

SECTION 730 - TRAFFIC SIGNAL INSTALLATION

##This section cross-references Sections which should be included in the specification:

- 731 – Incidental Construction – Street Lighting Installation
- 732 – Incidental Construction – ITS Devices Installations
- 733 – Incidental Construction – Conduits and Pits for Underground Wiring and Cabling
- 610 – Bridgeworks – Structural Concrete
- 611 – Bridgeworks – Steel Reinforcement
- 614 – Bridgeworks – Formwork

730.01 GENERAL

(a) Scope

This section covers the requirements for the installation and remodel of traffic signals within the State of Tasmania for works supervised by the Department of State Growth).

For the purpose of this specification, traffic signals shall include:

- (1) intersection traffic signals
- (2) pedestrian operated traffic signals
- (3) pedestrian (zebra) crossings
- (4) emergency vehicle access signals
- (5) ramp metering signals.

(b) General Requirements

The Contractor shall be responsible for the supply, installation and commissioning of the traffic signal project as shown on the drawings, unless an agreement has been made in pre-project commencement meeting. This must be documented and formalised.

(c) New Traffic Signals

At the time of release of this Standard Section, all new traffic signal installations shall be Extra Low Voltage (ELV).

(d) Availability of Existing Traffic Signals

Where the works involve remodelling or upgrades to an existing traffic signal installation, the Contractor shall be responsible for ensuring the availability of all existing, operational traffic signals and devices connected to the traffic signal site for the duration of the works. Works shall be planned such that the time the signals are off or on 'flash' is minimised.

(e) Condition of Existing Traffic Signals

The Contractor shall be responsible for determining the condition of existing traffic signals and all associated infrastructure.

(f) Notification

Department of State Growth have a governance team that must be notified pre-project commencement. Initial notification must be sent to;

traffic.systems@stategrowth.tas.gov.au

730.02 CONTRACTORS

All electrical and cabling works associated with the installation and commissioning, or remodel of traffic signals shall be undertaken **only** by appropriately licenced electrical contractors/practitioners and registered cabling.

Such works shall include, but not be limited to:

- (1) installation of any and all conduits
- (2) installation and termination of cabling
- (3) installation of poles

- (4) installation and termination of traffic signal hardware
- (5) installation and termination of any other equipment attached to traffic signal infrastructure (e.g. Bluetooth detectors, ramp control signs, CCTV, ESLS, etc.)
- (6) any routine or non-routine maintenance activities during construction.

Department of State Growth Traffic Signal Maintenance technicians or an approved sub-contractor shall install all vehicle detector loops. The Superintendent will inform the contractor of the arrangements at the Pre-commencement meeting and in formal documentation.

730.03 DEFINITIONS

The following terms are used in this section:

Department of State Growth representative – An employee of Department of State Growth such as an authorised Department of State Growth surveillance officer. Where the Superintendent is not a Department of State Growth employee, a Department of State Growth representative shall also be present for specified activities as indicated throughout this document.

Minor Remodel – A remodel that involves works that affect less than 40% of the existing site.

Major Remodel – A remodel that involves works that include a controller replacement and affect more than 40% of the existing site.

Site Acceptance Test – 7-day operation test to ensure all systems and devices are functioning correctly and are fit for purpose.

Remodel – The full or partial rebuilding of an existing traffic signal site for the purpose of upgrading site equipment and/or adding to, deleting from or modifying the existing traffic signals.

Superintendent – The authorised person, or the authorised persons representative, responsible for managing the contract works.

Traffic Signals Maintenance (TSM) Subject Matter Expert (SME) – An employee of Department of State Growth Traffic Signals Maintenance who is nominated as the subject matter expert for the project. The TSM SME shall be present and/or undertake the specific activities as indicated throughout this document.

Type Approved – A product or device, that has been formerly approved by Department of State Growth for use on Department of State Growth projects.

730.04 ABBREVIATIONS

The following abbreviations are used in this section:

2T Post/Pedestal- Traffic signal post/pedestal 3.5 m in length

3 Post/Pedestal - Traffic signal post/pedestal 1.15 m in length (mini mast arm vertical section)

ACMA - Australian Communications and Media Authority

AS - Australian Standard

DC - Direct current

DSG - Department of State Growth

ELV - Extra Low Voltage (i.e. 42 volts AC)

GWTP - Give way to peds' sign

HP - Hold point

ITS - Intelligent transport systems

JUMA - Joint use mast arm

JUP - Joint use pole

LED - Light emitting diode

LV - Low Voltage (i.e. 240 volts AC)

MA - Mast arm

MEN - Multiple earthed neutral (as defined in AS/NZS 3000)

NLT - 'No left turn' sign

POD - Pedestrian Occupancy Detectors

Puffin - Pedestrian User Friendly and Intelligent crossing

SME - Subject Matter Expert

TSM - Traffic Signals Maintenance team

NRT - 'No right turn' sign

NZS - New Zealand Standard

RCD - Residual current device

RSLP - Rigid street lighting pole

TPS - Thermoplastic sheathed electrical cable

730.05 SITE PLAN

The scope of works, equipment requirements and placement of equipment shall be as shown on the Department of State Growth Site Plan.

Abbreviation and symbols used on Department of State Growth Traffic Signal Plans are detailed in Table 730.051 below.

Table 730.051 Abbreviations and Symbols for Traffic Signal Plans

<u>SIGNAL INFRASTRUCTURE FEATURES AND ANNOTATION</u>		
EXISTING	PROPOSED	
		TRAFFIC SIGNAL CONDUIT (No x Size)
		TRAFFIC SIGNAL DETECTOR FEED & LOOP ITS CABLE
		TRAFFIC SIGNAL PIT
		TRAFFIC SIGNAL CONTROLLER
		TRAFFIC SIGNAL POLE (2A) - 3.2m Stand Alone Pole (2B) - 4.1m Stand Alone Pole (2C) - 3.4m Stand Alone Pole (T3) - 1.4m Push Button Pole (MA) - Stand Alone Mast Arm Pole (JUP) - Joint Use Pole (JUMA) - Joint Use Mast Arm Pole
<u>SIGNAL LANTERN FEATURES AND ANNOTATION</u>		
		VEHICLE LANTERN AND SIGNAL GROUP PEDESTAL POLE (ROUNDEL ASPECTS)
		VEHICLE LANTERN AND SIGNAL GROUP PEDESTAL POLE (ARROW ASPECTS)
		VEHICLE LANTERN AND SIGNAL GROUP PEDESTAL POLE (ROUNDEL ASPECTS) "WIG-WAG"
		VEHICLE LANTERN AND SIGNAL GROUP MAST ARM POLE (ROUNDEL ASPECTS)
		VEHICLE LANTERN AND SIGNAL GROUP MAST ARM POLE (ROUNDEL & ARROW ASPECTS)
		PEDESTRIAN LANTERN, BUTTON AND SIGNAL GROUP PEDESTAL POLE (TWO ASPECT)
		PEDESTRIAN BUTTON PEDESTAL POLE (1.4m HIGH)
		ELECTRONIC SIGN [LED] (GWTP) - Give Way To Pedestrians (NRT) - No Right Turn (NLT) - No Left Turn
		VEHICLE LANTERN LOUVRE
		ACTIVE VEHICLE GROUP (UNOPPOSED)
		ACTIVE VEHICLE GROUP (FILTER)
		ACTIVE PEDESTRIAN GROUP
		SIGNAL GROUP NUMBER V = Vehicle P = Pedestrian
<u>OTHER TYPICAL FEATURES</u>		
		TELEPHONE LINE
		MINOR TRANSMISSION LINE
		ELECTRICAL - UNDERGROUND
		POLE - POWER
		POLE - STAY POLE
		STREET LIGHT - WITH OUTREACH
		STREET LIGHT
		JUNCTION BOX - POWER
		POWER - U'GROUND SERVICE PILLAR

730.06 REFERENCED AND RELATED SPECIFICATIONS, STANDARDS AND DRAWINGS

All works associated with the installation and commissioning of traffic signals and other devices covered under this specification shall conform to all relevant Department of State Growth specifications, Department of State Growth Standard Contract Sections and Australian Standards.

