

# A REFERENCE GUIDE TO LIGHTING SPECIFICATIONS

PRODUCED BY:



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# ACKNOWLEDGEMENTS

The Landscape Lighting Sub-Committee gratefully acknowledges the support of:

- Landscape Ontario's  
Landscape Contractors Commodity Group
- Landscape Ontario Horticultural Trades Foundation  
for the printing of this book
- All industry members who freely contributed their time  
and knowledge when requested.

# DISCLAIMER

This Installation Guide is intended as a reference tool only. All landscape lighting installations must be carried out according to the regulations as set out in the Canadian Electrical Code Book (current issue). The Code Book may be obtained at any Ontario Hydro inspection office.

**Produced by the Landscape Ontario  
Lighting Commodity Group**

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**Landscape Ontario**  
HORTICULTURAL TRADES ASSOCIATION

## SECTION A: DESCRIPTION & SCOPE OF THE WORK

### A.1 GENERAL DESCRIPTION

The term “Landscape Lighting System” refers to permanently installed outdoor lighting fixtures and related hardware.

C.E.C. in this specification refers to Canadian Electrical Code Book. All rules noted refer to rules in the C.E.C. Book.

### A.2 SCOPE OF THE WORK

The work consists of installing a lighting system to efficiently light areas identified in the accompanying documents. Electrical work and installation shall conform to the prevailing codes, and unless specified otherwise, the construction of the lighting system shall include the furnishing, installing, and testing of all lighting equipment, along with the restoration of the site to its original condition.

## SECTION B: GENERAL CONDITIONS

### B.1 PURPOSE OF THE SPECIFICATIONS

It is the intention of these specifications together with the accompanying drawing (if applicable) to furnish clear documentation:

- indicating delegation of responsibilities between the Lighting Contractor (known hereafter as the Contractor) and the Client or the Client’s Authorized Representative, (known hereafter as the Client).
- to provide a description of typical criteria that contractors must meet in order to fulfill a lighting system contract.
- indicating typical equipment specifications and installation procedures.
- to serve as an aid to the architect or engineer who may be required to provide such information as part of a design package.

### B.2 UTILITIES

The Client shall make the Contractor aware of all public utilities servicing the property, and provide written notation pertaining to all private utilities located on the property and location of property lines.

The Contractor shall notify the utility companies and arrange for cable locations prior to the commencement of any work.

### B.3 CLIENT’S AUTHORIZED REPRESENTATIVE

The Client may designate or appoint one (1) person as his Authorized Representative to work with the Contractor.

The Contractor shall be notified in writing of the name and address of this duly appointed representative. This person shall have full authority to approve work performed by the Contractor, make field changes that are deemed necessary and approve estimates and invoices submitted by the Contractor for payment.

### B.4 PROTECTION OF WORK AND PROPERTY

The Contractor shall maintain adequate protection of all his work from damage and shall protect the Client’s and adjacent property from injury or loss arising from this contract.

### B.5 EXAMINATION AND VERIFICATION OF THE DRAWING AND SITE

It shall be the Contractor’s responsibility to report to the Client any deviations between drawings, specifications and the site.

## **B.6 ORDINANCES AND REGULATIONS**

All local and municipal Rules and Regulations relating to any portion of this work are hereby incorporated into and made a part of these specifications and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed to conflict with any of the above mentioned regulations or requirements, and where a conflict may occur the regulations of the governing code shall be adhered to. However, when these specifications and/or drawings call for or describe materials, workmanship or construction of a better quality, higher standard or larger size, these specifications and/or drawings shall take precedence over the requirements of said Rules and Regulations.

## **B.7 MATERIALS AND WORKMANSHIP**

Whenever any material is specified by name and/or number thereof, such specifications shall be deemed to be used for the purpose of facilitating a description of the materials and establishing quality, and shall be deemed and construed to be followed by the words "or approved equal".

No substitutions will be permitted which have not been submitted for prior approval by the Client. All materials shall be new and without flaws or defects and shall be the best of their class and kind. Sufficient descriptive literature and/or samples must be furnished for any materials submitted as "equal" substitutes. All materials shall be guaranteed for a period of one (1) year against defects and workmanship.

All materials and equipment shall be installed in a neat and workmanlike manner according to the standard practices of the industry.

## **B.8 PERMITS AND INSPECTIONS**

Any permit for the installation or construction of any of the work included under this contract, which is required by any of the legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. He/she shall also arrange for and pay all costs in connection with any inspections and examinations required by these authorities. In all cases, where inspection of the lighting system work is required and/or where portions of the work are specified to be performed under the direction and/or inspection of the Client, the Contractor shall notify the Client of the time when such inspection and/or direction is required. Any necessary re-excavation or alterations to the system needed because of the failure of the Contractor to have the required inspections, shall be performed at the Contractor's expense.

## **B.9 CONTROLLER LOCATION**

The Client and the Contractor shall mutually agree on the location of the lighting controller.

