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REVISIONS: UPDATED LEGAL ACKNOWLEDGEMENT FORM. FD MAR '16

DESIGNED J. AGNOLIN	RECOMMENDED  F. DENNERT	ACCEPTED  G. REIMER	ENGINEER OF RECORD 	NOTICE FROM THE EXECUTIVE VICE PRESIDENT TRANSMISSION AND DISTRIBUTION AND CUSTOMER SERVICE	
DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: MAY 2004 ORIGINALLY ISSUED: NOV 1980		PAGE 1 OF 2	ES43/53/54/55/65 A1-01.01 ^R 4

Scope

This manual is one of a series containing standards for construction of the BC Hydro electrical distribution plant within the service area of BC Hydro. A new distribution plant shall be designed, constructed, owned, operated, maintained and repaired to these standards.

Purpose of Standards

BC Hydro objectives require standardization to:

- a) Ensure uniform safety requirements comply with BC statutes and regulations.
- b) Provide uniform system reliability.
- c) Provide uniform operating practices.
- d) Permit economic bulk purchasing of materials.
- e) Achieve optimum life cycle cost of plant construction.
- f) Effect efficient quality assurance.

Responsibility

The Distribution Standards Department prepares these standards and verifies that specified plant and procedures will perform adequately under all normally expected conditions encountered throughout the province of British Columbia. These standards are approved by Professional Engineers. It is the responsibility of BC Hydro Managers to ensure that the standards are followed unless abnormal conditions are encountered that require variations. These variations should be kept to a minimum and their performance shall be the responsibility of the Professional of Record in charge of the project, who will record and seal the variation based on satisfactory qualifications and experience to do so. As per the latest revision of the BC Hydro Distribution Owner's Engineer Guide, these variations must be accepted by BC Hydro's Owner's Engineer.

Use of Stock Materials

The electrical distribution plant covered by these standards is built using stock materials approved by a Professional Engineer as required by law. The use of non-stock materials for special and unusual situations must be approved by Distribution Standards or the BC Hydro Engineer responsible for the project.

Revisions to Manual

These standards are revised from time to time to improve the safety, performance, workability, cost effectiveness or appearance of the plant. The existing plant built to previous standards need not be updated unless so specifically advised by BC Hydro. When maintenance or other work, such as voltage conversion or conductor change is being done, updating plant to current standards is encouraged.

Mailing Addresses

The manual has been issued to a corporation or firm rather than to an individual. The corporation or firm is responsible for the safekeeping of the manual, and for keeping it current. Changes of address or in number of copies required must be reported promptly.

Suggestions for changes in the manual, or required changes of address may be made on the pre-addressed comment sheet included in the Manual and with each issue of revision.

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Section L - Street Lighting

ES43 L1

General

L1-01

General Notes

ES43 L2

Luminaire Structures

L2-01

Sub-Assemblies

L2-02

Mounting Height and Separations

L2-03

Installation on Hills

REVISIONS: R. 4 - REVISED TITLES FOR L2-01, L2-02, AND L2-03. M.S. SEP '20

DESIGNED  M. SCHAEFER	RECOMMENDED  H. GIESBRECHT	ACCEPTED  F. DENNERT	ENGINEER OF RECORD	STREET LIGHTING TABLE OF CONTENTS	
DISTRIBUTION STANDARDS 			ISSUED: SEP 2020 REPLACES: NOV 2012 ORIGINALLY ISSUED: OCT 1985	PAGE 1 OF 1	ES43 L0-01
					R 4

Scope

This section covers the installation of street lights when BC Hydro owns, installs and maintains the luminaires, conductors, photoelectric controllers and poles. These standards are referenced by BC Hydro installation crews and contractors, and street light customers completing lighting designs.

Street lights are provided at the request of the customer. Typical examples of street lighting customers are municipalities, the Ministry of Transportation and Infrastructure, and First Nations.

This section also provides background information on services for street lights which are owned, installed and maintained by the customer.