All works associated with the installation and commissioning of all devices covered under this specification shall conform to the general requirements of the following, in the listed descending order of precedence:

- (a) AS/NZS 3000 Wiring Rules
- (b) TasNetworks Service and Installation rules
- (c) Department of State Growth Contract Standard Sections
- (d) Department of State Growth 'SS' series specifications or relevant DoT (Roads) 'TCS' series specifications where a corresponding DSG document does not exist.
- (e) Department of State Growth 'SD' series drawings
- (e) AS 1742 Manual of Uniform Traffic Control Devices
- (f) Drawings included in the Principal's preliminary design
- (g) Technical specifications included in the Appendices

The relevant requirements of the ACMA shall apply to the provision of all communications facilities.

The individual requirements of TasNetworks shall apply for matters relating to the provision of mains power.

All traffic signal works shall be conducted in accordance with the appropriate DoT (Roads) Traffic Control Series (TCS) Specifications and Contract Standard Sections.

Australian Standards referred to in this section are listed in Table 730.051 below.

Table 730.061 List of Australian Standards

Australian Standard	Title
AS 1100.101	Technical drawing – General principles
AS 1319	Safety signs for the occupational environment
AS 1345	Identification of the contents of pipes, conduits and ducts
AS/NZS 2053	Conduits and fittings for electrical installations
AS/NZS 2648.1	Underground marking tape - Non-detectable tape
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS 3008.1.1	Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions
AS/NZS 3017	Electrical installations – Verification guidelines
AS/NZS 3100	Approval and test specification - General requirements for electrical equipment
AS 4070	Recommended practices for protection of low-voltage electrical installations and equipment in MEN systems from transient over-voltages
AS 60529	Degrees of protection provided by enclosures (IP Code)
AS/NZS 61386	Conduit systems for cable management

Department of State Growth Standard Sections referred to in this section are listed in Table 730.063 below.

Table 730.063 List of Department of State Growth Standard Sections

Std Section	Title
731	Street lighting installation
732	ITS devices installation
733	Conduits and pits for underground wiring and cabling
610	Structural concrete
611	Steel reinforcement
614	Formwork

All traffic signal works shall be conducted in accordance with the appropriate Department of State Growth Series Standard Drawings. (SD)

Department of State Growth Standard Drawings referred to in this section are listed in Table 730.064 below.

Table 730.064 List of Department of State Growth Standard Drawings

Drawing Number	Title
Traffic Operation Standard Drawings	
SD-103-001	51 Core for Intersections (Cable Connections)
SD-103-002	19 & 29 Core Cable Connections for Pedestrian operated signals
SD-103-003	Diamond Operation
SD-103-004	Double Diamond Operation
Traffic Signal Standard Drawings	
SD-101-001	RAG Bolts assembly
SD-101-002	Foundation for pedestals
SD-101-003	Bored Pile for MA, JUP and JUMA
SD-101-004	MA, JUMA, JUP and RSLP Baseplate detail
SD-101-005	Traffic Signal Post - Types 2T & 3
SD-101-006	JUP Base section
SD-101-007	JUMA Base section
SD-101-008	MA Base section
SD-101-009	JUMA, JUP and RSLP street light extension sections
SD-101-010	MA and JUMA outreach sections
SD-101-011	Typical 5.5M mast arm installation (2.5M outreach)
SD-101-012	Traffic Signal MA and JUMA Mast arm outreach clamping detail
SD-101-013	Traffic Signal MA and JUMA Overhead lantern mounting assembly
SD-101-014	MA, JUMA and JUP lantern support detail
SD-101-015	Spread Footing
SD-101-016	Traffic Signal MA, JUMA and JUP column conduit entry detail
SD-101-017	Weather Cap
SD-101-018	Pedestal location under or through verandahs
SD-101-019	Controller foundation details
SD-101-021	Cable Pit Installation details
SD-101-022	Cable Pit access cover
SD-101-023	Detector pit installation details
SD-101-024	RAG Bolt assembly for cabinet
SD-101-025	Mini Mast Arm (Type 2D)
SD-101-026	Components for standard traffic signal and street lighting poles
SD-101-027	JUMA and JUP Street Lighting extension spigot detail and spigot cap
SD-101-028	Detector pit (Extra Small) details
SD-101-029	Small pit details
SD-101-030	Large Pit Details

Table 730.064 continued next page

Table 730.064 List of Department of State Growth Standard Drawings... continued

Drawing Number	Title
SD-101-031	Extra Large Pit Details
SD-101-032	Signfix Pole, Ground Sleeve & Foundation Layout
SD-101-101	Traffic Signal Mounting Brackets
SD-101-102	Lantern and Mounting bracket orientation
SD-101-103	2T Lantern mounting details
SD-101-104	Visor dimensions
SD-101-106	Door Openings and Cable Termination block mounting details
SD-101-107	Site Identification encoder
SD-101-129	29 way terminal assembly
SD-101-130	29 Terminal assembly for use with MA, JUMA and JUP
SD-101-151	51 way terminal assembly
SD-101-152	51 Terminal assembly for use with MA, JUMA and JUP
SD-101-201	Typical layout underground ducting
SD-101-202	Traffic Signal Mounting Arrangements
SD-101-203	Typical layout flashing pedestrian crossing
SD-101-301	Loop pattern and installation details Tas 4x1
SD-101-302	Preformed loop pattern and installation details (EZY Loop)
SD-101-401	Traffic Signal Fault sticker
SD-101-402	Walk with Care sticker
SD-101-403	Not in Use sign
ITS Standard Drawings	
<u>***Note the ITS drawing set is currently under review as at Oct 2022***</u>	
SD-102-001	Highway Camera Site Typical Layout
SD-102-002	Camera column 8/10/12 M Mid Hinge
SD-102-003	Camera Column Bored Pile Foundation Installation Details
SD-102-004	Camera on Traffic Signal Post Typica mounting arrangement

Table 730.064 continued next page

Table 730.064 List of Department of State Growth Standard Drawings... continued

Drawing Number	Title
Public information labels	
SD-102-005	Highway Data Station Site - Typical Layout
SD-102-006	Highway Data Station Site - Loop Layout
SD-102-007	Cantilever Variable Message Sign - General Arrangement
SD-102-008	RC3 / TT4 Pole - Typical Arrangement
SD-102-009	Non-Accessible LUMS Gantry - Typical Arrangement
SD-102-010	Accessible VMS and LUMS Gantry - Typical Arrangement
SD-102-011	Pit and Conduit Arrangements at Gantries
SD-102-012	VLS Pole and Base Plate
SD-102-013	ITS Roadside Cabinet - General Arrangement
SD-102-014	ITS Field Cabinet and Post Foundations
SD-102-015	Active Ice Warning Sign
SD-102-016	Advance Active Warning Sign - Typical Layout Traffic Signals
SD-102-017	Vehicle Activated Sign - General Arrangement
SD-102-018	Bluetooth Detector Installation

NOTE: Current Department of State Growth Standard Drawings, Specifications and Guidelines are available for downloading from the Department of State Growth website at:

www.transport.tas.gov.au/roads_and_traffic_management/contractor_and_industry_information

730.07 SUPPLY OF EQUIPMENT AND HARDWARE

(a) Equipment supplied by Department of State Growth

Department of State Growth will supply or arrange for the supply of the following items:

- (1) the traffic signal controller and associated vehicle detector units, etc.
- (2) communication devices, such as ADSL modems, 4G modems or NBN modem
- (3) Bluetooth Data Stations.

Department of State Growth reserves the right to add to, delete from, or modify, the list of items to be supplied by Department of State Growth for any specific project.

(b) Equipment supplied by the Contractor

Other than those items listed in Clause 730.07(a), the Contractor shall be responsible for the supply of all equipment and hardware, items and peripherals required for the completion of the works.

All equipment supplied shall hold current 'Product Acceptance certification, where relevant.

All installations must use traffic signal equipment and hardware approved by Department of State Growth Traffic Systems Team prior to purchase.

All equipment, hardware, materials, and fittings supplied by the Contractor are to be new.

