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This document contains information that is provided for reference purposes only, and should not be construed or used as a substitute for an analysis of the applicable tariffs, agreements, and safety regulations specific to each particular customer.

CUSTOMER OWNED OUTDOOR LIGHTING – TABLE OF CONTENTS			
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1. **SAFETY:**

The number 1 priority of every job is:

SAFETY!

National Grid's distribution poles carry electric lines that operate at voltages as high as 34,500 volts and can carry very high amperages.

National Grid's underground infrastructure carries the same very high distribution voltages and amperages in a confined space, and may also carry sub-transmission or transmission lines that operate at even higher voltage levels.

Outdoor lights are installed within the electric space on a distribution pole. Performing work on outdoor lights may require the worker to be in close proximity to the distribution lines.

It is the responsibility of the customer that owns and maintains outdoor lighting to insure that all personnel working on the outdoor lighting system are qualified to work in the designated electric supply space on a distribution pole in accordance with OSHA 1910.269.

OVERHEAD DISTRIBUTION

No customer, customer's employees, or contractors are ever allowed to perform any work on National Grid 120/240 volt or 120/208 volt secondary conductors.

UNDERGROUND DISTRIBUTION

No customer, customer's employees, or contractors are ever allowed to enter a National Grid manhole or handhole for any reason without National Grid safety supervision personnel being present on site.

IF UNSURE: - STOP – Call National Grid for assistance.

No outdoor lighting repair is too important to sacrifice personal safety.

OUTDOOR LIGHTING - SAFETY			
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2. **GENERAL:** These Standards identify requirements to enable a customer to safely install, remove, and maintain a customer owned outdoor lighting system which is installed on National Grid distribution poles and connected to National Grid overhead or underground secondary conductors.

Standards: All customer owned outdoor lighting shall be in compliance with the applicable provisions of the National Electric Safety Code, (NESC) latest edition, and the applicable National Grid Construction Standards.

Note: (As of July 1, 2014, the latest edition of the NESC is the 2012 edition)

Customer Owned Equipment: The customer shall be responsible to own, operate, and maintain all outdoor lighting equipment beyond the service tap connections to National Grid. This shall include, but not be limited, to the following:

1. Supplying all material and labor.
2. Transferring an overhead supplied outdoor light attachment to a new pole in the event of a pole replacement.
3. Relocating an overhead supplied outdoor light attachment to accommodate other construction activities on the pole.
4. Performing any work required on the outdoor lighting underground conduit system, conductors, foundation, pole, arm and luminaire.
5. Emergency 24 hour response to remove or make safe the outdoor light attachment in the event of a broken pole.

***NOTE:** In an emergency, National Grid personnel may perform, at customer expense, any customer outdoor lighting work National Grid deems necessary to maintain public or employee safety.*

Electrical Separation: The customer is responsible to create an electrical separation between the National Grid secondary conductors and the customer owned outdoor lighting conductors. This is required to insure the safety of National Grid and customer employees. It also clearly defines where National Grid ownership ends and customer ownership begins. This is accomplished by installing a dual pole in-line fuse holder with a midget cartridge style fuse on every outdoor light supply located as near as possible to the connection to the National Grid owned secondary conductors. This fuse, in addition to providing electrical protection, shall serve as a future disconnect point for the customer owned outdoor light. Once installed, the customer may disconnect or reconnect a customer owned outdoor light only by means of the in-line fuse holder. See Figure 6 for overhead supplied outdoor lights, and Figures 7, 8, 9, or 10 for underground supplied outdoor lights. See Figure 12 for in-line fused disconnect details.

Ownership Identification: The customer is responsible to label all customer owned outdoor lighting luminaires in accordance with National Grid Construction Standards. See Figures 1 and 2.

Worker Qualifications: All customer work shall be completed only by personnel qualified to work in the electric supply space on a distribution pole (herein referred to as "Qualified Worker") in accordance with OSHA 1910.269. An executed copy of the OSHA 1910-269 ACKNOWLEDGEMENT FOR THE USE OF QUALIFIED ELECTRICAL WORKERS form is mandatory.

Final Connections to National Grid 120/240 VAC or 120/208 VAC Secondary Conductors: For OVERHEAD supplied lighting, National Grid will permit a Qualified Worker to make all connections and disconnections of customer owned outdoor light supply conductors to the company owned secondary and grounding conductors. For UNDERGROUND supplied lighting, National Grid will permit a Qualified Worker to make all connections and disconnections of customer owned outdoor light supply conductors to the company owned secondary and grounding conductors provided that National Grid personnel are present to provide safety supervision and access to the underground facilities.

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3. **CONSTRUCTION DRAWINGS:**

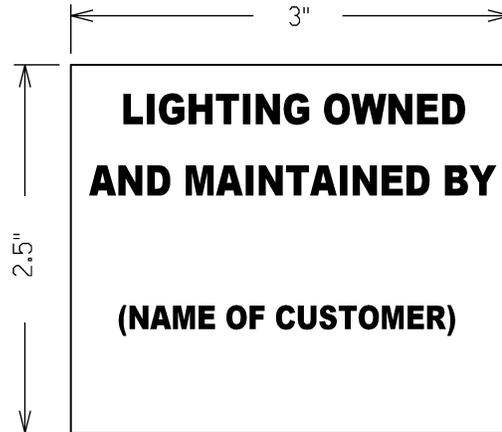


Figure 1 – Ownership Identification Label for Customer Owned Outdoor Luminaires

1. All customer owned outdoor light luminaires shall be identified with a label to clearly define ownership and maintenance responsibilities.
2. Ownership identification labels shall be reflective white with black lettering. See Figure 1.

