

# WTOC



Absolutely Positively  
**Wellington** City Council  
Me Heke Ki Pōneke

## WTOC Regional Special Conditions

Supplementing P43 Specification for Traffic Signals

(September 2023)

## WTOC Regional Special Conditions



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## Introduction

WTOC is responsible for network operations for the state highway network in the central and lower half of the North Island as well as the entire South Island. WTOC are empowered by a number of local authorities to operate and manage relevant traffic signals and other technology on the road network within their area of operation.

WTOC has a working relationship with other partners, which enable it to provide consistency of operation and design of on road technology across New Zealand and is nationally consistent with other TOCs.

## Purpose

The purpose of the “WTOC Regional Special Conditions” is to supplement the current “P43 Specification for Traffic Signals 2020”. It is to define the regional special requirements as required by the Wellington Transport Operations Centre (WTOC).

These special conditions apply for any Traffic Management infrastructure and any traffic signals work being done at any signalised intersection where the intention is to connect an intersection to the SCATS system operated by WTOC.

It is intended that any new or altered signal plan on the State Highway network, operated by WTOC, be reviewed, and approved by a WTOC representative prior to installation.

## Reference Documents

The special conditions are recognised in the P43 Specification for Traffic Signals 2020 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 2020 and are therefore the priority when compared against each other. However, this document is supplementary to the P43 Specification for Traffic Signals 2020, and both documents must be used together.

Other referenced documents are:

- CCC 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)
- CCC Regional Special Conditions
- CCC Asset Lifecycle Management - Disposal Process.
- Second Edition, Amendment 3, NZTA P43 2020)
- 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
- NZECP 34 2001 – New Zealand Electrical Code of Practice for Electrical Safe Distances.



## Outcomes

It is the responsibility of the signals contractor to ensure that they are using the most up to date version of the documents. Any variation or departure from either document will require WTOC approval. WTOC'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 WTOC 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 Waka Kotahi Health and Safety Policies available from WTOC on request and the Health and Safety Act 2015 requirements. They are reminded they must follow good practice and WTOC 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 Learnt"

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

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

WTOC 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"
WTOC	Waka Kotahi, NZ Transport Agency Authorised Representative
Contractor	As Per NZS 3910 "Conditions of contract for building and Civil engineering construction" Contractor, Consultant or Project Team
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	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. The Traffic Signal Engineer will be operating the asset once it is completed. RCA's have delegated this responsibility to Transport Operations Centres (TOC's). It is the traffic signal contractor's responsibility to verify whom the RCA Traffic Signal Engineer is before any work commences.

## Abbreviations

Abbreviations used in this specification have the following meaning.

CAPEX	Capital Expenditure
CAT6	Category 6 (network cable see 4.4.7)
CCCS	Conditions of Contract for Consultancy Services
CCTV	Closed Circuit Television
CIS	Controller Information Sheet
CLB	Carriageway Loop Box
Downer	Downer NZ Ltd (Contractor)
DBW	Dim by Wire
ELV	Extra Low Voltage
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 (Waka Kotahi)
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)
RTO	Real Time Operations (part of WTOC)
SCATS	Sydney Co-ordinated Adaptive Traffic System (software)
TCS	Traffic Control Systems Ltd (Contractor)
TfNSW	Transport for New South Wales (formerly RMS)
UFB	Ultra-Fast Broadband
UPS	Uninterrupted Power Supply
WTOC	Wellington Transport Operations Centre
WK	Waka Kotahi (NZ Transport Agency)

## Contacts

### WTOC Real Time Operations

Wellington Transport Operations Centre (WTOC)  
9 Arthur Carman Street  
Johnsonville  
0800 869 286 (24/7 Duty Phone)  
WellingtonSig@nzta.govt.nz

### Example of SCATS Professionals

Advanced Traffic Solutions Ltd  
Transport Network Optimisation Ltd  
Spelectronics Ltd  
UTD Ltd

### Contractors

Downer NZ Ltd  
Fulton Hogan Ltd - Electrical  
Traffic Control Systems Ltd

### WTOC Approved Pole Supplier

Spunlite Poles Ltd

## Revision Details

Revision No.	Date	Section	Name	Description
1.1	22-9-2022	All	Steen Bohanna	First revision of document.
1.2	17-10-2022	All	Steen Bohanna	Final Draft
2.0	9-12-2022	All	Steen Bohanna	First Official Release
3.0	8-9-2023	2.3.4, 4.5	Steen Bohanna	Revised

# Regional Special Conditions

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

Traffic control infrastructure is for the primary purpose of managing motorists, cyclists, and pedestrians. No auxiliary equipment shall be fitted/attached to this infrastructure without prior approval from WTOC. 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 WTOC. Failure to remove within 5 days of written notification could result in WTOC 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 signal infrastructure remains the responsibility of the installer/owner to replace or repair at their own cost. WTOC do not accept any responsibility, liability, renewal costs or maintenance costs for any third-party devices or products fitted to infrastructure WTOC are responsible for.

## **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. This includes vandalism; however, this will be determined on a case-by-case basis depending on the complexity of the work being undertaking. Please contact WTOC for advice. After the intersection or site is commissioned/re-commissioned it will be handed back to the incumbent 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**

Any new signalised intersection being installed shall be ELV (Extra Low Voltage) whenever reasonably viable. WTOC must approve any departure from this requirement. Where ELV equipment is new to a specific region, the project will be responsible for the purchasing the first set of equipment spares for maintenance purposes.

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 – Street Lighting Control**

Where Joint Use Street-Lighting Poles (JUSP) are used at an intersection, the streetlights must be supplied from the signal's 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 F. 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 weatherproof 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.

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

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

### **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 signal's contractor, consultancy, or project to purchase the poles from the WTOC approved supplier. The signals contractor must give the supplier adequate notice to manufacture the pole order. WTOC has an approved supplier, see contacts (pg.7). Other suppliers will be subject to testing and for quality before WTOC provides approval for use.

Appendix B 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 P43, Section 2.5.

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

All Type 0, 1, 2, 8, 9 & 11 poles must be installed into an IPL Retention Socket.

In some instances, retention sockets will be unable to be installed due to conflicts with underground services. In these circumstances, WTOC will need to be contacted and a solution will be advised. Various standard pole socket options are available on request from WTOC.

#### **Section 2.5.1.4 – Type 8 Hinged Poles (New clause)**

Type 8 Hinged Poles can be lowered to provide access and clearance for oversized loads (i.e., house relocations). 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 WTOC. Once approved, WTOC and TTM are to be notified 24 hours advance of the activity, to allow for WTOC 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 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 indicator. The disc embossed with the cycle symbol shall be blue. (P43 Appendix M Figure M03).

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

Any new electrical work done inside the controller cabinet may 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 visits/work must be documented in the controller logbook.

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

It is a requirement of WTOC 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 (New clause)**

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. 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 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 within 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 3.10.4 – 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 generally cut 40mm 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 subbase. 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 wires running back to the under kerb and channel ducting shall have a minimum separation between saw cuts of 300mm 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 E.

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

'Other Items' must be coloured black. This includes finial 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**

The contractor shall engage the WTOC 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 frames. There must be evidence of personality software testing to show it is error free. Exceptions are to be approved by WTOC.

As per the NZTA P43, there must be documented evidence of the software being tested with no errors for the following three testing regimes:

1. Independent WintraffSingle testing (WTOC Pre Installation Personality Check template, supplied on request)
2. Bench testing (Appendix H NZTA P43 specification for Traffic Signals)
3. Flash testing on site

The controller bench testing must be undertaken with the relevant controller version (e.g., VC5, VC6). Final testing will be undertaken during the commissioning where a delegate from the relevant RCA must be in attendance before the signals are switched on permanently.

Exceptions to this process are to be approved by WTOC and examples may include the following:

Minor personality changes such as Dimming, Audio muting, Pedestrian camera logic changes and adding all red phases.

The following SCATS Personality files are to be provided to WTOC when new intersection software is created:

- M68
- SFT
- CIS\_XXXX.DAT

### **Section 3.15.4 – Commissioning**

The project, signals builder/contractor must engage WTOC about the project as early as possible to allow sufficient time for the communications connection to be installed and connected to SCATS.

The signals contractor must advise WTOC 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 SCATS.

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 WTOC systems for at least 48 hours.

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

As part of the commissioning sign off requirements the following items must be printed, laminated, and placed in the door pocket of the Controller Cabinet. Digital copies must also be provided to the Traffic Signal Engineer.

- Cable Termination Chart
- Traffic Signals layout plan
- CIS (bound)
- Loop Settings Record (see example in Appendix E)

A Cable Termination Chart template in electronic format is available on request from WTOC.

### **Section 4.4.1 – Ducting**

Where there is a preference to duct by open trenching, approval must be obtained in writing from WTOC where it will be assessed on a case-by-case basis. Note that NZTA Infrastructure stipulate ducting depths of 1.5 m across highways and 1 m in grass berms. WTOC suggest any deviation from this will require direct discussion with regional NZTA office as part of the Corridor Access Request (CAR).

The minimum number of ducts to be installed from the controller and between access chambers is three (3x 100mm ducting). All ducting must be reasonably straight between access points to allow cables without kinks. Tight 90-degree bends are not acceptable, and any radius bends, or direction changes must be in the largest format possible.

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 positioned through the side wall so that a well in the bottom of the chamber is provided. This should be a minimum of 200mm 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 200mm. See Appendix G.

### **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 heat shrink 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 and the new connection form, contact WTOC.

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

In general, power to the controller cabinet from the Network 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 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 4.4.8 – Network Wiring (New clause)**

Data network equipment and connection can only be done by a network contractor specifically approved by WTOC. The signals contractor must engage the WTOC approved network contractor directly. The contact details for the network contractor can be obtained from WTOC. The signals contractor must notify the WTOC approved network contractor at least six weeks prior to requiring their services.

Some network providers may require up to 12 months lead time to install new connections. It is the signal contractor's job to notify WTOC 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 WTOC 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 WTOC network contractor to undertake radio signal checks prior to signals poles being ordered. Results must be communicated back to WTOC prior to commencement. WTOC 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 an appropriate Australian Standard approved cabinet that will accommodate the fibre termination point & Optical Network Termination box. In some instances, this will require a "Top Hat" cabinet.

#### **Section 4.4.9 – Traffic Observation Cameras & Pedestrian Detection Cameras (New clause)**

The CCTV cameras are installed for the purpose of traffic management and traffic observation. It is a requirement of WTOC that a CCTV camera(s) is installed at any new traffic signal site.

The signals contractor is responsible for the supply & mounting of the traffic observation camera. As the traffic observation camera must be WTOC approved, WTOC 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.

In addition, the fixed camera lens or lenses are to be wide enough to be able to view the whole of the intersection – 20m on each approach including pedestrian and cycle crossings. Guidance can be sort from WTOC for this requirement. If not achievable, the camera needs to be located on a suitable pole away from the intersection. In most cases, WTOC will advise a preferred camera location.

The WTOC approved network contractor will configure the camera and connect to the data network. The signals contractor must engage the WTOC approved network contractor directly. The traffic observation camera is to be powered from its own dedicated supply, so it remains functional if the traffic signals fail, 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 WTOC.

