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SECTION 17 : TRAFFIC SIGNALS

17.1 SCOPE

This specification covers the supply and installation of traffic signal equipment.

Specifications are in four main sections, as follows:

- Signal Control Equipment (Clause 17.2)
- Installation and Commissioning (Clause 17.3)
- Cabling and Civil Works (Clause 17.4)
- Maintenance (Clause 17.5)

All signals are to be installed in accordance with the following Specifications and Standards:

AS/NZS 2144:2002 : LED Lanterns

AS 2353:1999 : Pedestrian Push-button Assemblies

AS/NZS 2276.2:1998 : Feeder Cables for Vehicle Detectors

AS/NZS 2276.3:2002 : Loop Cable for Vehicle Detectors

AS/NZS 3000:2007 : Wiring Rules

AS/NZS 2312:2002 : Guide to the Protection of Structural Steel Against Atmospheric Corrosion by the Use of Protective Coatings.

NZS 3910:2003 : Conditions of Contract for Building and Civil Engineering Construction

BS 5252:1976 : Framework for colour co-ordination for building purposes

NZ Transport Agency Code of Practice for Temporary Traffic Management:2002

Austrad Guide 2003 :Part 7 : Traffic Signals — A Guide to the Design of Traffic Signal Installations

RTS 14 : Guidelines for Facilities for Blind and Vision-Impaired Pedestrians

Section 13 of this Manual (Road Openings & Reinstatement)

NZ Electrical Wiring Regulations

National Traffic Signal Specification Rev 2 (1 September 2005) or any updates as produced by the Signal New Zealand Group (SNUG) of IPENZ. (The latest version of the specification can be obtained from the following website <http://www.ipenz.org.nz/snug/natspec.htm>)

Council specification or individual requirements will supersede standards set out in the above documents.

17.2 SIGNAL CONTROL EQUIPMENT

17.2.1 General

This Section of the Specification covers the requirements of all signal equipment offered for supply, including signal controller and cabinet, detectors, lanterns, backing boards, cowls, poles and pedestrian push button assemblies.

Note: Where reference is made in the National Traffic Signal Specification (NTSS) to RCA of Client, this shall be read as Council.

17.2.2 Requirements Of Traffic Signal Equipment Equipment

All signal components proposed for installation must comply with Section 1 of the operative version of the "National Traffic Signal Specification" unless amended below:

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17.2.3 Amendments to Section 1 of the National Traffic Signal Specification NTSS - Section 1.3.1.2 Controller Cabinet

Add -

- The cabinet door locks shall use a L & F precision key 100.
- The front door should include a small window to facilitate the reading of the electricity meter.
- The front door and back of the cabinet should be fitted with the special yellow poster detailed on Appendix A to this Part. These posters are supplied by Council.

Surface Preparation - Sheet steel is to be zinc plated prior to powder coating. Unless specified, the coating colour shall be Almond 8019. Alternatively, a non-corrosive, anti-graffiti coating can be applied, the colour being the same shade as the Almond 8019 powder coating.

NTSS Section 1.3.1.2 Controller Cabinet

Add —

Pilot Cables

When the cabinet is to have pilot cables terminated inside it, the following additional features shall be provided:

- The gear tray shall be set forward 200 mm from the back face of the cabinet. All traffic signal wiring and terminations shall be confined to the front part of the cabinet with the back part left clear for the pilot cable terminations.
- The gear tray shall incorporate 4-7 mm diameter holes located 100 mm from the sides and bottom and 400 mm centre to centre of holes vertically. These holes are to be left clear for the installation of studs to hold a pilot cable termination plate which will be supplied and installed by the Council.

NTSS Section 1.4.1 General

Add —

Unless specified otherwise, all new traffic signal lanterns shall utilize LED lamps.

