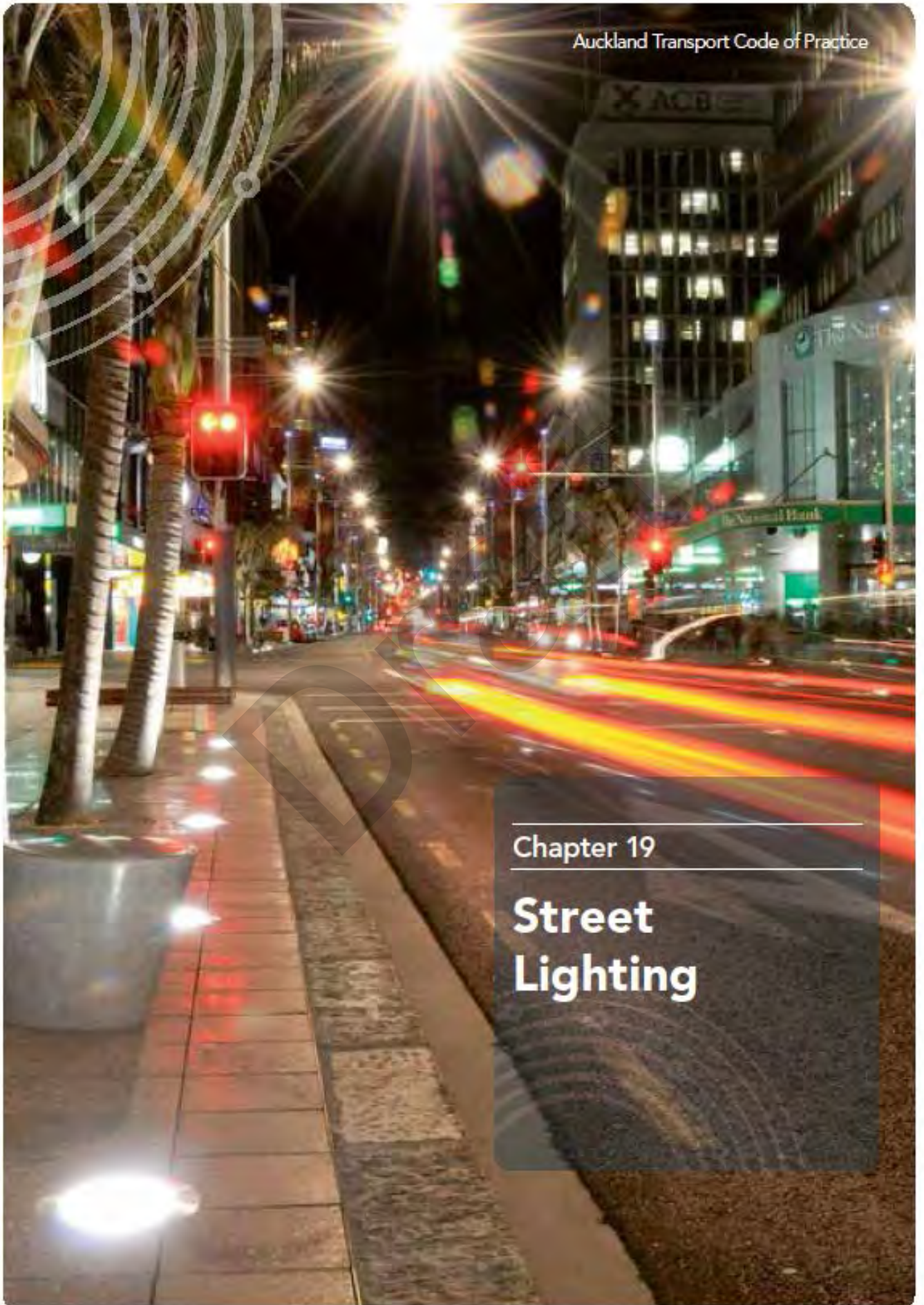


Chapter 19

**Street  
Lighting**



# 19 Street Lighting

## 19.1 Introduction

**Purpose** This document provides a guide to everyone involved in the management and design of public lighting installations on Auckland Transport routes or associated infrastructure. Its application will ensure that consistent standards are maintained.

**Differences from standards** Where clauses in this chapter differ from the standards referred to, this document takes precedence. See Section 19.9 for a list of differences.

**Updating** This document will be reviewed and updated from time to time. Please make sure you use the most up to date version.

**Scope** The scope of the document is outlined below.

Includes	Excludes
Outdoor car parks	Building facades
Pedestrian and cycle paths	Building interiors
Pedestrian crossings	Council parks
Public precincts, e.g. for shopping	Indoor car parks
Roads	Signs
Steps, stairs, ramps, subways and footbridges	Sports fields
Walkways & Access ways	Private Roads

**Principles of street lighting** Part of Auckland Transport's role is to ensure that the public lighting network is attractive, of good quality, easy to maintain, and cost effective. Public lighting is there to provide a safe environment for pedestrians and vehicles and to discourage illegal acts. At the same time, care must be taken to minimise spill light onto neighbouring properties and upward light (sky glow).

**Other consents** Note that lighting may require resource and building consents, unless it is street lighting in a designated public road.

**→ Read governing principles first** Before reading the rest of this chapter, please read the Asset Management Guidelines on street lighting. This is available [here](#).

## 19.2 Applicable standards

### Design standards

Street lighting must be designed in accordance with all applicable New Zealand standards, including the current version of AS/NZS 1158 *Lighting for Roads and Public Spaces*.

### Legal Frameworks & Regulatory

All works must be carried out in accordance with all relevant statutes, bylaws and regulations, e.g.:

- The Electricity Act 1992, Electricity Regulations 2010, the relevant Electrical Codes of Practice (ECP) referred to in this, and relevant standards referenced in ECP3.
- New Zealand Radio Interference Notices 1958 and 1985 and Radio (Television) Interference Notice 1961.
- Electrical Safety Act 1992.
- Electrical Safety Regulations 2010.
- Health and Safety Employment Act 1992.
- Health and Safety Amendment Act 2001 and regulations.
- Relevant Statutory Acts, Regulations and Bylaws.
- The requirements of Network Supplier's Health and Safety Standards (NHSS).
- AS/NZS3000 – *Australia/New Zealand Wiring Rules*.
- AS/NZS1158 – *Lighting for Roads and Public Spaces*.
- AS/NZS 7000 - 2010 *Overhead Line Design*.
- NZ Transport Agency Infrastructure Design Standard (IDS) M30:2014 *Specification and Guidelines for Road Lighting Design*.

## 19.3 Lighting design

### 19.3.1 Road Classification

Lighting requirements are largely determined by the road classification and sub-category. The road classification and sub-category are specified by Auckland Transport, and may change over time.

The AS/NZS 1158.1.1 and AS/NZS1158.3.1 standards should be used to determine the appropriate lighting classification and sub-category. To assist this process, use the V and P Category Calculator Tools in Appendix G.

The road classification and sub-category must be agreed by the Auckland Transport Team Leader Street Lights before the design process begins.

### Access ways

Access ways must be lit to the appropriate P category, as set out in the current version AS/NZS1158 3.1. Table 2.2 of that document defines the criteria for determining the lighting subcategory. Then use the Auckland Transport P Category Calculator Tool (Appendix G) to assist with the classification.

Where access ways are bordered by wooden fencing on the residential property boundary, light spill over these properties must be limited.

Luminaires must be pole top mounted to allow access from a ladder.

### Other spaces

Other spaces (e.g. public precincts, transport terminals) will be classified as per AS/NZS 1158 Part 3.1.

## Lighting design

The lighting design must comply with requirements set out in the *Auckland Transport Code of Practice* as well as the current version of:

- AS/NZS 1158 and all current parts.
- AS 4282 for control of the obtrusive effects of lighting.
- ECP34 Electrical Code of Practice.

## Checklist

The checklist below must be completed when submitting a proposed lighting design for approval.