Where required, the signals contractor is responsible for the supply & mounting of the pedestrian detection cameras. As the pedestrian detection cameras must be WTOC approved, WTOC will supply the signals contractor with the current brand and model. The signals contractor will program the detection configuration, after which the WTOC approved network contractor will configure the IP addresses into the cameras. The signals contractor must engage the WTOC approved network contractor directly. It is a WTOC 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 4.5 – Signal poles and mast arm/JUMA/JUSP poles**

It is a WTOC requirement to install overhead lanterns on mast arm poles at all signalised mid-block ped and/or cycle crossings if the road width at the crossing is more than 12m.

Exceptions to this process are to be approved by WTOC (in consultation with the RCA Safety team) and examples may include the following:

Low speed environments (30km/h)

Raised Safety Platform Intersections

Over dimension routes where mastarms cannot physically work

Airport height restricted areas.

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

Contractors are reminded that Kerbside Junction Boxes (KJB) shall be bedded on 100mm of free draining material and surrounded by 150mm wide by 150mm 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 could install a Carriageway Loop Box (CLB) as shown in Appendix U. The loop tails will run from the CLB to the KJB via a 50mm 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 6 – Surplus Equipment**

Where WTOC controlled equipment is removed as part of works at an intersection, the signals contractor is responsible for recording and storing or returning all reusable surplus equipment to WTOC. The WTOC 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.

#### **Section 7 – Illuminated Signs**

Illuminated signs use backlighting (i.e., LED) for No Right Turn (NRT), No Left Turn (NLT) and No Entry (NE) restrictions and are generally mounted to traffic signal poles.

- All new illuminated signs must have minimum five-year warranty for all parts and have an expected full lifespan of a minimum of ten years.
- They must be easily repairable in a manner that does not require breaking of riveted, glued or epoxy seals as these would be considered non-repairable devices. Parts must also be readily available in New Zealand for the expected lifespan of the illuminated sign. Fixing brackets must be robust and be able to last the life of the sign.



# Appendices

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

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

## **Appendix B – Signal Pole Details**

Appendix B shows the details of the poles and provides suggested foundation details only. It is up to the signal contractor to provide an engineered solution for the foundation, suitable for the soil type, as required in the P43 Specification for Traffic Signals 2020 Section 2.5.

## **Appendix C – WTOC Commissioning Sheet**

Appendix C shows the WTOC Commissioning Sheet.

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

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

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

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

## **Appendix F – Streetlight Connections**

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

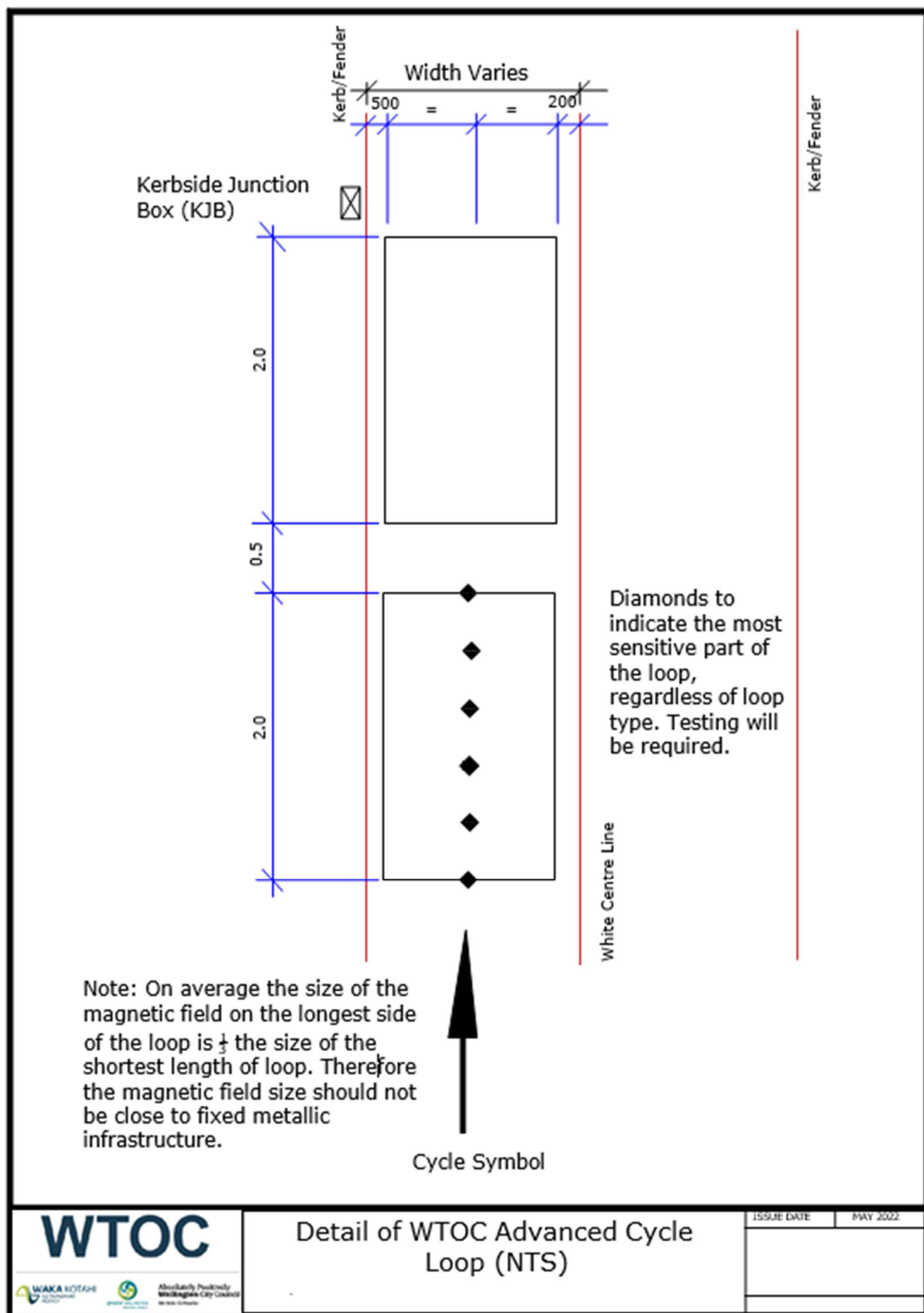
## **Appendix G – Signal Duct Access Chamber**

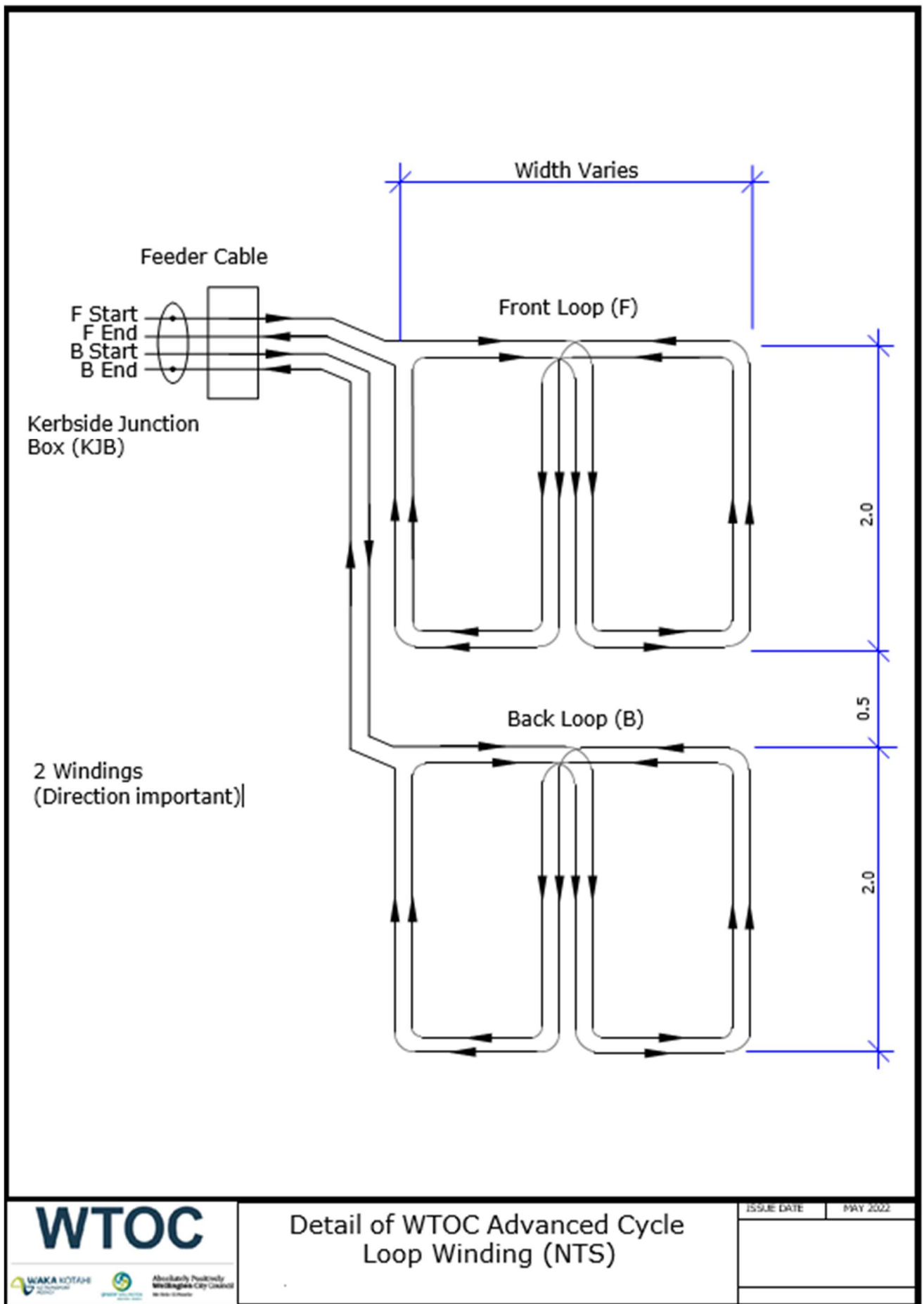
Appendix G shows the details of an Access Chamber and how the ducts are installed into the chamber.