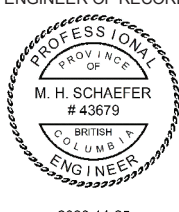
Distribution Instruction L15-1 Overhead Street Lighting (Hydro Owned) outlines the policies and procedures for providing street lights on public highways, streets and lanes from BC Hydro's overhead distribution system.

Revision Notes

R4 – New information for light emitting diode (LED) luminaires and correlated colour temperature. Added information on rate schedules. Removed references for high pressure sodium (HPS) luminaires.

List of Components

Item	Description	Material Number	Wattage (Label) (Note 1, 2)	Correlated Colour Temperature	Intended Replacement for HPS
A1	Light, LED, 120V, Tenon Mount, Street Light	9700-3876	39 W (40 W)	3000 K	100W HPS, Type II, Flat Glass
A2		9700-3877	39 W (40 W)	4000 K	100W HPS, Type II, Flat Glass
A3		9700-3878	75 W (80 W)	3000 K	100W HPS, Type II, Drop Lens
A4		9700-3879	75 W (80 W)	4000 K	100W HPS, Type II, Drop Lens
A5		9700-3880	114 W (110 W)	3000 K	150W HPS, Type II, Drop Lens
A6		9700-3881	114 W (110 W)	4000 K	150W HPS, Type II, Drop Lens
A7		9700-3882	162 W (160 W)	3000 K	200W HPS, Type III, Drop Lens
A8		9700-3883	162 W (160 W)	4000 K	200W HPS, Type III, Drop Lens
A9	Control, Photoelectric, 120V, LED Luminaire, Blue	9700-4678	--	--	--

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	DISTRIBUTION STANDARDS 					
	ISSUED: NOV 2020 REPLACES: NOV 2012 ORIGINALLY ISSUED: SEP 1985				PAGE 1 OF 4	ES43 L1-01.01

Note 1: The listed wattage applies to products approved on the standard issue date. A change to the manufacturer's approved product, or approval of alternate products may result in a different wattage for the material numbers above.

Note 2: The above table shows nominal wattage (used for billing), followed by rounded wattage (shown on the street light label) in brackets.

Reference Standards

ES43 L2-01	Luminaire Structures, Sub-Assemblies
ES43 L2-02	Luminaire Structures, Mounting Height and Separations
ES43 L2-03	Luminaire Structures, Installation on Hills

Luminaire Selection

The customer selects the luminaire wattage and correlated colour temperature to be installed by BC Hydro. The customer may consider local or municipal requirements, industry lighting standards, site conditions, and roadway type. IES photometric files are available from BC Hydro to support customers completing lighting designs.

BC Hydro is not responsible for the selection of the luminaire. It is critical that the correct luminaire be installed as per the customer's request.

Light emitting diode (LED) luminaires were selected to match the lighting pattern of high pressure sodium (HPS) luminaires as closely as possible; however, selection of the LED luminaire to replace an existing HPS luminaire is the responsibility of the customer.

The mounting height of the luminaire may vary due to site conditions or other equipment on the pole. This variance may impact the lighting design. See ES42 L2-02 for the allowable mounting height of a luminaire.

BC Hydro does not install shields on street lights. LED luminaires use an optics design to minimize glare and light trespass.

The customer shall notify BC Hydro of any required changes to street lights.

Correlated Colour Temperature

The correlated colour temperature describes the colour appearance of the light from a luminaire. It is measured in Kelvin (K). Luminaires with lower correlated colour temperature appear warmer or more yellow. Luminaires with higher correlated colour temperature appear cooler or more blue.

BC Hydro offers street lights with a correlated colour temperature of 3000K (warm white) or 4000K (cool white). The customer selects the correlated colour temperature for all street lights or for individual street lights.

REVISIONS: R. 4

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DISTRIBUTION STANDARDS 		ISSUED: NOV 2020 REPLACES: NOV 2012 ORIGINALLY ISSUED: SEP 1985		PAGE 2 OF 4	ES43 L1-01.02
					R 4

Labelling and Identification

LED luminaires use industry standard labelling on the underside for identification in the field. A decal with black text indicates the rounded wattage, luminaire type (LED), and last four digits of the BC Hydro material number.

