SECTION 731 - ROAD LIGHTING INSTALLATION

##This section cross-references Sections 610, 611, 614 and 733.
If any of the above sections are relevant, they should be included in the specification.
If any of the above sections are not included in the specification, all references to those sections should be struck out, ensuring that the remaining text is still coherent:
##Section 733 should be included in the specification:

731.01 DESCRIPTION

This section covers the requirements for the installation of VicRoads owned and operated road lighting installations and shall be read in conjunction with VicRoads Standard Drawings and individual contract documents.

Arterial road lighting is operated by either VicRoads or the local electricity distributor. Different installation standards apply depending on the distributor. All freeway lighting installations and selected arterial road lighting installations are operated by VicRoads. **This section applies only to VicRoads owned and operated** lighting installations.

New VicRoads operated stand-alone road lighting installations shall be installed in accordance with AS/NZS 3000 and in accordance with the VicRoads Specification.

731.02 REFERENCED AND RELATED SPECIFICATIONS, STANDARDS AND DRAWINGS

All road lighting installation works shall conform to all relevant VicRoads specifications and Australian Standards.

All road lighting equipment shall conform to the general requirements of:

(a) VicRoads 'TCS' series specifications

(b) VicRoads 'TC' series standard drawings

(c) AS/NZS 3000 Wiring Rules

(d) Victorian Service and Installation Rules.

The individual requirements of the Victorian Electricity Supply Industry (VESI) and the local electricity distribution business shall apply for matters relating to the provision of mains power.

All road lighting works shall be conducted in accordance with the appropriate VicRoads Traffic Control Series (TCS) specifications and Traffic Control (TC) Standard Drawings.

Australian Standards referred to in this section are listed in Table 731.021 below.

Table 731.021 List of Australian Standards

Australian Standard	Title
AS/NZS 3000	Wiring Rules
AS/NZS 61386.21	Conduit systems for cable management – Particular requirements – Rigid conduit systems

VicRoads Specifications and Technical Notes referred to in this section are listed in Table 731.022 below.

Table 731.022 List of Specifications and Technical Notes

Spec Number	Title
TCG-006	Guideline for Road Lighting Design
TCN-006	Work Instruction Retighten Slip Base Pole Flange Bolts
TCS 001	Supply of Joint Use Poles, Joint Use Mast Arms and Rigid Street Lighting Poles
TCS 014	Supply of Frangible Street Lighting Poles
TCS 043	The Supply of Electrical Distribution Cabinets
TCS-050	The Supply Street Lighting Brackets
TCS-065	Supply of LED Road Lighting Luminaires

VicRoads Standard Sections referred to in this section are listed in Table 731.023 below.

Table 731.023 List of Standard Sections

Std Section	Title
730	Traffic Signal Installation
733	Conduits and Pits for Underground Wiring and Cabling
610	Structural Concrete
611	Steel Reinforcement
614	Formwork

Table 731.024 List of Standard Drawings

Drawing Number	Title
TC-1061	Street Lighting Bracket Single and Double
TC-1062	Electrical Distribution Cabinet Foundation – Type 1
TC-1064	Impact Absorbing Pole Assembly – Ground Set Mounted
TC-1065	Slip Base Pole Assembly – Ground Set Mounted
TC-1071	Street Lighting Impact Absorbing Pole Electrical Installation Details
TC-1072	Street Lighting Slip Base Pole Electrical Installation Details
TC-1073	Street Lighting Slip Base Pole Electrical Disconnect Details
TC-1074	Electrical Distribution Cabinet Foundation – Type 2
TC-1075	Electrical Distribution Cabinet Rag Bolt – Type 2
TC-1076	Pole Location Identifier System
TC-1077	Typical Pole Numbering Arrangement

TC-1078	Pole Label Installation Location
TC-1201	Bored Pile Foundation for MA, JUP and JUMA
TC-1202	Spread Footing Foundation for MA, JUP and JUMA
TC-1210	Cable Pit Former – 600mm Dia.
TC-1220	Cable Pit Access Cover and Frame 600mm Dia.
TC-1230	Cable Pit – Installation Details
TC-2100	Standard Cabinet Label
TC-2106	Road Lighting Pole Label
TC-2231	Distribution Cabinet Type 1 for managed Motorways
TC-2232	Distribution Cabinet Type 3 for managed Motorways

NOTE: VicRoads Standard Drawings, Specifications and Guidelines are available for downloading from VicRoads website.

