SECTION 730 - TRAFFIC SIGNAL INSTALLATION

##This section cross-references Sections 731, 732, 733 and 610, which should be included in the specification.:

730.01 General

730.02 Pre-qualified contractors

730.03 Definitions

730.04 Abbreviations

730.05 Site plan

730.06 Reference and related specifications, standards and drawings

730.07 Supply of equipment and hardware

730.08 Preliminary works

730.09 Conduits

730.10 Pits

730.11 Foundations

730.12 Bridge decks and other concrete structures

730.13 Construction of concrete foundations

730.14 Traffic signal hardware

730.15 Other hardware

730.16 Point of supply

730.17 Traffic signal site cabling

730.18 Electrical works for street lighting

730.19 Provision of communications line

730.20 Public transport integration

730.21 Co-ordination with emergency vehicle operations

730.22 Pre-commissioning

730.23 Traffic signal controller installation

730.24 Completion of site works and commissioning

Attachment A – Pre-installation report

Attachment B – Hold point summary

Attachment C – Continuity test report

Attachment D – Insulation resistance test report

Attachment E – Detector loop continuity and insulation test

Attachment F – Pre-commissioning report

Attachment G – Flash test / Ped detector operation test report

Attachment H – Commissioning report

Attachment I – Power consumption record

730.01 GENERAL

(a) Scope

This section covers the requirements for the installation and remodel of traffic signals within the State of Victoria for works supervised by the Department of Transport and Planning and works supervised by others where the asset will be returned to the State.

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.

(6) Roundabout metering signals

(b) General Requirements

The Contractor shall be responsible for the supply, installation, and commissioning of the traffic signal project in accordance with this Standard Section, relevant Standard Drawings, individual contract specifications and individual contract drawings.

(c) Traffic Signal Voltage

(1) **New traffic signal installations** shall be designed and installed as LV installations.

(2) **Remodeled traffic signal installations** shall be designed and installed with the same voltage as the existing installation (i.e. LV if currently LV, and ELV if currently ELV), unless otherwise specified in individual contract documents.

(3) New installations may be installed as ELV if site specific conditions prohibit the use of LV. The use of ELV must be approved by the Superintendent and a DTP representative.

(d) Availability of Existing Traffic Signals

Where the works involve remodeling 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 to identify items that may need to be upgraded to comply with current regulations.

(f) Updating of RAI database

The **Superintendent** shall be responsible for maintaining accurate data in the RAI database. The **Superintendent** shall provide a nominated DTP representative with the required information to enable the maintaining of accurate data in the RAI database. This shall include:

1. Details of scheduled works.
2. Superintendent or Superintendent’s representative contact details.
3. Contractors contact details for business hours and after hours contact for fault attendance.
4. For existing sites (i.e. remodel works), the status change when works commence.
5. For new sites, updating status from proposed to ‘under construction’.
6. Building warranty contractor contact details.
7. Updating all required fields when works completed.

The **Superintendent** shall notify the DTP Maintenance Team a minimum of 10 days prior to possession of site, or works commencing, and provide details of maintenance arrangements and building warranty during construction.

(g) DTP Approval

Where indicated throughout this document, approval from the Department of Transport and Planning shall be obtained prior to works continuing or commencing. DTP reserves the right to determine which requests will require submission via the ‘Technical Review Panel’ process and shall advise the Superintendent of such determinations. Any works subject to DTP approval shall not commence until such approval has been granted.

(h) Hold points

Where indicated throughout this document, ‘hold points' shall be applied to the works. Upon completion, each hold point shall be recorded in Attachment B.

730.02 PREQUALIFIED CONTRACTORS

Only contractors that hold DTP (VicRoads) pre-qualification at the appropriate level shall undertake any works directly or indirectly on traffic signal installation.

All works associated with the installation and commissioning, or remodel of traffic signals shall be undertaken only by contractors that are prequalified at the **STS level** under the DTP (VicRoads) contractor prequalification scheme.

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.

The installation of **vehicle detector loops** in the pavement shall be carried out by a contractor that is pre-qualified at **SVDL** level.

The connection of **vehicle detector loops to detector feeder cables** shall be carried out by a contractor that is pre-qualified at **STS** level.

The installation of **CCTV** attached or connected to a traffic signal installation shall be carried out by a contractor that is pre-qualified at both **STS** and **SCTV** levels.

The following works shall only be carried out by the **Controller Supplie**r, or an **STS pre-qualified contractor authorised by the Controller Supplier**:

(g) Installation of traffic signal controllers.

(h) Modification of traffic signal controllers.

(i) Burning of personality files onto personality modules.

(j) Replacing personality modules (i.e., PROM change) on existing traffic signal controllers.

730.03 DEFINITIONS

The following terms are used in this section:

**Authorised DTP Representative** – An authorised employee of DTP such as a DTP surveillance officer who has been trained, has suitable experience, and is certified by their manager, to be competent to undertake any surveillance or commissioning works related to traffic signals. Where the Superintendent is not a DTP employee, an authorised DTP representative shall also be present for specified activities as indicated throughout this document.

**2A Pedestal** - traffic signal post 3.2 m in length (see definition in AS 2339)

**2B Pedestal** - traffic signal post 4.1 m in length (see definition in AS 2339)

**2C Pedestal** - traffic signal post 4.6 m in length (see definition in AS 2339)

**2D Pedestal** - traffic signal post 5.36 m in length (mini mast arm vertical section)

**Aspect** – see definition in AS 2144

**Branch circuit** – see SPUR

**Contractor** – the DTP (VicRoads), STS pre-qualified, Installation Contractor responsible under the contract for the installation of all traffic signal conduits, pits, foundations, cables, poles signal hardware, and any other equipment associated with the traffic signal installation except for the traffic signal controller

**Controller Contractor** – the controller supplier (if the controller supplier holds STS1 pre-qualification) or an STS1 pre-qualified contractor approved by the controller supplier to install their controller

**Direct Supervision** – refers to a situation where a nominated, STS pre-qualified, electrical contractor is present, at all times, works are being carried out

**Hold Point** – is a mandatory verification point, beyond which work cannot proceed without approval by the Superintendent or DTP (as indicated)

**Installation Contractor** – see definition for ‘Contractor’

**Mini mast arm** – a Type 2D pedestal with an outreach attached as detailed in Standard Drawing TC-1103

**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

**Rag bolt** – a bolt assembly manufactured to accommodate a standard pole base plate

**Rag bolt (cabinet)** – a bolt assembly manufactured or constructed on-site to accommodate a cabinet

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

**Standard Drawing** – A DTP Traffic Control (TC) Series standard drawing

**Specification** – A DTP Traffic Control Series (TCS) Specification

**SPUR** – a single cable used to branch off an existing ring circuit, (or directly from the controller) to connect a single pole

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

**Traffic signal lantern** – (also referred to as a lantern) see definition in AS 2144

**Type 3 Pedestal** - push button post 1.4 m in length

**Type Approved** – A product or device, that has been formerly approved by DTP for use on DTP projects or projects that are identified as State Returned Works

730.04 ABBREVIATIONS

The following abbreviations are used in this section:

**AC** – alternating current

**ACMA** - Australian Communications and Media Authority

**AS** - Australian Standard

**DB** – Local Distribution Business

**DC** - direct current

**DJCS** - Department of Justice and Community Safety

**DTP** - Department of Transport and Planning (Roads) – (formerly Department of Transport, formerly VicRoads)

**ELV** - extra low voltage (i.e. 42 volts AC)

**ESV** – Energy Safe Victoria (the Victorian electricity authority)

**GWTP** - give way to peds’ sign

**HP** - hold point

**ITS** - intelligent transport systems

**JUMA** - joint use mast arm (see definition is AS 2339)

**JUP** - joint use pole (see definition is AS 2339)

**LED** - light emitting diode

**LTN** – Traffic signal lantern

**LV** - low voltage (i.e. 240 volts AC)

**MA** - mast arm (see definition is AS 2339)

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

**NLT** - ‘no left turn’ sign

**NRT** - ‘no right turn’ sign

**NZS** - New Zealand Standard

**RAI** - Road Asset Inventory database (database for the inventory and maintenance records for all on-road electrical devices including traffic signals)

**RCD** - residual current device

**RoSTA** - Road Safety and Traffic Authority (traffic signal cable core allocation system)

**RSLP** - rigid street lighting pole

**TOC** – the DTP Traffic Operations Centre

**TPS** - thermoplastic sheathed electrical cable

**VESI** - Victorian Electricity Supply Industry

730.05 SITE PLAN

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

Abbreviation and symbols used on DTP Traffic Signal Plans are detailed in Table 730.051 below and Guideline TCG 019.

**Table 730.051 Abbreviations and Symbols for Traffic Signal Plans**



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 DTP specifications, DTP Standard Drawings. DTP 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) Victorian Service and Installation Rules.

(c) DTP Contract Standard Sections.

(d) DTP ‘TCS’ series specifications.

(e) DTP ‘TC’ 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.

**NOTE:** DTP standard sections, specifications and associated standard drawings are subject to periodic review. To keep the specifications up to date, amendments or new editions are issued as necessary. It is therefore important for users of DTP specifications to ensure that they have the latest version and associated amendments.

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

The individual requirements of VESI and the local electricity distribution business shall apply for matters relating to the provision of mains power and VESI lighting design and installation.

All traffic signal works shall be conducted in accordance with the appropriate DTP 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 2339 | Traffic signal posts, mast arms and attachments |
| 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 |

DTP Specifications, Guidelines and Technical Notes referred to in this section are listed in Table 730.062 below.