Photoelectric Lighting Controller

Luminaires are supplied with an integral control receptacle. This allows street lights to be individually switched and improves reliability as the failure of one light or controller will not result in all street lights being extinguished.

The photoelectric lighting controller uses a light sensor to turn on the luminaire at dusk and turn off the luminaire at dawn. The photoelectric lighting controller does not provide dimming, outage detection, or remote control capabilities.

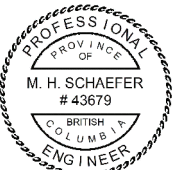
For installation of the controller:

1. Adjust the receptacle on the luminaire so the north indicator is positioned correctly.
2. Firmly place the controller into the socket and twist clockwise until it locks into place.
3. Confirm the clear window on the controller is facing north.
4. After installation, confirm proper operation of the street light by covering the window of the controller. This should cause the street light to turn on instantly.

Street Light Services

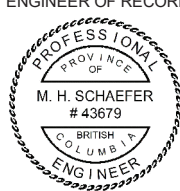
BC Hydro offers lighting services under the following rate schedules as defined in the Electric Tariff. Ownership of the street light equipment differs for each rate.

Rate Schedule	Application	Equipment owned by BC Hydro	Equipment owned by Customer
RS 1701 – Overhead Street Lighting	Lighting of public highways, streets and lanes where BC Hydro owns, installs, and maintains the lighting equipment.	Luminaires, conductors, controllers and poles are owned, installed and maintained by BC Hydro.	None.
RS 1702 – Public Area Ornamental Street Lighting	Lighting of public highways, streets and lanes and municipal pathways and for public area seasonal lighting displays where the customer owns, installs, and maintains the lighting equipment.	The overhead or underground service connection is provided by BC Hydro.	Luminaires, conductors, controllers and poles are owned, installed and maintained by the customer.

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	DISTRIBUTION STANDARDS 		PAGE 3 OF 4		ES43 L1-01.03	

RS 1703 – Street Lighting Service	Lighting of public highways, streets and lanes where the Customer owns, installs and maintains the fixtures, conductors and controls on BC Hydro poles. This rate is only applicable in municipalities specified in the Electric Tariff.	Poles are owned, installed and maintained by BC Hydro.	Luminaires, conductors, controllers and poles are owned, installed and maintained by the customer.
RS 1755 – Private Outdoor Lighting (Closed)	Lighting of private outdoor areas. This rate is closed and no new lights may be added.	Luminaires, conductors, and controllers are owned and maintained by BC Hydro. Poles may be owned and maintained by BC Hydro.	The pole may be owned by the customer.

REVISIONS: R. 4

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DISTRIBUTION STANDARDS 			ISSUED: NOV 2020 REPLACES: NOV 2012 ORIGINALLY ISSUED: SEP 1985	PAGE 4 OF 4	ES43 L1-01.04
					R 4

Application

This standard provides instructions for mounting a street light onto a pole.

Revision Notes

R4 – Updated format. Added mounting details and items required for mounting the bracket to a pole.
Revised the standard title.

Items Required

Item	Description	Material Number	Quantity	
			4.8m Bracket	1.2m or 2.4m Bracket
D1	Wire/Cable, RW90, #12AWG, Copper, 1C, White, Stranded, 600V, XLPE	380-4703	As required	
D2	Wire/Cable, RW90, #12AWG, Copper, 1C, Black, Stranded, 600V, XLPE	380-4700	As required	
F1	Connector, Compression	ES43 F5-09	2	
K1	Bracket, Street Light, 4.8m, c/w Backing Plate	440-0011	1	--
Or	Bracket, Street Light, 2.4m	440-0015	--	1
Or	Bracket, Street Light, 1.2m	440-0010	--	1
K2	Moulding, Grey	388-5221	As required	
N1	Bolt, Machine, 5/8" x Length	ES43 Z22-01	2	1
N2	Washer, Square, 5/8"	420-1521	2	1
N3	Washer, Helical Spring, 5/8"	102-4158	2	1
N4	Screw, Lag, 1/2" X 4-1/2"	101-0309	--	1
N5	Staple, Moulding	103-0228	As required	

