CHRISTCHURCH CITY COUNCIL

CONSTRUCTION STANDARD SPECIFICATION

PART 5 – LIGHTS

CSS: PART 5 2019

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1. FOREWORD

This Specification forms Part 5 of the Christchurch City Council Civil Engineering Construction Standard Specification (abbreviated as CSS). All parts of the CSS should be read in conjunction with each other and the Infrastructure Design Standards (abbreviated as IDS).

The full Specification includes the most recently published version of the following Parts:

CSS: Part 1 - General
CSS: Part 2 - Earthworks
CSS: Part 3 - Utility Drainage
CSS: Part 4 - Water Supply
CSS: Part 5 - Lights
CSS: Part 6 - Roads
CSS: Part 7 - Landscapes

Part 5 of the Standard Specification includes those Standard Details (SD) relating to this part only. The Standard Details (SD) are not to scale and all units are in millimetres (mm) unless otherwise shown. All rights reserved on Standard Details.

2. RELATED DOCUMENTS

The latest versions of the following documents shall be read and form part of this standard specification, together with revisions, replacements and amendments up to the date of calling tenders. The requirements of this specification supersede the requirements of any related documents listed or referred to within this specification, except acts of parliament. Where this document is referred to in a contract, the requirements of that contract supersede the requirements of this specification.

Christchurch City Council Infrastructure Design Standards 2018
https://www.ccc.govt.nz/consents-and-licences/construction-requirements/infrastructure-design-standards/download-the-ids/

Electricity Act 1992
Electricity (Safety) Regulations 2010
Electricity Distribution Network Owner's Standards and Specifications
Radiocommunications (Radio) Regulations 2001

NZS 3910: 2013	Conditions of contract for building and civil engineering construction
AS/NZS 1158.0: 2005	Road lighting - Introduction
AS/NZS 1158.1.1: 2005	Lighting for roads and public spaces - Vehicular traffic (Category V) lighting - Performance and design requirements

AS/NZS 1158.1.2: 2010	Lighting for roads and public spaces - Vehicular traffic (Category V) lighting - Guide to design, installation, operation and maintenance
AS/NZS 1158.3.1: 2005	Lighting for roads and public spaces - Pedestrian area (Category P) lighting - Performance and design requirements
SA/SNZ TS 1158.6:2015	Lighting for roads and public spaces - Part 6: Luminaires – Performance
AS/NZS 3000: 2018	Electrical installations
NZTA M30	Accepted Luminaires List
Ministry of Health Code of Practice for Safe Management of PCBs	http://www.health.govt.nz/publication/safe-management-pcbs-code-practice

3. SCOPE OF WORK

This specification sets out the requirements for the installation of lighting for legal roads, service lanes, cycleways and pedestrian accessways where these lights will be administered by the Christchurch City Council, as part of their Street Lighting Network.

Road lighting is typically connected to the Electricity Distribution Network Owner's network and in some cases lights are attached to their assets. Anyone carrying out work on or near the Electricity Distribution Network Owner's network must fully understand and comply with all Electricity Distribution Network Owner's requirements, including gaining the approvals required before starting work. The Electricity Distribution Network Owner's requirements are not included in this document. Orion NZ Ltd and MainPower NZ Ltd have networks in the Christchurch City Council area.

Where cabling will be vested and is outside of the legal road, it shall be constructed to the same standards as the adjacent Electricity Distribution Network.

4. APPROVAL OF MATERIALS, OPERATORS/CONTRACTORS, EQUIPMENT, LABORATORIES AND WORKMANSHIP

'Approved' in this document means:

- A material listed on the Approved Materials List, with a current Certificate Status and an Approval Status permitting that use;
- A Council-approved contractor authorised to do that specific work and listed on the relevant register;
- approved by the Engineer.

Schedules of approved materials and contractors can be found on the Christchurch City Council web page at:
www.ccc.govt.nz/consents-and-licences/construction-requirements/approved-materials-list/
www.ccc.govt.nz/consents-and-licences/construction-requirements/approved-contractors/

Unless otherwise specified, all construction materials and permanently installed equipment shall be new. Selected materials are specified in CSS: Part 1 - General.