## **B.10 CHANGES OR ADDITIONAL WORK**

The Client or the Contractor may, without invalidating the original contract, order such changes or additions as may from time to time be deemed desirable or necessary. In doing so, the contract price shall be adjusted to the mutual agreement of the Contractor and the Client, with all work being done under the conditions of the original contract except for such adjustments in price and in extension of time as may be necessary.

## **B.11 UNCLASSIFIED EXCAVATION**

Excavation shall be unclassified and shall include all materials encountered. All materials or matter that cannot be excavated by normal excavation means shall be brought to the attention of the Client and an adjustment in price agreed upon before excavation of these areas proceeds. When additional backfill material is needed to replace rock and/or other unsuitable materials, it shall be the Client's responsibility and expense to supply such material. for backfill, to the Contractor, at the site locations designated by the Contractor.

It shall also be the Client's responsibility to dispose of the unsuitable materials removed from the trench that cannot be used in the backfill operations, unless the foregoing is otherwise agreed upon by the Client and the Contractor.

## **B.12 INSURANCE**

The Contractor shall maintain in force Public Liability and Automobile Insurance with Bodily Injury and Property Damage for electrical work.

The Contractor is responsible for insuring all personnel under Worker's Compensation Board coverage under the appropriate electrical classification.

## **B.13 GUARANTEE**

The entire lighting system shall be guaranteed to be complete as per specifications in every detail for a period of one (1) year from the date of its acceptance, and the Contractor HEREBY AGREES to repair or replace any such defects occurring within that year, free of expense to the Client. Lamps are not guaranteed unless otherwise specified.

## **B.14**

### **AS-BUILT DRAWINGS**

Upon completion of the work, (if requested beforehand) the Contractor shall prepare an as-built drawing of the system indicating:

- Junction Box Locations
- Fixture Locations
- Wire Run Locations
- Transformer Locations
- Controller Location

The as-built drawing must be proportionally and diagrammatically correct.

## **SECTION C: INSTALLATION**

### **C.1**

#### **EXCAVATION AND BACKFILL**

##### **I) TRENCHING**

Trenches for electrical conduit and wiring shall be of sufficient width to permit proper handling and installation of the pipe and fittings.

Trenches containing conduit for line voltage wiring must have a minimum cover of at least 18" wherever possible and vehicle areas 24" in depth. (refer to Rule 12-012 and Table 53 of the C.E.C.)

Trenches containing conduit for low voltage wiring must have a minimum cover of at least 12" wherever possible.

The backfill shall be thoroughly compacted up to original grade level.

##### **II) PULLING**

Where soil conditions allow the pipe depths of cover described above to be met, the electrical conduit may be directly installed without trenching by the use of a vibratory plough.

In each of the above operations, the Contractor is responsible for keeping the interior of the conduit free from dirt and debris, and for restoring the site to its original condition, including responsibility for damage to existing trees, shrubs and structures, along with settlement of trenches within the warranty period.

### **C.2**

#### **UNDERGROUND CONDUIT**

##### **I) P.V.C.**

All P.V.C. conduit shall be installed in accordance with Rules 12-1200 through 12-1220 inclusive of the C.E.C.

All P.V.C. conduit shall be cut with a hacksaw or approved P.V.C. cutters, so as to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that a smooth, unobstructed pull will be obtained.

All P.V.C. conduit joints shall be solvent weld joints. Only the solvent recommended by the manufacturer shall be used. All P.V.C. pipe and fittings shall be installed as outlined and instructed by the pipe manufacturer and it shall be the Contractors responsibility to make arrangements with the pipe manufacturer for any field assistance that may be necessary. The Contractor shall assume full responsibility for the correct installation.

##### **II) POLY PIPE**

Can be used as the recommended protection for low voltage lighting wire protection.

### C.3

#### PULL BOXES AND JUNCTION BOXES

In the event that pull boxes and/or junction boxes are used as part of the conduit system, they shall be of an approved type suitable for outdoor installation.

The above mentioned boxes shall also remain accessible at all times. (Refer to Rule 12-3018 of the C.E.C.)

The size of the required pull boxes shall be determined using Rule 12-3042 of the C.E.C.

### C.4

#### TREE WIRING: PROCEDURES

##### I) IN-GROUND ROUTING AND

###### DEPTH OF CONDUITS AND WIRE

- Run all conduits parallel to existing main roots anywhere inside “Drip Line” of tree.
- Burial depth as per code where possible.
- Extreme caution to be taken when excavating within 1.3M of tree trunk, so as not to injure tree “buttress flair” root structure.
- All grade mounted fixtures and mounting stakes located so as to allow for normal plant growth with special attention paid to protecting roots and “buttress flair” root structure from potential injury during installation.

##### II) TREE WORK / PLANT SELECTION

- Trees to be selected for lighting installation are to be in healthy, vigorous, growing condition, free of structural deficiencies and free of disease and decay.

