



# AERIAL COMMUNICATION CABLE IDENTIFICATION GUIDE



As prepared by KCI Technologies, Inc.  
November 2021

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## 1.0 Introduction

Identifying possible impacts to utility infrastructure can avoid construction delays and additional cost to a given roadway project. Early identification of utility conflicts during the design process is an important task, this guide is intended to be used as reference material for various users to help identify the owners of various aerial and at grade communication facilities.

All information presented in this handbook is meant to guide the user. Field conditions and information shall be confirmed with the utility owner.

## 2.0 Types of Poles

The most common poles found in the field are round poles, however square poles can be found at times. The materials used in pole construction are wood, steel, concrete, or composites (i.e., Fiberglass). Important points to consider when one pole is directly impacted, it will typically involve other poles because of cable design elements including bending angle and potential need for guying.

### 2.1 Wood Poles

The majority of Utility Poles are made from various types of wood. These include, but are not limited to:

- Southern Pine
- Douglas Fir
- Lodgepole Pine
- Western Red Cedar
- Pacific Silver Fir

Typical wooden poles are cut to lengths in 5 feet increments (i.e., 35', 40', 45', 50', etc.). Whenever visible, a pole's brand/birthmark identifies its size, class, and type of wood. The following information is shown, manufacturer, type of wood and treatment, date of manufacture, class and overall length.

In the past, wooden poles have been treated with creosote for their preservation. More recently, wooden poles are being treated with various chemicals, to delay their rate of decay. These chemicals are more



*Figure 2-1: Wood Pole*

Environmentally Friendly than creosote. Small tags are affixed to poles as they are treated or tested (Figure 2-2). A typical wood pole lasts 25-50 years, before requiring replacement. Wooden poles are tested regularly to assure they haven't lost their structural integrity.



Figure 2-2: Treated Tags

### 2.1.1 Wood Pole Brand/Birthmark

**Field Identification:** Pole Brand or Birthmark is a tag that can be found on any side of a pole.

**Description and Purpose:** Wood Poles are branded with Species, treatment, Class, and length as in Figure 2-3.

**Considerations and Additional Information:** Some poles, due to degradation, wear, and tear, the birthmark fades off, and makes it difficult to find/read them.

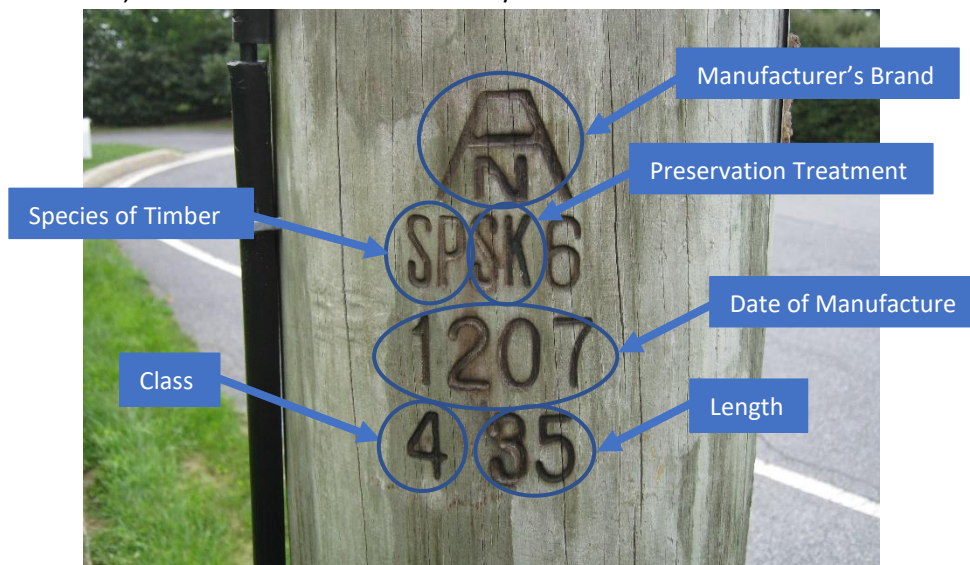


Figure 2-3: Wood Pole Brand/Birthmark

## 2.2 Steel Poles

Steel poles are quite common, especially acting as steel guy stub poles (Figure 2-4). Placing a down-guy requires additional permitting and can create additional time lag for utilities to acquire those permits. Down-guy poles are installed to relieve a load from adjacent poles, usually created by installing an angled pole line. Typically, once a pole line exceeds 3° offset guy lines or poles must be utilized to relieve the stress loading on a pole. Some steel poles are manufactured as self-supporting and avoid the need for down guys to back them up.