Tenderers may offer alternative or recycled materials or equipment from that scheduled, provided that the Engineer has approved the alternatives prior to tendering.

Approved testing laboratories are IANZ accredited to carry out the particular test being requested.

5. EXISTING SERVICES AND TREES

All work in the vicinity of existing services or trees shall be carried out in accordance with CSS: Part 1 - General.

6. HAZARD IDENTIFICATION

The Contractor's Health & Safety Plan must include the means for dealing with all hazards likely to be encountered on the site.

6.1. Polychlorinated Biphenyls (PCBs)

Best attempts have been made to remove Polychlorinated Biphenyls (PCBs) from the street lighting system however the Contractor should be aware of the possible presence of equipment containing PCBs. Any equipment suspected of containing PCBs must be handled in accordance with the "Ministry of Health Code of Practice for Safe Management of PCBs".

If any equipment is found that contains (or is suspected to contain) PCBs, the Engineer shall be notified immediately. Equipment suspected of containing PCB's should be returned to the Council's Street Lighting Maintenance Contractor, for removal of PCB's, before disposal.

7. EXCAVATION

All excavations shall be carried out in accordance with the requirements of CSS: Part 1 - General and the Electricity Distribution Network Owner.

7.1. Excavations in Legal Road

Excavations carried out in legal roads shall be carried out in accordance with CSS: Part 1 clause 31.0 - Excavation.

7.2. Excavations Within and Adjacent to Private Property

All work in private property shall be carried out in accordance with CSS: Part 1 - General.

The Contractor shall provide adequate support to the excavation when working in close proximity to the road boundary to prevent any damage or subsidence into the excavation. Any subsidence or damage shall be remedied immediately to the property owner's satisfaction at the Contractor's cost.

7.3. Measurement of Work and Basis of Payment

Excavation shall include sawcutting and excavating to the required depth and width, trench support where necessary, removal and suitable disposal of excavated material from site, and all costs incidental to the work.

Excavation shall be included in the rate for the relevant scheduled item.

8. BACKFILLING

Backfilling shall be carried out in accordance with CSS: Part 1 - General.

8.1. Materials.

Holes shall be backfilled with CCC SAP 40, unless otherwise specified.

Backfill to trenches shall be the specified imported material, unless the Engineer approves the use of the excavated material as backfill.

8.2. Quality Assurance

The Contractor shall provide records of compliance tests carried out on backfill as required by CSS: Part 1 - General.

Records of these tests shall be supplied at regular intervals, to provide confirmation of ongoing testing. Details of the proposed methods and frequency of such activities, and the reporting of these, shall typically be set out in the Contractor's Contract Quality Plan.

8.3. Measurement of Works and Basis of Payment

Backfill to subgrade level shall include the supply of materials, placement, compaction and testing. It shall also include the provision of records of backfill testing.

9. RESTORATION

Restoration shall be carried out in accordance with CSS: Part 1 - General and the Network Works Access Permit (WAP) conditions where applicable.

9.1. Measurement of Works and Basis of Payment

Restoration from subgrade level shall include additional saw cutting where necessary and additional sealing width as detailed in CSS: Part 1 clause 33.0 – Restoration and Final Surfacing.

Restoration shall be included in the rate for the relevant scheduled item.

10. INSTALLATION

All works, materials and equipment shall comply with the Electricity Act, the Electricity (Safety) Regulations, the Radiocommunications (Radio) Regulations, AS/NZS 3000 Electrical installations, the Electricity Distribution Network Owner's requirements and any other relevant regulation, standard or code of practice.

For approved materials see - http://www.ccc.govt.nz/consents-and-licences/construction-requirements/approved-materials-list/streetlighting-materials/.

All cabling and supply work shall be carried out to the Electricity Distribution Network Owner's requirements, including where the cabling will not be taken over by the Electricity Distribution Network Owner.

10.1. Installation of Columns and Arms

All columns and arms shall be assembled, lifted and installed to the manufacturer's specifications and recommendations and in accordance with this specification including the Standard Details. All metal columns, arms and brackets shall be hot dipped galvanised. Paint columns for a length from the bottom of the pole to 100mm above the ground level mark with an approved protective coating.