The Contractor is to ensure that all equipment used is compatible with all other equipment in the installation.

In the event of a proponent wishing to install equipment outside of this Specification (eg. multi/joint use poles), these assets will remain the responsibility of the proponent in perpetuity. Equipment shall comply with all relevant Australian Standards including AS/NZS 3000. Department of State Growth shall confirm equipment is acceptable and compatible. The responsible owner must keep spares and make these available to Department of State Growth for ongoing maintenance.

HP Written acceptance of these conditions must be supplied to Department of State Growth prior to purchase.

730.08 PRELIMINARY WORKS

(a) Existing site conditions

Where works are being carried out on an existing site (i.e. a remodel) the Contractor shall be responsible for inspecting and identifying all existing site conditions. For older sites, this should include such things as:

- (1) existing multicore traffic signal cable type (older sites may not use current cable types)
- (2) existing cable core allocations (older sites may pre-date the current core allocation system)
- (3) existence of any 'sand and slab' arrangements on site
- (4) extent of existing conduit network
- (5) existence of any asbestos pits, conduits, or form tubes on site.

(b) Pre-Construction

The Contractor shall be responsible for locating and proving all underground and overhead services which may be affected by the works and for coordinating the activities of the service authorities in the locating of services and carrying out of any alterations to services.

Any consultation with, and authorisation required from, other authorities under relevant utility regulations and codes shall be the responsibility of the Contractor.

(c) Pre-Installation Meeting

The Superintendent/Contractor ~~##strikethrough superintendent or contractor as required:~~ shall arrange a pre-installation meeting, to be convened by the Superintendent, consisting of representatives of the Contractor, Department of State Growth, service authorities, municipalities, and others as appropriate.

The Contractor shall ensure that the agenda for the meeting includes those matters that need to be resolved for the project to proceed expeditiously.

At the meeting, the Contractor shall, where practical, mark the position of pedestals, poles, controller bases, pits and conduits in accordance with the drawings, in the presence of a Department of State Growth TSM SME and the Superintendent, and with the approval of the Superintendent.

Where trees, poles, obstructions, services, or other site conditions prevent or adversely affect sight lines or obstruct the location as specified, the Contractor shall determine an alternate location for the affected aspect of the works and obtain approval of the Superintendent of the nominated change.

The marked location of each item approved by the Superintendent prior to excavation of foundations shall constitute agreement of the location only and shall in no way relieve the Contractor from their responsibilities under the Contract.

On satisfactory completion of the pre-installation meeting, the Superintendent will issue to the Contractor a copy of a Pre-Installation Report. A sample pre-installation report is attached.

HP The Contractor shall not commence installation of the traffic signal pedestals, poles, controller bases or pits until the pre-installation report has been approved.

(d) During Construction

Unless otherwise specified in individual contract documents, where works are being carried out on an existing operational site, the Contractor shall be responsible for the operation and maintenance of the traffic signals during the construction works. Any faults reported on site, during normal business hours shall be attended to, and rectified by, the Contractor. All after hours faults shall be attended and rectified by a Department of State Growth traffic signal maintenance technician and reported to the Superintendent..

730.09 CONDUITS**The Contractor shall install all conduits in accordance with Department of State Growth Specification 733.04**

All electrical conduit installation works for traffic signals must be carried out by, or under the direct supervision of an appropriately licenced electrical contractor/practitioner or registered cabler.

All communication conduit installation works are to be carried out under the 'on site' supervision of a registered cabler.

A plan showing the as-constructed conduit locations and depths shall be provided to the Superintendent and Department of State Growth TSM SME, and a copy left in the controller cabinet.

730.10 PITS

All pits, pit lids and frames shall be as per standard drawings.

The Contractor shall install all pits in accordance with Department of State Growth Section 733.07.

All cable pit installation works for traffic signals must be carried out by, or under the direct supervision of a licenced electrical contractor.

All communication pit installation works are to be carried out under the 'on site' supervision of a registered cabler.

Unless otherwise approved by the Superintendent, pits shall be installed for the purposes as detailed in Table 730.101 below.

Table 730.101 List of Typical Pits and Applications

Pit Type	Typical Application
Extra Large Cable Pit	Traffic signal cables, detector feeder cables. Unless agreed otherwise all communications pits shall be an Extra Large Cable Pit.
Large Cable Pit	Traffic signal cables and detector feeder cables. Only used on existing traffic signals sites for replacement of damaged pits.
Small Cable Pit	Traffic signal cables and detector feeder cables. Only used on existing traffic signals sites for replacement of damaged pits.
Detector Pit	Joining detector feeder cables to detector loop cables
Earth Pit	Locating earth stake for main switchboard

730.11 FOUNDATIONS

All rag bolts and reinforcing cages used in foundations shall be as per standard drawings.

Foundations shall be located in accordance with the drawings and as approved at the Pre-Installation Meeting.

When locating foundations, the Contractor shall ensure that all the required clearances of the installed

hardware are achieved.

Rag bolts shall be set below finished surface level as shown in standard drawing SD-101-002.

Electrical conduit shall be centred using a centring Jig so that there is no gap between conduit and pole base as shown in standard drawing SD-101-002

No part of the signal hardware is to be closer than 500 mm behind the face of the nearest kerb line, or closest vehicle path if no kerb is present.

In accordance with Department of State Growth Standard Drawing SD-101-011 , the minimum clearance of 5.5 m shall be achieved between the lowest part of a lantern installed on an outreach and the roadway directly beneath it.

Foundations and footings shall be as specified in the Department of State Growth Standard Drawings for the specific item of equipment they are to support, as listed in Table 730.111 below.

The standard foundation for an MA, JUMA and JUP shall be a bored pile. A 600 mm diameter tube former shall be used for any exposed parts of the bored pile foundation above ground level.

Where the installation of a bored pile foundation is not feasible and the Contractor proposes to install a spread footing, or adopt an alternative design, the Contractor shall obtain the prior approval of the Superintendent.

Table 730.111 Standard Foundation Types

Foundation Type	Used For	Standard Drawing
Pedestal	2T Type 3	SD-101-002
Bored Pile	MA, JUMA, JUP, 2D (mini mast arm)	SD-101-003
Spread Footing	MA, JUMA, JUP, 2D (mini mast arm)	SD-101-015
Rag Bolt Assembly	All poles	SD-101-001
Controller	Traffic signal controller UPS cabinet	SD-101-019
Street lighting	Distribution box	Refer to TasNetworks requirements
Rag bolt assembly	Traffic signal controller	SD-101-024

NOTE: Where the Contractor proposes an alternative foundation design to those shown on the Department of State Growth Standard Drawings, the Contractor shall provide sufficient evidence and proof engineering to the Superintendent to confirm that the proposed footing arrangement is suitable.

HP Where alternative foundations are proposed, they shall be approved by the Superintendent prior to the Contractor installing the foundations.

Wherever possible, when foundations for pedestals and poles are cast into concrete structures, two rag-bolt assemblies shall be installed similar to the arrangement shown in Department of State Growth Standard Drawing SD-101-015

HP All conduit, pit and foundation works shall be inspected by the Superintendent and Department of State Growth TSM SME prior to the Contractor covering the works.

730.12 BRIDGE DECKS AND OTHER CONCRETE STRUCTURES

Where traffic signals are to be installed onto a bridge deck or other concrete structure and the thickness of the bridge deck does not allow for the standard conduit, pit and foundation arrangements, the following process shall be followed.

(a) Conduits

Where conduits are required to be placed within a bridge deck, or other concrete structure, and the standard conduit size or depth of cover is not achievable, alternative conduit arrangements may be considered.

A reduced diameter conduit may be considered where additional quantity of conduits is provided to compensate for the reduced capacity.

Any variation to standard conduit arrangements must be approved by the Superintendent prior to installation.

(b) Pits

Where pits are required to be placed within a bridge deck, or other concrete structure, the pits may be shallower than standard where standard depth is not achievable or smaller where a standard pit is not achievable.

Any variation to a standard pit arrangement must be approved by the Superintendent prior to installation.

