# Part 11: Lighting

## Contents



## Tables

# 11.1 Referenced Documents

## Planning and Policy

- Electricity Act (1992)
- Electricity (Safety) Regulations (2010)
- Radiocommunications Regulations (2001)

## Design

- *Christchurch Central Streets and Spaces Design Guide* www.otakaroltd.co.nz/assets/BalanceOfLand/streets-and-spaces-technical-guide-dec-2015-full-document.pdf
- Orion NW72.21.01 *Conditions for Connecting Equipment to Orion's Lighting Network*
- New Zealand Transport Agency *M30 Specification and Guidelines for Road Lighting Design* www.nzta.govt.nz/resources/specification-and-guidelines-for-road-lighting-design
- New Zealand Transport Agency M26: 2012 *Specification for Lighting Columns* www.nzta.govt.nz/resources/lighting-columns
- AS/NZS 1158 Set *Lighting for roads and public spaces - series*
- AS/NZS 3000: 2018 Electrical Installations AS/NZS CISPR 15:2011 *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*
- EngNZ Practice Note 02 *Peer Review – Reviewing the work of another engineer* www.engineeringnz.org/resources/practice-notes-and-guidelines

## Construction

- Christchurch City Council *Civil Engineering Construction Standard Specifications Parts 1-7* (*CSS*) www.ccc.govt.nz/consents-and-licences/construction-requirements/construction-standard-specifications/download-the-css/

Where a conflict exists between any Standard and the specific requirements outlined in the Infrastructure Design Standard (IDS), the IDS takes preference (at the discretion of the Council).

# 11.2 Introduction

This Part explains the Council's lighting design requirements where the lighting is (or will be) managed by the Council and connected to the Electricity Distribution Asset Owner street lighting network.

It covers lighting design requirements for both privately funded developments and Council funded new installations or upgrading of existing installations.

# 11.3 Quality Assurance Requirements and Records

Provide quality assurance records that comply with the requirements in Part 3: Quality Assurance and the *Construction Standard Specifications (CSS)*, during design and throughout construction.

## 11.3.1 Project brief

The Council must provide or agree to the lighting requirements for a project before any detailed design is undertaken. These lighting requirements will be specified in a project brief or, for developer-funded projects, in the Council's consent conditions. The project brief does not require updating within 12 months of design.

## 11.3.2 The designer

The designer must be suitably qualified and experienced and have an excellent track record in road lighting design. Refer to NZTA M30 *Specification and Guidelines for Road Lighting Design* and clause 2.7.1 – Investigation and design (General Requirements) for further information. The designer must ensure the lighting scheme meets the requirements of the IDS and the CSS.

Where the role of the engineer for the lighting component of the project's construction is being undertaken by another party apart from the designer, provide the company and individual's name, qualifications and contact details in the Design Report.

## 11.3.3 Design peer reviewer

Where a peer review is required as a condition of consent, peer review the design in accordance with *Peer Review – Reviewing the work of another engineer*.

## 11.3.4 Design records

Provide the following information in addition to that required by NZTA M30 *Specification and Guidelines for Road Lighting Design*, to support the Design Report defined in clause 3.3.2 - Design Report (Quality Records).

- A comparative whole of life cost analysis between the options considered;
- Records of any non-compliant design elements and any departures from the design spacing that have been used in the design process in the form required in clause 3.7.1 - Control of non-conforming work;
- A safety audit complying with clause 8.4.2 - Safety audit.

## 11.3.5 Engineering drawings

Provide drawings complying with clause 2.9 - Drawings and NZTA M30 *Specification and Guidelines for Road Lighting Design*.

In addition to Appendix I - Standard Draughting Layout and Format Requirements of Part 2: General Requirements, clause 8 - Title blocks, include:

a) The peer reviewer's name and signature (where a reviewer was specified)

b) An amendment box providing for a brief description of each amendment and sign off by the designer and peer reviewer.

### 11.3.6 Acceptance of design

Submit the Design Report for acceptance under clause 2.10.3 - Engineering acceptance, including the Lighting Design Statement (LDS1) - Design (refer NZTA M30 *Specification and Guidelines for Road Lighting Design*). Supply the lighting related documents as one package along with ALL other disciplines in the project's Design Report.

Where materials are not ordered within 12 months of the completed design's date of acceptance by Council, the acceptance is revoked.

### 11.3.7 Engineer's Report

Provide an Engineer's Report, including the Engineer's Completion Certificate for the lighting work. Include those documents required in clause 11.6 – Completion Procedures and Certification, and documentation to prove compliance with clause 3.3.4 – Engineers report (Quality Assurance). Provide audit and test records to confirm that the design has been implemented in its entirety, including records generated at hold or witness points. Where non-conformances have occurred, provide non-conformance reports in accordance with clause 3.7 – Non-Conformance and Quality Improvement (Quality Assurance).

The engineer must be suitably qualified and experienced and have an excellent track record in road lighting construction. The engineer may also be the designer but cannot be the contractor. The engineer must:

- ensure the lighting installation meets the requirements of the IDS and the *CSS*;
- manage the lighting construction to its conclusion, including regular site supervision;
- resolve any complaints to the satisfaction of the Council, prior to 224(c) certification;
- sign-off the project at completion.

