



# TRAFFIC SIGNAL SPECIFICATION

**Prepared by:**

**Traffic Operations Team  
Wellington City Council**

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# **WCC SPECIFICATION FOR NEW TRAFFIC SIGNALS**

## **1. Approvals**

- a. The signal works shall comply with the drawing/s approved by WCC Traffic Signals Project Manager unless subsequent variations are found to be necessary.
- b. Traffic signal works may commence only after all other required approvals associated with these works have been obtained.

Mandatory approvals include:

- Prior Approval from WCC Road Protection Team (egg. for oversize cabinet and works on Main Road)
- Road Work Notice from WCC Road Protection Team
- Traffic Management Plan approval from WCC Traffic Management Coordinator or other suitably designated person

In addition the following pre-construction approvals may also be required:

- Approvals from other WCC asset managers to alter footpaths, street furniture etc.
- Approval of any interim signal arrangements, phasing or displays from WCC Traffic Signals Project Manager.
- Adjacent property owner consent for controller cabinet siting
- Approval of any proposed mastarm structure from WCC Traffic Signals Project Manager.

## **2. Traffic Control & Signage**

- a. At least 1 week prior to commencing works, suitable temporary project information signage shall be installed on all approaches. The signage shall be in the standard TW sign format (orange background with black text & border) and be located well in advance of the intersection.
- b. Prior to commencing signal works, traffic management plans covering all stages of the work shall be submitted to WCC Traffic Management Coordinator for approval. The plans shall include diagrams showing the layout of pedestrian and vehicle traffic control measures (including signs & cones) in the vicinity of the new signals.

## **3. Workmanship**

- a. All traffic signal works shall be carried out to the satisfaction of the WCC Traffic Signals Project Manager. All works involving alterations / additions to other WCC assets shall be to the satisfaction of the relevant project manager (e.g. Nayan Swaminarayan for street lighting; Ruchir Gaur for road markings & signage; Don Mudalige for Roading and footpaths.)
- b. All signals work must be carried out by a traffic signals contractor pre-approved by WCC Traffic Signals Project Manager. At present Downer EDI Ltd (trading as ITS) and HTS Group Ltd have this pre-approved contractor status.

- c. Unless specifically stated otherwise all work shall be carried out in accordance with the requirements of the Wellington City Traffic Signal Maintenance Contract Specification. A copy of this contract Specification is available on request. A 3 month warranty period applies for workmanship.

#### **4. Traffic Islands**

The minimum width of traffic islands (measured top of kerb to top of kerb) shall be 1.1m for islands with single column lanterns and 1.4m for islands with two column lanterns. No pole shall be installed closer than 1.0m from the bull-nose of an island.

#### **5. Trenching & Cabling Works**

- a. All trenching & reinstatement work shall comply with the current version of WCC "*Code of Practice for Working on the Road*".
- b. Prior to commencing trenching works, the Contractor shall arrange for all underground services to be marked out on site & shall carry out all necessary letter drops and communications.
- c. Prior to commencing trenching works, the Contractor shall arrange one or more meetings on site with relevant representatives from the Contractor's trenching subcontractor, WCC Traffic Signals Project Manager, WCC's consultant (if any), Chorus and Wellington Electricity. The purpose of the meetings is:
  - to mark out the approved controller cabinet location
  - to mark out where Chorus and Wellington Electricity will connect to their network
  - to mark out the approved pole locations taking into account proposed/existing services, limit lines, footpaths & kerb ramps.
  - to establish the optimum trench alignment so that the Contractor can trench & install ducting for Chorus and Wellington Electricity at the same time as installing signal ducts. (Note: This coordinated trenching arrangement aims to minimise:
    - i. extent and duration of disruption to adjacent footpaths, roads and private accesses
    - ii. trenching costs caused by multiple trenching & resurfacing
    - iii. Delays caused by multiple prior approvals, road work notices and resident notifications.)
  - to mark out preliminary chamber locations based on the best information available
  - to establish the ducting, cabling & timing requirements of Chorus & Wellington Electricity
- d. The Contractor shall trench and lay ducting for Chorus and Wellington Electricity at the same time as installing signal ducts.
- e. Unless specifically instructed otherwise, all cabling is to be laid underground and be fully ducted.
- f. All cabling and ducting shall comply with Electrical Regulations 2010 and Code of Practice AS/NZS3000 for Category B Underground Wiring Systems. Ducts

to be medium duty UPVC with not less than 600mm cover and mechanical protection in the form of polymeric protection strip laid within 75mm of the top of the ducts. If 600mm cover is not achievable, the Contractor shall install a 75 mm thick concrete protection slab between the ducting and the polymeric protection strip. Marker tape is required.