*Figure 2-4: Steel Pole (Guy Pole)*

## 2.3 Parts of the Joint-Use Utility Pole

Joint-Use Utility poles, in Delaware, are typically owned by the territories prevailing power distribution company, municipalities or Verizon. Most poles carry electric, cable tv, communication, and traffic cables to mention a few. There are three distinct zones, electric, safety and communication zones, as described below:

### 2.3.1 Upper Portion (Electric Zone)

**Field Identification:** The Upper Portion of the pole is also known as the *Electric Zone*. On a typical 40' Joint-use pole, the top 8' of the pole is considered the Electric Zone (Figure 2-5).

**Description and Purpose:** One of the main reasons electric cables are placed higher on the poles is for safety as live cables and equipment can carry deadly high voltage. Typically, the highest voltage is attached to the top of the pole, with the voltage decreasing as you work your way down, for example: 33kV (transmission), 13kV (distribution), 4kV (distribution), Secondary, and Street Lights.

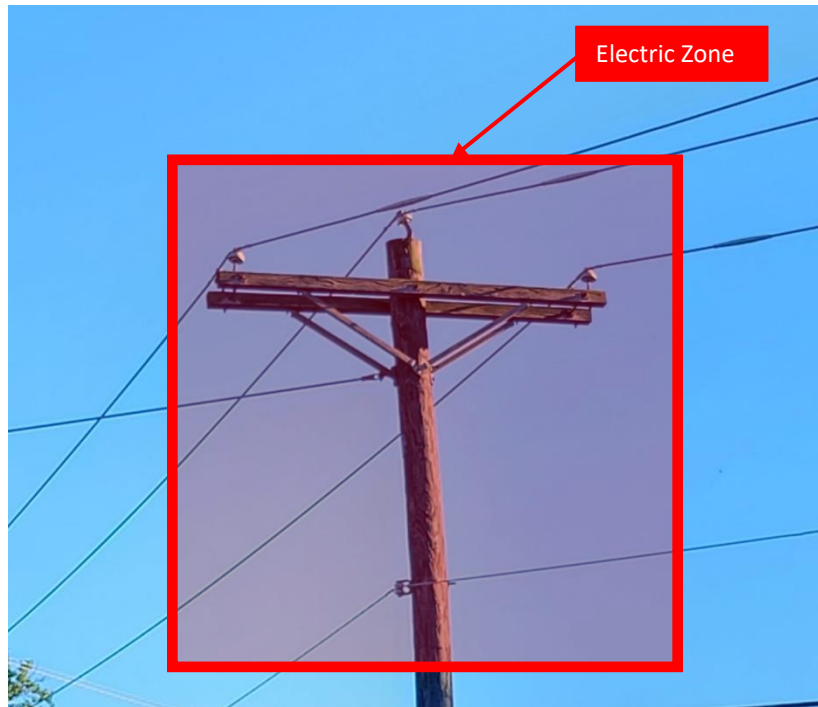


Figure 2-5: Electric Zone Picture

**Considerations and Additional Information:** Occasionally, there is what is commonly known as Field Spun Primary cable below the Secondary cable on the pole. Field spun cables are composed of three large diameter cables, that have been braided/twisted together, for ease of installation



Figure 2-6: Field Spun Cables



(Figure 2-6). These cables can carry higher voltage, 33 kV or 13kV, but are considered safe, as they are heavily insulated cables.

### 2.3.2 Middle Portion (Safety Zone)

**Field Identification:** The Middle Portion is often referred to as the *Safety Zone*. This is often a 40" gap between the lowest secondary electric, and the highest communication cable attached to the pole (Figure 2-7). This Safety Zone is typically where pole-mounted streetlights are attached. The voltage required for streetlights is also very dangerous, so there are standards on how close communication cables can