731.03 SCOPE

The installation of a new VicRoads lighting installation or additional works at an existing VicRoads lighting installation by the contractor shall include:

(a) supply and installation of all civil works including, but not limited to, trenching, under road bores, conduits, conduit bends, cable pits and lids, draw strings, slabs, distribution cabinet foundations, and pole foundations

(b) supply, installation and connection of all hardware, equipment and materials including, but not limited to, the distribution Board, circuit breakers, poles, brackets, luminaires, electrical cables, cable guards, fuses, fittings and all materials and equipment necessary to complete and commission the road lighting installation

(c) liaison with the local power distribution company and relevant authorities for the installation of the works, and the obtaining of all necessary approvals and permits from the relevant authorities

(d) re-instatement of all works.

731.04 OWNERSHIP

The Principal will retain ownership of the road lighting installation. The contractor is not authorised to sign any document with any party which transfers ownership of the road lighting installation to any other party.

Furthermore, the contractor is not authorised to sign or enter into any agreement with any electricity distribution business, electricity retailer or other party on behalf of the Principal for supply of power to the lighting installation (Public Lighting Site).

731.05 SERVICES

The location of all existing underground and above ground services shall be proven and confirmed on site by the contractor before commencement of any works.

The contractor shall liaise with all relevant authorities, power distribution companies or other relevant organisations, as necessary, regarding the conduit locations, pit locations, pole locations, and the point of power supply.

The contractor shall make all necessary arrangements for the connection of power to the distribution Board(s).

731.06 POLES AND OUTREACH BRACKETS

(a) Installation of Joint Use Poles (JUPs) and Joint Use Mast Arms (JUMAs)

(i) the contractor shall carry out installation in accordance with VicRoads Standard Section 730.

(ii) all JUPs, JUMAs and rigid road lighting poles shall comply with VicRoads Specification TCS 001 and shall be VicRoads approved

(iii) power distribution company and appropriate HV transmission company current clearance requirements, including 'No Go' zones shall be adhered to by the contractor.

(b) Installation of Frangible, Impact Absorbing (IA) and Slip Base (SB) Poles

Frangible poles shall be supplied by the contractor, must be VicRoads type approved, and shall conform to VicRoads Specification TCS 014 Supply of Frangible Street Lighting Poles and to drawings TC-1064 and TC-1065. These poles are to be transported to the site of the works in one piece with the base section securely bolted to the upper section.

The contractor shall install frangible poles in a vertical position +/- 2 degrees and in accordance with AS/NZS 3000.

The contractor shall install impact absorbing poles so that the joint between pole and base shall be located at 75 mm ±25 mm above the finished ground surface level.

The slip plane of a slip base pole shall be located 75 mm ±25 mm above the finished ground surface level to allow proper movement of the pole if involved in a vehicle impact.

The contractor shall backfill around the pole and reinstate the ground around the pit and pole. Where a concrete mowing pad has been formed around the pole at ground level, the contractor shall ensure that the bolt heads are kept clear of the concrete.

(c) Installation of Outreach Brackets

The contractor shall firmly attach the outreach bracket to the pole spigot using the clamping bolt assembly which is supplied with the outreach bracket.(Ref TCS 050, TC-1060, TC-1061). The contractor shall align the bracket and luminaire as shown in the road lighting design at right angles to the vehicle path on the road, and shall install and plumb the pole and luminaire(s) to within the tolerances specified in Table 731.061 below.

Table 731.061 Pole and Luminaire Orientation Details

Pole Height SB / IA Metres	Lantern Mounting Height Metres	Lantern Type (LED)	Max Bracket Length Metres	Lantern Angle to Road Degrees	Lantern Upcast Angle Degrees	Lantern Spin Angle Degrees
8.5	10.0	L1	3.0	90 ± 5	5 ± 1	0 ± 1
11.0	12.5	L2	5.0	90 ± 5	5 ± 1	0 ± 1
13.5*	15.0	L4	5.0	90 ± 5	5 ± 1	0 ± 1

NOTE: SB indicates Slip Base pole; IA indicates Impact Absorbing pole.

**There is no 13.5 metre variant of the Impact Absorbing pole.*

(d) Torque

The contractor shall supply and install slip base poles in accordance with the following requirements:

(i) the pole bolt and nut assembly shall be installed such that the nuts are placed in the upper position to enable ease of access for correct torque installation and for subsequent 730 day cycle torque maintenance checking for slip base poles only as per Work Instruction TCN 006 - Work Instruction Retighten Slip Base Pole Flange Bolts.