<b>Lighting Design Submission Checklist</b>	
<b>1. Initial considerations</b> a. A holistic approach to the lighting design has been considered. b. A night site visit (where applicable) has been completed, identifying features such as CCTV cameras, trees and neighbouring properties.	<input type="checkbox"/> <input type="checkbox"/>
<b>2. Area classification</b> An appropriate lighting sub category classification has been agreed with Auckland Transport for all roads with the design scheme. The lighting classification/sub category for each road is:	<input type="checkbox"/>
<b>3. Light source</b> Define which light source has been utilised in the design – LED, ceramic metal halide or high pressure sodium. <i>Generally, a LED luminaire included in the Auckland Transport approved list must be used in all new designs, for both Category P and Category V roads.</i> The light source for each road is:	
<b>4. Luminaire selection</b> Only luminaires included on the Auckland Transport LED (Appendix F) road lighting specification approved lists are being used in the design scheme. <i>Alternative luminaires (including those in Appendix E) may be submitted for approval on a specific project, however these will have to be assessed against the standards in Appendix A and Appendix B and must be approved by Auckland Transport before design begins.</i>	<input type="checkbox"/>
<b>5. Lighting column</b> Only lighting columns on the Auckland Transport Lighting Column (Appendix D) Specification Approved List were used in the design. <i>Alternative lighting columns may be submitted for approval on a specific project. However, these will have to be assessed against the respective standards in Appendix C and must be approved by Auckland Transport before design begins.</i>	<input type="checkbox"/>
<b>6. Electrical considerations</b> Electrical reticulation has been specified (where applicable).	<input type="checkbox"/>
Prepared By:      Date:	
Checked by:      Date:	

### 19.3.2 Design criteria

- Maximise spacing** The lighting design must maximise the spacing between luminaire positions by optimising the mounting height, luminaire type and lamp output.
- Power vs. spacing** For category P3 and P4 roads, one of the primary objectives is to reduce the luminaire power to less than 28W per luminaire. Designs using luminaire power above 28W will only be considered if this yields significant gains in the spacing of lighting columns.
- Lighting spill** The lighting design must minimise glare and light spill onto neighbouring properties and environment. Designs must show horizontal isolines.
- AS/NZS 1158 *Lighting for Roads and Public Spaces* gives requirements on the obtrusive effects of public lighting. Further guidance is provided in AS 4282 *Control of the Obtrusive Effects of Lighting*.
- In addition:
- The maximum tilt for a luminaire must be 5° from the horizontal. Tilts of up to 10° from the horizontal may be used in exceptional cases, at Auckland Transport's discretion.
  - The threshold increment along the road must be no greater than 10%, with the pedestrian traffic lights as well as the adjacent street lights included in the calculation.
  - External screens may not be used.
- Luminous intensity** For new designs, Auckland Transport is currently assessing the luminous intensity at Gamma 80 with a view to limiting the light output to 400 cds. As part of the design submission, the luminous intensity must be considered and the Gamma 80 lumens stated.
- ### 19.3.3 Trees and road lighting luminaires
- Coordinate trees and planting** There is no simple single solution for roads or streets with existing trees. However, the placement of lighting columns should always be coordinated with the trees to provide an acceptable urban landscape.
- Existing trees** For mature tree-lined roads with trees on one side, poles should be on the opposite side. If there are trees on both sides, lighting columns on each side may be required, located midway between trees, with long outreach arms to reach out under the canopy. Pruning trees as part of the design is not recommended, as this would require ongoing maintenance.
- Lighting columns should be located at least 5m from the centre of any tree. Place street light columns where the tree root structure cannot interfere with underground cabling or other underground services, unless tree pits are used to confine the root structure.
- New subdivisions** In new subdivisions, lighting columns must be located first to provide the correct lighting levels in accordance with AS/NZS 1158 and this manual. Only then should trees be placed to create the future daytime aesthetics. Consider the potential impact of shadows from road lighting when the trees are mature. Exercise care when selecting the species of trees and positioning them relative to street lights.

Also consider the use of 6m poles in treed subdivisions. This will result in additional lights, but will better distribute light onto the road from under the tree canopy and limit light spill.

#### 19.3.4 Overhead reticulation

If there is overhead reticulation, consult with the power and telecommunications utilities. Consider supplementing the light from the other side of the road. Brackets on distribution company poles must comply with their standard.

#### 19.3.5 Maintenance factor

The design engineer should use the maintenance factor provided by the luminaire supplier. Calculations may be requested.

### 19.4 Lighting columns

#### 19.4.1 Compliance

→ [Compliance, Appendix C](#)

All street light columns must comply with the *Street Lighting Column Specification and Assessment Methodology* in Appendix C. All columns used in design must be on the approved list.

[Numbering](#)

Each column must be individually numbered at time of manufacture, together with the month and year of manufacture. In addition to the unique column number, a QR code must be attached for easy on-site data access. These labels must be 2m above ground level.

#### 19.4.2 Lighting column location within the road reserve

[Minimum set back](#)

The minimum column set back, from kerb face to the face of the column, must be 450mm, unless otherwise agreed with Auckland Transport.. At intersections it is recommended that columns are placed at the back of the footpath.

[New subdivisions](#)

In new subdivisions, lighting columns must be located:

- a) At the common boundary between adjacent property lots OR
- b) On the build-line, i.e. the corner of a building within the property lot. (This is particularly relevant in regards to point c below.)
- c) Within 15m of the corner if it is the first lighting column in a side street. Measure from the kerb-line of the street that vehicle has turned from. The column should be on the driver's left side.

[Footpaths](#)

Street lighting columns should be clear of footpaths. Where this is not possible, place them towards the back edge of the footpath. Maintain a clear 1.5m minimum footpath space.

## 19.5 Luminaires

### 19.5.1 Requirements

Standards	Luminaires must be manufactured and tested in accordance with <i>AS/NZS 1158 Part 6</i> and <i>NZ Transport Agency M30:2014</i> .
Approved luminaires	All luminaires must comply with <i>Auckland Transport HID Specification</i> (Appendix A) and <i>LED Road Lighting Specification</i> (Appendix B) and must be included on the approved list.
LED only	Auckland Transport requires all new luminaires to be LED type. The approval process for LED luminaires is set out in Appendix B. Auckland Transport does not expect to approve any new HID luminaire. If it is agreed to carry out an assessment, it will be in accordance with Appendix A. HID luminaires will only be considered as an exception mandated by special circumstances.
Approved list	All new lighting designs must use luminaires from the appropriate approved list at the end of this chapter.
→ Appendices E and F	The current approved lists are shown in: <i>Appendix E, Road lighting HID approved list (AT-HALL)</i> <i>Appendix F, LED Approved Luminaire List (AT-LALL)</i>
Certificate of compliance	For each luminaire, a certificate of compliance from an accredited, independent testing laboratory must be made available on request.
NEMA receptacle	Luminaires must be fitted with either a 5 or 7-contact NEMA receptacle, compliant with <i>ANSI C136.41:2013</i> .
In-ground up-lights	In-ground up-lights must not present a tripping or slip hazard. Anti-glare attachments must be positioned to limit the upward light. In addition, these lights must: <ul style="list-style-type: none"><li>• meet <i>AS/NZS 60598.1:2003</i></li><li>• have impact resistance of <i>IK10</i></li><li>• have ingress protection of <i>IP68</i>.</li></ul>
Bollard luminaires	The use of bollard luminaires must be pre-approved by Auckland Transport. The construction and finishes of bollard luminaires must be consistent with the requirements for columns and luminaires. The maximum luminous intensity in any normal viewing direction must not exceed <i>500cd/m<sup>2</sup></i> .
Labelling	Labelling must be in accordance with the current version of <i>AS/NZS 1158 Part 6</i> .
<b>19.5.2 Light source</b>	
LED road lighting	Only LED luminaires meeting the <i>LED Road Lighting Luminaire Specification</i> (Appendix B) and included on the Auckland Transport approved list (Appendix F) or the NZ Transport Agency <i>M30:2014</i> approved list may be used for Category V and Category P lighting designs.
Lamp replacements	Lamp replacements must utilise the minimum rated lumens defined in Appendix A, <i>HID Road Lighting Luminaire Specification</i> .

## 19.6 Road lighting in specific areas

### 19.6.1 Rural road lighting

#### Standards

Road lighting in rural areas is addressed in AS/NZS 1158 Clause 3.5. Given that the ambient light and sky glow in rural areas is significantly less than in built-up areas, take special care to limit spill light.

#### → Guide

AS 4282-1997 *Control of the Obtrusive Effects of Outdoor Lighting* is a good guide in these areas.

In addition:

- Keep road lighting to the minimum applicable standard at intersections and road terminations.
- Minimize lighting beyond these areas. Only provide sufficient lights so that a pedestrian walking along the road always has a light in view.
- Give priority to roads that are designated for traffic detours from main highways.

### 19.6.2 Safety and security lighting

#### → CPTED

Lighting can reduce the risk of crime and improve safety levels on local roads and public spaces. This is a principle of Crime Prevention through Environmental Design (CPTED). See AS/NZS 1158 Part 3.

### 19.6.3 Pedestrian crossing lighting

#### Standards

Pedestrian crossings must be lit in accordance with the current version of AS/NZS 1158 Part 4. Use luminaires with specifically designed photometric distributions. Light must be white.

#### Unsignalised

At an unsignalised pedestrian crossing, AS/NZS allows the use of a Belisha disc or a flashing Belisha beacon. Auckland Transport will specify which is appropriate for the specific crossing.