Holes shall not be excavated until the Engineer has approved the marked location. The Engineer may amend the specified location on site.

The column shall be installed within 0.1m of the approved marked location, unless a tighter tolerance is specified. Columns shall be firmly installed at the specified height above final ground level to ±50mm of the manufacturer's ground level. Columns shall be within ±0.5° of vertical.

For overhead supply, the light fitting's optical centre in the installation shall be within 400mm of the specified vertical location. For underground supply, the height, measured from the manufacturer's ground level mark to the optical centre of the light fitting, shall be within 200mm of the specified height.

Where flange mounted columns, excluding slip based poles, are used the flange and holding down nuts and threads shall be 100mm minimum below final ground level. The hold down nuts and threads shall be protected with an anti-corrosion tape (e.g. Denso tape) and covered with a layer of compacted crusher dust and a 50mm minimum layer of compacted AP20 for an asphaltic concrete surface. The surfacing shall be finished to match the adjacent surface.

The base compartment door of the column shall face towards the adjacent footpath. Where there is no footpath, the door shall be located so that it can be accessed safely and without impeding the use of the road or space.

Poles installed shall be frangible where setbacks for rigid poles do not comply with the requirements of IDS clause 11.4.6 – Column locations.

Where poles are to be installed against the boundary line, the Contractor shall ensure that the poles are installed in the legal road and that no aerial trespass or damage to adjacent buildings occurs.

10.2. Earthing of Columns

Requirements of AS/NZS3000 shall apply.

All columns being installed shall be earthed via a separate earth rod as follows, in compliance with SD 514:

- *The earth rod shall be copper clad with a minimum length of 1.8m.*
- *It shall have a continuous (without joints) 3.0m long, 6mm2 (minimum) green / green yellow conduit earth wire from the earth rod to the street light switchboard.*
- *A minimum length of 50mm bare copper of the earth wire shall be welded to the earth rod (exothermic welding is an acceptable welding method).*
- *The weld shall start 75mm from the top of the earth rod to enable earth rod driving equipment to be used.*

For each column an Earth Test Sheet containing the following information shall be provided with the completion documentation;

- *date,*
- *location,*
- *drawing number,*
- *column number,*
- *name and registration number,*
- *test results,*
- *diagram showing dimensions and location of earth rod from column.*
- *photo showing the installed column and earth rod. Standard drawing.*

A sample Earth Test Sheet is provided in Appendix 1.

The earth rod shall be located as close as possible to the column so it will not impede compacting of the specified backfill material or conflict with utility services.

10.3. Switchboards and Terminations

Switchboards and terminations shall comply with SD 510, SD 511, SD 512 and the Electricity Distribution Network Owner's requirements.

10.4. Internal Wiring

Tough plastic sheathed cable (TPS), 1.5mm² copper twin and earth shall be used to connect between the switchboard and each luminaire and shall be continuous without joints. The TPS shall be round to ensure the IP rating of the luminaire is maintained.

10.5. Luminaires

Luminaires shall be manufactured, tested and certified in accordance with SA/SNZ TS 1158.6:2015 Lighting for roads and public spaces - Part 6: Luminaires – Performance.

Unless otherwise specified, luminaires shall be Light Emitting Diodes (LED) type, be on the latest NZTA, M30 Accepted Luminaires list and be accepted for use on the Council's Street Lighting Network. The luminaires shall have a;

- *DALI2 dimmable driver;*
- *seven-pin NEMA socket;*
- *Luminaire Controller (LC) programmed to work on the Council's Central Management System in clause 10.6.*