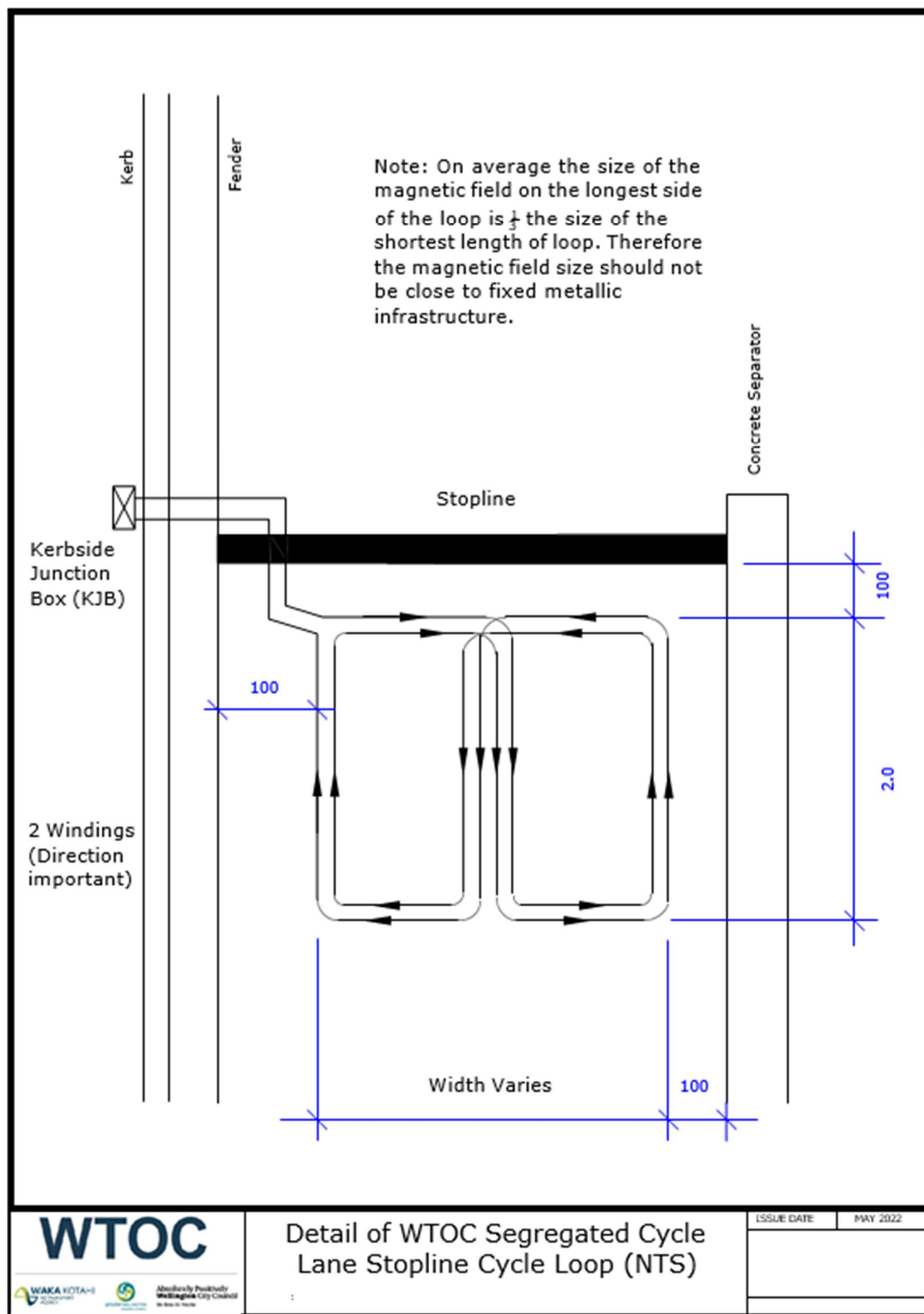
## **Appendix H – Carriageway Loop Box**

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

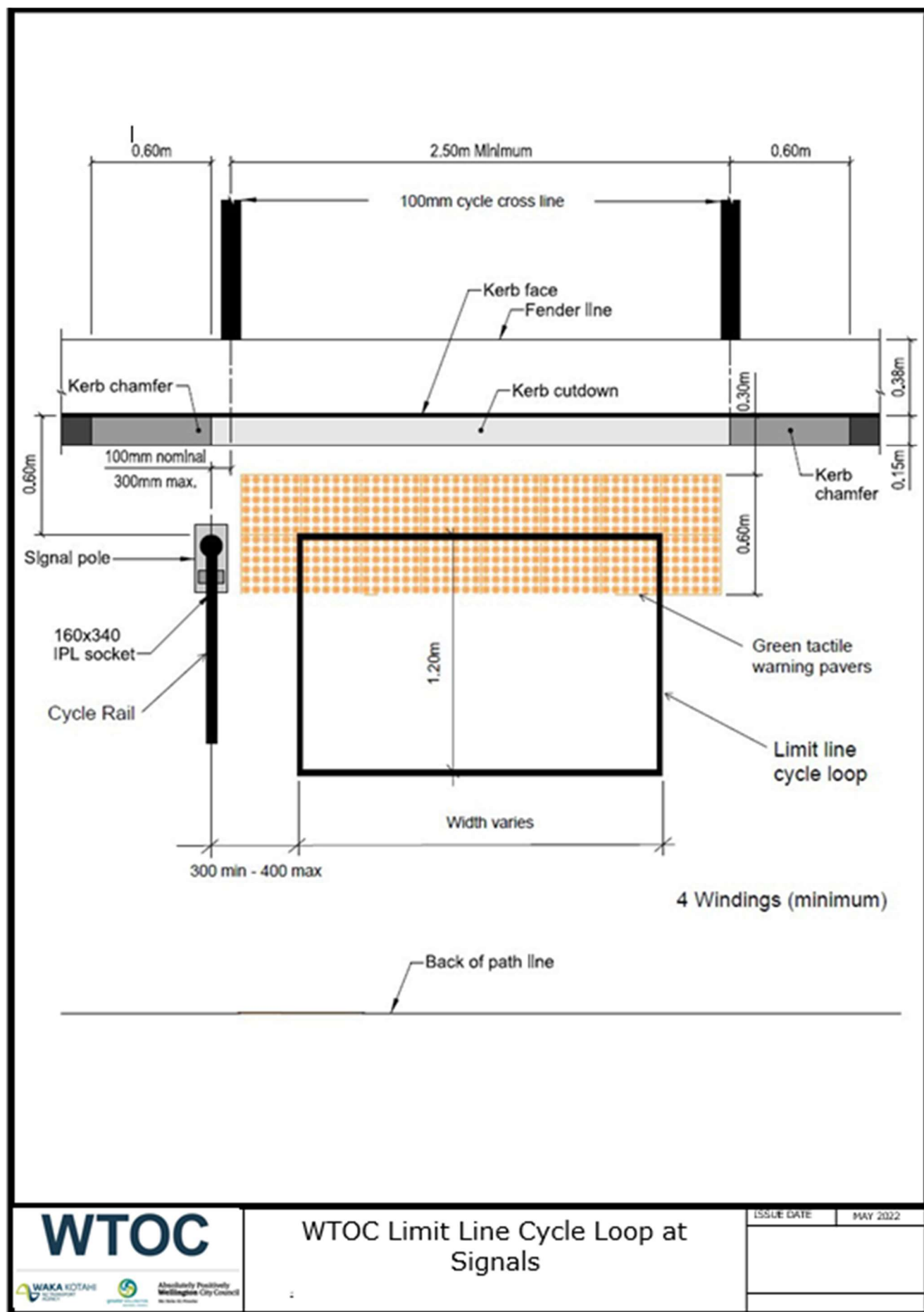
## Appendix A – WTOC Inductive Loop Details



