



## CS8 – Streetlighting

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## **CS8 Streetlighting**

### **8.1 Scope**

This section sets out the requirements for the installation of streetlighting systems in new development areas and for upgrading of lighting systems in existing roads. It covers the installation of underground cables but does not cover the connection of the cables to the supply system or the switching and controls mechanisms.

Streetlights shall be maintained throughout the maintenance period. Maintenance shall include but not be limited to sound engineering practices.

Evidence of a regular maintenance contract, including contact details shall be submitted for Council approval prior to the consideration by Council of the release of either the s224 certificate or certificate of practical completion.

### **8.2 Definitions**

Definitions are set out in Section 1 of the Development Code: Design, unless otherwise described.

### **8.3 Related Documents**

The following Drawings and other documents form part of this contract Document as listed:

Design Standard DS8:	Streetlighting
Drawing Number: .....	Name: .....
Construction Standard CS8:	Streetlighting

### **8.4 Materials**

Materials shall be as listed in the appropriate section of the Development Code: Construction, or as defined in this document.

Materials shall be as specified within this document, unless otherwise specifically agreed with Council.



## 8.5 Specifications, Regulations & Codes of Practice

The work shall be undertaken in compliance with all statutory requirements including but not limited to the following:

- a. Relevant Statutory Acts, Regulations and Bylaws.
- b. Health & Safety in Employment Act 1992 and associated regulations.
- c. Electricity Regulations 1997 & handbook to the electricity regulations.
- d. The Electricity Act 1992.
- e. Electrical codes of practice.
- f. New Zealand Radio Interference Regulations and Interference Notices.
- g. Ministry of Health Code of Practice for the Safe Management of PCBs
- h. Code requirements regarding 'Road Opening Notices'

## 8.6 Safety

All work must be carried out in accordance with the NZ Electrical Regulations.

All personnel working on road lighting equipment shall either be registered personnel or be covered by an Employer license as defined in the Electricity Act 1992 and have current competency and safety tuition as defined in the Electricity Regulations 1997.

Applications for electricity shutdowns will only be supported where the work is otherwise unsafe or not technically feasible. If shutdowns are necessary, the network owner requires at least 7 days prior notice.

## 8.7 Trenching, Backfilling and Reinstatement

### 8.7.1 Trenching

Refer to Section 12.

In existing streets, all crossings under carriageways, footpaths and vehicle entrances shall be carried out by thrusting in order to minimise the disruption to the public and damage to the pavement / seal. Unless agreed otherwise with Council, an orange coloured high-impact PVC duct is to be installed for all crossings under paved areas.

Cable routes are to be, parallel to and within 800mm of the road boundary line unless obstructions make this impracticable, in which case consent for an alteration must be obtained from the authorising officer. In new streets the location of the cables shall be as detailed in the Drawings in this Code of the standard technical specifications. The cable route shall continue from the source of supply to immediately opposite the lighting standard and shall then cross at right-angles to the boundary to the column or pole.



Where trenching is required, cables shall be laid with a minimum cover of 600mm and bedded in clean material free of sharp objects. A PVC cable warning marker strip shall be laid along the whole length of the cable in accordance with the Drawings.

Trenches near to walls or embankments shall be not deeper than a line projected at 45° downwards from the bottom of the wall or foundation until the minimum cover of 600mm is achieved. This is necessary to avoid damage to the structure by movement of the ground caused by the trench excavation.

### 8.7.2 Backfilling

Where the trench is in a carriageway or paved area it shall be backfilled as soon as possible after laying and inspection by the Engineer/Authorised officer. The trench shall be compacted to match the bearing strength of the existing natural ground in the immediate vicinity.

In areas other than carriageway, backfilling is to be carried out in layers not exceeding 300mm and compacted with a plate compactor using suitable excavated material.

The minimum level of compaction is 3 passes of the plate compactor over each of the 300mm thick layers and a further 2 passes over the top after topping up the trench.

If the excavated material is unsuitable to be used and compacted as backfill then it shall be removed from the site and replaced with suitable imported material.

The Engineer/Authorised officer may carry out random penetrometer tests to ensure that the required compaction is being or has been achieved. Any settlement that becomes visible during the maintenance period will render the backfilling not acceptable and reworking will be required.

### 8.7.3 Column Installation

Embedment depths for ground-planted columns shall comply with the manufacturer's recommendations, section 6.0 of AS/NZS 4676:2000 and TNZ M/19:1994. A tolerance of  $\pm 50$ mm in embedment depth is allowable. Columns shall be installed so that centreline of the columns is vertical within  $\pm 0.5^\circ$  and the outreach arm is perpendicular to the road. The column shall be oriented so that safe and convenient access to the gear access opening is available. Column foundation excavations shall be backfilled with suitable material either as excavated or imported and compacted in layers not exceeding 300mm.

Concrete backfill is not to be used unless wind stability cannot be achieved by rammed earth backfill and specifically approved by the Engineer/Authorised officer. If concrete backfill is used a cable duct must be provided to allow cabling to enter the column base. The duct shall be of sufficient diameter to allow for an additional cable.



## 8.7.4 Restoration and Reinstatement

Reinstatement work shall proceed during the execution of the works and within 2 days of backfilling the trench. Restoration shall be carried out to the satisfaction of the Engineer/Authorised officer and to a standard the same, or better, than the existing ground prior to trenching. All surplus material shall be removed from the site.

Pavement shall be reinstated as described in the appropriate section of the Development Code.

Restoration of any damage to footpaths, kerbing and channelling, driveways and fences during the course of the work shall be made good by the Contractor at the Contractor's expense and to the satisfaction of the Engineer/Authorised officer. Berms and grassed areas disturbed during the course of the work shall be re-sown to the satisfaction of the Engineer/Authorised officer. The finished surface shall be levelled true to grade and crossfall to match the surrounding ground level, cleared of all stones and debris and dressed with a 75mm layer of clean topsoil, cultivated and sown with an approved seed mixture.

Any shrinkage of the fillings in trenches shall be made up by the Contractor so that at the end of the maintenance period all surfaces shall be fully up to the level of the surrounding road or ground to the satisfaction of the Engineer/Authorised Officer.

All private properties and roadways affected by the works shall be restored within 2 days of the backfilling. The Contractor shall notify the Engineer/Authorised officer when the reinstatement is completed. The Engineer/Authorised officer will then inspect the work, preferably with the Contractor, and will supply a list of further work that may be required. Any settlement or deterioration that occurs during the maintenance period shall be put right by the Contractor at their cost.

## 8.8 Cables and Jointing

### 8.8.1 Cable Location and Installation

Underground cabling shall be provided to all streetlighting columns except for lights that are specified to be installed on existing power poles and supplied by overhead lines.

All column installations shall be provided with approved internal termination junction boxes for terminating the lighting circuits. These are to be located at the gear openings of each column. Underground jointing will not be permitted.



## 8.8.2 Termination, Joints and Connections for Underground Cables

For underground cables the following jointing types are used:

In-line joints at 11kV and 33kV

Heat-shrink polymeric

For terminations at 11kV and 33kV

Heat-shrink polymeric and cold shrink for single core 25mm 11kV terminations. Note that only Raychem brand terminations with shrink or re-entenable roll-on boots are approved for use with ABB SD switch units.

In-line joints 400V

Heat-shrink polymeric "Endless" rubber sleeve with mastic.

Tap-offs 400V

Resin-filled joint box normally (only in retro-fit situations where 400V reticulation is already in place).

Cap joint compression in above ground connection box.

For all the above joints and terminations except for the 400V resin-filled box, the conductor is joined or lugged using compression techniques.

The 400V tap-offs from multi-core cable make use of a three-phase plus neutral insulation piercing connector and the resin-filled box noted above.

Where aluminium cable is to be terminated onto an overhead line, an in-line compression joint shall be made using a connector blanked off in the centre to prevent ingress of moisture into the cable by capillary action.

Bi-metal connectors and lugs shall be used where appropriate.

Underground connections to neutral screen cables are not permitted.

For more information refer to UND 006: Jointing of overhead and underground cable.

## 8.8.3 Low Voltage Cables

The following table lists low voltage cables to be used for new distribution lines.



Cores & Size (mm <sup>2</sup> )	Conductor		Insulation and Sheath	Rating (A)		Application
	Material	Stranding (mm)		Buried Direct	Single way in ducts	
4 x 185	Al	37/2.52	XLPE/PVC	350	295	Distribution line & transformer looms
4 x 120	Al	37/2.03	XLPE/PVC	275	230	Distribution line & transformer looms
4 x 95	Al	19/2.52	XLPE/PVC	240	200	Distribution Line
4 x 70	Al	19/2.14	XLPE/PVC	200	165	Distribution Line
4 x 70	Cu	19/2.14	XLPE/PVC	250	215	Distribution line tee-off to customer
1 x 16NS or 1 x 10NS	Cu	7/1.04	PVC/PVC	74	74	<b>Street Lighting</b>
1 x 4	Cu	7/0.85	PVC/PVC			HW pilot

#### 8.8.4 As-built Records

The logging of cable locations and recording of information shall be as required by the local electricity network utility company as set out in their Contract Works Manual. The recording of locational and other information about the lighting column and luminaire shall be as required by Council and as set out in the as-built section of this Code.