**Table 730.062 List of DTP** **Specifications and Guidelines**

|  |  |
| --- | --- |
| **Spec Number** | **Title** |
| TCS 001 | Mast arms, joint use mast arms and joint use poles |
| TCS 003 | Ramp control / metering signs |
| TCS 010 | Give way to peds sign |
| TCS 016 | Traffic signal controllers |
| TCS 027 | Puffin crossings – Walk detectors |
| TCS 032 | No Right Turn signs |
| TCS 038 | Traffic signal lanterns  |
| TCS 043 | Electrical distribution cabinets |
| TCS 054 | Detector loop installation |
| TCS 055 | Emergency vehicle pre-emption |
| TCS 058 | UPS for traffic signals |
| TCS 066 | Linking traffic signals to rail crossings |
| TCS 067 | Digital Closed Circuit Television Camera (CCTV) |
| TCG 008 | Interfacing Road Safety Cameras with DTP Assets (not published, available upon request only) |
| TCG 018 | Register of ITS approved products |
| TCG 019 | ITS Final drawing presentation (*under development)* |
| TCN 009 | ELV implementation (*currently withdrawn and not published on website*) |
| TCN 010 | Installation of electrical conduits |

DTP Standard Sections referred to in this section are listed in Table 730.063 below.

**Table 730.063 List of DTP** **Standard Sections**

|  |  |
| --- | --- |
| **Std Section** | **Title** |
| 731 | Road lighting installation |
| 732 | ITS and electrical devices installation |
| 733 | Conduits and pits for underground wiring and cabling  |
| 734 | Electrical network installation |
| 610 | Structural concrete |
| 611 | Steel reinforcement |
| 614 | Formwork |

All traffic signal works shall be conducted in accordance with the appropriate DTP Traffic Control (TC) Series Standard Drawings.

DTP Standard Drawings referred to in this section are listed in Table 730.064 below.

**Table 730.064 List of DTP** **Standard Drawings**

|  |  |
| --- | --- |
| **Drawing Number** | **Title** |
| **Layout of intersections, Ped Ops and other site types** |
| TC-1000 | Typical layouts |
| TC-1003 | Typical layouts for pedestrian operated signals |
| TC-1005 | Typical layout for PUFFIN pedestrian operated signals |
| **Posts and attachments** |
| TC-1100 | Traffic signal posts – Types 2A, 2B and Type 3 |
| TC-1101 | Traffic signal mounting brackets |
| TC-1103 | Traffic Signal Post Type 2D (Mini mast arm) |
| TC-1104 | Typical layout - flashing pedestrian crossing |
| TC-1105 | Typical layouts - Traffic signal and street lighting poles |
| TC-1106 | Traffic signal MA’s, JUP’s & JUMA’s overhead lantern mounting assembly |
| TC-1107 | Traffic signal MA’s, JUP’s & JUMA’s base plate detail |
| TC-1108 | Weather cap for traffic signals and street lighting |
| TC-1109 | Outreach arm clamping details for MA’s, JUP’s & JUMA’s |
| TC-1110 | Traffic signal MA’s, JUP’s & JUMA’s column conduit entry details |
| TC-1111 | JUMA, JUP, RSLP street lighting extension spigot cap |
| TC-1112 | Typical 5.5m mast arm installation (2.5m Outreach) |
| TC-1113 | MA, JUMA and JUP lantern support detail |
| TC-1114 | Terminal assembly – pedestal 51 way |
| TC-1115 | Lantern and mounting bracket orientation |
| TC-1116 | Traffic signal mounting arrangements |
| TC-1118 | Door openings and cable termination – Block mounting details |
| TC-1119 | Lantern mounting details |
| TC-1120 | Joint use pole (JUP) base section |
| TC-1121 | Joint use mast arm (JUMA) base section |
| TC-1122 | Mast arm (MA) base section |
| TC-1123 | JUMA, JUP & RSLP street lighting extensions section |
| TC-1124 | Mast arm (MA) and joint use mast arm (JUMA) outreach sections |
| TC-1126 | Pedestal location under or through verandahs |
| TC-1127 | Traffic signal - Visor types and dimensions |
| TC-1128 | Terminal assembly - MA, JUP & JUMA 51 way |

 **Table 730.064 continued next page**

**Table 730.064 List of DTP** **Standard Drawings… continued**

|  |  |
| --- | --- |
| **Drawing Number** | **Title** |
|  |
| TC-1129 | Terminal assembly - pedestal 19 way |
| **Civil and electrical** |
| TC-1075 | Rag bolt assembly - Distribution cabinet Type 2 |
| TC-1200 | Foundation for pedestals |
| TC-1201 | Bored pile foundation for MA, JUP and JUMA |
| TC-1202 | Spread footing foundation for MA, JUP and JUMA |
| TC-1203 | Traffic signal controller foundation details |
| TC-1204 | 51 Core for intersections – Single ring circuit |
| TC-1205 | 29 Core for pedestrian operated Signals |
| TC-1206 | Assembly and installation of consumer mains and meter box |
| TC-1207 | General layout – Traffic signal ducting |
| TC-1208 | Underground conduit warning sign |
| TC-1210 | Cable pit former – 600 mm diameter |
| TC-1211 | Heavy duty cable pit |
| TC-1214 | Suitable arrangement - Dual 51 Core terminations for complex intersection |
| TC-1215 | Suitable arrangement - Dual 51 Core terminations for diamond interchange |
| TC-1216 | Emergency Station Call Panel |
| TC-1220 | Cable pit access cover and frame 600 mm diameter |
| TC-1230 | Cable pit - Installation details |
| TC-1601 | Rag bolt assembly - M24 CG and HS 600 mm x 350 mm PCD |
| TC-1603 | Rag bolt assembly for cabinet M12 600 x 460 x 255 |
| **Detection** |
| TC-1300 | Loop pattern and installation details - Symmetripole |
| TC-1301 | Vehicle and tram detector loops along shared and exclusive tram lines |
| TC-1302 | Wheelchair detector loops |
| TC-1303 | Infinity tram detector loops for tram track installations |
| TC-1304 | Bus and vehicle detector loops along shared and exclusive bus lanes |
| TC-1310 | Detector pit and lid |
| TC-1320 | Detector pit installation details |
| TC-1332 | Advance tram detection (feeder cable details) |
| TC-1380 | Concrete slab for tram detectors |

 **Table 730.064 continued next page**

**Table 730.064 List of DTP** **Standard Drawings… continued**

|  |  |
| --- | --- |
| **Drawing Number** | **Title** |
| **Public information labels** |
| TC-2100 | Standard cabinet label |
| TC-2101 | Small cabinet label |
| TC-2104 | Pedestrian label |
| **Other** |
| 443016 | Traffic Signals Ahead, Prepare to Stop, active advance warning W3-V101 (DTP/VicRoads supplement to AS 1743 – Edition 1, Revision 1) |

**NOTE:** Current DTP Standard Drawings, Specifications and Guidelines are available for downloading from the VicRoads website at:

<https://www.vicroads.vic.gov.au/business-and-industry/technical-publications/electrical-and-intelligent-transport-systems>

730.07 SUPPLY OF EQUIPMENT AND HARDWARE

(a) Equipment supplied by DTP

DTP will supply or arrange for the supply of the following items:

(1) Traffic signal controller and associated vehicle detector units, tram detectors, etc.

(2) Communication devices, such as ADSL modems, 4G modems or NBN modem (possible future arrangement).

(3) Bluetooth Data Stations.

DTP reserves the right to add to, delete from, or modify, the list of items to be supplied by DTP 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 ‘Type Approval’ certification or Product Acceptance certification, where relevant.

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.

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 that may affect the works. For older sites, this should include such things as:

1. Compliance with current regulations of the existing point of supply.

(2) Existing multicore traffic signal cable type (older sites may not use current cable types.

(3) Existing cable core allocations (older sites may pre-date the RoSTA core allocation system).

(4) Existing multilane loops.

(5) Existence of any ‘sand and slab’ arrangements on site.

(6) Extent and condition of existing conduit network.

(7) 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, Superintendent, DTP, 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 mark the position of pedestals, poles, controller base, electrical distribution cabinet base, pits and conduits in accordance with the drawings, in the presence of 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 his 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. See Attachment A for a sample pre-installation report.

**HP The Contractor shall not commence installation of conduits, pits, pole foundations, cabinet foundations, or commence any other traffic signal related works until the pre-installation report has been approved by the Superintendent and DTP.**

(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, either during or outside normal business hours shall be attended to, and rectified by, the Contractor. All after hours faults shall be attended and rectified within the times specified in DTP maintenance contract.

All business hours and after hours, non-routine fault calls to site MUST be recorded on the maintenance card (stored in the controller) and in the RAI database.

730.09 CONDUITS

The Contractor shall install all conduits in accordance with Section 733, Technical Note TCN 010 and Standard Drawing TC-1207.

For traffic signal installations, the requirement for conduit connections in pits to be fitted with a bush, as specified in 733.09 (a), need not apply provided the ends of the conduits are suitably deburred to prevent damage to the cables when they are being pulled through the conduit.

All electrical conduit installation works for traffic signals must be carried out by, or under the direct supervision of, a DTP, STS prequalified traffic signal contractor, and in accordance with the requirements of Energy Safe Victoria.

All communication conduit installation works are to be carried out under the ‘on site’ supervision of a licensed cabler.

Where existing conduits are to be reused (such as for remodel works) the Contractor shall prove the existing conduits to confirm they are clear, undamaged and comply with minimum depth of cover requirements prior to installing any new cables.

If adding additional cables to existing conduits, the Contractor shall ensure the maximum number of cables in the conduit does not exceed the maximum number specified in AS/NZS 3000, Appendix C6.

If existing conduits do not meet current minimum depth of cover requirements as specified in Standard Section 733, Table 733.051, new LV cables **shall not** be installed in the conduits without approval from the Superintendent and in accordance with the requirements of TCN 010.