Figure 2-7: Safety Zone

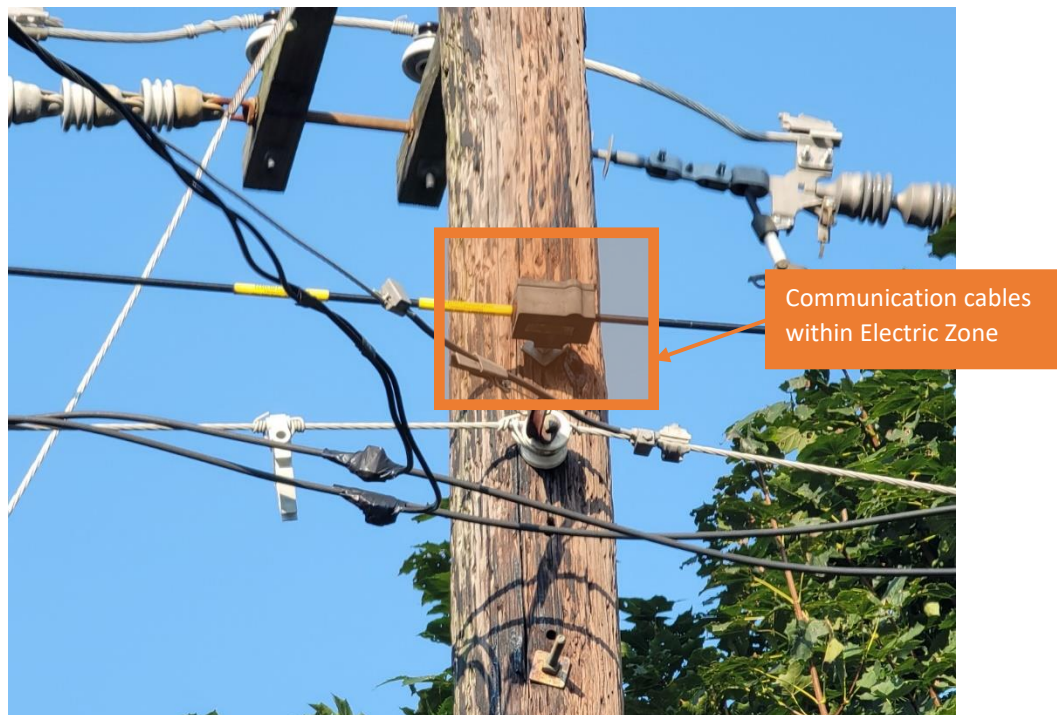


Figure 2-8: Streetlight Location

be mounted below the streetlights (*Figure 2-8*).

**Description and Purpose:** The Middle Portion offers a clearance, or barrier between Communication personnel working on their cables, and the dangerous high voltage electric cable just above them. This gap also aids in keeping the various cables safely separated between poles, otherwise known as their *mid-spans*.

**Considerations and Additional Information:** The electric cables feeding the streetlights enter through the bottom of the streetlight bracket. When the electric feed cables hang loosely below the bracket, the clearance between those cables and the communication cables must be at least 12 inches. In certain occasions, utility owners have received approval to mount communication cables above streetlights, closer to, or within the Electric Zone (*Figure 2-9*). Examples of those cables include, but are not limited to electric company communication cables, and traffic signal communication cables.



*Figure 2-9: Communication Cables within Electric Zone*

### 2.3.3 Lower Portion (Communication Zone)

**Field Identification:** The lower portion of a joint-use pole is often referred to as the Communication Zone. This section of a pole usually begins approximately 18' above ground level. That attachment height might differ, depending on the overall height of a pole. However, on a 40' pole, an attachment height between 18' and 22'6" above ground level is where most communication cables are mounted (*Figure 2-12*).

It's common to find Verizon cables as the lowest attached cables on poles. Particularly, the Middle Atlantic Region, Verizon and its affiliates have been the telephone provider for the longest period of time. Many of the existing Verizon cables are some of the oldest communication cables on their respective poles, therefore they are in the lowest position on the poles (Figures 2-10 & 2-11).

**Description and Purpose:** The Lower Portion or Communication Zone carries most of all communication cables. It offers enough clearance of at least 18' from the lowest attachment cable to the ground obtaining clearance for communication cables over roadways, railroads, and other structures and objects.

**Considerations and Additional Information:**

Exceptions to communication height attachment would include poles adjacent to main roads, highways, Interstates, railroad crossings and industrial areas where increased height clearance over the adjacent roadway or structures is required.

As new communication companies request permission to attach to a pole, they are assigned the uppermost position, within the communication zone, on each pole. If a pole has a *pre-attachment* safety zone of approximately 40" already, the existing communication cables could each be asked to lower, leaving the top position open for the newcomer.