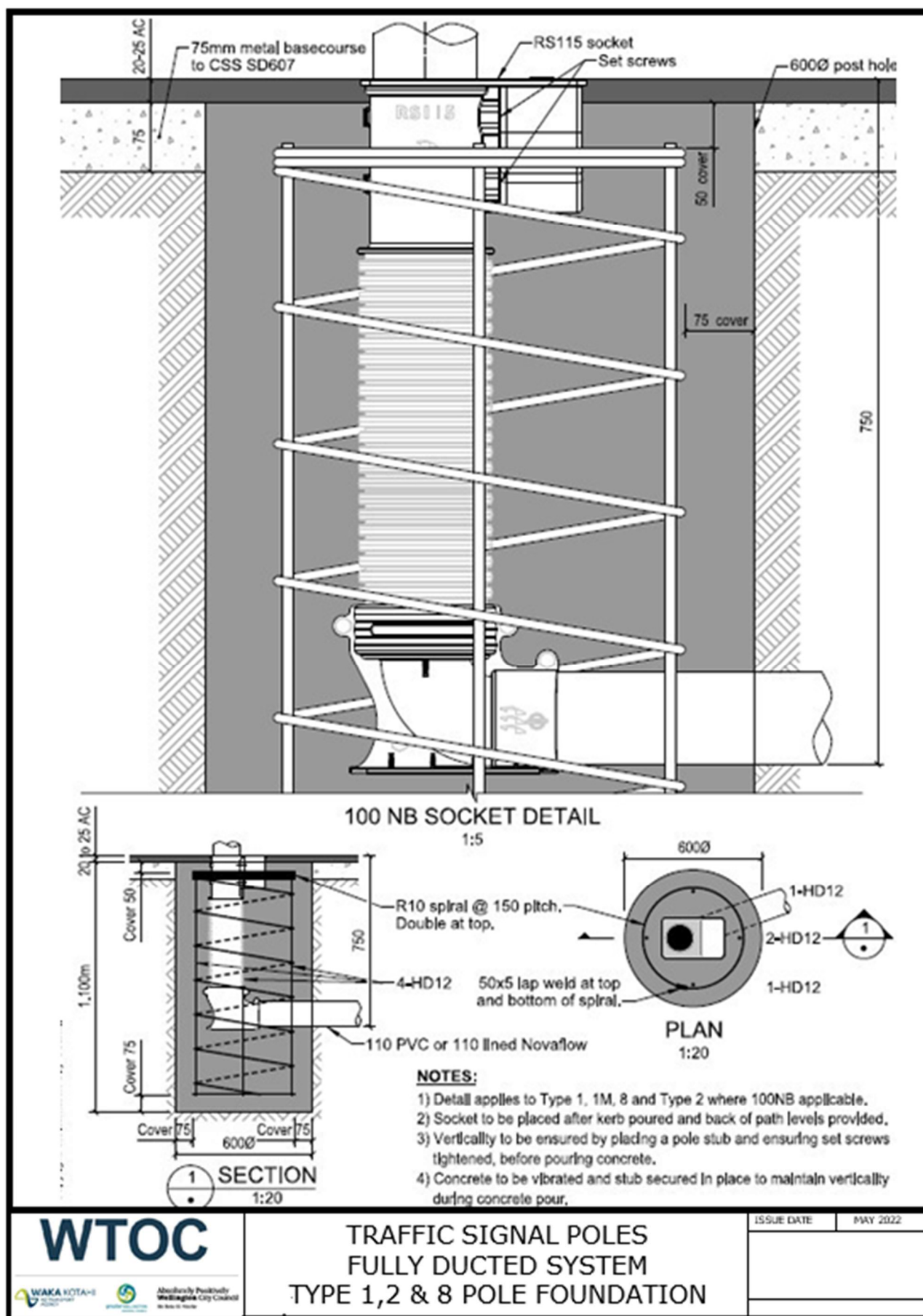


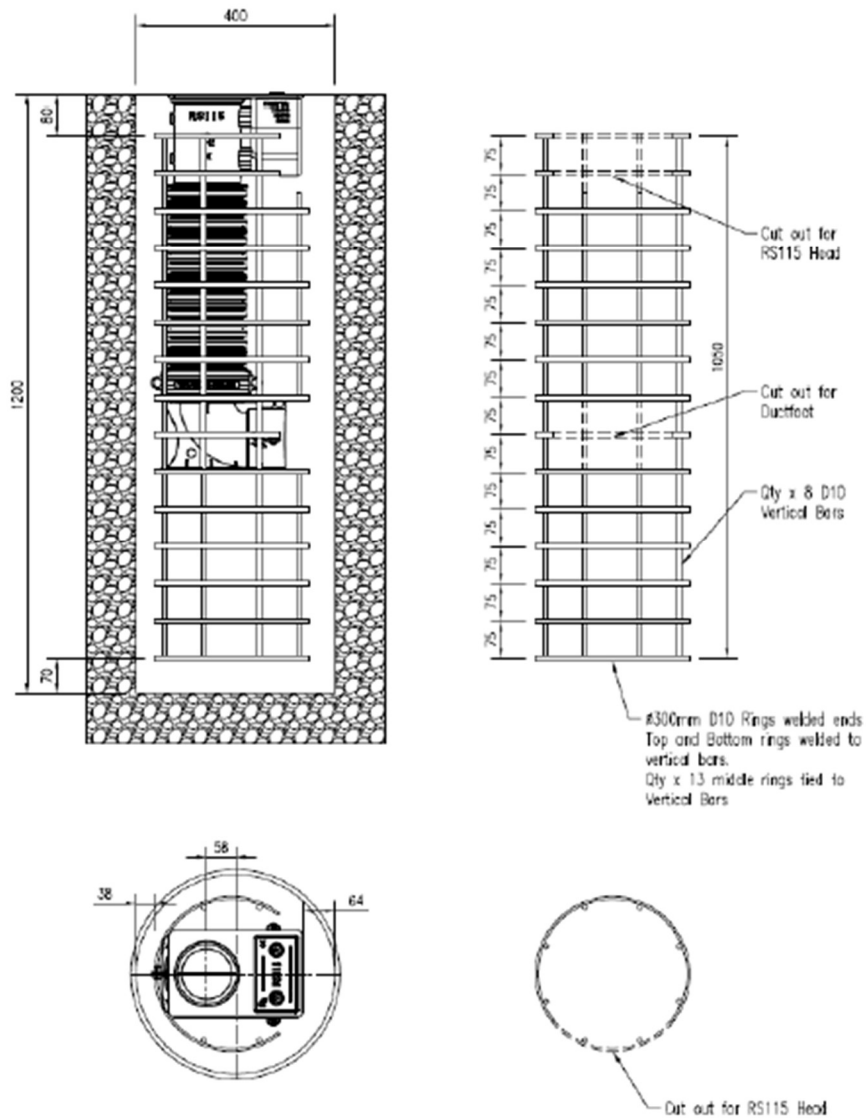






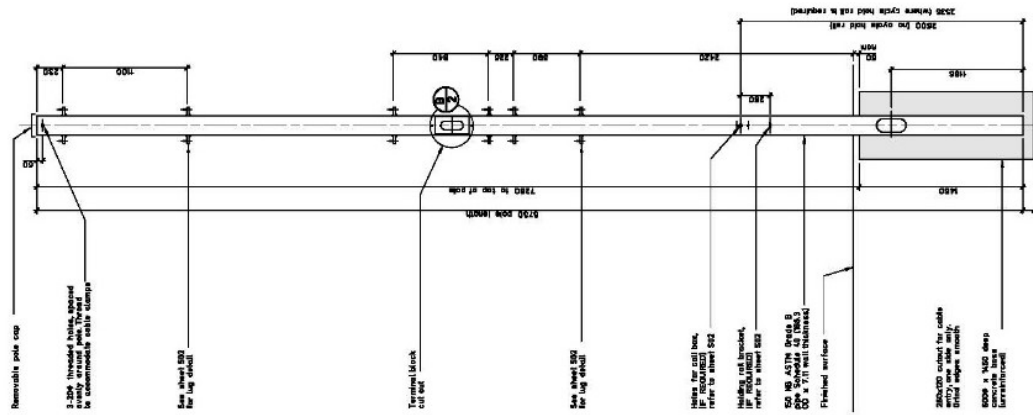
## Appendix B – Signal Pole Details





*Fig 2.1 Foundation Details*

## Narrow Pre-Cast IPL Pole Socket

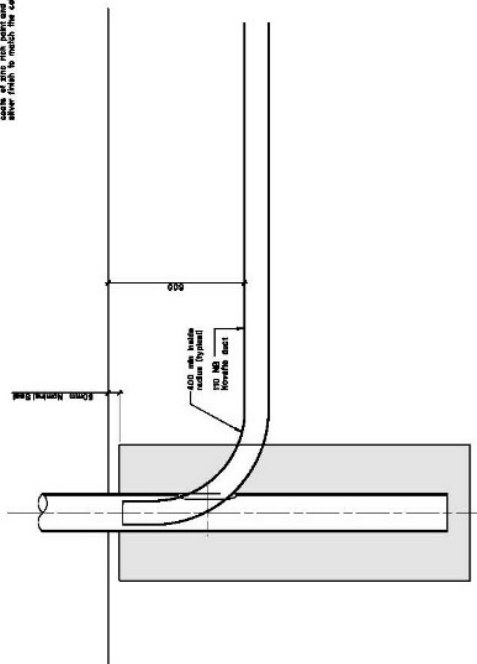


TYPE O-POLE AND O M  
MAST ARM ASSEMBLY 120

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

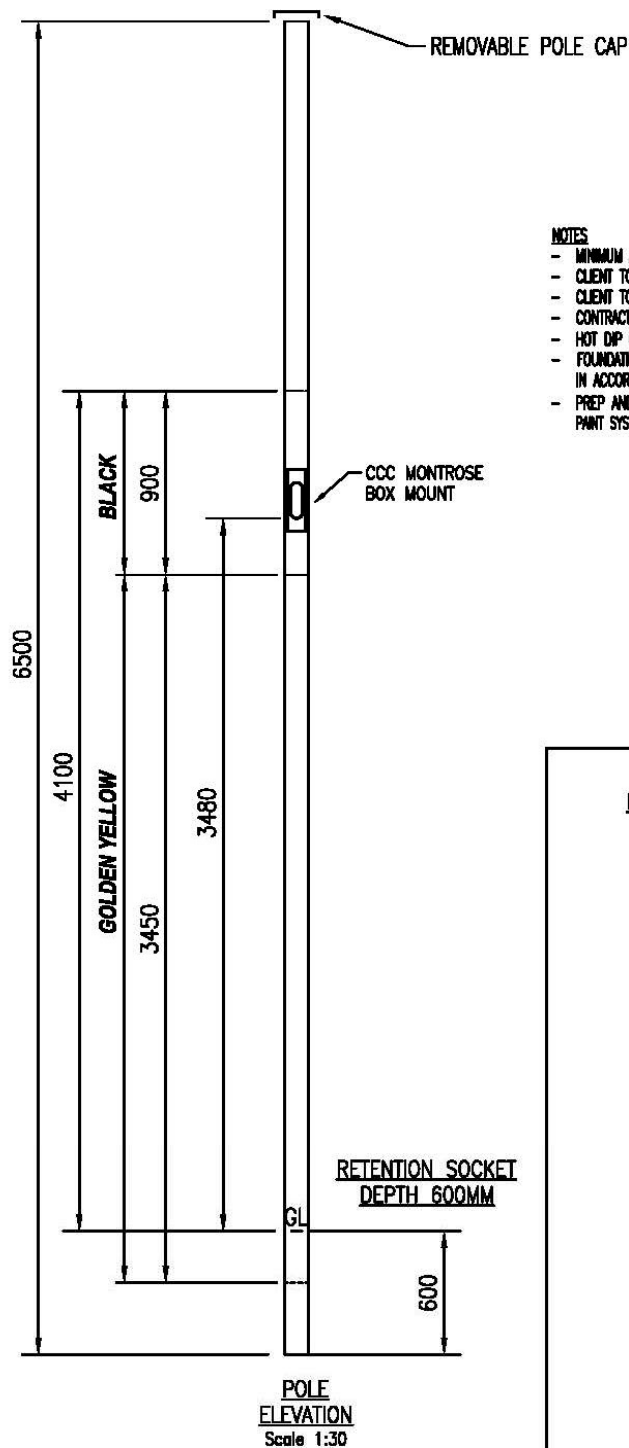
NOTES

- 15 Concrete
- a) All concrete work to comply with the provisions of K203 3104 1987 & related documents
- b) Concrete strength f'c (28 days) = 40N/mm<sup>2</sup>
- 21 Pipes
- a) All pipes are to be hot dip galvanized
- b) If welded into manufactured with galvanized steel, all welded joint and surfaces to be protected with zinc coats at zinc rich point and then overcoated with a primer finish to match the colour of the galvanizing.



**SIGNAL POLE BASE**  
**SECTIONAL ELEVATION**  
1:80



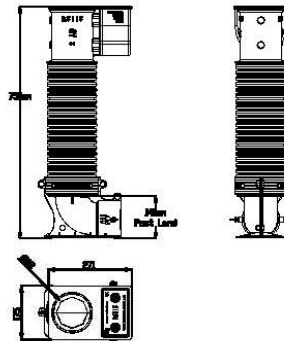


#### NOTES

- 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 PSI 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



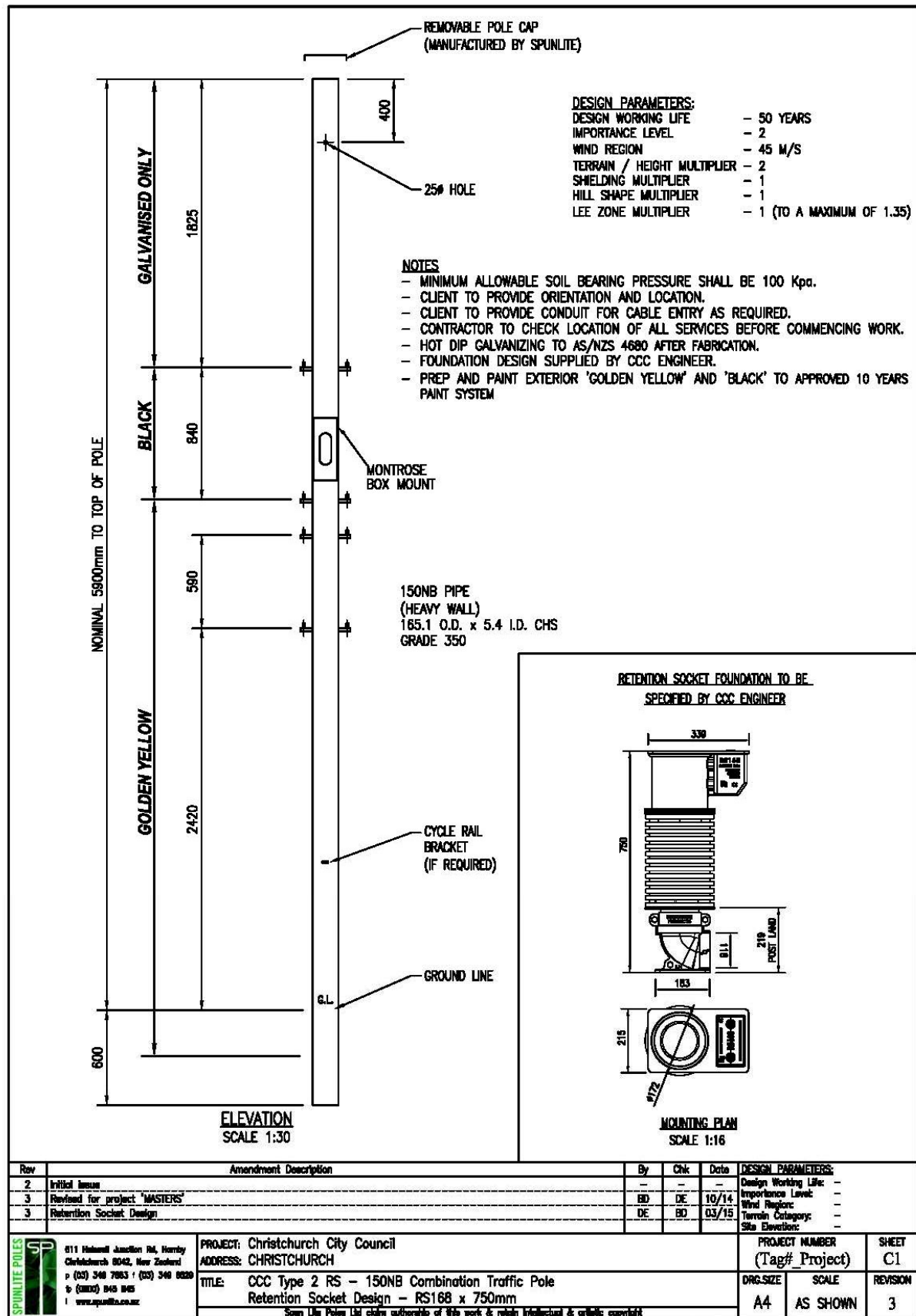
#### RETENTION SOCKET ELEVATION Scale 1:20

