WAIMAKARIRI
DISTRICT COUNCIL

ENGINEERING CODE OF PRACTICE

PART ELEVEN

LIGHTING

April 2009

Part 11: Lighting

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11.1 INTRODUCTION

This Part explains the Council's lighting design requirements for roads, service lanes, cycleways, footpaths through reserves and other pedestrian accessways where the lighting is (or will be) managed by the Council and connected to the electricity operator's street lighting network.

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

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11.2 CONSENT AND COMPLIANCE ISSUES

The consent and compliance information set out in Part 2: *General Requirements* applies to all works within the Waimakariri District, with the addition of the clauses below.

11.2.1 Legislation

The Electricity Act 1992 and amendments is the principal statute that controls the provision of electricity. The Electricity Regulations 1997 and amendments, and the Electrical Code of Practice shall also be complied with at all times.

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11.3 QUALITY ASSURANCE REQUIREMENTS AND RECORDS

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

11.3.1 The Designer

The designer must be suitably qualified and experienced and have an excellent track record in road lighting design. The designer must:

- Be conversant with Australian/New Zealand Standards and Practices concerning lighting design for public outdoor areas;
- Undertake the complete lighting design, including preparing estimates, tender documents and drawings, assisting with tender evaluation;
- Provide a Design Report in accordance with CoP Part 3 clause 3.3.1 – *Design Report*, including all documentation;
- Notify all adjacent residents of the proposed lighting work and pole locations before the start of the physical work;
- Ensure the lighting installation meets the requirements of the CoP 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.

11.3.2 Design Records

Provide the following information as a minimum, to support the engineering drawings and Design Report, and for engineering acceptance before tendering. For “Design Build” projects, supply this information with the tender, along with a programme for implementing the design and the physical works.

- Records of any non-compliant design elements and any departures from the design spacing that have been used in the design process (e.g. AS/ NZS 1158.1.1 clause 3.4.3.4 - Conflict points at intersections) on a Nonconformance Report;
- A completed Lighting Specification Form (see QP-C820-AB, attached as Appendix B);
- The complete computer analysis information required by AS/NZS 1158;
- Intensity distribution tables (in North American IES or CIE format as requested) if required;
- The name and source of the computer programme used, and a statement of its compliance or otherwise with the requirements of AS/NZS 1158;
- Details of the design method used and the values of the light technical parameters obtained, for each of the road elements involved, compared to the limiting values given in AS/NZS 1158;
- The origin of the photometric data for the luminaires and lamps;
- Details of the road surface reflection characteristics assumed in the luminance based design calculations; Justification for the maintenance factor used in the calculations and the associated schedule of maintenance to be adopted, e.g. the luminaire cleaning and lamp replacement intervals;
- A cross-section drawing showing the proposed type of pole, arm and luminaire.

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11.3.3 Engineering Drawings

Show on the engineering drawings:

- The existing and proposed electrical load of the street lighting circuits;
- The lighting design details including: lighting standard and category that the scheme has been designed to meet, mounting height, upcast, maximum spacing and any non-complying portions or exceptions;
- A lighting schedule.

Provide a schedule detailing the work required for each light, including:

- Light manufacturer, model and optic used;
- Lamp manufacturer, type and wattage;
- Outreach arm code, outreach and upcast angle;
- Pole manufacturer and type;
- Mounting height;
- Offset;
- Any other equipment or work required to ensure a complete installation.

Use the reference system and drawing symbols set out in QP-C811-AA – *Standard Draughting Layout and Format Requirements* (attached to CoP Part 2 as Appendix A) to identify the work location.

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11.4 LIGHTING DESIGN

11.4.1 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.

Any resource consent requirements are considered to be part of the project brief, which will also include details about the:

- Scope and location of the project;
- Purpose and objective of the lighting scheme;
- The Council Project Manager, for Council funded projects;
- Lighting category that applies to the project;
- Specific requirements (if any), such as: a particular type of pole or luminaire, restrictions on pole locations, special features of the proposed road layout or landscaping that may influence the lighting design, traffic management devices that require supplementary lighting;
- Designation of the road or area (strategic, arterial, collector, local road, pedestrian area, accessway).