NTSS Section 1.7 Poles

Delete first paragraph and insert —

All poles shall be constructed to the following specifications:

1. Joint Use Streetlight and Joint Use Mastarm Poles — To details shown in NTSS Appendix A
2. Standard 4 and 5 Metre Poles and Mastarm Poles — To details shown in Drawing TS 378
3. Fold Down Poles — To details shown in Drawing TS 381

The contractor shall supply, at the time of tender, a **Design Certificate and a Certificate of Compliance from a suitably qualified Engineer** for each pole type to be supplied, except standard 5 metre poles. The Certificate of Compliance shall include the foundation details.

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NTSS Section 1.11 Instruction Manual

Add —

The Technical Manual shall be sufficient to allow all maintenance of the unit to be carried out. It should include descriptions of:

- a) The unit specification with input and output requirements and thresholds.
- b) The internal organisation of the unit with the cable connections amongst the sub-units and pin connections within the sub-units.
- c) The options available and their location within the unit if supplied.
- d) The software organisation to enable fault finding for microprocessor type controllers

These manuals will not be required if copies have previously been supplied to the Council.

17.3 INSTALLATION AND COMMISSIONING OF TRAFFIC SIGNAL EQUIPMENT

17.3.1 General

This Section of the Specification covers the installation and commissioning of signal equipment including controller, cabinet, vehicle lanterns, pedestrian lanterns, call boxes, detector equipment and detector loops. It also covers the painting of some equipment. Work practices and standards shall be in accordance with the AUSTRROAD Guide 2003: Part 7 : "Traffic Signals - A Guide to the Design of Traffic Signal Installations".

All installation and Commissioning work shall comply with Section 2 of the National Traffic Signal Specification unless amended below.

NTSS Section 2.12.1 Lantern Mounting Supports and Straps

Add —

Straps shall be in a continuous length without joints and one strap shall not be hung off another strap except as allowed for in Drawing TS 378.

Where mounting heights of lanterns are to be increased using extension straps (because the existing height is too low), the method shown in Drawing TS 378 shall be used. Alternative methods can be used if previously approved by the Signals Engineer.

NTSS Section 2.13 Inductive Loops

Delete first paragraph and replace with —

Detector loops shall be positioned so as to record the specified output from vehicles passing or occupying the positions indicated on the appropriate plans and to the dimensions and locations shown in Drawing TS 379 and TS 380.

Paragraph 3 Add —

For typical connection and wiring of loops see Drawing TS 379 and TS 380.

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Paragraph 7 Add —

An approved sealant is Plasticast LQB Tixophiate as specified below: -

<p>* Plasticast LQB Plasticast LQB is a two part epoxy compound formulated specifically for the encapsulating of traffic signal detector cable loops which are embedded in asphaltic road surfaces.</p> <p>Properties Cured (full cure : 1-5 days)</p> <ul style="list-style-type: none"> - Compressive Strength : NA flexible - Bond Strength : Greater than surrounding asphalt - Operating Temperature : -10°C - 100°C - Water Absorption : 1.4 mg/cm³ - Volume Resistivity @ 20°C : 500 x 10¹² ohm cm - Dielectric Strength @ 50 HZ : 110 KV cm - Permittivity @ 20°C : 3.3 - Power Factor @ 20°C : .028

Add —

The Contractor is to ensure that the surrounding area shall be swept clean of all sand and debris. This material shall be suitably disposed of. The Contractor is to ensure that no solid matter can enter any waterway as a result of the sawcutting operation. This could require the placement of filters or similar on catchpits etc.

Sawcutting in residential and commercial areas shall only be carried out during the hours specified in the Project Specification.

Sawcutting for loops shall not be carried out before 7 am or after 8 pm unless specifically approved by the Engineer.

NTS Section 2.15 Painting

Modify Heading to read —

Painting and Powder Coating

NTS Section 2.15 (a) General

Delete paragraph 4 and replace with —

The colour yellow described in this specification shall be colour number 08E53 Golden Yellow as described in BS 5252. The colour blue described in this specification shall be Dulux "True Blue" shade 2821 or equivalent.

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Add -

All new traffic signal poles are to be powder coated. Previously painted traffic signal poles and signal mast arm poles are to be painted.