(ii) the bolts and nuts shall be re-run after galvanising and shall be free of excess galvanising in the threads

(iii) the thin slip plane washer shall be supplied flat and free of kinks, bends, deformation and warping - a damaged slip plane washer can result in incorrect torque and eventual pole failure and shall not be used

(iv) the slip-plane flange nuts shall then be slackened off ONE AT A TIME and re-tightened as specified in TCN 006 Work Instruction Retighten Slip Base Pole Bolts.

The torque wrench used to tighten the bolts and nuts shall hold a current calibration certificate (i.e. not more than 12 months old). The contractor shall provide a copy of the calibration test report upon request by the Superintendent.

(e) Operating Near Power Lines

When installing, removing, or working on poles, operating plant, machinery, or equipment near power lines the contractor shall meet all relevant requirements of the Energy Safe Victoria (ESV) and shall provide 'Spotters' in accordance with ESV's regulations.

The contractor shall also meet the requirements of the VicRoads Safe Operating Practices *Plant Operation in Proximity to Overhead power lines*, and *Plant contact with overhead power lines*.

(f) Notice ##(strikethrough this clause if the contractor has to supply all pole types):

Where specifically required by the installation contract, and based on VicRoads current policy, VicRoads will supply free on ground all necessary joint use traffic signal poles and joint use mast arm poles. The contractor shall give the VicRoads representative/contract Superintendent a minimum of sixty (60) days notice before the poles are required.

731.07 LUMINAIRE ORIENTATION

The contractor shall install luminaires such that they meet the mounting and orientation requirements of Table 731.061 above.

731.08 CONDUITS AND PITS

Conduits and pits shall ONLY be installed by a **Registered Electrical Contractor** that holds current VicRoads pre-qualification for Traffic Control System Installation and Maintenance; Traffic Control Equipment (STCE). Notwithstanding the requirements of AS/NZS 3000, installation, bedding and backfilling of conduits, pits and trenches shall be carried out in accordance with VicRoads Standard Drawings and in accordance with VicRoads Standard Section 733.

The contractor shall install all cable pits and lids in accordance with VicRoads Standard Drawings TC-1210, TC-1220 & TC-1230 and with the approved detailed road lighting design. The cable pits shall be located to minimise water ingress. Pits shall generally be located 1 metre in advance of, and 1 metre off the line of, each pole. A two metre spare length of each cable shall be left coiled in each pit.

All conduits shall be installed complete with draw string and shall terminate in cable pits. During construction the ends of the conduits shall be sealed to prevent the ingress of dirt.

A Certificate of Electrical Safety shall be provided to the Superintendent within 7 working days from the installation date.

731.09 CONCRETE

All concrete works shall conform to VicRoads standard drawings and be undertaken in accordance with Sections 610, 611, and 614.

731.10 CONDUIT AND PIT LOCATIONS

The contractor shall undertake detailed recording of the actual installed conduit and pit locations as detailed in clause 731.12.

731.11 ELECTRICAL

(a) Wiring Rules

All electrical works, electrical fittings, materials and installations shall fully conform to the requirements of the latest edition of AS/NZS 3000.

Where AS/NZS 3000 does not cover a specific aspect of the electrical works (e.g. such as pits) all works shall be undertaken in conformance to the requirements of the Energy Safe Victoria.

(b) Registered Electrical Contractor

The electrical contractor engaged to carry out electrical works on any VicRoads road lighting installation (Public Lighting Site) shall be a **Registered Electrical Contractor**, being registered in accordance with:

(i) Part 3 of the Electricity Safety Act 1998; and

(ii) Electricity Safety (Installations) Regulations 2009.

The electrical contractor shall also be **pre-qualified within the VicRoads pre-qualification scheme** at the level of 'Traffic Control System Installation and Maintenance; Traffic Control Equipment (**STCE**)'.

(c) Electrical Design

The electrical design of the lighting installations (Public Lighting Site) shall be in accordance with VicRoads ITS Guideline TCG 006.

Where practicable, all above ground electrical installations and works, such as point of power supply and the Distribution Cabinet, shall be located a minimum of 5 m from any carriageway.

(d) Power Supply

The supply of electricity shall be in accordance with the following:

(i) The 'Point of Supply' shall be determined in conjunction with the relevant power distribution company. The supply of electrical power from the point of supply to the meter in the Distribution Cabinet shall be in accordance with the requirements of the relevant power distribution company.