11.4.2 General Requirements

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. Consider the crime prevention aspect of public lighting and incorporate this into the design. See the CPTED guidelines for more information.

The design must comply with all the appropriate New Zealand Standards, in particular the requirements of AS/NZS 1158. Anything not specified within this Part is specified in those standards.

Lighting on rural roads may not be required or necessary. Where lighting is required at a rural intersection, then only a full installation designed in accordance with AS/NZS 1158.1: 2005 shall be approved. The Council will not approve "Flag Lights" or isolated lights at intersections

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

The electricity operator's 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 operator's network is overhead and is not part of an underground conversion project, use the electricity operator's 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.

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11.4.3 Category V (Traffic Route) Lighting

Category V lighting should provide a lighted environment conducive to the safe and comfortable movement of vehicular and pedestrian traffic at night and the discouragement of illegal acts. The visual requirements of the motorist predominate.

Design the lighting to accord with AS/NZS 1158.1:2005 *Road lighting - Vehicular traffic (Category V) lighting*.

QP-C820-AA (attached as Appendix A) explains how the different categories identified in AS/NZS 1158.1.1 apply to the Council's roads.

11.4.4 Category P (Local Road and Pedestrian Area) Lighting

Category P lighting should assist pedestrians to orientate themselves and detect potential hazards, and discourage fear of crime and crime against the person.

Design the lighting to accord with AS/NZS 1158.3.1:2005 *Road lighting - Pedestrian area (Category P) lighting*. The luminaires must meet the requirements for type 4 luminaires detailed in AS 1158.3.1, Table 2.5.

The minimum maintained illuminance for Category P3 must be 0.35 lux, and the horizontal illuminance uniformity U_p (that is, the ratio of maximum horizontal illuminance to average horizontal illuminance within a defined area) shall be less than or equal to 8:1.

To minimise the number of poles installed, apply the following:

Table 11.1 Minimum design spacings along local roads

Legal road width (m)	20	18	16	14	12
Minimum design spacing (m)	42	45	47	50	50

The last street light in a cul-de-sac head must be no more than 0.4 of the designed light spacing from the end of the cul-de-sac, when measured from the road boundary at the end of the cul-de-sac.

The minimum mounting heights are:

- 6.0m in residential areas.
- 7.0m in industrial areas.

11.4.5 Category P (Cycleways and Paths in Reserves) Lighting

Design the lighting to accord with AS/NZS 1158.3.1:2005 *Road lighting - Pedestrian area (Category P) lighting*. The lighting category is usually Category P3 or P4.

Luminaire types 3 or 4 can be used to control glare and the loss of waste light upwards (refer to AS/NZS 1158.3.1 Table 2.5).

The minimum mounting height is 5.5 metres and the maximum is 7.5 metres. However, if the lights are located near trees, it may be appropriate for the lights 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.

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11.4.6 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 1158.1:2005 *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.

The minimum lamp size would normally be 100 watt high-pressure sodium light. (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 must 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.

11.4.7 Traffic Management Devices

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

- Where the device is intended to slow 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 at a similar level to the normal road lighting.

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

11.4.8 Pole Locations

Ideally, lighting poles should be positioned in line with the common boundary between properties; however, these locations do not always coincide with the spacing requirements of the lighting design. If an adjacent property has not been developed (e.g. a new subdivision) and the pole cannot be positioned in line with the common boundary, locate the pole at least five metres from the boundary to allow for a future vehicle entrance.

Position poles at least one metre away from a vehicle entrance or kerb cutdown. Keep poles clear of any tree canopies in the street or in adjacent properties. Trees in a legal road or on Council land must be at least six metres away from lighting poles 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 CCC *CSS: Part 1*, when locating lighting poles.

Where possible, poles should be located close to reserves and other open spaces to provide light in these areas and improve safety.