All powder coating is to be carried out in accordance with the manufacturers specifications.

NTS Section 2.15 (c) Primer / Undercoat

Add —

The approved etching primer/undercoat is Epiglass "PA-10 Red Oxide"
 Within two hours of preparation, prime all exposed metalwork with Epiglass "PA-10 Red Oxide" primer (or equivalent) to achieve a dry film thickness of 12 microns. Leave a minimum of 20 minutes before overcoating.

Apply one coat of Epiglass "Leaderflex Undercoat" (or equivalent) to achieve a minimum dry thickness of 50 microns. Leave a minimum of 4 hours before overcoating.

NTS Section 2.15 (d) Topcoats

Delete and replace with —

Apply two full coats of Epiglass "Leaderflex Enamel" (or equivalent) to achieve a minimum dry film thickness of 30 microns per coat. Leave a minimum of two hours between coats.

NTS Section 2.15 (f) Painting Schedule

Delete Poles section and replace with —

Poles	- below lower level of lanterns	gloss yellow
	- above lower level of lanterns	gloss black
	- below lower level of lanterns	grey- Resene M46-011-255

Delete Other Items and replace with —

Other Items (pole caps, detector boxes etc)	gloss black
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NTSS Section 2.18 Particular Requirements

Add —

The Engineer requires that all electrical work will be done in accordance with the AS/NZS 3000:2007 Wiring Rules.

All mains, switchboards, earthing systems and earthing leads must be inspected by a Registered Electrical Inspector before power is applied to any installation as per AS/NZS 3000:2007 Wiring Rules.

The Contractor will be responsible for Inspection Checks as per AS/NZS 3000:2007 Wiring Rules.

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17.3.3 Additional Requirements to the National Traffic Signal Specification

17.3.3 (i) Existing Conditions

- a) The Council will arrange for the removal of existing signs and traffic facilities (excluding signal lanterns) which interfere with or are rendered redundant upon the installation of new equipment.
- b) Shop verandahs, poles and other obstructions which will interfere with the installation, visibility or operation of the signals will be removed or altered by the Contractor.

Where such obstacles originate in private property, clearance to proceed with this work shall first be obtained from the Engineer. Some delay may occur while the property owner is contacted.

Note: All alterations to services will be undertaken by the appropriate service authority.

17.3.3 (ii) Programme Of Works

All work contracted out under this specification is to be fully programmed. A completed programme is to be submitted to the Engineer at least two weeks prior to commencing work.

The programme is to include such information as:

- Start date
- Date of commencement of ducting
- Date of commencement of cabling
- Date of commencement of lantern installation
- Date of commencement of controller installation
- Date of commencement of loop cutting
- Date of completion of all electrical work
- Date of proposed commissioning of signals

The Engineer will keep the Contractor informed of anticipated progress of preliminary roadworks and of an expected start date if dependent on this work.

When existing signals are to be off between the hours of 8.00 am and 5.30 pm, work is to be continuous to ensure the signals are operational as soon as possible. As a result of this, an intersection must not be left unattended with the signals not working during this period.

17.4 CABLING AND CIVIL WORKS

17.4.1 Scope

This Section of the Specification covers the installation of all cabling including multicore cable, loop-feeder cable, ducting, trenching and backfilling. It also covers the installation of the toby boxes and under-kerb access for detector loop tails, pole erection and controller base.

All cabling and civil work shall comply with Section 3 of the National Traffic Signal Specification unless amended below.

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17.4.2 Amendments to Section 3 of the National Traffic Signal Specification NTSS Section 3.3 Trenching

Modify heading to read —

Trenching and Thrusting

Add —

All cables across carriageways shall be placed in ducts installed by means of thrusting. The Contractor is to assume all responsibility for any damage to existing services.

Cables required behind the kerb lines shall be placed in ducts installed in trenches. Restoration of footpaths and grassed areas are the responsibility of the Contractor.

Trench restoration shall be carried out in accordance with the Council Code of Practice for Street Openings.

