

ENGINEER'S REPORT
of the
SAFETY OF MAW COMMUNICATIONS
FIBER OPTIC CABLE INSTALLATION

Prepared by:

Daryl L. Ebersole, P.E.

Jeffrey M. Kobilka, P.E.

January 7, 2018

SAFETY OF MAW COMMUNICATIONS FIBER OPTIC INSTALLATION

ENGINEER'S REPORT

January 7, 2018

A. INTRODUCTION

MAW Communications is a Pennsylvania public utility which provides telecommunication services for institutional and residential customers in Berks and Lancaster counties. MAW has installed Fiber Optic Cable in Lancaster City attached on utility poles owned by PPL Electric Utility. PPL has claimed the fiber optic cable installation by MAW represents an exigent public safety risk.

The purpose of our investigation was to determine if the fiber optic supply cables installed by MAW and identified by PPL as exigent public safety risks represent exigent public safety risk, a public safety risk, and/or a worker safety risk.

B. MATERIALS AVAILABLE FOR REVIEW

1. Inspection of FOSC Installations in Lancaster City, 01/03/2018
2. 20171221 List 1 of MAW Unauthorized Attachments including Exigent safety issues
3. Corning SST-Drop Data Sheet
4. Corning ROC Drop Data Sheet

C. ANALYSIS – MAW Fiber Optic Cable Materials - ADSS

The MAW fiber optic cable installation in Lancaster city utilizes two Corning fiber optic cables. The backbone cable is Corning SST-Drop. The drop cable is Corning ROC Drop. Both cables are All Dielectric Self Supporting (ADSS) fiber optic cables. Fiber optic cables by definition do not transmit electricity, instead they transmit light signals. An “All Dielectric” cable is not conductive and therefore is not a risk for conducting hazardous electricity from pole to pole or from pole to ground if the cable should break. The “Self Supporting” designation allows the cable to be attached without a messenger. A messenger is a cable, often constructed of conductive metals, used to support another cable across a span between two attachment points.

In multiple locations within the National Electrical Safety Code (NESC), the recognized national standard for overhead communication and power lines, ADSS fiber optic cables are referred to as Rule 230F1b cables.

D. ANALYSIS – ADSS Clearance From Power in Supply Space

ADSS cable operates under different rules for clearance from supply cables than conductive communication cables because it is dielectric (non-conductive) and does not require a

messenger. The NESC recognizes that ADSS poses no risk of carrying voltage from pole to pole in Table 235-5 “Vertical Clearance between conductors at supports” FN10:

“No clearance is specified between fiber-optic supply cables (FOSC) meeting Rule 230F1b and supply cables and conductors. The FOSC may be attached to a supply conductor or cable at the pole or in the span, provided that the FOSC is positioned away from the supply conductor or cable to prevent abrasion damage.”

ADSS cable can be wrapped around electrical supply cables and be in accordance with the NESC as long as the connection is mechanically sound and does not cause abrasion.

The below picture is of a PPL installation in Berks county that utilizes ADSS fiber optic cable with minimal clearance to supply. This is acceptable per the NESC, provided workers utilize supply space work rules.

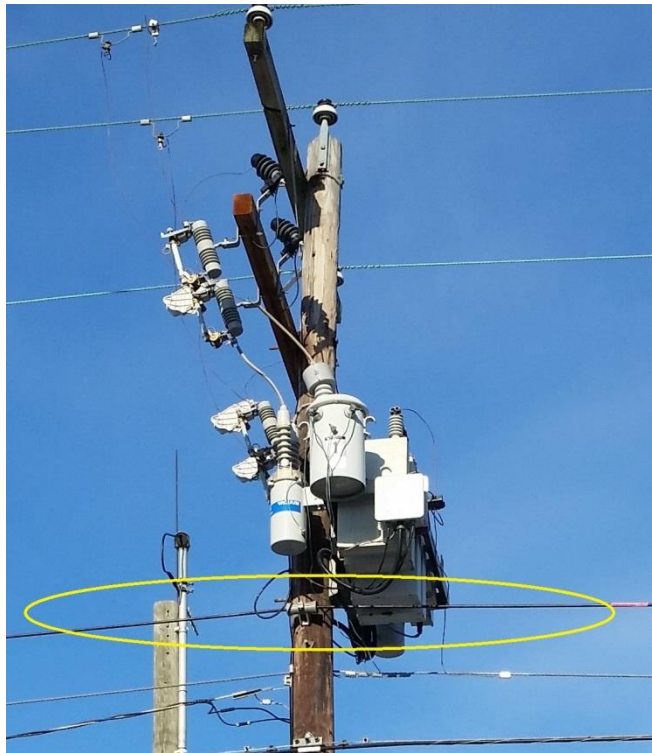


Figure 1 - PPL ADSS Fiber Optic Installation (outlined in yellow)

E. ANALYSIS – Exigent Public Safety Risk

PPL has claimed that the MAW fiber optic cable installation represents an Exigent Public Safety Risk. The ways in which an overhead line can represent a public safety risk include:

- Low hanging conductors and conductive cables can pose a risk of electric shock
- Broken conductors and conductive cables can pose risk of electric shock

The above risks require the cable in question to be able to conduct electricity to present a risk to the public. The MAW installation is All Dielectric and does not conduct electricity and does not present either risk. If an energized cable should break (or otherwise fail) and come into contact with an MAW ADSS cable and the MAW ADSS cable should break or otherwise be in reach of the public there exists no electrical hazard from the MAW ADSS cable. Categorizing the MAW fiber optic system as an *exigent* public safety risk would indicate there is a pressing, urgent safety risk to the public. There is no basis for this claim, and none of the issues described by PPL present a risk to the public. The MAW Communication fiber optic system does not present a safety risk to the public.