A staggered layout is preferred for road lighting installations, when practicable and economical. Consider traffic safety when placing lighting poles, especially when they are on or near bends, intersections, threshold treatments, road humps and roundabouts.

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11.4.9 Site Requirements

Poles are normally ground planted. When ground planting is not practicable, a special foundation is required. Provide a Producer Statement for this when applying for engineering acceptance.

If the road is at a different level to the area where the pole is being planted, specify pole lengths to achieve the correct mounting height, so ensuring the installed lighting complies with the design requirements. For each light type the mounting height must be uniform and consistent.

Where the longitudinal grade may exceed 1 in 6, the crossfall of a road may exceed 6% or the poles cannot be easily serviced from a cherry picker, discuss alternative pole types with the Council.

11.4.10 Pole Setback from Road or Path

For traffic safety reasons, position rigid Category V poles to comply with CoP Part 8 clause 8.12.10 – *Clear Zones*. This is generally achieved by locating the pole on the property boundary. Wherever the required setback cannot be achieved, it may be necessary to locate the pole closer to the kerb. In such instances, use frangible poles and locate the poles to comply with AS/NZS 1158.1.3:1997 Appendix B.

Rigid Category P poles in urban areas should also be positioned to comply with clause 8.15.11 where possible. Where these setbacks are not achieved, provide frangible poles, positioned to comply with Table 11.2 or discuss alternative options with the Council early in the design process.

Table 11.2 Clearance to support, traffic speed 70km/hr or less

Kerbed road	Un-kerbed road
0.7m behind kerb, increasing to 1.0m at tee intersections and on curves	3.0m from shoulder

Where installing a pole against the building line, ensure that it is installed on the legal road or on Council land, and not on private property. The Council will not accept responsibility for maintenance of any street lighting installed on private property, including right-of-ways.

11.4.11 Signs

Identify any signs that need to be altered, relocated onto lighting poles or onto their own posts. Locate these to comply with CoP clause 8.8.5 – *Traffic Control Signage*.

11.4.12 Lighting Equipment

The design lifetime of equipment is shown in Table 11.3.

Table 11.3 Expected lifetime of equipment

Component	Design life
Poles (concrete and steel)	40 years
Outreach arms	40 years
Luminaires	20 years
Lamps	20,000 hours
Painted / powdercoated surfaces	10 years

The luminaires, poles and outreach arms that are used in new installations should be compatible with adjacent lighting and, where practicable, visually match.

For efficient maintenance, the types of lighting equipment used are usually limited to those already in the lighting network.. The use of new equipment requires approval from the Council.

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Provide information about the poles, outreach arms, luminaires and lamps used in an installation on the Lighting Specification Form (Appendix B) and the Lighting Equipment List (QP-C820-AC, attached as Appendix C).

A permanently marked, unique identification number shall be applied to every light pole or column, fitted before or during street lighting commissioning. This number shall accord with the Council's numbering system.

11.4.13 Backfill and Bedding

Specify backfill materials individually. The material used must be capable of achieving the backfill compaction requirements set out in CCC *CSS: Part 1*. Bedding materials should comply with the electricity operator's requirements. Carry out trench restoration in accordance with *CSS: Part 1*.

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11.5 ELECTRICAL STANDARDS AND REQUIREMENTS

Ensure that all parts of the lighting installation conform to the following:

- All of the electricity operator's requirements for connection, supply and installation of cables, and attachment of lighting equipment to their poles;
- Mainpower *Network Connection Standards*
- The Electricity Act (1992), Electricity Regulations (1993) and approved Codes of Practice issued by the Minister.
- Part 8: *Roading*, Part 9: *Utilities* and Part 10:*Reserves, Streetscapes and Open Spaces* of the Code of Practice

Frangible and slip-base type lighting poles and columns shall be designed not to become 'live' during or after shear failure resulting from vehicle impact. In this event a mechanism shall be incorporated into the pole or column to safely break the power supply.

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11.6 INSTALLATION AND COMMISSIONING

Carry out installation and commissioning in accordance with CCC *CSS: Part 5*.