The basecourse layer is to be constructed on a sub-base with a minimum soaked CBR of 7.

No backfilling is to be carried out until the Engineer has approved the backfilling material and the method of compaction. Under no conditions whatsoever shall vegetable or any other organic matter be included in the backfilling material.

The disposal of surplus excavated material shall be the entire responsibility of the Contractor.

NTSS Section 3.6 Installation of Signal Poles and Mastarms

Delete first paragraph and replace with —

Signal poles shall be erected as detailed on Drawing TS 378 and TS 381. Each pole is to be plumbed vertically to a tolerance of 10mm per 5.0 metre length.

Add —

Where required, street name signs are to be attached to signal poles as detailed on Drawing TS 359.

NTSS Section 3.7 Controller Base

Delete first paragraph and replace with -

The controller base shall be constructed as detailed on Drawing TS378.

NTSS Section 3.8 Kerbside Junction Boxes

Add —

Access for loop-feeder between detector loop and toby box may be obtained in two ways:

- i) under kerb access (Refer Drawing TS 324) - to be used in all cases where new kerb and channel is to be constructed;

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ii) saw cut through kerb & channel - may be used where existing kerb is to be retained.

Under kerb access (Refer Drawing TS 324) shall consist of 25mm alkathene water pipe laid from the toby box under the kerb and to within 50mm of the top of the seal and within 100mm of the edge of the seal.

The access hole in the pavement shall be backfilled, compacted with basecourse material, and sealed.

Alternatively, for existing kerb & channel, a 5mm wide sawcut may be made through the kerb & channel and sealed with Sikadur 43 epoxy resin mortar* or equivalent.

*** SCOTEC LSS/F6**

SCOTEC LSS/F6 is a two part resin compound formulated specifically for the encapsulating of traffic signal detector loops which are embedded in asphaltic road surfaces.

Properties

- Density : 1.4 at 25°C
- Solubility in water : Does not mix
- Elongation at break : > 50%
- Tensile strength : 1-3 Mpa

NTSS Section 3.10 Cabling Documentation

Add —

The cost of recording traffic signal ducting and cabling must be paid for by the Contractor and allowed for in any prices submitted to the Council.

Council shall be provided with a copy of the "As Built" plan including all cable locations and detector loops in accordance with Section 18 of this Part.

17.5 MAINTENANCE

17.5.1 General

All maintenance work on new installations shall be carried out as detailed in Section 4 of the National Traffic Signal Specification.

Maintenance work on existing sites shall be as specified below.

Where existing equipment is modified then the maintenance period shall apply in accordance with the Contract Specification.

At the end of the maintenance period the equipment shall be handed over in full working order with no defects of any kind. Where such defects exist whether in control equipment, detectors, signal hardware or in any part of the equipment maintained, these shall be made good at no expense to the Council.

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Where traffic signal installations are under warranty to a separate contractor, any faults, except accident damage faults, reported for these intersections are to be forwarded to the Contractor for their attention.

The modification, maintenance and repair of intersection linking cables and their respective terminations will be the responsibility of the Council. Damage to these cables will be paid for by the person(s) who caused the damage.

17.5.2 Maintenance To Be Carried Out

The maintenance of Traffic Signal installations and equipment shall include Preventative Maintenance, Emergency Maintenance and the repair of Accident Damage, together with the supply of all necessary labour, spare and replacement lamps and replacement components for signal controller modules, vehicle detectors, lanterns and poles.

a) Preventative Maintenance

This maintenance is to ensure the continuing efficient operation of the equipment. It is important that this maintenance be carried out on a regular basis as specified below. The acceptable tolerance for each item shall be two weeks. If the period between maintenance is more than two weeks outside that specified below, the work shall be deemed to have not been done and the appropriate amount shall be deducted from subsequent progress payments.

Preventative maintenance shall be carried out during the off peak traffic flows, but generally between the hours of 9.00 a.m and 3.00 p.m Monday to Friday, unless by previous arrangement with the Engineer.