*Figure 2-10: Verizon Cables*



*Figure 2-11: Verizon Cables and Equipment*

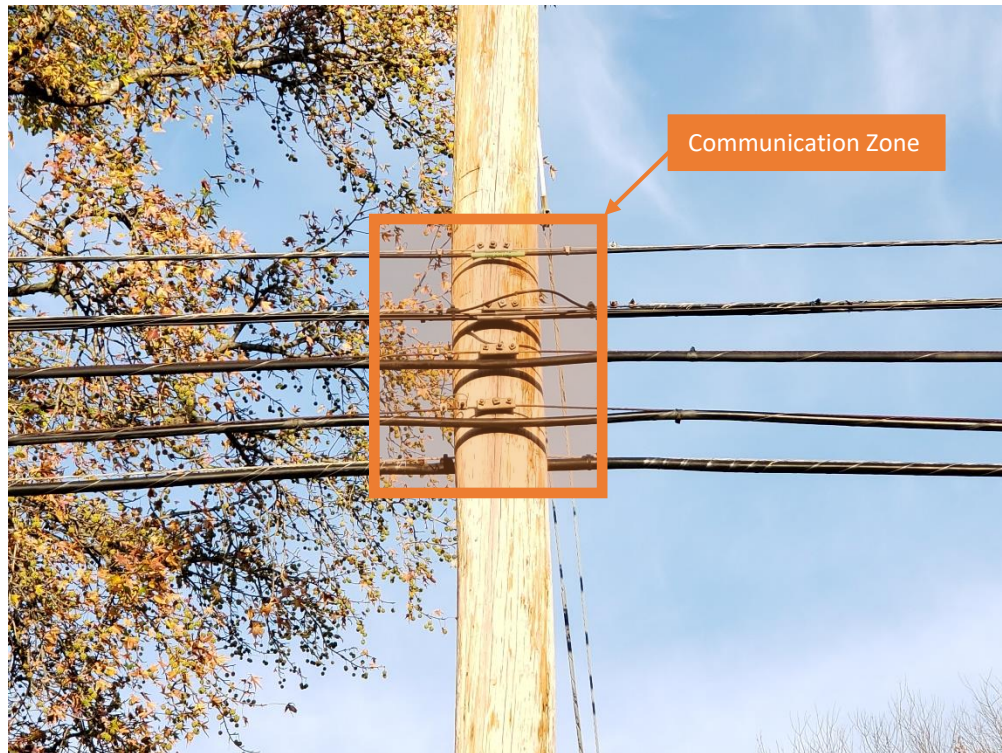


Figure 2-12: Communication Zone

### 3.0 Types of Communication Cables

#### 3.1 Copper Cables

**Field Identification:** Most copper cables are typically attached via lashing to a messenger with a strong small silver wire known as Lashing Wire and are often visible from ground level.

**Description and Purpose:** Copper cables are classified by the number of cable pairs (i.e., 600, 1200 pairs). Each cable pair represents a line or service going to an end user. Though, some aerial copper cables are self-supporting, where the messenger is integrated into the construction of the cable as illustrated in (Figure 3-2).

Copper cables are one of the most prevalent cables found on utility poles. They can measure up to 4" in diameter and can weight more than 6.5 lbs/ft (Figure 3-1). Historically, most copper cables have been owned by Verizon, as they were the primary type of communication cable used for decades before the introduction of fiber optic cables (FOCAs).

**Considerations and Additional Information:** Large copper cables are often referred to as feeders or distribution cables. Other communication providers owning and maintaining larger Copper cables carrying data long distance are sometimes referred to as trunkline cables.