Rev	Amendment Description	By	Chk	Date	DESIGN PARAMETERS:
2	Initial Issue	-	-	-	Design Working Life: -
3					Importance Level: -
					Wind Region: -
					Terrain Category: -
					Site Elevation: -

<p>611 Hainault Junction Rd, Harewood Christchurch 8042, New Zealand P (03) 346 7063 F (03) 346 8620 E (03) 346 846 W www.spinlite.co.nz</p>	PROJECT: Christchurch City Council	PROJECT NUMBER	SHEET
	ADDRESS: CHRISTCHURCH	DWG #	C1
	TITLE: Type 2 100mm Combined CCTV Traffic Pole Painted - Retention Socket	DWG-SIZE	REVISION
	Scale 1:30	A4	3

CCC - ACC - Type 2 - 100mm 8.8m Traffic Pole.dwg



[illegible]

**Elevation**  
(Scale 1:50)

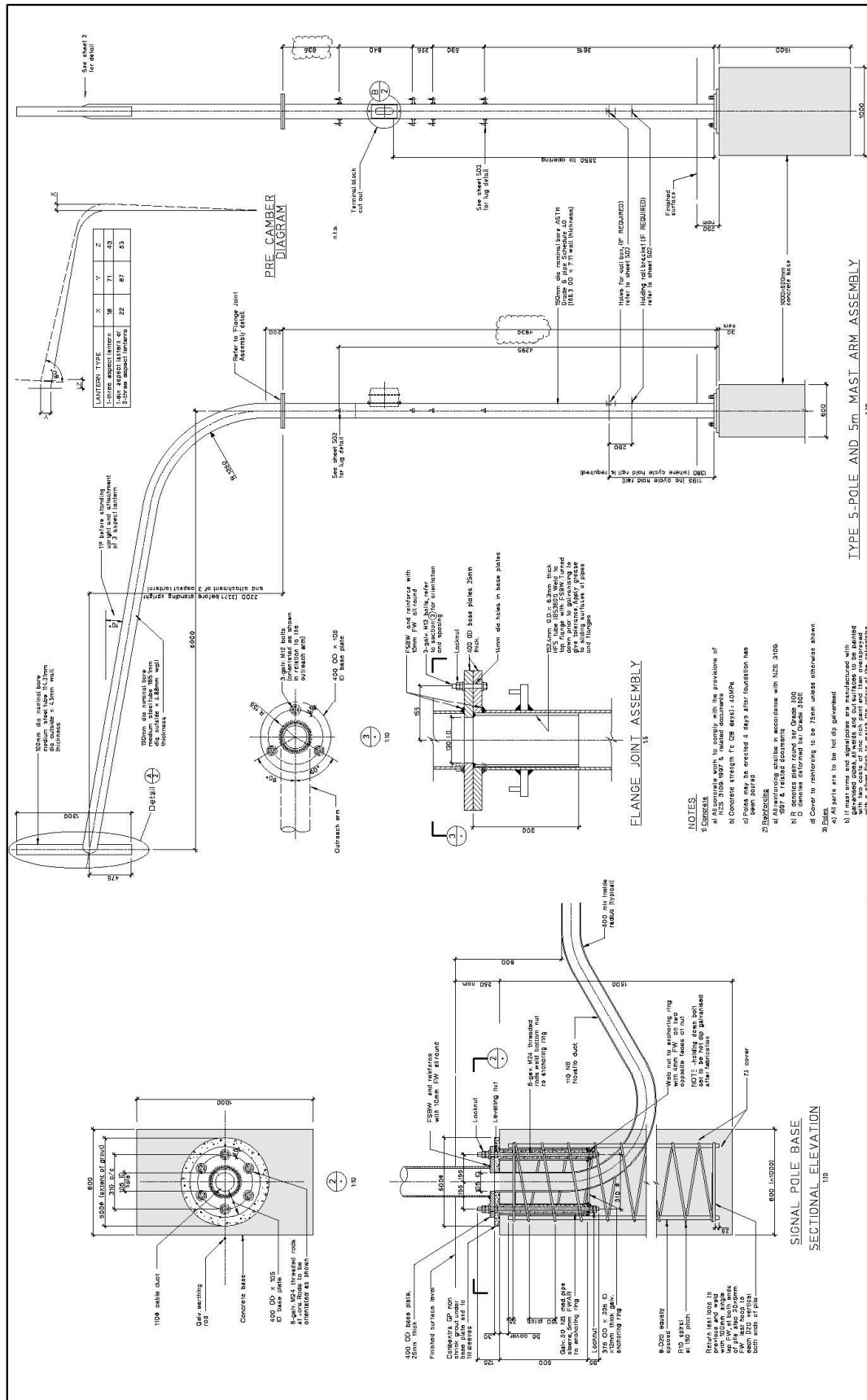
- 5.0m traffic area - 1.0 x 1.4m Target Board with Total Max loading of 1.0Mpa and 80kg
- Mast - Max loading of 1.0Mpa and 80kg

**Standard Index:**

- Control compressive strength ( $f_c$ ) at 28 days.
- Standard deviation (Standard plastic pipe) = 17.5 MPa.
- Alternative deviation (Steel 2) = 28 MPa.
- Materials & workmanship to be in accordance with NES 3402.
- Reinforcing bars shall comply with NES 3402: 1990
- If diameter grade 300 plain bar, 1" diameter grade 300 deformed bar.
- Steel workmanship to be in accordance with NES 3404.
- Fabric shall comply with AS 3678, grade 250.
- Fabric shall comply with AS 3678, grade 300.
- Reinforce surface shall comply with AS 1983.
- Chemicals to be hot dip galvanized after fabrication.
- Client responsible for installation and location.
- Contractor to check location of services before commencing work.
- Provide conduit for ducts entry as required.
- Minimum electrical and heating pressure shall be 900 kPa

(As the evaluation is by Competent/Qualified Engineer is required).