When signals must be turned off to facilitate preventative maintenance, the Engineers Representative is to be given 24 hours advance notice, and the exact time is to be mutually agreed.

Preventative Maintenance shall include servicing, adjustment and repair of the following:

- i) Replace lamps 65w incandescent at four monthly intervals (200mm red and green).
- ii) Replace lamps 65w incandescent at eight monthly intervals (200mm amber and symbolic pedestrians).
- iii) Replace lamps 100w incandescent at eighth monthly intervals (300mm red, amber and green)
- iv) Replace 18w fluorescent tubes in illuminated signs at eight monthly intervals.
- v) Clean lenses, both inside and out, and polish reflectors of all lanterns including LED's at eight monthly intervals.
- vi) Clean inside and outside of illuminated signs at eight monthly intervals.
- vii) Replace lamps Quartz Halogen (200mm & 300mm red & green) at 12 monthly intervals.
- viii) Replace lamps Quartz Halogen (200mm & 300mm amber and Symbolic Pedestrians) at 24 monthly intervals. Any premature failure of lamps or tubes shall be a direct charge to the Contractor.

Check and Maintain Traffic Signal Equipment (6 Monthly Controller Maintenance)

- ix) Each six months requires checking the condition and operation of vehicle detectors, including those for the computer surveillance data system. This includes ensuring that:
 - detectors are not pulsing, hanging on or giving false detection.

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- the mode of operation (either presence or dynamic) is correct.
 - the loops are not exposed to traffic or weather
 - the loops are not earthed (resistance to earth must be above 1 Meg Ohm).
 - the loop terminals are sealed and that the toby boxes are clean and dry.
 - the pole top mounted detector boxes are watertight and in good condition.
 - tuning voltage is correct and that the sensitivity settings are correct.
- x) Each six months requires checking functional operation of all pedestrian detectors, buzzers and tactile facilities including lamps and light emitting diodes. Check also call boxes for damage and ensure that lenses and covers are watertight.
- xi) Each six months requires checking all signal hardware and wiring with particular attention to gaskets, lens, legends, fluorescent tube starters, lantern alignment and wiring terminals (including pole tops) etc. Also examine all load switching relays for contact burning and clean as necessary.
- xii) Each six months requires checking the operational functions of the controller to ensure that the sequence and timings of all facilities are correct. This includes gap, headway, waste, maximum green, amber, red and pedestrian timings. Clean and adjust as necessary.
- xiii) Preventative maintenance on the controller to the manufacturer's instructions at least every six months. When this is carried out the wiring shall be examined and the earths and output load voltages shall be checked. The Engineer shall be advised of any major change in AC load voltages, taking into account time of day variations in AC input voltages. At the same time as carrying out preventative maintenance on the controller, the Contractor shall inspect the control cabinet including cabinet body, holding down bolts, hinges, locks etc. The Cabinet shall be maintained in a clean and watertight condition.

The Contractor shall arrange to provide a suitable vehicle to service all overhead mast arm signals maintained.

b) Emergency Maintenance

A continuous twenty-four hour emergency maintenance service is required and the servicing agency shall make adequate facilities available to ensure this continuity of service. This maintenance will cover any failures of the equipment and associated works in service.

The servicing agency shall make available such replacement parts as are necessary to ensure prompt repairs. Where the equipment is in the form of plug-in modules or micro-computer units, the faulty unit will be immediately replaced with a spare and repairs will be made in the agency workshop. All spare units will remain the property of the servicing agency and shall be clearly identified.

c) Accidental Damage

Accidental damage shall include the misalignment of lanterns (including mast arms) and poles resulting from wind or other accident causes. The repair of accidental damage will be undertaken by the Traffic Signal Maintenance Contractor.