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11.7 COMPLETION PROCEDURES AND CERTIFICATION

At the completion of the physical works, check and then certify that:

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

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

Provide the following documentation:

- Test Certificates for each lighting standard;
- Compliance Certificate for the complete installation;
- As-built information in RAMM (SLIM) format (refer to CoP Part 12: *As-Builts*);
- Lighting Specification Form (refer to Appendix B);
- Lighting Equipment List (refer to Appendix C);
- Lighting Completion Form (refer to QP-C820-AD, attached as Appendix D);
- Contractor documentation required by the CCC *CSS*.

Update the Lighting Specification Form and Lighting Equipment List with any approved changes that have occurred.

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11.8 ASSOCIATED DOCUMENTS

Appendix A Lighting Categories (QP-C820-AA)

Appendix B Lighting Specification Form (QP-C820-AB)

Appendix C Lighting Equipment List (QP-C820-AC)

Appendix D Lighting Completion Form (QP-C820-AD)

Lighting Categories

Note that this table is intended to be a guide only, and the category required will be detailed in the project brief or in the Council conditions for the project.

Many rural roads will not require lighting.

Road classification		Other criteria	Traffic volume	Lighting Category
Urban	Strategic / Arterial	Major shopping area with bright surroundings	> 20,000	V1
	Strategic / Arterial		> 15,000	V2
	Strategic / Arterial		7,000 to 15,000	V3
	Strategic / Arterial		< 7,000	V3
	Collector		> 15,000	V2
	Collector		7,000 to 15,000	V3
	Collector		3,000 to 7,000	V4
	Collector		<3,000	P3
	Local			P3
Rural	Strategic / Arterial		> 15,000	V3
	Strategic / Arterial		7,000 to 15,000	V3
	Strategic / 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		P3
	Local			P4

Lighting Specification Form

Road lighting works at _____

Plan Number _____ Date _____ Sheets _____

Design Standard – AS/NZS 1158 Category: _____

Signed _____ Date _____

LIGHT TYPE A

Pole: Type _____ ☐ Ground Planted ☐ Flange Base
Colour _____ Offset _____ Kerb/Boundary _____

Arm: Type _____ Outreach _____ Tilt _____
Colour _____

Luminaire: Type _____ Optics _____ Mounting Height _____
Colour _____

Lamp: Type _____ Watts _____ Flux _____
☐ Tubular ☐ Elliptical

LIGHT TYPE B

Pole: Type _____ ☐ Ground Planted ☐ Flange Base
Colour _____ Offset _____ Kerb/Boundary _____

Arm: Type _____ Outreach _____ Tilt _____
Colour _____

Luminaire: Type _____ Optics _____ Mounting Height _____
Colour _____

Lamp: Type _____ Watts _____ Flux _____
☐ Tubular ☐ Elliptical

Lighting Equipment List

Lighting Project _____

Contractor _____

Signed _____ Date _____

Designer _____

Signed _____ Date _____

Description	Manufacturer	Model	Compliance Certificate	Country of Origin
Pole				
Arm				
Luminaire				
Lamp				
Ignitor				
Ballast				
Other				

Lighting Completion Form

To: _____ (WDC Project Manager)

_____ (WDC Department)

Waimakariri District Council
Private Bag 1005
Rangiora 7440

From: _____ (Designer's Name)

_____ (Designer's Address)

_____

Lighting works at: _____ (Location)

The above project has been completed by: _____ (Contractor's Name)

All work has been carried out in accordance with the Waimakariri District Council's Engineering Code of Practice and the CCC Construction Standard Specifications and the brief/requirements for this project

All the tests were successfully completed and the lights were livened on: _____ (Date)

The maintenance period commences from this date.

The following documentation is enclosed:

- ☐ Test Certificate for each Lighting Standard
- ☐ Certificate of Compliance for the complete installation
- ☐ As-Built Information
- ☐ Lighting Specification Form
- ☐ Lighting Equipment List

_____ (Signature)

_____ (Print Name)

_____ (Date)