**HP The Contractor shall not use existing, or commence installation of any new, reduced cover conduits before obtaining approval from DTP and, where required, ESV in accordance with TCN 010. The Superintendent shall not release this hold point without DTP approval.**

A plan showing the as‑constructed conduit locations and depths shall be provided to the Superintendent and a copy left in the controller cabinet.

Conduits for VESI lighting schemes shall be installed in accordance with the requirements of the local Distribution Business.

730.10 PITS

All pits, pit lids and frames shall be Type Approved.

The Contractor shall install all pits in accordance with Section 733. Pits shall not be installed within a trafficable area.

All cable pit installation works for traffic signals must be carried out by, or under the ‘direct supervision’ of a VicRoads prequalified traffic signal Contractor and in accordance with the requirements of Energy Safe Victoria.

All communication pit installation works are to be carried out under the ‘on site’ supervision of a licensed cabler.

Pits for VESI lighting schemes shall be installed in accordance with the requirements of the local Distribution Business by a VESI pre-qualified contractor.

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** |
| 600 mm Cable Pit | Traffic signal cables, detector feeder cables and AS/NZS 3000 (DTP owned and maintained) lighting |
| 750 mm Cable Pit | Cable pit closest to the controller. See Standard Drawing TC-1207.Traffic signal cables and detector feeder cables where required due to large numbers of cables (e.g. sites more than 24 signal groups or 32 vehicle detectors) |
| Detector Pit | Joining detector feeder cables to detector loop cables |
| Earth Pit | Locating earth stake for main switchboard |
| P2 Communications Pit | Demarcation point between DTP ADSL line and the Communications Carriers ADSL line |
| VESI Pit | ONLY used where a VESI lighting scheme is installed and VESI pits are required by the local Distribution Business for lighting cables |

730.11 FOUNDATIONS

(a) General

All rag bolts and reinforcing cages used in foundations shall be Type Approved.

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.

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.

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

**Table 730.111 Standard Foundation Types**

|  |  |  |
| --- | --- | --- |
| **Foundation Type** | **Used For** | **Standard Drawing** |
| DB Cabinet | Type 1 | TC-1062 |
| DB cabinet | Type 2 | TC-1074 |
| Rag bolt assembly | Type 2 cabinet | TC-1075 |
| Pedestal | 2A, 2B, Type 3 | TC-1200 |
| Bored Pile | MA, JUMA, JUP, 2D (mini mast arm) | TC-1201 |
| Spread Footing | MA, JUMA, JUP, 2D (mini mast arm) | TC-1202 |
| Rag Bolt Assembly | All poles | TC-1601 |
| Controller | Traffic signal controllerUPS cabinet | TC-1203 |
| Rag bolt assembly | Traffic signal controller | TC-1603 |

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

**HP The Contractor shall not commence installation of any proposed alternative foundations before obtaining approval by DTP. The Superintendent shall not release this hold point without DTP approval.**

(b) Pedestal foundations

The standard foundation for 2A, 2B and Type 3 pedestals shall be in accordance with Standard Drawing TC‑1200,

Where the installation of a standard 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.

Poles shall not be stood on any foundation until the foundation has reached the minimum curing requirements specified in 730.13.

(c) Large pole foundations

The standard foundation for large poles (MA, JUMA, JUP), and 2D pedestals, shall be a 3m bored pile foundation in accordance with Standard Drawing TC 1201. 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 (TC-1202), or adopt an alternative design, the Contractor shall obtain the prior approval of the Superintendent.

In accordance with VicRoads Standard Drawing TC‑1112, the minimum clearance of 5.5 m shall be achieved between the lowest part of a lantern installed on an outreach of a MA or JUMA and the roadway directly beneath it. This does not apply to lanterns installed on a 2D pedestal (i.e. mini mast-arm).

Poles shall not be stood on any foundation until the foundation has reached the minimum curing requirements specified in 730.13.

(d) Controller foundation

Controller foundations shall be installed in accordance with Standard Drawing TC‑1203. Rag bolts used in a controller foundation shall in accordance with Standard Drawing TC‑1603 and shall be Type Approved.

Controller foundations shall be located:

(1) In accordance with the drawings and as approved at the pre‑installation meeting.

(2) Within existing footpaths or grassed areas on the outside of the roadway.

(3) To ensure maximum visibility of the entire intersection from the controller.

(4) To ensure safe access for installation and maintenance activities.

For large intersections (e.g., a freeway interchange or two separate ‘tee’ intersections connected as a single intersection), the controller foundation shall be located as centrally as practicable between the two parts of the intersection to minimise the length of traffic signal and detector feeder cables.

Controller foundations **shall not** be installed in areas such as:

(5) Medians.

(6) Traffic islands.

(7) Splitter islands.

(8) Low lying areas susceptible to flooding.

(9) Slopes with fall risks without suitable access and fall/slip prevention measures.

When locating the controller foundation, the Contractor shall ensure that all the required clearances of the installed controller are achieved.

No part of the controller is to be closer than 500 mm behind the face of the nearest kerb line, or closest vehicle path if no kerb is present. The foundation shall be installed to enable the back of the controller to face the roadway and the controller door to open away from the roadway as indicated Standard Drawing TC‑1203.

When installed in a grassed area, the foundation shall include a concrete apron in accordance with Standard Drawing TC‑1203,

Where specified in individual contract documents, the controller foundation may be installed against a building. Where installed against a building, the back of the controller foundation shall have a minimum clearance of 200 mm from the building line and the controller door shall open toward the roadway.

**HP The Contractor shall not commence the installation of the controller foundation before obtaining approval for the location from DTP. The Superintendent shall not release this hold point without DTP approval.**

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

Controllers shall not be installed on a controller foundation until the foundation has reached the minimum curing requirements specified in 730.13.

(e) Distribution cabinet foundation

Distribution cabinet foundations shall be installed in accordance with Standard Drawing TC‑1062 or TC-1074 as specified in individual contract documents.

Distribution cabinet foundations shall be located:

(1) In accordance with the drawings and as approved at the pre‑installation meeting.

(2) Within existing footpaths or grassed areas on the outside of the roadway.

(3) As far as is practicable, with a minimum clearance of 3-6m from the controller cabinet foundation to minimise the risk of both cabinets being impacted by an errant vehicle.

(4) To ensure safe access for installation and maintenance activities.

Distribution cabinet foundations **shall not** be installed in areas such as:

(5) Medians.

(6) Traffic islands.

(7) Splitter islands.

(8) Low lying areas susceptible to flooding.

(9) Slopes with fall risks without suitable access and fall/slip prevention measures.

When locating the distribution cabinet foundation, the Contractor shall ensure that all the required clearances of the installed cabinet are achieved.

No part of the distribution cabinet is to be closer than 500 mm behind the face of the nearest kerb line, or closest vehicle path if no kerb is present. The foundation shall be installed to enable the back of the cabinet to face the roadway and the cabinet door to open away from the roadway as indicated in Standard Drawing TC‑1062 or TC-1074, as applicable.

When installed in a grassed area, the foundation shall include a concrete apron in accordance with Standard Drawing TC‑1062 or TC-1074 as applicable,

Where specified in individual contract documents, the distribution cabinet foundation may be installed against a building. Where installed against a building, the back of the controller foundation shall have a minimum clearance of 200mm from the building line and the cabinet door shall open toward the roadway.

**HP The location of the distribution cabinet shall be approved by DTP prior to installation. The Superintendent shall not release this hold point without DTP approval.**

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

Distribution cabinets shall not be installed on a distribution cabinet foundation until the foundation has reached the minimum curing requirements specified in 730.13.

**HP All conduit, pit and foundation works shall be inspected and approved by the Superintendent 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, two sets of rag-bolts shall be installed. Where a single set of rag bolts are proposed, it shall be approved by DTP.

Where 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 DTP prior to installation.

**HP Where alternative conduits, pits, foundations, or single set of rag-bolts are proposed for installation within a bridge deck or other concrete structure, they shall be approved by DTP prior to the works commencing. The Superintendent shall not release this hold point without DTP approval.**

730.13 CONSTRUCTION OF CONCRETE FOUNDATIONS

Concrete used in foundations shall be constructed to comply with the requirements of Section 610 using a minimum concrete grade of VR400/40.

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

No cabinets or poles shall be installed onto foundations prior to the foundation achieving the minimum required compression strength.

Foundations shall be allowed to cure for a minimum of 3 days and reach a minimum compression strength of 40 MPA, in accordance with Standard Section 610,05, Table 610.051.

**HP Evidence shall be provided to the Superintendent that all foundations have cured for a minimum of 3 days plus reached a minimum compression strength of 40MPa before standing any poles or installing any cabinets.**

730.14 TRAFFIC SIGNAL HARDWARE

All traffic signal hardware shall be Type Approved by DTP.

Unless otherwise specified in individual contract documents, all traffic signal installations shall be LV. The Contractor shall ensure all supplied traffic signal hardware is suitable for the specified voltage.

Where individual contract documents specify ELV, the Contractor shall ensure that the combination of ELV lanterns and traffic signal controller are compatible. For details of compatibility see TCG 018.

(a) Standing of Pedestals and Poles

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

(1) For all new installations and major remodels, all Type 2 pedestals shall be 2B.

(2) For minor remodels with existing 2A pedestals, where required, 2A pedestals may be used for consistency.

(3) For tertiary and secondary lanterns at pedestrian operated signals, 2A pedestals may be used as detailed in Standard Drawing TC-1003. Alternatively, 2B pedestals may be used with all tertiary and secondary lanterns mounted at the equivalent of a 2A height.

(4) Where specified, Type 3 pedestals shall be installed for pedestrian detectors.

(5) Pedestals installed through or under a verandah shall be installed in accordance with Standard Drawing TC-1126.