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17.5.3 Guarantees

a) **Repaired and Re-installed Equipment**

All equipment repaired and re-installed under this contract shall be guaranteed by the Contractor against defective materials or workmanship for a period of 4 months from the time of installation. The guarantee shall also cover the installation of the equipment and the Contractor will be responsible for making good any defects at no charge to the Council.

b) **New Equipment**

All new equipment supplied and installed shall be guaranteed by the Contractor against defective materials or workmanship for a period of 12 months from the time of installation. The guarantee shall also cover the installation of the equipment and the Contractor will be responsible for making good any defects at no cost to the Council.

c) **Detector Loops**

All detector loops installed under this contract shall be guaranteed by the Contractor for a period of 6 months. The guarantee shall cover any damage to the loop caused by other than road works or vandalism. The guarantee may be waived by the Engineer if the Contractor can show at the time of installation that the site conditions are below standard.

d) The Contractor shall replace any bulb which fails during the preventative maintenance period as defined in Section 17.5.2 a) of this specification. The Contractor should allow for that cost within the routine maintenance schedule of prices.

17.5.4 Spare Parts

The cost of all replacement lamps, fluorescent tubes and starters are to be allowed for in the cost of routine maintenance. In addition it shall be the Contractor's responsibility to hold backup equipment and spares, particularly those specialised parts for micro-computer based equipment, unless this specification otherwise indicates that those spares will be provided by Council.

Where the equipment consists of discrete plug-in modules or contains micro-computer based units any faulty module (or unit) shall be replaced immediately with a spare and repairs to the faulty module (or unit) shall be made in the workshop as soon as possible. The responsibility for this workshop repair rests with the Contractor but tenderers must indicate any intention to sub-let any of this work to the supplier of the equipment (or another agency).

All components used by the Contractor shall be of long life or computer grade and shall be adequately rated in accordance with their application. Other spare parts, particularly those effecting the optical characteristics of lanterns and illuminated signs, must be of high quality to ensure continuing high standards of performance. Spare parts provided by the Contractor that do not meet these requirements to the satisfaction of the Engineer shall be rejected.

The Council has a range of spares and these will be made available to the Contractor.

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The Contractor may hold stocks of Council's spares as agreed by the Engineer. All such spares will remain the property of the Council and the Contractor shall clearly mark them as such and inform the Engineer of their use.

17.5.5 Response Time

All calls are to be attended to promptly. Priority faults shall be attended to within 30 minutes of the fault being reported to the Contractor.

Priority faults are defined as failures affecting the safe operation of the traffic signals or the safe display of traffic signals, including the non-appearance of any phase when demanded.

When immediate action is specifically requested a serviceman is to be dispatched immediately on the receipt of such calls.

A response time of not more than 45 minutes to site is to apply to all fault reports and service calls received outside normal working hours. Council will endeavour to ensure that all calls made during these periods relate only to priority faults. The response to all other (non-priority) calls is to be as prompt as is reasonably practical, but only under exceptional circumstances shall it exceed 24 hours.

Where the correction of a fault requires the cutting of a new detector loop on the carriageway, the Contractor shall ensure that this work is carried out within 14 days of the fault being identified and the Engineer's approval being given after notification of the fault, and all necessary preliminary work such as road reconstruction being completed.

17.5.6 Incorrect Fault Reports

A proportion of fault reports received by the Contractor will result in no fault being found when the serviceman arrives at the site. Other errors in fault reporting can also be expected. Where such calls are received they shall be acted upon, with all the associated costs being met by the Council. As most faults will be reported by the Council, they will be confirmed where possible, by integrating SCATS. The incidence of errors in fault reporting is therefore expected to be low.

Fault calls may be received for intersections not maintained by the Contractor. The Council will not accept charges for these incorrect calls. The Contractor receiving the report shall pass the fault onto the Council for redirection to the appropriate contractor.

17.5.7 General

Where it is necessary to switch local controllers off-line to facilitate servicing including preventative maintenance, notice must be given, by telephone or radio-telephone, to the City Council Control Centre staff immediately prior to such action being taken, and immediately after the controller is switched back on-line.

In the event of traffic signals being turned off for more than a short time in the course of servicing, the Duty Senior Traffic Officer or their acting deputy, is to be informed so that arrangements for alternative control of the intersection can be made as considered necessary. The fact that the signals were turned off is to be recorded on the report form.