(c) Foundations

Where foundations are required to be placed within a bridge deck, or other concrete structure and the standard foundation or rag-bolt assembly is not achievable, an alternative foundation will be required.

Any alternative foundation arrangement shall be proof engineered and approved by the Superintendent prior to installation.

730.13 CONSTRUCTION OF CONCRETE FOUNDATIONS

Concrete used in foundations shall be constructed in accordance with the requirements of Section 610 using a minimum concrete grade of VR330/32.

Concrete placed in a bored pile foundation bore hole shall be poured as specified in Section 610.18(a).

Sampling of concrete shall be carried out in accordance with Section 610.16. The frequency of sampling shall be in accordance with Section 610, Table 610.161. For information, Table 730.131 has been included (This is a reproduction of Table 610.161).

Table 730.131 Frequency of concrete sampling

Volume Cast in One Continuous Operation (cubic metre)	Minimum Number of Samples
0 to 10	1
10 to 25	2
25 to 50	3
50 to 100	4

Note: This is a reproduction of Table 610.161

730.14 TRAFFIC SIGNAL HARDWARE

All traffic signal hardware shall be approved as fit for purpose by the Superintendent after consultation with Department of State Growth TSM SME.

Individual contract documents shall specify whether the traffic signals are LV or ELV. The Contractor shall ensure all supplied traffic signal hardware is suitable for the specified voltage.

The Contractor shall ensure that the combination of ELV lanterns and traffic signal controller are compatible.

(a) Standing of Pedestals and Poles

Pedestals and poles shall be installed in accordance with the following requirements:

- (1) for all new and major remodels, all Type 2 pedestals shall be 2T
- (2) for minor remodels 2T pedestals shall be used
- (3) where specified, Type 3 pedestals shall be installed for pedestrian detectors
- (4) pedestals installed through or under a verandah shall be installed in accordance with Standard Drawing SD-101-018
- (5) pedestals and poles shall be fastened to the rag bolt assembly cast into the foundations, as detailed in Standard Drawing SD-101-003, with the nuts tightened to 150 Nm of torque
- (6) pedestals and poles shall be installed such that they are vertical when fully loaded
- (7) pedestals shall not be stood within 48 hours of casting of the foundations
- (8) JUP, MA and JUMA poles shall not be stood within 7 days of the casting of the foundations
- (9) JUP, MA and JUMA poles shall be installed such that the access door is on the face furthest from the traffic flow.

(b) Lanterns

Lanterns shall be installed in accordance with the following requirements:

- (1) all traffic signal lanterns installed shall be LED type
- (2) for all remodels all existing non-LED lanterns shall be replaced with LED
- (3) the lantern voltage (i.e. LV or ELV) shall be specified in individual contract documents.

(c) Installation of Hardware

Hardware shall be installed in accordance with the following requirements:

- (1) all lanterns shall be mounted vertically, using standard straps securely fixed to mounting brackets or lugs
- (2) upper mounting brackets shall be oriented and fixed to the top of pedestals in accordance with Standard Drawing SD-101-102
- (3) two-way and four-way lower mounting brackets shall be fixed as required to provide suitable mounting points for the installation of lanterns
- (4) the top and bottom of each lantern must be firmly attached to ensure that it will not rotate
- (5) each lantern shall be attached so as to provide an unobstructed line of sight to the traffic which it controls, and such that the potential to be hit by vehicles is minimised
- (6) external cables and conduits shall be fixed to pedestals, poles or supports using suitable plastic cable ties
- (7) cable connections to lanterns shall be of sufficient length to hang below the cable entry point on the lantern (this is referred to as a drip loop), but not hang below the lower mounting strap, as shown in Standard Drawing SD-101-103, and shall be securely fixed by means of cable ties
- (8) cable connections to lanterns shall be made with continuous lengths of cable; no joins shall be allowed; this will typically require the cables supplied with lanterns to be replaced with longer cables when installed on mast arm outreaches
- (9) junction boxes, key switches, and all other electrical hardware shall comply with the relevant Australian Standards.

(d) Lantern Mounting Heights

Lantern mounting heights shall be in accordance with the following requirements:

- (1) mounting heights for lanterns on 2T pedestals shall be as specified in Standard Drawing SD-101-202
- (2) lanterns installed on the vertical section of an MA, JUP and JUMA shall be mounted on lugs so as to give the same mounting heights for the respective lantern positions as specified in Standard Drawing SD-101-202
- (3) lanterns on the outreach of an MA or JUMA shall be mounted in accordance with Standard Drawing SD-101-011
- (4) 1 and 2 aspect lanterns shall be installed to achieve the mounting height of an aspect of the same colour as if it were part of a 3-aspect lantern
- (5) 2 aspect bicycle lanterns shall be mounted at the same height as pedestrian lanterns
- (6) aspects fitted with white or lunar white lenses shall be mounted at the same height as a green aspect
- (7) lanterns mounted on poles not belonging to Department of State Growth shall be mounted at the same heights as specified in Standard Drawing SD-101-202
- (8) internally illuminated signs shall be mounted at a height to provide a clearance of not less than 2.4 m from the finished surface level
- (9) flashing yellow signals used at pedestrian crossings shall be mounted at the height specified in Standard Drawing SD-101-203.

(e) Lantern Mounting Locations

Lantern mounting locations shall be in accordance with the following requirements:

- (1) lanterns shall be mounted as indicated in Standard Drawing SD-101-102 and SD-101-202
- (2) pedestrian lanterns shall be mounted not more than 1 m from the projection of the nearest crosswalk line
- (3) where 2 aspect bicycle lanterns are installed adjacent to pedestrian lanterns, the bicycle lanterns shall be located on the furthest side from the pedestrian crossing (i.e. left side of the pedestrian lantern when looking at the displays).

(f) Lantern Alignment

The alignment of lanterns shall be in accordance with the following requirements:

- (1) vehicle lanterns shall be aligned so as to provide optimum visibility for approaching traffic considering road alignment, speed, visibility and other site characteristics
- (2) generally, lanterns shall be aimed at a point on the centre of the approach, at a distance before the stop line as shown in Table 730.141 below
- (3) pedestrian lanterns shall be aimed at the mid-point of the cross walk on the opposite side of the carriageway to which it applies.

Table 730.141 Lantern Alignment Distances

Approach Speed (km/h)	Primary	Secondary
	Metres from stop line	
40	40	80
50	60	100
60	80	130
70	100	150
80 +	120	170

(g) Target Boards, Visors and Louvres

All target boards shall suit the housing type (metal, plastic) of lanterns and include a white border around the outside edge

Target boards shall be fitted to all lanterns in accordance with Standard Drawing SD-101-103

All visors for vehicle lanterns shall be type 3 with no cutaway.

All visors for pedestrian and bicycle lanterns shall be type 4 with no cutaway.

Refer to Department of State Growth Standard Drawing SD-101-104 for details of the visor types.

Louvres shall not be installed on LED lanterns unless otherwise specified.

(h) Installation of Pedestrian Push Buttons

Pedestrian push buttons shall be installed in accordance with following requirements:

- (1) pedestrian push button assemblies shall be mounted clear of any access openings and such that the centre of the button is 0.9 m above finished surface level, as shown in Standard Drawing SD-101-202
- (2) Pedestrian push button shall be mounted within proximity of ramps, preferably in ramp wings to enable reachable access maximum distance is 300 mm as specified in Standard Drawing.
- (3) the face of the button shall be in line with the direction of the associated walk lines
- (4) the tactile arrow indicator shall be oriented to indicate the walk direction to which the button relates, with the arrow pointing up to indicate a straight ahead walk direction
- (5) where a single button is mounted in a median, a double headed arrow plate shall be used with the arrow oriented horizontally and the front face of the button shall be parallel with the walk direction
- (6) a label complying with Standard Drawing SD-101-402 shall be installed on the pedestal or pole directly above each pedestrian push button.

(i) Audio Tactile Devices

Where specified on the drawings, audio tactile units shall be mounted as shown on Department of State Growth Standard Drawing SD-101-202.

Audio tactile units shall be mounted using a pole clamp and be facing away from traffic so that it can be easily accessible for maintenance.

