method of communications involves connection to UFB fibre, the signals contractor must also supply and install the Australian Standard approved 'Top-Hat' for the fibre termination point & Optical Network Termination box. This is the CTOC preferred solution. In certain circumstances, a GE EH2C-Pedestal cabinet (c/w gear plate and locks) may be used with CTOC approval. If using the GE cabinet, there must be no 230v or LV power in the GE cabinet (must be ELV). For layout details regarding UFB, see Appendix S.

#### **Section 4.4.8 – Traffic Observation Cameras & Pedestrian Detection Cameras**

'It is generally expected that a CCTV camera(s) will be installed at any new traffic signal site. Requirements will be confirmed by the relevant RCA'.

The signals contractor is responsible for the supply & mounting of the traffic observation camera. As the traffic observation camera must be CTOC approved, CTOC will supply the signals contractor with the preferred or newer versions of current brand and model. Currently the approved brands of CCTV cameras are Axis and Vivotek. The Axis PTZ model is the P5635-E MkII and the Fixed model is the P1447-LE. As for Vivotek, the PTZ model is SD9362-EH and the Fixed model is the IB9381-HT.

In addition the fixed camera lens or lenses is to be wide enough to be able to view the whole of the intersection – 20 m on each approach including pedestrian and cycle crossing. Guidance can be sort from CTOC RTO for this requirement. If not achievable, the camera needs to be located on a suitable pole away from the intersection.

The CTOC approved network contractor will configure the camera, and connect to the data network. The signals contractor must engage the CTOC approved network contractor directly. The traffic observation camera is to be powered from its own dedicated supply so it remains functional when the traffic signals regardless of controller or flashing yellow unit state.

Additional devices added to an existing system must provide their own extra connection. They are not permitted to utilise existing cables unless an exception is obtained from CTOC.

Where required, the signals contractor is responsible for the supply & mounting of the pedestrian detection cameras. As the pedestrian detection cameras must be CTOC approved, CTOC will supply the signals contractor with the current brand and model. The signals contractor will program the detection configuration, after which the CTOC approved network contractor will configure the IP addresses into the cameras. The signals contractor must engage the CTOC approved network contractor directly. It is a CTOC requirement of an extended warranty (total Warranty of FIVE years) for the CCTV camera.

If a UPS is installed, the controller, flashing yellow unit, CCTV camera and network switches are to be connected to the UPS. High-energy devices such as red light cameras and outlet plugs are not to be connected to any UPS.

#### **Section 4.7 – Kerbside Junction and Carriageway Loop Boxes**

Contractors are reminded that Kerbside Junction Boxes (KJB) shall be bedded on 100 mm of free draining material and surrounded by 150 mm wide by 150 mm deep concrete haunching. The KJB must be able to free drain all moisture build-up into the soil.

Where there are 3 or more loops running back to the KJB the contractor must install a Carriageway Loop Box (CLB) as shown in Appendix U. The loop tails will run from the CLB to the KJB via a 50 mm diameter flexible conduit (with draw wire) under the kerb and channel.

Where 1 or 2 loops are required, the carriageway loop box is not required but still can be installed. In all cases, the flexible conduit under the kerb and channel is required. Under no circumstances are saw cuts to be made into the kerb and channel.

#### **Section 4.8 – Labelling of Cables**

The approved method for labelling all cables is using slide on numbers, white with black moulded or engraved lettering. This marker is to be of the non - split type that completely encircles the cable core. Printed heat shrink labels are acceptable.

Each signal group will be labelled starting with its number first followed by its lamp colour e.g. SG1 followed by Red, SG1 followed by Yellow and SG1 followed by Green.

#### **Section 4.10 – Surplus Equipment**

Where CTOC controlled equipment is removed as part of works at an intersection, the signals contractor is responsible for returning all reusable surplus equipment to the CTOC store located at TCS. The CTOC Engineer will define which equipment is to be saved or scrapped. The signals contractor shall dispose of the non-reusable equipment in accordance with the conditions of the contract.

## **Design Requirements**

*The following sections reference the previous section numbers and will eventually be removed from this document and placed into a Design Requirements document. For all exceptions to Standard Practise, contact CTOC for direction/advice.*

### **Section 2.2.3 – CCTV Camera and SCATS Licences**

Each CCTV camera installation requires specific camera licencing to run in the CCTV operating system. It is the responsibility of the project to pay the first 2 years of operation and licences. The licences are to be handed to CTOC in perpetuity. On-going licencing will be paid for by CTOC. Contact CTOC for further details of these costs.

Each Signalised intersection/site requires specific licencing to run on the SCATS operating system. It is the responsibility of the project to pay the initial cost of the licencing. These licences are to be handed to CTOC in perpetuity. On-going licencing will be paid for by CTOC. Contact CTOC for further details of these costs.

For ANPR camera requirements please contact CTOC.

### **Section 2.2.4 – Signal Plan Requirements**

CTOC has had developed a standard format that Traffic Signal plans are to be presented. A CAD package is available providing all CAD data required to produce the plans to CTOC standards on the required template. It includes examples for the drafter to follow. Traffic Signal Operation and Design requirements can be found at:

<https://ccc.govt.nz/consents-and-licences/construction-requirements/traffic-signal-operation-and-design/>

### **Section 2.3.2 – Special Output Board**

The new controller cabinet shall be fitted with a Special Output Board where the installation is in a residential area. This is required to give the ability to mute the audio from the Audio Tactile pedestrian driver.

### **Section 2.4 – Signal Lanterns**

CTOC requirements for Right Turn arrows is a minimum of three (3) for these traffic movements. The location of these lanterns are:

- 1 in the stopping location i.e. Dual Primary pole (preferable if installed) or Primary pole.
- 2 in the starting location i.e. Secondary and Dual Secondary/Tertiary poles including mastarm.

### **Section 2.5 – Signal Poles**

It is a CTOC requirement to install Overhead lanterns on mast arm poles at all signalised mid-block ped and/or cycle crossings.

#### **Section 2.5.1.3 – Pole Installation**

In the event a traffic signal pole is damaged as of the result of a crash or other event and where the pole needs to be replaced the foundation type must be considered. IPL Retention Sockets are mandatory with only a few exceptions (see 2.5.1.3 in the 'Regional Special Conditions' section of this document). However consideration should be given to this requirement on a case by case basis. The CTOC Traffic Signal Engineer is to be contacted for advice and approval of what type of pole foundation to install if not an IPL Retention Socket.

### **Section 3.3 – Supply of Electric Power**

UPS installations are becoming common on the network. The industry is moving away from environmental and health hazards. Therefore use of lithium batteries is encouraged over lead acid batteries in UPS cabinets. Caution must be advised and displayed on the cabinet of the presence of high energy batteries. For further advice, contact CTOC RTO.

### **Section 3.5.4 – Cable Run Allocation**

It is important for resilience of running the intersection that sufficient vehicle displays on approach and on the exit side of the intersection remain functional for each approach if a single pole is knocked down or cable core becomes faulty. Each corner of the intersection will generally be feed from at least one 36-core cable. Two cables may be required depending on lantern requirements. If there are medians/islands installed on any approach, with traffic signal poles then a separate cable must run from the controller to each pole on the median/island. Each cable must have a minimum of 4 cores spare for resilience. Check with CTOC if clarification is required.

### **Section 3.6 – Controller Cabinet**

The controller cabinet is to be installed in an assessable location free of interference for maintenance purposes. This shall include the provision for the parking of the Signal Contractors maintenance vehicle clear of traffic lanes and foot/cycle ways where possible. Adequate working space must be provided adjacent to the cabinet.

It is preferable that the controller cabinet is located at the property boundary and must be on road reserve. Ideally, the cabinet door should not face the road. This is so that the maintenance contractor can view the controller operation while also being able to see the operation of the intersection. However, in an urban environment due to fences and structures at the property boundary this may not be achievable. Contact CTOC for advice.

### **Section 3.6.2 – Communications Cabinet**

The communications cabinet is a cabinet approved by CTOC located at an intersection or another site as the need may arise. It is preferred to be a 'Cooling Cabinet' and follows RMS standards.

The Communications Cabinet must provide:

- Full 19inch rack with the ability for UPS internals
- 3 way lock with standard CTOC FS880 key
- Full cable management system
- A backing board
- A rack mounted power bar (No multi boards or boxes are permitted)
- Fan kit with thermostat
- Weather tightness with air flow
- Gland plates with 'Break Away' washers
- Coloured to match a Signal Cabinet
- Document holders
- Use the same concrete base as Signal Cabinets
- The ability for additional Gear Trays
- Uniform installation when installed next to Signal Cabinets

Two cabinet sizes are available:

Small	847 mm H x 780 mm W x 380 mm D
Large	1547 mm H x 780 mm W x 380 mm D

Any plug socket must be of a permanent mounted type. All communications equipment shall be mounted on the shelves, the backing board or 1U rack. Communication equipment shall not be RCD protected. All plug sockets for general use must be RCD protected. All cabling including power supply shall be labelled.

It is permissible to use an extension to the Traffic Signals Controller Cabinet (Top Hat) to house communications equipment. This will need CTOC approval if this is the proposed option. The internal requirements of the 'Top Hat' are the same as the stand-alone communications cabinet as detailed above. All devices must be suitably mounted so they do not move in an earthquake or impact event.

The communications 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 Traffic Signal Engineer 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.

### ***Section 3.9.2 – Pole Locations***

Prior to installation, the pole locations shall be marked on site and their locations approved by the CTOC Traffic Signal Engineer. Generally, traffic signal poles are located a minimum of 600mm from the pole face to kerb face. There will be cases where the pole cannot be located in the exact position as indicated on the plan. The CTOC RTO Team Leader is to be advised of this issue and direction will be given to provide a solution. For layout details for pole location at kerb cut downs, see Appendix O.

### ***Section 3.9.3 – Pole Numbering***

The numbering of traffic signal poles is relative to the position of the controller cabinet. Any changes to the original controller cabinet position may impact on the intersection design. This also follows through to signal group and approach numbering. CTOC is to be informed of any design changes prior to the CIS and personality files being written. Any costs is to be part of the project.

### ***Section 3.9.4 – Pole Mounted Street Name Plates***

Street Name Plates can be mounted, when approved on the signal pole. They are to be mounted on an extension pole clamped to the signal pole with two clamps below the finial cap. This will place the nameplate above the top of the pole. The clamps are to provide sufficient clearance from the finial cap so the cap can be removed and access provide to the pole top terminations without removal of the street nameplate extension pole. The ownership and maintenance of the street nameplate and mounting structure remains the responsibility of the installer.

### ***Section 3.18 – Rail Interface and Warning Signals***

KiwiRail have specific requirements for the provision of an interface for the railway barriers with nearby Traffic Signals. It is up to the designer to liaise with KiwiRail to ascertain their requirements when traffic signals are proposed or being modified near a barrier controlled rail crossing.

In some circumstances at a Mid-Block crossing adjacent to a Rail Crossing, advance 'Railway Warning Signals' may be installed on the traffic signal mastarm by KiwiRail. The railway warning signals are low voltage and are not part of the Traffic Signal or control cabinet installation. KiwiRail will maintain these Railway Warning Signals independently from the traffic signals.

### ***Section 4.4.2 – Signal Duct Access Chambers***

All duct access chambers shall be concrete and manufactured in accordance with NZS 3109 and AS/NZS 4058, with surfaces finishes to NZS 3114, and Class B or higher specification load bearing cover as defined in AS 3996. Where contractors have chambers and covers manufactured from alternative materials, they shall seek prior written approval from CTOC before tender/installation. No modifications to the cover is permissible as this may reduce the load bearing capacity of the cover.

The current CTOC approved chamber is a 600 mm diameter Humes or Hynds concrete pipe with a cast metal cover. See Appendix Q.

### ***Section 4.4.9 – Network Radios***

CTOC have specific requirements for the provision of communication radios and communication to the CTOC Network. All new communication radios must be agreed to by CTOC prior to installation. All Ubiquiti Radios are to be 5AC range unless connecting to an existing M5 sector on a CTOC communications tower. CTOC will advise which type of radios are preferred. CTOC will not accept wireless communications for intersections within or around the City Centre due to interference.

The preferred option to connect to the CTOC Network is by fibre. This future proofs the system and significantly avoids communications issues. Where possible fibre will be installed with any project between intersections or to communication hubs. UFB Fibre product shall be installed as a communications solution with CTOC approval only. There are significant ongoing cost implications to a UFB Fibre solution hence it may be used as a last option but only if previously agreed to by CTOC.

#### **Section 4.4.10 – Communications Ducting**

When a capital project is open trenching on the CTOC road network CTOC would like the opportunity to install future proof communication ducting in the same open trench where possible. We are aiming to build assets that are going to last well into the future and support future technologies providing valuable services to the City and working with projects and contractors already doing infrastructure work to reduce cost is critical.

CTOC have on many occasions worked well with other capital projects by either CCC or NZTA funded to install communication duct into an open trench. CTOC do not operate a CAPEX budget of any significance, and so cannot contribute to any civils work.

Ducting will be used for fibre communications supporting a variety of council services such as Transportation communications (CCTV and Traffic signals), Police Crime cameras, Public Wi-Fi and Smart Cities initiatives. Being given the opportunity to install ducts in already open trenches makes good use of ratepayer provided funds.

Ducting is to have no elbows and must have sweeping bends with a minimum radius of 900mm. Communications ducting is generally installed at a depth of 300mm minimum to 600mm maximum. Note that NZTA Infrastructure may require depths of 1.5 m, which is subject to discussion with NZTA.

# Appendices

## **Appendix A – CTOC Inductive Loop Details**

Appendix A shows the detail of the cycle loops arrangement and winding requirements.

## **Appendix C – Poles as per the attached drawings**

Appendix C shows the details of the poles, and provides suggestion foundation details only. It is up to the signals contractor to provide an engineered solution for the foundation, suitable for the soil type, as required in the P43 Specification for Traffic Signals 2018 Section 2.5.

## **Appendix G – CTOC Commissioning Sheet**

Appendix G shows the CTOC Commissioning Sheet.

## **Appendix M – Cyclist Call Button**

Appendix M shows the CTOC cyclist call button.

## **Appendix O – Traffic Signal Pole Location Relative to Kerb Cutdown**

Appendix O shows the detail of the location of the traffic signal pole relative to kerb cutdown and tactile pavers.

## **Appendix P – Vehicle Detector Loop Settings and Measurements Record**

Appendix P shows the Vehicle Detector Loop Settings and Measurements Record sheet.

## **Appendix Q – Access Chamber and Cover**

Appendix Q shows an Access Chamber with metal cover.

## **Appendix R – Streetlight Connections**

Appendix R shows the detail of connection of streetlights when JUSP are used at an intersection.

## **Appendix S – UFB Fibre Connections**

Appendix S shows the details of how the equipment is laid out inside the GE EH2C-Pedestal cabinet. Note the modem is located inside the signals cabinet.

## **Appendix T – Signal Duct Access Chamber**

Appendix T shows the details of an Access Chamber and how the ducts are installed into the chamber.

## **Appendix U – Carriageway Loop Box**

Appendix U shows the details of the Carriageway Loop Box (CLB) and how the ducts are installed into and between the CLB and KJB.

## **Appendix V – Fault Response Times**

Appendix V details of the contractor Fault Response Times.

## **Appendix W – CTOC UPS Installation Specification (New Appendix)**

Appendix W outlines CTOC UPS Installation requirements

## **Appendix X – Intellectual Property (New Appendix)**

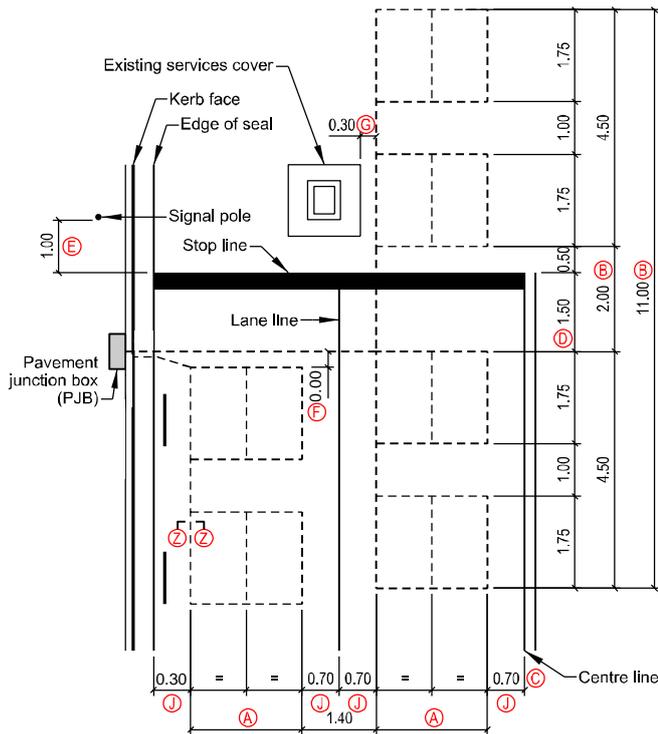
Appendix X outlines Intellectual Property details

Appendix A – CTOC Inductive Loop Details



# VEHICLE LOOPS

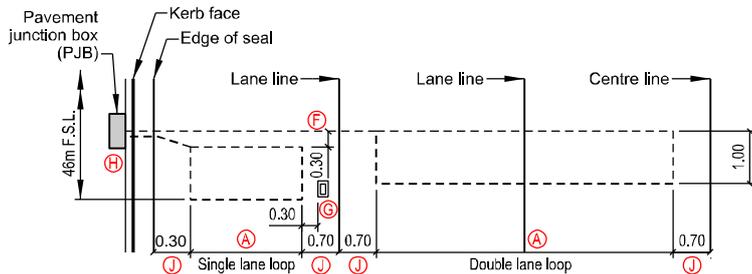
## INDUCTIVE LOOP LAYOUT DETAILS



**Standard 4.5m SCATS Stopline Loop with Right Turn Call Loop**

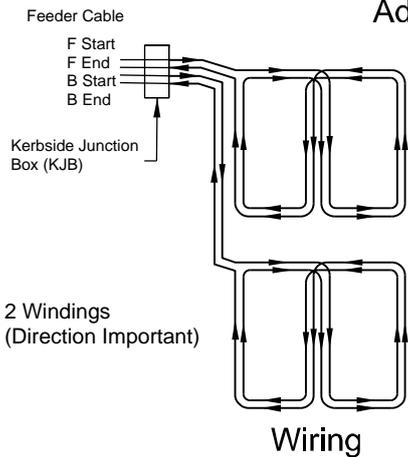
**Notes:**

- A Dimension derived from the lane width stated on the design plan.
- B Distance between the loops will depend on geometry layout and right turn filtering position of vehicle.
- C 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
- D Distance 1.5m from stop line (F.S.L.) unless otherwise stated on the design plan.
- E 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.
- F 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.
- G Service covers shall be at least 0.3m from any loop cable slot or estimated magnetic field.
- H 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.

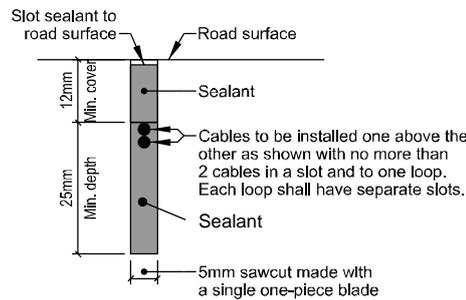


**Advance Loop**

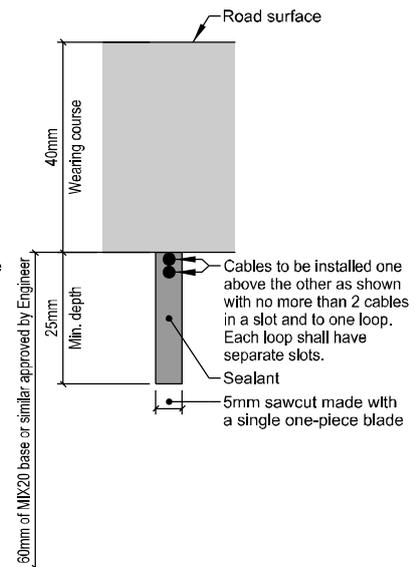
- J Offset loops 0.7m from the road lane markings adjacent to the loop, where lane loop is adjacent to kerb face use edge of seal to offset 0.3m to loop.