(6) Pedestals and poles shall be fastened to the rag bolt assembly cast into the foundations, as detailed in Standard Drawing TC‑1201, with the nuts tightened to 150 Nm of torque.

(7) After the rag bolt nuts are tightened, exposed thread above the nuts shall be wrapped in a protective tape to protect the thread prior to the non-shrinkable grout being applied (see Standard Drawings TC-1200 and TC-1201).

**HP Mortar shall not be applied prior to the Superintendent inspecting and confirming that all rag bolts have been suitably covered.**

(8) Pedestals and poles shall be installed such that they are vertical when fully loaded.

(9) Further to requirement for foundations to curing of concrete in 730.13, pedestals shall not be stood within 72 hours of casting of the foundations

(10) Further to requirement for foundations to curing of concrete in 730.13, JUP, MA and JUMA poles shall not be stood within 7 days of the casting of the foundations

(11) JUP, MA and JUMA poles shall be installed such that the access door is on the face furthest from the traffic flow.

(12) Where lighting outreach brackets are not attached at the time JUP and JUMA poles are installed, a weather-proof cap as detailed in Standard Drawing TC-1108 shall be installed on the top of the spigot.

(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) QH and LED lanterns **shall not** be mixed on the one site.

(4) The lantern voltage shall be LV unless otherwise 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, 300mm straps securely fixed to mounting brackets or lugs as specified in TCS 038, Section 3.1. (The use of longer straps must be approved by DTP).

(2) Upper mounting brackets shall be oriented and fixed to the top of pedestals in accordance with Standard Drawing TC‑1115.

(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 minimized.

(6) External cables and flexible conduits (hoses) 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 TC‑1119, and shall be securely fixed by means of cable ties.

(8) Where the cable entry point on the pole is lower than the cable entry point on the lantern, the drip loop shall hang below the cable entry point on the pole.

(9) 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.

(10) 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 2A and 2B pedestals shall be as specified in Standard Drawing TC‑1116.

(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 TC‑1116.

(3) Lanterns on the outreach of an MA or JUMA shall be mounted in accordance with Standard Drawing TC‑1112.

(4) One and two 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) Two 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 VicRoads shall be mounted at the same heights as specified in Standard Drawing TC‑1116.

(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 TC‑1104.

(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 TC‑1115 and TC-1116.

(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 730.131 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**

|  |  |
| --- | --- |
| **Lantern** | **Distance** |
| Primary | 240m |
| Tertiary | 5m |
| Secondary | 150m |

(g) Target Boards, Visors and Louvres

All target boards shall be metal type.

Target boards shall be fitted to all lanterns in accordance with Standard Drawing TC‑1119.

Visors for LED Lanterns shall be fitted as specified in Table 730.132 below.

**Table 730.142 Visors for LED Lanterns**

|  |  |  |
| --- | --- | --- |
| **Lantern location** | **Visor type** | **Cutaway** |
| MA or JUMA Outreach | 1 | Both Sides |
| L/H Primary | 1 | Both Sides |
| R/H Primary | 1 | Both Sides |
| Secondary and Tertiary | 3 (short)\* | None |
| Pedestrian and Bicycle | 4 | None |

**Note:** Refer to Standard Drawing TC‑1127 for details of the visor types.

\* Long visors may be used where specified

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 1.0 m above finished surface level, as shown in Standard Drawing TC‑1116.

(2) The face of the button shall be at right angles to the direction of the associated walk lines.

(3) 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.

(4) 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.

(5) A seam of silicone sealant shall be applied between the back of the button housing and the pole to prevent the ingress of water into the pole; the sealant shall be applied across the top and on both sides of the button.

(6) A label complying with Standard Drawing TC‑2104 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 VicRoads Standard Drawing TC‑1116.

(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 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 VicRoads Standard Drawing TC‑1104.

(l) Attaching of Equipment to Other Supports

Attachment of traffic signal equipment to service poles or structures which are not owned by DTP shall be by applicable means such as stainless-steel straps, coach bolts, 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 a suitable diameter galvanised steel 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 m whichever is the lower.

All traffic signal equipment (e.g., lanterns, junction boxes, pedestrian push buttons, audio tactile devices, etc.) and cabling (e.g., traffic signal power cables, pedestrian push button cables, lantern cables, etc.) mounted on tramway poles shall be externally attached to the pole and must be electrically insulated from the pole to minimise the risk of a DC injection resulting from a fault with the overhead tramway system.

Examples of acceptable means of providing electrical insulation from a tramway pole include the following:

(1) Lanterns with plastic housings that use metal straps are considered insulated without further action required.

(2) Placing rubber or other insulating material under stainless-steel straps.

(3) Placing rubber or other insulating material under lantern bracket.

(4) Placing rubber or other insulating material between the pedestrian push button and the pole.

(5) Ensuring the attachment of any junction boxes to the pole, maintain the junction boxes electrical insulating properties.

Whatever method is used, the Contractor shall ensure that there are no sharp edges or protrusions that may cause injury to pedestrians.

**HP No signal equipment shall be attached to any service pole prior to DTP approval of the attachment method. The Superintendent shall not release this hold point without DTP approval.**

(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.

At remodel sites, or sites where existing lanterns are operating, all non-operating lanterns shall be covered with a blanking sign or other approved method. Alternatively, the lanterns may be turned so as not to be visible to traffic.

(n) Awnings

Where pedestals need to be installed under or through awnings or verandahs, the installation shall be in accordance with Standard Drawing TC‑1126.

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) Uninterruptable Power Supply

Where specified, a ‘stand-alone’ UPS shall be installed in accordance with TCS 058.

(b) CCTV Camera

Where specified, CCTV camera equipment shall be supplied and installed in accordance with TCS 067.

(c) Bluetooth Detector Stations

Where specified, Bluetooth data stations shall be supplied and installed in accordance with TCS 069.

(d) Ramp Control Signs

Where specified, ramp control signs shall be supplied and installed in accordance with TCS 003.

(e) No Right/Left Turn sign

Where specified, NRT/NLT signs shall be supplied and installed in accordance with TCS 032.

(f) Give Way to Peds sign

Where specified, GWTP signs shall be supplied and installed in accordance with TCS 010.

(g) Other detection devices

Where specified, other detection devices (e.g. video detector, microwave detector, radar detector, etc) shall be supplied and installed in accordance with the manufacturer’s requirements.

(h) Traffic Signal Ahead / Prepare to Stop (advanced warning signs)

Where specified in individual contract documents, ‘Traffic Signal Ahead / Prepare to Stop’ advance warning signs shall be installed in accordance with the site plan. Advanced warning signs shall comply with Standard Drawing 443016 for W3-V101 signs.

Where a pair of signs are installed on the same approach, the flashing yellow lanterns shall flash the outside aspects (i.e. the widest pair of aspects) together, then the inside aspects (i.e. the narrowest pair of aspects) together.

Conduits for advanced warning signs shall be 100 mm and pits shall be 600 mm. Where site conditions prevent the use of 600 mm pits, a 400 mm pit may be used with the approval of the Superintendent. Where a 400 mm pit is used, the conduit shall be 63 mm. The distance between pits shall not exceed 100m.

730.16 POINT OF SUPPLY

(a) General

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 by the local Distribution Business (DB). Where an existing point of supply exists (supplying an existing DTP asset) the local DB will typically not provide a second, separate point of supply for an additional DTP asset within 100m of the existing point of supply.

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

(1) Prior to submitting an application for power, the **Superintendent** shall request details of the electricity retailer and consolidated billing account number from the DTP Maintenance Team.

(2) The ‘Application for Supply of Power’ shall be completed and submitted by the **Superintendent** or Superintendent’s representative. The application shall specify the site number and address. The Superintendent shall provide a copy of the application to the DTP Maintenance team.

(3) The Contractor shall arrange for the installation of the point of supply with the local power distribution company, at the location approved at the pre-installation meeting.

(4) Supply pillars and Electrical Distribution cabinets shall, as far as is practicable, 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.

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 the Office of the Chief Electrical Inspector and the local Distribution Business 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.

Any arrangement for the supply of power that is not consistent with current DTP practice must be approved by DTP.

(b) Metered point of supply

Where specified in individual contract documents, the POS shall be a metered supply:

(1) A distribution cabinet shall be provided as detailed in Table 730.161.

(2) The main switchboard shall contain a main switch and suitably sized circuit breaker.

(3) Access to the main switchboard shall be via a DTP (VicRoads) Power Industry Lock key.

(4) The earth stake shall be installed within the associated earth pit.

(5) The main switchboard shall contain the MEN link.

(6) If a street lighting distribution cabinet is to be installed as part of the project, the point of supply for the traffic signals (and other ITS devices) shall be provided by means of a separately metered circuit within the cabinet.

(7) The circuit breaker controlling the traffic signals shall be clearly marked.

**Table 730.161 Typical Electrical Distribution Cabinets for Metered Supplies**

|  |  |  |
| --- | --- | --- |
| **Site asset** | **DB Type** | **Number of meters** |
| Traffic signals and ITS devices | Type 2 | 1 |
| Traffic signals and ITS devices, and DTP street lighting | Type 1 | 2 |

(c) Unmetered point of supply

Where specified in individual contract documents, the POS shall be unmetered and installed in accordance with Standard Drawing TC‑1206.

Where the distribution company requires an unmetered supply pillar, it shall:

(1) Be installed in accordance with the distribution company’s requirements.

(2) The main switchboard shall contain a main switch and suitably sized circuit breaker

(3) Include the MEN point.

(4) Include the earth stake located within the distribution pillar.

(5) Be locked using a DTP (VicRoads) Power Industry Lock.