- g. Signal cable ducts shall be 100mm diameter for multicore cables and 50mm diameter for loop feeder cables. Between chambers, minimum duct numbers shall be 1 x 100mm and 1 x 50mm. At least one spare 100mm diameter duct shall be laid under all carriageways. Additional ducting may be required between the controller cabinet and the nearest chamber. Swept bends shall be installed where a straight duct line is not possible. Chorus and Wellington Electricity ducting shall be as required by Chorus and Wellington Electricity.
- h. Chambers in footpaths, traffic islands and berms shall comprise Class B Unsealed light duty covers & frames complying with AS3996 (available from Humes or Hynds) on a 600mm diameter sump barrel. Chambers shall be installed at all locations critical for replacing cables, including adjacent to the controller cabinet and at each end of road crossings. Chambers shall be located clear of pedestrian kerb ramps.
- i. Chambers will only be permitted within carriageways as a last resort. Any such chambers shall have a heavy duty cover and frame. The sump barrel shall sit on a suitable concrete base.
- j. Chambers in planters shall have a mortar collar to secure the frame. The concrete shall be finished below the surrounding soil level if practicable.
- k. Multicore cable sizes shall be 19 core or 35 core. Each cable run shall have at least 7 spare cores. Each vehicle and pedestrian movement shall have its own signal group and associated cores.
- l. Multicore cabling runs shall comprise a "corner-to-corner" arrangement to minimise the effects of loss of lanterns (i.e. risks to motorists) if the most vulnerable poles are destroyed. The most prone poles shall be at the ends of a cable run. Poles near the cabinet shall be on a dedicated cable run.
- m. Spare loop feeder pairs shall be provided to each toby (to allow for loop and feeder damages).
- n. Where more than one loop is cut to the same kerb, tobies are to be spaced along 5m length of kerb adjacent to the loops. (This eliminates multiple close kerb & asphalt cuts and reduces the risk of losing all loops simultaneously.)
- o. The precast concrete controller cabinet base shall be installed so it is at least 30mm above the adjacent finished footpath level on all sides of the cabinet.

## **6. Other Hardware**

### **a. Controller:**

The controller shall be QTC or Tyco Eclipse with latest software (v5.70 or later). The cabinet shall be TSC4 compliant in all significant respects and shall match existing PSC2 controller cabinets for colour. Installation details to be as per WCC Controller Upgrade Specification. Door stays shall be fitted. Lamp control boards and software shall be suitable for operation and outage monitoring of LED modules. A flush concrete band shall be laid between the cabinet plinth and the back of the public footpath in cases where asphaltting this strip is not practicable.

A layer of Malthoid or similar DPC shall be installed to galvanically separate the concrete base from the metal plinth.

Where a bollard is needed to protect the cabinet, it shall be 150mm diameter concrete-filled and fully wrapped in self-adhesive yellow reflective tape.

**b. Controller Power:**

The controller shall be connected in an approved manner to Wellington Electricity's power network. The Contractor shall arrange and pay Wellington Electricity (or their contractor) for the necessary connections, cabling and associated works. All new sites are to be metered.

**c. Controller Communications:**

WCC Traffic Signals Project Manager will arrange for all connections with Fusion Networks.

**d. Mastarm Poles:**

Mastarm poles shall meet the following criteria:

- Ground planted
- 5.0m or 7.0m curved outreach arm with no joints in the outreach
- Capable of supporting 2 back-to-back 6 aspect 300mm LED lanterns with backing boards
- Additional (JUMA) spigot to be provided on outreach arm to allow for mounting of additional outreach for CCTV or Street lighting.
- Vertical to be sufficiently tall so that no part of the outreach arm encroaches within 1.0m of trolley bus overhead power cabling or span wiring. (Overhead cabling is normally 5.5m above carriageway.)
- Vertical to be free of circumferential welds.
- Foot of vertical to have baseplate to improve bearing
- Buried section of vertical to have vanes or similar to prevent turning in the ground under severe wind conditions
- Pre-painted blast grey in the CBD and all other areas yellow (vertical only).
- Provided with suitable fixing and cabling access for termination enclosure ("Montrose box")
- Certified by a chartered structural engineer as suitable for Wellington Wind loadings. PS2 to be provided prior to ordering.
- All poles to have a unique identifying number

Note: Attaching hooks are not required on the outreach arm (since hooks make it difficult to slide rope along arm).