#### Signalised

For defined pedestrian crossing routes at traffic signal controlled crossings, AS/NZS11581.1 (Category V) and AS/NZS1558.3.1 (Category P) apply. The following lighting design criteria shall apply in addition at signalised crossings:

Category	Minimum horizontal point illuminance
V1 and V2	20 lux
V3 and V4	10 lux
P	10 lux

#### Local area traffic management

At local area traffic management devices, including roundabouts, intended to:

- Slow traffic on category P roads: Use 3.5 lux horizontal point illuminance. This is not additional to road lighting.
- Deter traffic on category P roads: Install reflective devices as per the *Manual of Traffic Signs and Markings* (MOTSAM).

Auckland Transport will determine whether local area traffic management devices are slowing or deterring traffic. This should be agreed before design begins.



#### 19.6.4 Adjacent access routes

Where the primary area to be lit is accessed by a road or path that also has to be lit, the access way must be lit to the same standard with lighting systems of similar appearance as those in the primary area.

### 19.7 Electrical aspects

#### 19.7.1 Equipment & components

Electrical equipment and components must be manufactured to comply with the applicable New Zealand or international standards and must have spare parts readily available. These components must be:

- incorporated into the luminaire or column,
- protected against the ingress of dust and moisture to the appropriate ingress protection (IP) level and
- easily accessible for repair or replacement.

Warranties on these components must be the manufacturers' standard warranty and be applicable from the date of handover of the installation to Auckland Transport for at least another 10 years.

#### 19.7.2 Energy efficiency

##### Standards

High efficiency lamps must be used and the installation must be designed for economic use of energy, applying the following standards:

- All LED luminaire drivers must be fitted with a DALI control interface with a minimum of 100,000 hours design life.
- Electronic control ballasts must be used for HID luminaires up to and including 150w.
- Power factor must be  $\geq 0.95$ .

##### Electronic ballasts

Electronic ballasts are more efficient than magnetic ballasts and prolong the life of the lamp by regulating the lamp voltage to within close tolerances.

##### Adaptive lighting

Auckland Transport will be installing adaptive lighting in selected areas. This reduces spill light and sky glow, as well as energy consumption when there is less traffic. The telemanagement system can be further extended through traffic sensors to be fully interactive, adjusting the light levels. In addition, allowance can be made for weather conditions. Each luminaire must be supplied with either a 5 or 7-contact NEMA receptacle, compliant with ANSI C136.41:2013.

#### 19.7.3 Electrical installation

##### Installation

Each street light position is an installation as defined in AS/NZS3000. All work must be carried out in accordance with this standard, as well as Electricity Regulations 2010 and the applicable electrical codes of practice.

## Connection

Each street light must be connected directly to the distribution company network, providing continuous supply. In some sections of road, it may be cost effective to connect more than one light to a single connection from the low-voltage network. The number of lights connected to a single circuit should be limited to three in any one direction from the supply point. Where more than one light is fed from a single distribution company connection, a 10mm<sup>2</sup> N/S single core cable must be looped in and out of each column. Breach joints are not allowed as part of a new design.

## No network

Where there is no established distribution company network and many lights have to be supplied from a single network connection, install two separate cables, with each cable looping into every second street light column. This means that, if a circuit fault occurs, only every second light will be out. This system is often used along long cycle routes. Please agree details of the cabling configuration with Auckland Transport beforehand.

## Isolation

At the base of each pole, between 600 and 900mm above ground level, a fuse board must be installed inside the pole to meet the requirements of AS/NZS 3000, with a neutral and earth bar to comply with the requirements of an installation. A 6 amp HRC fuse link must connect each light to the incoming supply. Miniature circuit breakers (MCBs) are not permitted. See Figure 1 below for guidance.

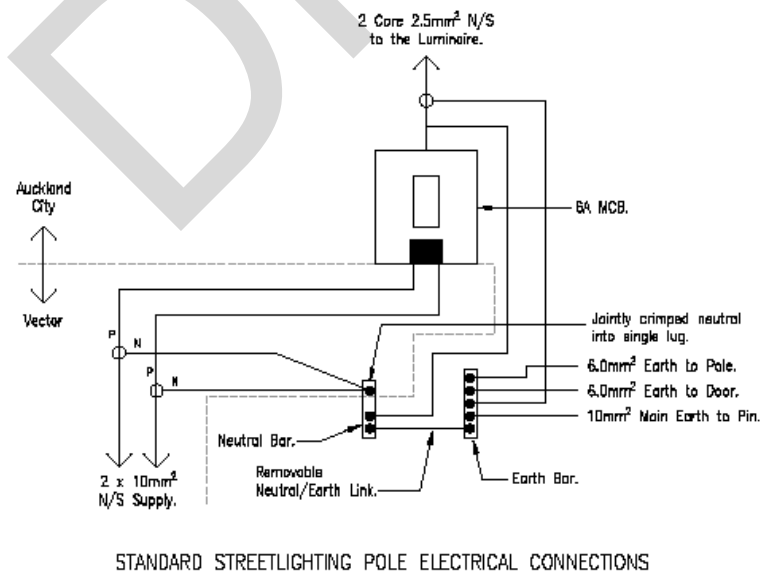


Figure 1: Street lighting – electrical connections.

## Luminaires on distribution company poles

In areas where a distribution company's network is overhead and Auckland Transport has installed luminaires on distribution company poles,

each luminaire must be connected directly to the distribution company supply using an HRC fuse in the live conductor.

- The fuse carrier must be a 20 amp Michaud K223.
  - The HRC fuse link must be 6 amps with fusing characteristic gG 120kA.
- Each luminaire along the street must be connected to alternate phases to keep the load on the low-voltage network balanced.

### Luminaire control

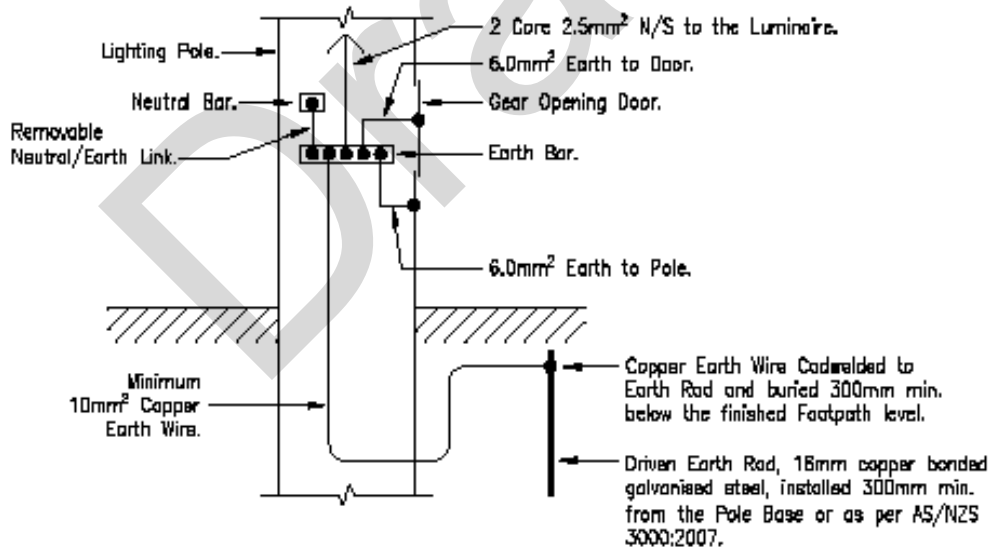
Auckland Transport is in the process of changing the control of all road lights to a telemanagement system. During the changeover, a mix of several controls will co-exist. Auckland Transport will advise the control type to be used in any particular area at time of design approval.

### Internal wiring

The cable from the fuse board at the base of the column to the luminaire must be two-core 2.5mm<sup>2</sup> neutral screen. The screen must be earthed.

### Earthing

Each pole must be earthed by means of 10mm<sup>2</sup> copper insulated wire, exothermically welded to a 16mm diameter copper-bonded steel earth rod 300mm from the pole base. Sherlock connectors are approved for burying. The connector must be buried 300mm below the pavement surface. AS/NZS 3000 applies. See Figure 2 below.



TYPICAL POLE EARTHING DETAIL

Figure 2: Street lighting – earthing details

Connection at traffic control cabinets

For connection at traffic control cabinets, see Figure 3 below.

