

# Roads

## Master Specification

### RD-EL-C1 Installation of Lighting for Roads and Public Spaces

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## Document Amendment Record

Version	Change Description	Date
1	Initial issue (formerly R52). General document review and update; updated Referencing.	02/07/19
2	Formatting for publishing	20/09/19
3	Clarification of mounting plate setup requirement to cover both slip-base and energy-absorbing pole to ensure the acceptable verticality of the pole. Added requirement of 240V warning sicker to be installed on Combo pole at ELV traffic signal site.	August 2020
4	General document review and update; updated referencing; clarification of requirements on slip base poles, luminaires, and smart lighting cells	August 2021
5	Provision of standard drawings and master specification to construction contractors. Clarification on requirements of pole footing positioning and provision of safe working area around pole base. Clarification on methodology to support pole base plate during assembly process and position outreach as per drawings. Exclude the use of pole risers. Changed reference from service point to supply point. Guidance on switchboard labelling	July 2022

## Document Management

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# RD-EL-C1 Installation of Lighting for Roads and Public Spaces

## 1 General

- 1.1 This Part specifies the requirements for the installation of lighting for roads and public spaces.
- 1.2 Documents referenced in this Part are listed below:
- a) AS/NZS 2053                      Conduits and Fittings for Electrical Installations.
  - b) AS/NZS 3000                    Electrical Installations (known as the Australian/New Zealand Wiring Rules).
- 1.3 The work shall comply with the following (in order of precedence):
- a) AS/NZS 3000: Electrical Installations (known as the Australian/New Zealand Wiring Rules);
  - b) Contract specific drawings and specified by the Principal (if any);
  - c) Department Technical Standards and Guidelines including standard drawings are available from the following web site: <https://www.dit.sa.gov.au/standards>; and
  - d) any other relevant Australian Standards.
- 1.4 Where necessary, the Contractor shall liaise with SA Power Networks regarding the removal of SA Power Networks' poles and shall co-ordinate this work in conjunction with the installation and operation of the Principal's light poles.
- 1.5 Relevant master specifications and standard drawings shall be issued to installation contractors prior to commencement of work. Installation of lighting shall be in accordance with DIT approved Issued for Construction (IFC) drawings.

## 2 Materials

- 2.1 Materials shall comply with the following:
- a) Poles, Outreaches and Footing Units: RD-EL-S1 "Supply of Lighting Components";
  - b) Luminaries: RD-EL-S2 "Supply of Luminaries";
  - c) Conduits and Junction Pits: RD-EL-C3 "Installation of Conduits and Pits";
  - d) Footing Reinforcement: ST-SC-S6 "Steel Reinforcement";
  - e) Concrete: ST-SC-S1 "Normal Class Concrete";
  - f) Flexible Conduit: Flexible Conduit to AS/NZS 2053; and
  - g) Other Conduit: Heavy Duty Rigid PVC Conduit to AS/NZS 2053 (colour orange).
- 2.2 If the Contractor supplies frangible poles, the Contractor shall provide evidence demonstrating compliance with requirements of RD-EL-S1 "Supply of Lighting Components". Provision of the documentation shall constitute a **Hold Point**.

## 3 Pole Footings

### Setting Out

- 3.1 The positions of the footings shall be set out from the coordinates given in the Geometric Details document, on the drawings or as referenced by chainage and offset.
- 3.2 The appropriate slip-base V-notch shall be oriented in accordance with DIT standard drawings S-4055 sheets 19 to 22.

- 3.3 The access hatch on poles shall be positioned on the rear of the pole so that it can be easily and safely accessed. If this is not practical, it shall be positioned on the side opposite to the on-coming traffic.
- 3.4 The level and slope of the concrete surround shall match the specified finished levels and slopes of the surrounding ground.
- 3.5 The area surrounding the pole footing shall provide for a safe working area for maintenance personnel.

## Setting Up

- 3.6 Where steel footing units are used, the footings units shall be firmly supported to prevent movement during pouring of concrete. Where holding down bolts are used, the bolts shall be firmly held in position by a jig. The use of welding to secure the position the bolts is not permitted. All conduits shall be plugged to prevent the entry of concrete during pouring.
- 3.7 Prior to pouring concrete a **Hold Point** shall apply.
- 3.8 The level of the top of the footing mounting plate or holding down bolts shall be determined from the specified finished levels for the surrounding ground. The mounting plate shall be set at gradient of no more than 1:250 from the horizontal to ensure acceptable verticality of the pole.
- 3.9 Footing units or bolts shall be placed within the following tolerances:

**Table RD-EL-C1 3-1 Footing Units or Bolts Tolerances**

Component	Tolerance
Vertical	
Height of base (slip-base poles)	+0, -10 mm
Height of threaded rod (I/A poles)	± 5 mm
Horizontal	
Distance from face of kerb	- 20 mm, + 50 mm
Chainage along kerb line	± 100 mm

## Concrete

- 3.10 Concrete shall be compacted by use of a pencil vibrator. The surface of the concrete footing surround shall be a wood float finish with the edges arrised with an edging tool.
- 3.11 The exposed part of the steel footing unit or exposed bolts shall be cleaned immediately after pouring of concrete is completed. All vent holes shall be left clean and have any anti-corrosive tape completely removed from the hole.
- 3.12 Where steel footing units are used for slip-base poles, the concrete inside the footing unit shall be dished down by approximately 25 mm to the bottom of the conduit drainage holes to ensure that no water pools in the base. It shall be a smooth finish.
- 3.13 Backfill shall not cover the concrete surround.

## 4 Trenching, Boring, and Backfill

- 4.1 Excavation and backfill of trenches shall comply with RD-EW-C2 "Trench Excavation and Backfill".
- 4.2 Under-road boring shall comply with RD-EW-C3 "Boring".
- 4.3 Reinstatement of any existing pavements to be retained shall comply with RD-PV-C6 "Reinstatement of Existing Pavements".

## 5 Assembly and Erection of Poles

### General

- 5.1 Poles shall be assembled in accordance with the manufacturer's instructions or, if the Principal has supplied the poles, the assembly instructions included in Clause 0 of this specification. Poles shall be mechanically pulled together with an appropriate force to prevent the rotation of outreaches.
- 5.2 For energy-absorbing poles, approved wedges or shims shall be used to support the base plate during the grouting process. Levelling nuts shall not be used to support the pole base plate.
- 5.3 After erection, all poles shall be vertical. Poles shall be marked with the Department identification no. (as shown on the drawings) using a Vinyl film label with permanent acrylic adhesive material (Brady B-7569 or equivalent accepted by the Principal), which:
  - a) has a white background with black numbers;
  - b) has numbers at least 40 mm high using a bold, sans-serif font;
  - c) is horizontally attached to the poles at a height of 1.7 m; and
  - d) is orientated 45° towards the oncoming traffic so that it can be easily read from an approaching vehicle.
- 5.4 Where combination traffic signal/road lighting poles are installed in ELV traffic signal intersection, if road lighting is fed from LV supply, dual Voltage 240V AC and 42V AC voltages present stickers shall be affixed to the access door of the Combination Pole.
- 5.5 GPS coordinates (latitude and longitude) for each asset shall be provided to the Department for inclusion in lighting database.

### Slip-Base Poles

- 5.6 At least 2 days prior to installation, the Contractor shall provide a copy of the current Calibration Certificate for the torque wrench. The certificate shall not be dated more than 12 months earlier than the date of installation. Provision of the Certification shall constitute a **Hold Point**.
- 5.7 Threads shall be cleaned to allow hand tightening of clamping bolts prior to torque being applied. The clamping bolts shall be tightened to the torque specified on the drawings using a calibrated torque wrench. The Contractor shall provide a copy of the certification that all clamping bolts have been correctly tensioned in accordance with this Clause.
- 5.8 Vent holes in the pole base shall not be blocked by concrete or protective tape around the pole base.
- 5.9 The top of the base flange shall be 90mm (+0mm -10mm) above the concrete pad finished level in accordance with Standard Drawings.
- 5.10 Pole risers shall not be used for any purpose including to compensate for incorrectly installed footings.

## 6 Electrical Work

### General

- 6.1 All electrical installations shall be carried out by an electrical worker who is licensed to perform any electrical works. The installations shall comply with AS 3000 and the Service Rules and Conditions of Supply of SA Power Networks.

### Working in the Vicinity of Existing Overhead Cables

- 6.2 The Contractor shall:
  - a) comply with the requirements of the Technical Regulator when working in the vicinity of existing overhead electricity cables;

- b) ensure that at least one person trained in working near overhead cables is present to supervise the work taking place near overhead cables; and
- c) obtain approval from the Technical Regulator before working within the restricted zone as outlined in the Office of the Technical Regulator documents Building Safely Near Powerlines and Working Safely Near Powerline, available from:
  - i) [https://www.sa.gov.au/\\_data/assets/pdf\\_file/0003/18606/150513-Building-safely-near-powerlines-web.pdf](https://www.sa.gov.au/_data/assets/pdf_file/0003/18606/150513-Building-safely-near-powerlines-web.pdf); and
  - ii) [https://www.sa.gov.au/\\_data/assets/pdf\\_file/0003/6969/160708-Working-safely-near-overhead-powerlines.pdf](https://www.sa.gov.au/_data/assets/pdf_file/0003/6969/160708-Working-safely-near-overhead-powerlines.pdf).

6.3 Provision of the approval and evidence of training shall constitute a **Hold Point**.

## Inspection

6.4 The Contractor shall:

- a) arrange for Certificates of Compliance for all electrical work;
- b) provide copies of the certificates to the Principal; and
- c) pay for any applicable fees for the connections.

## 7 Supply Points

### General

- 7.1 If the Principal has made arrangements for supply point locations, the locations will be shown on the drawings. The Contractor shall confirm the position of the supply points on-site and with SAPN before installing conduit runs to these points.
- 7.2 If the Contractor is to arrange supply points, the Contractor shall:
  - a) complete and submit a SA Power Networks REX application;
  - b) provide a copy of the form to the Principal and the Department's Road Network Maintenance directorate;
  - c) provide Certificates of Compliance to the Principal in accordance with the Electricity Act; and
  - d) apply for an electricity meter where required.
- 7.3 SAPN underground or Stobie pole supply shall be connected in accordance with SA Power Networks service rules and regulations.

### Temporary Supply Points

7.4 For details of any temporary overhead supply points, refer to the Principal.

### Layout

7.5 The layout of supply points shall be substantially as shown on the drawings.

### Location

- 7.6 Supply fuses shall not be located in Department switchboards.
- 7.7 Isolation pit and fuse shall be installed in accordance with Department standard drawings. Three phase installation shall have all phases identified on both sides of the isolation fuse with appropriate coloured heat shrink.

## 8 Wiring

### Combination/Combination Mast Arm poles

- 8.1 Unless otherwise specified, combination/combination mast arm poles shall be fed from the traffic signal controller.

### Four Way Lighting Poles

- 8.2 Four way lighting poles shall have two circuits fed from the same phase in accordance with the drawing.

### Conductors

- 8.3 Notwithstanding AS 3000, all neutrals shall have black primary insulation.
- 8.4 All active and neutral conductors shall be double insulated and comply with AS 3000.

### Circuit Breakers

- 8.5 All circuit breakers shall be as specified in the Contract specific drawings or standard drawings.

### Jointing

- 8.6 All joints below ground shall be waterproofed using Department approved epoxy jointing kits. "Tee-offs" shall be of equivalent size to a "Scotchcast" 90-B1 or larger.

### Cable Lengths

- 8.7 Spare cable shall be installed in each junction pit/pulling pit equal to the length plus the width of the junction pit. Spare cable shall be installed neatly in a loop and suitably cable tied.

### Earthing

- 8.8 All earthing electrodes shall be 13 mm diameter copper sheathed steel stakes. Earth electrodes shall be provided in accordance with SA Power Networks Supply and Installation rules and shall be identified and protected in accordance with AS 3000.

## 9 Switchboards

- 9.1 Switchboard label shall be installed on the door of the switchboard.
- 9.2 The Contractor shall supply and install DIT asset identification sticker 300mm H × 250mm W for Type A switchboard and 85mm H × 280mm W for Stobie mounted switchboard as per the approved drawings. Asset Labels shall be yellow colour reflective type with black print and clear gloss laminate. Refer to RD-ITS-C1 Appendix 2 for an example of the artwork.

## 10 Luminaires

### General

- 10.1 Unless otherwise specified, luminaires shall be LED of the wattage and type specified on the drawings, and be in accordance with the Department's Approved Products List.

### Mounting

- 10.2 Unless otherwise specified, luminaires shall be mounted horizontally with zero degree upcast and perpendicular to the road. Luminaires shall be attached to the pole spigot with the bolt torque specified by the luminaire manufacturer



## Conductors

- 10.3 All single insulated conductors in the luminaires shall have a heat rating appropriate for the expected temperatures in their location in the housing.