(ii) The electricity supply shall be a 415 volt 3 phase AC supply. Single phase power may only be supplied with the prior written approval of the Superintendent. The low voltage power supplies shall be strategically placed to minimise the maximum load on each lighting circuit and to limit the extent of voltage drop.

(iii) In accordance with the wiring design, copper consumer mains cable shall be provided in underground conduit to the base of each LV supply point pole mechanically protected to 2.4 metres above ground level (on the pole) with 6 metre tail to power distribution company requirements for final termination by the power distribution company into a 3 phase, 100 amp, Fused Mains Box, 4 metres above ground in accordance with the Victorian Service and Installation Rules (SIRs).

The cable for trunk electricity supply from the 'point of supply' to the road lighting Distribution Board or the appropriate road lighting power supply pit (where no Distribution Board is installed) as appropriate, shall be not less than 16 mm square 4 core, 3 phase plus earth, copper XLPE cable.

(iv) The required conduits for power supply shall be installed in accordance with AS/NZS 3000, and with the requirements of the relevant power distribution company for underground power supply.

The conduits for trunk electricity supply from the 'point of supply' to the road lighting Distribution Board or the appropriate road lighting power supply pit (where no Distribution Board is installed) as appropriate, shall be 63 mm diameter heavy duty grade non-metallic rigid orange UPVC to AS/NZS 61386.21.

Power supply conduits shall be located at least 1200 mm below the finished surface level of any freeway, State highway, or arterial road and at least 600 mm below the finished surface level in all other locations.

(v) It shall be the responsibility of the installation contractor to lodge all notices, pay all fees and arrange all inspections.

(e) Electrical Distribution Cabinet

(i) The distribution cabinet shall be in accordance with VicRoads Specification TCS 043.

(ii) A distribution cabinet may be used to supply electricity to road lighting assets only or it may be used to supply a combination of road lighting assets and other ITS assets.

(iii) Unless specifically approved by the Superintendent, each site or installation shall include **one only** distribution cabinet.

(iv) Where an existing distribution cabinet does not have sufficient spare capacity for additional assets, a new distribution cabinet with sufficient capacity shall replace the existing distribution cabinet.

Two or more distribution cabinets at the same location shall not be installed.

(v) The cabinet shall be located not less than 5 metres from any carriageway, and where possible, beyond the clear zone. For any distribution cabinet located within the clear zone, the contractor shall provide traffic barriers to protect the cabinet.

(vi) The PE cell shall be located so as to not be affected by light spillage at night.

(f) Power Distribution Company Assets

Power Distribution company poles shall not be used for any purpose other than obtaining power supply.

(g) Earthing Requirements

An earth rod shall be installed in the earth rod inspection pit in the concrete base of the distribution cabinet as shown on VicRoads Standard Drawing TC-1062.

An earth cable attached to the earth rod shall be provided and installed in all VicRoads lighting circuits from the distribution cabinet. All earths shall be terminated within the lighting Distribution cabinet in accordance with Wiring Rules AS/NZS 3000 for the M.E.N. (multiple earthed neutral) system of earthing.

Where necessary, and in accordance with the wiring design, a separate PVC insulated and sheathed earth cable shall be provided to ensure compliance with AS/NZS 3000.

All poles shall be individually earthed to the earth cable in the pit in the case of frangible poles and to the earth cable in the pole in the case of rigid poles.

All luminaires shall be individually earthed.

The size of earth cable is to be designed to ensure a Fault Loop Impedance 'low enough to allow sufficient current to flow in the fault loop to cause the protective device to operate within the disconnection time' in accordance with AS/NZS 3000.

(h) Trunk Cabling

The cable used to connect the distribution cabinet to the first lighting pole and between lighting poles shall be one of the following methods:

(i) Orange circular, 4 core and earth;

(ii) XLPE, 4 core and earth;

For each trunk cable entering a cable pit, a minimum of 2m of spare cable shall be coiled and left in each cable pit. This is to provide spare cable length for maintenance purposes.

(i) Jointing

All electrical cable joints in pits shall be waterproof.

Jointing is only allowed when connecting the pole wiring to the trunk cable as detailed in (i) and (ii) below.

Joints in the trunk cable for any other purpose (e.g. to extend a cable length) are not allowed without approval from the Superintendant.

Connection of the 'trunk' wiring to the 'pole' wiring in the cable pit shall be achieved in one of the following manners:

(i) Bell Style Enclosure

An appropriate sized, VicRoads approved, 'bell style' enclosure with an ingress rating of not less than IP68. The cables shall be fitted into the enclosure and sealed with heat-shrink or similar in accordance with the enclosure manufacturer's directions. The enclosure shall include:

- Active connector

- Neutral connector
- Earth connector
- In-line, 8 amp, waterproof fuse to enable complete isolation of pole for maintenance purposes.