**Wiring**



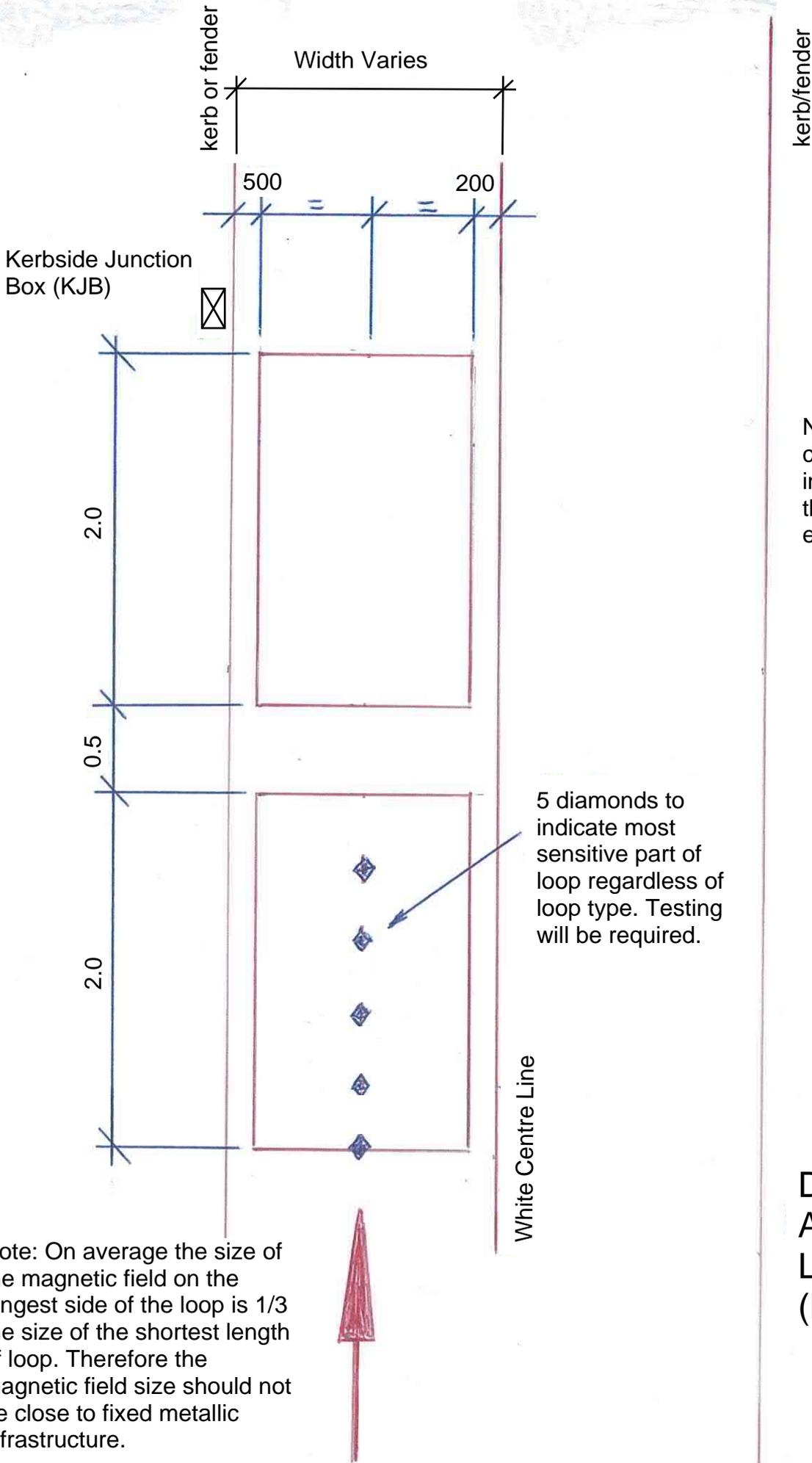
**Existing Road Surfaces Section**



**Newly Constructed Road Surfaces Section**

**Wiring Rules:**

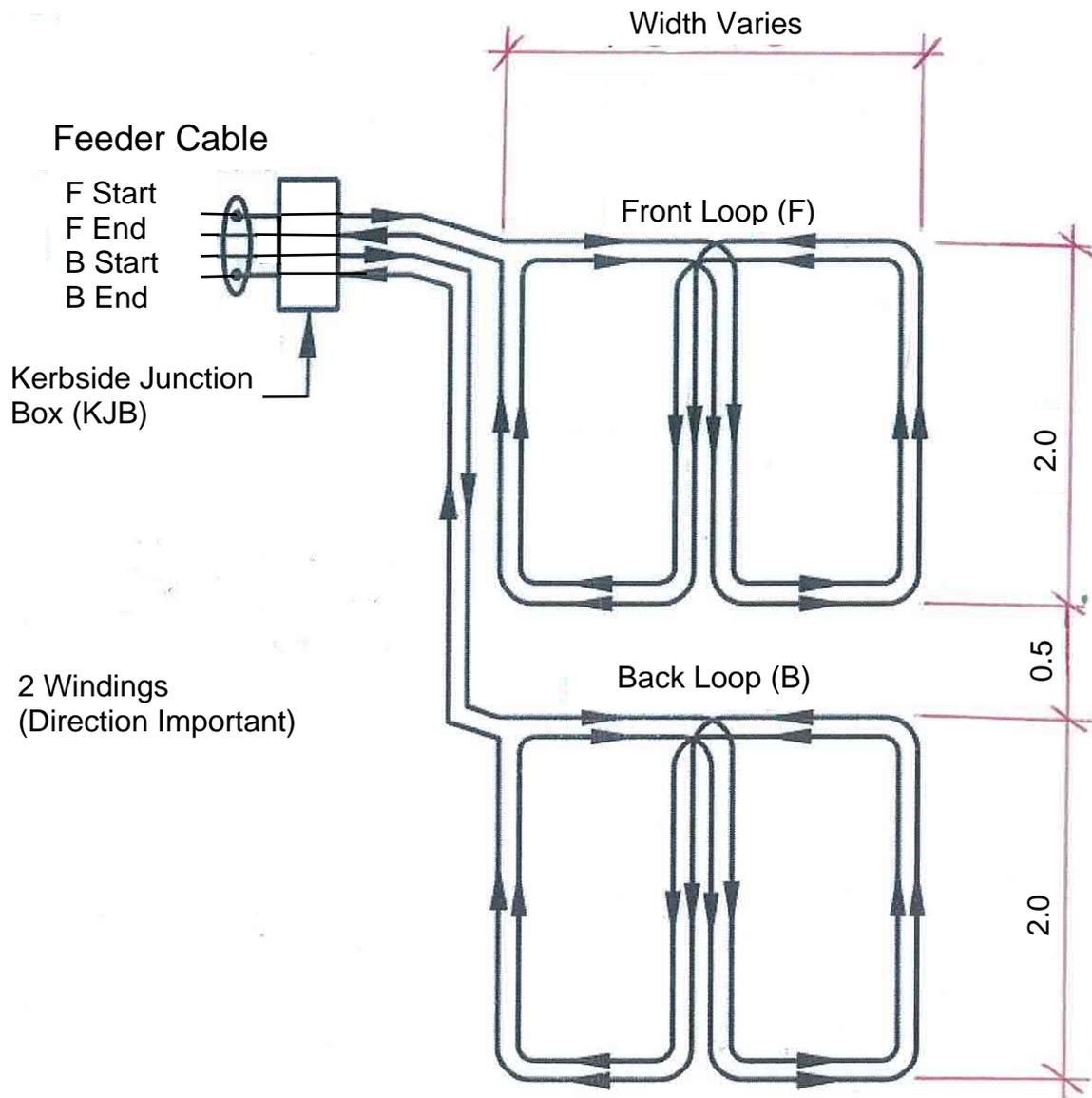
1. Mark 'start' at end of cable.
2. Start of in a clockwise direction on entry from kerb face.
3. Form two 'figure 8' patterns for each loop section.
4. Change direction at the centre (longitudinal) cut to make a 'figure 8' pattern.



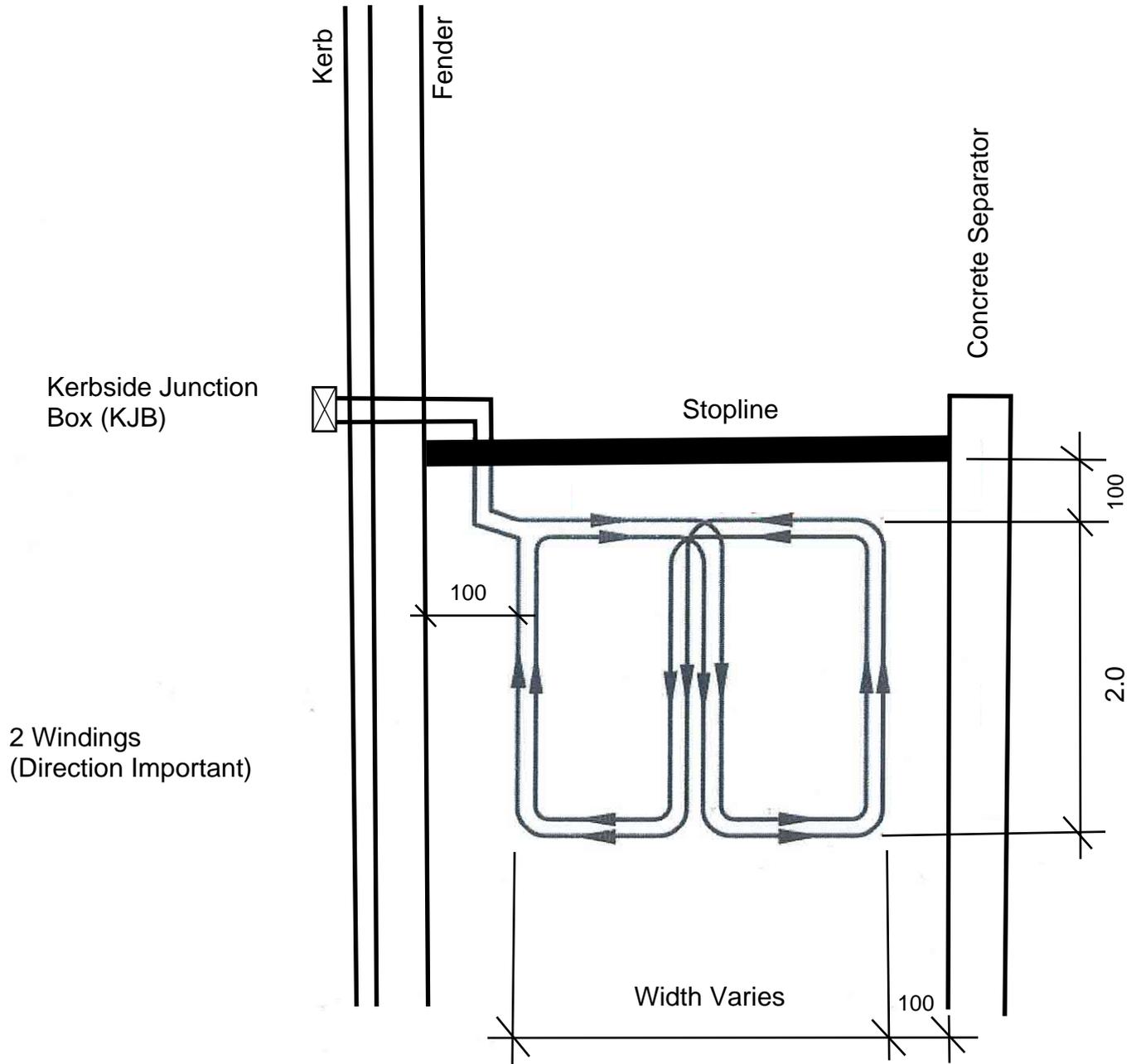
Note: Do not use the cycle loop as shown in P43 figure A02 in the CTOC environment

### Detail Of CTOC Advance Cycle Loop (NTS)

Note: On average the size of the magnetic field on the longest side of the loop is 1/3 the size of the shortest length of loop. Therefore the magnetic field size should not be close to fixed metallic infrastructure.

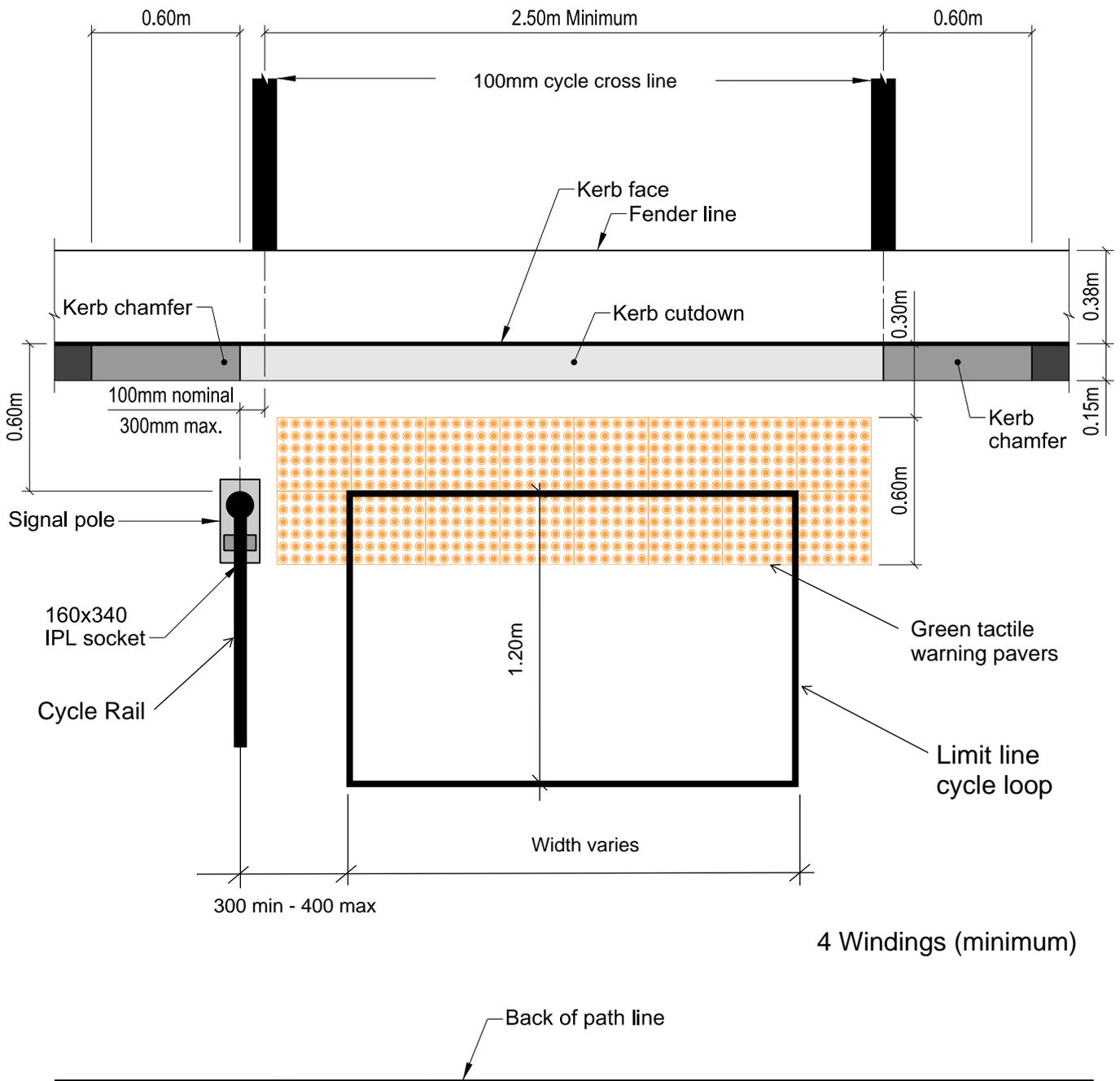


**Detail Of CTOC  
Advanced Cycle Loop Winding  
(NTS)**



Detail Of CTOC  
 Segregated Cycle Lane  
 Stopline Cycle Loop  
 (NTS)

Jeff Owen  
 04/02/2019



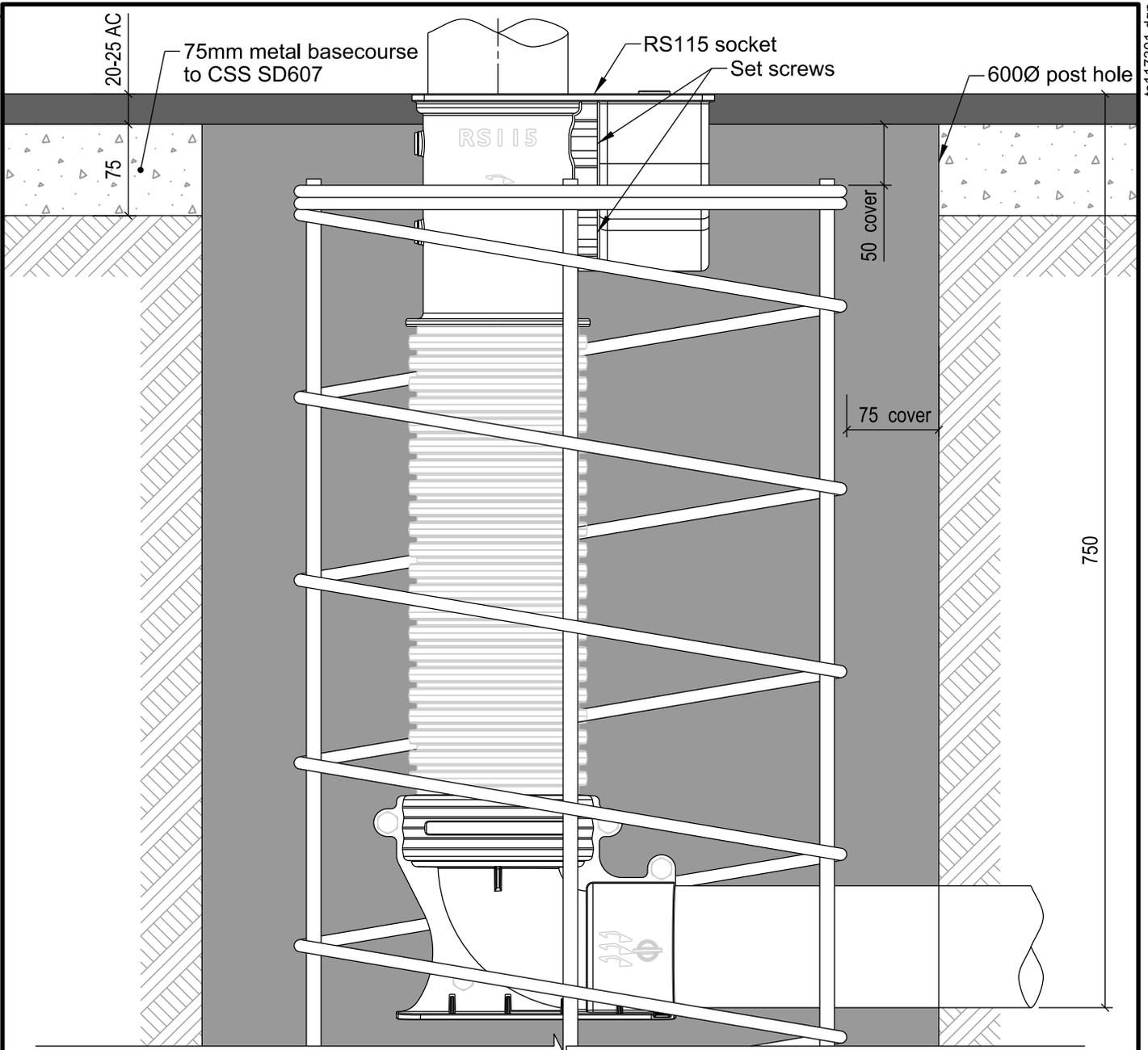
4 Windings (minimum)

Note: On average the size of the magnetic field on the longest side of the loop is 1/3 the size of the shortest length of loop. Therefore the magnetic field size should not be close to fixed metallic infrastructure.