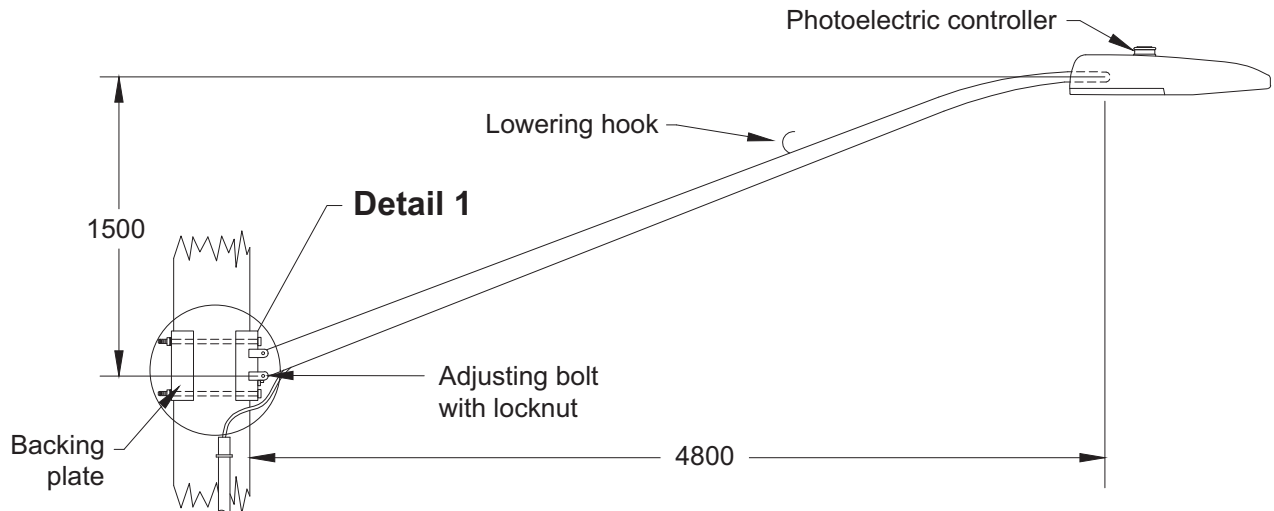
Reference Standards

ES43 F5-09	Partial Tension Splices and Streetlight Connectors
ES43 L1-01	Street Lighting, General Notes
ES43 L2-02	Luminaire Structures, Mounting Height and Separations
ES43 Z22-01	Material Catalogue, Fasteners, Threaded Fasteners

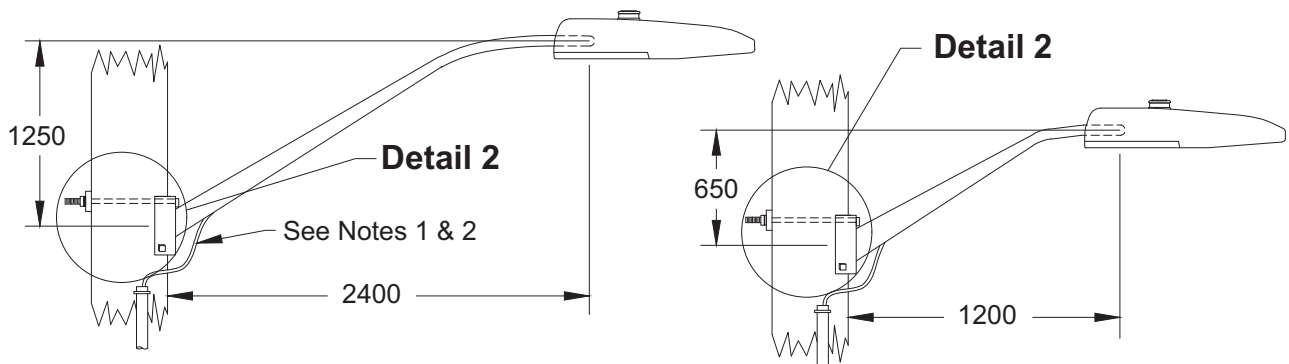
DESIGNED  M. SCHAEFER	RECOMMENDED  H. GIESBRECHT	ACCEPTED  F. DENNERT	ENGINEER OF RECORD  M. H. SCHAEFER #43679 BRITISH COLUMBIA ENGINEER 2020-09-18	LUMINAIRE STRUCTURES SUB-ASSEMBLIES	
DISTRIBUTION STANDARDS  BC Hydro		ISSUED: SEP 2020 REPLACES: NOV 2012 ORIGINALLY ISSUED: SEP 1985		PAGE 1 OF 3	ES43 L2-01.01
					R 4