**HP Where an alternative power supply arrangement is proposed, it shall be approved by DTP before proceeding. The Superintendent shall not release this hold point without DTP approval.**

(d) Connection of Traffic Signal Controller

The Contractor shall install a 3-core, low voltage, power supply cable (orange circular) in a 50 mm conduit between the point of supply and the controller base in accordance with the requirements of the local power distribution company.

Sufficient cable shall be provided to reach 1 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.

Where a UPS is installed, the connection to supply and the controller shall be in accordance with TCS 058.

730.17 TRAFFIC SIGNAL SITE CABLING

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

Only type approved traffic signal cables shall be used.

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

Traffic signal installations shall be cabled in a single or dual ‘ring circuit’ configuration in accordance with the following requirements and the relevant Standard Drawing.

**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.

(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 DTP.

(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 minimized.

(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 Standard Drawing TC-1114B) 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 Type 2 pedestal or large pole, or directly in the traffic signal controller.

(14) Prior to the controller being installed, unterminated cables located at the traffic signal controller base shall be coiled in the adjacent pit and sealed from water ingress.

(15) Sufficient cable shall be provided to reach 1.5 m above the controller base.

(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**, (typically with not more than twelve signal groups) 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 Standard Drawing TC‑1204.

(2) At **larger intersection traffic signals**, (typically with more than twelve signal groups or additional hardware such as pedestrian above ground detection, CCTV, etc.) 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 Standard Drawing TC‑1214.

(3) At **freeway 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 **dual 51 core cable** arrangement in accordance with Standard Drawing TC‑1215.

(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** in a continuous ring circuit in accordance with Standard Drawing TC‑1205.

(5) At **flashing pedestrian crossing (Zebra) signals**, the control equipment and all upper mounting assemblies and/or terminal assemblies shall be connected by a **13 or 19 core cable** in accordance with Standard Drawing TC‑1216.

(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 **13 or 19 core cable** branch circuit.

(7) For **ramp metering signals**, the control equipment and all upper mounting assemblies and/or terminal assemblies shall be connected in sequence by a **13 core cable**.

(8) For **roundabout metering signals**, the control equipment and all upper mounting assemblies and/or terminal assemblies shall be connected in sequence by a **13 or 19 core cable** in a continuous ring circuit.

(9) For **signals attached to utility poles**, the terminal assemblies shall be connected by a **13 or 19 core cable** branch circuit. The branch circuit shall be fed directly from the traffic signal controller.

(10) For t**raffic signals ahead / prepare to stop** (advanced warning) signs as detailed in clause 730.15(h), 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 and fault loop impedance requirements of AS/NZS 3000.

**NOTE:** Spur cables should be connected directly to the controller as a first option. Where approved by DTP, a spur cable connected to a ring circuit in a pole shall not be used to connect more than one spurred pole. Where more than one pole is being connected via a spur, each pole shall be connected back to the controller. All spur connections must be approved by DTP before cabling commences.

**HP Where a spur cable is proposed, it shall be approved by DTP before any cabling works commence. The Superintendent shall not release this hold point without DTP approval.**

The Signal Installation Contractor shall provide the Controller Installation Contractor with a copy of the site cabling core allocations, with a copy left in the controller cabinet.

For remodel works where spare cores of an existing traffic signal cable are to be used, the Installation Contractor shall ensure that there are no lanterns or other devices already connected to those cores.

**HP For a large signal installation where the arrangements detailed in Standard Drawings TC‑1214 or TC‑1215 is required to be adopted, the Contractor shall draw up a proposed cabling scheme and submit this to the Superintendent to obtain DTP approval, prior to cabling the site. The Superintendent shall not release this hold point without DTP approval.**

(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. If an independent road crossing conduit is not available, feeder cables may be installed in the same conduit a traffic signal power cables if sufficient conduit capacity exists.

(2) Detector feeder cable shall be a Type Approved 1 pair (2 core) or multipair (6 core or 8 core) shielded cable, 1 cable-pair 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.

**NOTE:** Connecting of detector feeder cables to detector loop cables must be carried out by an STS pre-qualified contractor. Connections are not permitted to be carried out by SVDL pre-qualified contractors.

(6) The 4 wires for each individual loop (e.g. 9SA, 9FA, 9SB and 9FB as shown in Standard Drawing TC‑1300) shall be tied together in a knot located close to the conduit end.

(7) Unused loop cable ends shall be left open circuit and sealed from water ingress.

(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) Where a controller has not been installed, new 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 controller installation contractor 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 circuit off a ring circuit (also known as a spur) | 19 or 29 core traffic signal cable |
| Branch circuit direct from controller | 19 or 29 core traffic signal cable |
| Branch circuits to separate pedestrian operated signals connected to an intersection controller. | 29 core cable directly from the traffic signal controller. |
| 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 emergency station call panel (left labelled but unterminated at the controller base) | Suitable multi-core data cableor13 or 19 core traffic signal cable |
| Linking cable between the controller and public transport facilities (left labelled but unterminated at the controller base) | Suitable multi-core data cableor13 or 19 core traffic signal cable |

(f) Installation of Detector Loops

The Contractor shall arrange for the installation of vehicle detector loops by a DTP prequalified SVDL Contractor in accordance with the contract specific drawings and related Standard Drawings.

Vehicle detector loop installations shall conform to DTP Specification for the Installation of Inductive Detector Loop, TCS 054.

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 a DTP prequalified STS contractor.

Following the connection of the detector feeder cables to the loop cables, the Contractor shall test all detector loops for continuity and insulation resistance in accordance with TCS 054, Clause 6.8 at the controller end of the feeder cable. A copy of the measurements shall be recorded on the form provided in Attachment E.

(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 on all new installed cables, **prior to connection of lanterns and other hardware to the traffic signal cable**:

(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.

Following the installation of all lanterns and hardware, the Contractor shall carry out a ‘flash test’ to ensure that all lanterns and signal aspects are connected to the correct cable core and signal group. A flash test report shall be provided to the Superintendent.

730.18 ELECTRICAL WORKS FOR STREET LIGHTING

(a) DTP owned AS 3000 schemes

Where DTP owned and operated street lighting is to be installed, all works shall be carried out in accordance with DTP Standard Section 731.

Where the isolation switch for a traffic signal installation is located within a street lighting distribution cabinet, the Contractor shall ensure that a key to the street lighting cabinet is installed in the traffic signal controller cabinet.

(b) Distribution Company owned (VESI) Schemes

Any Distribution Company (VESI) street lighting shall be installed in accordance with the local distribution company standards and requirements.

A separate 63mm conduit shall be installed with the two 100mm conduits as shown in Standard Drawing TC-1207. The 63 mm conduit shall be used for the installation of VESI lighting cables.

730.19 PROVISION OF COMMUNICATIONS LINE

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

The Contractor shall supply and install a 50 mm white ‘Telstra’ communication conduit together with a two pair telecommunication cable from the controller to the associated P2 pit as shown in Standard Drawing TC‑1207. The P2 pit is the demarcation point between DTP’s asset and the Communication Carriers asset. A minimum of 1.5 m of telecommunications cable shall be left coiled in the P2 pit.

The P2 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 P2 pit to the nearest Communications Carrier pit. The Contractor shall not undertake any works between the P2 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 owners, 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.

(b) Tram Detection

Tram detection may be provided by one of the following:

(1) Transponder.

(2) Loop within tracks.

(3) Out of pavement detection technology.

(4) Manual or automatic points.

(5) Manual input.

(6) Other means as detailed in individual tender documents.

Tram detection shall be installed by the Contractor as shown on the drawings.

Where tram track loops are shown on the drawings, the Contractor shall arrange for the installation of the tram track loops in accordance with Standard Drawings TC‑1301, TC-1303, TC‑1332 and TC‑1380.

Where advance detection is specified, the Contractor shall install the conduits and pits at each end of the run, in accordance with Standard Drawing TC‑1332, connect the detector feeder cable to the advance detector loop and run the cable to the controller base.

(c) Bus Detection

Bus detection shall be installed as detailed in individual contract documents and in accordance with the Standard Drawing TC-1304. The type of bus detection arrangement shall be specified in individual contract documents.

730.21 CO-ORDINATION WITH EMERGENCY VEHICLE OPERATIONS

(a) Emergency Vehicle Pre-Emption

Where specified in individual contract documents the Contractor shall install an approved Emergency Vehicle Pre-Emption system and associated equipment in accordance with TCS 055, on nominated poles.

All associated cabling shall be installed and connected at the receiver.

(b) Emergency Station Input

Where specified in individual contract documents and on associated drawings the Contractor shall provide a suitable cable (refer to Table 730.172) within a 50 mm conduit, between the controller and the Emergency Station Call Panel located within the emergency premises (i.e. Fire, Ambulance or Police).

The location of the Emergency Station Call Panel shall be in a location approved by the Superintendent and the owner of the affected properties.

Where specified in individual contract documents, the Contractor shall supply and install the Emergency Station Call Panel in accordance with Standard Drawing TC-1216. Table 730.211 shows the connection details for the Emergency Panel cabling. See also Specification TCS 016.

**Table 730.211: Emergency Station Call Panel Cable Connections**

|  |  |
| --- | --- |
| **Emergency Station Call Panel** | **Controller** |
| Call A | Call A – Input |
| Call A – call recorded | Call A – call recorded |
| Call Cancel | Call Cancel – Input |
| Common | Common |
| Call B | Call B – Input |
| Call B – call recorded | Call B – call recorded |

730.22 PRE-COMMISSIONING

(a) Pre-Commissioning Preparation

Upon completion of the installation works, a complete pre-commissioning inspection shall be undertaken by the Contractor and the Superintendent.

The Contractor shall arrange for a suitable time with the Superintendent to carry out the inspection

Prior to the inspection being conducted, the Contractor shall provide copies of the following reports to the Superintendent:

(1) Copies of all applications and notices relating to the supply of power and wiring of the site

(2) The cable continuity test report in accordance with 730.17(g) (see Attachment C).