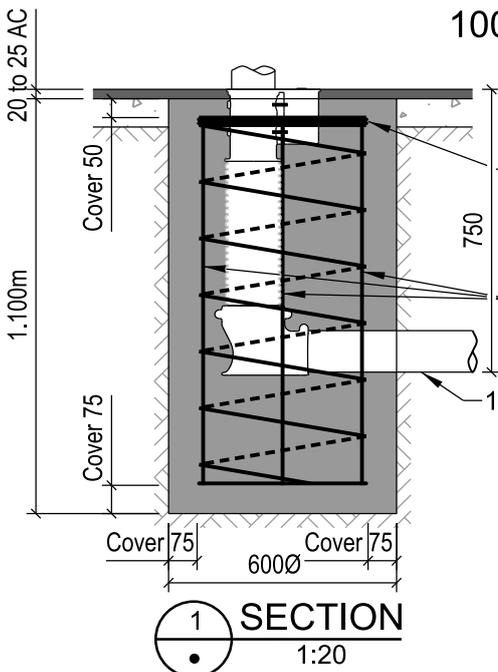
Appendix C – Signal Pole Details



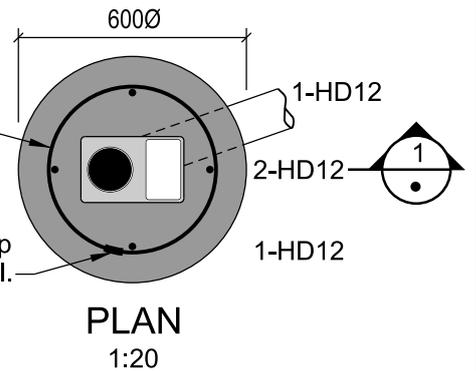


100 NB SOCKET DETAIL

1:5



SECTION 1:20



PLAN 1:20

**NOTES:**

- 1) Detail applies to Type 1, 1M, 8 and Type 2 where 100NB applicable.
- 2) Socket to be placed after kerb poured and back of path levels provided.
- 3) Verticality to be ensured by placing a pole stub and ensuring set screws tightened, before pouring concrete.
- 4) Concrete to be vibrated and stub secured in place to maintain verticality during concrete pour.

## 2. Installation

### 2.1 Dimensions

The foundation size and installation dimensions can be seen in the figures below.

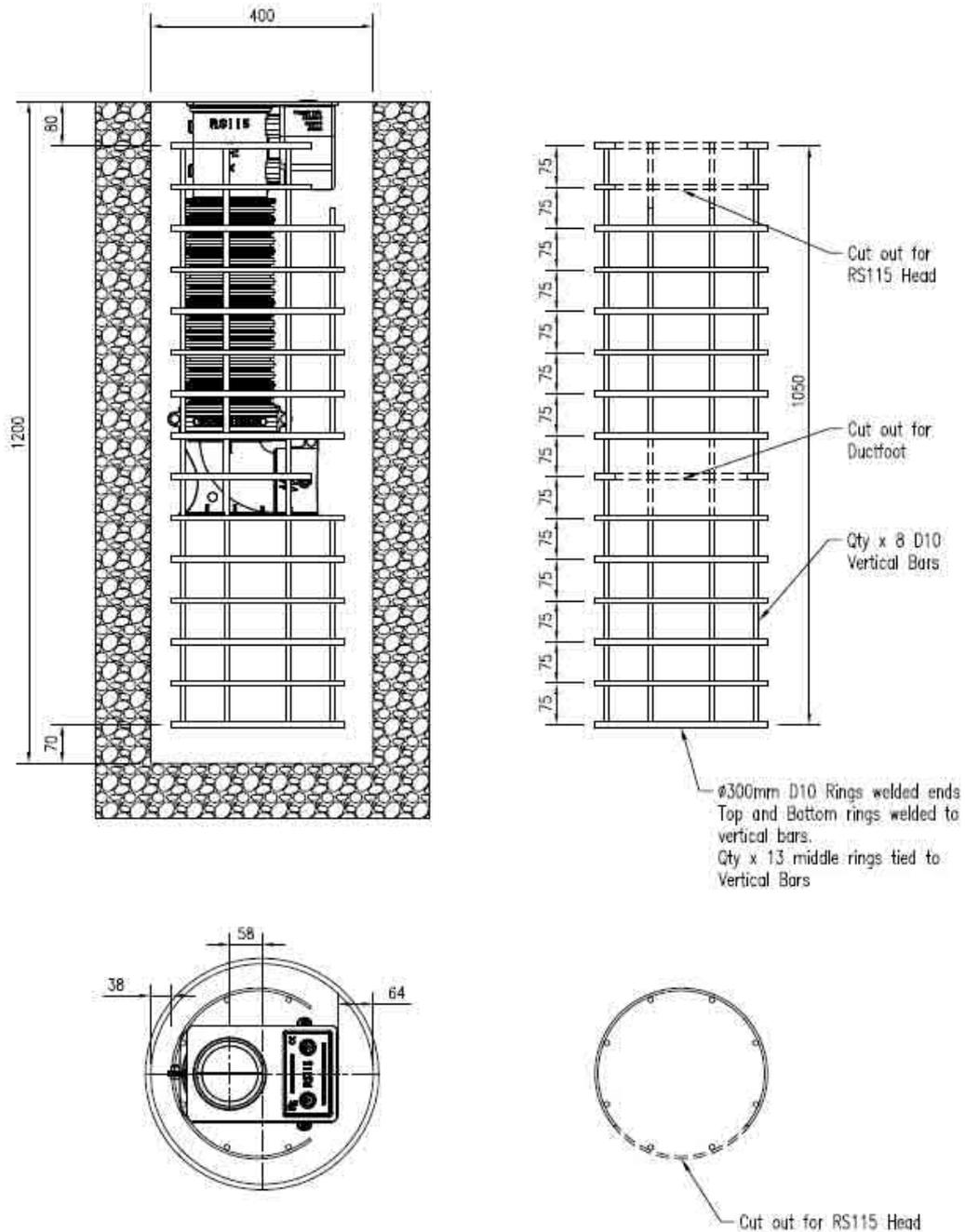


Fig 2.1 Foundation Details

Narrow Pre-Cast IPL Pole Socket

## 2.2 Concrete form installation

For the initial installation the cardboard forms were braced for pouring above ground.

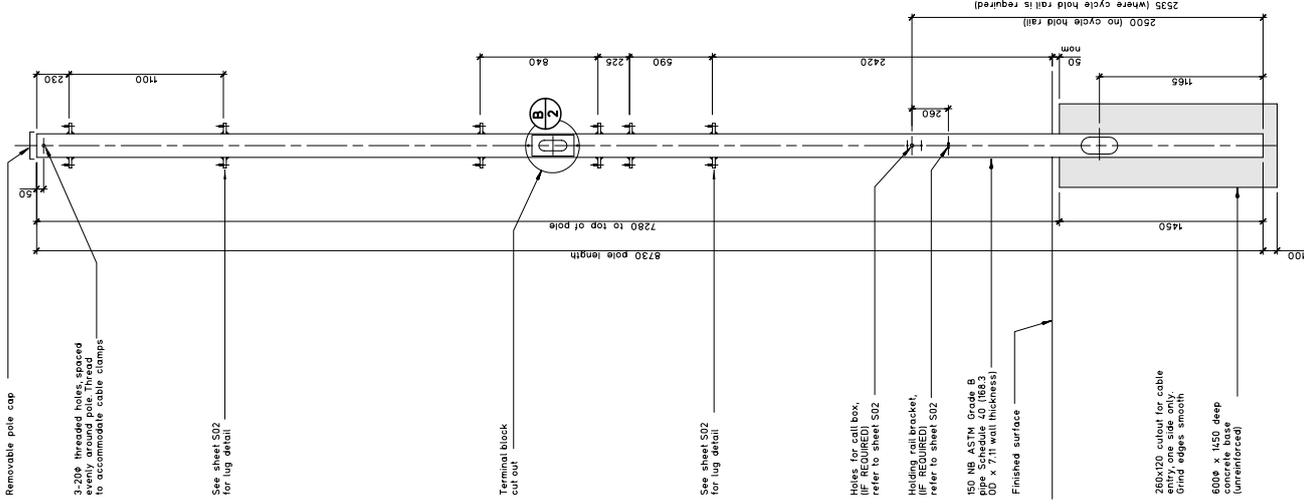
Concrete was then poured and vibrated until it was flush with the top of the forms. Making sure to level each Retention Socket using a stump pole and spirit level. Our recommended minimum concrete strength is EN206 - C30/37. See appendix A.



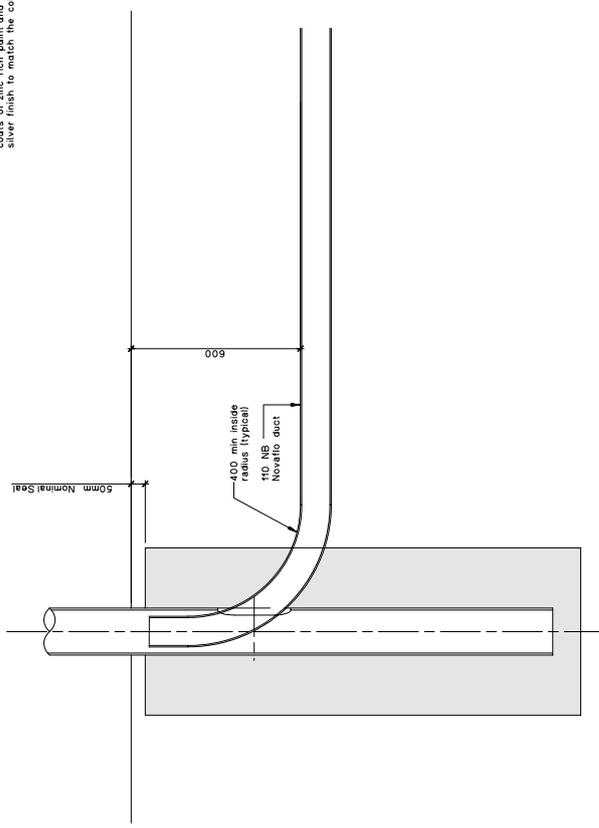
*Fig 2.2a Installation in formwork*

After 48 hours the forms were removed.

**Narrow Pre-Cast IPL Pole Socket**



- NOTES**
- 1) Concrete
    - a) All concrete work to comply with the provisions of NZS 3109:1997 & related documents
    - b) Concrete strength f'c (28 days) = 40MPa
  - 2) Poles
    - a) All parts are to be hot dip galvanised
    - b) If signal pole is not finished with anti-rust primer, all welds and cut surfaces to be painted with two coats of zinc rich paint and then oversprayed with a silver finish to match the colour of the galvanising.



**SIGNAL POLE BASE  
SECTIONAL ELEVATION**  
1:10

**NOTE: Reduced copy,  
Do not scale**

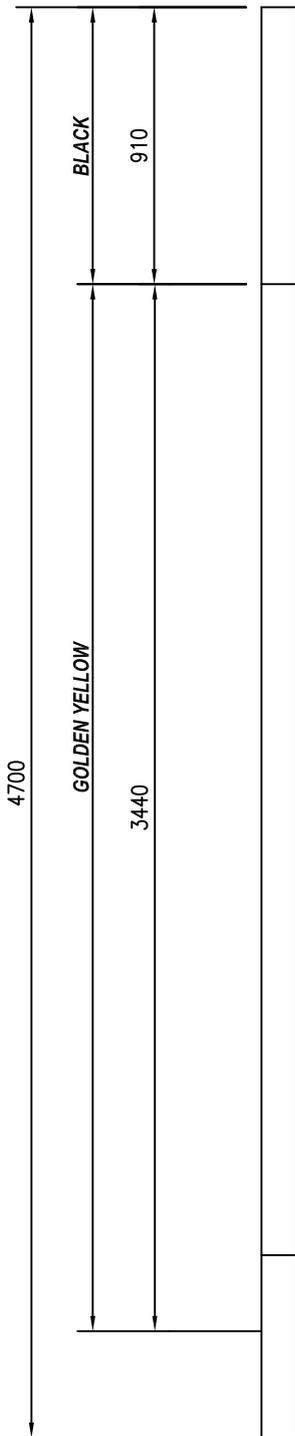
**TYPE 0-POLE AND 0m  
MAST ARM ASSEMBLY**  
1:20

DATE	BENCH MK	DESIGNED	NAME	SIGNED	DATE	APPROVED	CLIENT	PROJECT TITLE	DRAWING TITLE	CONTRACT NUMBER	ORIGINAL SHEET	AS SHOWN	SHEET	DATE
29/7/03		29/7/03	L. Greenfield	[Signature]	29/7/03	29/7/03	CHRISTCHURCH CITY COUNCIL - YOUR PEOPLE - YOUR CITY	STANDARD TRAFFIC SIGNAL POLES AND CONTROLLER BASE	TYPE 0-POLE AND 0m MAST ARM ASSEMBLY	254/025088/1/5	A1	AS SHOWN	S07	8
			S. D. Smith	[Signature]										
			A. J. Beaumont	[Signature]										
			L. Greenfield	[Signature]										
			L. Greenfield	[Signature]										

CITY SOLUTIONS  
 ASIAL PHOTOGRAPHY & COPYRIGHT  
 CONSULTING SURVEYORS & ENGINEERS

**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)



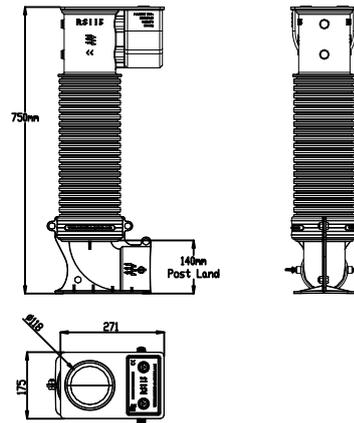
100NB PIPE  
(MEDIUM WALL)  
114.3 O.D.

**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.
- PREP AND PAINT EXTERIOR 'GOLDEN YELLOW' AND 'BLACK' TO APPROVED 10 YEARS PAINT SYSTEM

**RETENTION SOCKET FOUNDATION TO BE SPECIFIED BY CCC ENGINEER**

Duckfoot



RETENTION SOCKET  
DEPTH 600MM

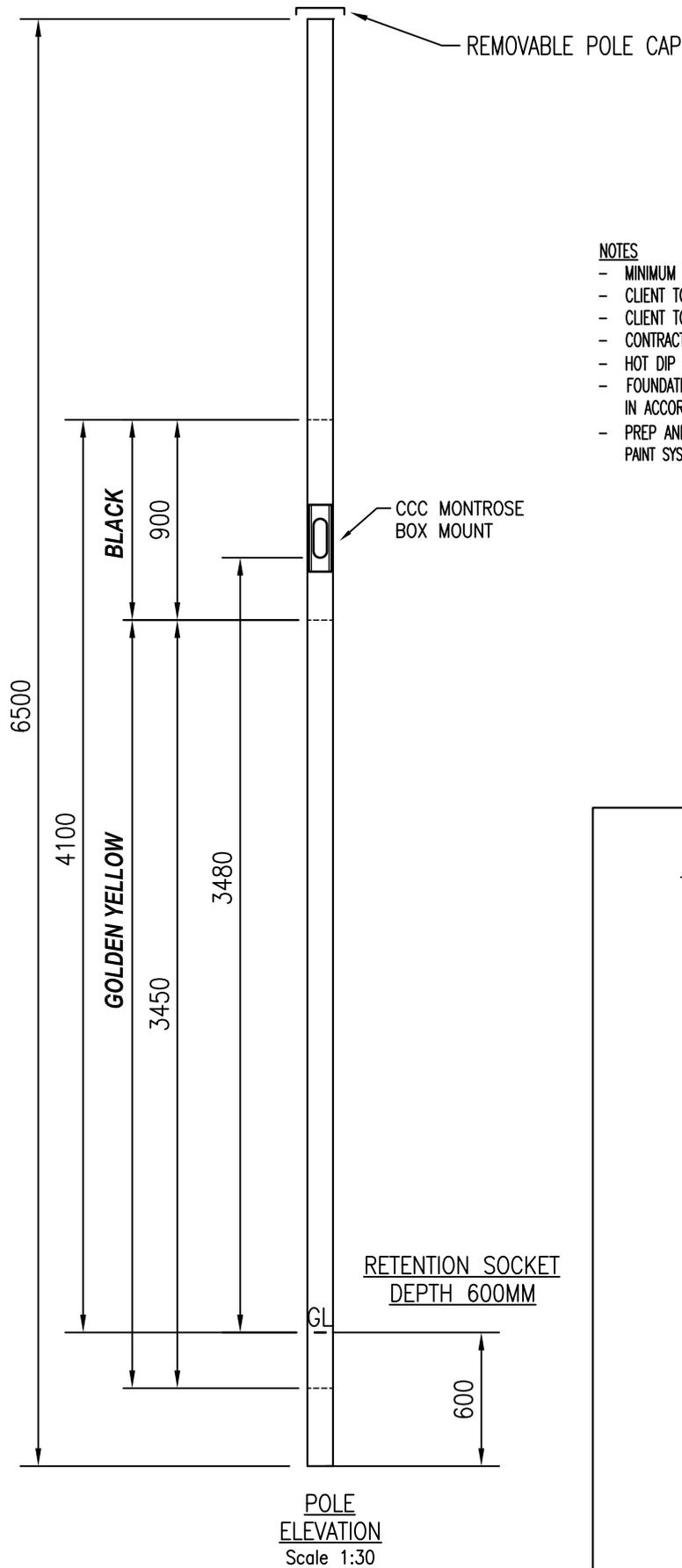
ELEVATION  
SCALE 1:25

RETENTION SOCKET  
ELEVATION  
Scale 1:20

Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
2	Initial issue	-	-	-	Design Working Life: -
3	Revised for project 'MASTERS'	DE	DE	02/15	Importance Level: - Wind Region: - Terrain Category: - Site Elevation: -

<p>611 Halswell Junction Rd, Hornby Christchurch 8042, New Zealand p (03) 349 7853 f (03) 349 6529 fp (0800) 845 845 i www.spunlite.co.nz</p>	<p>PROJECT: Christchurch City Council ADDRESS: CHRISTCHURCH</p>	<p>PROJECT NUMBER DWG #</p>	<p>SHEET C1</p>
	<p>TITLE: CCC Type 1RS - Retention Socket Pole Painted - Ground Planted</p>	<p>DRG.SIZE A4</p>	<p>SCALE AS SHOWN</p>

Spun Lite Poles Ltd claim authorship of this work & retain intellectual & artistic copyright

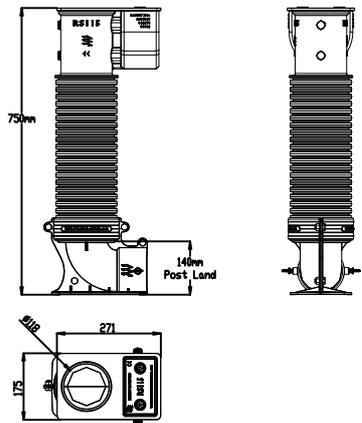


**NOTES**

- MINIMUM ALLOWABLE SOIL BEARING PRESSURE SHALL BE 100 Kpa.
- CLIENT TO PROVIDE ORIENTATION AND LOCATION.
- CLIENT TO PROVIDE CONDUIT FOR CABLE ENTRY AS REQUIRED.
- CONTRACTOR TO CHECK LOCATION OF ALL SERVICES BEFORE COMMENCING WORK.
- HOT DIP GALVANIZING TO AS/NZS 4680 AFTER FABRICATION.
- FOUNDATION DESIGN INFORMATION IS SUPPLIED AS A GUIDE ONLY AND MUST BE IN ACCORDANCE WITH THE COLUMNS PS1 AND GEOTECH REPORT.
- PREP AND PAINT EXTERIOR 'GOLDEN YELLOW' AND 'BLACK' TO APPROVED 10 YEARS PAINT SYSTEM