Where it is necessary for the traffic signals to remain non-operational for more than one hour, special "SIGNALS NOT WORKING" signs (provided by the Contractor) shall be

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placed on the approaches to the intersection by the Contractor (refer NZTA Code of Practice for Temporary Traffic Management.)

The time settings on controllers shall not be altered without prior authority from the Engineer. In an emergency temporary alterations may be made provided these are corrected immediately after the fault has been repaired. In such cases, the alterations shall be noted on the fault report and a note left in the log book giving the changes, reason why and date. A standard sheet listing controller time settings is provided in each signal controller cabinet so that time settings may be re-entered correctly.

17.5.8 V8 Supercars

The Hamilton 400 V8 Supercars event requires modification and removal of traffic signals around and inside the motor racing track. Some after hours and weekend work is required pre and post race so that the city network may operate as normal once the roads are re opened. Storage facilities inside the circuit will be available for signal poles and any necessary equipment and vehicles required to complete this work. The Engineer will provide any necessary passes/accreditation for access onto the circuit and storage facilities.

Removal of Square base Traffic Signal Pole

Removal of poles will be required at the intersections of Hall St and Lake Rd, Mill St and Tristram St and Tristram St and London St. Some of this work will need to be carried out during initial stages of the track build and on the Wednesday night prior to the event at approximately 11pm. The poles that are to be removed are a distinctive square shape and have had connections etc specifically designed for easy removal and reinstatement.

Installation of Square base Traffic Signal Pole

Installation of poles will be required at the intersections of Hall St and Lake Rd, Mill St and Tristram St and Tristram St and London St. Some of this work will need to be carried out on the Sunday directly after the event at approximately 6pm and the following days as the track is disassembled.

Modification to lanterns

The intersection of Tristram St and London St requires modification to lanterns due to a phasing change to allow right turn vehicles. This work will need to be carried out approximately two to three weeks pre-event and two to three weeks post-event.

Change site personality

The intersection of Tristram St and London St requires the personality to be changed to allow for right turning vehicles. This work will need to be carried out approximately two to three weeks pre-event and two to three weeks post-event. Hamilton City Council own the Eprom required.

Reconfiguration of signal group wiring

The intersection of Tristram St and London St requires the reconfiguration of the signal group wiring to modify the normal signal phasing operation pre and post track build.

Disconnection of Mastarms

The intersection of Tristram and Bryce has a mastarm which faces the drivers on the circuit. This needs to be disconnected pre and post race. This will be done on a technician hourly basis.

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17.5.9 Control Cabinet Documentation

The Contractor shall provide a log book for each intersection maintained (unless one already exists). This log book shall become the property of the Council and shall remain in the control cabinet at all times. Any time the control cabinet is opened, the log book shall be filled in prior to closing the cabinet door.

The log book shall record:

- a) The date of the visit; and
- b) The time of the visit; and
- c) The reason for the visit and any action taken; and
- d) The initials of the recorder.

Other documents contained in the control cabinet are:

- a) Controller timing sheet showing phase timings; and
- b) Co-ordination Data Sheet; and
- b) HCC Intersection plan; and
- c) Cable connection chart or equivalent.

It shall be the Contractor's responsibility to maintain these documents in a clean and tidy condition in the control cabinet. Any modifications shall be noted on them. Where documentation has become ripped or tatty, the Contractor shall obtain further copies from the Council and install them at the intersection.

17.5.10 Third Party Warranty

The Engineer shall be informed if any fault or malfunction involves equipment that is under warranty by another Contractor. This shall be done immediately during normal working hours and before 9.00 am on the next working day after for after-hours faults.

Should the Engineer not be available and in the opinion of the contractor the integrity or operational safety of the intersection is in doubt, then the minimum repairs necessary shall be completed and the Engineer notified at the earliest possible time.

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**Appendix A
Poster for front and back of pilot cabinets**