*Figure 3-1: Copper Cables*

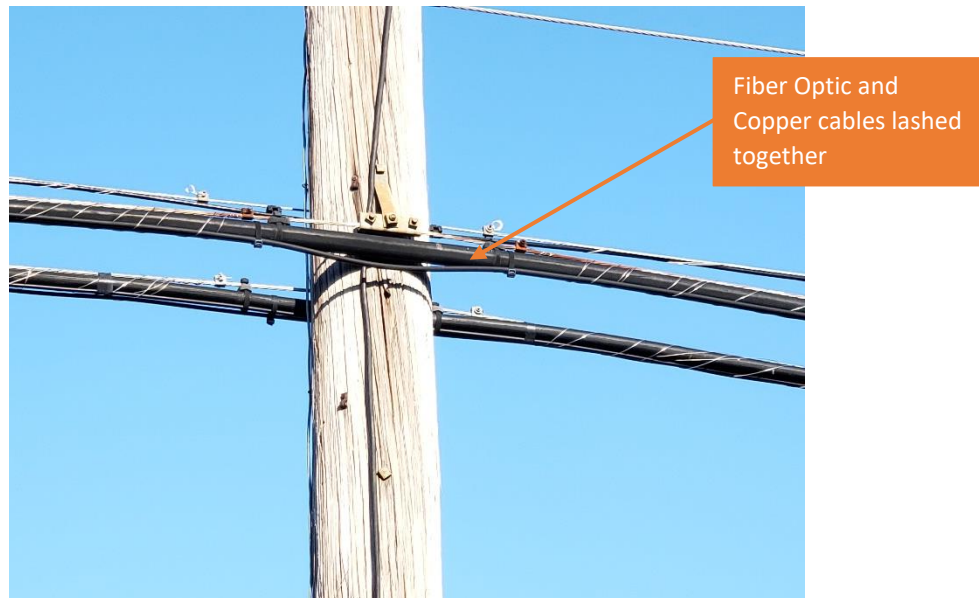


*Figure 3-2: Self Supported Copper Cables*

### 3.2 Fiber Optic Cables (FOCAs)

**Field Identification:** FOCAs (Fiber Optic Cable Assemblies) are lighter and more flexible than copper cables and can be easily identify by the slack loops (*Figure 3-5*) commonly left on poles (preferred Verizon methodology). Sometimes, small FOCAs can be found over-lashed to existing copper cables (*Figure 3-3*).

**Description and Purpose:** FOCAs are also common on utility poles, as most communication and 3<sup>rd</sup> party companies utilize them. FOCAs are characterized by the strands of glass fiber utilized to transmit data faster and more reliable than copper cables. They vary in size, from the thickness of a pencil to more than 2" in diameter.



*Figure 3-3: Fiber Optic and Copper Cables Lashed together*

**Considerations and Additional Information:** FOCAs manufacturing company names can be found printed/displayed on the sheath or outer jacket of the cable. Some of those manufacturers include but are not limited to Corning, OFS, Prysmian, and Sumitomo. Other information that can be found printed on the sheath or outer jacket include date of manufacturing, footage, and various numbers that identify a given cable (*Figure 3-4*). Occasionally, the owner of the cable will also be printed here; examples of those cable owners include Comcast, Level 3 and Zayo. The disadvantage of this is that the printed data is not easily visible from a distance and can fade over time.

Other FOCA elements that can aid in identifying cables in the field are what are commonly known as sno-shoes. These are installed to organize excess cable slack for use at a future date. Sno-shoes are attached to the messenger cable approximately 20' to 50' apart, so the slack can be stored within a pole span (*Figure 3-6*). It is important to note that Verizon does not participate in this practice, as they prefer hanging a circular slack coil directly next to a pole as depicted in *Figure 3-5*.