## 11.4 Lighting Design

The lighting design must maximise safety and efficiency while minimising the life cycle cost and impact on the environment.

Design the lighting to blend in with adjacent street lighting, complement the neighbourhood character and, as far as is reasonably practicable, minimise the impact on the neighbouring properties and environment

with regard to aesthetics, glare and spill light. Appendix I – Lighting Categories explains how the different categories identified in AS/NZS 1158.1.1 and 1158.3.1 apply to the Council's roads.

Reticulate all 'greenfields' developments underground. In areas where the existing overhead network is for street lighting only, or where the Electricity Distribution Asset Owner network is underground, cable the power supply for the new lighting underground. The overhead network must not be extended.

The Electricity Distribution Asset Owner network usually determines whether the lighting will have an overhead or underground power supply. When lighting is being upgraded in an area where the Electricity Distribution Asset Owner network is overhead and is not part of an underground conversion project, use the Electricity Distribution Asset Owner poles to support the lights. Obtain the permission of the pole owner beforehand. This solution minimises the number of poles in that area.

This Part defines the minimum standards but it is important not to over-design and provide a standard of lighting higher than that required. Ensure that all parts of the lighting installation conform to the following:

- NZTA M30 *Specification and Guidelines for Road Lighting Design*
- AS/NZS 1158
- Electricity Distribution Asset Owner's requirements
- AS/NZS 3000.

Refer to *Streets and Spaces Design Guide* where designing lighting in the central city. Council requires lights to be located on columns due to issues securing electricity supply for building mounted lights.

### 11.4.1 Category P (local road and pedestrian area) lighting

The luminaires must be approved by Council. See Approved Materials list for street lighting, www.ccc.govt.nz/consents-and-licences/construction-requirements/approved-materials-list/streetlighting-materials.

Specify a minimum maintained illuminance for subcategory PR4 of 0.26 lux.

Specify mounting heights:

- between 6.0m and 7.5m in residential areas.
- between 7.0m and 9.0m in industrial areas.
- consistent along the street on each column type.

### 11.4.2 Category P (cycleways and pathways) lighting

The lighting category is usually Category PP3 or PP4.

Submit a non-conformance report where proposing the lighting of paths or cycleways that are not designated safe routes.

If the lights are located near trees, it may be appropriate for them to be mounted at a lower height, to illuminate underneath the tree canopy and avoid shadowing. In this case, a minimum mounting height of 4.5 metres may be accepted.

### 11.4.3 Pedestrian crossings

Design the lighting to comply with AS/NZS 1158.4 *Lighting for roads and public places - Lighting of Pedestrian Crossings*. The luminaires must meet the light technical parameters for New Zealand conditions detailed in AS/NZS1158.4, Table 3.5.

### 11.4.4 Intersections

Wherever an existing Category V road intersects with a new Category V road or an existing Category V road being upgraded, apply the requirements of AS/NZS 1158.1 *Road lighting - Vehicular traffic (Category V) lighting* to the intersection, even if the intersecting road is not lit to the appropriate Category V Standard.

Wherever an existing minor (Category P) road intersects with a new Category V road or an existing Category V road being upgraded, apply whichever of the following options provides the higher lighting standard:

> the requirements of AS/NZS 1158 for such intersections.

> the provision of a new light positioned in the side road near the intersection. (For an underground power installation the light shall be less than 10 metres away from the kerb line of the Category V road.)

The first light from an intersection on a Category P road shall be less than 10 metres away from the through road, measured from the kerb line. Where the lighting is attached to reticulation poles, this distance can be increased to 0.4 of the designed light spacing. The design light spacing requirements for the through road continue through the intersection.

### 11.4.5 Traffic management devices

Design lighting of traffic management devices to support the purpose of the device:

> Where the device is intended to regulate traffic, the lighting may need to be installed to a higher standard than normal road lighting. This will provide sufficient visibility to alert the drivers of the presence and speed constraint of the device.

> Where the device is intended to deter through traffic, the device may be identified by reflectors or by road lighting.

Ensure all lighting is designed to AS/NZS 1158 Set *Lighting for roads and public spaces – series*.

### 11.4.6 Column locations

If an adjacent property has not been developed (e.g. a new subdivision) and the column cannot be positioned in line with the common boundary, locate the column at least eight metres from the side boundary to allow for a future vehicle entrance. Position columns at least one metre away from a vehicle entrance or pedestrian kerb cutdown, including in traffic islands. Refer to NZTA M30 *Specification and Guidelines for Road Lighting Design* for guidance on locating columns.

Trees in a legal road or on Council land must be at least six metres away from lighting columns and more clearance may be necessary for some tree species or if the tree is protected. Consider the requirements for working near existing trees in *CSS: Part 1* clause 22.0 – Protection of Natural Assets and Habitats, when locating lighting columns.

Where retaining walls are being constructed in the likely area of column locations, consider incorporating column foundations into the walls.