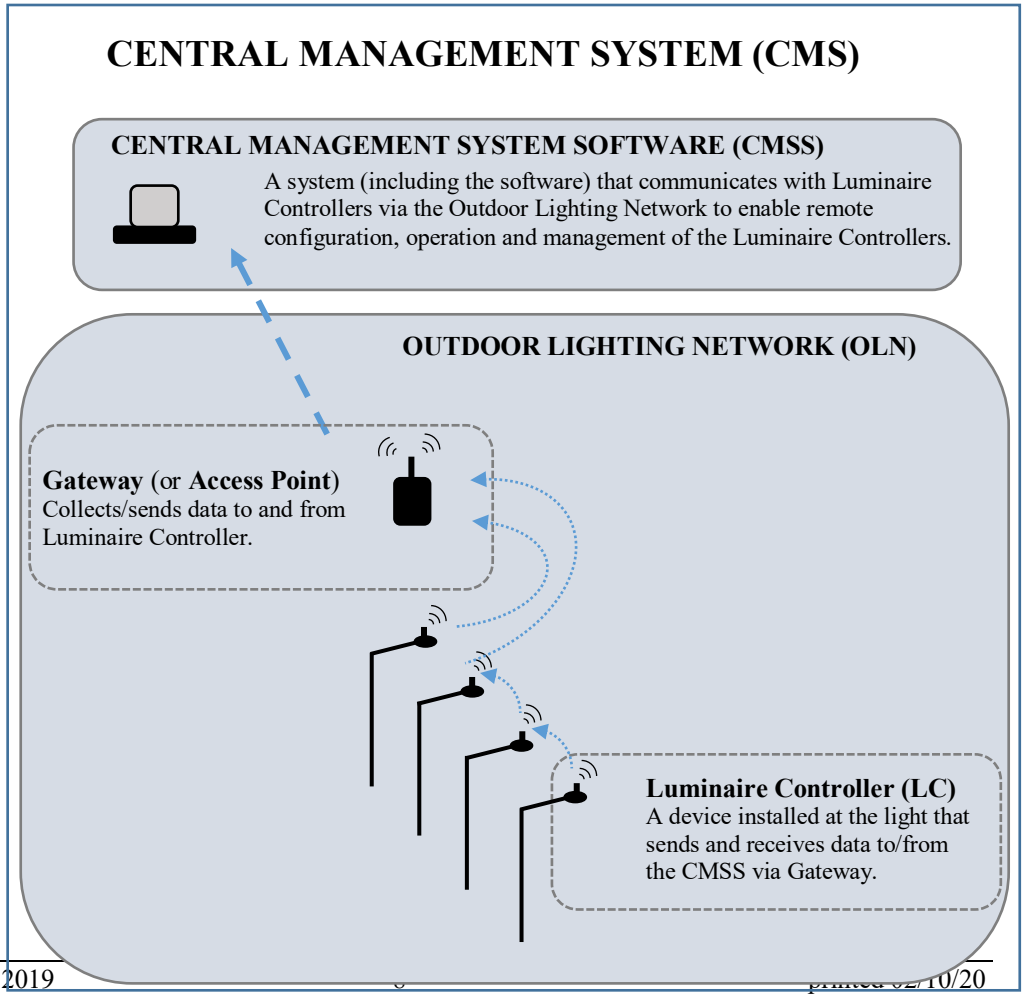
The control gear shall be in the luminaire. The luminaire shall be installed to the manufacturer's recommendations and comply with all relevant codes.

The luminaire control gear housing shall include a fuse terminal block with an appropriately rated HRC fuse link.

10.6. Central Management System (CMS)

All new lights shall be connected to the Council's CMS.

The following diagram provides an overview of the Council's CMS.



The Outdoor Lighting Network is an Itron Network Solutions mesh network.

The Central Management System (CMS) consists of the:

- *Outdoor Lighting Network (OLN) - the mesh network that is formed between endpoint devices (Luminaire Controllers) and the Gateways (or Access Points APs) using 900MHz technology.*
- *Central Management System Software (CMSS) - the backhaul network from Gateways to the Itron back office where the software is hosted. The Council's CMSS is Street Light Vision (SLV).*

For details regarding acceptable Luminaire Controllers (LC) see *http://www.ccc.govt.nz/consents-and-licences/construction-requirements/approved-materials-list/streetlighting-materials/*.

The Contractor shall install a LC on each light and provide data that can be uploaded into RAMM and SLV as changes to the network occur. The LC has a MAC ID, which is a unique identifier for each controller. When a LC has been installed the MAC ID shall be captured accurately to enable it to be added to RAMM and SLV, so it will connect to the CMS Network. If not captured correctly, a return visit may be required to recapture this information.