All connectors shall be further protected from water ingress by use of a water-displacing gel filled cap.

The enclosure shall be designed to be held in place on the side of the pit, just under the pit lid, using a suitable mounting bracket. See Standard Drawings TC-1071 and TC-1072.

(ii) Underground Insulation Piercing Connectors

Suitable sized, insulation piercing, low voltage, waterproof connector. Such connectors shall be the type that use torque controlled, shearing type bolts. This type of connection shall also use an 'in-line' submersible 8 amp fuse to enable complete isolation of pole for maintenance purposes.

Alternative forms of jointing may be allowed only with the approval of the Superintendent and the agreement of the ITS Solutions Development Team.

(k) Pole Cabling

Each pole shall be cabled from the cable joint in the adjacent pit to the luminaire located at the limit of the bracket arm using one of the following methods:

(i) 2 core, power industry cable with separate earth cable

(ii) 2.5 mm^2, 2 core and earth, TPS (between luminaires on a double outreach only)

Note: The use of 2.5^2 TPS within the pole is no longer an approved wiring method.

In an impact absorbing pole the cable shall be supplied through the flexible conduit fitted inside the pole from the cable termination access door to the pole spigot, as shown in Standard Drawing TC-1064. If a double bracket arm is used, 1.5 m of cable shall be looped between the luminaires.

731.12 LABELLING OF INSTALLED ASSETS

The contractor is to affix labels to all road lighting assets installed under this contract in accordance with this clause.

The contractor shall supply all blank self-adhesive base labels and self-adhesive numbers in accordance with this section. The contractor shall attach all numbers to the base label, in accordance with the correct matching asset records as supplied to the contractor.

The contractor shall thoroughly clean the area on the pole to be covered by the label prior to attaching the label and if a liquid cleaning solution is used, ensure that the pole is completely dry before application. Any labels that delaminate due to insufficient surface preparation shall be rectified by the contractor.

(a) Distribution Cabinet Labelling

A cabinet identification label conforming to VicRoads Standard Drawing TC-2100 shall be affixed to the distribution cabinet. The Superintendent will advise of the site number. The contractor shall maintain the cabinet label(s) to be clean, free of graffiti and clearly legible.

The label shall be located such that is can be viewed from the roadway.

(b) Pole Labelling

Each lighting pole shall have a label affixed to it in accordance with drawing number TC-2106. A VicRoads full asset number consists of a 5-digit site asset number followed by a 3-digit pole number. The string of 8 numbers is considered the full pole number. The Pole location identifier provides for additional information to be coded. See standard drawings TC-1076 and TC-1077.

Each label installed shall have the correct number overlays stuck on - matching the pole identification as per plans and inventory information provided by the Superintendent. There shall be no blank squares/boxes on a pole identification label and each square shall contain a number from 0 to 9.

It is a requirement to remove all other existing non-approved asset numbers/labels written, painted or marked on those poles covered by this contract by a method approved by the Superintendent, so that the new pole identification label is the only visible asset identifier on the pole. However, labels indicating the date of latest re-tension for pole specifications etc. are to be left untouched. All rubbish generated from these works is to be properly disposed of by the contractor off site.

The pole label shall directly face oncoming traffic at approximately a 45 degree angle between 2.5m to 3m above the surrounding ground level. For any lighting pole with a single outreach, one label shall be installed. For any lighting pole with a double outreach and/or lighting up multiple passageways, two labels shall be installed so that they are facing oncoming traffic, allowing it to be readable from either direction. See standard drawing TC-1078.

The Superintendent will advise of the pole numbering to be adopted for each pole.

731.13 DATA COLLECTION OF ASSETS

Lighting installations shall have all required information recorded and provided as specified below.

All lighting installation assets shall have their location identified and recorded using GPS co-ordinates. The co-ordinates shall be captured using the World Geodetic System WGS84 in decimal degrees to 6 decimal places.

Details of all installed assets (e.g. distribution boards, circuits, cabling, pits, poles, outreaches, luminaires etc) shall be recorded in an Excel spreadsheet.

Each of the following shall be provided in three separate worksheets within the same file.