Notes

1. Use #12 AWG copper (white), item D1, to connect the luminaire to the neutral. Use #12 AWG copper (black), item D2, to connect the luminaire to 120 V secondary. Use the applicable compression connector as per ES43 F5-09.
2. Cover street light wiring with moulding, item K2, if lead length is greater than 600 mm.
3. Bracket may require bonding to neutral. See ES43 L2-02.
4. See ES43 L1-01 for luminaire wattage and correlated colour temperature options, and photoelectric lighting controller.



4.8 m Bracket
Material Number 440-0011

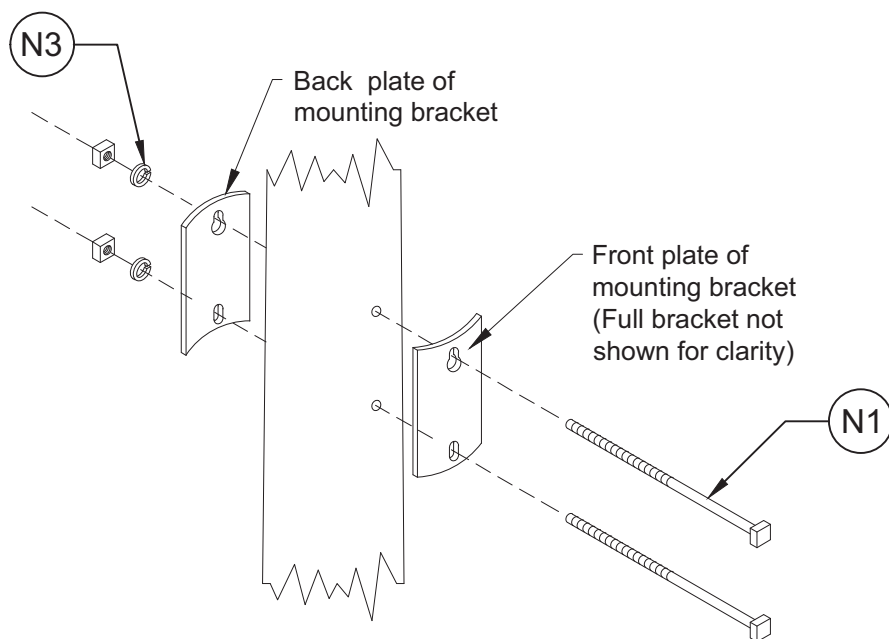


2.4 m Bracket
Material Number 440-0015

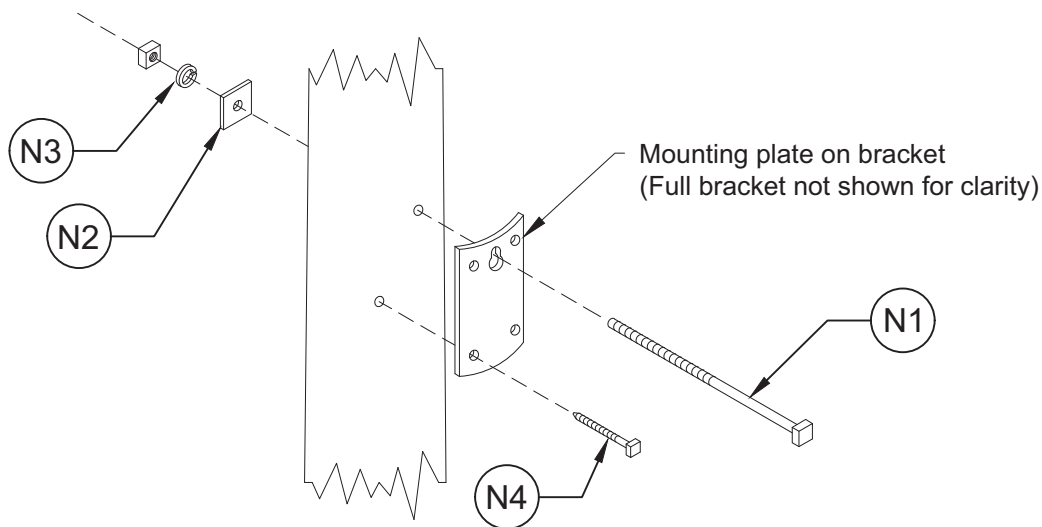
1.2 m Bracket
Material Number 440-0010

REVISIONS: R. 4

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					R 4

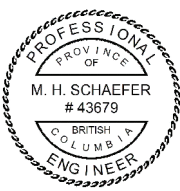


Detail 1
Mounting Detail for 4.8 m Bracket



Detail 2
Mounting Detail for 1.2 m or 2.4 m Bracket

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Application

This standard describes how to select a street light bracket and where to mount a street light on a pole.

Revision Notes

R4 – Updated format. Revised notes to improve clarity regarding selection of the street light bracket, the luminaire mounting height, and requirements for bonding. Added requirement that street light be mounted below the neutral if other distribution equipment is installed above the neutral. Revised standard title.

Reference Standards

ES43 L2-01	Luminaire Structures, Sub-Assemblies
ES43 R3-08	Bonding and Grounding, Equipment, Street Light Bracket

Selecting the Bracket Length

- The customer may specify the bracket length. If not specified by the customer, select the bracket length based on:
 - the distance from the pole to the edge of the roadway, and
