

NORTHLAND TRANSPORTATION ALLIANCE

Electrical Cable Specification

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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, Northland Transportation Alliance 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 the Northland Region Road Controlling Authority's (**RCA**) construction activities shall comply with the relevant New Zealand and international standards, statutory requirements, and Northland Transportation Alliance 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) The Lines Company requirements
- (b) AS/NZS 3000 Australia/New Zealand Wiring Rules
- (c) AS/NZS 4961 Electric Cables – Polymeric Insulated – for Distribution and Service Applications
- (d) AS/NZS 2053 Conduits and Fittings for Electrical Installations
- (e) AS/NZS 3008.1.2 Cable Selection
- (f) AS/NZS 2648 Underground Marking Tape
- (g) AS4702 Polymeric Cable Protection Covers
- (h) New Zealand Electricity (Safety) Regulations
- (i) New Zealand Electricity Codes of Practice
- (j) New Zealand Electricity Act
- (k) Northland Transportation Alliance Design Manual (DM)
- (l) National Code of Practice for Utility Operators' Access to Transport Corridors
- (m) Code of Practice for Temporary Traffic Management (CoPTTM)

3.2 Electricity Service Connections for Amenity Lighting

Where a new electricity service connection is required, the Contractor shall be responsible for all approvals from the electricity Lines Company including any network extension requirements to supply amenity lighting.

The load side of the Lines Company fuse at the point of connection will be the demarcation between the electricity Lines Company and the RCA.

In cases where a RCA 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.

If required by the Lines Company, signage, as detailed in Section 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 the RCA to install road lighting and its associated electrical infrastructure in a new subdivision, the Developer shall be responsible for all approvals from the electricity Lines Company including any network extension requirements to supply the subdivision road lighting.

The design shall make provision for all future extensions if required. Volt drop and load calculations shall be shown in the design details as required by the electricity Lines Company for approval.

If required by the Lines Company, signage as detailed in Section 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 the RCA to install road or amenity lighting and its associated electrical infrastructure in a new private subdivision, the Developer shall be responsible for all approvals from the electricity Lines Company including any network extension requirements to supply the subdivision road and amenity lighting.

The design shall make provision for all future extensions if required. Volt drop and load calculations shall be shown in the design details as required by the electricity Lines Company for approval.

If required by the Lines Company, signage, as detailed in Section 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 (**CAR's**) are required before any work (except emergency work) is carried out on public roads.

The contractor shall comply with all conditions of the Work Access Permit (**WAP**) including Temporary Traffic Management and all saw cutting and reinstatement requirements.

The contractor shall work in accordance within the National Code of Practice for Utility Operators' Access to Transport Corridors.

4 Electrical Cable Specification

4.1 General Requirements

All electrical cables installed on Northland Transportation Alliances' network shall be neutral screened XLPE copper cables and shall comply with AS/NZS 4961. Direct buried electrical cables not enclosed in PVC ducts are not acceptable (Note: The power Lines Company network supply cables on the line side of the demarcation point are not covered by this specification).

4.2 Subdivision Road Lighting Specific Cable Requirements

The minimum road lighting supply cable size shall be 10mm² 1C NS cable. Increase as required to suit loading and voltage drop requirements in accordance with the Electricity Safety Regulations, AS/NZS 3000 and Lines Company requirements.

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

A local earthing connection consisting of a 1.8m x 16mm 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. Refer to the DM for further details.

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 (e.g. by bellling 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 in accordance with the requirements of 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 (thrust)

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 and/or conditions of the Work Access Permit (WAP) (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 that specified in AS/NZS 3000.

6.3 Backfill Material & Compaction

Backfilling shall not be carried out until the Engineer has inspected the cable installation. Reinstatement 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.

Refer also to the requirements of the National Code of Practice for Utility Operators' Access to Transport Corridors.

6.4 Cable Protection

Polymeric cable protection covers complying with AS 4702.

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 Road Controlling Authority (RCA) and in accordance with National Code of Practice for Utility Operators' Access to Transport Corridors.

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. A Certificate of Compliance, a Record of Inspection and the as-built for the lighting network shall be supplied by the contractor to the RCA.

7.2 Network Records

Upon completion of construction, one set of electronic copies of the following certified "as built" information shall be provided to the RCA:

- 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
- Supply point for each light
- Installation Control Point (ICP) number
- Streetlight Pole details
- Streetlight luminaire or amenity light details
- Location of all subdivision road lights
- Position of any cable joints
- Name and details of cable jointer

8 Specific Subdivision Road Lighting – Signage Requirements

8.1 Supply from the Northpower Electricity Network

If required by the Lines Company, warning signs for lighting columns and distribution transformers within Developer reticulated subdivisions on the Northpower network are shown below. The specific transformer number and street names shall be confirmed with Northpower.