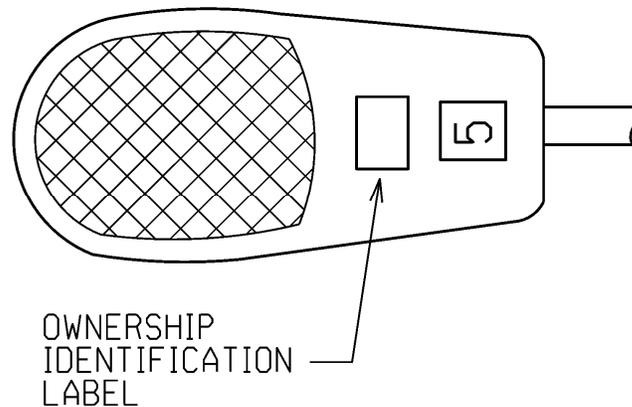


Figure 2 – Installation of Ownership Identification Label

1. Ownership identification label shall be installed on the lower door of a horizontal roadway luminaire such that it is clearly visible from the ground. See Figure 2.
2. For post top, floodlight, and other luminaires, the ownership identification label shall be installed on the luminaire housing in a location such that it is clearly visible from the ground.

OWNERSHIP IDENTIFICATION OF CUSTOMER OWNED LIGHTING			
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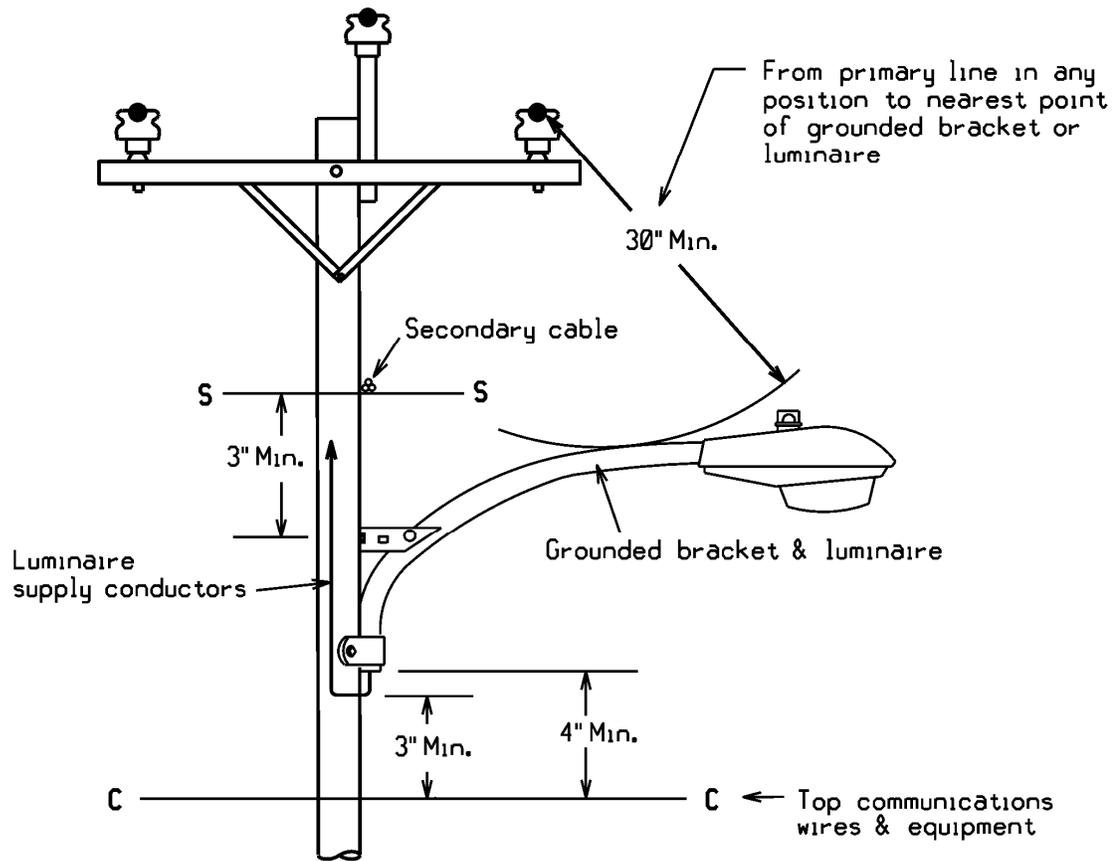


Figure 3 – Outdoor Light Clearance from Overhead Conductors

1. Primary Conductors – Maintain minimum 30-inch clearance from any primary conductor or cable to nearest point of grounded luminaire or bracket.
2. Secondary Conductors – Maintain minimum 3-inch vertical clearance from secondary wires or cable to nearest point of grounded luminaire bracket. (NESC Table 239-1)
3. Communications Cables – Maintain minimum 4-inch vertical clearance from closest communication cable to nearest point of grounded luminaire bracket. (NESC Table 238-2)

Maintain minimum 3-inch clearance from closest communications cable to nearest point of luminaire supply conductors drip loop. Luminaire supply conductors must be covered with non-metallic flexible conduit. (NESC 238D)

4. Location on Pole – Always install the outdoor light **BELOW** the secondary conductors. This applies to new installations and any time an existing outdoor light is relocated or transferred to a new pole.