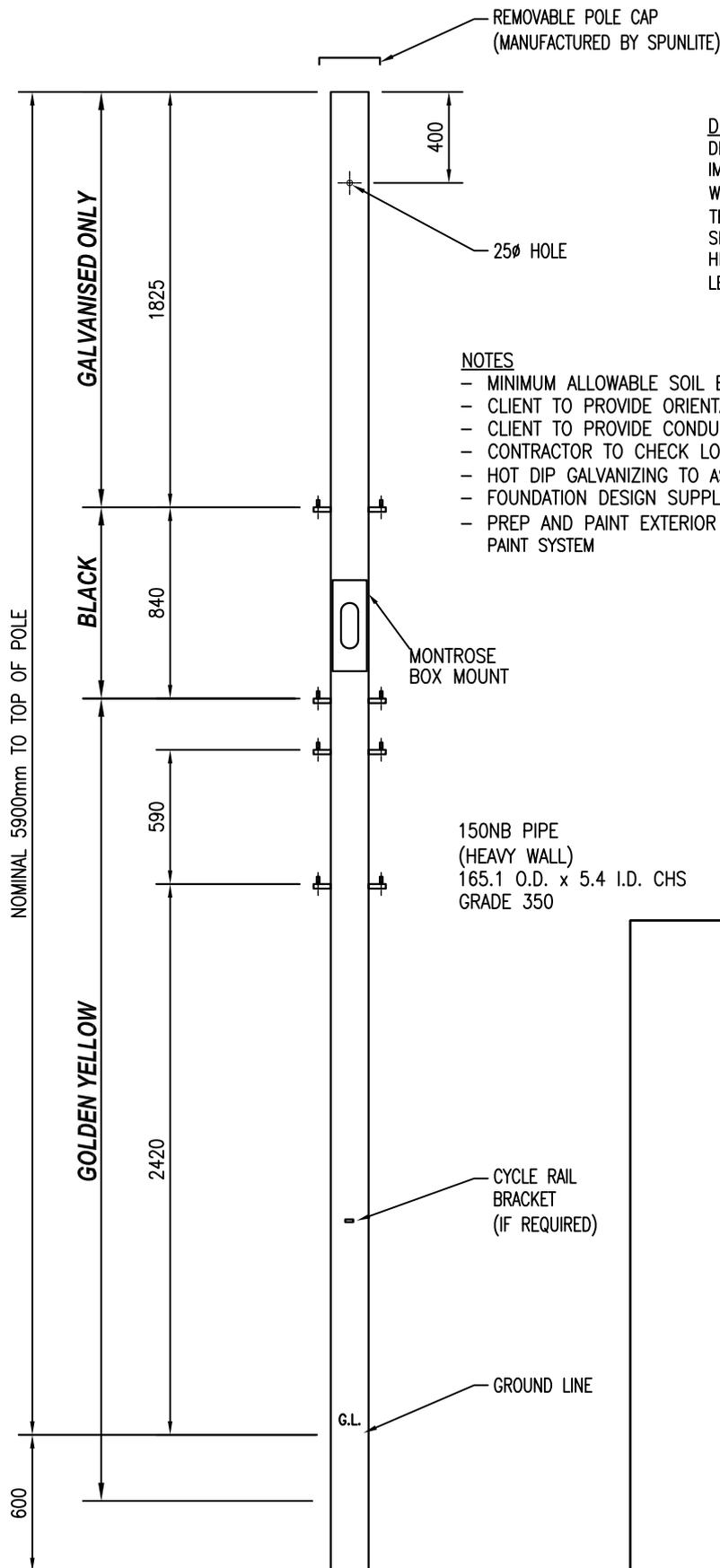
RETENTION SOCKET FOUNDATION TO BE SPECIFIED BY CCC ENGINEER

Duckfoot



RETENTION SOCKET ELEVATION  
Scale 1:20

Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:		
2	Initial issue	-	-	-	Design Working Life: -		
3					Importance Level: -		
					Wind Region: -		
					Terrain Category: -		
					Site Elevation: -		
 611 Halswell Junction Rd, Hornby Christchurch 8042, New Zealand p (03) 349 7853 f (03) 349 6529 fp (0800) 845 845 i www.spunite.co.nz					PROJECT NUMBER DWG #	SHEET C1	
PROJECT: Christchurch City Council ADDRESS: CHRISTCHURCH TITLE: Type 2 100mm Combined CCTV Traffic Pole Painted - Retention Socket Spun Lite Poles Ltd claim authorship of this work & retain intellectual & artistic copyright					DRG.SIZE A4	SCALE AS SHOWN	REVISION 3



**DESIGN PARAMETERS:**

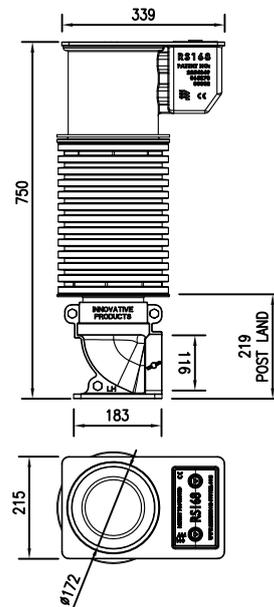
DESIGN WORKING LIFE	- 50 YEARS
IMPORTANCE LEVEL	- 2
WIND REGION	- 45 M/S
TERRAIN / HEIGHT MULTIPLIER	- 2
SHIELDING MULTIPLIER	- 1
HILL SHAPE MULTIPLIER	- 1
LEE ZONE MULTIPLIER	- 1 (TO A MAXIMUM OF 1.35)

**NOTES**

- MINIMUM ALLOWABLE SOIL BEARING PRESSURE SHALL BE 100 Kpa.
- CLIENT TO PROVIDE ORIENTATION AND LOCATION.
- CLIENT TO PROVIDE CONDUIT FOR CABLE ENTRY AS REQUIRED.
- CONTRACTOR TO CHECK LOCATION OF ALL SERVICES BEFORE COMMENCING WORK.
- HOT DIP GALVANIZING TO AS/NZS 4680 AFTER FABRICATION.
- FOUNDATION DESIGN SUPPLIED BY CCC ENGINEER.
- PREP AND PAINT EXTERIOR 'GOLDEN YELLOW' AND 'BLACK' TO APPROVED 10 YEARS PAINT SYSTEM

150NB PIPE  
(HEAVY WALL)  
165.1 O.D. x 5.4 I.D. CHS  
GRADE 350

RETENTION SOCKET FOUNDATION TO BE SPECIFIED BY CCC ENGINEER



ELEVATION  
SCALE 1:30

MOUNTING PLAN  
SCALE 1:16

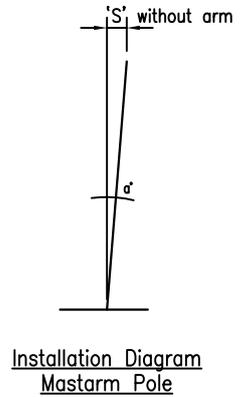
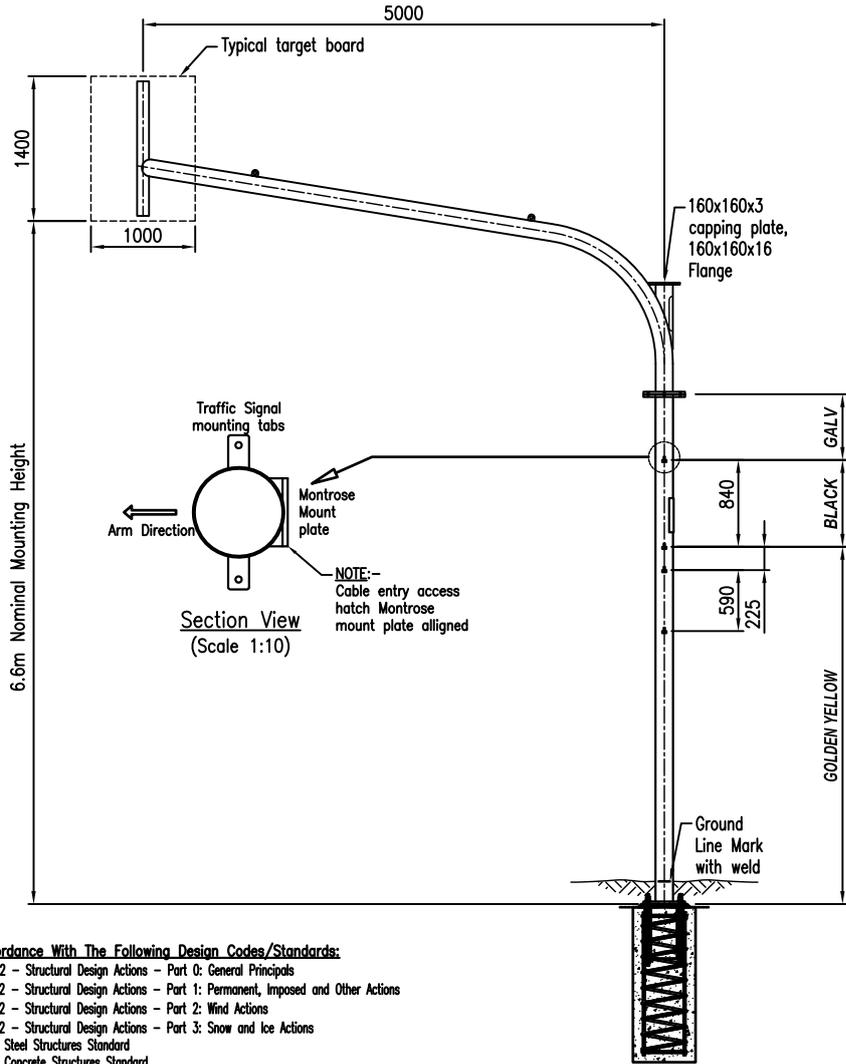
Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
2	Initial issue	-	-	-	Design Working Life: -
3	Revised for project 'MASTERS'	BD	DE	10/14	Importance Level: -
3	Retention Socket Design	DE	BD	03/15	Wind Region: -
					Terrain Category: -
					Site Elevation: -

<p>611 Halswell Junction Rd, Hornby Christchurch 8042, New Zealand p (03) 349 7853 f (03) 349 6529 fp (0800) 845 845 i www.spunlite.co.nz</p>	<p>PROJECT: Christchurch City Council ADDRESS: CHRISTCHURCH</p>	<p>PROJECT NUMBER (Tag#_Project) C1</p>	SHEET
	<p>TITLE: CCC Type 2 RS - 150NB Combination Traffic Pole Retention Socket Design - RS168 x 750mm</p>	<p>DRG.SIZE SCALE REVISION A4 AS SHOWN 3</p>	
<p>Spun Lite Poles Ltd claim authorship of this work &amp; retain intellectual &amp; artistic copyright</p>			



FABRICATION AND INSTALLATION DIMENSIONS (mm)

OUTREACH ARM 'A'	3000		4000		5000	
No. OF LANTERNS	1 x 6	2 x 6	1 x 6	2 x 6	1 x 6	2 x 6
SETBACK 'S' (Without arm)	23	32	34	46	47	61
ANGLE $\alpha$ (Without arm)	0.22°	0.31°	0.32°	0.44°	0.45°	0.58°



Design is in Accordance With The Following Design Codes/Standards:

- AS/NZS 1170.0:2002 - Structural Design Actions - Part 0: General Principles
- AS/NZS 1170.1:2002 - Structural Design Actions - Part 1: Permanent, Imposed and Other Actions
- AS/NZS 1170.2:2002 - Structural Design Actions - Part 2: Wind Actions
- AS/NZS 1170.3:2002 - Structural Design Actions - Part 3: Snow and Ice Actions
- NZS 3404: 1997 - Steel Structures Standard
- NZS 3101: 2006 - Concrete Structures Standard
- AS/NZS 4678: 2000 - Structural Design Requirements for Utility Services Poles
- AS 4100: 1998 - Steel Structures Standard (not currently applicable)
- BS EN 40-3-3-2003 - Lighting Columns Part 3-3 - Design and Verification by Calculation

Design Criteria:

Design Working Life:	50yrs
Importance Level:	2
Wind Region:	W
Regional Wind speed - Ultimate limit state:	51m/s
Regional Wind speed - Serviceability limit state:	43m/s
Terrain Multiplier:	2
Estimated Pole Frequency:	2.28 hz
Most top Horizontal Deflection:	162mm

Mast Loadings:

- 5.0m traffic arm - 1.0 x 1.4m Target Board with Total Max loading of 1.68sqm and 80kg
- Mast - Max loading of 1.68sqm and 80kg

Elevation  
(Scale 1:50)

Structural Notes:

- Concrete compressive strength ( $f_c$ ) at 28 days.
  - Standard foundation (Ground planted pole) - 17.5 MPa.
  - Alternative foundation (Detail 2) - 20 MPa.
- Materials & workmanship to be in accordance with NZS 3109.
- Reinforcing bars shall comply with NZS 3402: 1989
  - 'R' denotes grade 300 plain bar, 'D' denotes grade 300 deformed bar.
- Steel workmanship to be in accordance with NZS 3404.
- Flats shall comply with AS 3679, grade 250.
- Plate shall comply with AS 3678, grade 250.
- Hollow sections shall comply with AS 1163.
- Steelwork to be hot dip galvanized after fabrication.
- Client responsible for orientation and location.
- Contractor to check location of services before commencing work.
- Provide conduit for cable entry as required.
- Minimum allowable soil bearing pressure shall be 100 kPa (A site evaluation by a Civil/Geotechnical Engineer is advisable).

Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
B	Initial issue	-	-	-	Design Working Life: -
C	Revised for project 'Tag#_Project'	BD	DE	09/14	Importance Level: -
					Wind Region: -
					Terrain Category: -
					Site Elevation: -

**SPUNITE POLES**  
 611 Halswell Junction Rd, Hornby  
 Christchurch 8042, New Zealand  
 p (03) 349 7853 f (03) 349 6529  
 fp (0800) 845 845  
 www.spunite.co.nz

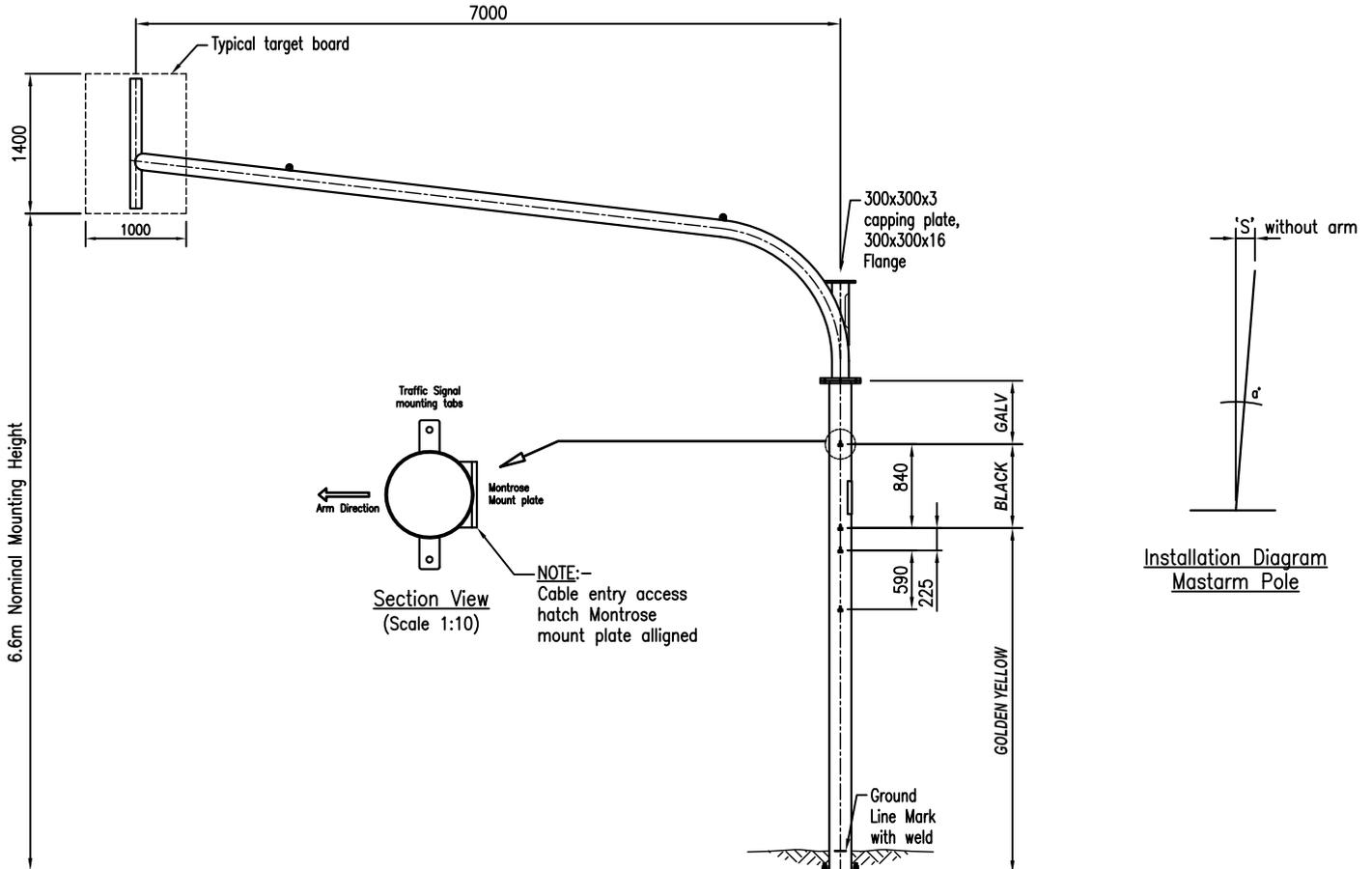
PROJECT: Christchurch City Council Type 5 JUMA Pole	PROJECT NUMBER	SHEET
ADDRESS: Christchurch	DWG #	C1
TITLE: CCC Type 5 JUMA Column - 5m Mastarm without attachments, FB	DRG.SIZE	SCALE
	A3	AS SHOWN
		REVISION
		C

Spun Lite Poles Ltd claim authorship of this work & retain intellectual & artistic copyright



FABRICATION AND INSTALLATION DIMENSIONS (mm)

OUTREACH ARM 'A'	3000		4000		5000		6000	
No. OF LANTERNS	1 x 6	2 x 6	1 x 6	2 x 6	1 x 6	2 x 6	1 x 6	2 x 6
SETBACK 'S' (Without arm)	23	32	34	46	47	61	65	86
ANGLE $\alpha$ (Without arm)	0.22°	0.31°	0.32°	0.44°	0.45°	0.58°	0.60°	0.78°



Design is in Accordance With The Following Design Codes/Standards:

- AS/NZS 1170.0:2002 - Structural Design Actions - Part 0: General Principles
- AS/NZS 1170.1:2002 - Structural Design Actions - Part 1: Permanent, Imposed and Other Actions
- AS/NZS 1170.2:2002 - Structural Design Actions - Part 2: Wind Actions
- AS/NZS 1170.3:2002 - Structural Design Actions - Part 3: Snow and Ice Actions
- NZS 3404: 1997 - Steel Structures Standard
- NZS 3101: 2006 - Concrete Structures Standard
- AS/NZS 4678: 2000 - Structural Design Requirements for Utility Services Poles
- AS 4100: 1998 - Steel Structures Standard (not currently applicable)
- BS EN 40-3-3-2003 - Lighting Columns Part 3-3 - Design and Verification by Calculation