(3) The cable insulation resistance test report in accordance with 730.17(g) (see Attachment D).

(4) Loop electrical test report in accordance with TCS 054, Clause 6.8 (see Attachment E)

(5) The Installation Contractors site flash test report (typically for new sites only) in accordance with 730.17(g).

(6) The certificate of electrical safety in accordance with ESV requirements.

(7) Any signed exemptions from ESV where applicable

(b) Pre-Commissioning Site Inspection

The pre-commissioning inspection shall confirm that all field works have been completed before the installation 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 coiled in the pit adjacent to the controller foundation.

(6) Traffic signal cables have been clearly marked as appropriate.

(7) All lanterns are installed and connected as shown on the plan.

(8) All other associated hardware has been installed and connected.

(9) A cable numbering diagram has been provided for the Controller Contractor.

(10) 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.

(11) Communications cable is installed and coiled in comms pit adjacent to the controller foundation.

(12) Power is available.

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 Controller Contractor prior to the installation of the controller.

Any item found to be defective or incorrectly installed shall be replaced and/or rectified prior to commissioning.

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

(c) Provision of Power

The Contractor shall:

(1) Arrange for the submission of all necessary paperwork, inspections, payment of fees, etc., to obtain connection to mains supply.

(2) Advise the Superintendent when power is available at the site.

The **Superintendent** shall:

1. Provide DTP with all details of the electricity point of supply (i.e., NMI number, Site address, Meter number, etc.).
2. Confirm with DTP that the POS has been added to the correct consolidated billing account.

730.23 TRAFFIC SIGNAL CONTROLLER INSTALLATION

The traffic signal controller shall ONLY be installed by the Controller Supplier (if the Supplier holds STS1 prequalification) or an STS1 prequalified contractor authorised by the Controller Supplier.

**HP The traffic signal controller shall not be installed unless all items detailed in 730.22 above have been completed, all required test reports provided, and all site civil works such as kerb and channel, concrete pathways, TGSI’s, line marking, etc. have all been completed.**

(a) Controller preparation

Prior to installation of the controller, the **Superintendent** shall confirm that the Controller Supplier has:

1. Received a copy of the traffic signal Operation Sheet from DTP.
2. Where specified on individual traffic signal plans, received the personality module from DTP with the personality loaded.
3. Where specified on individual traffic signal plans, received the SFT file from DTP and ‘burned’ it onto the appropriate personality media.
4. Prepared the controller in accordance with TCS 016, Section 8.
5. Been monitoring the controller operating ‘on-line’ to a SCATS Test Region, without faults, for a minimum period of 48 hours in accordance with TCS 016, Clause 8.3.
6. Provided a copy of the test report in accordance with TCS 016, Clause 8.4.

(b) Pre-controller Installation preparation

The **Superintendent** shall:

1. Advise DTP at least 7 business days before controller installation/site commissioning works take place, to allow for the pre-configuring of SLOT/SCATS data.
2. For ethernet connected modems, confirm with DTP that Port 2 on the modem has been opened.
3. Provide a copy of the pe-commissioning report to the Controller Contractor.
4. Ensure that all site civil works such as kerb and channel, concrete pathways, TGSI’s, line marking, etc. have all been completed before arranging for the controller installation.

(4) Ensure that all traffic signal installation works have been completed.

Where a remodel of an existing site prevents all site works being completed before the installation of the traffic signal controller, the Superintendent shall advise the Controller Contractor what works are to be completed at the time the controller is installed.

(c) Pre-controller Installation Field Works

Unless a remodel of an existing site prevents all site field works being completed before the installation of the traffic signal controller, the Contractor shall ensure that all site works have been completed as detailed in 730.22(b) above.

(d) Traffic Signal Controller Installation

The Controller Contractor shall advise the TOC that controller installation/replacement works are about to commence and request that the site SLOT data be installed/updated.

The Controller 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) Other detection devices.

(5) Communications cable.

(6) Public transport and emergency vehicle interface cables.

(7) Power supply cables for other ITS devices such as CCTV, ESLS, Ramp Control signs.

(8) Where specified, existing DJCS connections, in accordance with DJCS requirements and TCG 008.

(9) Any other cables for any other devices required to be connected to the controller.

(10) Earthing of one end of unused conductors of the multicore traffic signal cable.

(11) Earthing of ‘drain’ conductor in each detector feeder cable.

(12) Earthing of all unused cable pairs in multicore detector feeder cables.

(13) Installation of ‘extension top-hat’ where specified in individual controller orders.

(14) Installation of devices within the ‘extension top-hat’ where specified in individual controller orders.

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

**NOTE:** The Controller Contractor is not responsible for any site related field works.

The Superintendent shall advise the Contractor when the Controller Contractor’s works have been completed.

Once all cable connections have been completed and power has been switched on, the Controller Contractor shall ‘power up’ the modem and check the modem operation.

730.24 COMPLETION OF SITE WORKS AND COMMISSIONING

(a) Participants

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

(1) The **Superintendent**

(2) Traffic signal **Installation Contractor**.

(3) **Controller Contractor** (where associated controller works are or have been carried out).

(4) **Authorised DTP representative** (e.g. Surveillance Officer) where the Superintendent is not a DTP employee.

**HP Tests described in 730.24 (b) and (d) below, shall not proceed without the presence of all participants nominated above.**

The tests detailed in 730.24 (b), (d) and (e) below shall be conducted in the documented order.

(b) Flash Test (Step 1)

(1) General

A ‘flash-test’ is required to be conducted to confirm that all lanterns and signal aspects are connected to the correct cable core and signal group, and that all field cables are connected correctly in the controller.

A ‘flash-test’ is required if:

1. A controller has been installed onto a new signal installation.

(ii) An existing controller has been replaced with a new or secondhand controller.

(iii) An existing installation has had existing signal groups reallocated to different groups or additional groups have been added.

(iv) The traffic signal cables in any pole have been disconnected and reconnected in the terminal strip in any pole or upper mounting assembly.

**NOTE:** For a simple PROM change, where no field wiring changes have occurred, a flash test is not required.

(2) Procedure

Following the connections of the mains supply cable and all traffic signal cables in the controller, a signal group ‘flash test’ shall be conducted.

The flash test shall be conducted and coordinated by the Controller Contractor (where the controller has been installed/replaced). Where site works have been carried out, but no controller replacement, an STS pre-qualified contractor who has been trained and certified by the controller manufacturer to carry out on-site controller modifications, PROM changes, and flash testing, may conduct the flash test.

The certified Contractor conducting the flash test shall coordinate with the Superintendent and Installation Contractor to determine the agreed sequence that the flash test will be conducted in.

The **Superintendent** and the **Installation Contractor** are responsible for observing the flash test to determine that all signal aspects are connected and operating correctly. The **Superintendent** shall complete the flash test report. The **Authorised DTP representative** shall witness the flash test to confirm observations and results.

Prior to conducting the flash test, the **Superintendent**, **Contractor,** and **Authorised DTP representative** shall identify, and agree to, the following:

1. How many signal groups there are on site.

(ii) How many lanterns are connected to each signal group.

(iii) What type of display each signal group is (roundel, arrow, pedestrian, etc.).

The **Superintendent** shall populate the *Site Flash Test & Ped Operation Test Report* (See Attachment G) with a list of all the above.

The **Superintendent**, the **Installation Contractor**, and **Authorised DTP Representative** shall then stand in a safe location where all lanterns on the signal group being tested can be clearly observed.

(iv) **The Superintendent** shall indicate to the **Controller Contractor** to begin ‘flashing;’ the signal group.

(v) The **Superintendent**, the **Installation Contractor**, and **Authorised DTP Representative** shall observe all lanterns required to operate on that signal group are flashing.

(vi) Upon agreement from the Contractor and the Authorised DTP Representative, the **Superintendent** shall record the findings in the *Site Flash Test & Ped Operation Test Report*.

(vii) The **Superintendent** shall note any lanterns that were not observed to flash as required.

(viii) The above steps (iv through vii) shall be repeated for all signal groups.

(ix) Any lanterns not observed to flash correctly (e.g. connected to the wrong cable cores) shall be rectified by the **Contractor** and the signal group(s) affected shall be flash tested again to confirm correct connection.

Once the flash test has been completed and the test report has been filled in, the **Installation Contractor** shall sign the report indicating agreement with the report results. If satisfied, the **Authorised DTP Representative** shall then sign the report confirming acceptance of the flash test and authorising the Superintendent to switch-on the site. The **Superintendent** shall then sign the report. With all three signatures on the report, the Superintendent can authorise the site to be switched-on.

**HP The site shall not be switched on before a successful ‘flash test’ has been completed and the test report signed by all three participants. The Superintendent shall not release this hold point without DTP approval.**

(c) SCATS connection (Step 2)

Once the above tests have been successfully completed and all reports completed and signed-off by the required parties, the **Controller Contractor** shall confirm with the TOC that the SLOT data has been updated and the site is cleared for ‘switch-on’.

The **Controller Contractor** shall then connect the site to SCATS (i.e. place the site ‘on-line’) and confirm correct SCATS communications.

(d) Switch-On/Commissioning (Step 3)

Once (b) and (c) above have been successfully completed and all reports completed and signed-off by the required parties, the site can be switched on with approval from the **Superintendent**.

Upon authorisation from the Superintendent, the **Controller Contractor** shall ‘switch-on’ the traffic signal controller. Once the signals are operating, the installation shall be thoroughly checked and monitored to ensure safe and proper operation.

With the **Controller Contractor** observing the operation on the controller, the **Superintendent** and **Installation Contractor,** with the **Authorised DTP representative** as a witness, the following shall be carried out.