CLEARANCES FROM OVERHEAD CONDUCTORS			
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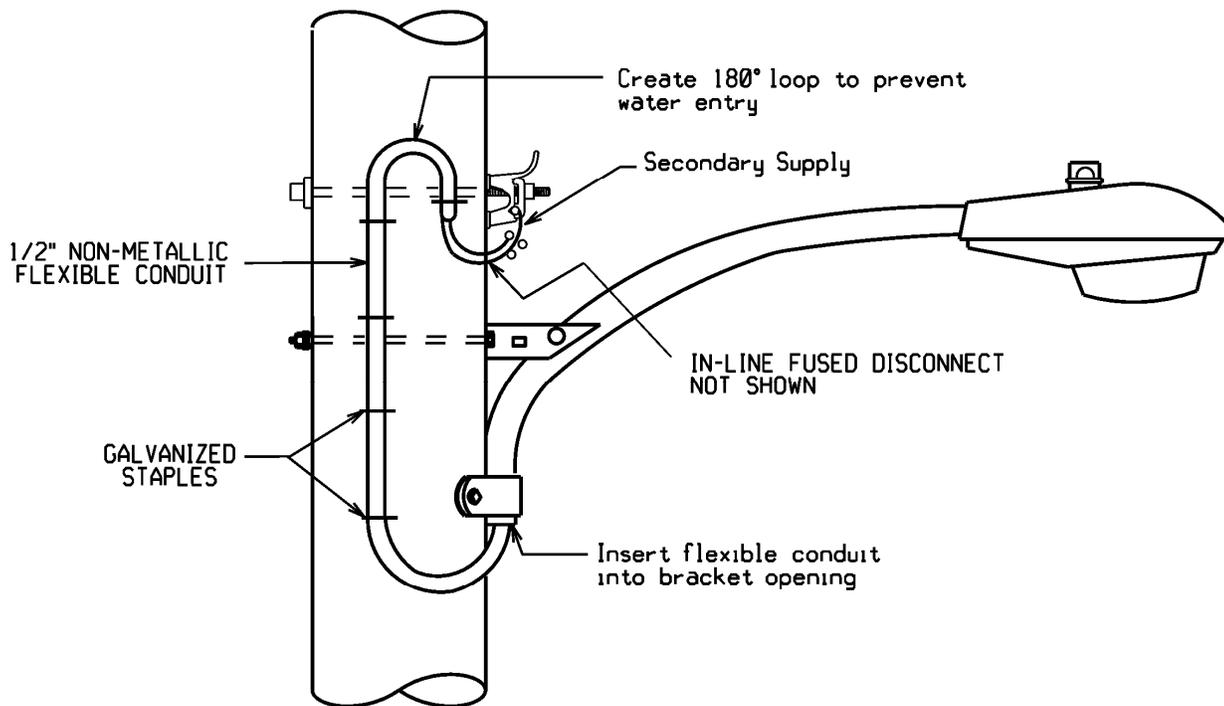


Figure 4 - Mechanical Protection for Overhead Supplied Outdoor Light Fixture Conductors

1. NESC Table 239G1 requires that all luminaire supply conductors (#10 AWG) shall have mechanical protection (1/2" non-metallic flexible conduit) installed from the point where they leave the pole end of the bracket to the connection to the secondary supply in order to take advantage of the clearance dimensions shown on page 5.
2. Insert the non-metallic flexible conduit into the bracket opening and extend up the pole to the secondary supply.
3. Create a 180 degree loop at the secondary supply to prevent rain water from entering and becoming trapped inside the flexible conduit.
4. Secure the non-metallic flexible conduit with galvanized staples spaced 12-inches apart or closer as necessary.

MECHANICAL PROTECTION FOR OVERHEAD OUTDOOR LIGHTING FIXTURE CONDUCTORS			
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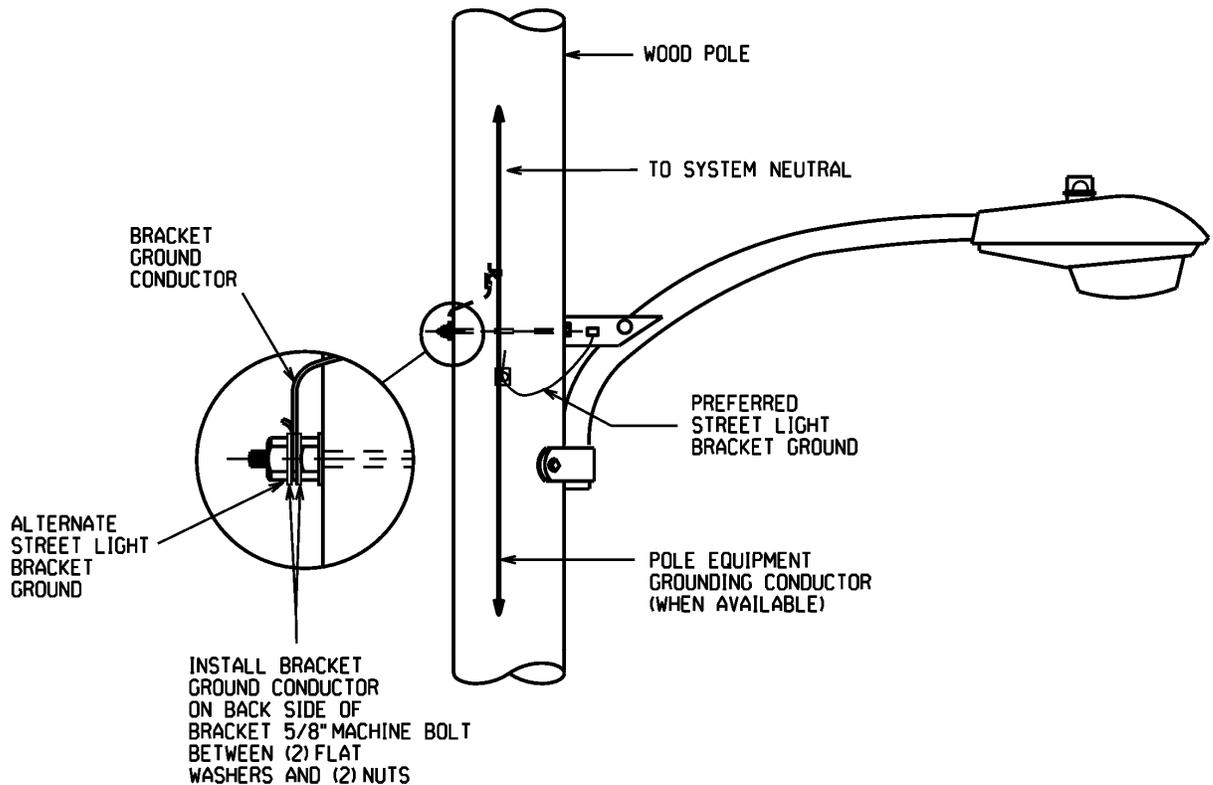