F. ANALYSIS – Clearance from Ungrounded Luminaire Brackets

One of the issues presented in the PPL document titled “20171221 List 1 of MAW Unauthorized Attachments including Exigent safety issues” is insufficient clearance from an ungrounded luminaire bracket. The issue is listed multiple times and has a range of 6” to 36” from the ungrounded street light bracket. (Poles: 40670S26463, 40692S26440, 40701S26449, 40718S26466, 40743S26491, 40770S26512, 40819S26504, 40840S26501)

NESC Section 238 defines requirements for clearances between non energized metal supply equipment (such as brackets) and communications equipment or cables. The purpose of the clearances in this section is to create a “communication worker safety zone” between communication equipment/cables and the supply space. The need for this zone comes from the work rules for communications workers. Compared to supply space work rules, communication space work rules are less stringent and require different equipment. If a communications cable is to operate in the supply space then the telecom utility workers must follow supply space work rules, increasing requirements for insulated equipment and protective gear. This is defined in section 224A1:

Communication circuits located in the supply space shall be installed and maintained only by personnel authorized and qualified to work in the supply space in accordance with the applicable rules of Sections 42 and 44.

Table 238-2—Vertical clearance of span wires and brackets from communication lines and equipment
(See also Rule 238C.)

	Carrying luminaires, traffic signals, or trolley conductors			
	Not effectively grounded		Effectively grounded	
	(mm)	(in)	(mm)	(in)
Above communication support arms	1000	40	500	20 ^①
Below communication support arms	1000	40	600	24
Above messengers carrying communication cables	1000	40	100	4
Below messengers carrying communication cables	1000	40	100	4
From terminal box of communication cable	1000	40	100	4
From communication brackets, bridle wire rings, or drive hooks	1000	40	100	4

Figure 2 - NESC 2017 Table 238-2

Table 238-2 is understood by PPL to place the MAW installation in violation of the NESC. This is incorrect. Per the NESC if the MAW workers utilize supply space work practices there is no need for the communication worker safety zone. Analysis from the IEEE 2017 NESC Handbook agrees:

If communication workers are authorized to work in the supply space; use supply work rules and methods, insulated buckets, insulating tools and insulating personal protective gear; and otherwise meet Rule 224A, there is no requirement for a separate communication space and communication worker safety zone.¹

MAW is not in violation of the NESC. For instances where their cables are within 40 inches of the lowest piece of supply space equipment, or there is an ungrounded luminaire in the communication worker safety zone, the NESC requires MAW Communications utilize supply space work rules and equipment.

The location of the MAW fiber optic cable does not present a safety risk to properly trained and equipped MAW workers, nor does it present a safety risk to employees of other telecommunication companies or PPL utility workers as the cable is not capable of carrying electrical hazard from pole to pole. However, the presence of not effectively grounded luminaires in the communication worker safety zone does present a risk to workers who are not utilizing supply space work practices. As shown in Figure 3 there are other, non-ADSS telecom cables within 40” of the ungrounded luminaire bracket. For this reason and general good

¹ IEEE 2017 NESC Handbook Rule 238E page 429

practice it is recommended that the luminaires be effectively grounded. With the luminaire effectively grounded, clearance requirements are reduced to 4”, and the requirement to follow supply space work rules is removed.



Figure 3 - Ungrounded Luminaire clearance to communication cables

G. ANALYSIS – Clearance from Neutral

The PPL issue list states that it is an exigent safety concern that the MAW ADSS fiber optic cable is “30” from Neutral” (Poles: 40764S26513, 40862S26497, 40760S26509). This is neither a safety concern nor a violation of NESC. This does not require supply space work rules. Footnote 5 of Table 235-5 “Vertical clearance between conductors at supports” requires 30” of space between neutrals and ADSS fiber optic cables.

May be reduced to 30 in for supply neutrals meeting rule 230E1, fiber optic supply cables on an effectively grounded messenger meeting Rule 230F1a,

entirely dielectric fiber-optic cables meeting Rule 230F1b, ... Bonding is not required for entirely dielectric cables meeting Rule 230F1b.²

H. ANALYSIS – Clearance from Drip Loops

The PPL issue list includes clearance from drip loops as an issue. There are two instances listed that have a clearance of 12” or more (Poles 40777S26511 and 40832S26503). These instances are not safety risks nor are they NESC violations. Per Section 238D:

If a drip loop of conductors entering a luminaire, a luminaire bracket, or a traffic signal bracket is above a communication cable, the lowest point of the loop shall not be less than 12 in above the highest communication cable.³

Pole 40701S26449 is listed as having 3” of clearance from the Street Light Drip loop to the fiber optic cable. Per the NESC this drip loop should have a “suitable nonmetallic cover”⁴.

² 2017 NESC Table 235-5 “Vertical clearance between conductors at supports” footnote 5

³ 2017 NESC Rule 238D

⁴ 2017 NESC Rule 238D Exception

I. FINDINGS

Within the bounds of reasonable engineering certainty, and subject to change if additional information becomes available, it is our professional opinion that:

1. The fiber optic network installed and maintained by MAW Communications and identified by PPL as exigent safety risks are not public safety risks.
2. The fiber optic network installed and maintained by MAW Communications and identified by PPL as exigent safety risks are not utility worker safety risks.
3. For instances where the clearance required by the communication worker safety zone (40" from supply space) is not possible, telecommunication workers should follow supply space work rules, methods, and utilize insulated equipment.
4. Ungrounded luminaires that are in the communication worker safety zone should be grounded to reduce the worker safety risk for all telecommunication workers who are not following supply space work rules.
5. Recommend installation of non-metallic cover on Pole 40701S26449 street light drip wire.



Daryl Ebersole, P.E.



Jeffrey Kobilka, P.E.