Figure 3-4: Printed Information on FOCAs



Figure 3-5: Slack Loops

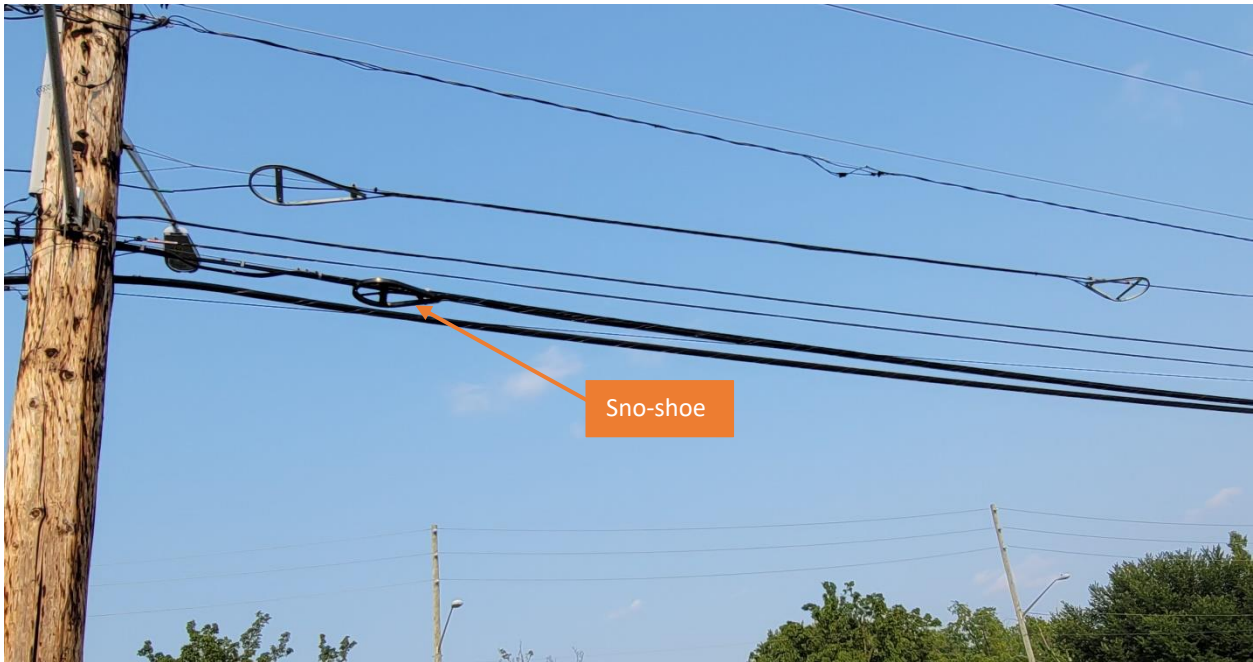


Figure 3-6: Sno-shoe

### 3.3 Self-Supporting Innerduct (SSID)

**Field Identification:** Tagging SSID becomes important as the cable is no longer visible and frequently SSIDs and self-supporting copper cables tend to be confused. It is important to note that with SSID, gaps entering and exiting the innerduct are typically seen at the pole attachment point as illustrated in *Figure 3-8*.

**Description and Purpose:**

Communication companies use SSID as another method of installing cables aerially. SSID is a small PVC tube, typically 1 ¼” to 2”, that is installed along pole lines creating a path that a FOCA can be pulled through. This provides a quick and easy way for the cable company to install its FOCA and will help to protect the cable from damage after installation.

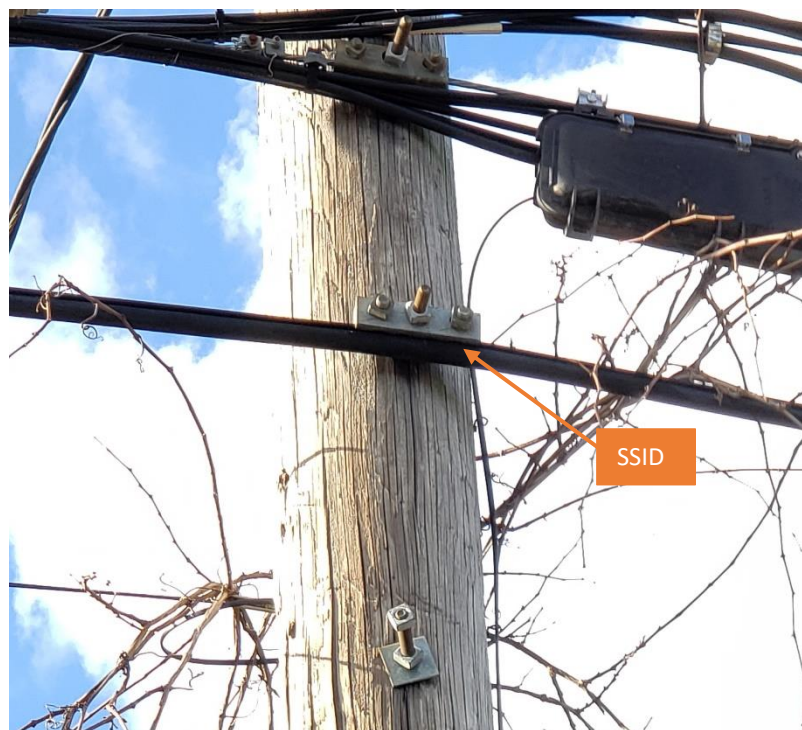


Figure 3-7: Self-Supporting Innerduct



SSID can be attached to adjoining poles using an internal supporting cable or messenger, which is built directly into the top of the tube itself (Figure 3-7).