Figure 5 – Grounding of Overhead Supplied Outdoor Light

1. Every outdoor light bracket shall be grounded. Install a #4 AWG stranded copper conductor with enough length to connect to the pole equipment grounding conductor (when available) or to the secondary system neutral. Final connections to National Grid conductors may be made by a Qualified Worker.
2. Many brackets have a bracket grounding bolt located near the wood pole end of the bracket. If none exists, install a bracket grounding bolt on the bracket or connect grounding conductor to the back side of the 5/8" square head machine bolt which secures the bracket to the pole.

GROUNDING OF OVERHEAD SUPPLIED OUTDOOR LIGHTING			
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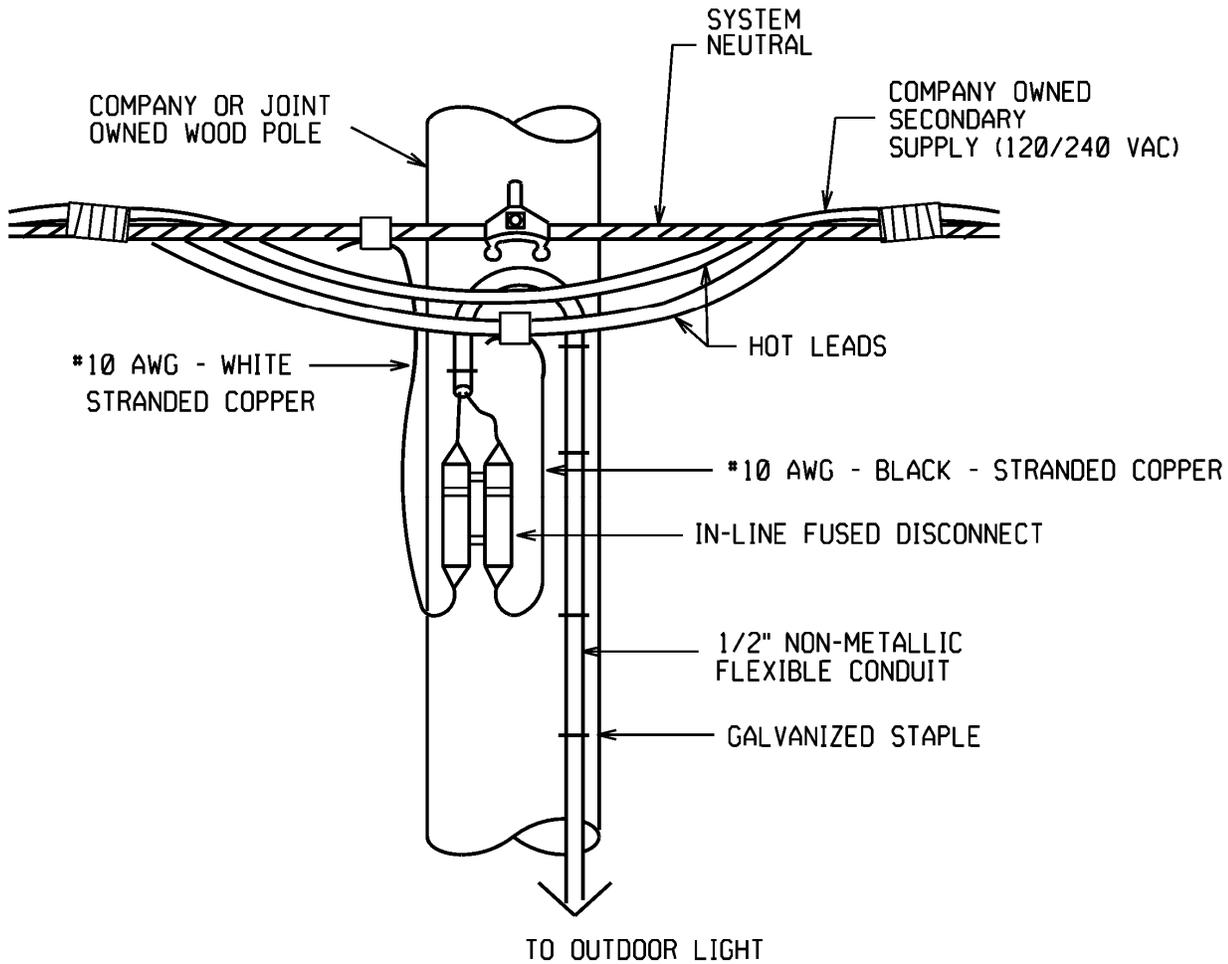