Mastarm poles shall be installed as follows:

- In accordance with supplier's and certifier's requirements
- Excavation shall be kept to minimum size to preserve the underground services corridor. If hole dimensions in plan exceed 0.7m x 0.7m, the

contractor shall use boxing to form a square concrete surround and then place compacted backfill around it.

- Bottom 1.0m of excavation to be squared up to prevent turning in severe wind conditions.
- Certified by a chartered structural engineer if soft foundation soils are encountered. PS4 to be provided to Engineer within 5 days of installation.

**e. Poles in Prone Locations (e.g. narrow median islands & some corners):**

These poles shall comply with Drawing M01 Rev A. Stub and pole sections to be HD galvanised. The stub section does not need to be painted. Yellow 3M reflective tape (at least 750mm long x 200mm wide) shall be fitted to the lower portion of the pole facing the most likely direction/s of impact.

**f. Poles General:**

All poles except mastarm poles shall be new, 4.1m in height and fully painted. Pre-painting is preferred, with any installation damage to be made good. All hoses shall be secured to the pole at not more than 700mm centres using UV-resistant cable ties.

(Concrete collar: deleted)

**g. Callboxes:**

Callboxes shall be Panich or Aldridge with full audio-tactile facilities in accordance with AS 2353:1999. . To minimise confusion for pedestrians, callboxes, callbox protector bars (WCC-supplied) & pedestrian signage shall be installed either:

- i. On the day of commissioning. Callboxes may be predrilled and wired ready for installation.
- or
- ii. Up to 2 weeks before commissioning and securely covered so it is clear to pedestrians they are not in use. Covering to be maintained until date of commissioning.

Pedestrian signage (WCC-supplied) shall be affixed approximately 50mm above callbox in accordance with adhesive manufacturer's recommendations. The top edge of the sign and any adjacent gaps in the adhesive strip shall be sealed with clear silicone-based sealant.

Callboxes must be orientated so the direction they are pressed is within 1m of where the crosswalk line meets the channel at the far side of the crossing.

**h. Callbox Driver Units:**

These enclosures shall be Aldridge sealed cast aluminium. They shall be mounted near the top of the pole and not on the side of the pole closest to the kerb. The cross tone time shall be set to 8s. The gain switch shall be set to Normal. A 2mm drainage hole shall be drilled in the bottom of the enclosure and a nylon cord wick installed to prevent water building up inside the enclosure.

**i. Detector Loops:**

Unless specifically stated otherwise all loops to be 4.5m long SCATS stop line type with 0.5m setback to centre of limit line. Any count loops to be 2.0m long with central sawcut and standard width. Tails shall be sawcut into the kerb &

channel surfacing (i.e. not connected via under-kerb hosing). Sawcuts shall be sealed immediately after wire installation. i.e. prior to allowing traffic over the loop.

**j. Tobies:**

Tobies shall be approximately 100mm square cast aluminium, labelled "TRAFFIC" and with a hinged lid. All tobies to be located at back of kerb. To facilitate loop cutting to the toby, hinges shall not be adjacent to the kerb. Tobies shall be installed on all median islands. One toby shall be installed for each detector loop.

**k. Lanterns:**

All lanterns shall be AEI or Orange Tek LED. Low level lanterns shall be 200mm diameter. Mastarm outreach lanterns shall be 300mm diameter, fitted with anti-rotational devices.

All LED modules shall be dimmable. All lanterns shall comply with AS2144:2002. Aldridge LED lanterns are unacceptable.

Unless instructed otherwise, low level mounting heights to be

- 4.1m for primary lanterns
- 4.1m for secondary / tertiary lanterns located more than 20m from the limit line
- 3.2m for other secondary / tertiary lanterns & all pedestrian lanterns

All lanterns mounted at 3.2m or lower shall have doors secured in an approved manner.

Cowl fixings for low level lanterns may include canoe clips, screws, springs or suitable bolts. Mastarm outreach lantern cowls shall be fixed with screws or bolts. The exposed sharp ends of any screws must be rounded or clipped off. Open cowls shall be used for all mastarm lanterns unless more than 30% of lens is visible from limit line of the adjacent side-road turning lane.

Where no trolley bus wires are present, mastarm outreach lanterns shall be mounted using cranked brackets so the bottom edge of the backing board is 75mm above the bottom end of the pipe on which it is mounted.

**l. Backing Boards:**

2.0mm thick Chappell or Metco with white borders. No other types acceptable.

