

SECTION 734 - ELECTRICAL NETWORK INSTALLATION

##This section cross-references Sections 610, 611, 614 and 730, 731, 732, 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 732 should be included in the specification:

##Section 733 should be included in the specification:

734.01 GENERAL

(a) Scope

This section relates to the requirements for the power supply network for the ITS Communications Network, Freeway Management Devices, Public Lighting and Traffic Control Devices including:

- (i) points of supply
- (ii) supply meters
- (iii) switch boards and associated protection systems
- (iv) cabling
- (v) earthing systems
- (vi) electrical cabinets
- (vii) electrical pits and conduits

and shall be read in conjunction with the drawings included in the Contract.

(b) General Requirements

The Contractor shall be responsible for the installation and commissioning of the Electrical network covered under this specification in accordance with individual contract documents.

All electrical work shall be carried out by electrical tradespersons holding current Victorian Electrical Licences and pre-qualification with VicRoads.

(c) Pre-Qualified Contractor

All works associated with the installation covered under this specification shall be undertaken by contractors that are appropriately pre-qualified as detailed in Table 734.011 below.

Table 734.011 Contractor Pre-Qualification Level Requirements

Conduits and pits for	Pre-Qualification Level
Works on or associated with traffic signals	STS1
All other on-road electrical works	STCE
Works associated with VicRoads owned communications networks	STCE
Works associated with telecommunications carrier networks	SCTV (must hold AMCA licence)

Sub-contractors undertaking works covered under this specification shall be pre-qualified at the appropriate level under the VicRoads contractor pre-qualification scheme, in the sub-contractors own right.

734.02 REFERENCED AND RELATED SPECIFICATIONS, STANDARDS AND DRAWINGS

All works associated with the installation and commissioning of all devices covered under this specification shall conform to all relevant VicRoads specifications, VicRoads 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:

- (a) AS/NZS 3000 Wiring Rules
- (b) Victorian Service and Installation Rules.
- (c) VicRoads 'TCS' series specifications
- (d) VicRoads 'TC' series standard drawings

Notwithstanding the General Conditions of Contract and Precedence of documents, the following descending order of precedence of shall apply:

- (a) AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)
- (b) Relevant Australian Standards in Table 734.021
- (c) VicRoads 'TC' series standard drawings
- (d) VicRoads 'TCS' series specifications
- (e) Drawings included in the Principal's Preliminary Design
- (f) Technical Specifications included in the Appendices

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.

Where a 'part' of an Australian Standard has not been specifically referred to, all or only those parts that are relevant are to be complied with.

Australian Standards referred to in this section are listed in Table 734.021 below.

Table 734.021 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 1768	Lightning protection
AS/NZS 2053	Conduits and fittings for electrical installations
AS/NZS 2648.1	Underground marking tape - Non-detectable tape
AS 2700	Colour standards for general purposes
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 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/NZS 5000.1	Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV
AS/NZS 60227.5	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Flexible cables (cords)
AS 60529	Degrees of protection provided by enclosures (IP Code)
AS/NZS 60898	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations
AS/NZS IEC 60947	Low-voltage switchgear and control gear
AS/NZS 61000	Electromagnetic compatibility (EMC)

AS/NZS 61386	Conduit systems for cable management
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VicRoads Specifications and Technical Notes referred to in this section are listed in Table 734.022 below.

Table 734.022 List of Specifications and Guidelines

Spec Number	Title
TCS 043	The Supply of Electrical Distribution Cabinets
TCG 018	Register of ITS Approved Products

VicRoads Standard Sections referred to in this section are listed in Table 734.023 below.

Table 734.023 List of Standard Sections

Std Section	Title
732	ITS Devices Installation
733	Conduits and Pits for Underground Wiring and Cabling
610	Structural Concrete
611	Steel Reinforcement
614	Formwork

VicRoads Standard Drawings referred to in this section are listed in Table 734.024 below.

Table 734.024 List of Standard Drawings

Drawing Number	Title
TC-2200	600mm Round Electrical Cable Pit
TC-2201	750mm Round Electrical Cable Pit
TC-2202	600mm Round Electrical Cable Pit
TC-2203	P8 Communication Pit
TC-2204	Electrical & Communication Trenches
TC-2205	600mm Isolated Electrical Pit
TC-2206	Tail Conduit Junction Arrangements
TC-2207	General Arrangement at Gantries
TC-2208	General Arrangement at Interchanges
TC-2209	General Arrangement at Communications Hut
TC-2210	Transition to Bridge Barrier
TC-2211	General Arrangement for Existing Structures
TC-2212	Typical Structure Mounted Junction Boxes
TC-2215	General Arrangement at Points Of Supply
TC-2216	Cable Pit Former 750mm Dia To Suit 600mm Dia Lid
TC-2217	Cable Pit Access Cover Frame and Precast Concrete Surround 750mm Dia
TC-2231	Typical Distribution Cabinet Foundation Type 1

TC-2232

Typical Distribution Cabinet Foundation Type 3

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

734.03 GENERAL REQUIREMENTS

(a) General

The installation of a new power supply network or additional works at an existing power supply network by the Contractor shall include:

- (i) 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 and distribution cabinet foundations.
- (ii) supply, installation and connection of all hardware, equipment and materials including, but not limited to, the distribution Board, circuit breakers, electrical cables, cable guards, fuses, fittings and all materials and equipment necessary to complete and commission the installation.
- (iii) 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
- (iv) re-instatement of all works.

Unless otherwise specified, equipment and materials used shall be VicRoads type approved, (refer to VicRoads website for type approved ITS products) and comply with the requirements specified in the VicRoads Traffic Control Series Standard Specifications.

The Contractor shall submit a data sheet of all types of equipment to the Superintendent for review prior to ordering. When requested by the Superintendent a sample of the equipment shall be submitted.

(b) Durability

All structural components shall have a nominated service life as specified in Table 734.031. All other components shall have the nominated service life as specified in VicRoads Traffic Control Series Specifications or if not so specified, as indicated in Table 734.031.

Table 734.031

Component	Nominated Service Life
All structural components/supports including pedestals, conduits and pits	50 Years
All other components not specified in VicRoads Traffic Control Series Specifications	15 Years

734.04 ASSET OWNERSHIP

The Principal will retain ownership of the power supply network. The Contractor is not authorised to sign any document with any party which transfers ownership of the 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 installation.

734.05 POINT OF SUPPLY

Pits and conduits for connection to the point of supply shall be installed in accordance with Section 733 and TC-2215.

The electrical power supply to all Type 1 and Type 3 distribution boards shall be three phase rated at 415 V 50 Hz.

734.06 EARTHING SYSTEMS

The Contractor shall be responsible for the design and installation of all the earthing systems required in accordance with AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)

Multiple Earthed Neutral (MEN) connections are required where each earth is connected to an independent earth electrode. There is to be no MEN connection at sub-boards where the earthing is connected to the distribution board.

Installation of an earth electrode and MEN connection at sub-boards shall be approved by the Superintendent.

734.07 ELECTRICAL DISTRIBUTION CABINETS

(a) Cabinet

The supply and installation of Distribution board cabinets shall comply with the requirements specified in the VicRoads Traffic Control Series Standard Specification TCS-043 Electrical Distribution Cabinets, Standard Section 732, Standard Section 733 and individual contract documents.

The Contractor shall only supply and install VicRoads Type Approved Electrical Distribution Cabinets.

The type of Distribution Cabinets required shall be Type 1 or Type 3 as nominated in individual contract documents or listed in Table 734.071 below.

Table 734.071 Selection of Distribution Cabinets

Assets Supplied by Distribution Board Cabinet	No. of Power Meters	Distribution Board Cabinet Type	VicRoads TC Series Standard Drawing for Cabinet Foundation
<ul style="list-style-type: none"> • ITS Assets; • DJR Assets; • Traffic Signals; and • Road Lighting. 	2	3	TC-2232
<ul style="list-style-type: none"> • ITS Assets; • DJR Assets; and • Road Lighting. 	2	3	TC-2232
<ul style="list-style-type: none"> • ITS Assets; • DJR Assets; and • Traffic Signals. 	1	1	TC-2231
<ul style="list-style-type: none"> • ITS Assets; and • DJR Assets. 	1	1	TC-2231
<ul style="list-style-type: none"> • Traffic Signals; and • Road Lighting. 	2	3	TC-2232
<ul style="list-style-type: none"> • Road Lighting only. 	1	1	TC-2231

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

For all electrical cabinets, spare space for future additional equipment shall be not less than 25%.

The power provided shall be sufficient and allow, in the designed electrical load, for a 25% additional capacity for any future loads at any point in the circuit.

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.

If any equipment, cabling or infrastructure is damaged during upgrading works to an existing distribution board cabinet, all damaged equipment, cabling and infrastructure must be replaced.

Where a new cabinet replaces an existing cabinet, the existing cabinet and foundation shall be decommissioned and removed from site.

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

(b) Supply Meters

Where any distribution board is installed or upgraded and the distribution board supplies road lighting and/or traffic signals in addition to ITS assets, one power meter shall be provided for all ITS assets, DJR assets and traffic signals and a second power meter shall be provided for all road lighting. The distribution boards and the power meters shall be housed in **one** Type 3 distribution board cabinet.

(c) Switch Boards and Associated Protection Systems

All distribution boards shall include a main isolating switch after each power meter such that all assets supplied by that meter can be isolated for maintenance purposes. In addition, an isolating switch for each of the following groups of assets shall be provided after the main isolating switch such that each group of assets can be isolated separately for maintenance purposes:

- (i) ITS Assets
- (ii) DJR Assets
- (iii) Traffic Signals
- (iv) Road Lighting

(d) Sub-boards

Sub-boards shall not include a Multiple Earthed Neutral (MEN). The Superintendent shall review if a sub-board is too far from a distribution cabinet. In this event, where a separate earth has been used, an MEN shall be required. See clause 734.06 above.

Where an existing distribution board and/or cabinet does not meet the above requirements, the distribution board cabinet shall be replaced with a new one.

(e) Additional Isolation

Where assets are located at a distance greater than 50m from the group isolating switch, an additional isolating switch shall be located at the asset.

(f) Provision for Maintenance

All device support and containment structures shall be designed and constructed to provide for ease of maintenance with specific requirements as described below.

Cabinets shall be located outside of the clear zone or protected by a suitable traffic barrier, in positions that are accessible and provide a safe work area for routine and non-routine maintenance.

Opening doors shall generally be away from the traffic side.

(g) Foundations

Cabinet foundations shall comply with Standard Section 732, TCS 043 and the standard drawings detailed in Table 734.071 above.

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.

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

HP No concrete shall be poured for any distribution cabinet foundation or apron before inspection and approval by the superintendent.

(h) Smart Road Lighting Controller

Where a meter is supplied for road lighting, provision shall be made to ensure sufficient space for the installation of a Smart Road Lighting Controller within the distribution cabinet.

734.08 PITS, CONDUITS

(a) General

Pits and conduits shall be installed in accordance with Standard Section 733 and individual contract documents.

Conduits and pits for the power supply network are considered an electrical installation under State Legislation of Victoria. Therefore, only a licenced electrician or licenced electrical contractors may install conduits and pits.

Separate power and communications pits and conduits shall be used.

Pits shall be located to provide a safe work area for routine and non-routine maintenance and, where practical, shall be not less than 1.5 m from the edge of any traffic lane.

(b) Managed Motorways

Trunk conduit networks for managed motorways shall be installed in accordance with Standard Section 733, relevant standard drawings and individual contract documents.

As a minimum, the number of conduits shall be 2 x 100mm electrical conduits and 2 x 100mm communications conduits on both sides of the freeway as specified in Standard Section 732.

(c) Arterial Roads

Conduit networks for arterial roads shall be installed in accordance with Standard Section 733, relevant standard drawings and individual contract documents.

As a minimum, the number of conduits shall be 1 x 100mm electrical conduit and 1 x 100mm communications conduit on one side of the roadway as specified in Standard Section 732.

734.09 CABLING

(a) General Requirements

All power cabling shall be fully compliant with the AS/NZS 3000 and the specific requirements for mains power cabling and architecture detailed in individual contract documents.

Cables and cable capacity shall be designed to be suitable for the intended purpose, with appropriate capacity for the intended load. Cable shall be procured so that it will not be necessary to have a cable joints between termination points. The Contractor shall submit a power cable schedule to the Superintendent for review prior to procurement of any cable.

Locations where cable joints are required due to extended distance shall be approved by the Superintendent. The Contractor shall submit a detailed proposal for all such locations, including plans with the joins clearly marked. All such joints shall be above ground, clearly marked and in a VicRoads approved enclosure, with the exception of road lighting.

Under no circumstances, shall a cable joint be placed within a conduit.

For all cables the Contractor shall provide an additional length of cable of not less than 2 metres at each cable end. The additional cable shall be coiled within the pit adjacent to each site.

For all electrical pits containing cabling within the Works, an additional length of cable of not less than 2 metres shall be coiled within each third pit.

(b) Cable in Conduit

Care shall be taken during installation of cable in the conduit to minimise friction between the cable and the conduit and other cables. An approved lubricant shall be used to reduce friction.

Care shall be taken to avoid damage to the sheath and/or insulation at changes of direction, within pits, or at transitions between different methods of installation.

Replacement draw cords, in accordance with Clause 733.05, shall be installed in each conduit with the installation of cable.

734.10 GALVANIC CORROSION PROTECTION

The Contractor shall use 'resistance to corrosion' as critical criteria in the selection of all equipment, fixings and installation methods. Fixings shall generally be stainless steel. Metallic components shall be stainless steel or shall be hot dip galvanised.

Where two dissimilar metals with high galvanic potential are brought together, the Contractor shall fit a suitable insulating material to achieve galvanic isolation at the point of contact.

A corrosion inhibiting film or protective coating shall be applied between the mating surfaces of all dissimilar materials in contact. In particular:

- (1) stainless steel and aluminium surfaces;
- (2) galvanised steel and aluminium surfaces; and
- (3) stainless steel and galvanised steel surfaces.

Threaded fasteners shall be protected and treated to prevent seizing. The inhibitors shall be applied according to the manufacturer's recommendation.

The Contractor shall prevent wet contact between electrolytically dissimilar metals either by using electrically insulating barriers or by excluding moisture from the contact zone. Where electrical isolation is to be avoided such as with equipotential bonding for earthing or lightning protection, the Contractor shall select metals which avoid large electrochemical potential differences, use fusion jointing such as brazing or welding or exclude water using proprietary systems. The Contractor shall submit its proposed method to be used to the Superintendent for review.

734.11 LABELLING OF INSTALLED ASSETS**(a) General**

The date of initial certification of an installation shall be available on-site, in the form of permanent, indelible marking on or at the main switchboard in accordance with Clause 8.4 of AS/NZS 3000.

The Contractor is to affix labels to all assets installed under this contract in accordance with this clause and device specific specifications.

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

(b) Cabinets

All electrical distribution cabinets and equipment mounted within the cabinets shall be clearly labelled. The cabinet label shall include the descriptive name and identifying number of the enclosure as prescribed by VicRoads.

All electrical distribution cabinets shall include a Public Information Label as per standard drawing TC-2100. The site number of the cabinet shall be provided by VicRoads.

(c) Markings, labels and signs

Markings, labels and signs shall be located where they may be readily seen. Warning and operational labels must be located to ensure visibility before the person can be placed at risk and to ensure positive identification before operation.

The text on the label, warning sign or marking shall match the identification on the as-constructed drawings and any Operation and Maintenance Manuals.

Internal labels shall be laminated plastic and external labels stainless steel unless approved otherwise by the Superintendent.

Labelling shall be provided with the lettering height indicated:

(1) External Labels

- | | | |
|-------|------------------------------------------|-------|
| (i) | Description and equipment number | 6 mm |
| (ii) | Main label | 20 mm |
| (iii) | Internal Labels (functional description) | 3 mm |

Warning labels shall be provided stating (where applicable):

- (2) Exposed or live parts inside;
- (3) Authorised personnel only; and
- (4) Origin of supply.

Danger or warning labels shall comply with AS 1319.

All labels shall be secured via screws, nuts (or tapped holes) and washers. Self tapping screws shall not be allowed. Labels with a length of 150 mm and more shall have slotted fixing holes to allow for thermal expansion.

A phase coloured and numbered disc shall be fixed to the escutcheon for each circuit breaker chassis pole in accordance with the drawings.

A typed circuit schedule, together with a spare circuit schedule, shall be mounted inside the distribution board door in a clear perspex cover.

(d) Labelling of cables

In addition to the requirements above, and those specified in AS/NZS 3000, the following shall apply to the labelling of cables:

- (1) Where cables are unable to be removed in accordance with clause 734.14 below, they shall be clearly labelled as redundant with the prior agreement of the Superintendent.
- (2) Where cables are installed in pits which does not clearly state their purpose, they shall be individually labelled with the prior agreement of the Superintendent.
- (3) Where cables are sub-ducted inside of pits or conduits they shall be clearly labelled with the prior agreement of the Superintendent.

734.12 INTERRUPTION TO SUPPLY

The Contractor shall seek the Superintendent's agreement to any proposal to interrupt the electrical supply to any VicRoads asset.

734.13 RECORDS, DOCUMENTATION AND DATA COLLECTION OF ASSETS

The information to be supplied by the Contractor in relation to the power supply network elements of the Works shall also include the following:

(a) General

All documents shall be prepared in accordance with IEC 61082 "Preparation of documents used in electrotechnology".

(b) Electrical Infrastructure Layout Plans

Electrical infrastructure layout plans shall be presented at 1 : 500 scale on A3 sized drawings and shall include:

- (i) supply associated with all traffic signal sites and associated public lighting; and
- (ii) public lighting,

Plans shall include but not be limited to the following:

- (i) location of points of supply including details of: pole / pillar / Point of Supply number or identifier, and load on the point of supply;
- (ii) location, type of equipment and details of all above ground hardware associated with the electrical works for new and existing;
- (iii) location, size and number of conduits, including distances from the kerb and road reserve boundary, proposed trenching depth and under road bore details;
- (iv) location and type of electrical distribution boards and/or cabinets with relevant cabinet numbers shown clearly;
- (v) location and type of electrical cabinets;
- (vi) location and type of electrical pits;
- (vii) connection to electrical power supply, including associated conduits and pits;
- (viii) electrical power cable details including cable sizes, cable type, circuit details; and
- (ix) location of meters, meter numbers and supply company details.

For clarity, layout plans may be separated for different applications. Layout plans shall be geo-referenced.

In addition, the Contractor shall prepare design and shop drawings of equipment switchboards, layouts, specialised components and wiring diagrams.

(c) Electrical Single Line Diagrams

Electrical single line diagrams shall be presented on A3 sized drawings, drafted using an appropriate CAD system for the following:

- (i) each distribution board, including its associated point of supply and supply meter(s);
- (ii) each ITS field cabinet;
- (iii) each Traffic Signal cabinet; and
- (iv) each public lighting sub-board where provided.

Diagrams shall include, but not be limited to the following:

- (v) the capacity of existing or proposed points of supply and the associated load per phase on the fuse/protection for that point of supply;

- (vi) all electrical power cable details including cable sizes, cable type, circuit details and insulation type;
- (vii) fuse, circuit breaker and isolation switch details, including ratings, making a clear distinction between existing and proposed protection;
- (viii) supply meter details, including meter number and National Meter Identifier (NMI) number;
- (ix) details of devices within each cabinet, including rating;
- (x) details of devices supplied by each cabinet; and
- (xi) clear distinction between existing and proposed equipment connected to distribution boards and cabinets.

For clarity a diagram shall be provided for each cabinet and/or circuit with detail extending from the point of supply.

(d) Circuit Diagrams

Circuit Diagrams shall show the electrical components of the circuit with the following information:

- (i) Distribution cabinet ID
- (ii) Circuit numbers with each distribution cabinet
- (iii) Phase information for each electrical component
- (iv) Electrical components with asset numbers as shown on the Electrical Power Cable Layout Plans

(e) Electrical Cabling Documentation

Cable sizing calculation documentation shall be provided to the Superintendent for review for all electrical cables prior to installation. This documentation shall include calculations for Voltage Drop and Earth Fault Loop Impedance that demonstrate compliance with the requirements of AS/NZS 3000. This documentation shall be proof engineered as signed by a registered Electrical engineer with Chartered Professional Engineer status.

(f) As-constructed Drawings and Documentation

An accurate record of the Works as actually constructed shall be kept and as-constructed drawings and documentation shall be provided for all Electrical Power Cable Layout Plans, Electrical Single Line Diagrams, Circuit Diagrams and Electrical Cabling Documentation specified above.

The Contractor shall also provide final as-constructed drawings of all shop drawings. These should include switchboard layouts, distribution line diagrams, control circuits with wire and terminal numbers, schedules of all equipment, fabrication drawings, etc.

As-constructed documents shall include a spreadsheet of GNSS coordinates for all new and existing items. The datum required for the GNSS data is the Map Grid of Australia 1994 (MGA94) Zone 55 or suitable alternative approved by the Superintendent.

Where assets could not be removed in accordance with Clause 734.14, they shall be clearly marked in the drawings and documentation with their type, location and any terminations. This information shall be duplicated on any labels affixed to the asset in accordance with Clause 734.11.

(g) Data Collection

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

Assets shall have their location identified and recorded using GNSS coordinates. The coordinates shall be captured using the World Geodetic System WGS84 in decimal degrees to 6 decimal places. Layout plans shall be geo-referenced.