Design Criteria:

Design Working Life:	50yrs
Importance Level:	2
Wind Region:	W
Regional Wind speed - Ultimate limit state:	51m/s
Regional Wind speed - Serviceability limit state:	43m/s
Terrain Multiplier:	2
Estimated Pole Frequency:	2.28 hz
Most top Horizontal Deflection:	162mm

Mast Loadings:

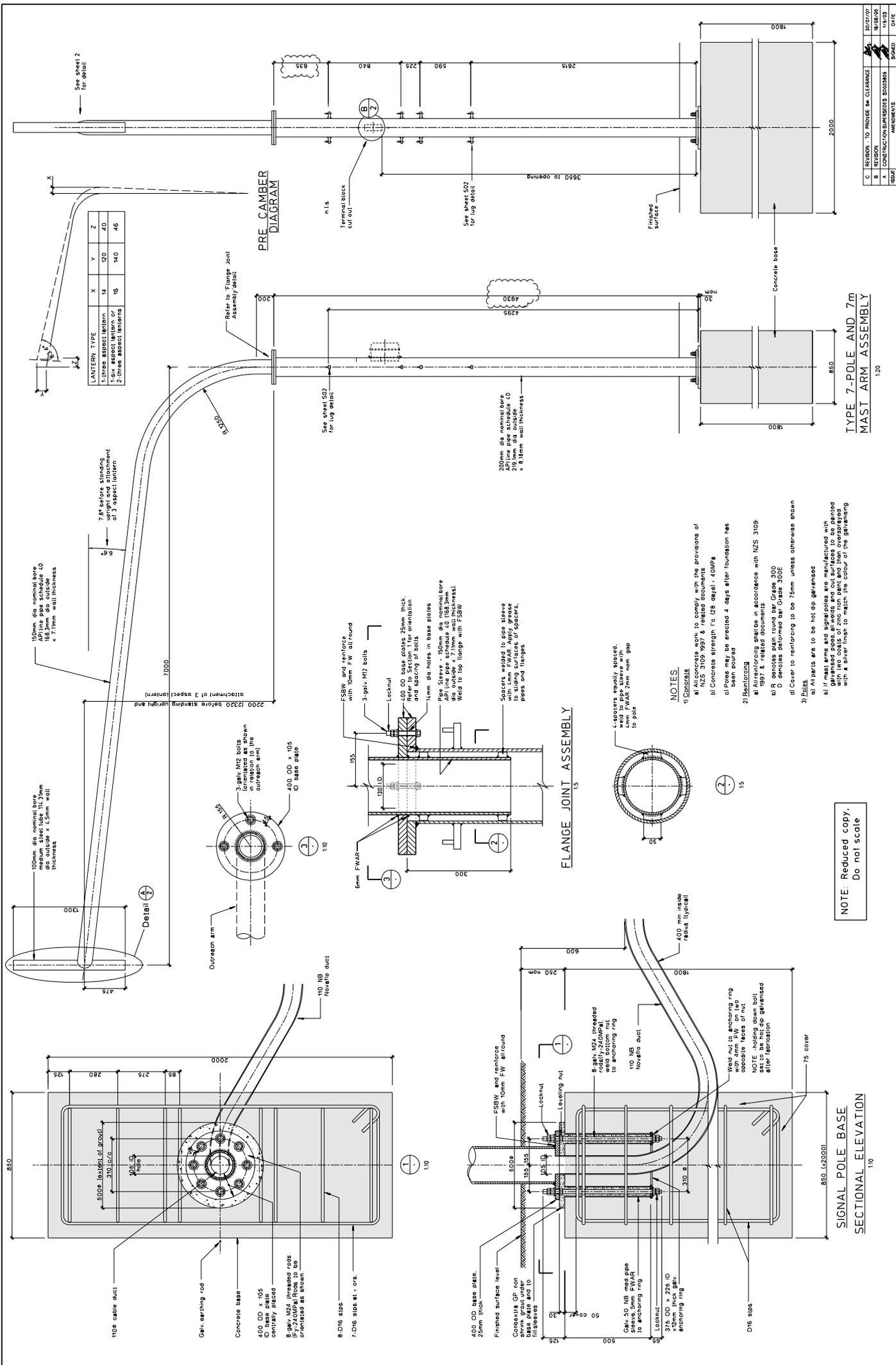
- 5.0m traffic arm - 1.0 x 1.4m Target Board with Total Max loading of 1.68sqm and 80kg
- Mast - Max loading of 1.68sqm and 80kg

Structural Notes:

- Concrete compressive strength ( $f_c$ ) at 28 days.
  - Standard foundation (Ground planted pole) - 17.5 MPa.
  - Alternative foundation (Detail 2) - 20 MPa.
- Materials & workmanship to be in accordance with NZS 3109.
- Reinforcing bars shall comply with NZS 3402: 1989
  - 'R' denotes grade 300 plain bar, 'D' denotes grade 300 deformed bar.
- Steel workmanship to be in accordance with NZS 3404.
- Flats shall comply with AS 3679, grade 250.
- Plate shall comply with AS 3678, grade 250.
- Hollow sections shall comply with AS 1163.
- Steelwork to be hot dip galvanised after fabrication.
- Client responsible for orientation and location.
- Contractor to check location of services before commencing work.
- Provide conduit for cable entry as required.
- Minimum allowable soil bearing pressure shall be 100 kPa (A site evaluation by a Civil/Geotechnical Engineer is advisable).

Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
B	Initial issue	-	-	-	Design Working Life: -
C	Revised for project 'Tag#_Project'	BD	DE	09/14	Importance Level: -
					Wind Region: -
					Terrain Category: -
					Site Elevation: -

<p>611 Halswell Junction Rd, Hornby Christchurch 8042, New Zealand p (03) 349 7853 f (03) 349 6529 t (0800) 845 845 www.spunite.co.nz</p>	PROJECT: Christchurch City Council Type 7 JUMA Pole ADDRESS: Christchurch	PROJECT NUMBER	SHEET	
	TITLE: CCC Type 7 JUMA Column - 7m Mastarm without attachments, FB	DWG #	C1	
	Spun Lite Poles Ltd claim authorship of this work & retain intellectual & artistic copyright	DRG.SIZE	SCALE	REVISION
		A3	AS SHOWN	C



LANTERN TYPE	X	Y	Z
1-line aspect lantern	14	20	40
1-line aspect lantern or 2-line aspect lantern	15	14.0	46

- NOTES**
- General
    - Concrete work to comply with the provisions of NZS 3109:1997 & related documents
    - Concrete strength f<sub>cu</sub> 28 days = 40MPa
    - Poles may be erected 4 days after foundation has been poured
  - Painting
    - Anticorrosion galvalume in accordance with NZS 3109
    - 8 galvanneal base plate, 300 OD devices galvalume bar Grade 300E
    - Cover to reinforcing to be 75mm unless otherwise shown
  - Galv.
    - All parts are to be hot dip galvanized
    - Flange plates, hot rolled plates, reinforcement with galvanized plates, all welds and cut surfaces to be painted with live coats of zinc rich paint and then overpainted with a silver finish to match the colour of the galvanizing

NOTE: Reduced copy.  
Do not scale.

**SIGNAL POLE BASE  
SECTIONAL ELEVATION**

**TYPE 7-POLE AND 7m  
MAST ARM ASSEMBLY**

1:20

REVISION	TO PROVIDE	BY	CHECKED	DATE
C	CONSTRUCTION	AS SHOWN		10/07/07
A	CONSTRUCTION	AS SHOWN		14/03
B	CONSTRUCTION	AS SHOWN		14/03

CONTRACT NUMBER	254/025088/1/5
FILE REFERENCE	254/025088/1/5
DRAWING NUMBER	SD027201
SHEET	S05 of 8

PROJECT TITLE  
**STANDARD TRAFFIC SIGNAL POLES  
AND CONTROLLER BASE**

PROJECT TITLE  
**TYPE 7-POLE AND 7m  
MAST ARM ASSEMBLY**



DATE	NAME	STATUS	DATE	APPROVED
12/02/07	L. Gwynne	DESIGNED	12/02/07	[Signature]
18/02/07	S.D. Smith	DES. REVIEW	18/02/07	
19/02/07	T. Williams	DRAWN	19/02/07	
19/02/07	L. Gwynne	CHKD	19/02/07	

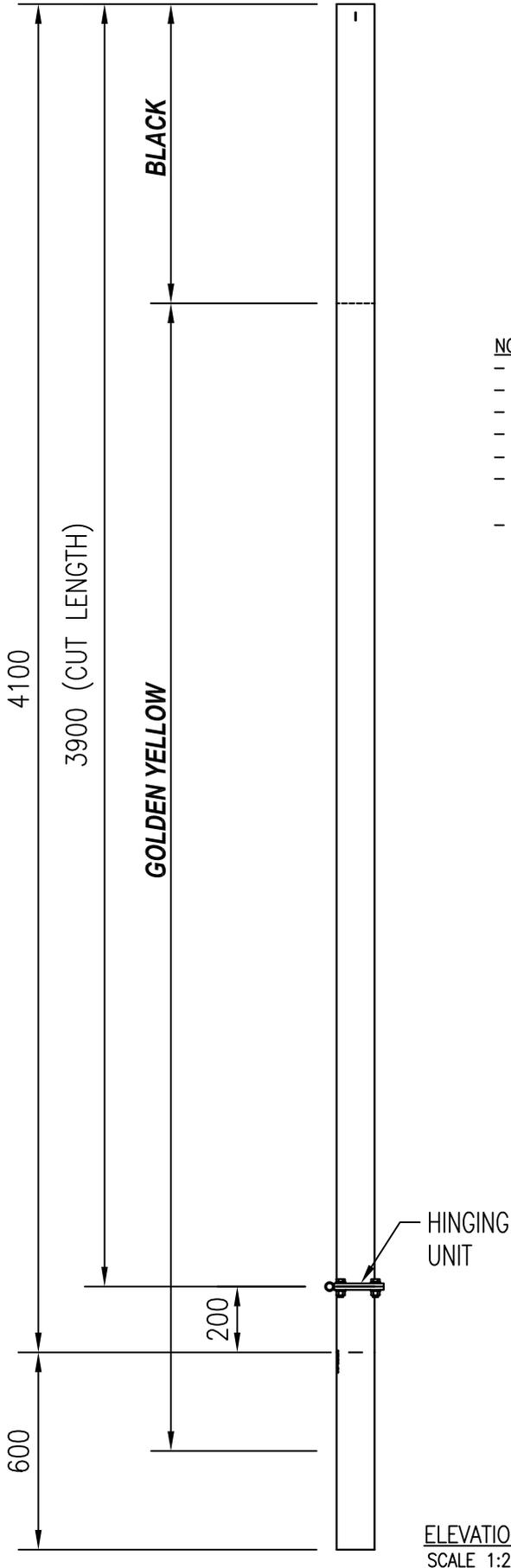


**DESIGN PARAMETERS:**

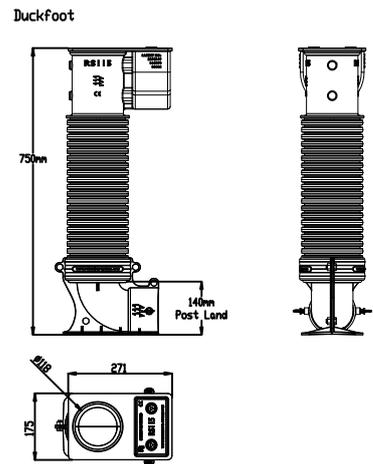
DESIGN WORKING LIFE	- 50 YEARS
IMPORTANCE LEVEL	- 2
WIND REGION	- 45 M/S
TERRAIN / HEIGHT MULTIPLIER	- 2
SHIELDING MULTIPLIER	- 1
HILL SHAPE MULTIPLIER	- 1
LEE ZONE MULTIPLIER	- 1 (TO A MAXIMUM OF 1.35)

**NOTES**

- MINIMUM ALLOWABLE SOIL BEARING PRESSURE SHALL BE 100 Kpa.
- CLIENT TO PROVIDE ORIENTATION AND LOCATION.
- CLIENT TO PROVIDE CONDUIT FOR CABLE ENTRY AS REQUIRED.
- CONTRACTOR TO CHECK LOCATION OF ALL SERVICES BEFORE COMMENCING WORK.
- HOT DIP GALVANIZING TO AS/NZS 4680 AFTER FABRICATION.
- FOUNDATION DESIGN INFORMATION IS SUPPLIED AS A GUIDE ONLY AND MUST BE IN ACCORDANCE WITH THE COLUMNS PS1 AND GEOTECH REPORT.
- PREP AND PAINT EXTERIOR 'GOLDEN YELLOW' AND 'BLACK' TO APPROVED 10 YEARS PAINT SYSTEM



RETENTION SOCKET FOUNDATION TO BE SPECIFIED BY CCC ENGINEER



Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
2	Initial issue	-	-	-	Design Working Life: -
3	Revised for project 'MASTERS'	BD	DE	10/14	Importance Level: -
4	Retention Socket Design	DE	BD	03/15	Wind Region: -
					Terrain Category: -
					Site Elevation: -

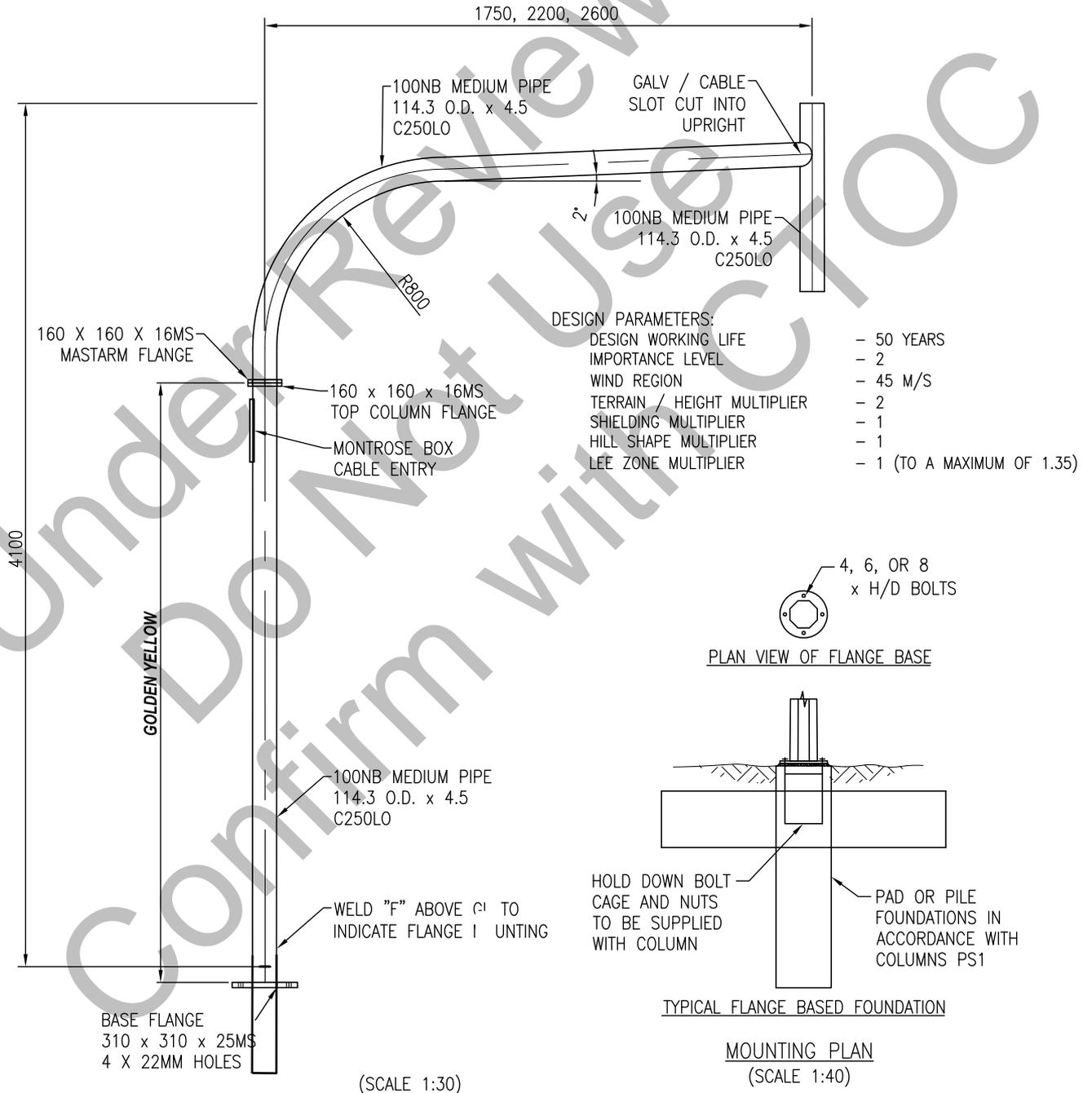
<p>611 Halswell Junction Rd, Hornby Christchurch 8042, New Zealand p (03) 349 7853 f (03) 349 6529 fp (0800) 845 845 i www.spunlite.co.nz</p>	PROJECT: Christchurch City Council ADDRESS: CHRISTCHURCH	PROJECT NUMBER (Tag#_Project)	SHEET C1
	TITLE: CCC Type 8 Hinged NASSRA RS Pole - Painted Retention Socket - RS115 x 750 Spun Lite Poles Ltd claim authorship of this work & retain intellectual & artistic copyright	DRG.SIZE A4	SCALE AS SHOWN

**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.
- ONLY APPROVED LIGHT FITTINGS MAY BE USED, NO ADDITIONAL ATTACHMENTS CAN BE PLACED ON POLE WITHOUT SPUNLITE'S APPROVAL. (MAXIMUM LIGHT SIZE=0.15m<sup>2</sup> WITH A CD=1.0, MAXIMUM LIGHT WEIGHT=15kg)
- ALL DIMENSIONS SHOWN ARE NOMINAL.