10.7. Measurement of Work and Basis of Payment

Installation shall include excavation and disposal of spoil and surplus materials, completion procedures and certification, commissioning, backfilling and restoration. Installation shall be paid by lump sum or per light installed, as specified.

Cable shall include supply, excavation and disposal of spoil, installation, backfilling and restoration and shall be paid by lump sum.

11. SURPLUS MATERIALS

11.1. Return of Surplus Materials

All lighting materials are the property of the Christchurch City Council. Materials owned by the Council and suitable for reuse but not specifically required for the contract, shall be returned to the Council. The Engineer shall specify lighting materials that are to be returned.

Any damage done to lighting materials identified to be returned shall be made good at the Contractor's expense.

The Contractor shall return identified materials to the Council's current street lighting maintenance contractor (refer to Engineer) within normal working hours.

11.2. Disposal of Surplus Materials

The Contractor shall dispose of any surplus materials not required by Council in a safe and sustainable manner.

The Contractor shall keep a register of all disposed materials including details of quantities, date of disposal, type of materials, disposal method (e.g. recycled, donated, sent to landfill etc) and owner or location of disposed materials. The disposal register shall be in spreadsheet format.

In addition to the disposal register, where hazardous waste is identified, the Contractor shall provide a disposal plan to the Engineer. The disposal plan shall detail the type of material, method of extraction, transportation, and location of the disposed material. Hazardous waste shall not be sold or donated.

When requested, the Contractor shall provide a copy of the disposal register to the Engineer and email address cccassetdisposal@ccc.govt.nz.

11.3. Measurement of Works and Basis of Payment

Transportation of new unused or recycled materials or disposal of surplus materials shall be included in the rates for the replacement items being constructed.

12. COMMISSIONING

The existing lighting must be kept operating until the new lighting is commissioned. New and existing lighting shall not operate simultaneously. If it is necessary, for construction purposes, to remove the existing lighting prior to commissioning the Contractor shall provide temporary lighting. Temporary lighting shall comply with AS/NZS 1158.1.1 or AS/NZS 1158.3.1 depending on the required lighting category and shall be approved by the Engineer.

The Contractor must be present when commissioning is carried out.

Where the lighting is to be commissioned in stages, it shall begin at one end and continue through to the other end. When staging commissioning, it is crucial that hazard situations are not created (e.g. by stopping the commissioning prior to an intersection, or bend).

Lights may only be commissioned after all Record of Inspection Certificates, Electrical Certificate of Compliances, Electrical Safety Certificates, and Earth Test Sheets have been completed. These certificates shall be provided to the Engineer within 20 working days of commissioning. Where it is necessary to stage the livening of an installation, individual lights may be commissioned however the Record of Inspection Certificate, Electrical Certificate of Compliance, Electrical Safety Certificate, and Earth Test Sheet covering each light shall be provided to the Engineer within the required timeframe. The compliance certificate and a final `Contractor's Completion Certificate` for the complete works shall be received and approved by the Engineer when all lights are commissioned.

Non-complying installations must not be commissioned.

12.1. ***Measurement of Work and Basis of Payment***

Commissioning shall include the provision of temporary lighting, where required.

13. COMPLETION PROCEDURES AND CERTIFICATION

Certification, testing and commissioning shall be carried out in accordance with the Electricity Act, the Electricity (Safety) Regulations, AS/NZS 3000, any other relevant regulation, standard or code of practice and the Electricity Distribution Networks Owner's requirements for connecting to their network. Documentation of this shall be provided through the Contract Quality Plan.

All lighting shall be tested and inspected and the Record of Inspection Certificate, Electrical Certificate of Compliance, Electrical Safety Certificate, and Earth Test Sheet covering each light shall be returned to the Engineer within 20 working days of commissioning. The Contractor's Completion Certificate and Engineer's Completion Certificate shall also be completed and returned (see Appendix VII and VIII of IDS: Part 3 - Quality Assurance). The Contractor shall provide all certificates, showing that each luminaire and associated equipment meets the requirements of this specification and the relevant Electricity Regulations, standards and codes of practice.