Figure 6 – Connection of Overhead Supplied Customer Owned Outdoor Light to National Grid Overhead Secondary Conductors

1. Every customer outdoor light shall have an in-line fused disconnect as described in “Electrical Separation” on page 3. See page 14 for details on the in-line fused disconnect.
2. Secure the in-line fused disconnect to the pole using a spring loaded conduit clip or galvanized staple.
3. Provide sufficient slack in the luminaire wiring to facilitate fuse replacement.
4. Outdoor lighting fixture wiring shall be #10 AWG 7-strand copper BLACK-WHITE with RHH/RHW/USE-2 insulation.

CONNECTION OF CUSTOMER OWNED LIGHTING TO NATIONAL GRID OVERHEAD SECONDARY CONDUCTORS			
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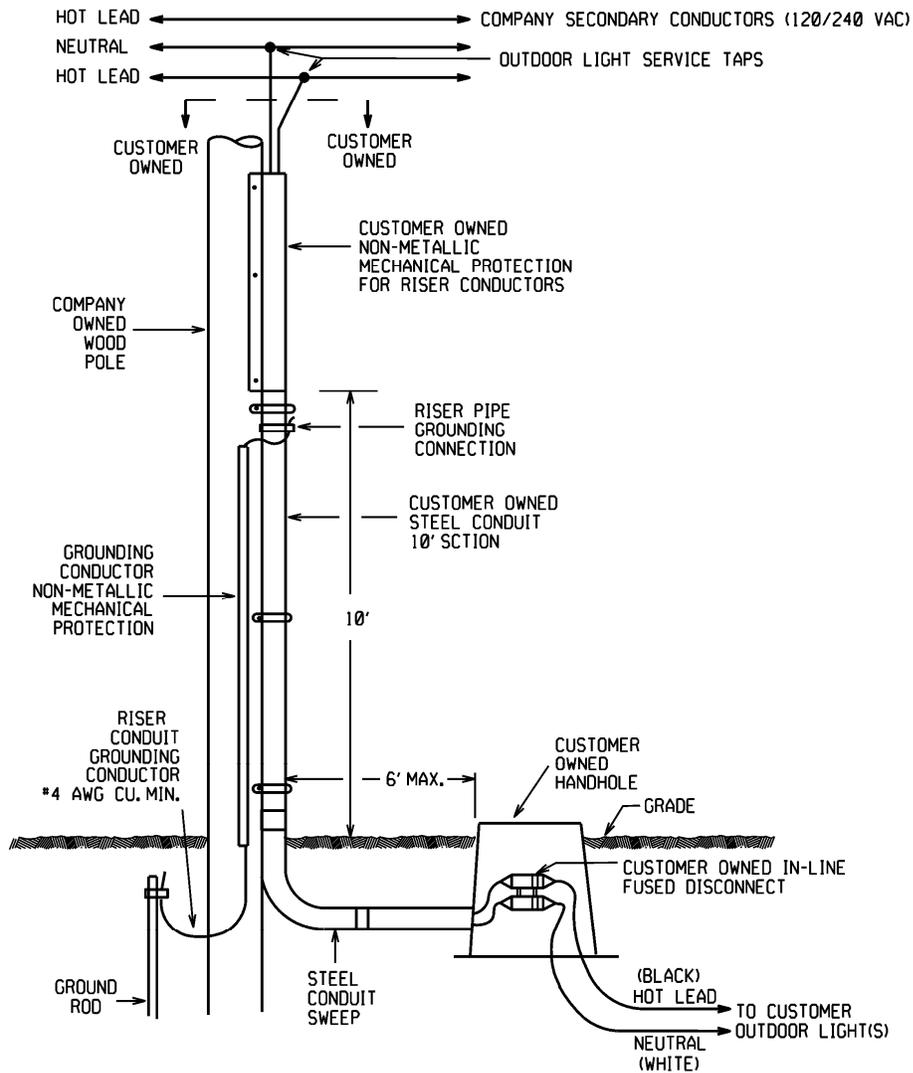


Figure 7 – Connection of Customer Owned Outdoor Lighting Riser to National Grid Overhead Secondary Conductors

1. Install customer owned handhole as shown in Figure 7. Customer owned handhole shall house the in-line fused disconnect. See page 14 for details on the in-line fused disconnect.
2. Always install the riser conduit away from vehicle traffic.
3. No more than (2) riser conduits may be attached to a pole. Consult National Grid Engineering if more than (2) risers are desired.
4. Underground supply conductors shall be #6 AWG 7-strand copper (minimum) with RHH/RHW/USE-2 insulation. Conductors shall be color coded BLACK = Hot lead, WHITE = Neutral.