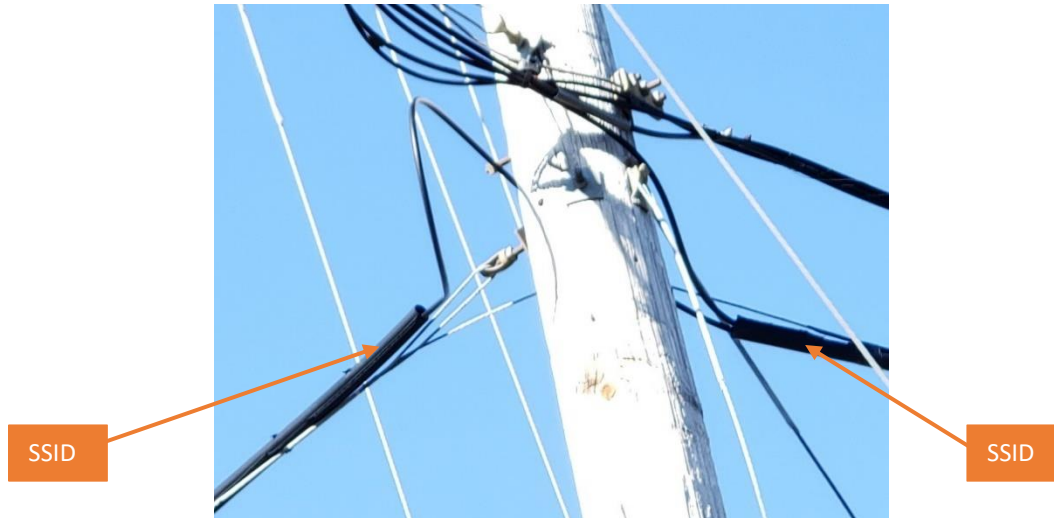


Figure 3-8: Cables entering/exiting SSID

### 3.4 Cable Television (CATV)

**Field Identification:** CATV Coax cables are dense cables which makes them easy to recognize. During the installation of aerial coax cables, installers will bend the cable into a trapezoid like shape next to each pole that acts as an expansion loop also known as alley arms. The additional slack provided by the expansion loop allows the cable to move as it deals with the stress caused by thermal expansion and contraction. This expansion loop is a feature that provides a quick way to differentiate CATV cables from other aerial cables (Figures 3-9 & 3-10).



Figure 3-9: Coaxial Expansion Loop

**Description and Purpose:** CATV cables are another type of cable commonly found on many utility poles. These are the cables responsible for providing services such as cable television, internet, and telephone to many residences throughout the area. Currently CATV providers use coaxial (coax) and FOCAs to meet their clients' demands.

**Considerations and Additional Information:** At times, it has been observed that telephone and cable companies over-lash multiple cables onto the same messenger. This could be helpful in identifying a cable owner if at least one cable can be identified.



Figure 3-10: Coaxial Expansion Loop

In addition to over-lashing, another method of attachment that can be helpful when trying to identify owners is boxing the pole. This method consists of attaching a cable to the front of a pole (street side) and attaching a second cable to the back of the pole (field side) on the same bolt. Boxed cables are owned by the same company.

### 3.5 Traffic Cables

**Field Identification:** The traffic systems utilize both FOCAs and small copper cables. One of the easiest ways to identify traffic cables is by following them until they terminate, typically at intersections (Figure 3-11).

**Description and Purpose:** Traffic Cables exist throughout many cities, towns, and jurisdictions, interconnecting the vehicular traffic signal and pedestrian crossing systems.



Figure 3-11: Traffic Signal Aerial End Point

### 3.6 Other Cables

**Field Identification:** Fire

Department cables can be easily recognized, as it is usually two small cables that travel parallel to each other, about 4" apart, from pole to pole (*Figure 3-12*).

Occasionally remnants of old Fire boxes on the poles where these cables used to terminate can also be found.

**Description and Purpose:** Other cables can be found throughout aerial pole lines everywhere. These can include retired Fire Department or Police Department communication cables.