The Contractor shall provide field-generated (red line) as-built plans that show details of all removed assets and all newly installed assets to the Engineer/Engineer's Representative. Where the work is within the road boundary, the as-built plans shall show the location of lighting equipment in relation to the legal boundary. Where work is outside the legal road, the as-built plans shall include the location of lighting equipment including cables, to the requirements of the relevant Electricity Distribution Network Owner.

The Contractor shall provide inventory data as detailed in IDS Part 12 and the "Requirements for RAMM Inventory Updates". The data shall be supplied in electronic format using the template spreadsheet, "RAMM Inventory for Renewal Assets". These documents can be found at http://www.ccc.govt.nz/consents-and-licences/construction-requirements/infrastructure-design-standards/ramm-and-costing-as-built-requirements/

The works shall not be considered complete, in accordance with NZS 3910 "Conditions of contract for building and civil engineering construction" until commissioned and all Completion Procedures and Certification, as-builts and inventory data is accepted by the Engineer.

13.1. ***Measurement of Work and Basis of Payment***

Completion procedures and certification shall include all tests, certification, inspection and documentation in the required format necessary to fulfil the requirements of this clause.

All costs involved in the obtaining and providing of as-built records are scheduled separately.

14. DEFECTS LIABILITY

The following criteria shall be met at the end of the defects liability period:

- *all columns and arms shall be assembled, lifted and installed to the manufacturer's specifications and recommendations.*
- *columns shall be at the specified height above final ground level to ±50mm of the manufacturer's ground level.*
- *columns shall be within ±0.5° of vertical.*
- *the column shall be within 0.1m of the approved location, unless a tighter tolerance is specified.*
- *the light fitting's optical centre shall be within 400mm of the vertical location in the group for overhead supply or within 200mm for underground supply.*

Minor lighting failures and defects within the defects liability period shall be rectified within 24 hours of reported failure unless otherwise specified. Failure to respond may result in the Engineer making arrangements to have the work done by others at the Contractor's cost.

The Council's Maintenance Contractor will repair equipment damaged by vandalism or motor vehicle accidents.

CHRISTCHURCH CITY COUNCIL
PO BOX 237 CHRISTCHURCH
NEW ZEALAND

EARTH TEST SHEET

LOCATION _____

DRAWING NUMBER _____

COLUMN NUMBER _____

TEST RESULTS (ROD TO LUG) _____ OHMS (<0.5 OHMS)

NAME _____ REGISTRATION NUMBER _____

SIGNED _____ DATE _____

LOCATION DRAWING

PHOTO OF INSTALLED EARTH ROD

COMPLIANCE REQUIREMENTS CHECKSHEET - LIGHTING

ITEM	CSS REF	TASK	TEST STD/ DESCRIP	COMPLIANCE REQUIREMENTS	TEST FREQ.	PASS YES/NO	TEST BY	ACTIONS
1		**EXCAVATION**						
	Pt 5 7.0	Trench Width	manuf reqs	*specify*				
	Pt 5 7.0	Trench Depth	manuf reqs	*specify*				
	Pt 5 7.0	Trench formation	inspect	Sawcut edges of excavation prior				
	Pt 5 7.1	Excavation in legal road	inspect	Complies with road opening notice				
2		**INSTALLATION**						
	Pt 5 8.0	Work standards	inspect	Complies with AS/NZS 3000, and regs				
	Pt 5 8.0	Work standards	inspect	Complies with Network Operator's requirements				
	Pt 5 8.1	Columns	*Specify* SD	Within 0.1m location, 50mm height, 0.5° vert, painted				
	Pt 5 8.1	Luminaire	inspect	Complies with manufacturer's requirements. All metal parts galvanised				
	Pt 5 8.1	Luminaire – overhead supply	measure	Within 400mm of design vert position				
	Pt 5 8.1	Luminaire – underground supply	measure	Within 200mm of design height				
	Pt 5 8.1	Flange mounted column installation	inspect	Cover flange and bolts				
	Pt 5 8.1	Column	inspect	Frangible where required				