CONNECTION OF CUSTOMER OWNED OUTDOOR LIGHTING RISER TO NATIONAL GRID OVERHEAD SECONDARY CONDUCTORS			
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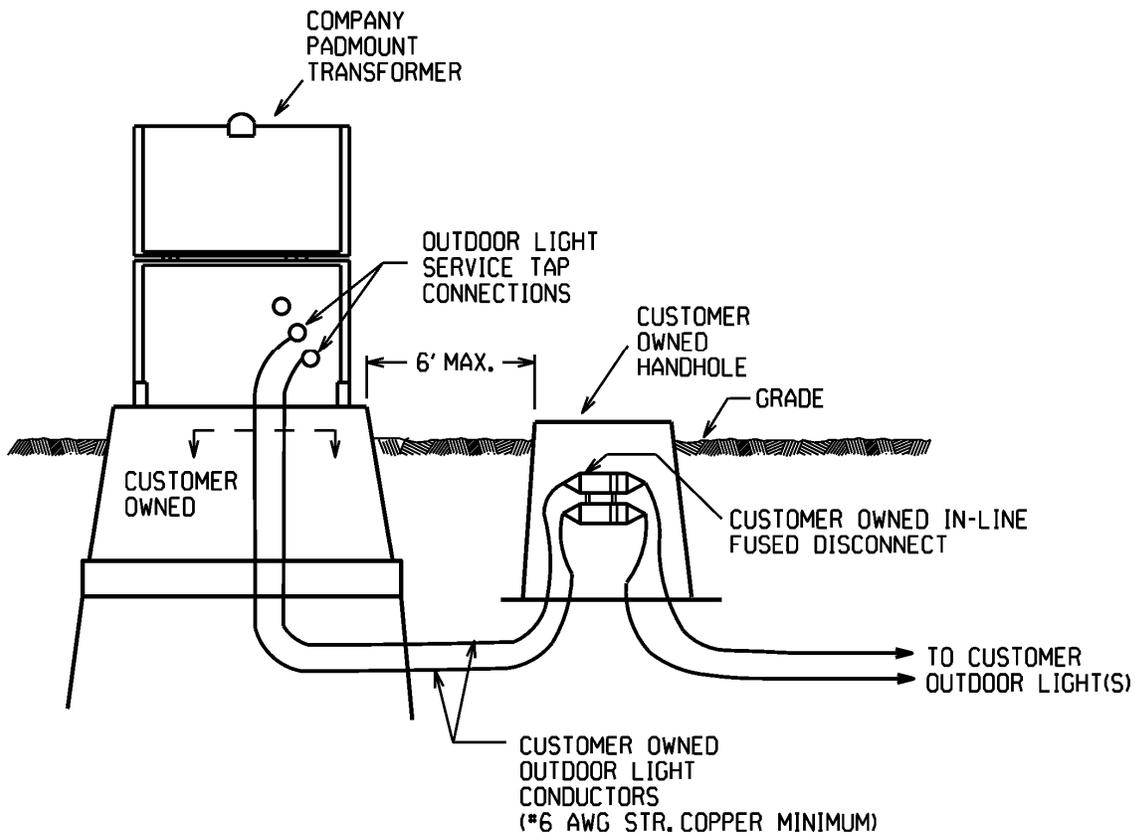


Figure 8 – Connection of Underground Supplied Street Light to National Grid Padmount Transformer

1. Install customer owned handhole as shown in Figure 8. Customer owned handhole shall house the in-line fused disconnect. See page 14 for details on the in-line fused disconnect.
2. Underground supply conductors shall be #6 AWG 7-strand copper (minimum) with RHH/RHW/USE-2 insulation. Conductors shall be color coded BLACK = Hot lead, WHITE = Neutral.
3. In cases where a new customer conduit is to be installed into a National Grid padmount transformer, National Grid shall determine the conduit entrance location at the padmount transformer foundation. The customer shall install the conduit to just outside this location. National Grid shall then create the opening in the padmount foundation and extend the customer conduit into the padmount foundation.
4. All electrical connections or disconnections to the secondary supply may be performed by a Qualified Worker, however, in every case, National Grid personnel shall be present to provide safety supervision and to unlock and relock the padmount transformer.

CONNECTION OF CUSTOMER OWNED LIGHTING TO NATIONAL GRID PADMOUNT TRANSFORMER			
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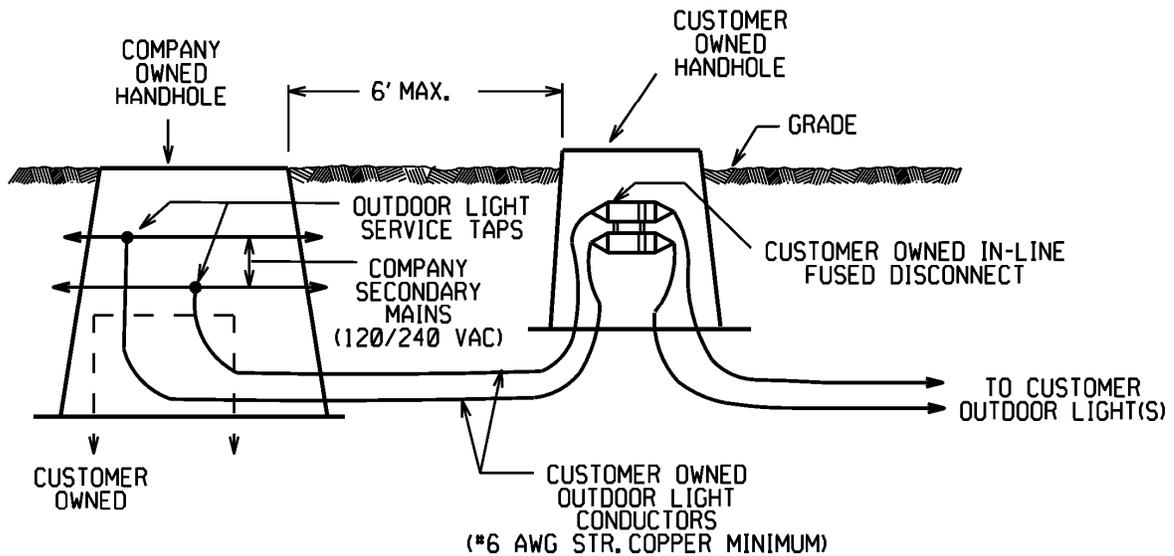