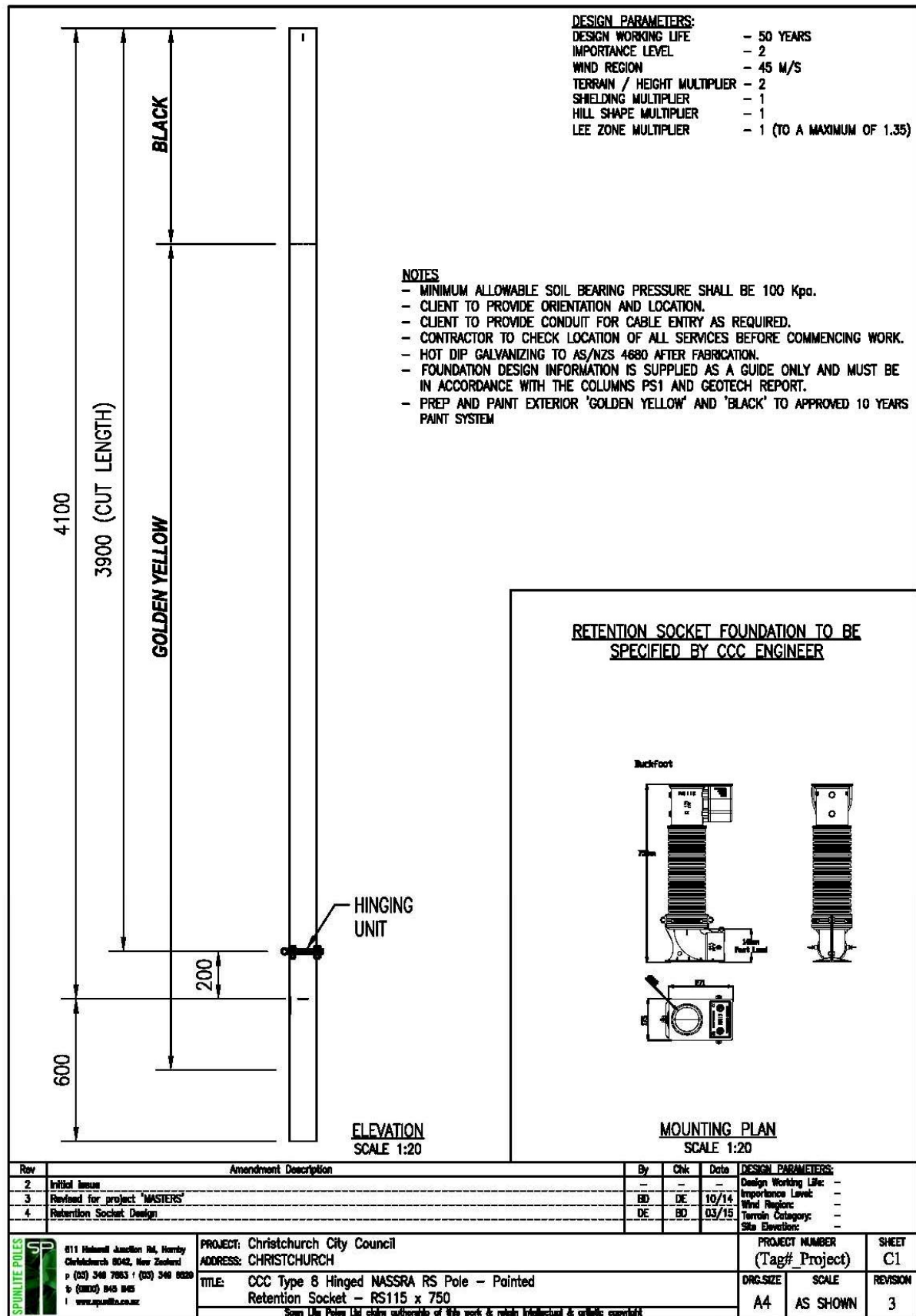
1992

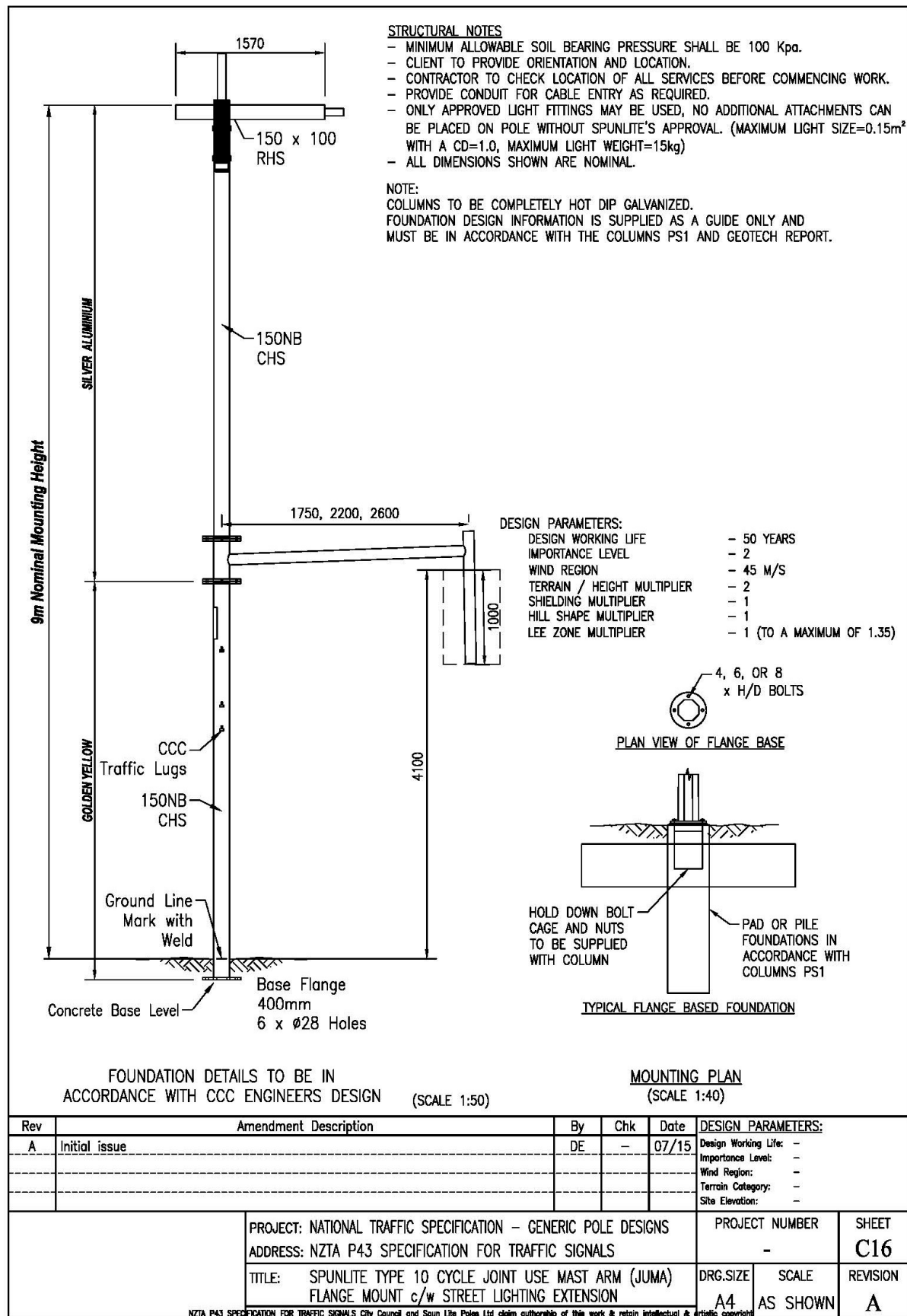


TYPE 5-POLE AND 5m MAST ARM ASSEMBLY





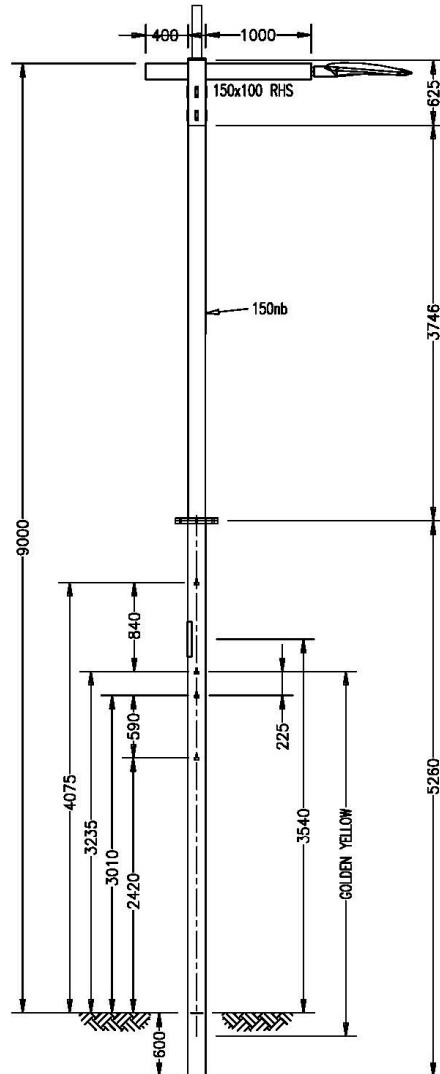




NZTA P43 SPECIFICATION FOR TRAFFIC SIGNALS City Council and Spun Lite Poles Ltd claim authorship of this work & retain intellectual & artistic copyright  
O:\4 LIBRARY\SPUNLITE LIBRARY\B - Traffic & Pedestrian Poles\SNUG - Pole Specification Drawings 2014\SNUG National Traffic Specification Pole Drawings (29-09-14).dwg

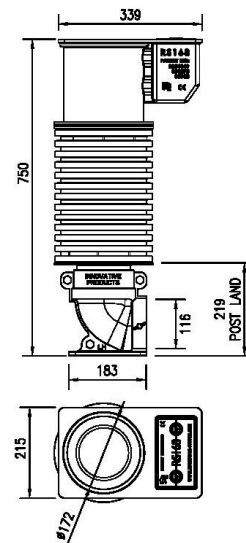







ELEVATION  
SCALE 1:40

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: -							
<div><div><div><div>SPUNLITE POLES</div><div></div></div><div><div>811 Halswell Junction Rd, Hornby Christchurch 8042, New Zealand p (03) 349 7853 f (03) 349 6529 tp (0800) 845 845 www.spunlite.co.nz</div></div></div><div><div>PROJECT: Christchurch City Council ADDRESS: CHRISTCHURCH</div><div>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 &amp; retain intellectual &amp; artistic copyright</div></div></div> <div><div>PROJECT NUMBER</div><div>DWG #</div></div> <div>SHEET</div> <div>C1</div>													
						DRG.SIZE		SCALE		REVISION			
						A3		AS SHOWN		1			

S14053 - CCC - AAC - 150NB JUSP.dwg

## Appendix C – WTOC Commissioning Sheet

# NZTA Intersection Operational Sign Off Sheet

INTERSECTION NAME: \_\_\_\_\_  
 INTERSECTION NUMBER: \_\_\_\_\_ DATE: \_\_\_\_\_  
 SIGNALS & CIVILS CONTRACTOR: \_\_\_\_\_  
 WORK COMMENCEMENT DATE: \_\_\_\_\_  
 NAME OF PERSON CARRYING OUT INSPECTION: \_\_\_\_\_  
 NAME OF ELECTRICIAN OR INSPECTOR: \_\_\_\_\_  
 EWRB Reg ID \_\_\_\_\_

1. PRE-INSPECTION	YES, NO OR N/A	NOTES
1.1 Intersection Design Drawings sent to NZTA		<b>If not received operational sign-off will be delayed.</b>
1.2 Loops Positioned correctly and working on the road relative to the stop line. Including advanced loops etc.		
1.3 Texiphalte or equivalent (black sealant) Installed Correctly		
1.4 Loop Wire – Depth of wire is correct and not sitting above road level or sealant. 12mm Minimum depth below surface of road.		
1.5 Comms (SCATS and any) Reliable connection to Servers and CCC / NZTA systems. (48 hrs min prior to commissioning)		Sign-off date will be moved until this line item can be met. <b>(No sign-off to occur on a Monday/Friday)</b>
1.6 CCTV Fully Functional and Pre-sets and home position setup in FLIR		
2. DOCUMENTATION	YES, NO OR N/A	NOTES
<b>In Controller (Laminated)</b>		
2.1.1 Intersection As-Built Drawings		
2.1.2 Controller Information Sheet		
2.1.3 Loop Detector Test Readings		
2.1.4 Copy of Electrical Certificate of Compliance (COC)/Electrical Safety Certificate (ESC)		
2.1.5 Copy of Electrical Record of Inspection (ROI)		
2.1.6 Logbook		
2.1.7 Full Cable Termination Chart		
<b>Sent to NZTA for addition to RAMM</b>		i.e., Electronic Copy (pdf/excel spreadsheet), <b>(if not received operation sign-off will be delayed)</b>
2.2.1 Intersection As-Built Drawings		
2.2.2 Controller Information Sheet		
2.2.3 Loop Detector Test Readings		
2.2.4 Copy of Electrical Certificate of Compliance (COC)/Electrical Safety Certificate (ESC)		
2.2.5 Copy of Electrical Record of Inspection (ROI)		
2.2.6 Intersection Equipment Warranty Dates		
2.2.7 Full cable Termination Chart		
2.2.8 RAMM Data		