(1) Observe every signal group for correct operation.

(2) Test every pedestrian detector to ensure it calls the correct pedestrian signal group and record observations in the *Site Flash Test & Ped Operation Test Report* (See Attachment G).

(3) Confirm call recorded lamps operate when each push-button is pressed and record observations in the *Site Flash Test & Ped Operation Test Report* (See Attachment G).

(4) Observe the correct operation of each audio-tactile with the correct pedestrian signal group and record observations in the *Site Flash Test & Ped Operation Test Report* (See Attachment G).

(5) Observe correct operation of any electronic signage.

The **Controller Contractor**, with the **Superintendent** and **Authorised DTP** representative as a witness, shall:

1. Observe the operation of the vehicle detectors in the controller and confirm all detectors are calling the correct phase in accordance with the Operation Sheet.

Any vehicle loop detectors not operating or connected to an incorrect detector input shall be rectified and rechecked for correct operation.
2. Test any Special Purpose Inputs (SPIP’s) and Special Purpose Output’s (SPOP’s) programmed in the controller for correct operation.
3. Observe the correct operation of any bus detectors.
4. Observe correct operation of any train link functions. Confirm if train operator needs to be present for this test.
5. Observe correct operation of any tram detector inputs. Confirm if train operator needs to be present for this test.
6. Observe correct operation of any ‘transfer of demand’ inputs or outputs.
7. Force the controller to ‘mobile 4G’ comms and confirm correct operation on SCATS.

The **Controller Contractor** shall:

1. Confirm with the TOC that they are satisfied with the site operation on SCATS.

(e) Post Commissioning (Step 4)

The **Contractor** shall sign all remaining test reports as required.

The **Controller Contractor** shall provide the following to the Superintendent:

(1) Confirmation that the controller is operating correctly

(2) Evidence that the time and date of the ‘switch-on’ has been recorded on the Controller Record Card in the controller.

(3) A copy of the power consumption readings as required in the Electrical Test Report for unmetered supplies (See Attachment I).

(4) A copy of the Certificate of Electrical Safety for the controller installation.

The **Controller Contractor** shall:

(5) Apply the controller cabinet label, complete with site number, in accordance with Standard Drawing TC-2100.

(6) Supply and ‘fill-in’ the maintenance card (pink card) with the site details and the ‘switch-on’ or controller swap date (as appropriate) and leave it in the controller.

The **Installation Contractor** shall also apply the distribution cabinet label (where applicable), complete with site number, in accordance with Standard Drawing TC-2100.

The **Superintendent** shall complete the Commissioning report (See Attachment H).

The **Superintendent** and the **Authorised DTP Representative** shall sign all test reports as required.

The **Authorised DTP Representative** shall sign the Controller Installation Contractors ‘controller installation check list’.

The **Superintendent** shall, within **24 hours**, ensure that the RAI database is updated.

The **Superintendent** shall, within **5 business days**, provide to the Maintenance Team, the following:

(7) Notification that the site has been commissioned.

(8) A signed copy of the Commissioning report.

(9) Signed copies of all test reports and documents detailed in 730.22(a).

(10) Copy of the Controller Contractors certificate of electrical safety.

(11) A signed copy of the Site Flash Test & Ped Operation Test Report.

(12) A copy of the Power Consumption record (where applicable).

(13) Copies of any exemptions provided by ESV.

(14) Details of any building warranty or defects liability period affecting the site.

(15) The date of scheduled handover.

(f) Removal of Redundant Controller

At remodel sites where an existing controller is replaced, the Controller Contractor shall de-commission and remove the redundant controller and store the controller for future use or arrange delivery to another holding location as directed by the Superintendent.

The Controller Contractor shall be responsible for maintaining the controller in “as removed from site” condition until the controller is delivered to, and accepted by a nominated third party, or held in storage until directed by DTP to undertake preparation as a second-hand controller for another site, or removal from storage for transfer to a third party or disposal.

All traffic signal controllers removed from traffic signal sites remain the property of the relevant DTP Region

(g) 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.

(h) Hand over

Upon completion of any building warranty or defects liability period, the Superintendent shall arrange for the site ‘hand 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 DTP specifications and requirements

(2) A completed ‘maintenance hand-over’ form (available from the Maintenance Team)

(3) Details of all hardware installed on site

(4) 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 DTP 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.

(i) As-built drawings

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

(1) As soft copies, prepared in digital cad format (e.g. Microstation)

(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:** The following file types will not be accepted:

* PDF files with ‘mark ups’
* Satellite images with ‘mark ups’

**Attachments**

The following documents are provided as examples of reports that are required to be completed at specified points during the installation works. The provided documents may be printed off and used, or the responsible party may develop their own forms/reports, provided all the required information shown in the attached example forms is included. A summary of the required reports is shown in the table below.

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

**Summary of required reports**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attachment** | **Document** | **When** | **Responsible Person** |
| Attachment A | Pre-installation report | Prior to works commencing | Contractor and Superintendent |
| Attachment B | Hold point summary | On completion of each hold point | Superintendent |
| Attachment C | Continuity test report | On completion of cabling and connecting the traffic signal cable and before lanterns are connected | Contractor |
| Attachment D | Insulation resistance test report | On completion of cabling and connecting the traffic signal cable and before lanterns are connected. | Contractor |
| Attachment E | Detector loop continuity and insulation test | All detector loops shall be tested prior to connecting feeder cables. | Contractor |
| Attachment F | Pre-commissioning report | Prior to installation of controller | Superintendent and Contractor |
| Attachment G | Flash test / Ped Detector Operation Test | Pre ‘switch-on’ / post switch-on | Superintendent (observe and complete test report)Contractor (Observe and sign report)Authorised DTP Representative (witness and sign reports) |
| Attachment H | Commissioning report | Post ‘switch-on’ | Superintendent (complete and sign)Authorised DTP Representative (observe and sign) |
| Attachment I | Power consumption record | After ‘switch-on’ | Controller Installation Contractor |

The following documents shall be completed as required by ESV, 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 Safety | On completion of conduit installation. | Installation Contractor |
| Certificate of Electrical Safety | On completion of all electrical field works. | Installation Contractor |
| Certificate of Electrical Safety | On completion of controller installation and switch-on | Controller Installation Contractor. |

**Traffic Signal installation** – Attachment A

**Pre-installation report**

|  |  |
| --- | --- |
| SITE: | FILE NO: |
| PLAN NO: | JOB NO: |
| OFFICERS IN ATTENDANCE (INCLUDE AUTHORITY NAME, CONTACT NUMBER) |
| DTP: | SIGNATURE: |
| CONTRACTOR: | SIGNATURE: |
| COUNCIL: | SIGNATURE: |
| OTHER | SIGNATURE: |
| DATE: |
| CHANGES TO PLAN (TO BE CONFIRMED BY EMAIL) |
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|  |
| ITEMS TO BE CHECKED: |
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| NOTES: |
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**Traffic signal installation** – Attachment B

**Hold Points Summary**

|  |
| --- |
| Site Name: |
| Suburb/City: | Site No: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Clause** | **Hold Point** | **Date****Approved****By DTP** | **Date****Released by Superintendent** | **Superintendent****Initial** |
| 730.08(c) | Pre-Installation report | N/A |  |  |
| 730.09 | Reduced cover conduits |  |  |  |
| 730.11(a) | Alternative foundations (where applicable) |  |  |  |
| 730.11(d) | Controller foundation location |  |  |  |
| 730.11(e) | Distribution cabinet foundation location |  |  |  |
| 730.11 | Conduit, pit and foundation inspection | N/A |  |  |
| 730.12(c) | Conduits, pits and foundations in bridge decks |  |  |  |
| 730.13 | Foundation curing time completed | N/A |  |  |
| 730.14 (a) 7. | Protective grease or tape applied to all rag bolts | N/A |  |  |
| 730.14(l) | Equipment attached to service pole |  |  |  |
| 730.14(n) | Inspection of all installed hardware | N/A |  |  |
| 730.16(c) | Alternative power supply arrangement |  |  |  |
| 730.17(b) | Approval of ‘spur’ cables |  |  |  |
| 730.17(b) | Approval of non-standard cabling arrangement |  |  |  |
| 730.23 | Pre-commissioning completed, all reports provided, all site works complete | N/A |  |  |
| 730.24(a) | Authorised DTP representative present |  |  |  |
| 730.24(b) | Flash test completed successfully |  |  |  |

|  |
| --- |
| Superintendent Name: |
| Signed: | Date: |

**Traffic signal installation** – Attachment C

**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** – Attachment D

**Electrical Test Report – Insulation resistance test**

|  |
| --- |
| 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 |  |  |  |

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| --- | --- |
| Signed: | Date: |
| Print Name: |
| Company: |