(j) Puffin Pedestrian Operated Signals

Where a 'Puffin' (Pedestrian User Friendly and Intelligent) Crossing is specified, the Contractor shall install approved Puffin Crossing 'Walk' detectors in accordance with VicRoads Specification Puffin Crossing 'Walk' Detectors, TCS 027, and VicRoads Standard Drawing TC-1005.

Where Pedestrian Occupancy Detectors (POD's) are specified, the Contractor shall install approved

POD detectors at the nominated pedestrian waiting area. POD's shall be installed in accordance with the site-specific operational requirements and the manufacturers requirements.

(k) Flashing Pedestrian Crossings

Flashing pedestrian crossings shall be installed in accordance with Department of State Growth Standard Drawing SD-101-203.

(l) Attaching of Equipment to Other Supports

Attachment of traffic signal equipment to service poles or structures which are not owned by Department of State Growth shall be avoided.

If there is no other option equipment shall be installed by means of matt stainless-steel straps, coach bolts or masonry bolts as applicable, or such other methods as approved by the relevant authority, the owner of the pole or structure and the Superintendent.

Above ground conduits attached to structures or poles owned by other agencies shall be 25 mm diameter galvanised wrought iron conduit or steel sheathing of an approved type.

Above ground conduits shall extend up to a termination point for the electrical cables or to a height of 3 metres whichever is the lower.

(m) Non-Commissioned Lanterns

The faces of all installed but not yet operating lanterns shall be covered.

At sites that have not been switched on, all vehicle lanterns shall be covered with 'NOT IN USE' signs as shown in SD-101-403.

At remodel sites, or sites where existing lanterns are operating, all non-operating lanterns shall be covered with a 'NOT IN USE' sign or other approved method.

(n) Awnings

Where pedestals need to be installed under or through awnings or verandahs, the installation shall be in accordance with Standard Drawing SD-101-018.

The Contractor shall be wholly responsible for providing and making good any holes through awnings which may be necessary for the erection of pedestals.

Where pedestals pass through awnings, a clearance all round shall be left between the pedestal and the awning and finished such that water from the awning cannot flow into the opening.

Any alterations to the awning shall be carried out by a qualified plumber and with the agreement of the owner of the awning.

HP All installed hardware shall be inspected by the Superintendent prior to works proceeding.

730.15 OTHER HARDWARE

(a) ITS

All ITS equipment shall be supplied and installed in accordance with 732.

730.16 POINT OF SUPPLY**(a) Point of Supply**

All electrical works, conduits, fittings, materials and installations related to the point of supply shall comply with the requirements of AS/NZS 3000 Wiring Rules.

At any location, only a single point of supply shall be allowed. A second point of supply shall not be installed within 100 m of an existing point of supply.

Unless otherwise indicated, the word “provide” is used in this document to mean “supply, install, test, commission, record results & documentation and make fully operational”.

Point of supply for traffic signal installation shall be in accordance with the following requirements:

- (1) the “Basic Connection Application” shall be completed and submitted by the Superintendent or Superintendent’s representative
- (2) the Contractor shall arrange for the installation of the point of supply with the supply authority (TasNetworks), at the location approved at the Pre-installation Meeting
- (4) where required by the supply authority, the point of supply shall be an approved, unmetered, supply pillar
- (5) where the supply authority requires a metered supply a distribution cabinet shall be provided
- (6) the supply enclosure should be located between 3 m and 6 m from the controller cabinet to minimise the risk of both the controller and the point of supply being hit by an errant vehicle in the same incident
- (7) the main switchboard shall contain a main switch and/or suitably sized circuit breaker
- (8) access to the main switchboard shall be via a TasNetworks Lock key. Locking mechanism and handle shall be recessed and only become accessible with the use of the key.
- (9) the earth stake shall be installed in the associated earth pit, adjacent to the Main Switchboard.
- (10) the main switchboard shall contain the MEN (Multiple Earthed Neutral) link
- (11) if a street lighting distribution cabinet is to be installed as part of the project, the point of supply for the traffic signals shall be provided by means of a separately metered circuit within the cabinet
- (12) the circuit breaker controlling the traffic signals shall be clearly and permanently labelled.
- (13) provide a protective earth conductor
- (14) supply and install a suitable draw wire, securely fastened at both ends for future use
- (15) conduits shall be fully sealed at the conclusion of works, to prevent the ingress of dust, debris, insects, vermin, water and moisture.

Where there is additional load added to an existing point of supply, the Contractor shall ensure that the point of supply has sufficient capacity for the additional load.

The Contractor shall lodge all relevant associated documentation to comply with the requirements of TasNetworks and WorkSafe Tasmania for the provision of a 240 v 50 Hz single phase power supply for final termination on not less than a 32 amp service fuse.

NOTE: Any arrangements for the supply of power that are not consistent with current Department of State Growth practice shall be submitted to the Superintendent for approval.

(b) Connection of Traffic Signal Controller

The Contractor shall install a 2 or 3 core low voltage power supply cable in a Dia. 50 mm HDPE conduit between the point of supply and the controller base in accordance with the requirements of the supply authority.

Sufficient cable shall be provided to reach 1.0 m above the controller base.

An additional length of at least 1.5 m of the power supply cable shall be left coiled in the pit closest to the controller base.

The active and neutral cores of the power supply cable shall have a cross sectional area not less than

6 mm².

730.17 TRAFFIC SIGNAL SITE CABLING

All traffic signal site cabling shall be installed in accordance with the following requirements.

The only joints allowed in cables shall be those detailed in the following clauses.

No cable joints in any cable type shall be allowed in any conduits, pits or other non-approved location or in any non-approved manner.

(a) Multicore traffic signal cabling

Multicore traffic signal cabling shall be installed in accordance with the following requirements.

- (1) Where practicable, traffic signal power cables shall be installed in independent road crossing conduits.
- (2) Inter-connecting traffic signal power cables shall be drawn through the conduits and pits as shown on the drawings.
- (3) A draw cord shall be left in each conduit at the completion of the cabling.
- (4) A spare length of not less than 1.5 m of each inter-connecting cable shall be coiled in each cable pit. Each individual cable run between poles shall have no less than 5 m cable spare coiled in pit.
- (5) All cables shall be installed in a manner which ensures that sheathing and insulation are not damaged.
- (6) Any cables damaged during installation or remodel works shall be immediately replaced by the Contractor at no additional cost to Department of State Growth.
- (7) Site cables shall be appropriately restrained at the point of termination (e.g. top of pedestals, access points in MAs, JUPs, etc.) to ensure that stress on terminations (due to the self-weight of the cable) is minimised.
- (8) Cabling shall be terminated in the upper mounting assembly (UMA) terminal strip on Type 2 pedestals.
- (9) Cabling shall be terminated in the terminal strip located behind the access door on all MA's, JUP's and JUMA's.
- (10) Where the terminal strip is a 'twin connector' type (i.e. four screwed connectors on each terminal as per SD-101-151) the traffic signal cable shall be terminated in the lower (or rear) terminals and the traffic signal lantern cables shall be terminated in the upper (or front) terminals.
- (11) No cable joints or terminations shall be made in any location or manner other than that described in clauses 8, 9 and 10 above.
- (12) Only one terminal strip shall be installed in any pedestal or pole.
- (13) Spur cables shall be connected into the ring circuit in the terminal strip in a pedestal or pole, or directly in the traffic signal controller.
- (14) Unterminated cables located at the traffic signal controller base shall be coiled in the adjacent pit and appropriately secured.
- (15) Sufficient cable shall be provided to reach 1.5 m above the controller base and coiled in the nearest pit.

(b) Multicore traffic signal cable sizes and wiring arrangements

With the exception of terminations at the controller, all cables and wiring shall be installed by the Contractor and shall comply with the following requirements.