 - the width of the roadway (see Figure 1).

If pole to road distance is:	Use bracket length of:
Less than 1 m	1.2 m
1 m to 3 m	2.4 m
More than 3 m	4.8 m

If the width of the roadway is:	The maximum overhang is:
Less than 15 m	1.5 m
Greater than 15 m	2.5 m

- Where civic officials confirm that a revised curb line or roadway width will be established in the near future, choose the bracket length to suit the proposed roadway.

Luminaire Mounting Height

- The street light should be mounted above the neutral on a pole without other distribution equipment. If clearance to the overhead primary cannot be maintained (see Figure 1), or if other distribution equipment is mounted on the pole above the neutral, the luminaire shall be mounted 200 mm below the secondary.
- Luminaires shall be mounted as close to 9 m above the roadway as possible. Mounting the luminaire at a height of 10 m to 8.5 m is acceptable (see Figure 1).

A lower mounting height may result in uncomfortable glare, reduced coverage area, and reduced light uniformity. A higher mounting height may result in light trespass and lower vertical illumination.

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	DISTRIBUTION STANDARDS  BC Hydro				ISSUED: SEP 2020 REPLACES: NOV 2012 ORIGINALLY ISSUED: SEP 1985		PAGE 1 OF 3	ES43 L2-02.01	R 4

Street Light Brackets in the Safety Clearance Zone

5. The luminaire bracket requires bonding if installed below the neutral. See ES43 R3-08 for bracket bonding details.
6. When installed below the neutral, street light supply conductors shall not extend below the street light bracket to maintain clearance to TELUS and third party attachments.
7. Cover street light supply conductors with moulding (material number 388-5221) when the bracket is attached within the neutral space.