3. CONTROLLER CABINET	YES, NO OR N/A	NOTES
3.1 Cabinet is Safe to Touch (test with 'Non-Contact voltage tester).		<b>IMPORTANT</b> IF CABINET IS FOUND TO BE LIVE, SIGN-OFF IS TO CEASE IMMEDIATELY UNTIL CABINET IS MADE SAFE.
3.2 All Safety/Warning Signs fitted to Cabinet Externally. i.e. Buried earth and 230v internal		
3.3 SCATS Controller Make, Type & size. i.e. ATC, QTC, Eclipse, VC5, VC6		
3.4 Signal Group Size/No. of	8	12
3.5 Detector Card Size/No. of	8	12
3.6 Detector Card Operational		
3.7 Controller Cabinet Earthed in Accordance with AS/NZS 3000. i.e. Metal of cabinet to main earth + Main earth to earth bar + Cabinet doors earthed + Correctly setup earth and neutral bars		
3.8 Test Current with Clip-on Ammeter. (Only if accessible.)		Results: _____ Phase- _____ Neutral- _____ Earth- _____
3.9 Rating of Main CB/Switch and what type of CB/Switch is used. (C curve general purpose & D Motor rated) (KA fault rating)		Rating Current - _____ Type (C/D) - _____ KA Rating - _____
3.10 Rating of Signal / Lamps CB and what type of CB is used (C curve general purpose & D Motor rated) (KA fault rating)		Rating Current - _____ Type (C/D) - _____ KA Rating - _____
3.11 Protection against Live Cores/Terminals/Switches etc. i.e., Shroud across single insulation cables and exposed terminals. This includes shrouding of side switches such as streetlight and facility switches regardless of voltages		
3.12 All CB/RCD's Correctly Labelled as to what circuit they are for		
3.13 Labelling / Numbering of multicores and other cores is complete, and complies with AS/NZS 3000		
3.14 All required Electrical Safety/Warning labels fitted internally. Danger 230v on inside of door and on plastic front shrouds. If ELV then ELV label.		
3.15 Cable Management Present and Functional. No weight loading on cores at point of termination or joint		
3.16 Spare Cores Bonded to Earth in Accordance with P43 Specification. Crimp or Line tap bonding cables together and with a single earth lead (per group of bonded cables) to earth bar. No sheath or tape over lug or line tap.		
3.17 All Cable/Core Joints and Connections Comply with AS/NZS 3000. Joints must be supported and insulation of original cable rating (230v)		
3.18 GPO's (230v plugs) installed and functional. No tap on plugs to be used.		
<b>UPS</b>		
3.19 Is Cabinet supplied from a UPS		If Yes, continue down. If No, skip to 3.24
3.20 Is the Ups in its own Cabinet		
3.21 MEN Link is only present in UPS Cabinet. Assuming mains initial entry is in UPS cabinet.		
3.22 UPS Cabinet has all required Warning/Safety Signs. Electrical and Chemical.		
3.23 UPS changeover is Fully Functional		Include SCATS Alarm

Normal	YES, NO OR N/A	NOTES
3.24 Generator Socket Installed Y/N. & generator eyelet security fitted to side bottom of cabinet.		
3.25 Is Earth and Neutral Connected Correctly? Double nuts/screws, Main E/N cables on the correct studs etc.		
3.26 Earthing of Low Voltage (LOOP cables) Compliant. Sheath on road loop cables bonded to earth		
3.27 Cabling Sheathing passes through Glands. i.e., Multicores must be sheathed as they go through glands		
3.28 All Apparatus fixed and stable on shelving i.e., Controller Substantial cable tie for controller lockdown or locking nut from below (not Velcro tape). All other lighter object Velcro or cable tie is ok.		
3.29 Gland Plate Labelled- Cable/Multicore goes to which pole or location first (On Top of plate beside cable gland entry point) and/or (attached to side of cable insulation at point of entry)		
3.30 Cable Looms from controller plugs to Connectors is tidy and controlled.		
3.31 Loop Detector Switches Labelled on front of controller and not faded (on/off/simulate)		
3.32 Signal Groups Numbered on front of controller card not faded or missing		
3.33 Loop Detector Block Card Numbered.		
3.34 Cable Glands tightened around cables(s) Sealant to be used if more than one cable. Cable must be secure and supported in gland		
3.35 Service Light Working		
3.36 Door & Seals & Locks in good condition. 3-point linkage in good condition and door fitting correctly.		
3.37 Sign of Rodents in cabinet		
3.38 Signs of Moisture or corrosion		
3.39 Any Non-Standard Items within Cabinet. i.e., earthquake monitor system, Portable UPS batteries, Bluetooth devices etc.		
3.40 No single insulation cables or cores are to be touching or leaning directly against cabinets internal earthed metal surface. This is to address issues with possible shorting to cabinet surface.		
<b>UPS Cabinets</b>		<b>NOTES</b>
3.19 Is Cabinet supplied from a UPS		If Yes, continue down. If No, skip to 3.24
3.20 Is the Ups in its own Cabinet		
3.21 MEN Link is only present in UPS Cabinet. Assuming mains initial entry is in UPS cabinet.		
3.22 UPS Cabinet has all required Warning/Safety Signs. Electrical and Chemical.		
3.23 UPS changeover is Fully Functional		Include SCATS Alarm
<b>Cabinet – Other</b>		<b>NOTES</b>
3.24 If there has been disconnection and then reconnection of Multicores and/or Mains power that may affect safe operation of traffic signals. * Contractor must provide evidence of Flash testing lanterns. * Contractor must provide ROI to inspect mains		
3.25 Any Cabinets with Black backboards may have asbestos and must be labelled on outside of cabinet with appropriate hazard sign.		

4. CABLING	YES, NO OR N/A	NOTES
4.1 Safe Isolation Point Known – GIRO demarcation power box / power Toby / Grid connection on plan inside door and in RAMM		
4.2 Communications Provider Connections Identified. Reseller/Supplier of (What is it) 3G, Fibre, Copper, etc		
4.3 1m Cable Slack in Chambers. Installer must provide details/picture evidence before closing up inspection hatches.		
4.4 Draw Cables Installed. Contractor to provide evidence (pictures)		
5. COMMUNICATIONS CABINET / TOP HAT	YES, NO OR N/A	NOTES
5.1 Rack mounted Power Bar Installed. No multi-boxes		
5.2 Communications Equipment and Cables secured and tidy		
5.3 Communications CB labelled in main Controller Cabinet. Sub-main to cabinet clearly labelled		
6. OPERATIONS	YES, NO OR N/A	NOTES
6.1 Check Fault Log Clear		
<b>FULL START UP</b>		
6.2 Flash Test each Signal Group		
6.3 Flashing Amber/Yellow Functional		
6.4 Confirm Cameras work in FY		
6.5 Check All Red Phase		
6.6 Revision on Correct Phases		
6.7 All Default Phases Call		
6.8 Test Facility Switch		
6.9 Check SCATS control of FY and Lamps Off		
<b>AFTER FULL START UP</b>		
6.10 Ped Protection Okay		
6.11 Mains Off/On, Controller Operations Okay?		
7. POLES	YES, NO OR N/A	NOTES
7.1 Correct Location in Accordance with Drawing		
7.2 Concrete Collar (500mm)		
7.3 Ground Sockets Level with Surface		
7.4 All Poles Painted/Powder Coated		
7.5 Fold-down Poles Functional		
7.6 All Poles Numbered and fitted with Live Power Warning Labels		
8. LANTERNS	YES, NO OR N/A	NOTES
<b>VEHICLE LANTERNS</b>		
8.1 Attached & Aligned Correctly		
8.2 Correct Height (3.2m-4.1m)		
8.3 Directional Arrows Aligned		
8.4 Louvers Installed Correctly		
8.5 Correct Visors Installed (Entry/Exit Cows)		
<b>PEDESTRIAN LANTERNS</b>		
8.6 Attached Correctly		
8.7 Pedestrian Lantern Height (3m) and Alignment Correct		
8.8 Correct Visors Installed		
<b>ILLUMINATED SIGNS</b>		
8.9 Location, Alignment & Height Okay		



9. PEDESTRIAN/CYCLE XING	YES, NO OR N/A	NOTES
<b>PUSH BUTTONS</b>		
9.1 Installed at Correct Height (0.9m)		
9.2 Audio Volume & Ambient Control Okay		
9.3 Muted Unit Okay (If fitted)		
9.4 Arrow Aligned to Xing		
9.5 Tactile Vibration Okay		
9.6 Cycle Call Accept Okay		
<b>PEDESTRIAN DETECTORS</b>		
9.7 Pads/Camera Installed Functional		
9.8 Pads/Camera Activities Okay		
9.10 Xing Instructions Installed		
9.11 Full Walkthrough both Directions		
10. VEHICLE DETECTORS	YES, NO OR N/A	NOTES
10.1 KJB (Kerbside Junction Box) 1000mm Concrete Surround		
10.2 KJB 20mm Concrete Pad		
10.3 Loops joined with Solder		
10.4 >1.8m Slack in Controller Cabinet Base		
10.5 0.5mm Slack in KJB		
10.6 Each Loop Detects Reliably		
10.7 Loops Detect cyclist where required		
10.8 Kerb Accesses Correct and Sealed		
11. CIVIL WORKS	YES, NO OR N/A	NOTES
11.1 All Chambers Level with Surface		
11.2 Plastered Inside Chamber		
11.3 Direction Pavers Installed/Aligned		
11.4 Tactile Warning Pavers Installed/Aligned		
11.5 Road markings Installed and Comply with Standards		
11.6 Correct Signage Installed		

## 12.NOTES/OTHER

## 13.OPERATIONAL SIGN-OFF DATE

NZTA Representative:

Name:

Date:

Signature:

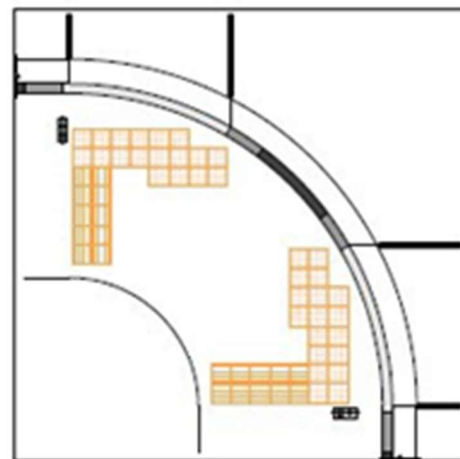
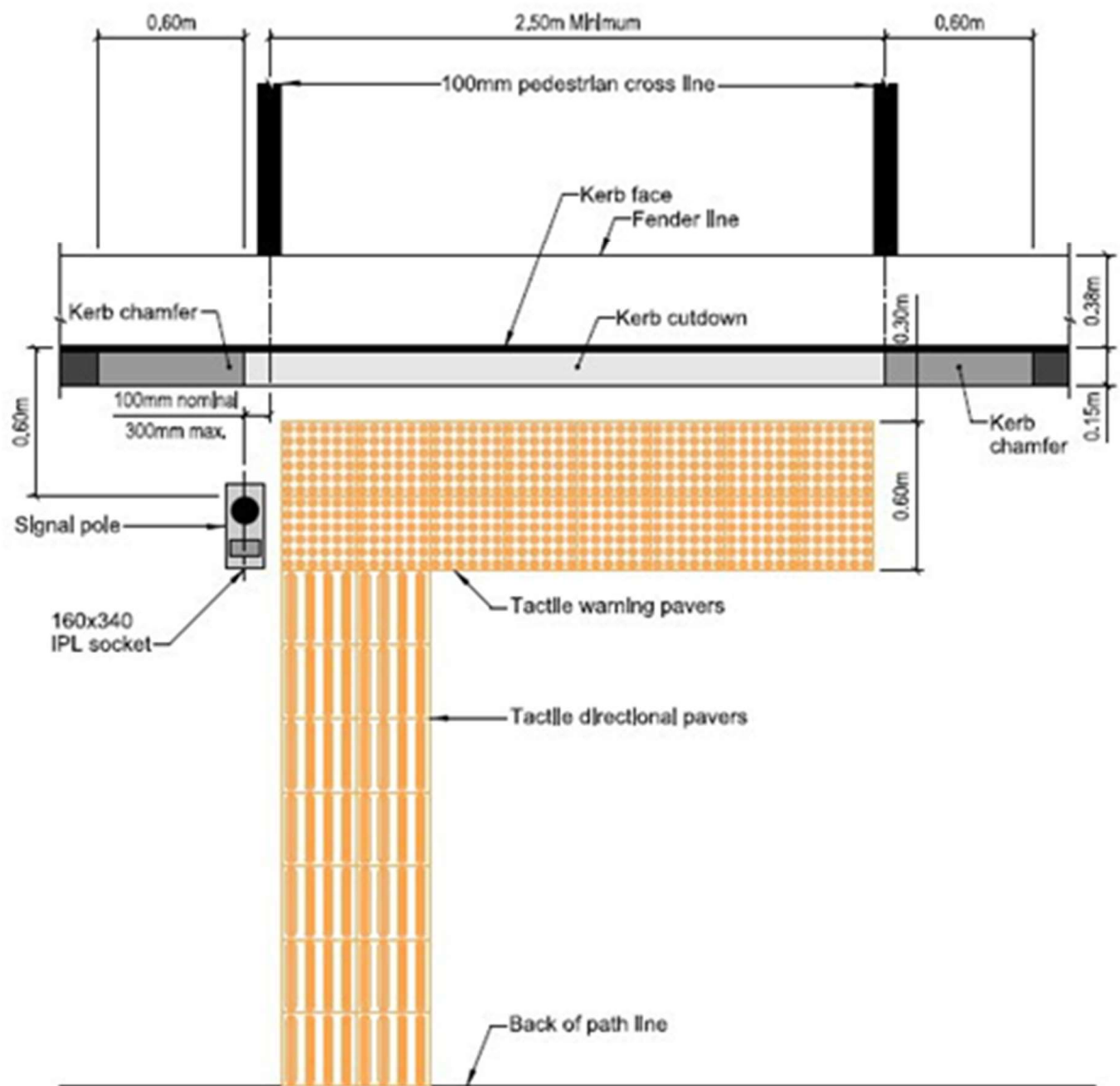
Signals Contractor Representative:

Name:

Date:

Signature

## Appendix D – Traffic Signal Pole Location Relative to Kerb Cutdown



Corner Rounding Detail

**WTOC**

## TRAFFIC SIGNAL POLE LOCATION RELATIVE TO KERB CUTDOWN

ISSUE DATE MAY 2022

## ***Appendix E – 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

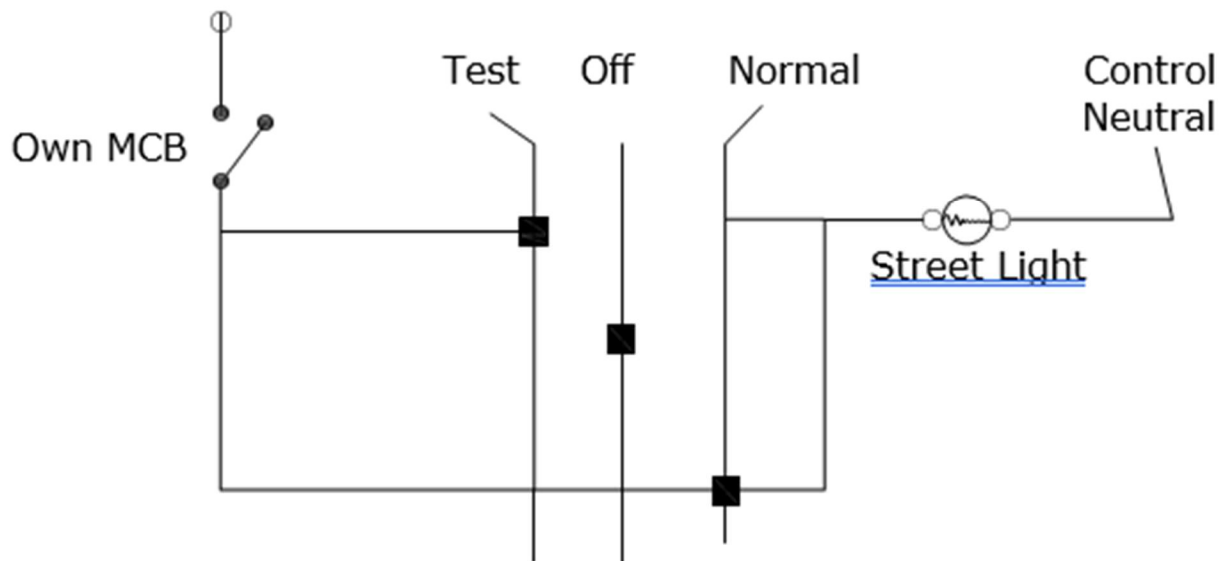
Loop number	Loop				Loop & feeder cable				Detector data				Q or Manufacturer information	
	Insulation resistance (M)	Resistance ( $\Omega$ )	Q	Inductance ( $\mu$ H)	Frequency	Resistance ( $\Omega$ )	Q	Insulation resistance (M)	Inductance ( $\mu$ H)	Sensitivity setting	Frequency (kHz)	Mode Passage/ Presence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

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
TCS Rep

## *Appendix F – Streetlight Connections*



## Supply Phase (Mains, UPS, Generator)



**Kraus & Naimer**  
BLUE LINE switchgear

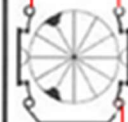
CA10

A240

### Face Plate



Norm	Test				
①	③	5	7	9	11



Switching Angle	60	2	4	6	8	10	12
Total switching Angle	120		C				
0 Off	270						
	285						
	300						
	315						
1 Norm	330						
	345						
	0						
	15						
2 Test	30						
	45						
	60						
	75						

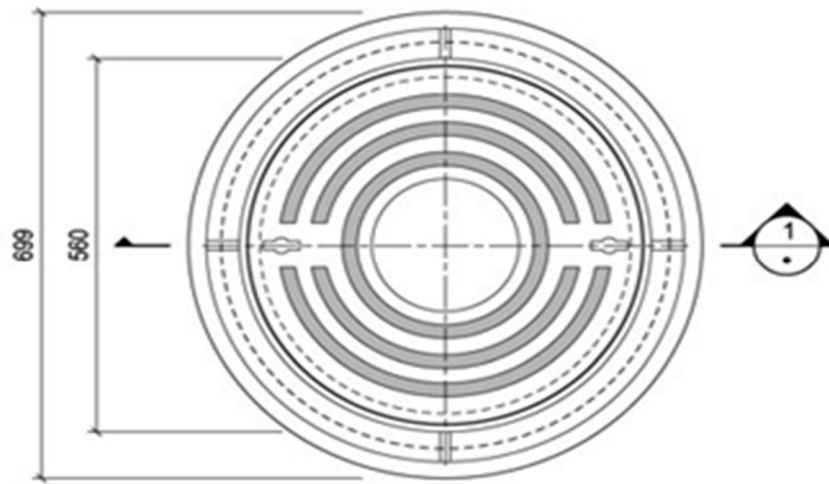
**WTOC**

WAKA KOTAHI  
NZ TRANSPORT  
AGENCY

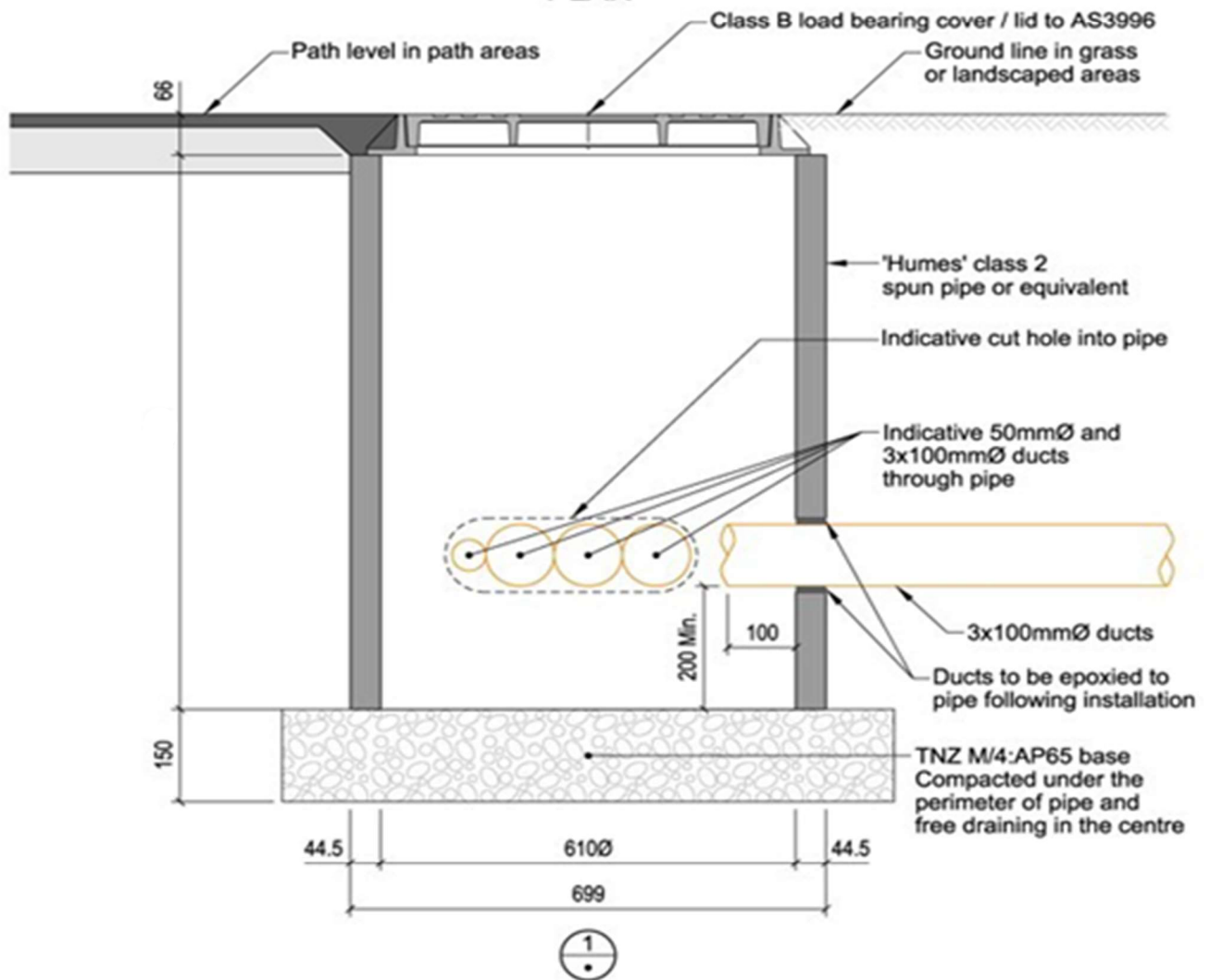
Streetlight Connection

ISSUE DATE: MAY 2022

## *Appendix G – Signal Duct Access Chamber*



PLAN



**WTOC**

## Traffic Signal Ducts Access Chamber

ISSUE DATE MAY 2022

## *Appendix H – Carriageway Loop Box*