- (1) At **standard intersection traffic signals**, the traffic signal controller and all upper mounting assemblies and/or terminal assemblies (in MAs, JUMAs and JUPs) shall be connected by a **51 core cable** in a continuous ring circuit arrangement in accordance with VicRoads Standard Drawing SD-103-001
- (2) At **larger intersection traffic signals**, where the standard allocation of cores (i.e. standard single

- 51 core ring circuit) cannot be readily adopted, the traffic signal controller and all upper mounting assemblies and/or terminal assemblies (in MAs, JUMAs and JUPs) shall be connected by a **dual 51 core cable** arrangement in accordance with Department of State Growth Standard Drawing SD-103-001.
- (3) At **diamond interchanges**, where the standard allocation of cores (i.e. standard single 51 core ring circuit) cannot be readily adopted, the traffic signal controller and all upper mounting assemblies and/or terminal assemblies (in MAs, JUMAs and JUPs) shall be connected by a **51 core cable** arrangement in accordance with Department of State Growth Standard Drawing SD-103-004.
 - (4) At **pedestrian operated signals (single and dual carriageway)**, the traffic signal controller and all upper mounting assemblies and/or terminal assemblies (in MAs, JUMAs and JUPs) shall be connected in sequence by a **29 core cable** circuit in accordance with Department of State Growth Standard Drawing SD-103-002.
 - (5) At **flashing pedestrian crossing (Zebra) signals**, the control equipment and all upper mounting assemblies and/or terminal assemblies shall be connected by a **19 or 19 core cable** in accordance with Department of State Growth Standard Drawing SD-103-002.
 - (6) For **spurs and flashing (red or yellow) signals**, the control equipment and all upper mounting assemblies and/or terminal assemblies shall be connected in sequence by a **19 core cable** branch circuit.
 - (7) At **ramp metering signals**, the traffic signal controller and all upper mounting assemblies and/or terminal assemblies (in MAs, JUMAs and JUPs) shall be connected by a **13 core cable**.

- (8) For **traffic signals ahead / prepare to stop** (advanced warning) signs as detailed in clause 730.15(i), the signs shall be connected to the controller by a suitably sized cable. The required cable size will depend on the distance the signs are from the controller. The cable size shall be determined to ensure compliance with voltage drop requirements of AS/NZS 3000.

(c) Cabling of Pedestrian Push Buttons

Pedestrian push button detectors shall be connected by flexible 5 core cable (each core shall have a cross sectional area of not less than 1.5 mm²) to the appropriate termination positions for the multi-core traffic signal cables.

The termination of push button cable connections shall be as detailed in Table 730.171 below.

Table 730.171 Pedestrian Push Button Cable Connections

Nominal core colour	Function
White	Push Button
Blue	Push Button return
Brown	Call Record
Orange	Call Record return
Green/Yellow	Earth

(d) Detector Feeder Cables

Detector feeder cables shall be used to connect detector loops to the traffic signal controller and shall be installed in accordance with the following requirements.

- (1) Where practicable, detector feeder cables shall be installed in independent road crossing conduits.
- (2) Detector feeder cable shall be a 2 core, 4 core or 8 core shielded cable, 1 cable per loop and each cable pair shall be clearly and durably marked at both ends to enable positive identification.
- (3) The maximum length of any individual detector feeder cable shall not exceed 200 m.
- (4) The only permissible joint in a detector feeder cable is where it joins to the associated loop feed-in wires in the associated detector pit. Joints in feeder cable to extend the length of the feeder cable are not permitted.
- (5) The Contractor shall connect the detector loop cables to the detector feeder cables in accordance with this section by soldering.
- (6) The 6 wires for each individual loop shall be knotted in accordance with Standard drawing SD-101-301
- (7) Unused loop cable ends shall be left open circuit.
- (8) All terminations, joined or unjoined, shall be separately insulated and sealed against the ingress of moisture with heat shrink containing resin or another acceptable method approved by the Superintendent.
- (9) Detector feeder cables shall be left unterminated and coiled in the pit closest to the controller base.
- (10) Each detector feeder cable shall have sufficient length to allow 1.5 m to be coiled in the pit and to reach 1.5 m above the top of the controller base.
- (11) Each feeder cable shall be clearly marked or labelled to clearly identify the connected loop.
- (12) A cable diagram shall be provided to the Superintendent detailing the loop cable/feeder cable connections.

(e) Miscellaneous Cabling

For miscellaneous cable usage, refer to Table 730.172 below.

NOTE: No cable joints in any cable type shall be allowed in any conduits, pits or other non-approved location or in any non-approved manner.

Table 730.172: Miscellaneous Cable Usage

Application	Cable Type
Branch circuits off a ring circuit (also known as a spur)	19 or 29 core traffic signal cable
Connection to advance warning signs (e.g. traffic signals ahead/prepare to stop with flashing yellow lanterns)	Suitable size cable that ensures compliance with voltage drop requirements of AS/NZS 3000.
Linking cable between a UPS and the controller for alarm monitoring	Suitable multi-core data cable
Linking cable between the controller and public transport or emergency service facilities (left labelled but unterminated at the controller base)	Suitable multi-core data cable or 13 or 19 core traffic signal cable

(f) Installation of Detector Loops

The Contractor shall arrange for the installation of vehicle detector loops in accordance with the drawings. Traffic Signals Maintenance can assist in the installation of vehicle detector loops as agreed.

Where the road is to be resurfaced Sub-Pavement Loops (EZY Loops) shall be installed under the wear surface of the final bitumen seal.

Vehicle detector loop installations shall conform to Specification for the Installation of Inductive Detector Loop, SD-101-301. Where there is a single lane, loops may be cut back to either the left kerb or the right (median) kerb.

Where there are 2 lanes, each loop may be cut back to the same side of the road, or 1 to each side.

Where there are 3 or more lanes, the loops shall be cut back to the closer side of the road. Table 730.173 shows some examples for typical installations.

Table 730.173: Cutting of Detector Loops

Number of lanes	Loops cut to left kerb	Loops cut to right (median) kerb
3	2	1
4	2	2
5	3	2
6	3	3

Where a median does not exist, loops shall not be cut back to the kerb on the opposite side of the road. In this instance, loops for the approach should all be cut back the left kerb.

Wherever possible, cutting loops into steel reinforced concrete bridge decks should be avoided.

The termination of detector loops to detector feeder cables in detector pits shall be carried out by the licenced electrical contractor.

(g) Testing of Electrical Works

The electrical installation shall be tested for correct cabling by the Contractor.

The Contractor shall be responsible for all testing associated with the proving of the electrical circuits in accordance with the requirements of AS/NZS 3000 Wiring Rules and AS/NZS 3017.

In particular, the following tests shall be carried out prior to installation of lanterns and hardware:

- (1) continuity of all active conductors
- (2) continuity of neutral and ELV conductors
- (3) continuity of earthing system in accordance with clause 8.3.3 of AS/NZS 3000.
- (4) insulation resistance test of all field cables in accordance with the requirements of AS/NZS 3000.

HP The results of the above tests shall be recorded on the forms provided at the end of this section and a copy provided to the Superintendent.

The Contractor shall provide a minimum 48 hours of notice to the Superintendent of readiness to undertake the flash test.

Following the installation of all lanterns and hardware, the Contractor shall carry out a flash test as part of the pre-commissioning testing.

730.18 NOT USED

730.19 PROVISION OF COMMUNICATIONS LINE

Where an ADSL or NBN line is required, it is the responsibility of the contractor to liaise with the Communications Carrier or any other third party to ensure the line is available at the location.

The communications pit is the demarcation point between DSG's asset and the Communication Carriers asset. A minimum of 1.5 m of telecommunications cable shall be left coiled in the communications pit.

The communications pit shall be installed as close as practicable to the controller foundation apron and not more than 3 metres from the traffic signal controller by the Contractor. The Communications Carrier is responsible for all works from the communications pit to the nearest Communications Carrier pit. The Contractor shall not undertake any works between the communications pit and the Communication Carriers pit.

Under no circumstances shall the Contractor connect conduits or cables into the Communication Carrier's pit. The Contractor is not authorised to enter, break into, undertake any works on or within, or in any other way tamper with or interfere with, any Communications Carriers pits, conduits or another Communications Carriers asset. ONLY the Communication Carrier is authorised to carry out any works on their asset.

The Superintendent shall make application for the line and advise the Contractor on availability of same.

Connection of the communication line shall be the responsibility of others.