**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.



Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
A	Initial issue	DE	-	07/15	Design Working Life: - Importance Level: - Wind Region: - Terrain Category: - Site Elevation: -

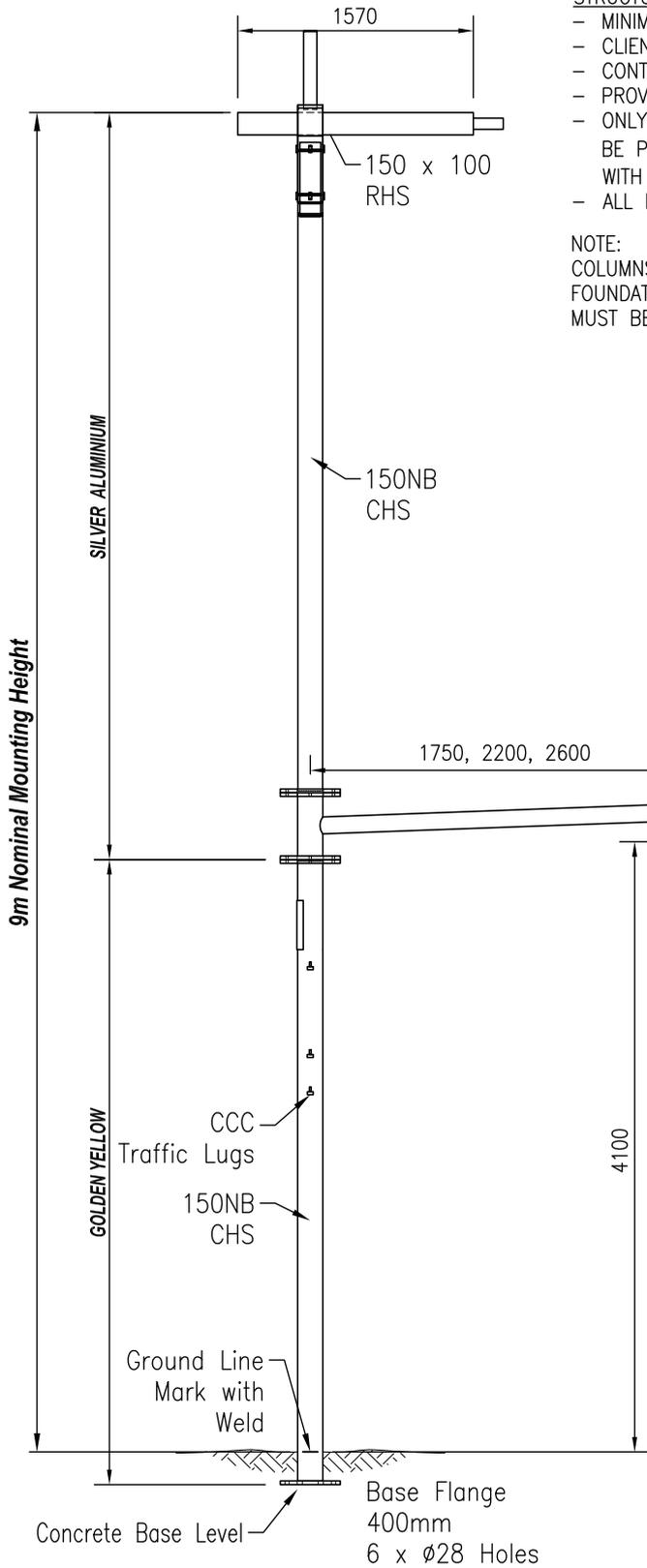
PROJECT: NATIONAL TRAFFIC SPECIFICATION - GENERIC POLE DESIGNS		PROJECT NUMBER		SHEET
ADDRESS: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS		-		C15
TITLE: SPUNLITE TYPE 9 CYCLE MAST ARM COLUMN		DRG.SIZE	SCALE	REVISION
100NB - RS115 RETENTION SOCKET		A4	AS SHOWN	A

**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.
- ONLY APPROVED LIGHT FITTINGS MAY BE USED, NO ADDITIONAL ATTACHMENTS CAN BE PLACED ON POLE WITHOUT SPUNLITE'S APPROVAL. (MAXIMUM LIGHT SIZE=0.15m<sup>2</sup> WITH A CD=1.0, MAXIMUM LIGHT WEIGHT=15kg)
- ALL DIMENSIONS SHOWN ARE NOMINAL.

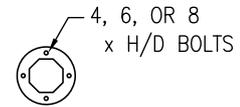
**NOTE:**

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.

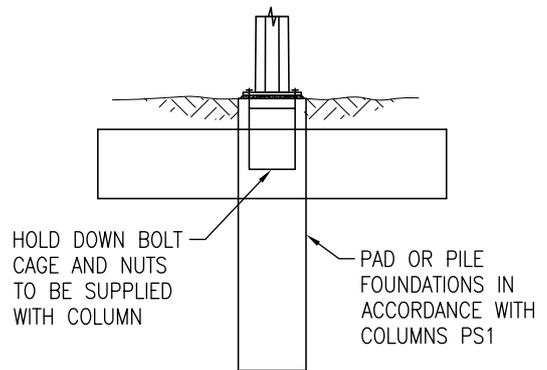


**DESIGN PARAMETERS:**

- 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)



PLAN VIEW OF FLANGE BASE



TYPICAL FLANGE BASED FOUNDATION

FOUNDATION DETAILS TO BE IN ACCORDANCE WITH CCC ENGINEERS DESIGN (SCALE 1:50)

MOUNTING PLAN (SCALE 1:40)

Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
A	Initial issue	DE	-	07/15	Design Working Life: - Importance Level: - Wind Region: - Terrain Category: - Site Elevation: -

PROJECT: NATIONAL TRAFFIC SPECIFICATION – GENERIC POLE DESIGNS		PROJECT NUMBER		SHEET
ADDRESS: NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS		-		C16
TITLE: SPUNLITE TYPE 10 CYCLE JOINT USE MAST ARM (JUMA) FLANGE MOUNT c/w STREET LIGHTING EXTENSION		DRG.SIZE	SCALE	REVISION
		A4	AS SHOWN	A

SOIL BEARING PRESSURE SHALL BE 100 Kpa.  
 ORIENTATION AND LOCATION.  
 CHECK LOCATION OF ALL SERVICES BEFORE COMMENCING WORK.  
 PROVIDE CONDUIT FOR CABLE ENTRY AS REQUIRED.

COMPLETELY HOT DIP GALVANIZED.  
 DESIGN INFORMATION IS SUPPLIED AS A GUIDE ONLY AND  
 SHALL BE IN ACCORDANCE WITH THE COLUMNS PS1 AND GEOTECH REPORT.

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)

**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.  
 DESIGN INFORMATION IS SUPPLIED AS A GUIDE ONLY AND  
 SHALL BE IN ACCORDANCE WITH THE COLUMNS PS1 AND GEOTECH REPORT.

Note: Bottom of Cycle Lantern to be mounted at 2.4 m above G.L.

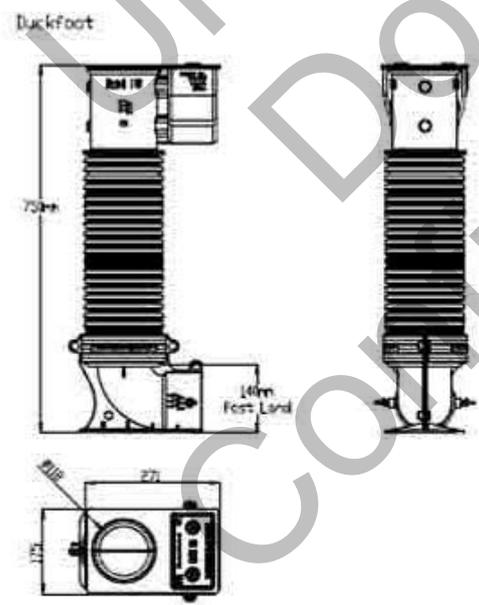
DESIGN PARAMETERS:

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)

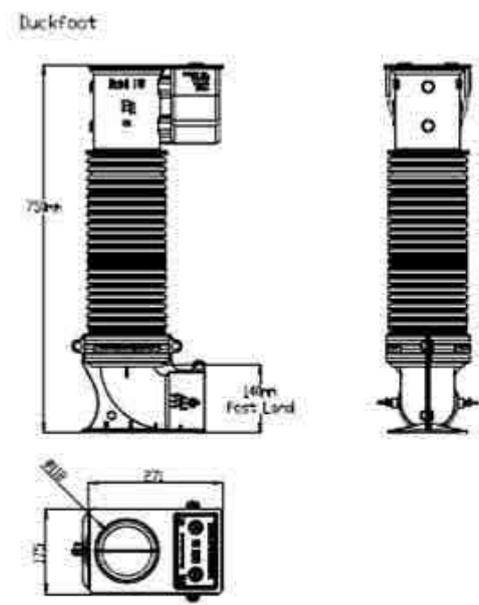


4700

4100



IPL RS114 RETENTION SOCKET PLAN



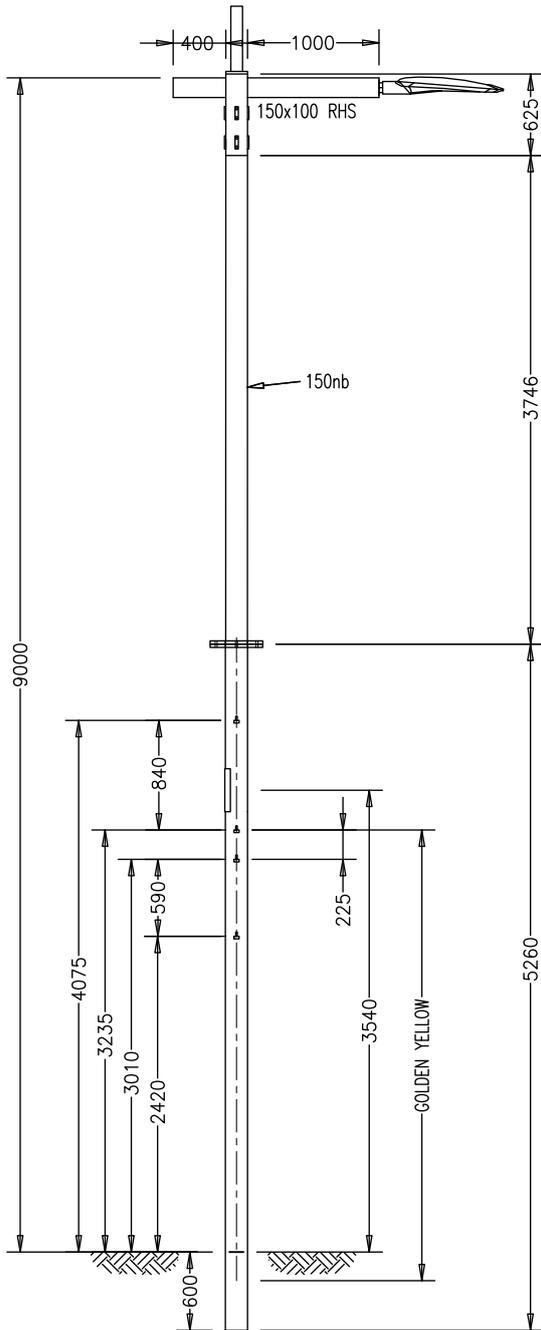
IPL RS114 RETENTION SOCKET PLAN

By	Chk	Date	DESIGN PARAMETERS:
DE	-	09/16	Design Working Life: - Importance Level: - Wind Region: - Terrain Category: - Site Elevation: -

TRAFFIC SIGNALS	PROJECT NUMBER		SHEET
	-		C8
CYCLE HOOP	DRG. SIZE	SCALE	REVISION
	A4	AS SHOWN	A

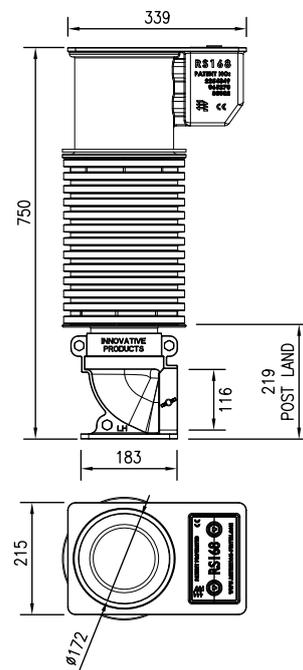
By	Chk	Date	DESIGN PARAMETERS:
DE	-	09/16	Design Working Life: - Importance Level: - Wind Region: - Terrain Category: - Site Elevation: -

TRAFFIC SIGNALS	PROJECT NUMBER		SHEET
	-		C8
NASSRA POLE with CYCLE HOOP RETENTION SOCKET	DRG. SIZE	SCALE	REVISION
	A4	AS SHOWN	A



ELEVATION  
SCALE 1:40

RETENTION SOCKET FOUNDATION TO BE  
SPECIFIED BY CCC ENGINEER



MOUNTING PLAN  
SCALE 1:10

Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
1	Initial issue	-	-	-	Design Working Life: -
2	JUSP Traffic Pole - Retention Socket Design	DE	JF	03/15	Importance Level: - Wind Region: - Terrain Category: - Site Elevation: -

**SPUNLITE POLES**  
 611 Halswell Junction Rd, Hornby  
 Christchurch 8042, New Zealand  
 p (03) 349 7853 f (03) 349 6529  
 fp (0800) 845 845  
 i www.spunlite.co.nz

PROJECT: Christchurch City Council  
 ADDRESS: CHRISTCHURCH  
 TITLE: 9.0mtr Joint Use Signal Pole - 150NB - CBD Design  
 Retention Socket Design - RS168 x 750mm Duckfoot  
 Spun Lite Poles Ltd claim authorship of this work & retain intellectual & artistic copyright

PROJECT NUMBER	SHEET
DWG #	C1
DRG.SIZE	SCALE
A3	AS SHOWN
REVISION	1



Appendix G – CTOC Commissioning Sheet



INTERSECTION NAME: NUMBER:	DATE:
-------------------------------	-------

Contract Name & Number
Commencement Date
Signals & Civils Contractor

PRE-INSPECTIONS	Y/N / N/A	
Loops Positioned Correctly		
Recorded Loop Positions		
Texiphalte Installed Cleanly		
>12mm Loop Feeder Cover		
Comms Reliable (48 Hrs min prior to commissioning)		
Camera Reliable with presets		
OPERATIONS	Y/N / N/A	
Check Fault Log Clear		
<i>Full Start Up:</i>		
Flash Test Each SG		
Flashing Ambers Working		
Check Camera Works in FY		
Check All Red (SPT=10s)		
Revision on Correct Phases		
All Default Phases Call		
Test Facility Switch		
Check SCATS Control of FY and Lamps Off		
<i>After Full Start Up:</i>		
Ped Protection OK		
Mains off-on. Contr Ops OK?		
POLES	Y/N / N/A	
Correct Location		
Concrete Collar (500mm)		
Ground Sockets level with surface		
Painted / Powder Coating		
Fold Down Poles Work		
Pole Numbers Installed		
Live Power Warning Labels on All Poles		
LANTERNS	Y/N / N/A	
<i>Vehicle Lanterns:</i>		
Attached & Aligned Correctly		
Correct Height (3.2m-4.1m)		
Directional Arrows Aligned		
Louvers Installed Correctly		
Correct Visors Installed (entry/exit cowls)		
<i>Ped Lanterns:</i>		
Attached Correctly		
Ped Lantern Height/Align (3m)		
Correct Visors Installed		
ILLUMINATED SIGNS	Y/N / N/A	
Location, Height and Alignment OK		

INTERSECTION NAME:	DATE:
NUMBER:	

PEDESTRIAN / CYCLE CROSSING	Y/N / N/A					
<i>Push Buttons:</i>						
Installed Correct Height (0.9m)						
Audio Volume & Ambient Control OK						
Mutable Unit OK (if fitted)						
Arrow Aligned to Crossing						
Tactile Vibration OK						
Cycle Call Accept OK						
<i>Ped Detectors:</i>						
Pads/Camera Installed OK						
Pad/Camera Activates OK						
Instruction Labels Installed						
Full walk through both directions						
CONTROLLER	Y/N / N/A					
Make, Type & Size						
Signal Groups Size / No. Of	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">8</td> <td style="padding: 2px 5px;">12</td> <td style="padding: 2px 5px;">16</td> <td style="padding: 2px 5px;">24</td> <td style="padding: 2px 5px;">32</td> </tr> </table>	8	12	16	24	32
8	12	16	24	32		
Detector Card Size / No. of	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">8</td> <td style="padding: 2px 5px;">12</td> <td style="padding: 2px 5px;">16</td> <td style="padding: 2px 5px;">24</td> <td style="padding: 2px 5px;">32</td> </tr> </table>	8	12	16	24	32
8	12	16	24	32		
Det Card Operation Check						
Gland Plate Labels (On top)						
Cabel Looms Labels (Under)						
Detector Switches Labelled						
Signal Groups Numbered						
Detector Block Numbered						
All Circuit Breakers Labelled						
Separate Circuit Breaker for Streetlight Labelled						
Main Switch Labelled						
Cable Glands Sealed						
Service Light Working						
Live Power Warning Sign on Cabinet						
Spare Sockets Working						
Wiring Tidy						
Logic Rack & Cabinet Secure						
Door Seals & Locks						
VEHICLE DETECTORS	Y/N / N/A					
KJB 100mm Concrete Surround						
KJB 20mm Concrete Pad						
Loop Joins with Scotchlok 314						
>1.8m Slack in Contr Base						
>0.5mm Slack in KJB						
Each Loop Detects Reliably						
Loops Detect Cycles where Required						
Kerb Accesses Correct and Sealed						

<b>INTERSECTION NAME:</b> <b>NUMBER:</b>	<b>DATE:</b>
---	--------------

<b>CABLING &amp; EARTHING</b>	<b>Y/N / N/A</b>
-------------------------------	------------------

Communication Provider Connections Identified		
Street Lighting Labelled		
RCD's Labelled		
Draw Cables Installed / Work		
Controller Cabinet Earthed		
Spare Cores Connected Together, Earthed		
1m Cable Slack in Chambers		

<b>CIVIL WORKS</b>	<b>Y/N / N/A</b>
--------------------	------------------

Chambers Level with Surface		
Plastered Inside Chamber		
Kerbing Installed Correctly		
Road Surface Condition		
Footpath Surface Condition		
Direction Pavers Installed / Aligned		
Tactile Warning Pavers Installed / Aligned		
Road Markings Installed		
Drainage. Esp at Crossings		
Grass Berms Restored		
Correct Signage Installed		

<b>DOCUMENTATION</b>	<b>Y/N / N/A</b>
----------------------	------------------

In Controller ( <i>Laminated</i> )		
Controller Information Sheet		
Intersection As-Built Drawings		
Loop Detector Test Readings		
Copy of Electrical CRC		
Warranty Information Documented		
Log Book		

<b>OTHER</b>
--------------

--

<b>COMMISSIONING / SWITCH ON DATE:</b>
--

<b>CTOC Representative:</b> Sign:	Date:
--------------------------------------	-------

<b>Signals Contractor:</b> Sign:	Date:
-------------------------------------	-------



Appendix M – Cyclist Call Buttons





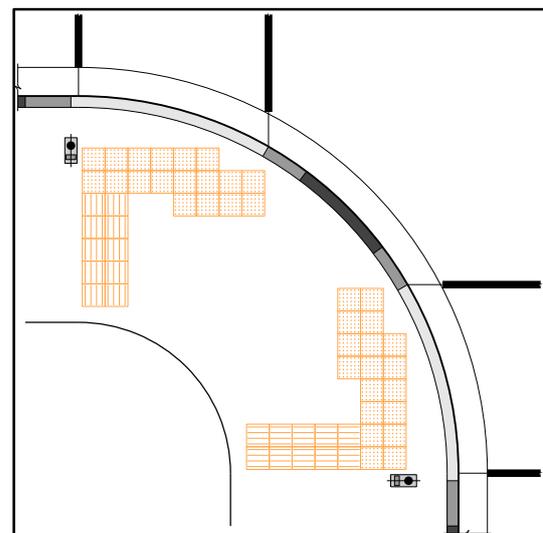
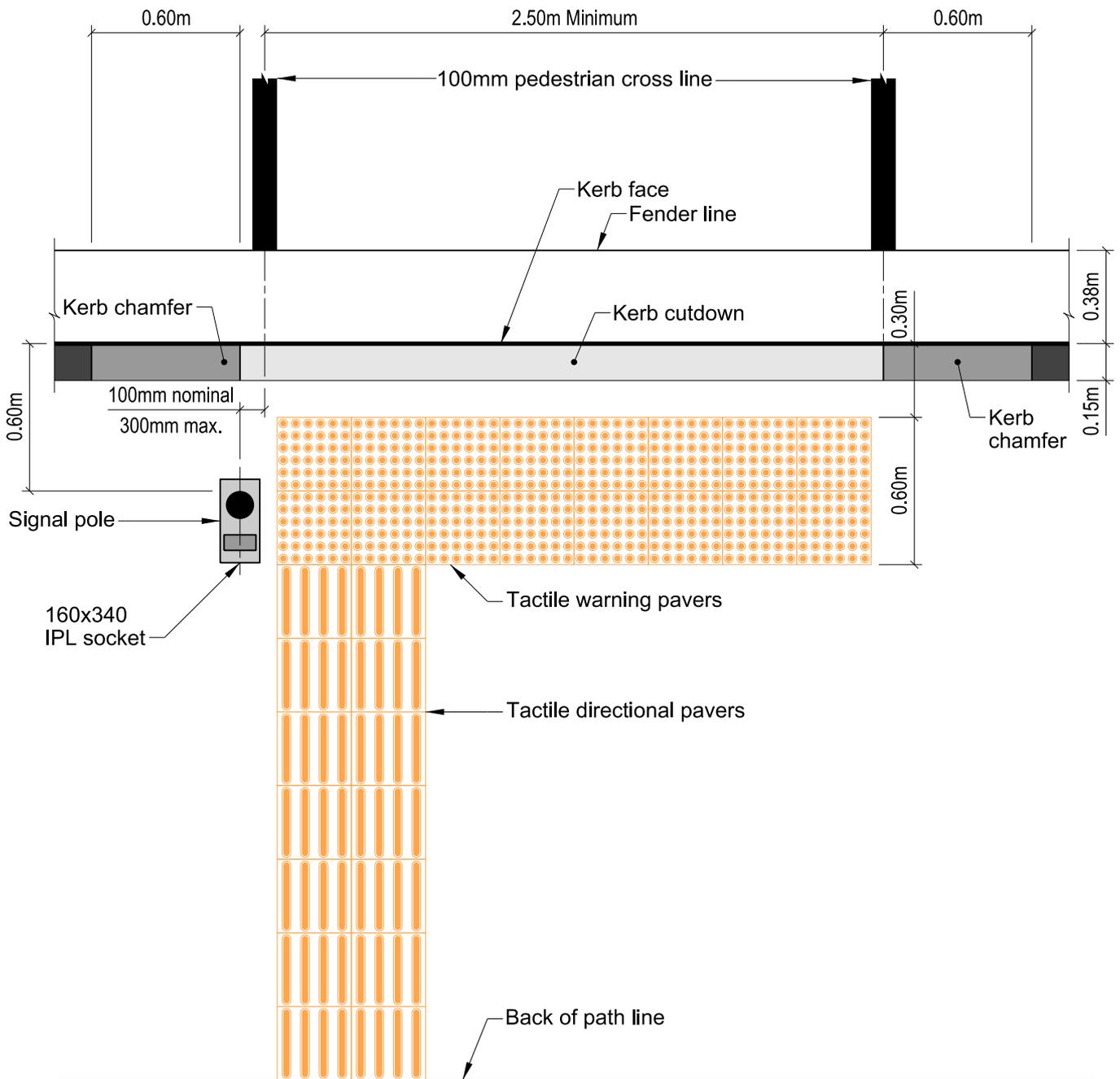
Detail Of CTOC  
Cyclist Call Button