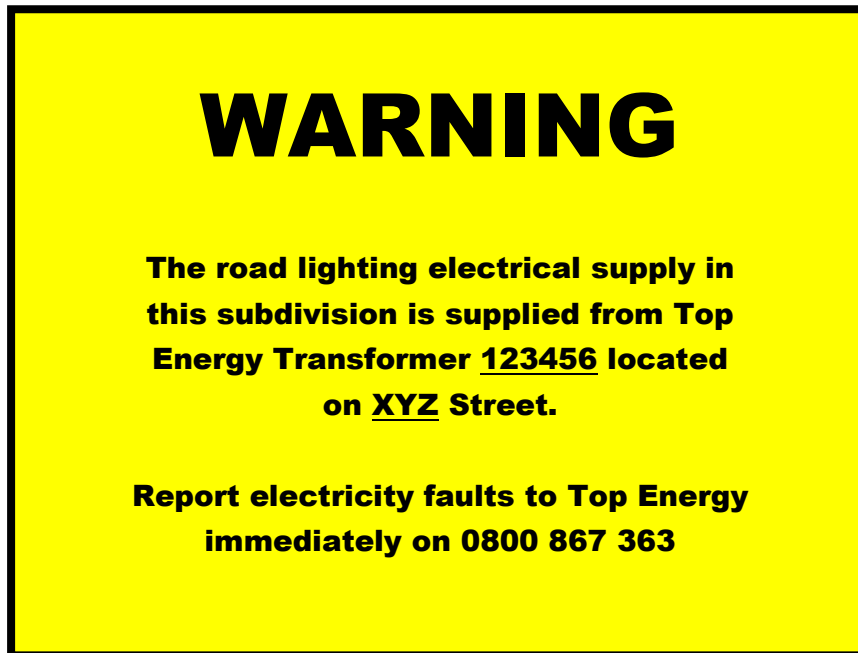


Specific Sign Details:

- 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 Supply from the Top Energy Network

If required by the Lines Company, warning signs for lighting columns and distribution transformers within Developer reticulated subdivisions on the Top Energy network are as follows. The specific transformer number and street name shall be confirmed with Top Energy.

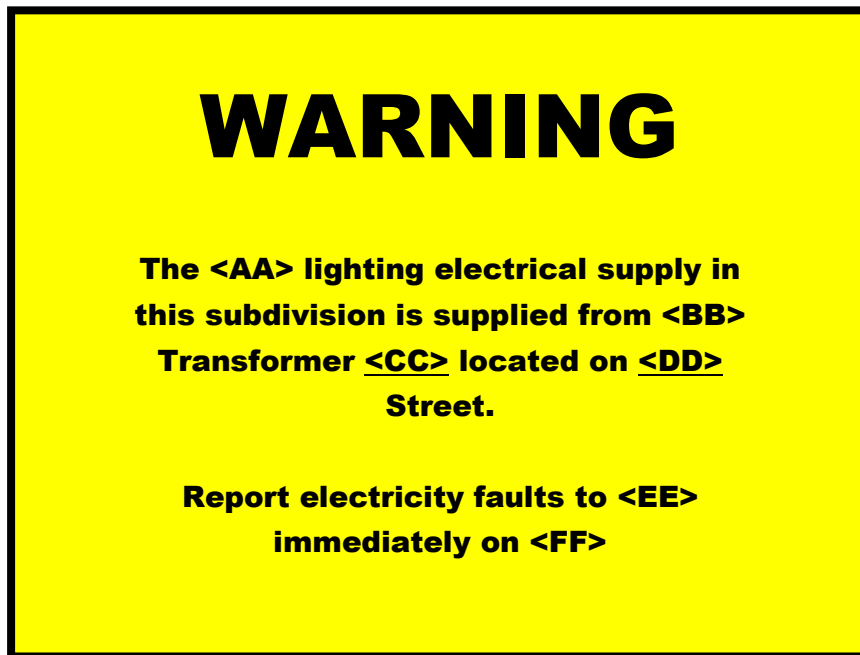


Specific Sign Details:

- 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 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 Northpower or Top Energy [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.



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>	<u>As applicable:</u> 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	15/10/2020	Original