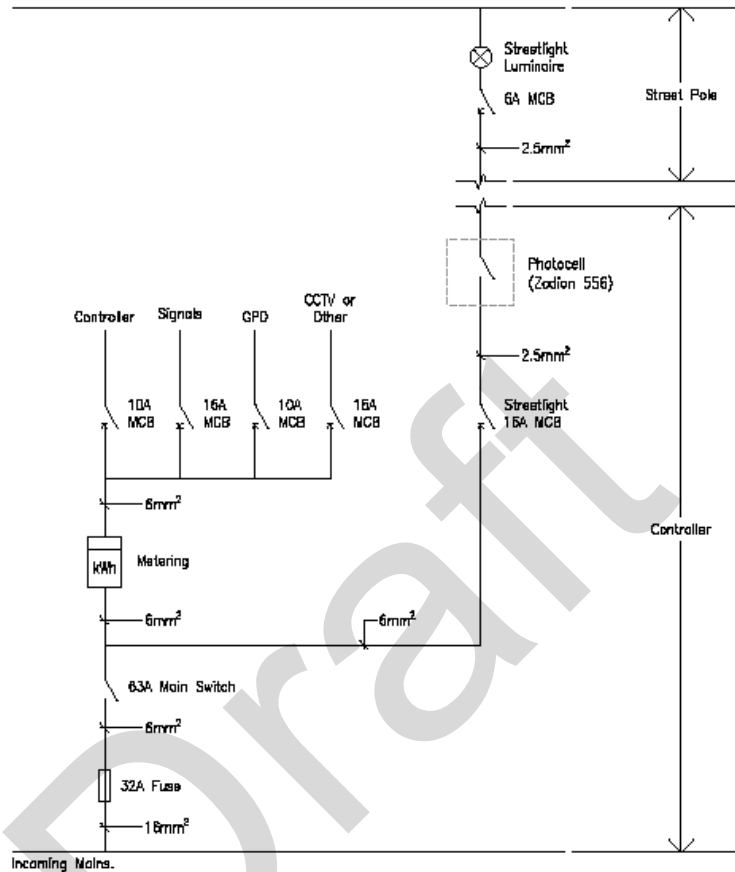


Figure 3: Traffic signal/street light combination electrical schematic.

Safe working distances

Safe distance from electric lines and cables must be maintained at all times. EPC 34 and the *Safety Manual – Electrical Industry (SM-EI)* parts 2 and 3 set out the minimum approach distances for approved qualified staff with current work competencies.

Personal protective equipment

All personnel working on the Auckland Transport lighting network must wear the appropriate personal protective equipment on all sites at all times.

Work on or near distribution company network

All work on or near a lines company network must be carried out in accordance with health and safety requirements set out in ECP 34 and the *Safety Manual – Electrical Industry (SM-EI)*. All workers must have the appropriate Work Type Competency (WTC). All aspects of the contract Health and Safety Management Plan must be adhered to at all times.

## 19.8 Approvals

### Approval needed

All proposed changes or additions to the public lighting network must be approved before construction by Auckland Transport using the Departures from Standard process.

### Alternative standards

Alternative road lighting design solutions utilising computer calculations based upon CIE standards are acceptable, provided that clear correlation is supplied to prove equivalence with the current version of AS/NZS 1158 for the specific project parameters.

### Required information

The following information is required for the review:

- A lighting design report and lighting design plan(s) scaled to 1:500. The minimum requirement for this is outlined in Appendix C.
- Electronic copy of the lighting design plan, showing luminaire positions.
- Documentation in accordance with the relevant part of AS/NZS1158 and the current version of AS/NZS1158.1.2 to show compliance.
- Lighting sub-category used in the design, e.g. V2, P4. These must be recorded on each lighting plan.
- For category V roads: Luminance calculations from Perfectlite, together with Isolux plots from AGI32, illustrating relevant contours for the lighting sub-category. Show the illuminance and point illuminance values necessary to demonstrate compliance.
- For Category P roads: Illuminance diagrams from AGI32 illustrating relevant contours for the lighting sub-category. Show illuminance and point illuminance values necessary to demonstrate compliance.
- Information as per tables 3 and 4 below.

Parameter	Symbol	Notes
Average carriageway luminance	L	Straight sections
Overall uniformity	U <sub>o</sub>	Straight sections
Longitudinal uniformity	U <sub>L</sub>	Straight sections
Threshold increment %	TI	Straight sections
Surround (verge) illumination ratio	E <sub>s</sub>	Straight sections
Point illuminance	E <sub>ph</sub>	Intersections, pedestrian crossings, pedestrian refuges and defined pedestrian crossing routes at signalised crossing
Illuminance (horizontal) uniformity	U <sub>E1</sub>	Intersections and pedestrian refuges only
Vertical illuminance	E <sub>PV</sub>	Pedestrian crossing

Parameter	Symbol	Notes
Average horizontal illuminance	E <sub>h</sub>	
Point horizontal illuminance	E <sub>ph</sub>	
Illuminance (horizontal) uniformity	U <sub>E2</sub>	
Point vertical illuminance	E <sub>pv</sub>	
Luminous intensity at Gamma 80	Cds	For maximum luminaire watts in the design.

## 19.9 Differences between the Auckland Transport Code of Practice and the standards

### ATCoP takes precedence

Where there are differences between the *Auckland Transport Code of Practice* and the standards, this manual takes precedence. The following are instances where Auckland Transport's requirements vary from the standards:

1. The maximum tilt for a luminaire must be a maximum of 5° from the horizontal, but in exceptional cases a maximum of 10° may be used. See Section 19.5.2
2. The threshold increment % (TI) along the road must not be greater than 10%. See Section 19.5.2
3. Pedestrian crossing routes at traffic signal controlled intersections have additional requirements to those of AS/NZS1158 for the illumination of intersections. See Section 19.6.3
4. Local area traffic management devices (including roundabouts) intended to slow traffic and regulate its flow must utilise white light. See Section 19.6.3
5. Category P roads: Illuminance diagrams from AGI32 illustrating relevant contours for the lighting sub-category with illuminance and point illuminance values are necessary to demonstrate compliance. See Section 19.9
6. Category P roads: Record maximum cds at Gamma 80 on the drawings. It should generally not exceed 400 cds for a maximum luminaire power of 28 watts. See Section 19.3.2

# Appendix A

## HID Road Lighting Luminaire Specification and Assessment Methodology

### A1 Overview

- Purpose** This specification outlines the requirements that a road lighting luminaire must meet for inclusion in the Auckland Transport *HID Approved Luminaire List* (HALL, Appendix E).
- Criteria** The approval criteria of new luminaires onto Auckland Transport-HALL comprises of three parts:
- Compliance with the most up-to-date version of the Australia/New Zealand *Standard for the Lighting of Roads and Public Spaces*, AS/NZS1158, Part 6.
  - Additional criteria specific to Auckland Transport listed below in Sections 2 and 3.
  - Achieving a “Pass” mark on the new Road Lighting Evaluation Form (See Appendix C Section 5.2).
- Fee** Manufacturers/suppliers of the HID road lighting luminaire under consideration must pay Auckland Transport a fee of NZ\$1000 to undertake the assessment.

### A2 Auckland Transport approved HID luminaire requirements

#### A2.1 Luminaire compliance and design features

Luminaires for use by Auckland Transport must:

- Comply with this specification document
- Comply with AS/NZS1158 Part 6
- Have an expected design life of 20 years minimum.

All approved luminaires must utilise flat glass (FG) or curved tempered glass (CTG). No bowl-style luminaires will be considered for standard road lighting projects.

For special projects, luminaires will be considered on a case-by-case basis. However, compliance with AS/NZS1158, Part 6 will be a minimum requirement.

Luminaires will be reviewed against each item listed on this specification. If determined to be non-compliant, they will not be considered for inclusion on Auckland Transport *HID Approved Luminaire List*.

#### A2.1.1 Material

The material of the luminaire housing must be in accordance with the current version of AS/NZS 1158 Part 6. It is preferred that luminaires utilize an aluminium alloy having a copper content of not greater than 0.1%.

Testing in accordance with ISO9227, where additional surface treatments have been applied, must be provided to demonstrate compliance with that standard.

Saline mist testing must be for a minimum of 1000 hours.

#### A2.1.2 Toolless entry

Toolless entry is required for the luminaire electrical compartment, for maintenance purposes. Additionally, for ease of maintenance, a quick disconnect control gear assembly is required.

#### A2.1.3 Internal tilt mechanism

The luminaire must have an internal tilt mechanism, so that the luminaire can be adjusted between 0° and -15° (minimum). No external bracket or adaptors must be required to provide a 0° (zero) tilt of the luminaire in relation to the road surface. This allows the luminaire to be installed on existing road lighting columns that have a tilt angle to the bracket arm.

#### A2.1.4 Ingress protection (IP)

The luminaire must be exposed to weather conditions and as such should have an IP66 rating, for both the optical and control gear compartments.

#### A2.1.5 Remote luminaire control – Telemetry

The luminaire must have room to incorporate telemetry control components within the luminaire body or bracket arm without compromising the IP66 rating.

#### A2.1.6 Control compatibility

Road lighting luminaires must be capable of incorporating photocells without compromising the IP66 rating. The Auckland Transport current approved photocell is the Zodian SS12A and variants thereof.

#### A2.1.7 Upgrade

The luminaire must be designed to enable the light engine to be replaced and/or upgraded. The IP66 rating of the complete luminaire must not be compromised as a result of either replacement or upgrade of the luminaire components.

#### A2.1.8 Warranty

The luminaire supplier must offer at least:

- A ten-year warranty from the date of installation for the housing/glass/seal and reflector of the luminaire and
- A five-year warranty for all electronic control gear, ballast or driver.