(a) Site Information

The following general site information shall be provided:

- Site Number
- Site name
- Start Road
- End Road
- Owner
- Municipality
- VicRoads Region
- Meter Number
- NMI Number
- Cabinet GPS co-ordinates

(b) Cabinet Information

The following cabinet connected load information shall be provided:

- Circuit No
- Phase circuit connected to
- Circuit breaker rating
- Pole numbers connected to circuit

(c) Poles and Luminaires

The following pole and luminaire information shall be provided for each pole:

- Pole number
- Road name
- Near Reference
- Position (e.g. left, centre median)
- Pole location using GPS co-ordinates
- Pole height
- Outreach type (single or double)
- Outreach length
- Luminaire brand
- Luminaire Type (LED T1, T2 or T4)

731.14 REDUNDANT ASSETS

All redundant assets shall be removed and disposed of as directed by the Superintendent. Any asset that could be re-used may be required to be delivered to a location nominated by the Superintendent and remain VicRoads property.

As existing public lighting assets may be owned by the local Power Distribution Company, the contractor shall give consideration to the method of removal of redundant lighting assets and, where required, shall deliver such redundant assets to a location specified by that Power Distribution Company within its area.

731.15 BACKFILLING, RE-INSTATEMENT AND CLEAN-UP WORKS

The contractor shall comply with the requirements of the Road Opening Permit issued by the relevant authority. Where these requirements are silent, the contractor shall undertake backfilling in accordance with Section 733 Conduits and Pits for Underground Wiring and Cabling, Clause 733.06 Backfilling.

On completion of all excavation and reinstatement works, the contractor is to ensure that all rubble, surplus crushed rock, surplus pavement materials, surplus concrete and all other surplus materials are removed from the site. The contractor is to leave the work site in a clean and safe condition.

Subject to the requirements of Clause 731.13 above, civil hardware and equipment which is not to be reused or salvaged is to be removed from the site and disposed of by the contractor and the cost of removal and disposal is to be included in the tender price.

731.16 COMPLETION

(a) Compliance

Following implementation of the installation phase of a stand-alone VicRoads lighting installation under this standard section, the contractor shall:

(i) check and adjust luminaire orientation as required;

(ii) replace all luminaires containing PE cells, or with the approval of the Superintendent, bypass the PE cells in the luminaires;

(iii) replace all damaged or non-functional luminaires, ballasts, and external igniters;

(iv) check all brackets for type, size, shape and tolerance and replace any not in conformance with the VicRoads standard drawings and within the specified tolerance limits;

(v) check and adjust all brackets for fixing and for orientation;

(vi) inspect all joint use poles and joint use mast arms for proper installation and functioning, and rectify all faults;

(vii) check all lighting poles for type, size, location, orientation, bolt washers, bolt torque, slip plane washer, verticality, and ground clearance, and where not in compliance replace, adjust or reinstall as appropriate;

(viii) inspect all pits, conduits, cables, and all other components, and where faulty repair or replace as necessary;

(ix) check all electrical circuitry, materials, components, and equipment for conformance with AS/NZS 3000, and rectify where full compliance has not been achieved; and

(x) check and confirm that the distribution cabinet has been properly installed and sealed from pests and moisture and rectify as necessary.

(xi) inspect and test the distribution cabinet for faults and non-complying components.

(xii) test the PE Cell and switching gear and replace if found to be faulty or performing unsatisfactorily.

(xii) check circuit diagrams for accuracy of each respective circuit

(xiii) Place a copy of circuit diagrams in the Distribution Cabinet.

One week before practical completion on the Whole of the Works, the torque in the slip base pole slip plane holding down nuts and bolts on the flange shall be checked by the contractor with an accurately calibrated torque wrench, and the nuts shall be adjusted as required, in accordance with Clause 731.06(d).

(b) Testing and Certificate of Electrical Safety

Prior to final acceptance, the contractor shall test all distribution cabinet, circuits, switches, PE cells, luminaires, and all other electrical and electronic components for correct installation and operation.

The contractor shall be responsible for arranging for the issuing of a Certificate of Electrical Safety for the electrical installation. The Superintendent will not accept the lighting installation as complete until such time as the Certificate of Electrical Safety has been issued.

(c) Commissioning

Upon final acceptance, the contractor shall switch on the lighting installation at the Distribution cabinet in automatic mode, and record the time, date and meter reading for contractual, warranty and power supply purposes and supply this record to the Superintendent within 48 hours.

(d) As-Built Plans

The contractor shall supply to the Superintendent two copies of ‘As-Built’ plans along with a USB drive or other approved storage medium containing the CADD/Microstation drawing files, and the same shall be supplied by the contractor to the local distribution company if appropriate.