730.20 PUBLIC TRANSPORT INTEGRATION**(a) Signals at Railway Level Crossings**

The Contractor shall obtain all the necessary permits and approvals for working on and adjacent to the rail track owner's, or the railway operator's, property and equipment.

Where specified on the drawings, the Contractor shall install a 10 pair approved communication cable (colour coded) between the traffic signal controller and the railway control equipment.

Where traffic signals are to be installed on each side of the railway, the Contractor shall supply and install 2 x 100 mm diameter conduits with draw cords as shown on the drawings and agreed by the railway track owner.

The Contractor should note, one of these conduits shall be for the traffic signal ring circuit cables, the other for any ancillary site equipment.

730.21 NOT USED**730.22 PRE-COMMISSIONING****(a) Pre-Commissioning Site Inspection**

Upon completion of the installation works, a complete pre-commissioning inspection shall be undertaken by the electrical Contractor and Department of State Growth TSM SME.

The Contractor shall provide 24 hours' notice to the Superintendent and Department of State Growth TSM SME of the time of the inspection.

Pre-commissioning inspection shall confirm that all field works have been completed before the pre commission Site Acceptance Testing of the traffic signal controller. .

The inspection shall cover such things as:

- (1) all pole foundations are installed correctly
- (2) the controller foundation is installed correctly
- (3) distribution cabinet foundation is installed correctly
- (4) traffic signal cables have been installed and connected in the field
- (5) traffic signal cables are installed and connected correctly in the Traffic signal controller.
- (6) traffic signal cables have been clearly marked as appropriate
- (7) all lanterns are installed and connected
- (8) all other associated hardware has been installed and connected
- (9) a cable numbering diagram has been provided
- (10) all traffic signal detectors (loops) have been installed
- (11) feeder cables have been connected to loops and the controller end of each feeder cable clearly marked as to what loop it is connected to
- (12) communications cable is installed and coiled in comms pit adjacent to the controller foundation, where applicable.
- (13) Mains Power has been connected and energised..

The Contractor shall complete the Pre-Commissioning Report provided at the end of this section and provide a copy to the Superintendent.

The Superintendent shall provide a copy of this report to the Department of State Growth TSM SME prior to the pre commission Site Acceptance Testing of the controller.

Once the flash test has been confirmed as acceptable, the site is to run with the lamps circuit breaker isolated for seven days to confirm correct operation of site.

Any item found to be defective or incorrectly installed shall be replaced and/or rectified prior to commissioning and the seven days shall recommence to confirm no faults.

The Contractor shall advise the Superintendent if any aspect of the works has not been completed.

(b) Provision of Power

The Contractor shall arrange for the submission of all necessary paperwork, inspections, payment of fees, etc., to obtain connection to mains supply.

The Contractor shall advise the Superintendent when power is available at the site.

The Contractor shall arrange for the issuing of the Certificate of Electrical Compliance and be responsible for the submission of all necessary paperwork, inspections, payment of fees, etc., to obtain connection of mains supply to the site.

730.23 TRAFFIC SIGNAL CONTROLLER INSTALLATION

The Contractor shall install the traffic signal controller. The controller installer shall be appropriately qualified and trained.

(a) Pre-controller Installation Field Works

Unless a remodel of an existing site prevents all fieldworks being completed before the installation of the traffic signal controller the installation contractor shall ensure that all site works have been completed including, but not limited to, the following:

- (1) traffic signal cables have been installed and connected in the field
- (2) traffic signal cables are coiled in the pit adjacent to the controller foundation
- (3) traffic signal cables have been clearly marked as appropriate
- (4) all lanterns are installed and connected
- (5) all other associated hardware has been installed and connected
- (6) a cable numbering diagram has been provided (this is usually written on the 'op-sheet')
- (7) feeder cables have been connected to loops and the controller end of each feeder cable clearly marked as to what loop it is connected to
- (8) communications cable is installed and coiled in comms pit adjacent to the controller foundation.

(b) Pre-controller Installation Documentation

The Installation Contractor shall provide copies of the following completed reports to the Superintendent:

- (1) a copy of the Certificate of Electrical Compliance for all electrical works as required
- (2) continuity test report
- (3) insulation resistance report
- (4) pre-commissioning report.

A copy of each of the above reports shall be provided to the controller installer prior to the installation of the controller.

(c) Traffic Signal Controller Installation

The Contractor is responsible for the removal of the existing controller (for controller replacement works) and the installation of the new controller and connection of all field cabling into the controller including:

- (1) mains power cable
- (2) traffic signal cables
- (3) detector loop feeder cables
- (4) communications cable
- (5) public transport and emergency vehicle interface cables
- (6) power supply cables for other ITS devices such as CCTV, ESLS, Ramp Control signs
- (7) existing DJCS connections.

If there are any field works required as part of the controller installation works, the Contractor shall undertake such works at the same time the controller is installed.

730.24 COMPLETION OF SITE WORKS AND COMMISSIONING

(a) Participants

The following participants shall be present for works as described in (b) and (c) below.

- (1) Installation Contractor representative
- (2) Department of State Growth TSM SME.
- (3) Superintendent or Superintendent's representative.

(b) Flash Test

Following the connections of the mains supply cable and all traffic signal cables in the controller, the controller installer shall carry out a 'flash test'. The 'flash test' is to ensure that all lanterns and signal aspects are connected to the correct cable core and signal group.

The Superintendent or Superintendent's representative shall witness the 'flash test' for all lanterns and confirm that the site is connected correctly.

NOTE: Department of State Growth TSM SME MUST be present to witness and approve the flash test prior to switch-on.

Any lanterns observed to be connected to an incorrect cable core or signal group shall be rectified by the traffic signal installation Contractor.

HP The site shall not be switched on before a successful 'flash test' has been witnessed by an authorised Department of State Growth TSM SME and confirmed as acceptable.

(c) Switch-On

Department of State Growth shall co-ordinate the site switch-on and arrange for all involved parties to be on site.

It is recommended that the local area maintenance contractor be present at the switch on.

On agreement from the Superintendent, the traffic signal installation shall be switched on and thoroughly checked and monitored to ensure safe and proper operation.

NOTE: Where the Superintendent is not a Department of State Growth representative, an authorised representative from Department of State Growth (e.g. Surveillance Officer) MUST be present to carry out the checking and monitoring of the site to ensure safe and proper operation.

The Contractor shall lodge copies of all applications and notices relating to the supply of power and wiring of the site, together with the Certificate of Electrical Compliance to the Superintendent.

The time and date of the switch-on shall be recorded on the Controller Record Card in the controller.

The controller supplier is responsible for recording the time and date of switch-on and for the power consumption readings as required in the Electrical Test Report.

(d) Commissioning

Once steps detailed in (b) and (c) above have been successfully completed, the site shall be deemed to have been commissioned.

The Superintendent shall provide to the DSG TSM Team, within 5 business day, the following:

- (1) notification that the site has been commissioned
- (2) a copy of the Commissioning report
- (3) details of any building warranty or defects liability period affecting the site
- (4) the date of scheduled handover.

(e) Removal of Redundant Hardware

All redundant components of the hardware and equipment (except those components below the finished surface level at the pedestals) shall be removed unless otherwise specified or shown on the drawings.

Hardware and equipment attached to the redundant pedestals shall be removed prior to cutting off and removal of the pedestals.

All holes and depressions formed by the cutting off and removal of pedestals and by the removal of any other items shall be made safe and reinstated to the level of the surrounding surface.

All surface areas such as footpaths, paved areas, grassed areas, etc., shall be reinstated to a finish and condition that is not inferior to the original surface finish and condition (e.g. grass to grass, concrete to concrete, asphalt to asphalt, etc.). All surface areas shall be reinstated to the satisfaction of the Superintendent.

The Contractor shall be responsible for disposal of all redundant materials and hardware.

Existing traffic signal equipment and hardware which is not re-used, but is to be salvaged, shall be delivered in good condition to a location specified by the Superintendent.

Any disused cable pits shall be backfilled to the satisfaction of the Superintendent.

(f) Handover

Upon completion of any building warranty or defects liability period, the site shall be 'handed over' to the Maintenance Team to be placed under the relevant maintenance contract.