### *A2.2 Quality assurance and electrical safety*

#### A2.2.1 Luminaire supplier declaration of conformity (SDoC)

All luminaires must have a Suppliers Declaration of Conformity, i.e. a statement from the supplier that the luminaire is electrically safe and that the supplier takes responsibility for the safety of the product.

#### A2.2.2 ISO 9001 Registered

All luminaire manufacturers must be independently verified to meet ISO 9001.



## A2.3 Sustainability

### A2.3.1 Restriction of Hazardous Substances (RoHS)

The luminaire must comply with the Restriction of Hazardous Substances directive which sets restrictions on the use of six hazardous substances in electric equipment. The restricted substances are:

- lead,
- mercury,
- cadmium,
- hexavalent chromium,
- polybrominated biphenyls and
- polybrominated diphenyl ether.

### A2.3.2 International Dark-Sky Association (IDA)

The luminaire must be accredited by the International Dark-Sky Association or be able to demonstrate that it complies with their principles, limiting light pollution from outdoor luminaires in respect to glare, sky glow (light directed above the horizontal into the sky) and light trespass (illuminating unwanted areas such as private property).

## A3 Approved luminaire assessment methodology

HID road lighting luminaire manufacturers and suppliers must supply supporting documentation and IES/CIE files identifying their best performing road lighting luminaires.

Optical performance will be assessed in accordance with the most up-to-date versions of AS/NZS 1158 1.1 and 3.1 respectively for Category V and P roads. → See Table A1 below.

Table A1: AS/NZS 1158 design categories				
Vehicle Category Roads				
	Average Carriageway Luminance (cd/m <sup>2</sup> )	Average Illuminance (lux)	Overall Uniformity (min/avg)	Longitudinal Uniformity (min/avg)
V1	1.5	15	0.33	0.3
V2	1.0	10	0.33	0.3
V3	0.75	7.5	0.33	0.3
V4	0.5	5	0.33	0.3
Pedestrian Category Roads				
	Average Illuminance (lux)	Point Horizontal Illuminance (lux)	Horizontal Uniformity (max/avg)	
P3NZ	1.3	0.22	10	
P4	0.85	0.14	10	

\* As at November 2011

Each luminaire will be reviewed against the criteria in this specification and must be compliant with all requirements to be considered for inclusion in the *Auckland Transport Road Lighting HID Approved List* (Appendix E).

Once the luminaire has been placed on the *Auckland Transport Road Lighting HID Approved List*, it may be subjected to random product testing at Auckland Transport’s discretion. Failure to meet and maintain the requirements laid out in this specification and assessment methodology document may result in the luminaire being removed from the list.

### A3.1 Performance and acceptance testing

All road lighting luminaires for consideration will be assessed, based on their optical performance on the test road and their performance against luminaires already on the approved luminaire list. The test road sets out a typical roadway topology for Category V and P roads.

Table A2: Typical roadway topology for Category V and P roads		
Aspect	Category V	Category P3 and P4
Overall carriageway width	12m (kerb to kerb)	20m (back of footpath to back of footpath)
Number of lanes	two (one in each direction)	two (one in each direction)
Footpath	2m	1.5
Grass berm	1.5m	2m
Road luminaire mounting height	12m complete with 2m outreach arm	8m complete with 2m outreach arm
Setback	Luminaire supplier’s choice	Luminaire supplier’s choice
Road lighting column arrangement:	Luminaire supplier’s choice between single sided, staggered and opposite.	Luminaire supplier’s choice between single sided, staggered and opposite.
Luminaire tilt angle	0°	0°
Maintenance factor: High pressure sodium	0.75	0.78
Maintenance factor: Metal halide	0.75	0.67
Maintenance factor: CosmoPolis	0.8	0.7

Minimum rated lumens

The minimum rated lamp lumens in Table A3 below must be used for the replacement of existing lamps in the street lighting network as part of ongoing maintenance.

Table A3: Minimum rated lamp lumens			
Lamp Source / Watts		Minimum Lumen Output	Comments
<b>High Pressure Sodium</b>	50	4400	
	70	6600	
	100	10700	
	150	17500	
	250	33200	
	400	56500	
	600	90000	
<b>Metal Halide</b>	35	3200	GE Streetwise lamp
	50	5000	GE Streetwise lamp
	70	7640	GE Streetwise lamp
	100	10700	GE Streetwise lamp
	150	16300	GE Streetwise lamp
	250	25000	GE TT
	400	41000	GE TT
<b>CosmoPolis</b>	45	4725	
	60	6800	
	90	10450	
	140	16500	
<b>Elite</b>	210	24150	Colour Temp = 3000K
	315	38700	Colour Temp = 3000K

# Appendix B

## LED Road Lighting Luminaire Specification and Assessment Checklist

### B1. Overview

- Purpose** This appendix sets out the standard requirements for LED road lighting luminaires. It also details the luminaire assessment methodology, covering the optical performance against a group of standard road geometric configurations.
- Criteria** The luminaires will be assessed on five main criteria:
1. LED attributes
  2. Luminaire optics
  3. Driver and electrical properties
  4. Luminaire compliance and design features
  5. Sustainability.
- Application fee** An application fee of \$3,000 is required for each luminaire to be assessed for inclusion in the approved list. When the assessing engineer has spent \$1,000 (maximum) of the fee, a decision will be made, in conjunction with the applicant, to proceed with the remaining work to complete the assessment. Should the decision be made not to proceed, the remaining \$2,000 will be refunded.

### B2. Standards referred to

- Illuminating Engineering Society of North America IES LM-79-08: *IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products*. (2008)
- Illuminating Engineering Society of North America IES LM-80-08: *IES Approved Method for Measuring Lumen Maintenance of LED Sources*. (2008)
- Illuminating Engineering Society of North America IES TM-21-11: *Lumen Depreciation Lifetime Estimation Method for LED Light Sources*. (2011)
- AS/NZS 1158: *Lighting for roads and public spaces*. (2005-2010).
- IEE/ANSI 62.41 *IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits*. (1995)
- IEC/EN 62471: *Photobiological safety of lamps and lamp systems*. (2006)
- ANSI/IESNA RP-27: *Recommended Practice for Photobiological Safety from Lamps*. (2007)
- *Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Regulations 2008*. (2008)

### B3. Assessment checklist

[Download the LED Road Lighting Luminaire Assessment Checklist \(.xlsx, 102KB\).](#)

## Appendix C

# Street Lighting Column Specification and Assessment Methodology

### C1 Overview

#### Purpose

This document specifies the minimum requirements for the standard design of street lighting columns intended for use in Auckland Council region, under the guidance of Auckland Transport. It should be read in conjunction with the rest of this chapter in the *Auckland Transport Code of Practice*.

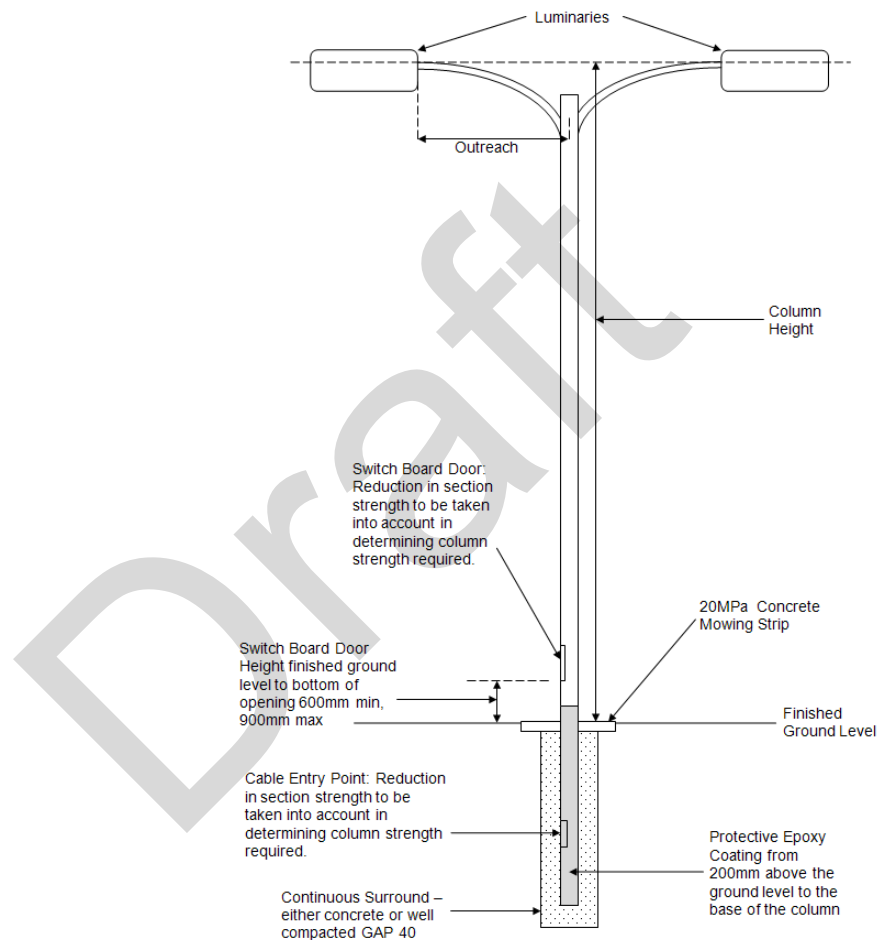


Figure C1: Parts of the lighting column.