## 11 Smart Lighting cells

- 11.1 Where Smart Lighting cells are installed on luminaires, all appropriate information shall be documented including MAC Address, Serial Number, GPS coordinates, luminaire number and other information as specified in EARLS Data Collection Template' and supplied to the principal in a spreadsheet.

## 12 Other Lighting

- 12.1 Any other lighting shall be as specified by the Principal or on the drawings.

## 13 Acceptance and Records

- 13.1 The Contractor shall demonstrate that all luminaires are operational as designed, prior to acceptance. All pits and infrastructure shall be free of vermin and debris at the time of asset handover.
- 13.2 The Contractor shall supply the Principal a detailed list of Road Lighting Assets, including switchboards, poles, luminaires, smart cells, circuits etc, in accordance with RAMA-AM-PRC-005 Road & Marine Assets – Asset Data Collection Manual and in the format of Road Lighting EARLS Data Collection Template (KNet # 17074938).
- 13.3 As-constructed drawings shall be supplied as part of the asset handover documentation. These drawings shall be presented as a clean suite of drawings (without construction notes) showing all installed infrastructure as existing on the drawing and lighting details table.

## 14 Removal of Existing Poles and Footings

- 14.1 Where specified, the Contractor shall remove Department lighting poles and footings shown on the drawings. The Contractor shall provide 2 weeks' notice prior to removal. Unless otherwise specified, backfill of holes resulting from removal of existing footings shall be in accordance with Clause 4 "Trenching, Boring, and Backfill".
- 14.2 Unless otherwise specified by the Principal, ownership of the poles, footings and luminaries is vested in the Contractor, who shall remove them from the site.

## 15 Hold Points

- 15.1 The following is a summary of Hold Points referenced in this Part:

**Table RD-EL-C1 15-1 Hold Points**

Document Ref.	Hold Point	Response Time
2.2	Provision of the evidence of compliance with RD-EL-S1	5 Working Days
3.7	Prior to pouring concrete footing	3 Working Days
5.6	Calibration certificate for the torque wrench.	5 Working Days
6.3	Provision of the approval and evidence of training prior to working near overhead poles	3 Working Days

## 16 Verification Requirements and Records

16.1 The following is a summary of records to be supplied by the Contractor to demonstrate compliance with this Part:

**Table RD-EL-C1 16-1 Verification Requirements**

Document Ref.	Record
5.7	Holding Down Bolt Tension Verification Certificate
6.4	Certificates of Compliance of all Electrical Work
7.1	SA Power Networks Connection Test and Certificates of Compliance
13.2	Road lighting asset data to be recorded in accordance with EARLS Data Collection Template
PC-SI1 "Site Surveys"	Position Verification Certificate

## 17 Appendix 1: Street Lighting Pole Assembly Instructions

- 17.1 The outreach is attached to the column by means of a forced tapered fit. Carrying out the following procedure will achieve an effective joint.
  - 17.2 Place column and outreach on timber bearers.
  - 17.3 Check that joint area of both sections is clean and undamaged.
  - 17.4 All columns have top OD of 100 mm and nominal lap joint length of 300 mm. Mark the minimum overlap length slightly under at approximately 250 mm.
  - 17.5 Line up the top and bottom section so that the base plate, the door and the outreach arm are in the correct relationship.
  - 17.6 To achieve the specified overlap a pulling force of up to 1.5 tonne shall be applied. During assembly, the joint area may be vibrated by tapping with a mallet, or length of wood.
  - 17.7 The force can be applied in a variety of ways, depending on the equipment available. The following methods have been found satisfactory:
    - a) With columns having mounting height of 7.5 m, or greater, a "Tirfor" Model T7 winch can be placed in the door opening and the wire rope secured at the top and bottom openings of the outreach and column.
    - b) A winch can be supported against the column base and the rope passed up through the column, secured at the tip of the outreach.
    - c) A hydraulic puller/press with the appropriate pole clamps can also be used.
  - 17.8 Ensure that the correct rotational orientation is maintained as the sections are forced together.
  - 17.9 After assembly, the joint shall be snug and the top section shall cover the minimum overlap mark.
  - 17.10 Any damage to the poles (e.g. to galvanising) shall be repaired in accordance with RD-EL-S1 "Supply of Lighting Components".
-