**Traffic signal installation** – Attachment E

**Detector Loop Electrical Test Report**

|  |
| --- |
| Site Name: |
| Suburb/City: | Site No: |

|  |
| --- |
| Results |
| **Loop** | **Continuity****Ω** | **Insulation Resistance****MΩ** | **Loop** | **Continuity****Ω** | **Insulation Resistance****MΩ** |
| 1 |  |  | 17 |  |  |
| 2 |  |  | 18 |  |  |
| 3 |  |  | 19 |  |  |
| 4 |  |  | 20 |  |  |
| 5 |  |  | 21 |  |  |
| 6 |  |  | 22 |  |  |
| 7 |  |  | 23 |  |  |
| 8 |  |  | 24 |  |  |
| 9 |  |  | 25 |  |  |
| 10 |  |  | 26 |  |  |
| 11 |  |  | 27 |  |  |
| 12 |  |  | 28 |  |  |
| 13 |  |  | 29 |  |  |
| 14 |  |  | 30 |  |  |
| 15 |  |  | 31 |  |  |
| 16 |  |  | 32 |  |  |

|  |  |
| --- | --- |
| Signed: | Date: |
| Print Name: |
| Company: |

**Traffic signal installation** – Attachment F

**Pre-Commissioning Report**

|  |
| --- |
| Site No: |
| Site Name: |
| Suburb/City: |
| Instructions:* This report must be completed 10 business days prior to the switch-on and forwarded to the ITS Project Manager.
* The controller installation and switch-on must occur on the same day.
 |

|  |  |  |
| --- | --- | --- |
| **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 P2 pit |  |  |
| 14 | Telecommunications cable installed by Telstra into P2 pit and connected to controller cable |  |  |
| 15 | Power available on site |  |  |
| 16 | Electrical continuity test report provided |  |  |
| 17 | Electrical insulation resistance report provided |  |  |
| 18 | Detector loop electrical test report provided |  |  |
| 19 | Copy of CEOS for ALL electrical installation works, including conduit installation, provided |  |  |
| 20 | Kerb structures completed |  |  |
| 21 | Line marking completed |  |  |

|  |
| --- |
| For any items above where the response in ‘NO”, please provide reasons for DTP ITS assessment. |

|  |
| --- |
| STS Prequalified Contractor: |
| Contractor representative: |
| Signed: | Date: |
| Superintendent representative: |
| Signed: | Date: |

**Traffic signal installation** – Attachment G (page 1 of 5)

**Flash Test / Ped Detector Operation Test** (Instructions)

**F1 Preparation**

Prior to undertaking the flash test the DTP representative shall confirm that all lanterns shown on the plan have been installed correctly.

The DTP representative shall enter the following details into the **Site Flash Test & Ped Operation Test Report**.

* All signal group numbers and display types.
* Number of lanterns on each signal group.
* Number of pedestrian detectors connected to each pedestrian group.

Display types are defined as follows.

**R** = roundel. **RT** = right turn arrow. **LT** = left turn arrow. **U** = U-turn. **P** = pedestrian. **BC** = bicycle.

**T** = tram. **E** = emergency. **B** = bus.

Below is an example completed test report.

|  |  |  |
| --- | --- | --- |
| **Signal Groups** | **Flash Test****(Pre-Switch-on)** | **Pedestrian Detector & Audio Test****(Post-switch-on)** |
| **No.** | **Display Type** | **Installed** | **Operating** | **Ped Detector** | **Operating** | **Call****Recorded Lamp** | **Audio Tactile** |
| 1 | R | 4 | 4 | - | - | - | - |
| 2 | RT | 2 | 2 | - | - | - | - |
| 3 | T | 2 | 2 | - | - | - | - |
| 9 / P1 | P | 2 | 2 | 2 | 2 | 2 | 2 |

**Example Site Flash Test & Ped Operation Test Report showing details and results**

**F2 Flash test (pre-switch-on)**

Conduct the flash test as detailed in 730.24(b) and record the findings in the Site Flash Test & Ped Operation Test Report.

Record the number of lanterns connected to the group and the number of lanterns observed operating correctly.

**F3 Pedestrian detector and audio tactile test (post switch-on)**

Each pedestrian detector (push buttons) and associated audio tactile shall be tested for correct operation.

The Controller Contractor shall coordinate with the Superintendent and Installation Contractor to determine the agreed sequence that the pedestrian detector test will be conducted.

**Traffic signal installation** – Attachment G (page 2 of 5)

**Flash Test / Ped Detector Operation Test** (Instructions)

The Superintendent and the Installation Contractor shall conduit the test as follows.

1. Activate pedestrian detector.
2. Confirm the correct controller input with the Controller Contractor.
3. Confirm call recorded lamp operates.
4. Confirm correct audio-tactile ‘audio’ operation for both locating and crossing signals.
5. Confirm correct audio-tactile ‘tactile’ operation for both locating and crossing signals.
6. Repeat the above for every pedestrian detector on site in the agreed sequence.

Any pedestrian detector (including call recorded lamp) not operating or observed to be connected to an incorrect input, shall be rectified by the Installation Contractor. The test shall then be repeated.

Any audio tactile not operating or observed to be connected to the wrong pedestrian group shall be rectified by the Installation Contractor. The test shall then be repeated.

**F4 Other detectors (post switch-on)**

Other detectors, such as on-crossing WALK detectors, Pedestrian Occupancy Detectors, above ground vehicle detectors, etc., shall be tested in accordance with the manufacturer’s specification.

**Traffic signal installation** – Attachment G (page 3 of 5)

**Site Flash Test & Ped Operation Test Report** (page i of iii)

|  |
| --- |
| Site Name: |
| Suburb/City: | Site No: |

|  |  |  |
| --- | --- | --- |
| **Signal Groups** | **Flash Test****(Pre-switch-on)** | **Pedestrian Detector and Audio Test****(Post-switch-on)** |
| **No.** | **Display Type** | **No.****LTNs****installed** | **No.****operating** | **Ped Detector** | **Operating** | **Call****Recorded Lamp** | **Audio Tactile** |
|  |  |  |  |  |  |  |  |
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**Traffic signal installation** – Attachment G (page 4 of 5)

**Site Flash Test & Ped Operation Test Report** (page ii of iii)

|  |
| --- |
| Site Name: |
| Suburb/City: | Site No: |

|  |  |  |
| --- | --- | --- |
| **Signal Groups** | **Flash Test****(Before Switch-on)** | **Pedestrian Detector****and****Audio Tactile Operation Test****(After switch-on)** |
| **No.** | **Display Type** | **No.****LTNs****installed** | **No.****operating** | **Ped Detectors** | **Operating** | **Call****Recorded Lamp** | **Audio Tactile** |
|  |  |  |  |  |  |  |  |
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**Traffic signal installation** – Attachment G (page 5 of 5)

**Site Flash Test & Ped Operation Test Report** (page iii of iii)

|  |
| --- |
| Site Name: |
| Suburb/City: | Site No: |

**Flash Test**

|  |  |
| --- | --- |
| Contractor Company: | Contractor Representative: |
| Signed: | Date: |
| Authorised DTP Representative: |
| Signed: | Date: |
| Superintendent or Representative: |
| Signed: | Date: |

**Pedestrian Operation Test**

|  |  |
| --- | --- |
| Contractor Company: | Contractor Representative: |
| Signed: | Date: |
| Authorised DTP Representative: |
| Signed: | Date: |
| Superintendent or Representative: |
| Signed: | Date: |

**Traffic signal installation** – Attachment H

**Commissioning Report** (Page 1of 3)

|  |
| --- |
| Site No: |
| Site Name: |
| Suburb/City: |

|  |  |  |
| --- | --- | --- |
| **Item** | **Checked** | **Completed Y/N** |
| Flash test conducted and report completed (Attachment G) |  |  |
| Controller switched on |  |  |
| All traffic signal lanterns operating correctly. |  |  |
| All lanterns on all groups aligned correctly |  |  |
| All Pedestrian Detectors operating correctly. Report completed (Attachment G) |  |  |
| All Audio Tactiles operating correctly. Report completed (Attachment G) |  |  |
| Site observed to be operating correctly |  |  |
| Controller operating correctly on SCATS – ADSL connection |  |  |
| Controller operating correctly on SCATS – 4G connection |  |  |
| All vehicle detectors operational |  |  |
| Tram detectors are operating correctly |  |  |
| Number installed: | Number operating: |  |  |
| Bus detectors are operating correctly |  |  |
| Number installed: | Number operating: |  |  |
| Other detectors operating correctly |  |  |
| Train link is operating correctly as per TCS 066 |  |  |
| Rail link inputs | Cable monitor |  |  |
| Pre-release |  |  |
| Release/Force (R/F) |  |  |
| Call |  |  |
| Booms Horizontal |  |  |
| Rail link outputs | Traffic Light Response (TRL) |  |  |
| Acknowledge Call (AKN) |  |  |
| Transfer of demand input(s) operating correctlyDetails: |  |  |

**Traffic signal installation** – Attachment H

**Commissioning Report** (Page 2of 3)

|  |
| --- |
| Site No: |
| Site Name: |
| Suburb/City: |

|  |  |  |
| --- | --- | --- |
| **Item** | **Checked** | **Completed Y/N** |
| Transfer of demand output(s) operating correctlyDetails: |  |  |
| Give Way to Peds Signs |  |  |
| Number installed: | Number operating: |  |  |
| All internally illuminated signs operational |  |  |
| Number installed: | Number operating: |  |  |
| Special Purpose Inputs operating correctly |  |  |
| Number programmed: | Number tested: |  |  |
| Special Purpose Outputs operating correctly |  |  |
| Number programmed: | Number tested: |  |  |
| All field works completed |  |  |
| Cabinet label, with site number, affixed to the controller |  |  |
| Cabinet label, with site number, affixed to the distribution cabinet (where applicable) |  |  |
|  |  |  |

**Traffic signal installation** – Attachment H

**Commissioning Report** (Page 3 of 3)

|  |
| --- |
| Site No: |
| Site Name: |
| Suburb/City: |

|  |
| --- |
| **Superintendent representative** |
| Signed: | Date: |
| Date report provided to Maintenance Team: |

|  |
| --- |
| **A**uthorised **DTP representative** |
| Signed: | Date: |

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

**Traffic signal installation** – Attachment I

**Power readings (for unmetered sites only)**

|  |
| --- |
| Site Name: |
| Suburb/City: | Site No: |

|  |  |
| --- | --- |
| Voltage |  |
| Current Reading (minimum) |  |
| Current Reading (maximum) |  |

**Readings carried out by:**

|  |
| --- |
| STS Prequalified Contractor: |
| Contractor representative: |
| Signed: | Date: |