Jeff Owen  
19/02/2019



Appendix O – Traffic Signal Pole Location Relative to Kerb Cutdown





Corner Rounding Detail



Appendix P – Vehicle Detector Loop Settings and Measurements Record



# Vehicle Detector Loop Settings and Measurements Record



Location

Detector Manufacturer's name

Date of Loop installation

Site identification number

Detector model

Date data collected

Loop number	Loop				Loop & feeder cable				Detector data					
	Insulation resistance (M)	Resistance ( $\Omega$ )	Q	Inductance ( $\mu$ H)	Frequency	Resistance ( $\Omega$ )	Q	Insulation resistance (M)	Inductance ( $\mu$ H)	Sensitivity setting	Frequency (kHz)	Mode Passage/ Presence	Inductance ( $\mu$ H)	Q or Manufacturer information
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														

Approved by:

TCS Rep

Date:



Appendix Q – Access Chamber and Cover





Access Chamber Cover and Surround



Access Chamber Ducting

## Detail Of CTOC Access Chamber

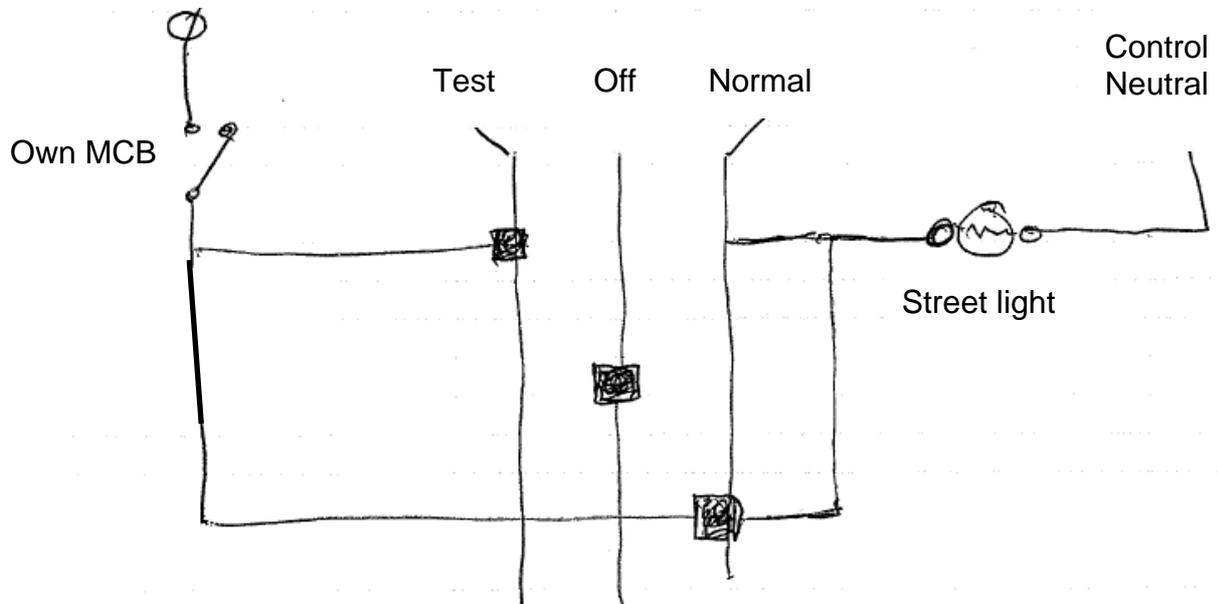
Jeff Owen  
06/06/2018



# Appendix R – Streetlight Connections



Supply Phase (Mains, UPS, Generator)



**Kraus & Naimer**  
BLUE LINE switchgear

		CA10	A240				
<b>Face Plate</b>							
		1	3	5	7	9	11
		2	4	6	8	10	12
Switching Angle	60						
Total switching Angle	120						
0 OFF	270						
	285						
	300						
	315						
1 NORM	330	█					
	345						
	0						
	15						
2 TEST	30		█				
	45						
	60						
	75						



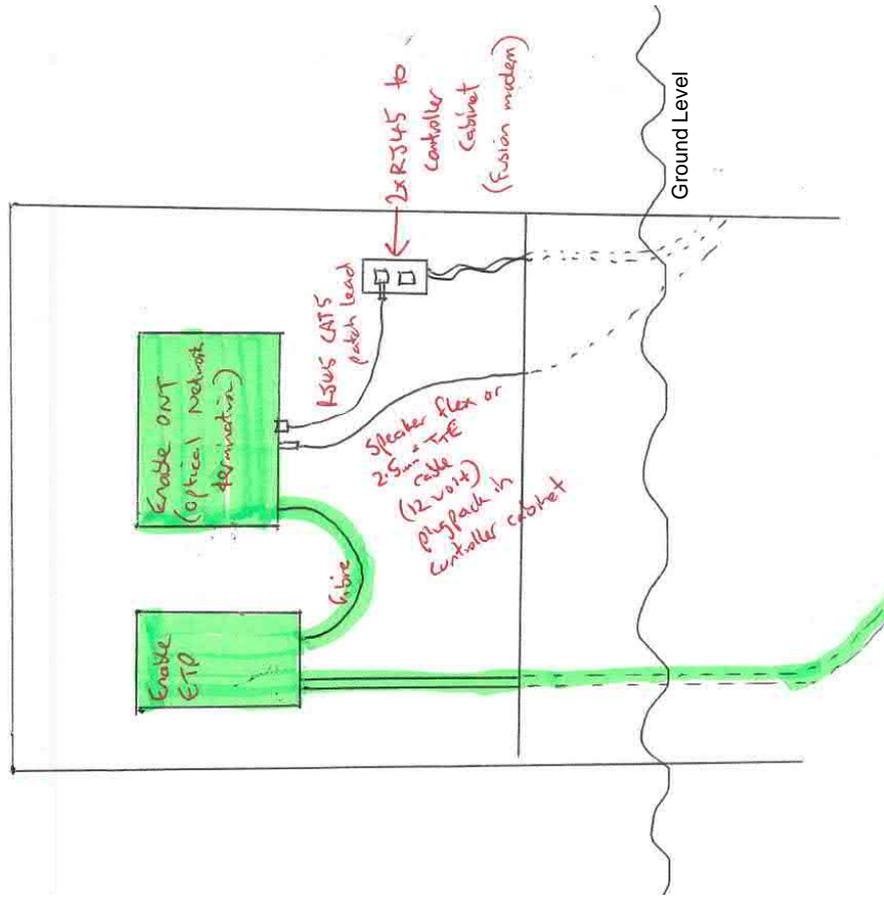
Appendix S – UFB Fibre Connections



Highlighted items are to be supplied by Enable Networks

All others (incl cabinet) by the Signals Installation Contractor

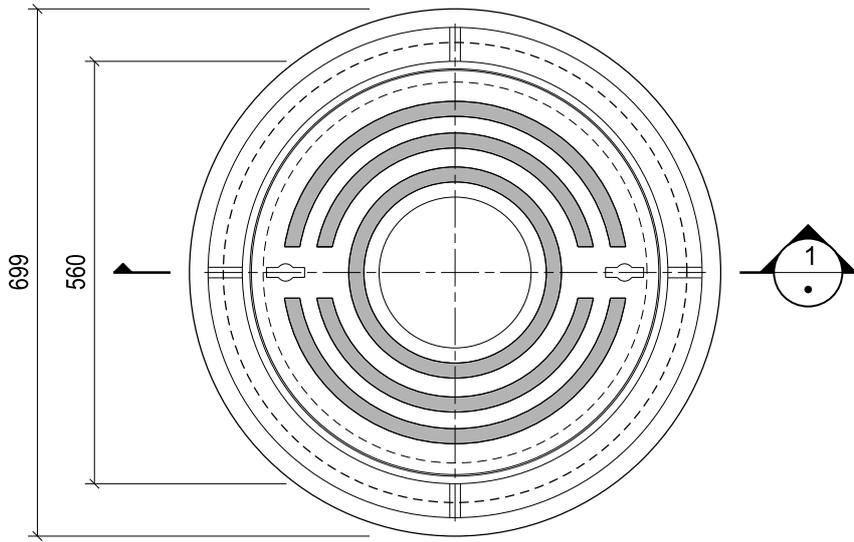
GE EH2 cabinet (mid size)



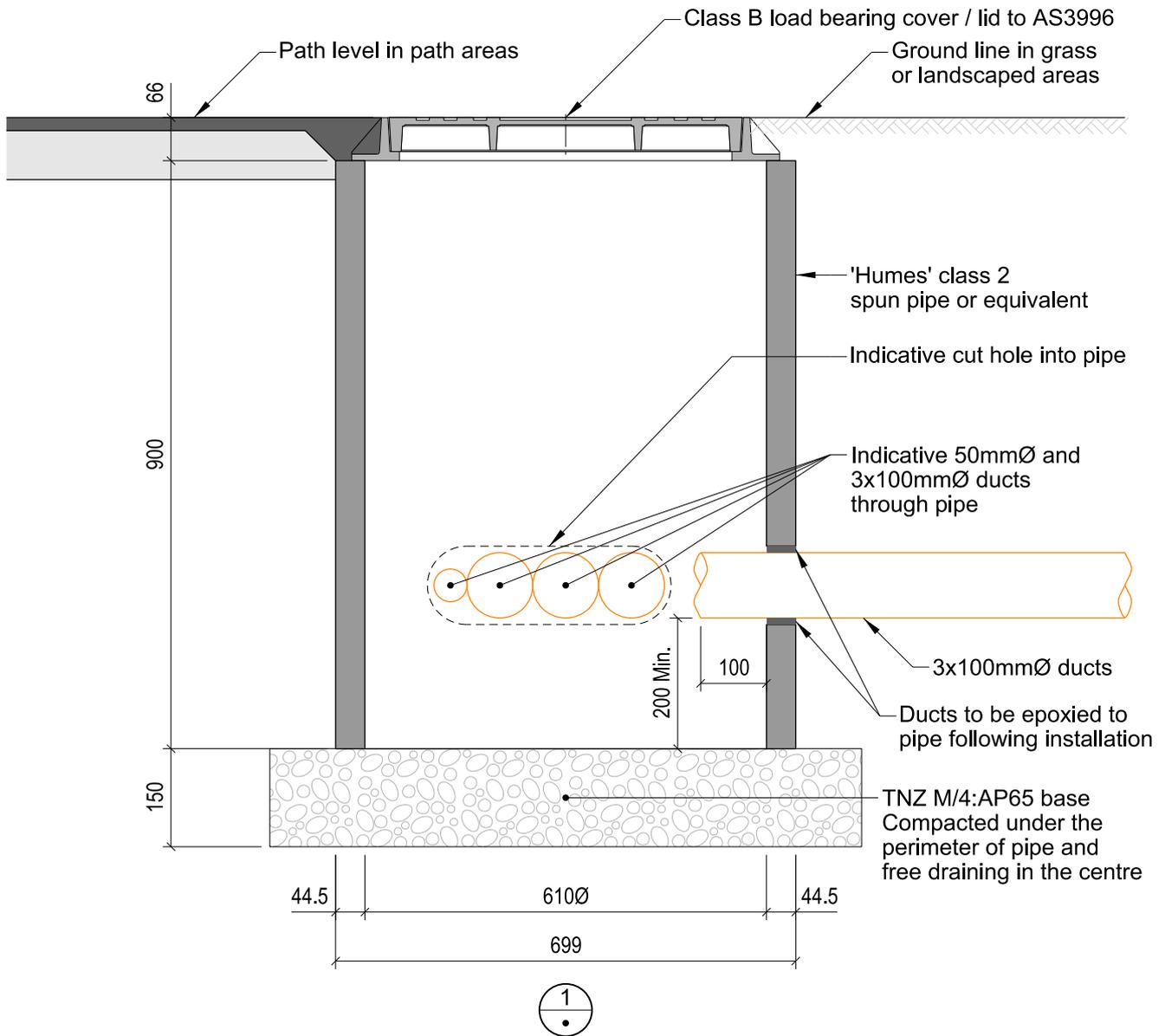


Appendix T – Signal Duct Access Chamber





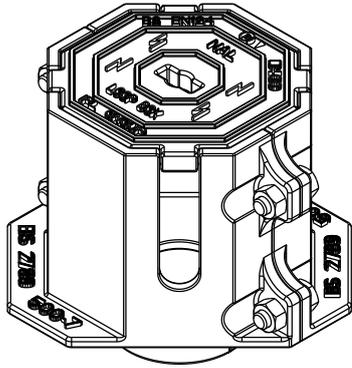
PLAN



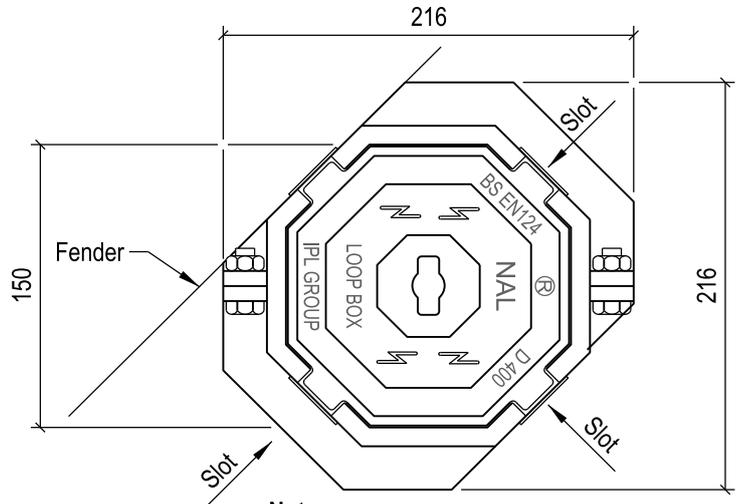


Appendix U – Carriageway Loop Box





ORTHOGRAPHIC

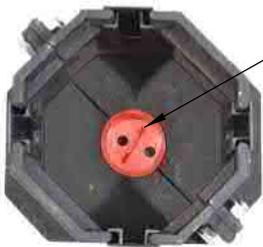


Notes:

- 1) Entry slots to be aligned with fender as shown.
- 2) Entry slots must be sealed if not in use.

PLAN

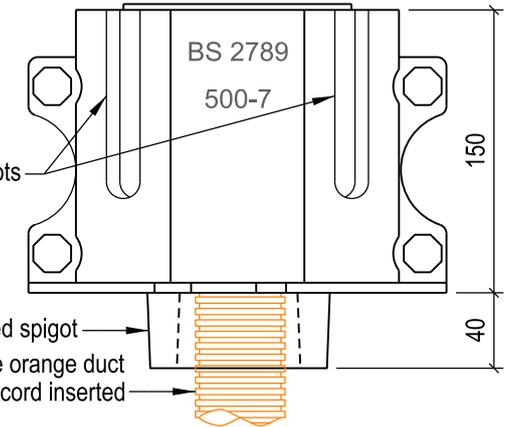
1:4



Carriageway loop box must be provided with a base sealing plug which allows the loop cables to pass through it complete with 2x 6mm rubber grommets.