Figure 9 – Connection of Underground Supplied Customer Owned Outdoor Lighting to National Grid Handhole or Manhole – Standard Connection

1. Install customer owned handhole as shown in Figure 9. Customer owned handhole shall house the in-line fused disconnect. See page 14 for details on the in-line fused disconnect.
2. Underground supply conductors shall be #6 AWG 7-strand copper (minimum) with RHH/RHW/USE-2 insulation. Conductors shall be color coded BLACK = Hot lead, WHITE = Neutral.
3. In cases where a new customer conduit is to be installed into a National Grid manhole or handhole, National Grid shall determine the conduit entrance location in the manhole/handhole, The customer shall install the conduit to just outside this location. National Grid shall then create the opening in the manhole/handhole wall and extend the customer conduit into the manhole/handhole.
4. All electrical connections or disconnections to the secondary supply may be performed by a Qualified Worker, however, in every case National Grid personnel shall be present to provide safety supervision.

CONNECTION OF CUSTOMER OWNED LIGHTING TO NATIONAL GRID MANHOLE OR HANDHOLE – STANDARD CONNECTION			
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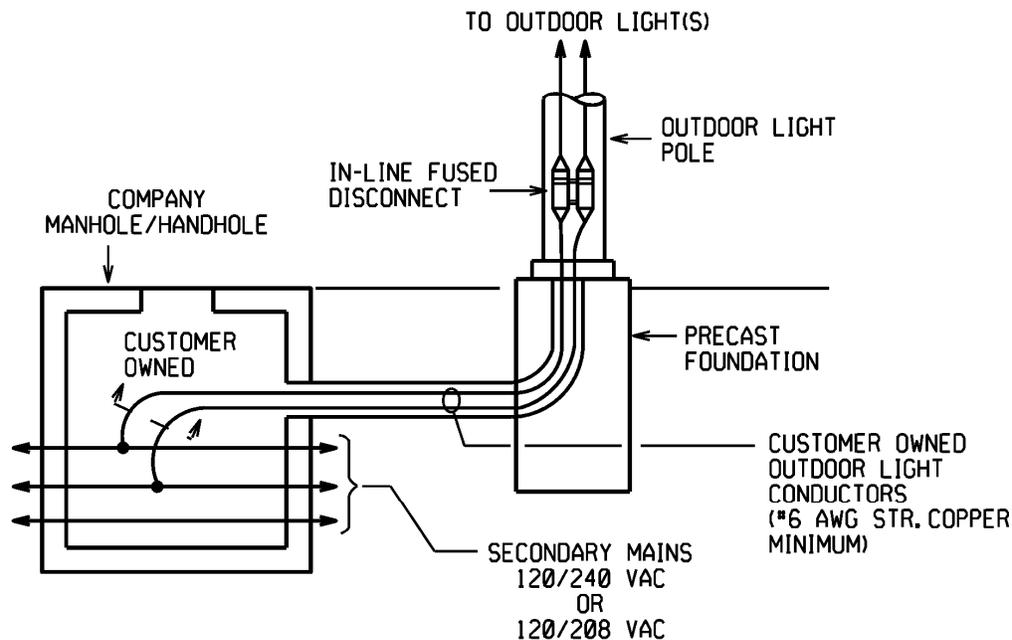


Figure 10 – Connection of Underground Supplied Customer Owned Outdoor Light to National Grid Handhole or Manhole – Non-Standard Connection

1. For all new installations and modifications to existing installations, the customer is required to install an in-ground handhole located as close as possible to the company provided electrical source point, as illustrated in Figures 7, 8, and 9.
2. In the rare case where the customer owned concrete outdoor lighting foundation is immediately adjacent to the National Grid manhole/handhole, installation of an in-ground customer owned handhole may be impossible. In this case, the in-line fused disconnect may be installed inside the pole access handhole. **This is allowed only in cases where no physical space exists to install the in-ground customer owned handhole.** Note that the #6 AWG underground supply conductors between the manhole and the base of the outdoor light are customer owned.
3. Underground supply conductors shall be #6 AWG 7-strand copper (minimum) with RHH/RHW/USE-2 insulation. Conductors shall be color coded BLACK = Hot lead, WHITE = Neutral.
4. In cases where a new customer conduit is to be installed into a National Grid manhole or handhole, National Grid shall determine the conduit entrance location in the manhole/handhole, The customer shall install the conduit to just outside this location. National Grid shall then create the opening in the manhole/handhole wall and extend the customer conduit into the manhole/handhole.
5. All electrical connections or disconnections to the secondary supply may be performed by a Qualified Worker, however, in every case National Grid personnel shall be present to provide safety supervision.