**m. Warranty:**

All LED modules shall include a minimum 5 year + 0% -failure warranty. The warranty shall include all plant, labour and materials costs associated with the repair or replacement of the modules, including temporary traffic management and module repairs. A single LED failure will be treated as a failure of the whole LED module.

All other materials shall have a 12 month warranty. Unless specifically negotiated otherwise, the warranty is to cover all costs to rectify faults including:

- removing faulty equipment

- installing any temporary equipment while repairs are carried out
- repairing faulty equipment
- removing temporary equipment and refitting repaired equipment unless agreed otherwise
- Carrying out above works in timeframe agreed with WCC.

**n. Personality:**

Details of the new personality must be forwarded in writing to Tim Kirby for approval prior to burning. 5 working days must be allowed for this process.

**7. Inspections during Construction**

- a. 24 hours notice is required for all inspections during the works.

**8. Commissioning & Completion**

- a. When controller, cabling & poletop works are substantially complete and power supply has been connected, the Contractor shall provide the WCC Traffic Signals Project Manager with a written proposed sequence & timing of outstanding works.
- b. The sequence shall include:
- removal of any redundant Stop/Give Way or pedestrian crossing signs
  - removal of any redundant Belisha discs / beacons
  - removal of any redundant road-markings including any symbols, limit lines, crossing markings or wording
  - installation of new signs
  - installation of new road-markings
  - connection and testing of datalines
  - cutting of detector loops
  - switching onto flashing amber
  - inspection/s by WCC Traffic Signals Project Manager
  - installation of callboxes, pedestrian signage & protector bars
  - notification to Police and media release (as necessary)
  - proposed date and time for switching onto normal operation
- c. All safety-critical defects found by the WCC Traffic Signals Project Manager shall be rectified before commissioning will be permitted.
- d. All associated footpaths and vehicle accesses must be complete and open for use before commissioning will be permitted.
- e. The Contractor shall provide WCC with an electronic copy of the personality sft file and editable XL file of personality sheet before commissioning will be permitted.
- f. The length of time between the removal of existing controls and the introduction of fully-complying signal controls must be minimised. Flashing amber shall be utilised during this period to minimise risks.



- g. At the time of commissioning, the Contractor shall install TW2 temporary hazard warning signs with “New Traffic Signals” supplementary sign on all approaches in advance of the intersection. If the headroom to these signs is less than 2.1m, suitable measures shall be taken to prevent creating a pedestrian hazard e.g. mount signs on gates. A4 size laminated “Signals Working” signs shall be supplied & installed for pedestrians on all approaches.
- h. Within 5 working days after commissioning, the Contractor shall notify the Road Protection Team of completion. Any defects identified by the Road Protection Team shall be promptly rectified.
- i. Within 10 working days after commissioning, the WCC Traffic Signals Project Manager will advise the Contractor of any known defects or omissions. Unless specified otherwise, the Contractor shall attend to these matters within one month. The Contractor shall contact the WCC Traffic Signals Project Manager promptly on completion of the outstanding signal works so that a final inspection can be carried out. While attending to these matters, the Contractor shall also prove that LED lamp outages will be detected by the controller and reported on SCATS.
- j. All temporary signage (including project information, “New Signals”, “Signals Working”) shall be removed 2 months after the commissioning of the signals.

## **9. Deliverables**

- a. The finished works shall comply with this specification, the approved plans, and any subsequent changes to the design or specification required by the WCC Traffic Signals Project Manager.
- b. Prior to commissioning, the Contractor shall provide accurate As-Built Drawings (in Autocad & pdf electronic form plus hard copy to cabinet), personality sheets (to cabinet) and a Certificate of Electrical Compliance. The As-Built Drawings need not be to scale but shall be in the format required by the Traffic Signals Project Manager.
- c. Any removed surplus signal equipment which is in sound condition and potentially re-useable for maintenance (e.g. pole extension kits, surplus lanterns) shall be marked as “WCC” property and delivered to the WCC Maintenance Contractor’s Store.

## **10. Potential Hazards**

The Contractor’s attention is drawn under the HASIE Act to the following potential hazards associated with the signal works:

- Working with live conductors
- Working near “live” underground services including gas & power networks.
- Working near vehicular traffic
- Working at heights in EPV’s
- Working at heights on ladders
- Working with heavy components
- Working near microcellular sites
- Hazards to vehicular traffic caused by the works e.g. Inadequate or obscured

signal displays during construction.

- Hazards to pedestrian traffic caused by the works e.g. Inaccessibility of callboxes
- Undermining existing poles

The Contractor is responsible for appropriately controlling these and any other identified hazards.