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## 10. ELECTRICAL AND STREETLIGHTING

### 10.1 INTRODUCTION

- a) The purpose of the Electrical Utilities section of the Land Development Manual is to ensure that all electrical cabling is designed and installed to meet Council and network line operator expectations.
- b) The standards ensure that community expectations for electricity and streetlighting are met in a safe and efficient way, and that access to all underground services is achieved with a minimum of disruption.

#### 10.1.1 Objectives

- a) The objectives of the electrical utilities standards are as follows:
  - 1) All new electrical infrastructure meets the needs of people and communities for electricity and streetlighting;
  - 2) All new electrical infrastructure is located within public land, and/or is legally and physically protected where it is located on private property;
  - 3) Access to underground cabling is ensured for ease of repairs and maintenance, with a minimum of disturbance;
  - 4) The location of all electrical services is clearly marked;
  - 5) Streetlighting has been provided to ensure personal and traffic safety; and
  - 6) Streetlighting shall be in keeping with the amenity and character of the environment.

#### 10.1.2 Key References

- a) All electricity and streetlighting infrastructure shall be consistent with the standards set out in Table 10-1. Where a Standard or document is referenced this shall be the current version including any associated amendments.

**Table 10-1 External Standards and References for Electrical Utilities**

Standard / Reference	Description
	Nelson City Council Resource Management Plan
AS/NZS 1158.0:2005	Road lighting – Introduction
AS/NZS 1158.1.1:2005	Road lighting – Vehicular traffic (Category V) lighting – Performance and design requirements
AS/NZS 1158.1.3:1997	Road lighting – Vehicular traffic (Category V)

Standard / Reference	Description
	lighting – Guide to design, installation, operation and maintenance
AS/NZS 1158.2:2005	Road lighting – computer procedures for the calculation of light technical parameters for Category V and Category P lighting
AS/NZS 1158.3.1:2005	Road lighting – Pedestrian area (Category P) lighting – Performance and design requirements
AS/NZS 1158.4:2009	Road lighting – Lighting of pedestrian crossings
AS/NZS 1158.5:2007	Road lighting – Tunnels and underpasses
AS/NZS 1158.6:2004	Road lighting – Lighting for roads and public spaces - Luminaires
Electrical Act 1992	Electrical safety regulations 2009 Design of reticulation
NZ Electricity Code of Practice	Current and voltage ratings
AS/NZS3000	Electrical installations (Australian/New Zealand wiring rules)
Line Owner	Design and Construct and Distribution Codes

### 10.1.3 Interpretation

- a) "Electricity (Network) Operator" means any person (company) declared (by the minister) under section 4 or section 4a of the Electricity Act 1992 to be an Electricity Operator. A list of current Electricity Operators is held by the Ministry of Economic Development and is available on their website.
- b) "Line Owner" means any person or Company that owns Works that are used or intended to be used for the conveyance of electricity.
- c) "Works" means all "Works" that are owned by the "Electricity Operator" and form part of the Electricity Operator's Electrical Reticulation System or "Network". It has the meaning as per the Electricity Act 1992 sec 2.
- d) "Network Connection Point" means the point where a service main connects to a Line Owner's Works. This point is the demarcation point (typically defined by a fuse) between the Line Owner's Works and customer owned cables.
- e) "Service Main" or "Mains" is the term for the cable (fitting), owned by the owner of a premises and connecting a premises to the Line Owner's Works at a network connection point.
- f) "Point of supply" means the point at which the Line Owner responsibility ends. It has the meaning as per the Electricity Act 1992 sec 2.

## 10.2 ELECTRICAL RETICULATION

### 10.2.1 General

The following general standards and conditions apply to the provision of electrical utilities:

- a) All new Works and service main will be by underground cabling in urban areas.
- b) All new service mains will be by underground cabling in "rural areas" or as amended by Clause 10.2.56 d).
- c) Reinforcement or replacement of existing overhead Works will be by underground cabling apart from specific exemption from Council. This will not exclude the Line Owner carrying out any maintenance (replacement or upgrade) of existing works as long as the land will not be injuriously affected as a result of the maintenance (replacement or upgrade).
- d) Any dispensations (exceptional circumstances) given by either the line owner (for dispensation from its own electrical design and construction standards) or Council (for dispensation from its Land Development Manual) shall be in writing and shall indicate which section and subsection of the relevant standards the dispensation applies to.
- e) Existing allotments with no "power to the boundary" and requiring an electrical supply will be by underground cabling.
- f) All Works assets to be vested with the line owner or Electricity Operator will meet their respective design and construction standards and distribution code.
- g) Any underground or overhead Works cable being vested with the Electricity Operator and installed on any titled land will be secured by way of an easement in favour of the Line Owner. See section 10.2.7
- h) Service main exclusive fittings owned by a third party will also have private easements registered outside the point of supply if the route crosses titled land not owned by the third party. See section 10.2.87.
- i) Where a boundary is adjusted enabling a lot to contain an installation Council will require confirmation from the Line Owner that the existing Works is sufficient to supply another installation.
- j) Designers are to liaise with other service authorities to achieve economical use of road reserve area with due consideration given to ease of maintenance to the Works system and other services in the road reserve area.

### 10.2.2 Design

The following standards apply to the design of all electrical infrastructure:

- a) The design of the Works shall, as a minimum requirement, comply with the current Electricity Regulations and the requirements and standards of the line owner.
- b) The design of the Works shall give consideration to the likely electrical demand requirements per lot and allow for this in the initial design.
- c) Residential subdivisions should allow a minimum of 15kVA with diversity per lot and industrial subdivisions should allow a minimum of 40kVA without diversity per lot.
- d) The minimum electrical demand design criteria per lot and allowable after diversity maximum demand factor, shall be to the requirements of the line owner.
- e) All new residential, commercial and industrial subdivisions shall be reticulated with underground cabling running along each side of the road reserve. Council may allow dispensation for a single sided reticulation in exceptional circumstances (e.g. where allotment frontages are greater than 30.0m in length).
- f) Provision shall be made by land developers for the continuation of appropriate cabling along road frontages to facilitate the Works of adjoining future development. This may be achieved by the installation of cable ducting systems. Council may waive this requirement where it is demonstrated with approval from the line owner that adjacent sub-dividable land may be reticulated from another suitable route.
- g) Consideration shall be given to the future extension or reinforcement of the Works system without necessitating major road reserve disturbance to achieve such expansion or reinforcement. Where appropriate spare, ducting shall be installed along routes likely to be used for an extension, or reinforcement of the Works.
- h) Road crossings for power cables shall be kept to a minimum and where necessary, shall be at right angles to the carriage way and have minimum cover of 900mm.
- i) The typical design position for electrical cabling in road reserve is parallel with and 600mm from the boundary.

### 10.2.3 Cabling, Ducting and Service Boxes

These standards relate to the installation and design of cabling, ducting and services:

- a) Access to a three phase power supply shall be provided at the boundary of the road frontage of each lot of an industrial, commercial or residential subdivision.
- b) Rights-of-way not longer than 60.0m may have individual service duct systems (orange 50mm minimum diameter PVC to AS/NZS 2503 and wide swept bends) or appropriately sized service mains cable installed from a service box on the road frontage down the right-of-way to each rear allotment.
- c) Rights-of-way exceeding 60.0m to any allotment shall have an appropriate power cable installed to the main body of the rear allotments.
- d) Fusing and "network connection points" shall be to the satisfaction of the line owner. No service duct system extending from a service box, within a right-of-way shall be longer than 60.0m. No service duct system in road reserve shall be longer than 10.0m.
- e) Where either the service mains or the line owner's Works is installed within the sealed area of a right of way the cable is to be installed within a duct or a spare duct is to be laid beside the cable.
- f) Appropriate registration of Easements In Gross to the line owner's requirements shall be provided by the landowners prior to livening for all Works titled land. Where service cables cross others properties or right-of-ways private easements between lots will be required prior to livening.
- g) Where multiple driveways make it impractical to position a service box at a common boundary between lots or where a narrow road frontage width of a lot makes the location of a service box vulnerable to damage, it is permissible to install a service duct (orange 50mm minimum diameter PVC) in the road reserve from a service box offset no more than 10.0m from the affected lot.
- h) Any ducting systems installed in the road reserve area shall be considered as part of the Works system for the purpose of as-built records.
- i) Any excavation within the existing road reserve is subject to Council's approval including the National Code of Practice for Utilities Access to the Road and Rail Corridors and a Corridor Access approval issued by Council.

### 10.2.4 Location and Capacity

The following standards and conditions relate to the location of cabling and capacity of the Works:

- a) Voltage drop shall be no greater than permitted under the current Electricity (Safety) Regulations and the requirements and standards of the line owner.
- b) Current ratings shall be in accordance with Line Owner's design and construction standards, and relevant legislation.
- c) The design shall take into account the requirements of section 10.2.2 with specific attention given to the following details relating to likely electrical loads:
  - 1) Lot size in relation to permissible coverage and anticipated usage of the lot (e.g. multiple dwellings, cross-lease and potential subdivision permitted within the zoning).
  - 2) An appropriate after diversity maximum demand factor.
  - 3) The design of the Works shall give consideration to the likely electrical demand requirements per lot and allow for this in the initial design. Residential subdivisions should allow a minimum of 15kVA with diversity per lot and industrial subdivisions should allow a minimum of 40kVA without diversity per lot.
  - 4) Future load growth and Works expansion or reinforcement.
- d) Existing overhead electrical cabling shall be dealt with in accordance with section 10.2.6.

### 10.2.5 Subdivision Requirements

The following standards apply to the reticulation of electricity within the subdivisions process:

- a) Any variations (change to resource consent conditions) issued by Council from resource consent conditions shall be in writing and shall specifically state which condition the dispensation applies to, including how the condition is to be met.
- b) New allotments shall be serviced with live 400/230v Works to the boundary of each lot.
- c) Rear lots down right-of-ways or through front lots may have ducts provided from the road reserve frontage to the rear lots ready for future service mains installation at the owner's cost. Exceptions are catered for where it is impractical to position a supply at a boundary.
- d) Where practical, existing overhead 400/230v Works or "service mains" crossing new subdivisions shall be placed underground.

- e) High voltage power lines (greater than 1000 volts) across new subdivisions shall be relocated clear of the subdivisions or placed underground with the agreement of the line owner. Dispensation may be granted by Council where it is demonstrated to be impractical to achieve this requirement.
- f) In remote rural subdivisions where the allotments have a large land area and it is demonstrated that the lots are not intended for habitable dwellings or buildings ancillary, Council may waive the requirement for the supply of Works to the boundary. A consent notice will be required noting that the site will not have an electrical supply.
- g) Where Works referred to in the above paragraphs is not practically accessible or economically viable, local generation e.g. Hydro, solar, wind, may be considered as an alternative. It should be demonstrated that local electrical generation of 3kWhr minimum sustainable storage capacity over a 24-hour period per household is feasible for supplying lighting and small electrical appliances with alternative fuel for heating and cooking.
- h) All new subdivisions reticulated with service boxes or poles shall have service ducting (50mm orange PVC electrical duct) from the pole or box to 1.0m within the property it is intended to supply. Wide sweeping bends shall be used. Service ducting shall be 1.0m deep, 900mm cover. Duct ends shall be clearly marked within properties, and fixed by measurement to survey points or other permanent fixtures on as built records.

### 10.2.6 Rural

- a) Recognising the extent of 11kV Works in the rural sector, together with the difficulty and high cost of providing underground 11kV cabling, Council may in accordance with Section 35 of the Electricity Act and at its discretion and in agreement with the line owner, allow overhead 11kV Works and associated substations in the rural sector.
- b) Easements In Gross are to be provided by the land owner, in favour of the line owner, for all new or altered Works over private property. All proposed electricity easements over private property, whether the land is owned by the developer or not, must be listed under a memorandum of Easements In Gross on the subdivision plans.
- c) Substations may be located on lot boundaries or within the subdivided lots to enable an adequate electrical supply to specified or potential building sites on the allotments.
- d) 400/230v Works and service mains to individual premises shall be by underground cable unless precluded by ground profiles or other impediments in which case Council may grant dispensation for overhead cables to traverse the area concerned.



- e) Network connection points to individual lot boundaries shall be located to provide practical and legal access for service mains to specified or potential building sites.
- f) Where the length of a service mains cable exceeds 200.0m from a network connection point to a specified or potential building site, the Works designer shall state on the application drawing, the proposed service mains cable size and design criteria applicable to the lot.
- g) Subject to existing load and future development the line owner may approve the use of an existing two phase 11kV overhead line for residential and general farming purposes where it is demonstrated that three phase power is not likely to be required for the management of the land (e.g. irrigation). The design of any two-phase 11kV line extension should be to a standard whereby a third phase can be run or livened without changes to poles, cross-arms or guys.

### 10.2.7 Easements

- a) It is the responsibility of the Developer to ensure that all easements are obtainable. The Developer shall, where necessary and at their expense, provide any easements and obtain any formal consents required for overhead lines, underground cabling and equipment to be installed or altered in, on, under or over property other than road reserve.
- b) Easements In Gross with the line owner as the grantee/transferee shall be obtained and registered on all private land.
- c) Easements are required in the following cases but shall not be limited to:
  - 1) Where new works (lines or cables) are located on private properties.
  - 2) Where a padmount substation, switching station or transformer is to be located on other than road reserve.
  - 3) Where an overhead line located in a legal road intrudes into a privately owned property. This applies especially to crossarms and conductors where air space is encroached.
  - 4) Where an existing service main is physically altered, shifted or its status is changed, for example, to supply a new separately subdivided property.
  - 5) Where a network cable is used to supply lot(s) in right-of-ways or access lots.
- d) Conditions imposed in the consents granted by Council under section 220 of the RMA generally do not fully describe conditions required by the line owner particularly in relation to easements where neighbouring properties are affected by new or altered network systems. The line owner will have separate conditions that should be met to ensure, for instance, that perpetual right is gained

for new or altered works and the status of those works cannot be compromised by aggrieved property owners wishing to contest the line owners interests. A risk of stranding customers is not an option.

- e) Easements required on land being developed under subdivision consent must be described under a memorandum of easements. Land outside the subdivision and affected by new or altered network system changes must also be described in a memorandum of easements. Where lot servicing is able to be satisfied using service mains in right-of-ways or access lots, easements shall be prescribed on the deposited plan.
- f) Where service mains are used to service lots on a shared right-of-way, access lot, or across private land then an easement in favour of the line owner is not required. However, an easement between the respective parcels of land is necessary with the wording "right to convey electricity, telecommunications and computer data" entered as the purpose description.
- g) The line owner will not connect new works or allow alterations to its network system which constitutes new work by definition in the Electricity Act 1997 and subsequent amendments, until an Easement In Gross has been acknowledged and receipted by the district land registrar on the properties affected. This requirement may be waived for subdivisions approved by Council under section 220 of the RMA where property outside the subdivided property is unaffected and subdivision deposited plans with relevant transfers are lodged to the satisfaction of the line owner.
- h) Works are to be vested with the line owner prior to connection and livening, and registration of the easement. A separate agreement will be required to confirm vestment conditions and will be signed by approved signatories.
- i) Overhead lines require 6.0m wide easement corridors symmetrical to the actual line route.
- j) Underground cables require 3.0m wide easement corridors symmetrical to the actual cable route.

### 10.2.8 Physical Location

- a) Service boxes shall be set back 250mm from section boundaries and are to be clear of designated vehicular access and pedestrian ways by a minimum of 1.2m along the boundary and 700mm diagonally to the nearest point where the driveway tapers out to the kerb.
- b) The minimum spacing of any service box from any boundary line or survey peg shall be 250mm so as to enable future fencing construction.
- c) Cable and duct locations in the road reserve area shall be in general accordance with SD 1001, being 600mm from section boundaries at

a nominal laying depth of 1.0m (900mm cover) with provision for shared trenching with communication services.

- d) Cable and duct locations down right-of-ways shall, where possible be located 600mm from a boundary in a berm area where provided. Otherwise, the centre of the right-of-way is the preferred location. The standard cable depth shall be 1.0m (900mm cover) and may be in a common trench with water and communication services as shown in SD 1002. Individual consumer service mains cabling or ducting, within a right-of-way, shall be 600mm minimum depth as shown in SD 1002. Any cable installed under seal within a right-of-way must be installed within a duct or with a spare duct beside it.
- e) Appropriate mechanical protection shall be provided for any underground Works in accordance with the Line Owner's design and construction standards and appropriate legislation. Cable marker warning strip shall be placed along all cable routes at half the cable trench depth.
- f) In addition, where Works cables are on private property (excluding right-of-ways), visible above ground warning markers shall be placed where cables change direction and in between not more than 10.0m spacing in all but rural areas where the minimum spacing shall not be more than 20.0m. The warning markers shall be as stated in the line owner's design and construction standards.
- g) Road crossings for Works cables shall be in 100mm minimum orange electrical PVC ducts to the line owner's requirement at a depth of 1.0m (900mm cover).
- h) At all sites where cable is installed cable marker warning strip shall be placed along the cable route at half the cable trench depth unless the cable is mole-tunnelled or drilled and ducted.

### 10.2.9 Specific Installation Requirements

- a) Substations shall be of adequate design capability to supply the anticipated after diversity maximum demand with due consideration to section 10.2.4.
- b) Ground mounted substations will be permitted within new residential, commercial and industrial subdivisions.
- c) Pole mounted substations may be permitted in rural subdivisions.
- d) Pole mounted substations may be allowed in existing overhead Works.
- e) Substations shall be located in the berm, clear of designated vehicular access ways by a minimum of 1.0m and close to section frontages (but no closer than 300mm) or, in a recess into a lot or a public reserve, secured either by easement or preferably designated as road reserve. The line owner is to determine the size of the recess.
- f) Adequate public protection shall be provided at all substation sites, giving consideration to:

- 1) Earthing (NZECP 35);
- 2) Physical location to minimise the risk of damage by vehicles; and
- 3) Security to protect against public access to electrical contents.

#### 10.2.10 Design Approvals

Prior to any works commencing on site, the following requirements shall be submitted and approved:

- a) A Line Owner's approved electrical Works design plan and the designated street light connection point.
- b) The plan shall bear a design statement covering the following:
  - 1) Before diversity load per lot (i.e. 15 kVA per residential lot).
  - 2) Compliance with the line owner's design and construction standards.
  - 3) Compliance with the Land Development Manual.
  - 4) A list of easement requirements for any Works on titled land to be vested with the line owner and a list of reciprocal rights for service mains cables or ducts over shared right-of-ways or easements for service mains cables crossing titled land.
- c) Council signed approval of the design plan (for subdivision or large area Works).
- d) Prior to the 224 certification stage (for subdivision), the following details shall be forwarded via the Designer to Council:
  - 1) A letter of acceptance by the line owner confirming that:
    - As built documentation has been filed for network extensions and/or service mains; and
    - The Works has been livened and fulfils the line owner's design and construction standards and any other line owner requirements.

#### 10.2.11 Cable Locations

- a) The location and layout of the Works shall be shown on the design plan, with all variations authorised by the network line operator's representative.

- b) A shared services trench is likely to be the most economic option. Separation between the services in subdivisions is required. These will be detailed in the laying specification. However, safe working distances are required for all services within minimum separations for power cables. Table 10-2 shows the minimum clearances between power and telecommunications cables. SD 1001 - 1003 show the general layout of services.

**Table 10-2 Minimum Separations Between Power and Telecommunications Cables**

Voltage and cable type	At Crossings		On Parallel Runs	
	With protection	Without protection	With protection	Without protection
LV, neutral screened, or armoured	50mm	150mm	50mm No limit to length	300mm No limit to length
LV, neutral unscreened, or unarmoured	50mm	450mm	450mm No limit to length	450mm No limit to length
HV, single and multicore	150mm	450mm	450mm 2.4km limit to length	450mm 2.4km limit to length
<p>LV power cable is defined in the current electricity regulations as "any voltage exceeding 50 volts a.c. or 120 volts ripple free d.c. but not exceeding 1000 volts a.c. or 1500volts d.c.</p> <p>HV power cable is defined in the current electricity regulations as "any voltage exceeding 1000 volts a.c. or 1500 volts d.c.</p>				

- c) Protection shall take the form of either:

- 2) 50mm thick non metallic reinforced concrete slabs (usually 150mm wide and 500mm long); or
- 3) 100mm x 50mm ground retention treated timber with a minimum specification of the New Zealand Timber Preservation Authority classification h4 group b; or
- 4) 5mm polymeric cable cover.

- d) The depth and offset of trenches will be specified on the laying plan. It is essential that these be maintained. Minimum cover shall generally be 450mm in footways and 600mm in roadways.

- e) All services crossing the proposed duct pipe route shall be exposed and the necessary clearances maintained to enable other network line operator's ducts to be installed either above or below these other services. Telecommunication ducts shall be laid above power cables, but not directly above.
- f) All joints in duct pipe shall be water tight and may be glue jointed with solvent cement or rubber ring seal, depending on the ducting supplied. The rubber "o" ring sealed pipe is the preferred type of duct and will replace solvent cement glued ducting in the long term.
- g) The base of the trench shall be level with large objects removed. The duct pipe shall be bedded in suitable fine soil or pea metal if required. The suitability of the bedding material will be assessed by the Network Owner representative.

### 10.2.12 Records

- a) The network utility operator shall keep and maintain as-built records of their Works within the road reserve and on private property where the reticulation will be owned by the Line Owner in accordance with the Electrical (Safety) Regulations 2009.
- b) The Line Owner shall ensure that they receive and maintain as-built records of the Works and ensure that such records are made available upon request and as required, mark out cable routes on site for council or contractors carrying out works.
- c) Provision of as-built drawings for planned works shall be made available with 5 working days notice during normal working hours and for emergency call outs with no prior notice at any time.

## 10.3 ROAD LIGHTING

### 10.3.1 General

- a) The lighting design must maximise safety and efficiency while minimising the life cycle cost and impact on the environment.
- b) Lighting shall be designed to match the style, height and spacing of adjoining sections of road that have the same hierarchical classification.
- c) Lighting should 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. A tilt angle of 2.5% is set to achieve consistency across the network and reduce unwanted light spill. A tilt angle variation may be accepted only on approval by Council.
- d) The design must comply with all the appropriate New Zealand Standards, in particular the requirements of AS/NZS 1158. Anything not specified within the Land Development Manual is specified in those standards.

### 10.3.2 Lighting Hierarchy

- a) Roads and accessways will fall into the following roading hierarchy classifications (refer Section 4 Transport) and the lighting level associated with that classification is given below:
  - 1) Local Roads and Residential Lanes      Category P4
  - 2) Cul-de-sacs                                      Category P4
  - 3) Collector or Industrial                      Category V4 or P3
  - 4) Arterial and Principal                      Category V3 or V2
  - 5) Pedestrian Accessway                      See Table 10-3
- b) Category V lighting should provide a lighted environment conducive to the safe and comfortable movement of vehicular and pedestrian traffic at night.
- c) Design the lighting to accord with AS/NZS 1158.1:2005 Road lighting – Vehicular traffic (Category V) lighting.
- d) Category P lighting should assist pedestrians to orientate themselves and detect potential hazards, and discourage fear of crime and crime against the person.
- e) 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.
- f) The streetlight design must be certified by a suitably qualified and experienced lighting professional. This shall be endorsed on the plan.

### 10.3.3 Use of White Light

- a) White light has a number of benefits over conventional 'yellow' light. White light produces better colour rendition allowing objects to appear their natural colour at night, improving perceptions of security and wellbeing. White light also benefits city centres, commercial areas and historical and tourist attractions by making them appear more natural and inviting, increasing visitor numbers. Additionally, there is growing evidence that white light may reduce reaction times.
- b) Metal halide (MH), compact fluorescent (CFL), or new generation metal halide (NGMH or Cosmopolis) lamps produce a white light, in comparison to high pressure sodium (HPS) lamps which produce a more yellow light.
  - 1) White light is to be provided in the following areas:
    - Nelson city centre
    - Commercial areas with heavy pedestrian usage in the night
    - Areas of significant tourist, historical, amusement and entertainment interest

- Public transport terminals and interchanges
- Areas with security cameras
- Pedestrian or cycle areas (actively used at night).

c) The column height and minimum wattage in Table 10-3 applies to installations of high pressure sodium lamps only. Where another lamp type is to be used, the proposed design must be approved by the Engineering Manager.

**Table 10-3 Road Lighting Standards by Roothing Hierarchy**

Road Hierarchy	Lighting Category (AS/NZS 1158)	Column Height (Minimum)	Luminaire (Min Wattage)	Lamp type	Post Top Luminaires
Arterial	V2	By design	150W	HPS	NO
Principal	V3	By design	150W	HPS	NO
Collector or Industrial	V4 or P3	By design	100W	HPS	NO
Sub-collector	P3	8.5m	100W	HPS	NO
Local	P4	7.5m	70W	HPS, MH or CFL	NO
Cul-de-sac (includes Residential Lanes)	P4	5.5m for post top, 6m with outreaches	70W	HPS, MH or CFL or NGMH	YES
Rural	Flag lights only	8.5m	70W	HPS	NO
Pedestrian accessways (actively used at night)	Evaluated on case by case basis (P2, P3 or P4) see AS/NZS 1158	By design	By design	MH or CFL or NGMH	NO

Note 1: Light spacing shall be designed to meet the requirements in AS/NZ 1158.

Note 2: All luminaires must have a light distribution style with a UWLR (upward waste light ratio) of less than 1%.

Note 3: All luminaires shall have a tilt angle of 2.5%, which has been set to achieve consistency across the network and reduce unwanted light spill. This will reduce the likelihood of luminaires being installed at a negative angle. A tilt angle variation may be accepted only on approval by Nelson City Council.

Note 4: Where existing luminaires are already installed on part of a Local Road (including Cul-de-sacs or Residential lanes) then any extension of that road shall match the style, height, spacing and lamp type/light colour of the existing lights.

Note 5: Intersections will require specific design, except intersections which carry or may carry a combined through ADT traffic volume less than 1000 vehicles/day. All intersections shall comply with the standard intersection layout diagrams in Appendix F as a minimum.

Note 6: The Council prefers to light only those accessways and cycleways that receive high night-time use. Lighting shall be provided where necessary in a manner that is consistent with the Nelson City Council *Safer by Design - Crime Prevention Through Environmental Design (CPTED) Guidelines*. Consideration shall be given to the brightness, placement and coverage of any lights to ensure adequate illumination where necessary and to prevent adverse effects on adjacent landowners from light spill

Note 7: All lighting designs must be submitted to Nelson City Council for approval.



### 10.3.4 Pedestrian Crossings

- a) Lighting levels shall meet the requirements of AS/NZS 1158.4
- b) The approved luminaire type installation requirements are as shown in Appendix D.

### 10.3.5 Flag Lighting

- a) Rural Road Flag Lights shall be installed as per clause 3.5 of AS/NZS 1158.1.1.2005.

### 10.3.6 Luminaire, Column and Lamp Types

#### 10.3.6.1 Luminaire types

- a) All luminaires shall meet the requirements of AS/NZS 1158.6:2004. Verification shall be by the independent test reports. Any such luminaires will also need to meet the Engineering Manager's approval in terms of expected whole of life cost. Whole of life costs are to be measured over a 20-30 year lifetime. Appropriate luminaires will be listed on the Council "Approved Luminaire List". See Appendix A.

- b) Luminaires may be deleted from that list if the engineer deems them to be causing lifetime costs greater than 20% above the average of similar luminaires.

Note: Maintenance lifetime costs of "conventional" luminaires are likely to be significantly less than those of "decorative" luminaires.

- c) Luminaire components and fastenings shall be stainless steel or aluminium. No plated or painted steel components are permitted. Plastic components are permitted as long as they are UV and heat resistant.

- d) Luminaire control gear shall be mounted on easily removable "modular" trays to minimise replacement expense.

- e) Appendix A also gives details of luminaire "style" (classification). This classification is generally to distinguish between the various common references of named types as "conventional", "heritage", "post top" etc.

- f) A minimum Ingress Protection Rating of IP 65 is required for conventional luminaires, and IP 54 for heritage and post top style luminaires. (The first number is for dust, the second for water.)

- g) Luminaires will be added to the Approved List at the discretion of the Engineering Manager, provided they meet the criteria in section 10.3.10 Additions to Approved Lists. Performance curves for lamp mortality and lumen depreciation should be supplied.

### 10.3.6.2 Columns

- a) See Appendix C for approved types.
- b) Column types will be added to the approved list by being approved by the Engineering Manager.
- c) Columns and outreaches shall meet the requirements of the relevant AS/NZS standards:
  - 1) AS/NZS 4065:2000
    - Concrete utility services poles
  - 2) AS/NZS 4677:2000
    - Steel utility services poles
  - 3) AS/NZS 4676:2000
    - Structural design requirements for utility services poles
  - 4) AS/NZS 4680:2006
    - Hot-dip galvanised (zinc) coatings on fabricated ferrous articles
- d) If column set back complies with the requirements of AS/NZS 1158.1.1 and AS/NZS 1158.1.3 recommendations – then “solid” ground embedded columns may be used.
- e) Frangible (impact absorbing) type shall only be used in high-risk crash locations.
- f) Octagonal steel columns are preferred for “conventional” style luminaires.
- g) Colours permitted (either gloss or matt):
  - 1) Black
  - 2) Wineberry international colour code IPT0016, new code Orica 57074
  - 3) Rangoon green international colour code 12B29
  - 4) Galvanised gray
- h) The painting system to be used shall be the Resene paint system Altex Devoe or a similar approved equivalent. The following methods shall apply:
  - 1) Devthan 379 (previously named E-line 939) used in all exposed marine environments
  - 2) E-line 929 used in all other locations

- i) Any new paint system will require a 5-year workmanship warranty from supplier.
- j) Paint covering around the ground line of modular galvanised columns shall be 100mm above and 300mm below the ground line.
- k) The painting system shall be applied over galvanised poles which meet hot dip galvanised standard AS/NZS 4680:2006. (Note this requires galvanising both inside and outside the pole.)

### 10.3.6.3 Column Locations and Spacing

- a) 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 5m from the boundary to allow for a future vehicle entrance.
- b) Position poles at least 1m 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 6m away from lighting poles and more clearance may be necessary for some tree species or if the tree is protected.
- c) Where possible, poles should be located close to reserves and other open spaces to provide light in these areas and improve safety.
- d) Consider traffic safety when placing lighting poles, especially when they are on or near bends, intersections, threshold treatments, road humps and roundabouts.
- e) For traffic safety reasons, position rigid poles to comply with 4.3.18 Clear Zones. Wherever the required setback cannot be achieved, it may be necessary to use frangible poles and locate the poles closer to the kerb.
- f) 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.
- g) The indicative spacing of lighting columns for 'Non-classified Roads' (based on the Legal Road widths specified in Table 4-4) are:
  - 1) Sub-Collector Roads – 45m
  - 2) Local Roads (Cul de sacs and Residential Lanes) – 50m
- h) 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.

- i) Wherever an existing 'Classified Road' intersects with a new 'Classified Road' or an existing 'Classified Road' being upgraded, apply whichever of the following options provides the higher lighting standard:
  - 1) The requirements of AS/NZS 1158 for such intersections.
  - 2) The provision of a new light position in the side road near the intersection.
- j) The first light from an intersection on a 'Non-Classified Road' road must be less than 10m away from the through road, measured from the kerb line. Where the lighting is attached to reticulation poles, this distance can be increased to 40% of the designed light spacing. The design light spacing requirements for the through road continue through the intersection.

#### 10.3.6.4 Lamp types

- a) The approved types, wattage and suppliers are listed in Appendix B.
- b) High pressure sodium HID Lamps shall meet the requirements of IEC 60662. They shall not have internal (integral) igniters.
- c) Metal halide lamps shall meet the requirements of IEC 60192.

#### 10.3.6.5 Other public lighting

- a) Lighting designs will be required to meet the appropriate level of AS/NZS1158.3.1.2005. Luminaires, lamps and column types are as listed in Appendix A, Appendix B and Appendix C respectively.

#### 10.3.7 Cable Ownership

- a) There are two ownership regimes of underground cables within Nelson City Council area. These are as follows:
  - 1) Nelson Electrical Ltd (NEL) area – All underground cables up to the fuse located in the base of the streetlight pole and all overhead cables shall be scheduled as the property of NEL. The cable from the fuse in the base of the streetlight pole up to the streetlight shall be scheduled as the property of Council.
  - 2) Network Tasman (NWT) area – All lanterns, control circuits, underground cables (except streetlight pilot cores in underground cables), relays and associated equipment up to but not inside of NWT service boxes or padmount transformers shall be scheduled as the property of Council.
- b) All unmetered lighting load connected to the Line Owners "Works" must have prior approval from the Line Owner. Any maintenance changes or new design details must include individual site details, lamp wattages and losses and proposed livening dates. Once connected, the livening date must be confirmed to the Line Owner within 48 hours, allowing the Line Owner 24 hours to enter details on the Electricity Commission Registry pursuant to the Electricity Governance Rules. All work involving streetlights directly

connected to the Line Owners "Works" may only be performed by AHC holders approved by the respective Line Owner.

### 10.3.8 Data Collection

- a) Prior to the issuing of the Section 224 Resource Management Act certification for new subdivisions the developer must submit street lighting as-built data, including GPS location of all columns. This information shall be supplied on the street light as-built data information sheet Appendix E.

### 10.3.9 Private Road Lighting

#### 10.3.9.1 Private road lighting (excluding amenity lighting)

- a) Private road lighting on private roads or ROW will only be permitted if the luminaires are on a separate metered circuit and a charging agreement is set up with owners and a power supply company.
- b) These need to be identified by an orange disc, 100mm in diameter, painted at the rear of the pole. The maintenance of these lights will be the owner's responsibility.
- c) The installation of privately owned road lights (owned by power company, or other private company) are not permitted on public roads.

#### 10.3.9.2 Amenity lighting

- a) Amenity lighting that is lighting for decorative purposes that does not serve to provide lighting for pedestrians, vehicles or direction signage is not permitted on legal road.

### 10.3.10 Additions to Approved Lists

- a) The approved lists of luminaries, lamps and columns offer a wide range of choice to developers when undertaking new subdivisions. The styles identified in the approved lists are those used currently in Nelson. An approved list of products introduces some control on the different styles and product types the Council must maintain and ensures consistency across the city.
- b) Council will consider adding new styles or product types to the approved list if the following criteria are met:
  - 1) The new product is different in style and design to the existing selection, and meets a specific design need or landscape concept for the development.
  - 2) The product meets the design criteria of this standard.
  - 3) The supplier can demonstrate a strong company profile, history of service and assurance of maintenance parts supply.
  - 4) New products demonstrate economic efficiency and economic use of power.

- 5) Whole of life cost is comparable to current approved products or better.
- c) Addition to the list is at the discretion of the Engineering Manager.

## Appendix A Approved Luminaire Types

### Conventional Style (Side Entry Mounting Spigot)

Luminaire Type	Manufacturer/ Supplier	Lamp size and type
AMBAR 2	Betacom	70w HPS
AMBAR 2	Betacom	100w HPS
AMBAR 2	Betacom	150w HPS
AMBAR 2	Betacom	70w Metal halide
AMBAR 2	Betacom	100w Metal halide
AMBAR 2	Betacom	150w Metal halide
AMBAR 3	Betacom	150w HPS
AMBAR 3	Betacom	250w HPS
AMBAR 3	Betacom	400w HPS
AMBAR 3	Betacom	150w Metal halide
AMBAR 3	Betacom	250w Metal halide
AMBAR 3	Betacom	400w Metal halide
2 Tone	Kendelier	35w Metal halide
2 Tone	Kendelier	70w Metal halide
2 Tone	Kendelier	150w Metal halide
2 Tone	Kendelier	45w NGMH
2 Tone	Kendelier	60w NGMH
2 Tone	Kendelier	90w NGMH
2 Tone	Kendelier	140w NGMH

Notes:

Refer to manufacturers brochures for details of the luminaires listed.

Suppliers will only be approved if they have ISO/AS/NZS 9002 Quality management systems in place and are registered as a quality supplier.

Heritage Style (Top Entry Mounting Spigot)

<b>Luminaire Type</b>	<b>Cat No</b>	<b>Manufacturer /Supplier</b>	<b>Lamp size and type</b>	<b>Location Restriction</b>
Ely	A,B,C	Windsor Heritage	400w to 70w HPS	CBD only
Windsor	Street	Windsor Heritage	100w to 70w HPS	Only Collector, Local, Cul-de-sacs, Lanes
Promenade	PA, PB, PC	Kendelier Kendelier	100w to 70w	Only Collector, Local, Cul-de-sacs, Lanes
Strand	A,B,C	Windsor Heritage	400w to 70w HPS	Only Collector, Local, Cul-de-sacs, Lanes

Post-Top Style (Bottom Entry Mounting Spigot)

<b>Luminaire Type</b>	<b>Cat No</b>	<b>Manufacturer / Supplier</b>	<b>Lamp size and type</b>	<b>Location Restriction</b>
GOUGHLITE PT 1000	GOUGHLITE PT1000	Betacom	70w HPS	Only Local Roads, Cul-de-sacs, Lanes
	B2001 70 HPS	Slyvania	70w HPS	Only Local Roads, Cul-de-sacs, Lanes
GOUGHLITE PT 1000	GOUGHLITE PT1000	Betacom	100w HPS (SONE)	Only Local Roads, Cul-de-sacs
Windsor	Street	Windsor Heritage	100w to 70w HPS	Only in Heritage Areas, Local Roads, Cul-de-sacs, Lanes
Renaissance	RN 25	Kendelier	150w to 70w HPS	Only Local Roads, Cul-de-sacs, Lanes
York	Salisbury	Windsor Heritage	70w HPS	Parks and Reserves, accessways



## Appendix B Approved Lamp Types

Notes:

1. Refer to manufacturers' brochures for details of the luminaires listed.
2. Suppliers will only be approved if they have ISO/AS/NZS 9002 Quality management systems in place and are registered as a quality supplier.
3. All High Pressure Sodium lamps shall require external igniters (there may be some specific noted exceptions), they will generally have tubular clear outer envelopes unless the luminaire optical requirements dictate otherwise.

Lamp Type	Cat No
70w High pressure sodium	Philips 70w SON/T
70w High pressure sodium	Osram 70w NAV/T
100w High pressure sodium	Philips 100w SON/T
100w High pressure sodium	Philips 100w SON/T
150w High pressure sodium	Philips 150w SON/T
250w High pressure sodium	Philips 250w SON/T
400w High pressure sodium	Philips 400w SON/T
125w Mercury vapour	Philips HPL/N 125
70w Metal halide	Philips CDM-TT Osram HCI-TT
100w Metal halide	Philips CDM-TT Osram HCI-TT
150w Metal halide	Philips CDM-TT Osram HCI-TT
250w Metal halide	Philips CDM-TT Osram HCI-TT
400w Metal halide	Philips CDM-TT Osram HCI-TT
45w New generation metal halide	Philips MASTER CosmoWhite 45W/628
60w New generation metal halide	Philips MASTER CosmoWhite 60W/728
90w New generation metal halide	Philips MASTER CosmoWhite 90W/728
140w New generation metal halide	Philips MASTER CosmoWhite 140W/728

- a) The maintenance contractor will ensure that the supplier attributes are adequate to give a reliable supply at reasonable cost.
- b) Other Mercury vapour MV are used but only to replace existing lamps.
- c) SON-T-Plus lamps are acceptable.

## Appendix C Approved Column Types

Notes:

1. Refer to manufacturers' brochures for details of the luminaires listed.
2. Suppliers will only be approved if they have ISO/AS/NZS 9002 Quality management systems in place and are registered as a quality supplier.
3. Outreaches will vary in length depending upon design and location. Curved or straight outreaches are acceptable.

Mounting Height	Cat No	Manufacturer / Supplier	Location Restriction
Varies	Varies	Spunlite Poles	All roads except CBD
Varies	Varies	CSP Pacific	All roads except CBD
Varies	New Castle	Windsor Heritage	Only on Collector, local, Cul de Sacs, Lanes
Varies	Cardiff	Windsor Heritage	CBD only
Varies	Oxford	Windsor Heritage	Only in Heritage Areas, local Roads, Cul de Sacs, Lanes
7.5m max	Manchester	Kendelier	Only on Collector, local, Cul de Sacs,
7.0m	Manarc	Kendelier	Only on Cul de Sacs,
5.0m	Putney	Kendelier	Heritage Areas and Cul de Sacs, Lanes

## Appendix D Pedestrian Crossing Lighting Requirements

### Approved Luminaires

- a) Luminaires must be compatible with lamps that produce white light and must be installed so the lighting performance is compliant with AS/NZS 1158.4 2009.

### Approved Columns

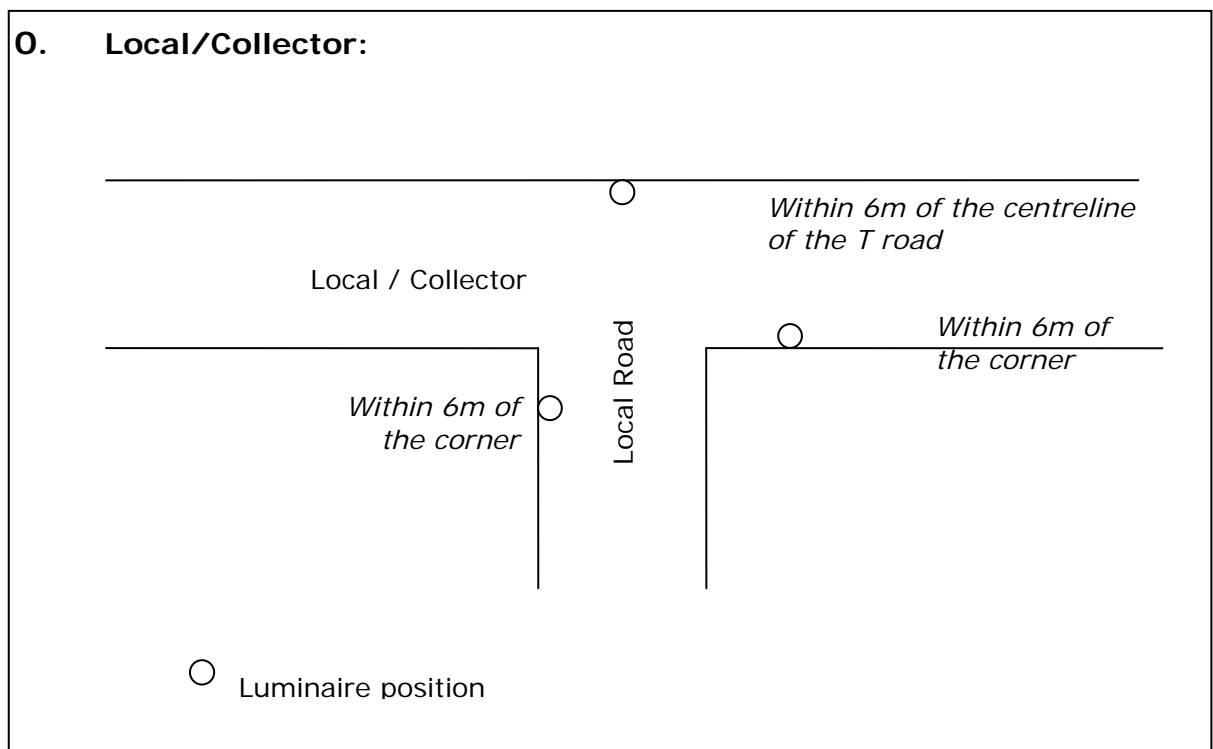
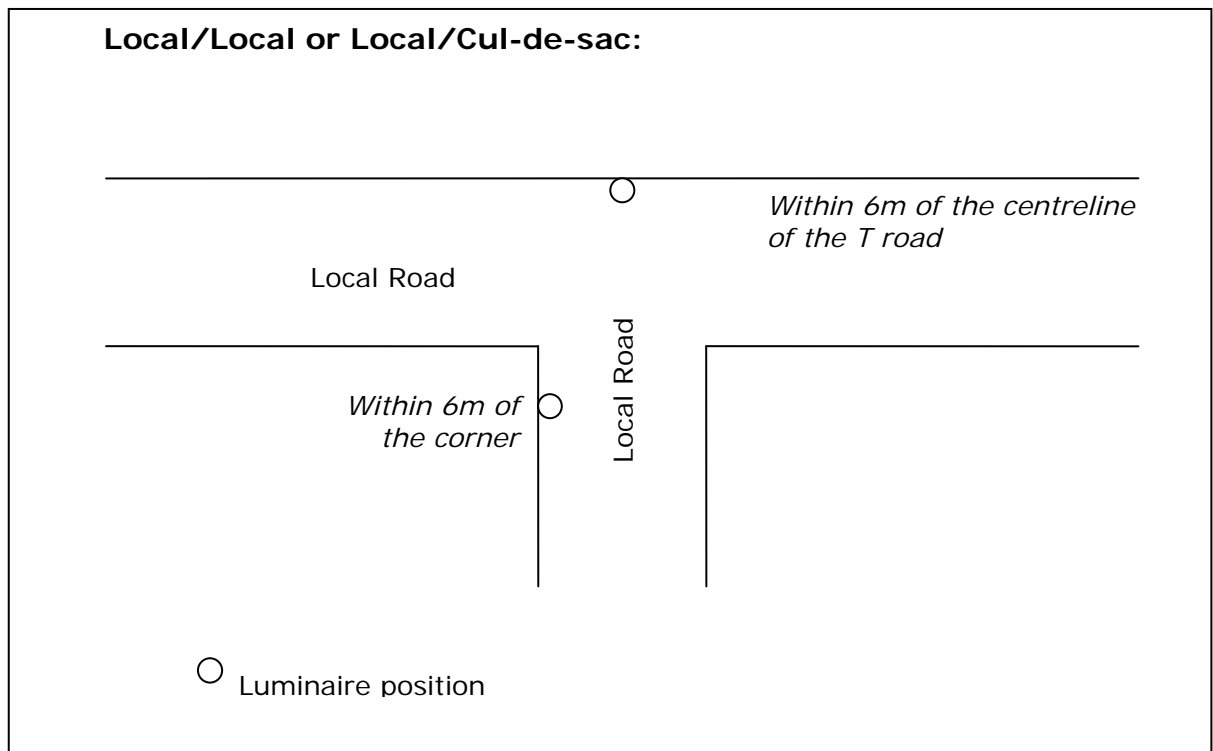
Mounting Height	Cat No	Manufacturer/Supplier
As per AS/NZS 1158	varies	Spunlite Poles
As per AS/NZS 1158	Oclyte pedestrian crossing pole	CSP

## Appendix E Streetlight Data Collection Form

## ROADLIGHT DATA COLLECTION FORM

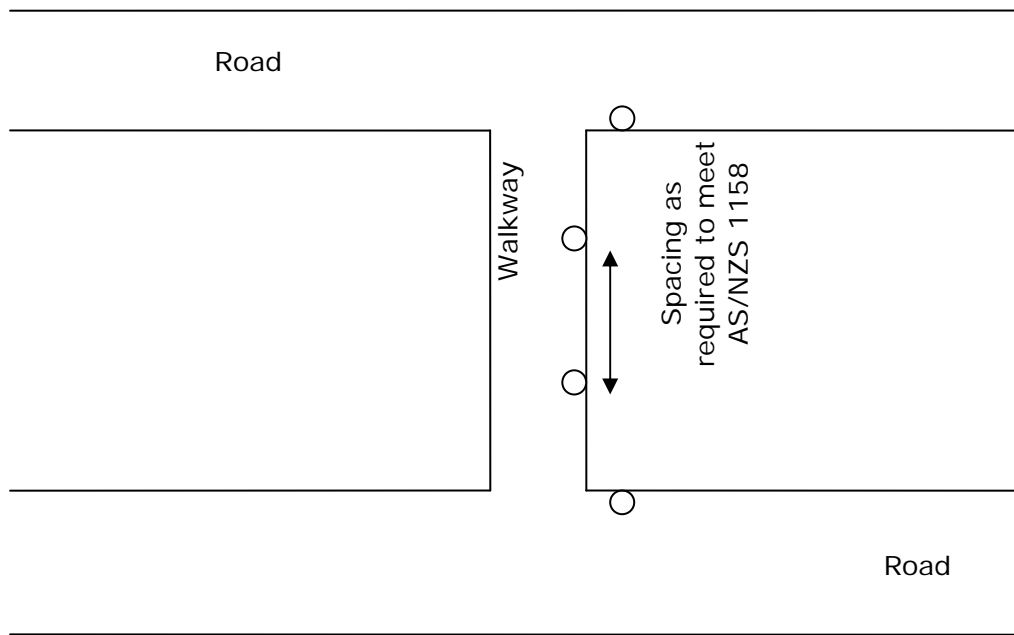
<b>LUMINAIRE NO:</b>		<b>INSPECTION DATE:</b>	
<b>LOCATION</b>			
<b>Roadname:</b>		<b>Side of Road:</b>	Left/Right/Centre/ Unknown
<b>House No.:</b>		Same Side / Opposite	
<b>Intersecting Road:</b>		<b>Side of Inters. Road:</b>	Left/Right/Centre/ Unknown
<b>Comments:</b>			
<b>POLE /COLUMN GENERAL</b>			
<b>Pole Owner:</b>	NCC / Telecom / Nelson Electricity / Network Tasman / Private / Other		
<b>Pole Purpose:</b>	Street lighting / Telephone / Electricity / Other		
<b>Control:</b>	Photocell / Relay / Time Switch / Other		
<b>Material:</b>	Concrete / Fibreglass / Steel / Spun Fibreglass / Wood		
<b>Shape:</b>		<b>Mounting Height:</b>	
<b>Make:</b>		<b>Condition:</b>	
<b>POLE IDENTIFIER</b>			
<b>Pole No.:</b>		<b>Power Board No.:</b>	
<b>Map Pole ID:</b>		<b>'X' Co-ordinate:</b>	
<b>GPS No.:</b>		<b>'Y' Co-ordinate:</b>	
<b>BRACKET</b>			
<b>Type:</b>			
<b>Mounting Height (m):</b>		<b>Outreach (m):</b>	
<b>Notes:</b>			
<b>LANTERN</b>			
<b>Luminaire Owner:</b>	Streets/Carparks/SH6/ROW(private)/Walkways/Ped. Crossings/Parks/Other		
<b>Make:</b>		<b>Model:</b>	
<b>Supply Point:</b>	Overhead / Underground / Other	<b>Transformer/ Service Box No.:</b>	
<b>Description:</b>			
<b>Network Owner:</b>		<b>Energy Supplier:</b>	
<b>CONTROL GEAR</b>			
<b>Make:</b>		<b>Model:</b>	
<b>Comments:</b>			
<b>LAMP</b>			
<b>Make:</b>		<b>Model:</b>	
<b>Lamp Type:</b>		<b>Lamp Wattage:</b>	
<b>Comments:</b>			
	<b>Signature</b>		<b>Date</b>
<b>Checked by Contractor</b>			
<b>Entered by SLMC</b>			
<b>Reviewed by NCC</b>			

**Appendix F Required minimum intersection layout for street light column locations**



Note: If there are existing luminaires along one side of a road it is not necessary to move them to the opposite side of the road to comply with these diagrams.

**Walkway from Road:**



○ Luminaire position