CONNECTION OF CUSTOMER OWNED LIGHTING TO NATIONAL GRID MANHOLE OR HANDHOLE – NON-STANDARD CONNECTION			
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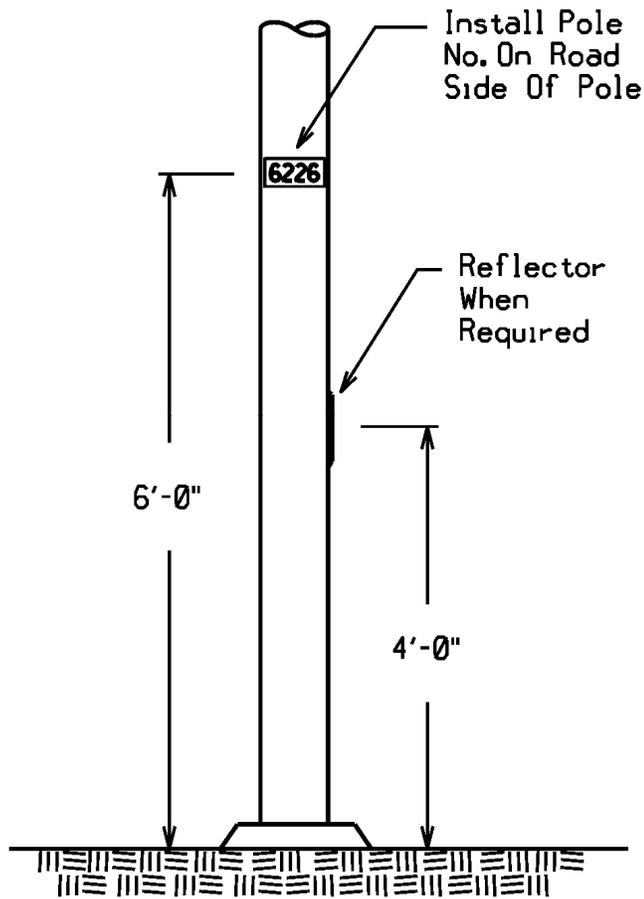


Figure 11 – Pole Numbering - Underground Supplied Customer Owned Lighting

1. Every underground supplied customer lighting pole shall be numbered in accordance with Figure 11.
2. Always use 1-3/4-inch x 3-inch, high intensity white reflective pole number decals.
3. Pole number decals shall be installed horizontal to each other as shown in Figure 11 – not vertical.

POLE NUMBERING – UNDERGROUND SUPPLIED LIGHTING			
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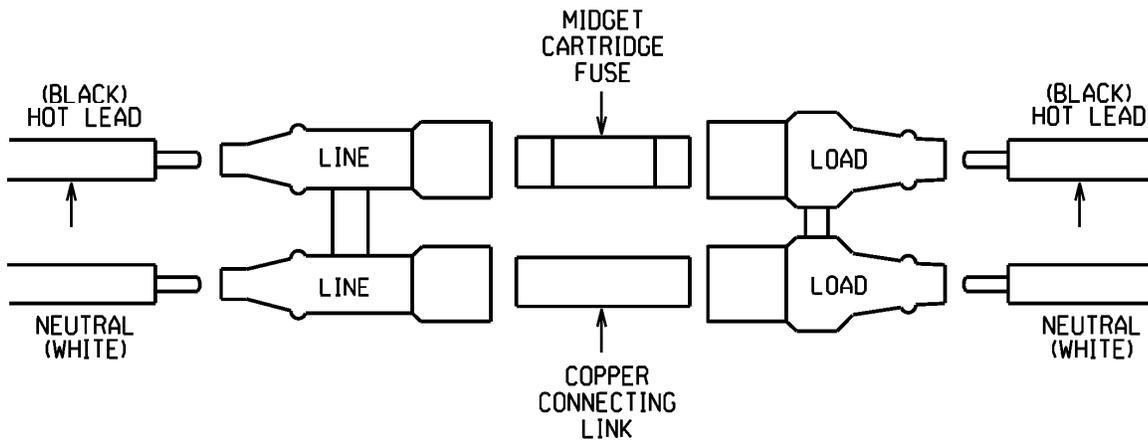


Figure 12 – In-Line Fused Disconnect Details

1. All customer owned outdoor lighting equipment shall be fused using a dual pole, watertight, in-line fuse holder and cartridge style fuse. This fuse, in addition to providing electrical protection, shall serve as a disconnection point for the customer owned outdoor lighting equipment.
2. Fuse Holder
 The fuse holder shall be a watertight device suitable for use in an outdoor environment.

 The fuse holder shall be totally insulated, thus having no exposed energized parts.

 The fuse holder shall accept #14 AWG - #6 AWG stranded copper conductors on both ends.

 The fuse holder shall be a dual pole device allowing simultaneous disconnection of both the 120 VAC hot lead (black wire) and the neutral conductor (white wire).

 The fuse holder shall be designed such that, when separated, the midget cartridge fuse and copper connecting link shall be held captive in the load end of the fuse holder.

 The fuse holder shall be polarized to prevent accidental reversal of the live leg and neutral connections.
3. Cartridge Fuse
 The fuse shall be a non-glass type, midget style cartridge fuse. Fuse dimensions shall be 13/32" diameter x 1½" length.
4. Neutral Connection
 The neutral conductor shall not be fused. Install a 13/32" diameter x 1½" length copper connecting link in place of a cartridge fuse.
5. Always provide sufficient slack in wiring to facilitate fuse replacement.

IN-LINE FUSED DISCONNECT DETAILS			
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