ITEM	CSS REF	TASK	TEST STD/ DESCRIP	COMPLIANCE REQUIREMENTS	TEST FREQ.	PASS YES/NO	TEST BY	ACTIONS
	Pt 5 8.1	Column installation	inspect	Installed within legal road, no aerial trespass				
	Pt 5 8.2	Luminaires	AS/NZS 1158.6	Complies with standard				
		Luminaire	NZTA M30 Standard	On Acceptable Luminaire list				
	Pt 5 8.2	Luminaires	inspect	Specified ingress protection rating				
	Pt 5 8.2	Luminiare	inspect	Light Emitting Diode (LED) type				
	Pt 5 8.2	Luminaires	inspect	Includes a 7-pin NEMA socket and Luminaire Controller				
	Pt 5 8.2	Control gear	inspect	Control gear in head, DALI2 dimmable driver, housing includes specified fuse				
	Pt 5 8.3	Switchboards and terminations	manuf reqs	*Specify* SD				
	Pt 5 8.4	Internal wiring	inspect	Round TPS cable				
3		**COMPLETION**						
	Pt 5 9.0	Certification, testing and commissioning	manuf reqs	Process followed				
	Pt 5 9.0	Documentation	inspect	Certificate of Compliance, Contractor's Completion Certificate, test certificates, Road Lighting Valuation received.				
	Pt 5 9.0	As-builts	manuf reqs	Locate all columns and cables, in relation to legal boundaries				
	Pt 5 9.0	Inventory Data	inspect	The required RAMM data is provided in the correct format				

ITEM	CSS REF	TASK	TEST STD/ DESCRIP	COMPLIANCE REQUIREMENTS	TEST FREQ.	PASS YES/NO	TEST BY	ACTIONS
4		**COMMISSIONING**						
	Pt 5 10.0	One system of lights operating at a time	inspect	Adequate lighting available over whole site.				
5		**BACKFILLING**						
	Pt 5 11.1	Backfill material to columns	CCC SAP 40	Complies with grading				
	Pt 5 11.1	Backfill material	*specify*	Complies with grading				
	Pt 5 11.2	Compaction of backfill	Clegg hammer	35 in road, ROW or commercial crossing, 25 elsewhere				
	Pt 5 11.2	Compaction of backfill	MDD by ND	2150kg/m^3 in road, ROW, commercial crossing or path, 70% elsewhere				
	Pt 6 6.5	Presealing surface shape - path	measure	Max 10mm gap, cumulative total gap under 25mm				
	Pt 1 28.1	Subgrade surface shape - berm	measure	75mm below existing surface				
	Pt 6 11.4	Presealing surface shape - road	measure	Max 12mm gap, cumulative total gap under 25mm in both directions				
7		**SURPLUS MATERIALS**						
	Pt 5 13.0	Surplus materials	inspect	Recycled materials returned to council, unfit materials disposed of				
8		**RESTORATION**						
	Pt 1 28.1	Surface preparation	inspect	Sawcut edges in permanent surfaces, strip to fender where within 1.5m				
	Pt 1 30.1	Asphaltic concrete supply – AC 5	NZTA M/10	Complies with specification				
	Pt 1 30.2	Asphaltic concrete supply – AC 7	NZTA M/10	Complies with specification				

ITEM	CSS REF	TASK	TEST STD/ DESCRIP	COMPLIANCE REQUIREMENTS	TEST FREQ.	PASS YES/NO	TEST BY	ACTIONS
	Pt 6 6.6	Tackcoat application	inspect	Tackcoat adheres to complete surface				
	Pt 6 6.7	Asphaltic concrete laying		Air voids between 2.5% and 11% Mix temperature within 10° of delivery temperature				
	Pt 6 6.8	Sealed surface shape - path	measure	Max 5mm gap, cumulative total gap under 20mm for longitudinal 3m straightedge and under 10mm for transverse 1m straightedge				
	Pt 2 9.5.3	Finished surface shape - berm	measure	+10mm, -0mm of existing level				
	Pt 6 14.4	Chipsealed surface shape - road	measure	Surface to be convex, mate-ins to be flush				
	Pt 6 17.5	AC surface shape - road	measure	Max 5mm gap, cumulative total gap under 10mm for longitudinal 3m straightedge				
	Pt 1 28.1	Surfacing	inspect	Bandage AC edges, overlap chipseal				