The 'hand over' process shall be managed by the Superintendent who shall provide the Maintenance Team with the following:

- (1) opportunity to carry out an audit of the site to ensure compliance with Department of State Growth specifications and requirements
- (2) copies of all Certificates of Electrical Safety for all electrical works
- (3) copies of the 'electrical test report'
- (4) copies of the switch-on report
- (5) details of the installation contractor
- (6) details of all hardware installed on site
- (7) copies of the 'as-built' drawings as detailed in (g) below.

NOTE: If, during the site audit listed in (1) above, the site is deemed not to comply with Department of State Growth specifications and requirements, the Maintenance Team may, at its sole discretion, elect not to accept the site until such non-compliances have been satisfactorily rectified.

The project 'handover' shall not be deemed to be completed until the maintenance team has provided written acceptance of the site.

(g) As-built drawings

At the completion of works, the Contractor shall provide 'as-built' drawings:

- (1) as soft copies, prepared in digital cad format
- (2) as soft copies in PDF format
- (3) that clearly show all changes from the IFC drawings and reflect what is on site
- (4) that are clearly dated and marked as 'As-built'.

NOTE: PDF files with 'mark ups' will not be accepted as 'as-built' drawings.

Attachments

The following documents shall be completed, signed and provided to the Superintendent as detailed in this standard section and as shown in the table below.

The Superintendent shall provide copies of all reports to the Maintenance Team upon handover.

The Hold Points identified shall apply.

Document / Reference	When / Hold Points	Responsible Person
Hold Point 730.07	HP Written acceptance of conditions must be supplied to Department of State Growth prior to purchase for equipment outside of this Specification	Proponent
Pre-installation report 730.08	Prior to works commencing.	Installation Contractor and Superintendent
Hold Point 730.08	HP The Contractor shall not commence installation of the traffic signal pedestals, poles, controller bases or pits until the pre-installation report has been approved.	Installation Contractor
Hold Point 730.11	HP Where alternative foundations are proposed, they shall be approved by the Superintendent prior to the Contractor installing the foundations.	Installation Contractor
Hold Point 730.11	HP All conduit, pit and foundation works shall be inspected by the Superintendent and Department of State Growth TSM SME prior to the Contractor covering the works.	Installation Contractor to arrange. Superintendent and DSG TSM SME to undertake inspection.
Hold Point 730.14	HP All installed hardware shall be inspected by the Superintendent prior to works proceeding.	Installation Contractor to arrange. Superintendent to undertake inspection.
Continuity test report 730.17	On completion of cabling and connecting the traffic signal cable and before lanterns are connected	Installation Contractor
Insulation resistance test report 730.17	On completion of cabling and connecting the traffic signal cable and before lanterns are connected.	Installation Contractor
Hold Point 730.17	HP The results of the above tests shall be recorded on the forms provided at the end of this section and a copy provided to the Superintendent.	Installation Contractor
Pre-commissioning report 730.22	On completion of Pre-commissioning Inspection	Installation Contractor and Superintendent

Hold Point 730.24	HP The site shall not be switched on before a successful 'flash test' has been witnessed by an authorised Department of State Growth TSM SME and confirmed as acceptable.	Installation Contractor to arrange. DSG TSM SME to undertake inspection.
Commissioning report 730.24	Post 'switch-on'	Superintendent
Power consumption record 730.24	After 'switch-on'	Controller Installation Contractor

The following documents shall be completed as required, signed and provided to the Superintendent as required. The Superintendent shall provide copies of all reports to the Maintenance Team upon handover.

Document	When	Responsible Person
Certificate of Electrical Compliance	On completion of conduit installation.	Installation Contractor
Certificate of Electrical Compliance	On completion of all electrical field works.	Installation Contractor
Certificate of Electrical Compliance	On completion of controller installation and switch-on	Controller Installation Contractor.

**Traffic signal installation
Pre-Installation Inspection Report**

SITE:	FILE NO:
PLAN NO:	JOB NO:
OFFICERS IN ATTENDANCE (INCLUDE AUTHORITY NAME, CONTACT NUMBER)	
DSG:	SIGNATURE:
CONTRACTOR:	SIGNATURE:
COUNCIL:	SIGNATURE:
OTHER	SIGNATURE:
	DATE:
CHANGES TO PLAN (TO BE CONFIRMED BY EMAIL)	
ITEMS TO BE CHECKED:	
NOTES:	

Traffic signal installation Electrical Test Report - Continuity test of all cables

Site Name:	
Suburb/City:	Site No:

Cable number (where more than one ring circuit):					
Core	Ω	Core	Ω	Core	Ω
Earth		15		32	
Neutral		16		33	
ELV		17		34	
1		18		35	
2		19		36	
3		20		37	
4		21		38	
5		22		39	
6		23		40	
7		24		41	
8		25		42	
9		26		43	
10		27		44	
11		28		45	
12		29		46	
13		30		47	
14		31		48	

Signed:	Date:
Print Name:	
Company:	

**Traffic signal installation
Electrical Test Report – Insulation resistance test of all field cables**

Site Name:	
Suburb/City:	Site No:

Cable number (where more than one ring circuit):					
Core	MΩ	Core	MΩ	Core	MΩ
Neutral		16		33	
ELV		17		34	
1		18		35	
2		19		36	
3		20		37	
4		21		38	
5		22		39	
6		23		40	
7		24		41	
8		25		42	
9		26		43	
10		27		44	
11		28		45	
12		29		46	
13		30		47	
14		31		48	
15		32			

Signed:	Date:
Print Name:	
Company:	

Traffic signal installation

Pre-Commissioning Report

Site No:
Site Name:
Suburb/City:
Instructions: <ul style="list-style-type: none"> This report must be completed to allow the pre commissioning soak test to begin. Department of State Growth TSM SME must be present at the Pre-commissioning inspection

Item		Checked	Completed Y/N
1	Controller foundation complete		
2	All poles installed		
3	Traffic signal cables installed and connected in the field		
4	Traffic signal cables clearly marked as appropriate (e.g. where two ring circuits are installed)		
5	A cable number allocation diagram has been provided		
6	No unapproved cable joints		
7	All lanterns installed and connected		
8	All other hardware installed and connected (e.g. push buttons, audio tactiles, GWTP signs, NRT signs, etc)		
9	All detector loops installed		
10	Detector feeder cables connected to detector loops		
11	Detector feeder cables clearly marked as to what loop they are connected to		
12	No unapproved joints in feeder cables		
13	Communications cable installed between controller and communications pit		
14	Telecommunications cable installed by communications provider into communications pit and connected to controller cable		
15	Power connected and energised to traffic signal controller.		
16	Electrical continuity test report provided		
17	Electrical insulation resistance report provided		
18	Copy of CEC for ALL electrical installation works, including conduit installation, provided		
19	As Constructed drawings are provided and comply		
20	Kerb structures completed		
21	Line marking completed		

For any items above where the response in 'NO', please provide reasons:

Contractor representative:	
Signed:	Date:
Superintendent representative:	
Signed:	Date:
Department of State Growth TSM SME	
Signed:	Date:

Traffic signal installation Commissioning Report

Site No:
Site Name:
Suburb/City:

Item	Checked	Completed Y/N
Flash test conducted and witnessed by authorised DoT representative		
Controller switched on		
Controller connected to SCATS		
Controller operating correctly on SCATS		
All field works completed		
All traffic signal lanterns operating correctly.		
All pedestrian detectors and audio tactiles operational		
All internally illuminated signs operational		
All vehicle detectors operational		
Other detectors operational		

Superintendent representative	
Signed:	Date:
DoT representative (if Superintendent representative is not DoT employee)	
Signed:	Date:
Date report provided to Maintenance Team:	

Building warranty details		
Date of building warranty	Start date:	Finish date:
Building warranty Contractor details		

**Traffic signal installation
Commissioning Report**

Site Name:	
Suburb/City:	Site No:

Voltage	
Current Reading (minimum)	
Current Reading (maximum)	

Readings carried out by:

STS Prequalified Contractor:	
Contractor representative:	
Signed:	Date: