AUCKLAND TRANSPORT
Electrical Cable Specification

Contents

1 Purpose

The purpose of this specification is to define the electrical cable infrastructure requirements for amenity lighting and subdivision road lighting installations for use by Contractors, Developers, Auckland Transport personnel and others involved in the design and construction of amenity lighting and subdivision road lighting and its reticulation.

2 Policy

All amenity lighting and subdivision road lighting electrical cables and associated equipment used in Auckland Transport construction activities shall comply with the relevant New Zealand and international standards, statutory requirements, and Auckland Transport equipment specifications or other documented method of approval.

3 General Requirements

All installations shall meet the relevant requirements of this specification, including but not limited to methodology, materials, inspection, testing and provision of records.

3.1 Compliance with Standards & Regulations

In addition to this specification, all amenity lighting and subdivision road lighting infrastructure shall be installed in full compliance with the most recent revision of the following documents:

(a) AS/NZS 3000 Australia/New Zealand Wiring Rules

(b) AS/NZS 4961 Electric Cables – Polymeric Insulated – for Distribution and Service Applications

(c) AS/NZS 2053 Conduits and Fittings for Electrical Installations

(d) AS/NZS 3008.1.2 Cable Selection

(e) AS/NZS 2648 Underground Marking Tape

(f) AS4702 Polymeric Cable Protection Covers

(g) New Zealand Electricity (Safety) Regulations

(h) New Zealand Electricity Codes of Practice

(i) New Zealand Electricity Act

(j) Auckland Transport Design Manual (TDM) – Streetlighting Chapter

(k) National Code of Practice for Utility Operators' Access to Transport Corridors

3.2 Electricity Service Connections for Amenity Lighting

Where a new electricity service connection is required, the Contractor shall request any required network extensions with the electricity distribution company. The electricity distribution company shall scope and quote any required network extensions and email the offer directly to Auckland Transport, copy to the electrical contractor. Once Auckland Transport has approved and made payment, the electricity distribution company will carry out required the network extension.

The main incoming cable at the point of connection will be the demarcation between the electricity distribution company and Auckland Transport.

In cases where an Auckland Transport owned electrical cabinet exists, and approval has been obtained to utilise it, the existing cabinet may be used to provide power supply to new amenity lights.

Signage, as detailed in Appendix 8 shall be affixed on the inside of every road lighting column gear door and distribution transformer throughout the subdivision.

3.3 Electricity Service Connections for New Subdivision Road Lighting

Where the Developer has agreed with Auckland Transport to install road lighting and its associated electrical infrastructure in a new subdivision, the Developer shall request the electricity distribution company to complete any required network extensions to supply the subdivision road lighting.

The number of connection points to the electricity distribution network will depend on the extent of the subdivision. The Developer shall provide a detailed design for Auckland Transport approval showing the proposed location of each network connection point, underground cable routes and the number and wattage of road lights on each circuit. The design shall make provision for all future extensions. Volt drop and load calculations shall be shown in the design details.

Signage, as detailed in Appendix 8 shall be affixed on the inside of every road lighting column gear door and distribution transformer throughout the subdivision.

3.4 Electricity Service Connections for Private Subdivision Amenity or Road Lighting

Where the Developer has agreed with Auckland Transport to install amenity or road lighting and its associated electrical infrastructure in a new private subdivision, the Developer shall request the electricity distribution company to complete any required network extensions to supply the lighting.

The number of connection points to the electricity distribution network will depend on the extent of the subdivision. The Developer shall provide a detailed design for Auckland Transport approval showing the proposed location of each network connection point, underground cable routes and the number and wattage of road lights on each circuit. The design shall make provision for all future extensions. Volt drop and load calculations shall be shown in the design details.

Signage, as detailed in Appendix 8 shall be affixed on the inside of every road lighting column gear door and distribution transformer throughout the subdivision.

3.5 Corridor Access Requests

Corridor Access Requests (CARs) are required before any work (except emergency work) is carried out on public roads.

The contractor shall comply with all conditions of the CAR including all saw cutting and reinstatement requirements.

3.6 Existing Conditions and Protection of Property

Contractors should carefully examine the work area for existing damage to surfaces or adjacent structures prior to the works commencing. Photographic or video evidence of any damage should be recorded to protect against any subsequent unfounded claims for property damage.

During trenching operations the contractor shall protect any structure, wall, fence, neighbouring property or other service in the vicinity of the works. Should any damage or disturbance take place the contractor shall immediately notify the owner.

The cost of any replacement, repair or reinstatement shall be at the expense of the contractor.

3.7 Existing Services

Before work commences, as much information as possible must be obtained about buried services in the area. Such information may be in the form of plans or on-site cable and pipe locating. The procedures noted in the OSH *Guide for safety with underground services* shall be followed.

All known services in the area of the planned works must be located prior to starting work. If the location of a service is uncertain, the owner of the service shall be contacted to locate the service.

Care must be taken when digging or trenching near to other services, as damage to them is likely to be costly and may be hazardous. Mechanical diggers should not be used when digging closer than 500 mm horizontally or 300 mm vertically from the recorded position of other services until those services have been located by hand digging.

Any damage shall be reported immediately to the owner of the service.

3.8 Excavations

Any excavation that is notifiable work under the *Health and Safety at Work Regulations 2016* requires supervision by a certified safety supervisor. The contractor shall inform the nearest OSH branch in advance of any notifiable work commencing.

Details of suitable battering and shoring methods are given in the OSH Approved code of practice for safety in excavation and shafts for foundations.

While excavations deeper than 1.5 m must be shored or battered, shallower excavations in unstable ground may also be liable to collapse. A site assessment is needed in these locations to determine whether special precautions are required.

All excavations shall be protected and made safe at all times.

3.9 Traffic Management

Traffic management, where applicable, shall be provided in accordance with the Auckland Transport *Code of practice for temporary traffic management.*

3.10 Survey Pegs and Marks

Survey boundary pegs and other similar marks shall be protected. Should they be disturbed they must be replaced by a registered surveyor at the conclusion of the work.

4 Electrical Cable Specification

4.1 General Requirements

All electrical cables installed on Auckland Transports' network shall be neutral screened XLPE copper cables and shall comply with AS/NZS 4961. Refer to section 4.2 regarding internal column wiring alternative. Direct buried electrical cables not enclosed in PVC ducts are not acceptable.

4.2 Subdivision Road Lighting Specific Cable Requirements

The minimum road lighting supply cable size shall be 10mm² 1C cable.

Internal wiring between the terminal blocks within the lighting column switchboard and the road lighting luminaire shall be 2.5mm² 2C NS cable.

Where the luminaire is supplied with a Wieland flex and plug, the internal column wiring shall instead be 3 core x 1.5 mm^2 copper Wieland H05VV-F heavy duty cable – round black sheath, complete with a Wieland socket to match the luminaire plug.

A local earthing connection consisting of a 1.8m driven earth rod shall be installed not more than 300mm from each road lighting column. The earth rod shall be connected to the earth terminal block within the lighting column switchboard using a minimum 10mm² copper green/yellow earth cable.

4.3 Electrical Cable Installation

4.2.1 General requirements

Cables shall generally be installed using a cable jinker and cable hauler. Cable run shall be completed in a single pull to avoid exceeding the maximum pulling tension upon restarting.

4.2.2 Bending radius

The minimum bending radii for pulling/setting of the cable shall be observed. Typical figures for single core cables are 20/15 diameters and for three-core cables 15/12 diameters, however the manufacturer's data shall take precedence.

4.2.3 Ducted cables

When pulling through ducts, draw tape shall be used to pull through the hauler rope which is then used to haul the cable back.

Care must be taken to prevent the cable rubbing against the leading edge of the duct at the entry point (eg by belling the duct or using a duct guide), and to prevent stones and other detritus being introduced into the duct. The use of a proprietary cable pulling lubricant is required to reduce the risk of friction damage.

Where multiple cables share a common duct all cables shall be pulled together to prevent friction damage or jamming. In these circumstances each cable shall have a separate sock and swivel.

Once cables have been installed, the ends of the ducts must be sealed with expanding foam to prevent ingress of foreign matter.

4.2.4 Cable rating

A ducted cable has a lower rating than the same cable direct buried. This is taken into account when the cable size and backfill material are selected. Bentonite shall not be used to increase the rating of a ducted cable.

5 Electrical Duct Specification

5.1 General Requirements

All electrical cables shall be installed in minimum 40mm diameter PVC duct, buried with minimum 600mm cover in all cases as per AS/NZS 3000. Wherever possible, draw wires shall be installed within each empty duct to ensure electrical cables are able to be pulled through.

At completion of the installation the total electrical cable capacity shall be no greater than 50% of the total duct capacity.

There are two acceptable methods for cable installation:

- Laid in ducts that are direct buried
- Laid in ducts that are drilled (thrusted)

Ducts shall be heavy Duty PVC type complying with AS/NZS 2053 and shall be jointed using a suitable PVC duct adhesive to prevent the ends moving out of alignment and be laid with no angles and slow bends.

5.2 Direct Buried Ducts

Direct buried ducts shall be utilised where trench excavation is possible.

High voltage and low voltage cables must not be laid in the same duct.

5.3 Drilled Ducts (Thrusting)

Where direct buried ducts are not appropriate then drilled ducts may be installed. Typically this will be in existing streets or other areas where disturbance of the ground surface is difficult or undesirable. In some situations the cost of reinstatement is also a factor.

6 Excavation, Backfilling & Cable Protection

6.1 Excavation

The management and storage of excavated material shall meet the requirements of the CAR (where applicable).

Where permitted, excavated material that is to be reused shall be carefully stored on the berm or other suitable area without blocking footpaths, driveways, planted areas or roadways.

Excavated material not required for backfilling shall be removed from the site during the excavation process and disposed of at an approved dumping site.

6.2 Depth of Cover

Ducts shall be laid at the depths no less than 600mm in all instances as specified in AS/NZS 3000.

6.3 Backfill Material & Compaction

Backfilling shall not be carried out until the Engineer has inspected the cable installation. Reinstate by backfilling in 100mm layers, hand ramming the first two layers, followed by power compaction. Complete backfilling and compaction to finish not more than 25 mm above normal ground level.

6.4 Cable Protection

Polymeric cable protection covers complying with AS4702.

6.5 Marking Tape

Underground marking tape complying with AS/NZS 2648 shall be used in open trenches as prescribed in AS/NZS 3000. Wide plastic warning tape is to be installed with black lettering stating “ELECTRIC LINE BURIED BELOW”. This warning tape shall be installed midway between the topmost duct and final grade above all conductors within the trench.

6.6 Surface Reinstatement

Permanent surface reinstatement shall be carried out as soon as practicable after backfilling and compaction, including reinstatement of all grass berms, kerbs and channels, concrete dished channels, concrete edgings and other surface features disturbed during the course of the work.

Where for any reason the permanent reinstatement will be delayed for more than seven days after completion of backfilling and compaction, temporary resurfacing shall be carried out. Permanent resurfacing shall be carried out no later than one week after completion of the temporary works.

Both temporary and permanent reinstatement shall meet the requirements of Auckland Transport and other property owners.

7 Commissioning & Records Management

7.1 Testing & Commissioning

When the installation is reported as completed and ready for acceptance, the Contractor, at his own expense, in the presence of the Engineer, shall make tests as directed. The Contractor shall supply all apparatus, materials and labour required for making the tests. The Contractor shall furnish a guarantee covering all labour and materials for a period of one year from the date of final acceptance of the installation and shall repair and make good at his expense any and all defects which may develop during that time, if in the opinion of the Engineer such defects shall arise from defective workmanship or materials.

7.2 Network Records

Upon completion of construction, two sets of hard copies and one set of electronic copies on a CD of the following certified “as built” information shall be provided to Auckland Transport:

- Schedule of all electrical cables including cable manufacturer specification sheet, size, type and length.
- Location of all ducts/electrical cables including depth of laying and offset to kerb or other feature such as property boundary or building.
- Location of all amenity lights
- Location of all subdivision road lights
- Position of any cable joints
- Name and details of cable jointer

8 Appendix

8.1 Specific Subdivision Road Lighting – Signage Requirements – Supply from the Vector Electricity Network

Warning signs for lighting columns and distribution transformers within Developer reticulated subdivisions on the Vector network are shown below. The specific transformer number and street names shall be confirmed with Vector.

WARNING

The road lighting electrical supply in this subdivision is supplied from Vector Transformer 123456 located on XYZ Street.

Report electricity faults to Vector immediately on 0508 832 867

Specific Sign Details:

- Background Colour – RAL 1026 Luminous Yellow
- Black border thickness – RAL 9017 Traffic Black
- "WARNING" text height" - 15mm
- Description text height - 5mm
- Minimum clearance around all text and black border – 20mm

- Minimum spacing between description text and “WARNING” text – 15mm
- Minimum spacing between description text – 5mm

8.2 Specific Subdivision Road Lighting – Signage Requirements – Supply from the Counties Power Network

Warning signs for lighting columns and distribution transformers within Developer reticulated subdivisions on the Counties Power network are as follows. The specific transformer number and street name shall be confirmed with Counties Power.

WARNING

The road lighting electrical supply in this subdivision is supplied from Counties Power Transformer 123456 located on XYZ Street.

Report electricity faults to Counties Power immediately on 0800 100 202

Specific Sign Details:

- Background Colour – RAL 1026 Luminous Yellow
- Black border thickness – RAL 9017 Traffic Black
- “WARNING” text height” - 15mm
- Description text height - 5mm
- Minimum clearance around all text and black border – 20mm
- Minimum spacing between description text and “WARNING” text – 15mm
- Minimum spacing between description text – 5mm

8.3 Specific Subdivision Amenity and Road Lighting – Signage Requirements – Supply from a Private Power Network

Warning signs for lighting columns and distribution transformers within Developer reticulated subdivisions on a private network (e.g. where the network is owned by a party other than Vector or Counties Power [e.g. such as the subdivision owner, or some other party]), are as follows. The specific transformer number and street name shall be confirmed with the network provider.

WARNING

The <AA> lighting electrical supply in this subdivision is supplied from <BB> Transformer <CC> located on <DD> Street.

Report electricity faults to <EE> immediately on <FF>

Specific Sign Details:

- Background Colour – RAL 1026 Luminous Yellow
- Black border thickness – RAL 9017 Traffic Black
- "WARNING" text height" - 15mm
- Description text height - 5mm
- Minimum clearance around all text and black border – 20mm
- Minimum spacing between description text and "WARNING" text – 15mm

- Minimum spacing between description text – 5mm
- Include details as below where indicated (AA, BB, CC, DD, EE & FF)

Legend:

Substitute the following details as appropriate;

PARAMETER	PRIVATE NETWORK: LABEL DETAILS
<AA>	As applicable: Road / Amenity / Road & Amenity
<BB>	<Actual private network company name>
<CC>	<Transformer number as supplied by the private network operator>
<DD>	<Actual street name where the transformer is located>
<EE>	<Actual private network company name>
<FF>	<Private network company contact phone number>

End of Specification

Revision Table

Version	Date	Changes
1	26/08/18	Original
2	04/07/20	Minor adjustments to align with the TDM