Columns should not be installed in swales. This is because of the additional details for this installation type that are required to comply with AS/NZS 3000 and because of the use of geotextiles in swale construction.

Excluding columns located on the boundary, provide 0.5m clearance between the column face and the footpath edge. Where columns are in the footpath, ensure the path width is adjusted to compensate. Refer to clause 8.15.1- Footpaths (Roading) for footpath widths.

Specify frangible columns that comply with the requirements of NZTA M26 *Specification for Lighting Columns*. If non-frangible poles are being specified, clearly state this on the drawings.

### 11.4.7 Signs

Identify any signs that need to be altered, relocated onto lighting columns or onto their own posts. Locate these to comply with NZTA M30 *Specification and Guidelines for Road Lighting Design* and clause 8.11.5 - Permanent signs and markings (Roading).

### 11.4.8 Lighting equipment

NZTA M30 *Specification and Guidelines for Road Lighting Design* details the design life of lighting equipment. The design life for lighting columns shall be a minimum of 40 years.

Luminaires and control systems must comply with the requirements of AS/NZS CISPR15 with regard to electromagnetic compatibility. Non-compliance with this standard is an offence under the Radiocommunications Regulations 2001. All luminaires and columns must also comply with those listed on the Council's web page for approved materials at www.ccc.govt.nz/consents-and-licences/construction-requirements/approved-materials-list/streetlighting-materials.

Luminaires shall be LED and include a DALI 2 dimmable driver, 7 pin NEMA socket and Luminaire Controller (LC) programmed to work on the Council's Central Management System (CMS).

Individual lights can be dimmed via the CMS. Therefore a higher wattage light (approximately 20% higher) should be installed and dimmed to the designed wattage via the CMS. To ensure the lighting is correctly set up the CMS the luminaire wattage on the drawing shall show the luminaire wattage first followed by the dimmed wattage, e.g. 112W/D90W.

### 11.4.9 Backfill and bedding

Specify backfill materials individually. The material used must be capable of achieving the backfill compaction requirements set out in *CSS: Part 1* clause 32.0 Backfilling. Bedding materials

should comply with the Electricity Distribution Asset Owner requirements. Carry out trench restoration in accordance with *CSS: Part 1* clause 30.0 – Restoration and Final Surfacing.

## 11.5 Installation and Commissioning

Carry out installation and commissioning in accordance with *CSS: Part 5*. Prior to accepting any newly commissioned lighting installation onto Council's network, Council will audit the installation as detailed in clause 2.11 - Approval of construction.

The MAC ID and location of the Luminaire Controller shall be accurately captured when installed, failure to provide this information will prevent practical completion

## 11.6 Completion Procedures and Certification

At the completion of the physical works, and after receiving the lighting contractor's Completion Certificate, inspect the work and certify that:

- the project has met all the requirements of the project brief, the standards and specifications; and
- all the documentation detailed below has been completed, is correct and has been forwarded to the Council.

Provide the following documentation:

- Test Certificates for each lighting standard;
- Earth test sheets;
- Compliance Certificate for the complete installation;
- Electrical Safety Certificate (ESC);
- Record of Inspection (RoI);
- As-built drawings of Council owned cables, to Electricity Distribution Asset Owner requirements;
- As-built information in RAMM format (refer to Part 12: As-Built Records);
- Engineers Completion Certificate (refer to Appendix VII, Part 3: Quality Assurance);
- Lighting Design Statement (LDS4) - Construction Review and Audit (refer NZTA M30 *Specification and Guidelines for Road Lighting Design*);
- Contractor documentation required by the *CSS*;
- Luminaire Controller e.g. MAC ID.

At the end of the defects liability period, carry out an audit and certify that lighting columns are vertical and lights have been installed correctly and are at the correct mounting height in compliance with *CSS: Part 5*.

# APPENDIX I

## Lighting Categories

Table 1 Lighting categories

| Road classification | Other criteria | Traffic volume | Lighting category |
|---|---|---|---|
| **Urban** | | | |
| Arterial | Major shopping area with bright surroundings | > 20,000 | V1 |
| Arterial | | > 15,000 | V2 |
| Arterial | | 7,000 to 15,000 | V3 |
| Arterial | | 3,000 to 7,000 | V3 |
| Collector | | > 15,000 | V2 |
| Collector | | 7,000 to 15,000 | V3 |
| Collector | | 3,000 to 7,000 | V4 |
| Collector | | 1,000 to 3,000 | PR4 |
| Local | | | PR4 |
| **Rural** | | | |
| Arterial | | > 15,000 | V3 |
| Arterial | | 7,000 to 15,000 | V3 |
| Arterial | | 3,000 to 7,000 | V4 |
| Collector | | > 15,000 | V3 |
| Collector | | 7,000 to 15,000 | V4 |
| Collector | | 3,000 to 7,000 | V4 |
| Local | Footpath and/or on road cycle lanes | | PR4 |
| Local | | | PR5 |

Note

1) This table is intended to be a guide only.

2) Some rural roads may not require lighting.

3 ) PR4 and PR5 lighting categories must comply with clause 11.4.4 – Category P (local road and pedestrian area) lighting.