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

(i) Site Information

The following general site information shall be provided:

- Site Number
- Site name
- Road
- Nearest intersection or interchange
- Chainage
- Municipality
- VicRoads Region
- Meter Number
- NMI Number
- Cabinet GNSS co-ordinates
- As built schematic drawings of electrical network and all power circuits

(ii) 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

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

734.15 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,

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 734.14 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.

734.16 COMPLETION AND HANDOVER

(a) Compliance

Following implementation of the installation phase of an electrical installation under this standard section, the contractor shall:

- (i) check all electrical circuitry, materials, components, and equipment for conformance with AS/NZS 3000, and rectify where full compliance has not been achieved; and
- (ii) check and confirm that the distribution cabinet has been properly installed and sealed from pests and moisture and rectify as necessary.
- (iii) inspect and test the distribution cabinet for faults and non-complying components.

- (iv) check circuit diagrams for accuracy of each respective circuit.
- (v) Place a copy of circuit diagrams in the Distribution Cabinet (See Clause 734.13 above).

(b) Testing and Certificate of Electrical Safety

Prior to final acceptance, the contractor shall test all distribution cabinets, circuits, switches, and all other all other components which form part of the Electrical Network for correct installation and operation.

The Contractor shall advise the Superintendent at least three Business Days prior to all inspections and tests. The Superintendent reserves the right to inspect the installation and witness any tests. Witnessing of inspections or tests shall not relieve the Contractor of its responsibilities under the terms of the Contract.

The Contractor shall advise the Superintendent in writing of its intention to commission the Works at least five Business Days prior to the planned commissioning date. The Superintendent reserves the right to witness the commissioning of the Works.

The Contractor shall submit signed Certificates of Electrical Safety (CES) and Test Reports for all electrical installations including, but not limited to:

- Distribution boards and sub-boards;
- Earthing systems;
- All pits and conduits; and
- Cabling works.

The Contractor shall provide Prescribed/ Non-prescribed CES in accordance with Energy Safe Victoria requirements.

The Contractor shall provide signed test certificates to the Superintendent within five Business Days of each respective component of the Works being completed.

HP 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 installation as complete until such time as the Certificate of Electrical Safety has been issued.

(c) Proof of Performance Tests (POP)

POP tests shall be completed once the equipment has been installed. These tests are necessary to prove that the equipment as installed will perform, in situ, as stated in this Specification and manufacturer's information. POP testing must be completed on each and every item of equipment. Electrical POP testing consists of two stages, 'pre' and 'post' energisation. POP testing for ITS equipment shall be done in accordance with the ITP.

A signed Certificate of Electrical Safety (CES) is required before any mains electrical power is switched on to the system.

(d) Commissioning

The Contractor shall submit to the Superintendent for review a detailed commissioning program and pro-forma commissioning sheets for every system or item of equipment to be commissioned.

The Contractor shall submit to the Superintendent for review reports indicating observations and results of tests and compliance or non-compliance with requirements.

The Contractor shall provide to the Superintendent for review a commissioning sheet for each cabinet and any other item of equipment.

HP The Contractor shall not commission the system or any part of the system until the results of all specified compliance tests, commissioning sheets, reports and certificates have been submitted for the Superintendent's review.

(e) As-Built Plans

The Contractor shall supply to the Superintendent two copies of 'As-Built' plans for the Electrical Network, as defined in Clause 734.13 above, along with a USB drive or other approved storage medium containing the CADD/Microstation drawing files. The same shall be supplied by the Contractor to the local distribution company if appropriate.

734.17 DEPARTMENT OF JUSTICE AND REGULATION SAFETY CAMERA WORKS

Where specified in individual contract documents, the Contractor shall provide the following as required for Department of Justice and Regulation (DJR) Safety Camera works.

A 240Vac, 40A, power supply for the ground-based unit (GBU) cabinet (to be installed by DJR) at the location shown in the Principal's Preliminary Design the following shall be provided:

The Contractor shall supply, install and terminate the required power supply cabling for Department of Justice and Regulation (DJR) safety camera GBU cabinets at the locations shown in the Principal's Preliminary Design.

The following will typically be supplied and installed by DJR:

- GBU cabinets
- DJR CCTV cameras
- Safety cameras
- Wiring from GBU to devices
- Type 6 Pole

The Contractor shall be responsible for all coordination with DJR required to undertake these works.