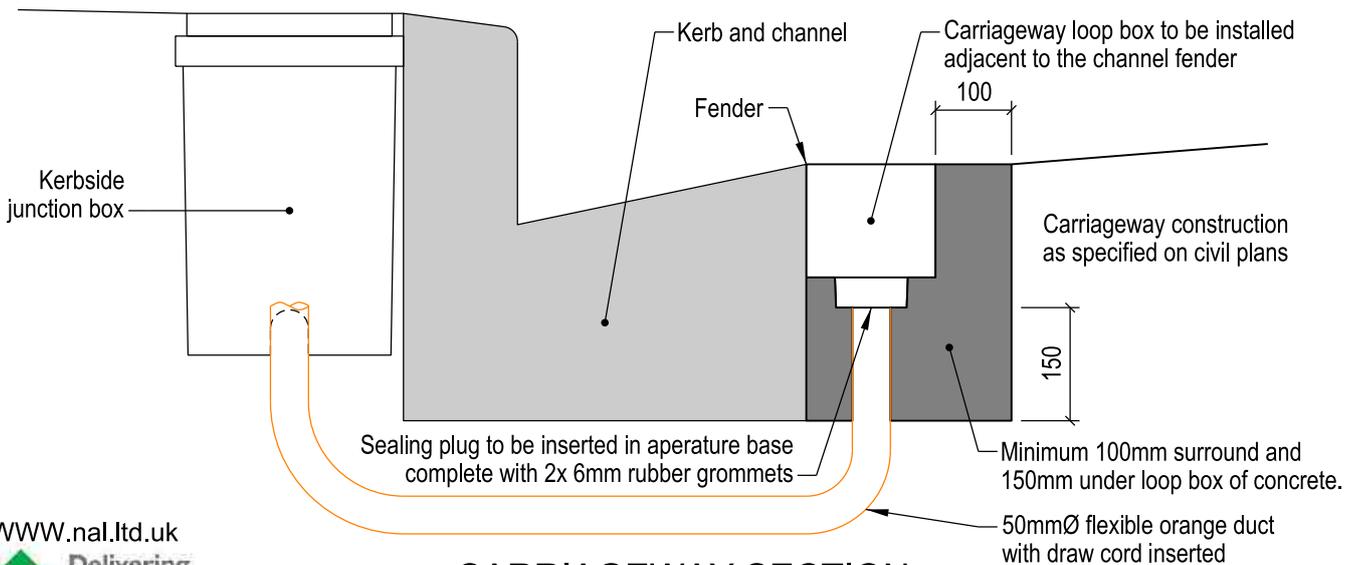


LID ELEVATION



ELEVATION

1:4



CARRIAGEWAY SECTION

1:10



Appendix V – Fault Response Times



Priority Level	Definition	Deadline for RAMM Dispatch Status: Onsite, Work Started	Deadline to Make Safe	Deadline for Works Completed
<b>1</b>	<p>Onsite Response time – 24hr /7days (no exception) One of, or a combination of, the following events:</p> <ul style="list-style-type: none"> <li>• Any issue raised via SCATS Alarm</li> <li>• Any operational issue that would quickly deteriorate road safety or optimisation if not resolved ASAP</li> <li>• Any Fault and/or Damage that may affect Customer or road user safety, including: <ul style="list-style-type: none"> <li>○ All Affected Assets at Site being inoperable - Blackout</li> <li>○ Signals flashing yellow</li> <li>○ Signals not changing</li> <li>○ Communication issue that affects optimisation across multiple intersections or Critical Sites (as defined in the Asset Register).</li> </ul> </li> <li>○ Multiple red or green lamps not working on an intersection approach</li> <li>○ Signals showing multiple or ambiguous conflicting indications</li> <li>○ Pedestrian phase inhibited</li> <li>○ Pedestrian push Button unit not demanding or presenting a permanent demand</li> <li>○ Audible tactile device not working</li> <li>○ Physical, mechanical, electrical or operational problem for the public</li> </ul> <ul style="list-style-type: none"> <li>• Any Damage to a Primary Signal Pole that stops its operation</li> <li>• Any fault of School Zone Speed Signs that stops its operation or creates driver confusion.</li> <li>• Any Affected Asset Fault that Police, CTC or RCA request urgent attention.</li> <li>• Any Fault and/or Damage that is likely to cause excessive vehicle queues, abnormal traffic conditions or excessive public transport delays</li> </ul>	<p>1 hour from Identification</p>	<p>2 hours from Identification</p>	<p>4 hours from Identification</p>
<b>2</b>	<p>Normal Work hours.</p> <ul style="list-style-type: none"> <li>• Fault or Damage to Vehicle and Cycle Induction Detection Loops fitted at intersection / Site stop-line or in pathway approach (if not determined Priority Level 1).</li> <li>• Fault or Damage to Poles (if not determined Priority Level 1).</li> </ul> <p>Normal Work Hours.</p> <ul style="list-style-type: none"> <li>• Fault or Damage to School Zone Speed Signs (if not determined PL1)</li> </ul>	<p>1 hour from Identification</p>	<p>2 hours from Identification</p>	<p>5 calendar days Identification</p>
		<p>1 hour from Identification</p>	<p>N/A</p>	<p>Before the next School Sign Activation Period.</p>

Priority Level	Definition	Deadline for RAMM Dispatch Status: Onsite, Work Started	Deadline to Make Safe	Deadline for Works Completed
<b>3</b>	Normal Work Hours. <ul style="list-style-type: none"> <li data-bbox="363 981 419 1809">• Fault or Damage to CCTV above heights of 5.2 meters (if not determined Priority Level 1).</li> </ul>	1 hour from Identification	N/A	5 calendar days from Identification
<b>4</b>	Normal Work Hours. <ul style="list-style-type: none"> <li data-bbox="467 936 549 1809">• Fault or Damage to Affected Assets in locations below 5.2 meters (not including Vehicle and Cycle Detection Loops) if not determined Priority Level 1).</li> </ul>	4 hours from Identification	N/A	8 hours from Identification
<b>5</b>	Normal Work Hours. <ul style="list-style-type: none"> <li data-bbox="596 1010 652 1809">• Fault or Damage to lanterns above 5.2 meters from the ground (if not determined Priority Level 1).</li> </ul>	N/A	N/A	5 calendar days from Identification

Appendix W – CTOC UPS Installation Specification



# CTOC UPS Installation Specification



## Summary

This document details the specifications for all Uninterruptable Power Supply (UPS) to be installed, upgraded and maintained for the operator Christchurch Transport Operations Centre (CTOC). The UPS is to support and continue operation of Traffic Technology, Traffic Signals, Communications and CCTV in event of a power outage. Development of this document is based on a combination of:

- experience from other TOCs and Technology Suppliers
- the need to be environmentally acceptable
- the need for a process of continual improvement in reliability while reducing costs

Version 005

Last Updated: 30 June 2019

Authors: Zac Smith, Ray Young

Site: CTOC

## Contents

1.1	General requirements .....	3
1.1.1	Consideration to when a UPS is desirable .....	3
1.1.2	Batteries.....	4
1.1.3	Generator socket.....	4
1.1.4	Other loads.....	5
1.1.5	Clarifications to AS5715:2015 .....	5
1.1.6	Labelling requirements for signal controllers on UPS supply .....	5
1.1.7	Wiring and cabling requirements.....	6
1.1.8	Hardware connection requirements .....	7
1.2	Permits, fees, applications, compliance and methodology.....	7
1.2.1	Permits, fees and applications .....	7
1.2.2	Compliance.....	8
1.2.3	Project installation methodology.....	8
1.3	Maintenance, warranty and servicing requirements.....	8
1.4	Preferred equipment types.....	9
1.5	Competitive Market .....	9
1.6	UPS Design build characteristics .....	11
1.6.1	UPS installed within full Size RMS compliant Controller Cabinet. Top-Hat and non-Top-Hat examples .....	11

## 1.1 General requirements

Any pricing provided for the installation of UPS must take into consideration any other work that must be undertaken to bring a site up to a desirable CTOC standard as part of the UPS installation. This document itemises many of the desirable outcomes required. No variance in contractor quoted price will be tolerated as it is expected that the contract will be competent in the installation and maintenance of UPS devices and Traffic Signals technology.

All UPS equipment supplied for this project should reasonably comply with documents as listed below:

- CTOC Regional Special Conditions (most current version at time of installation)
- NZTA P43 (whatever the most current version is)
- AS/NZS 3000:2010
- AS/NZS 5715:2015 with clarifications covered in Section 1.1.1 below

The UPS may be installed in a combination of environments as per the list below. CTOC must approve the suitable method for every situation.

- Separate suitable (approved) UPS cabinet to be placed as close as practical to the main Control Cabinet or Technology requiring a UPS
- Within the same Cabinet as the technology to be supported
- Within an extension (Cabinet TOP HAT) to the main cabinet.

### 1.1.1 Consideration to when a UPS is desirable

UPS is desirable in locations where the absence of an operating set of signals due to power failure and it creates a substantial safety hazard to the public. It could be deemed that this is always the case otherwise why would signals be used. However, some situations are far more dangerous than others and higher consideration has to be given to:

- Intersection size such as three or more lanes that pedestrians or turning traffic may need to cross
- Pedestrian crossing outside a School or in a location where a high number of children cross regularly
- High traffic volume roads
- High speed roads

- High Crash history
- Low power reliability / many power outages that cannot be resolved by other means

### 1.1.2 Batteries

Standardisation of equipment is highly desirable and all UPS's installed in this project shall have the same type of battery unless there is approved upgrade choice. Future installs are to use Lithium Ion batteries due to a requirement for:

- longer battery life-spans (longer warranty),
- higher reliability
- less maintenance
- smaller space requirements
- reduced environmental impact
- elimination of spill kits.

Lithium-Ion "may" require other challenges to be resolved such as better temperature management and risk of explosion which need to be incorporated into the containment design.

Minimum operation time for any UPS site for the designated load will be 5 hours.

Traffic Signal technology with a UPS installed must also have the UPS active signal and a UPS cabinet and controller door open signal wired to external inputs in the traffic signal controller with the desired outcome that any UPS activation or any door opening can be monitored remotely through the SCATS controller alarm system.

The UPS installation contractor will be required to supply and install new signal controller software for the intersection to allow for the two external inputs and to have MSS bit 16 set when the UPS is on and MSS bit 15 set when the UPS door is open. This will enable monitoring of the UPS through SCATS.

If not already present, the contractor is to install and connect door sensors on all cabinets at the intersection, including Top Hats, and connect to the traffic signal controller as described above for the UPS cabinet.

The UPS must have a network port which will support SNMP and a communications module installed to allow access via the web interface of the UPS, for technicians to perform support and maintenance activities.

### 1.1.3 Generator socket

The UPS cabinet must have a generator socket installed. If a UPS is installed in co-existence with another cabinet technology then that cabinet must be fitted with a Generator socket if it is not already fitted.

#### 1.1.4 Other loads

The contractor is to convert any integrated streetlights to LED to reduce load. Any connected load must be configured to reduce current load so that battery packs and UPS device can be minimised as much as possible.

#### 1.1.5 Clarifications to AS5715:2015

The following clarifications apply to AS5715:2015 for UPS's installed in the CTOC managed area.

1. With reference to 5.3.7 the lock supplied must be a single handle locking assembly, with three-point locking and keyed as per the CTOC Regional Special Conditions and NZTA P43 Specification for Traffic Signals (FS880).
2. With reference to 5.3.3, the cabinet shall be attached to a vented base and gland plate as per the CTOC Regional Special Conditions and NZTA P43 Specification for Traffic Signals.
3. With reference to 5.8, a service light MUST be included with UPS's supplied under this specification.

#### 1.1.6 Labelling requirements for signal controllers on UPS supply

When a site is running on UPS, consideration must be given to ensuring that all technicians who access the cabinet are aware that power is present, regardless of the status of the network power supply in the area. It is easy to assume that as there is a local power cut, there is no power in the controller cabinet. It is also important that additional loads, especially inductive loads are not placed on the UPS while it is running in 'Stored Energy' mode, so no external plugs to be installed on the load side of the UPS in the UPS cabinet.

For this reason, the following labelling is required in all signal controllers connected downstream of a UPS.

1. A warning label must be placed on all plug points in the Signal Cabinet (excluding dedicated communication equipment sockets)
  - a. Where the UPS supplied operates as 'Passive Stand-by Operation', the label must read "DO NOT USE PLUG WHILST POWERED BY UPS";
  - b. Where communications equipment is connected to mains power, a dedicated socket must be installed in accordance with the requirements of NZTA P43 Specification for Traffic Signals. This will be detailed on the Site Specific Sheet if required.
2. A warning label must be fitted on the Perspex cover below the main switch with the following wording "SITE IS POWERED BY UPS". This labelling must be red lettering on white label, or white lettering on red label. The lettering must be at least 10mm high.
3. A warning label must be fitted on the top of the door mounted document holder with the following wording "SITE IS POWERED BY UPS". This labelling must be red lettering on white label, or white lettering on red label. The lettering must be at least 10mm high.

4. A warning label must be fitted to the door indicating Hazardous materials. If lead acid batteries are used then the word “Corrosive” must be added to the label (example.. Hazardous/Corrosive materials)

#### 1.1.7 Wiring and cabling requirements

1. Installation of the UPS shall be between the gyro box/ mains power supply and the main cabinet, this will be detailed on the Site Specific Sheet. Where there is no gyro for power isolation, the position will be reviewed prior to the project.
2. When consideration is given to the location of the UPS device cabinet the location of the UPS and Communications and Controller cabinets must be considered as a whole for ideal location rather than in isolation. This will be qualified by CTOC at the design stage.
3. Installation of a UPS provides an opportunity to tidy up any associated cabinet (controller, communications) wiring, devices and terminal cover protection. This will be carried out by the contractor as part of installing the UPS. All obsolete cables are preferably to be removed, or if that is not possible then bonded together, earthed, and neatly managed inside the cabinet.
4. Any work must “at a minimum” be up to specification for the environment with Circuit Breakers, Earthing and an Earth Fault Current test.
5. Install a new main earth for the UPS. This must be a buried earth in accordance with NZS300 and this is reiterated in the CTOC Regional Specification and NZTA P43
6. Install new submain circuit from UPS cabinet to Controller cabinet.
  - a. This must be at least 6mm<sup>2</sup> cable, of a suitable type for the installation (i.e. neutral screened, or installed in orange conduit).
  - b. There must be a suitable sized earthing lead installed from the earth bar in the UPS cabinet to the earth stud in the Controller cabinet.
  - c. The existing site main earth at the controller must be disconnected.
  - d. Cabinets to be bonded together.
7. Install 4x burial grade CAT6 shielded (or better) network cables from the UPS to the Controller cabinet.
  - a. Three of these leads must be fitted with network sockets at each end.
  - b. One must be patched to the UPS data socket at one end, and patched to the network switch at the Controller end. A new network switch may be needed. This will be detailed on the Site Specific Sheet.
  - c. The fourth cable will be connected to three N/C outputs on the UPS and connected to the signal controller for basic alarm messaging in SCATS.

### 1.1.8 Hardware connection requirements

The cabinet must comply with NZTA and CTOC standards for traffic signal cabinets. This includes thermal issues that need to be accounted for.

A suitable isolator fuse must be installed in the UPS cabinet between the incoming mains supply, and the main switch.

.

This can be in the form of a 32A HRC fuse. This must have a higher short circuit current rating than the prospective short-circuit current available at that location. The contractor must be able to prove that the protective device is rated higher than the prospective short-circuit current.

The fourth data wire between the UPS and the Controller will monitor three outputs of the UPS, as detailed in AS5715:2015 4.6.3. These being:

1. Mains Failure.
2. UPS Fault.
3. Battery at <60% Remaining Capacity (this will also require configuration in the UPS).

These outputs will be configured as normally closed, and will connect to inputs on the signal controller. The specific controller inputs will be detailed on the Site Specific Sheet. It is noted that some changes may be required to adapt to controller capability and CTOC will manage this requirement.

The UPS must have the ability to provide clean-contact outputs to the signal controller for basic status alerting.

The UPS will also be connected to the CTOC data network for advanced hardware and status monitoring via "WhatsUp Gold"

The Controller software must be at a level to monitor the inputs. This will be confirmed on the Site Specific Sheet.

## 1.2 Permits, fees, applications, compliance and methodology

### 1.2.1 Permits, fees and applications

All required permits, fees, applications etc required to do the work must be included in the submitted price. This includes electrical connection and inspection fees, CAR's, traffic management, reinstatements and any other reasonable costs or tasks required to do the job based on this specification, the Site Specific Sheet, and a site visit by a skilled contractor.

### 1.2.2 Compliance

All work must be done in accordance with local requirements, including trenching and reinstatement work. All electrical work to comply with NZS3000 and all workmanship and outputs to comply with CTOC Regional Special Conditions and NZTA P43 Specification for Traffic Signals and the CTOC Regional Special Conditions.

### 1.2.3 Project installation methodology

Due to the nature of these sites, CTOC have a keen interest in the methodology to be applied to complete this work. CTOC will be discussing the proposed methodology with the contractor during the evaluation stage and reserve the right, as the Road Controlling Authority representative, to require changes to the proposed methodology. Full documentation to be provided by the Installation contractor.

## 1.3 Maintenance, warranty and servicing requirements

A spill kit and suitable PPE must be carried by the maintenance contractor when servicing LEAD ACID batteries.

The UPS must be maintained in line with the manufacturers guide lines. As part of your pricing response, please supply a full maintenance and servicing schedule for your proposed UPS solution.

In addition to the installation of the UPS, your price must include a full 5 year replacement warranty for all components of the UPS. This price will include:

- any associated labour to carry out the work and any auxiliary costs to perform the work.
- perform all the maintenance and servicing tasks, as per the manufacturer's specification, for a period of 24 months following installation. This means two 12-month cleans and service checks or maintenance to ensure that the UPS will still operate as intended if there is a mains failure with automated load testing every 3 months.
- A repair response time not exceeding 24 hours from the time of emailed notification of equipment failure to the DUTY email of the UPS supplier/installer. In all cases the CTOC preferred contractor may have already arrived to site and carried out temporary repairs to get Traffic technology working again. The UPS installer/supplier must then resolve the problem fully which includes removing any temporary alterations already carried out. All workmanship and equipment must be of a high standard. The Contractor must inform CTOC when work is completed.
- The UPS installer and supplier must acknowledge and agree that after 24 months the UPS may become part of the standard CTOC maintained. From that point in time the incumbent CTOC service contractor will manage the UPS and this work does not invalidate the equipment warranty of the UPS in any way.

Please itemise the maintenance and servicing costs and timeframes separately in your proposal.

## 1.4 Preferred equipment types

As technology improves and develops over time then preferences will change, but not without testing and due consideration by CTOC. CTOC are already successfully using the following products:

- Alpha 2000 Industrial UPS or Successor Alpha product;
- Hoppecke 12vDC 150AH AGM batteries;
- Aldridge Traffic Controllers.
- Lithium-ion batteries – (TBA)
- UPS Cabinet types and designs – (TBA)

## 1.5 Competitive Market

CTOC has a desire to keep an open and competitive market which is under constant improvement. Any new designs or technology approved by CTOC such as Cabinet designs/types, UPS configurations or other improvements sold to CTOC may be shown to, maintained and replicated by competitors. There is also a need for consistency and transparency of technology across the transport network.

In each situation where a UPS was being added to an existing controller site there were design build options factored in to resolve existing issues or deficiencies. These included;

- The overcrowding of communications equipment in the exiting control cabinet. This resulted in a TOP-Hat addition to the UPS cabinet to relocate communications equipment.
- Limited inputs on the SCATS controller etc. This resulted in limited alarm inputs back from the UPS as it was not worth changing the entire spec of the controller.
- Limited space or small controller setup. This has resulted in a combination controller/UPS design option but this only works in a situations where the controller space requirements and power load are small.
-



## 1.6 UPS Design build characteristics

### 1.6.1 UPS installed within full Size RMS compliant Controller Cabinet. Top-Hat and non-Top-Hat examples

(Top-Hat and non-Top-Hat QTC build examples)

- 19" rack mounted inside the cabinet
- 20" X Bar down from the top of the door lip, attached to the 19" rack.
- Capable of holding 4x Batteries
- Lowest shelf in line with the lower door lip
- Next shelf is 14" above the shelf below.
- Mains switch mounted inside cabinet, lower left side (as seen in photo)
- Ups switch mounted to 19" rack (as seen in photo)
- Extra gland enabling fibre run to tophat with communications equipment





Appendix X – Intellectual Property



## 1. INTELLECTUAL PROPERTY

### Ownership

- 1.1 Unless otherwise agreed by the parties in writing:
- (a) any Intellectual Property owned by a party or its licensor which is not developed or created under this Agreement, but which is used for the purposes of this Agreement, shall remain the property of that party or its licensor;
  - (b) all Intellectual Property in the Council Data shall be owned by the Council or the applicable Council CCO; and
  - (c) subject to clause 1.1.1(b), any Intellectual Property that is developed or created under this Agreement shall be owned by the Council.
- 1.2 In all cases where the Council does not own or is not otherwise licensed to use any Intellectual Property supplied to the Council under this Agreement, the Supplier grants to the Council, the Council CCOs and each of their respective subcontractors and suppliers, or will ensure that the Council, the Council CCOs and each of their respective subcontractors and suppliers are granted, a royalty-free, non-exclusive, perpetual, worldwide licence to use, copy, modify and develop such Intellectual Property for the Council's and the Council CCO's business and operational purposes.
- 1.3 The Council grants to the Supplier a royalty-free licence to use and copy the Council's Intellectual Property during the Term to the extent reasonably required to enable the Supplier to provide the Solution, Deliverables and Services to the Council. In this clause, **Council's Intellectual Property** means Intellectual Property owned by the Council and provided to the Supplier under this Agreement.
- 1.4 The Supplier will sign all necessary documents and do all things necessary immediately at the Council's request to establish and protect any of the Council's rights in any Intellectual Property which is owned, or to be owned, by the Council under this Agreement.
- 1.5 The Council grants to the Supplier a royalty-free licence to use and copy the Council's Intellectual Property during the Term to the extent reasonably required to enable the Supplier to provide the Solution, Deliverables and Services to the Council. In this clause, **Council's Intellectual Property** means Intellectual Property owned by the Council and provided to the Supplier under this Agreement.

The Supplier will sign all necessary documents and do all things necessary immediately at the Council's request to establish and protect any of the Council's rights in any Intellectual Property which is owned, or to be owned, by the Council under this Agreement.