#### 8.8.5 Wiring Columns

Any work undertaken on the streetlighting electrical system is to be undertaken by an approved Powerco Contractor.

The equipment tray on the lighting columns shall be wired in accordance with the drawings. HRC fuse holders only shall be used. In areas where the mains cables are not looped in and out of the column it shall be permissible to terminate the phase conductor directly into the fuse-holder. Crimp or compression lugs shall be used on all bolted terminations. Earth studs, washers and nuts shall be made of brass. Dropper cables from the luminaires shall be copper twin and earth TPS with a minimum cross-sectional area of 1.5m<sup>2</sup>.

All cables connecting to a column shall be looped into the column using an approved connector. "T"-jointing below ground shall not be permitted unless specific approval is given by the local electricity network utility company.



The fuses shall be appropriate to the wattage of the lamp and the incoming supply must go to the top of the fuse.

The screen of the "Neutral Screen" cable is to be sleeved at each end.

All cables from the column are to be terminated into a gyro-box, not into the existing underground pilot lines.

Where a column is to be cabled to an overhead circuit pole the cable is to be installed in high impact PVC conduit secured up the pole with stainless steel bandit strap to the level of the 400V cross-arm. The cable-tails are to be terminated into the fuse supplied and fitted by the Contractor at the 400V cross-arm. All exposed PVC conduit is to be coloured grey.

### **8.8.6 Wiring of Luminaires Attached to Existing Poles**

Cables from each individual luminaire shall be connected via a fuse to the overhead wire. This becomes the isolation point for maintenance contract works. The contractor shall install the cable from the luminaire to the fuse holder and the fuse holder itself. The Contractor shall note the requirement for any work on the electrical system to be carried out by the local electricity network utility company.

### **8.8.7 Earthing**

All columns shall be adequately earthed. Concrete columns shall have all exposed metal work earthed onto a separately driven earth spike with an earth resistance no greater than 10ohms. Steel or metal columns need not be separately earthed if the earth resistance of the standard itself is less than 10ohms. All metal-work shall be bonded together and to earth.

- i. Continuity shall be ensured between the cable and the equipment earth by continuity bonding.
- ii. All cable bends shall be followed by a minimum of 50mm of straight cable before the cable enters a gland.

### **8.8.8 Tests**

The Contractor shall be responsible for ensuring the electrical integrity and safety of the installation and shall arrange all the tests necessary prior to enlivening the installation. The Contractor shall measure the earth resistance of each lighting column and record each test result for the Engineer/Authorised officer to inspect. The insulation value between phase-neutral and earth shall be tested. If the earth test yields a result of greater than 10ohms then a separate earth electrode shall be installed to bring the test down to below 10ohms. Other methods for improving the earth resistance may be used subject to prior approval by the Engineer/Authorised Officer.





The Engineer/Authorised officer may request to witness any or all such tests. The Contractor shall advise the Engineer/Authorised Officer at least 24 hours prior to the tests to enable such attendance.

### **8.8.9 Outreach Brackets**

Streetlight outreach brackets shall be constructed as detailed on the Drawings. Brackets are to be manufactured with steel and hot-dip galvanised. Alternative bracket materials may be used subject to approval from the Engineer/Authorised Officer.

The bracket backing-plate shall be attached by using the 4-bolt clamp system which has been designed to accommodate the older-style concrete poles with no holes provided for bolting. All brackets are to be bolted top and bottom of the plate. The bolts shall be 12mm diameter minimum.

Stainless steel strapping will not be accepted.

### **8.8.10 Removed Items**

Where specified on the construction drawings and/or included in the Schedule of quantities the costs for relocating or reusing existing salvaged components are covered by the rates in the schedule.

All surplus columns, outreach brackets and luminaires made redundant shall be disposed of by the Contractor.

### **8.8.11 Stockpiling Streetlight Poles**

Where required in the contract streetlight columns shall be removed from the site and transported to the Council stockpile area – at Te Maunga for Tauranga City Council or, for Western Bay of Plenty District Council, at the site nominated. Access to the yard to stockpile the columns may be obtained through the Engineer/Authorised officer.