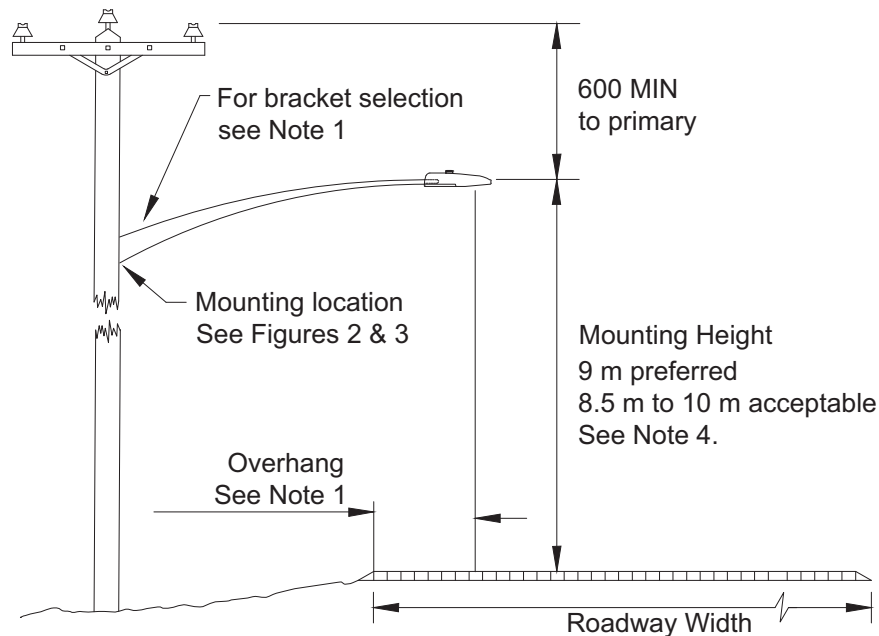
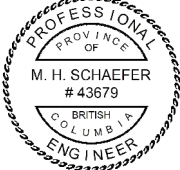


Figure 1
Street Light Mounting Height

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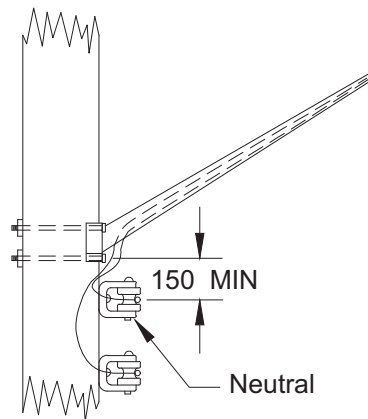


Figure 2
Bracket in BC Hydro Space

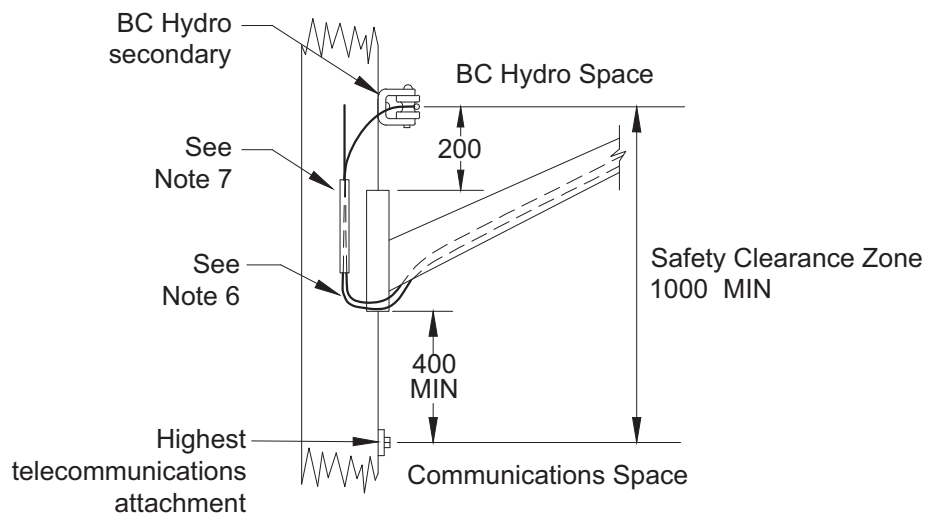
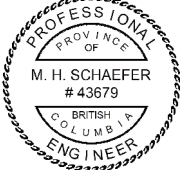


Figure 3
Bracket in Safety Clearance Zone
(See Note 5 for bonding requirements
in safety clearance zone)

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Application

This standard describes special installation conditions for street lights on hills.