### C2 Column design

#### C2.1 Introduction

#### Design life

All lighting columns must have a minimum 50-year design life.

#### Design standards

The design must be in accordance with AS/NZS 4676 *Structural Design Requirements for Utility Services Poles* and AS/NZS 4677 *Steel Utility Service Poles*.

#### Construction standards

All construction must comply with the New Zealand Building Code and the appropriate New Zealand standards.

→ **Approved suppliers** All lighting columns must be manufactured by Auckland Transport approved suppliers. See Appendix D for the current list of approved suppliers.

## C2.2 Standard columns

All lighting columns must be constructed to a standard length of 6m, 8m, 10m, 12m or 14m from the ground to the tip of the bracket arm and have a maximum bracket arm outreach length as specified in Table C1 below, unless otherwise approved by Auckland Transport.

Each column must be designed to take the load of a standard luminaire as outlined in Table C1 below.

Table C1: Standard column heights and associated bracket arm lengths, mass and sail areas			
Nominal Column Height (m)	Maximum Bracket Arm Outreach (m)	Luminaire Mass (kg)	Luminaire Sail Area (m <sup>2</sup> )
14.0*	4.0	15.0	0.15
12.0	4.0	15.0	0.15
10.0	3.0	10.0	0.12
8.0	2.0	9.0	0.10
6.0*	1.0	8.0	0.10

\* Appropriate for single outreach only.

**Bracket arm** Standard columns must have a curved outreach bracket arm with a 5° upward tilt.

**Spigot diameter** The minimum spigot diameter is 42mm.

**Structural steel plate** The minimum thickness of steel plate used in any structural column element must be at least 2mm. Special requirements from AS/NZS 4676 apply if the thickness of steel used in any structural elements of the column is less than 3mm.

## C2.3 Approved columns

→ **Approved columns** A list of the current approved columns can be found in Appendix D. Auckland Transport will consider alternative columns for specific projects on a case-by-case basis.

## C2.4 Wind loadings

The column must be designed to an Importance Level of 2 with 50 years design life and must be able to safely sustain the appropriate loads as set out in the current version of AS/NZS 1170.2 *Structural Design Actions - Wind Actions*. See Table C2 below.

Wind loadings are assumed to be non-directional, i.e. the worst orientation of the light column is considered. Specific design considering wind direction, with respect to the orientation of the lighting column, may be warranted in special cases, but this is generally not necessary.

Wind pressures are based on design wind speeds for each wind zone as per Section 5 of AS/NZS 3604 *Wind Bracing Demand* and are calculated in accordance with AS/NZS 1170.2.

The minimum drag coefficient is taken as for a smooth round shape ( $C_D = 1.2$ ). Other shapes will require modification with the appropriate modification factor in accordance with Table E4 of AS/NZS 4676.

The frontal area of luminaires must be taken from the orientation that results in the greatest wind exposed surface, and the force on these is assumed to act at the top of the column. The frontal area must include all other attachments, motifs etc., which are not part of the main lighting column structure.

Allowance must also be made for the additional forces due to wind on a 1m<sup>2</sup> fixed sign or, for a single outreach, one 0.9m x 1.8m banner, and for a double outreach, two 0.9m x 1.8m banners, mounted 2.5m above ground level. Columns may be fitted with either a sign or banner(s), but not both.

#### Wind speed design formula

The following formula shall be used to calculate the pole loading due to wind speed.

$$V_{\text{sit},\beta} = V_R M_d (M_{z,\text{cat}} M_s M_t)$$

Table C2: Factors to determine site wind speed		
Description	Factors	AS/NZS 1170.2:2002 Reference Clauses
Regional gust wind speed, $V_R$	45 m/s (design life 50 years, Region A)	Table 3.1 – Regional Wind Speeds
Wind directional multipliers, $M_d$	1.0 (any direction)	Table 3.2 – Wind Direction Multiplier
Terrain/height multiplier, $M_{z,\text{cat}}$	Terrain Category 2, site elevation 0m; $M_{z,\text{cat}}$	Clause 4.2 – Terrain/Height Multiplier
Shielding multiplier, $M_s$	1.0	Clause 4.3 – Shielding Multiplier
Topographic multiplier, $M_t$	1.0	Clause 4.4 – Topographical Multiplier

### C2.5 Minimum column strengths

Steel column strengths must be based on the requirements of AS/NZS 3404 *Steel Structures Standard* and AS/NZS 4600 *Cold-Formed Steel Structures*.

Steel section strength requirements apply to the base of the column (at the top of the concrete footing), i.e. not necessarily at the ground surface.

Minimum section modulus requirements must take into account any service opening near the critical location at the base. Locations of openings other than at the base should also be considered.

## C2.6 Deflection and vibration

The complete assembly (e.g. column, outreach and luminaire) must be designed to minimise deflection and vibration. To account for fatigue, the lateral liner deflection of the column must not exceed  $h_p/15$ , where  $h_p$  is the height of a column above ground level.

## C2.7 Dynamic response check

### Translational response

Dynamic response of a light column may subject the structure and fixtures to excessive acceleration and forces. Where structures have natural frequencies less than 1Hz, Section 6 of AS/NZS 1170.2 requires dynamic analysis to be carried out.

The dynamic response of a light standard may be in a number of vibrational modes, including fundamental translational (lateral) cross-wind response as well as torsional response, particularly where the fixtures are eccentric and have high mass.

### Torsional response

The torsional response may be combined with the translational response. As with the translational response, Section 6 of AS/NZS 1170.2 requires dynamic analysis to be carried out for structures with natural frequencies less than 1Hz.

### Wind-sensitive structure

The dynamic analysis of a wind-sensitive structure is outside the scope of this document and specialist design will be required where the structure is deemed to be wind sensitive.

## C2.8 Switchboard – Door cavity opening

### Position

The door cavity opening must be positioned to permit safe access for maintenance, e.g. not facing the street. The door cavity opening must be accessible at all times.

### Height

The door cavity opening must be a standard size of 300mm x 150mm. The base of the door cavity opening must be located between 600mm and 900mm above finished ground level, to provide safe and easy access for maintenance.

### Opening

The door cavity opening must be prevented from being opened by unauthorised persons, e.g. by the use of fasteners requiring a specific tool to gain access to the switchboard.



## C2.9 Shear base columns

Shear base columns are only to be installed in speed zones of 70km/h or greater. All other speed zones must utilize flange base or ground planted columns.

All shear base type columns must incorporate IP68 plug and socket connection to ensure that the pole disconnects from the live supply in the event of vehicle impact or similar event. (Transnet Amerace 65U or equivalent.)

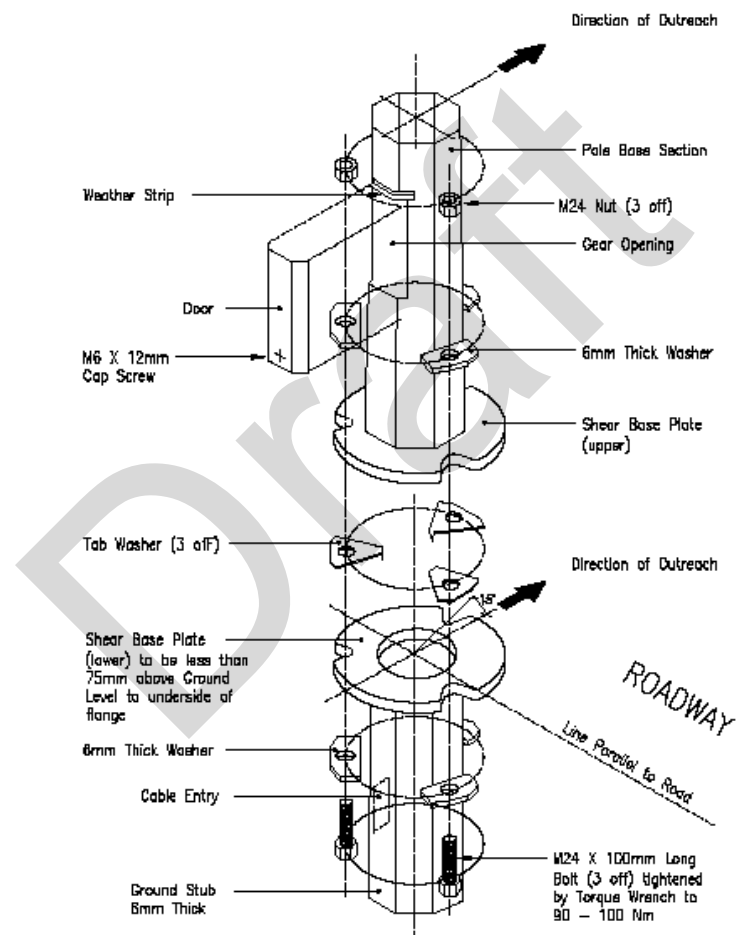


Figure C2: Typical shear base detail.

### C3 Foundation design

The design properties of the footing and foundation materials must be in accordance to Section 6 of AS/NZS 467 *Footings and Foundations*.

#### Two groups

Footings for lighting columns may be classified into two broad groups:

- direct planted footings
- pad footings.

#### Direct planted footing

A direct planted footing is simply an extension of the pole. It relies primarily on varying the length of the extension (i.e. the embedment depth) and its projected area, to engage the required resistance of the foundation to overturning and sliding. This type is widely used for foundations with a bearing strength between 100kPa and 240kPa.

The embedment depth of directly planted poles must be calculated in accordance AS/NZS 4676, taking due account of the mechanical properties of the particular foundation materials. The embedment depth should not be less than 500mm in any soil. The top 500mm of any pile foundation must be ignored when determining capacity.

#### Pad footings

Pad footings are usually constructed from concrete and rely primarily on their mass and the distribution of this mass to provide the required stability. For this type of footing, the embedment depth is not as critical a factor in the overturning resistance of the pole, but may be a major consideration in generating resistance to sliding.

Base fixing bolts must be designed in accordance with AS/NZS 4676. They must be arranged so that cable access through the base plate hole is not impaired.

### C4 Surface Coatings

This section details the requirements for finishes and their application. Alternative products and processes may be submitted for approval for specific projects and/or for future incorporation into this document.

Surface preparations, coatings and repairs must be in accordance with AS/NZS 2312 *Guide to the Protection of Structural Steel against Atmospheric Corrosion by the use of Protective Coatings* and be performed by one of the companies approved for that system, to meet the minimum warranty period.

Surface finishes must be smooth and free from obvious blemishes. Final coating is optional. However, all columns, complete with mitred and curved outreach arms, must be finished, both internally and externally, in one of the following forms:

- Hot dipped galvanised mild steel – painted or unpainted
- Stainless steel (316 grade) – painted or unpainted.

Contact Auckland Transport regarding other clear acrylic coatings.

#### C4.1 Standards

The following standards apply to this section:

- AS/NZS 2312 *Guide to the Protection of Structural Steel against Atmospheric Corrosion by the Use of Protective Coatings.*
- AS/NZS 4680 *Hot-Dip Galvanised (Zinc) Coatings on Fabricated Ferrous Articles.*
- AS/NZS 3750.9 *Paints for steel structures - Organic zinc-rich primer.*
- AS/NZS 3750.15 *Paints for steel structures - Inorganic zinc silicate paint.*
- AS/NZS 1554.1 *Structural Steel Welding - Part 1: Welding of Steel Structures.*

#### C4.2 Repair of damage to surfaces

Corrosion protection that has been damaged by welding, erection or other causes must be rectified before the column is put into use. The damaged area must be prepared and must be dry and clean, free from dirt, grease, loose or heavy scale of rust before the corrosion protection is applied. The corrosion protection must be applied as soon as practicable and before noticeable oxidation of the cleaned surfaces occurs. Damaged zinc coating must be resorted by application of an equivalent thickness of a suitable zinc paint conforming to AS/NZS 4680, AS/NZS 3750.9 or AS/NZS 3750.15 or with thermal zinc spray.

#### C4.3 In-ground section of all columns

Structural steel sections should not make direct contact with the ground. All sections must be embedded in, or bear on, concrete, or be otherwise protected. Concrete poured around steel structures must be continuous and not cast in sections.

All lighting columns must, on top of the all-over galvanisation, be covered in an extra epoxy protective coating from 200mm above the ground level to the base of the column. Bare, untreated metal is not acceptable.

#### C4.4 Alternatives

Where alternative materials or paint finishes are required, the applicant must submit full details of the proposed process and materials for review, with the submission.

#### C4.5 Warranty

##### Certified applicator

If the coating applicator has been certified by a paint supplier who is an approved provider of the proposed coating system, provide a copy of the coating applicator's certification that the galvanising and/or paint has been applied in accordance with the coating manufacturer's specification. This must happen before the columns are installed.

##### Non-certified applicator

If the applicator does not possess the necessary certified applicator status, the paint supplier must monitor the work and provide the required certification.

##### 10-year guarantee

Materials and paint finishes of columns and luminaire bodies must be unconditionally guaranteed against fair wear and tear for a minimum of 10 years, commencing from the date of handover to Auckland Transport.

#### *C4.6 Quality control*

##### **Standards**

All welds and welding processes must comply with the current standards outlined in AS/NZS 1554.

##### **Inspector**

Auckland Transport may nominate an inspector to ensure the quality of the lighting column, including the quality of steel, welds, and protective coating. Upon request by Auckland Transport, the manufacturer must supply Auckland Transport with certificates to ensure the quality of the column.

#### *C4.7 Protection*

##### **Transport**

Structural members must be adequately protected during handling and transport to minimise damage to the corrosion protection. The columns must be individually wrapped in heavy duty polythene, or similar method of protection. The protective wrapping must not remain in place for an extended time, e.g. during site storage, as damage to the paint finish may occur.

##### **Separable**

Components that are transported in nested bundles should be separable without damage to other components or their coatings. Consider the use of lifting beams with appropriately spaced lifting points and slings, or lifting with properly spaced fork-lift tines.

##### **Wrapping**

The column wrapping must be applied while the column is installed and stood upright in the excavation, and the wrapping must be removed upon completion of installation.

##### **Repair damage**

Any damage caused before the handover to Auckland Transport must be repaired as new, with all warranties remaining intact. Where the damage is considered too severe, the contractor must, upon written instruction from Auckland Transport or our representative, replace the damaged equipment with a new item at no cost to Auckland Transport.

#### *C4.8 Excavation and backfill*

All excavation and backfilling must be carried out in accordance with the contract specification.

#### *C4.9 Mowing strip*

A smooth concrete mowing strip must be provided around the base of lighting columns where appropriate. The concrete must be 25MPa strength with a minimum width of 200mm on all sides and depth of 150mm. The concrete must be boxed, finished level with the surrounding ground level and have a smooth trowel finish, slightly graded away from the column, to prevent water collecting against the column.

## C5 Checklists

### C5.1 Initial evaluation checklist

#### Initial evaluation checklist

The checklist below lists the essential criteria for this assessment that must be met for each new column design that is submitted to Auckland Transport. Lighting columns that satisfy all the requirements of this part may then be considered for a detailed assessment carried out by an independent consultant selected by Auckland Transport.

<b>Lighting Column Evaluation Methodology: Initial Evaluation Checklist</b>			
Column Manufacturer			
Model Name/Number			
Cost Per Unit			
	<b>Aspect</b>	<b>Yes</b>	<b>No</b>
<b>1</b>	<b>Height and Outreach Length</b> The column has a nominal height and a maximum outreach arm as outlined in Table C1.	<input type="checkbox"/>	<input type="checkbox"/>
<b>2</b>	<b>Tilt Angle</b> The outreach arm has an upward tilt angle of 5°.	<input type="checkbox"/>	<input type="checkbox"/>
<b>3</b>	<b>Permanent Design Load</b> The column is designed to take the load of a standard luminaire as outlined in Table C1.	<input type="checkbox"/>	<input type="checkbox"/>
<b>4</b>	<b>Wind Design Load</b> The column design must comply with the latest standards set out in AS/NZS 1170.2 and must be designed to take the load on a 1m <sup>2</sup> sign attached 2.5m above ground level.	<input type="checkbox"/>	<input type="checkbox"/>
<b>5</b>	<b>Structural Steel Thickness</b> The minimum steel thickness for the in ground section of the column with a nominal height greater than 10m is not less than 3mm. Other structural elements of the column is not less than 2mm thick.	<input type="checkbox"/>	<input type="checkbox"/>
<b>6</b>	<b>Steel Properties</b> All structural steel used to manufacture the column complies with the standards set out in NZS 3404.	<input type="checkbox"/>	<input type="checkbox"/>
<b>7</b>	<b>Deflections</b> The column must be designed to have a maximum deflection of no more than $\pm 3^\circ$ .	<input type="checkbox"/>	<input type="checkbox"/>
<b>8</b>	<b>Dynamic Response</b> The dynamic response of the column does comply with Section 6 of AS/NZS 1170.2	<input type="checkbox"/>	<input type="checkbox"/>
<b>9</b>	<b>Switchboard Door Cavity Opening</b> The base of the switchboard door cavity opening is located between 600mm and 900mm above finished ground level and requires a special tool to open.	<input type="checkbox"/>	<input type="checkbox"/>
<b>10</b>	<b>Protective coating</b> The entire column, both internally and externally, is galvanized or otherwise protected by an Auckland Transport approved coating system.	<input type="checkbox"/>	<input type="checkbox"/>
<b>11</b>	<b>Base Section</b> On top of the overall galvanisation, the base section of the column does have an approved extra protective coating from 200mm above ground level to the base of the column.	<input type="checkbox"/>	<input type="checkbox"/>
<b>12</b>	<b>Welding</b> All welding on the column complies with AS/NZS 1544.	<input type="checkbox"/>	<input type="checkbox"/>
<b>13</b>	<b>Design Life</b> The column has a minimum design life of 50 years.	<input type="checkbox"/>	<input type="checkbox"/>

*Note: If any column submitted does not comply fully with the above points, please provide all the necessary information (i.e. design calculations or manufacturer's warranty) for alternative design consideration.*

**New Zealand Distributor**

Company Name:

Contact Name:

Position:

Phone Number:

Email Address:

Signature:

Date:

Draft

*C5.2 Detailed independent assessment*

**Verify initial evaluation**

The checklist below show results for the column’s structural performance. This assessment must verify that the initial evaluation is accurate and that the column has no major design issues in relation to the specification outlined above.

**Auckland Transport's role**

If the lighting column passes this assessment, it may be placed on the approved light column list (Appendix D) at the discretion of Auckland Transport. It is recommended that the supplier of the lighting column pays Auckland Transport a fee of \$1000 to undertake the independent assessment. This will demonstrate the commitment of the supplier to the quality, performance and support of the product.

<b>Detailed Independent Assessment: Verification of Initial Evaluation Checklist</b>		
	<b>Aspect</b>	<b>Result</b>
<b>1</b>	Height and Outreach Length	Pass/Fail
<b>2</b>	Tilt Angle	Pass/Fail
<b>3</b>	Permanent Design Load	Pass/Fail
<b>4</b>	Wind Design Load	Pass/Fail
<b>5</b>	Structural Steel Thickness	Pass/Fail
<b>6</b>	Steel Properties	Pass/Fail
<b>7</b>	Deflections	Pass/Fail
<b>8</b>	Dynamic Response	Pass/Fail
<b>9</b>	Switchboard Door Cavity Opening	Pass/Fail
<b>10</b>	Protective coating	Pass/Fail
<b>11</b>	Base Section	Pass/Fail
<b>12</b>	Welding	Pass/Fail
<b>13</b>	Design Life	Pass/Fail
<b>Identify any issues with the column</b>		
<b>Recommend Column for Auckland Transport Approved Column List</b>		<b>Yes / No</b>
<b>Assessment Completed By:</b>		
Company Name:		
Contact Name:		Position:
Phone Number:		Email Address:
Signature:		Date:

## Appendix D

### Lighting column approved list (AT-LCAL)

Lighting Column Approved List (AT-LCAL)					
Manu- facturer	Model Name/Number	NZ Supplier	Road Category	Date Approved	Notes
<b>Street Light Column</b>					
Vicpole	Vicpole 6m; 8m	ADLT	P		
HiSpec	HiSpec slim square 6m; 8m; 10m	HiSpec	P sub- divisions	3/03/2014	Subdivisions only.
Kendellier	Round steel tapered 6m; 8m	Kendellier		3/03/2014	
Spunlite	Octagonal 6m; 8m; 10m; 12m	Spunlite	P & V	3/03/2014	
Steelgal	Octagonal tapered steel columns supplied in sections 6m; 8m; 10m; 12m; 14m Tamaki round steel column; AT MFP pole (Elliott Street style) Approved flange and shear base mounting plus double outreach arms for each size pole.	Steelgal	P & V	3/03/2014	Approval extended to double outreach arms and flange and shear base mounting for each pole size.
CSP Pacific Ltd	Octagonal tapered steel columns supplied in sections 6m; 8m; 10m; 12m; 14m Tamaki round steel column; AT MFP pole (Elliott Street style) These size poles approved for flange and shear base mounting.	CSP Pacific Ltd	P & V	3/03/2014	
GESS	Steel tapered section octagonal poles 6m, 8m, 10m, 12m and 14m	GESS	P & V		
GESS	Tamaki round steel column; AT MFP pole (Elliott Street style)	GESS	P & V	3/03/2014	

*Note: The street light luminaire performance and data will be assessed from time to time. This could result in the need to reassess the product for inclusion on the approved list. Should this be necessary the supplier will be advised.*



## Appendix E

### Road lighting HID approved list (AT-HALL)

Road lighting Auckland Transport - HID approved list (AT-HALL)					
Manu- facturer	Model Name/Number	NZ Supplier	Road category	Date Approved	Notes
<b>Category V</b>					
AEC	KAOS1	Tech Light	V	31/10/2011	
AEC	KAOS2	Tech Light	V	31/10/2011	
Schröder	Ambar2	Betacom	V	31/10/2011	
Schröder	Ambar3	Betacom	V	31/10/2011	
<b>Category P</b>					
AEC	KAOS1	Tech Light	P	31/10/2011	
Schröder	Ambar2	Betacom	P	31/10/2011	
Schröder	Nano	Betacom	P	31/10/2011	
<b>Pedestrian Crossing ( Zebra )</b>					
AEC	KAOS 1 OPSX/OPDX	Tech Light	Ped	31/10/2011	
Schreder	Amber /Ped	Betacom	Ped	23/07/2014	CosmoPolis lamp - low CCT (2900k) and low CRI (65) compared to MH lamp. (AS/NZS 1158.4)

*Note: The street light luminaire performance and data will be assessed from time to time. This could result in the need to reassess the product for inclusion on the approved list. Should this be necessary the supplier will be advised.*

## Appendix F

### LED approved luminaire list (AT-LALL)

Auckland Transport LED approved luminaire list (AT-LALL)					
Manufacturer & Luminaire	Luminaire Model	System Wattage (W)	LED Count /Module	Category	Supplier
AEC A2 LED	A2 LED	37 - 71	20-30	P only	Techlight
AEC LED-in (ST/OC)	4.5-18 - 4.5-90	28-145	18-90	P and V	
	4.7-27 - 4.7-54	60-118	27-54	P and V	
AEC Italo	Italo 1	15 - 35	1 - 2 M	P only	Techlight
	Italo 1	15 - 103	1 - 4 M	V	
	Italo 2	60 - 154	4 - 8 M		
	Italo 3	132 - 289	7 - 15 M		
DLEDS Stratos	Stratos N 6M W23A only	12 - 35	6	P only	Globelink
Betacom GL520P	GL520 Premium Driver - Optic 5032	29 (33 max)	24	P only	Betacom (1988) Ltd
Scheder Teceo	Teceo 1 - Optic 5068 Only	35 max	24	P only	
	Teceo 2 - Optic 5118 Only	86 - 279	80 - 128	V only	
Iguzzini Wow	Wow Mini - BU59/60/62/63	37/29/31/35	24	P only	ECC Limited
	Wow Small- BH34/38/41	38/68/80	24	P and V	
	Wow Large - BH59/60	118/116	24	V only	
CREE	LEDway XIL 3M Optic 'Series E'	Up to 35	20 (525mA)	P only	Advanced Lighting Technologies
	LEDway XIL 3M Optic 'SeriesE'	Up to 35	30 (350mA)	P only	
	LEDway XIL 'Series E'	35 - 279	Up to 120	V only	
	Edge Round/Square Series E	Up to 66 (max)	40 (350mA)	P only	
	XSP1	52	N/A	V only	
	XSP2	101 - 153	N/A	V only	
LED Roadway Lighting (LRL) NXT Series	NXT-24S - 4AH	28 (max)	24	P only	EnergyLight
	NXT-48M	53 - 108	48	V only	
	NXT-60M	65 - 133	60		
	NXT-72M	78 - 158	72		
Orangetek Ltd	TerraLED Mini WX1 & MX1	12 - 36	12 - 30	P only	Orangetek Ltd
Philips	Stela+Gen 2	36 (max)	24	P only	Kendellier Lighting
Sylvania	StreetLED ( Aero screen only )	26.7	18	P only	Aesthetics Lighting
KTL	KTL Shard	28	Cluster	P only	Brilliant Limited

Note: The blue shaded areas are the luminaires suitable for subdivisions. This is the approved list as at August 2015.

## Appendix G

### V and P Category Calculator Tools for Road Classification

V category calculator tool <https://at.govt.nz/media/1972108/street-lighting-category-v-road-calculator.xlsx>

P category calculator tool <https://at.govt.nz/media/1972107/street-lighting-category-p-road-calculator.xlsm>

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