###### LOCATION AND ROUTING

- All wire, hardware and fixtures are to be located so as to allow for “normal” plant growth with special attention paid to:
  1. Do not mount hardware or fixtures and Do not route wire through any “branch or trunk unions.”
  2. Do not encircle any branch or trunk with wire or any other hardware.
  3. Keep a minimum of 12” between all new and existing installations of tree hardware.

##### III) ABOVE GRADE WIRE PROTECTION

- All wire to be protected by P.V.C. conduit or water resistant flexible conduit (liquid tite) to a minimum of 8’ above grade.
- Low voltage lines carrying over 100 VA (sample) to be installed as above.
- All connections to be made in approved junction boxes.

##### IV) WIRE TYPE

- Low Voltage - 12 Gauge, 2 Wire, UV Rated Coating
- Line Voltage - 12 Gauge, N.M.W.U. or S.J.T.W.

### V) WIRE FASTENING

- All fastening hardware to be corrosion resistant or made of non-corrodible materials.
- Conduits are to be secured to tree with normal clips and hardware.
- Wire to be fastened with galvanized wire staples which have stand off nubs.
- Do not drive staples into tree past the stand-off nubs so as to squeeze wire but instead leave wire loose so as to allow for tree sway, tree growth, and wire expansion and contraction.
- Leave a 12” slack or service loop at each junction or fixture to allow for wire “play” and for servicing or relocation.

### VI) MOUNTING FIXTURES, JUNCTION BOXES AND BALLASTS

- All to be mounted with a “stand off” type galvanized lag bolt, minimum diameter 3/8”, leaving a minimum of 1” between limb and fixture.
- Pre-drill all holes for bolt installation to bolt shank diameter.
- Limbs for fixture installation to be of sufficient size (minimum 2” diameter) and strength to support fixture and hardware installation.

### C.5

#### TREE WIRING: MAINTENANCE

- i) A yearly inspection and maintenance of all tree installations is an absolute must and all customers should be made aware of this fact at the time of purchasing system.
- ii) As determined at time of inspection such procedures as follows will be necessary from time to time:
  - “Back-Off” any screw type fastening hardware so as to accommodate tree growth.
  - Cut off existing wire-mounting staples and install new staples as required to accommodate tree growth.
  - Relocate or re-secure grade mounted fixtures so as to accommodate for plant (including root) growth and climatic effects.
- iii) All electrical installations in trees should conform with the Occupational Health and Safety Act which requires a minimum clearance of 10’ from any existing electrical utility or energized conductor.
- iv) Installation personnel, when climbing over 3metres above ground level, must use climbing equipment and techniques which conform with the Occupational Health and Safety Act and which are C.S.A. approved.
- v) It is strongly recommended that personnel who are involved in the design and installation of tree mounted lighting systems be well versed in arboriculture as it applies to tree identification, growth habits and tree care.

### C.6

#### BELOW GRADE WIRING

All below grade wiring shall be installed in accordance with Rule 12-012 and table 53 of the C.E.C.

## **C.7 SLEEVES**

Recommend use of rigid pipe similar to P.V.C. or A.B.S.

When installing conduit under sidewalks, roadways, etc., it shall be installed in a sleeve at least 4" in diameter.

The sleeve that is used shall be of an approved type and must be installed at the same depth as the remainder of the conduit system.

Electrical Sleeves must be DEDICATED for electrical lines only. All sleeving must be sealed and clearly marked as to location for easy location.

## **C.8 TRANSFORMERS**

All transformers used in a low voltage lighting installation shall be C.S.A. approved in addition to having local Hydro approval.

All transformers must be installed in accordance with Section 16 of the C.E.C.

All transformers must be properly fused in accordance with Rules 16-100 through 16-106 and Rules 16-200 through 16-208 inclusive of the C.E.C.

All transformers must be installed in accordance with the manufacturer's recommendations and in such a manner as to be kept clear of debris, water, snow, etc.

## **C.9 FINAL HOOK UP**

All line voltage hook ups must be performed by or under the direct supervision of a qualified electrician.

# **SECTION D: MATERIALS**

## **D.1 FIXTURES**

All fixtures installed in the Landscape Lighting system shall be C.S.A. approved and be suitable for outdoor installation.

## **D.2 WIRE**

All wiring used in the installation shall be C.S.A. approved. It is recommended that 12 gauge wire be used in all landscape lighting installations.

# **SECTION E: DISTRIBUTION (POWER SUPPLY)**

## **E.1 PROTECTION**

The Landscape Lighting system must be protected by an approved fuse or breaker in accordance with Rules 14-100 through 14-304 inclusive of the C.E.C.

## **E.2 POWER SUPPLY**

The supply line brought to the outside wall of the building shall be designated for the sole use of the Landscape Lighting system and shall be minimum 12 gauge in size.

# **SECTION F: MAINTENANCE**

## **F.1 MAINTENANCE**

All Landscape Lighting systems shall be maintained by the installing company for a period of one (1) year after the date of installation. A regular maintenance check once a year is required after the first year to monitor tree growth and landscape changes and their effect on the lighting system, See Tree Maintenance Section C.4.





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