Revision Notes

R3 – Updated format, and notes added. Removed recommended tree pruning. Revised standard title.

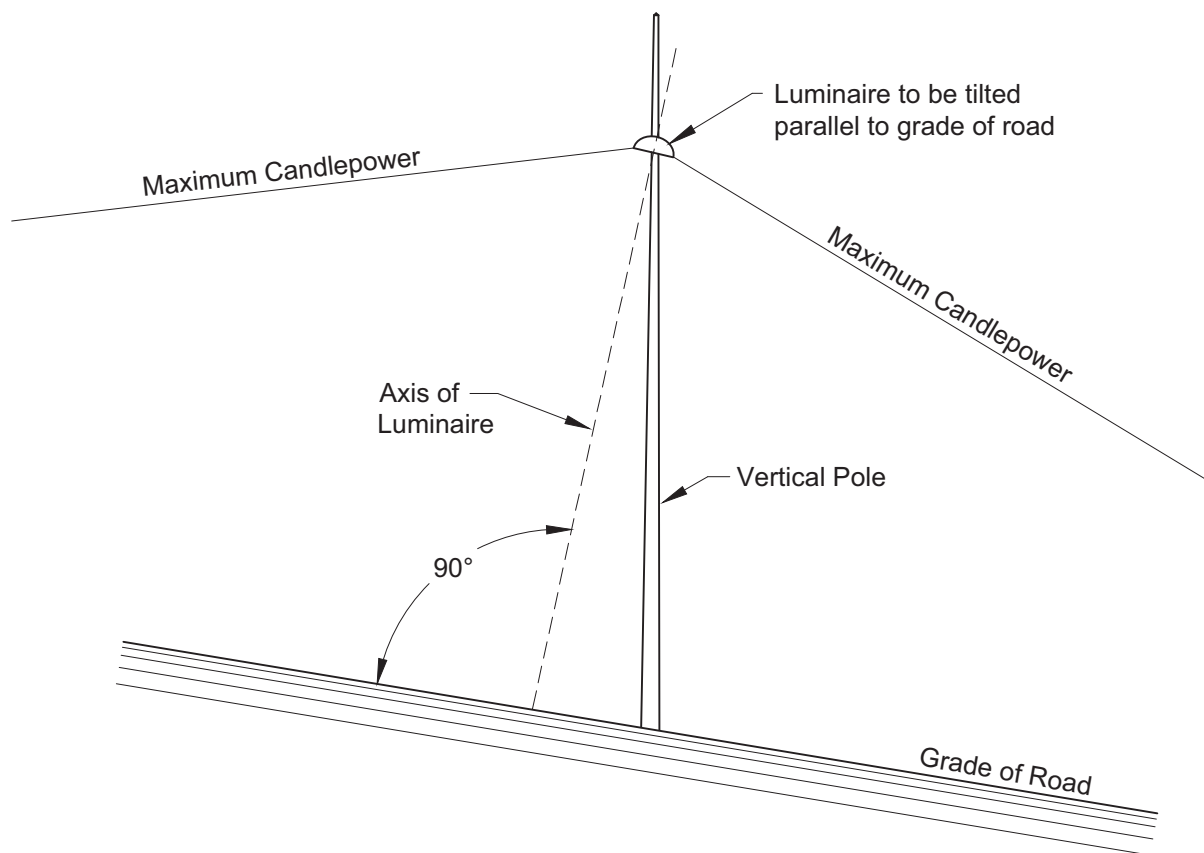
Notes

When installing street lights on hills, the street light shall be tilted parallel to the grade of the roadway to reduce glare for drivers and pedestrians.

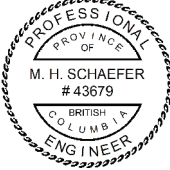


ATTENTION

Failure to install the luminaires at the appropriate angle will result in uncomfortable glare.



REVISIONS: R.3

DESIGNED	RECOMMENDED	ACCEPTED	ENGINEER OF RECORD	LUMINAIRE STRUCTURES INSTALLATION ON HILLS		
						
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			2020-09-18	PAGE 1 OF 1	ES43 L2-03	R 3