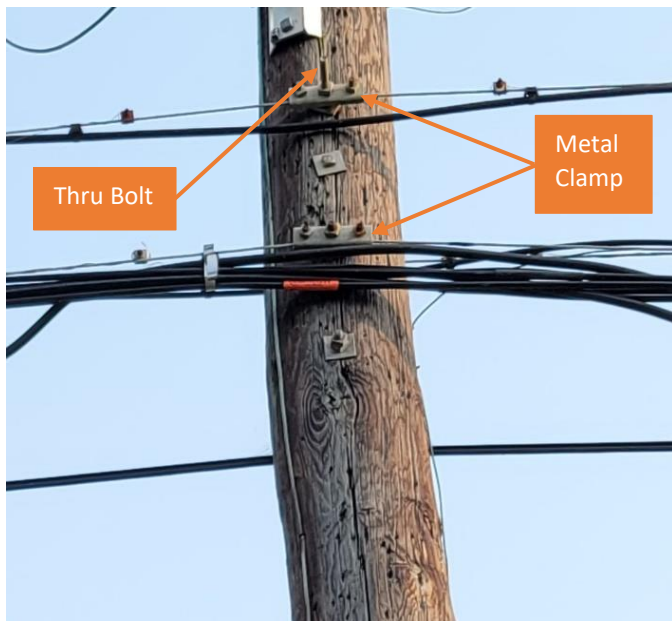


*Figure 3-12: Retired Fire Department Cables*

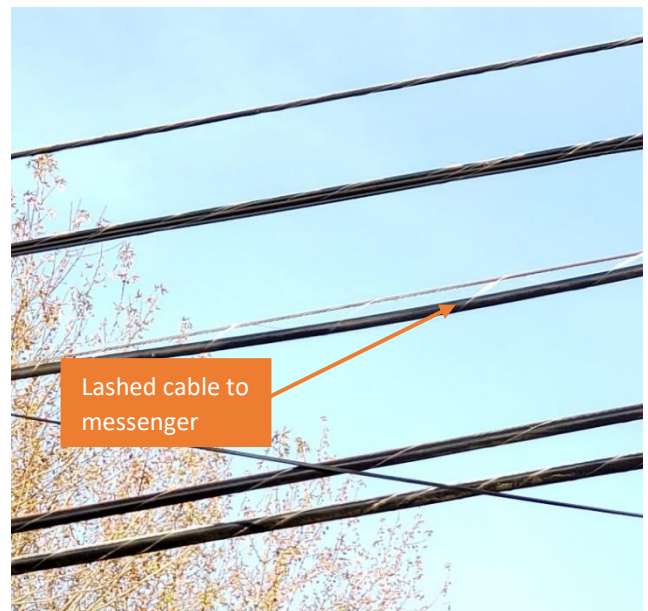
## 4.0 Typical Aerial Equipment

### 4.1 Messengers and Lashing

**Description and Purpose:** Typically, communication cables are mounted to poles in a similar fashion. During the attachment of cables, a strand or messenger is installed along the proposed route. This messenger attaches to the poles with a metal clamp typically using a thru-bolt as illustrated in *Figure 4-1*. The messenger is a braided metal cable that is designed to withstand the weight of cables. The typical method of attaching cables to messengers is called lashing. Lashing can be described as a small wire pulled along the messenger encircling (binding) the new cable and messenger together (*Figure 4-2*).



*Figure 4-1: Metal Clamp and thru Bolt*



*Figure 4-2: Lashed cable to messenger*

## 4.2 Cable Tags

**Field Identification:** The simplest method of identifying aurally mounted cables is by way of their tags, a sample tag is included in (Figures 4-3 & 4-4).

**Description and Purpose:** When new cables are installed, there should be a tag affixed to them at the point of pole attachment. Unfortunately, with time these tags tend to fade, fall off, turn around, and at times tags are not attached at all during the cable's installation. It is recommended to trace a cable in either direction, until a tag is encountered, and it can be read. There are dozens of cable owners that have cables mounted to utility poles throughout Delaware. Identifying all of them can prove to be extremely difficult. Coordination with and confirmation from utility companies is crucial.



Figure 4-3: Tag Sample (Verizon)



Figure 4-4: Tag Sample (Comcast)

### 4.3 Splice Cases (Copper/FOCA)

**Field Identification:** Splice cases are often found along overhead pole lines. Splice cases are almost always black approximately 24"-36" long, about 10"-12" in diameter and attached to the messenger. The following are examples of those typically found in the field.

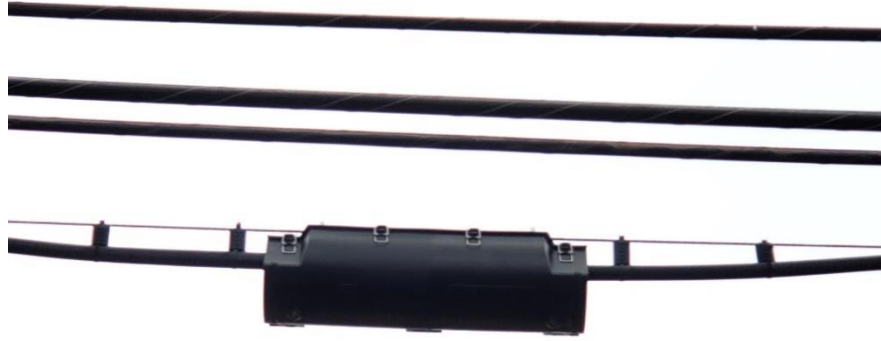
**Description and Purpose:** Splice cases is a device that provides space and protection to cables spliced together. Splice cases also are good for terminating, feeder and distribution.

#### 4.3.1 Copper Splice Cases

Large copper cable splice cases that are often associated to Verizon facilities. A standard copper-cable splice case will have cables entering both ends of the case (Figures 4-5 to 4-8).



*Figure 4-5: Copper Cable Splice Cases*

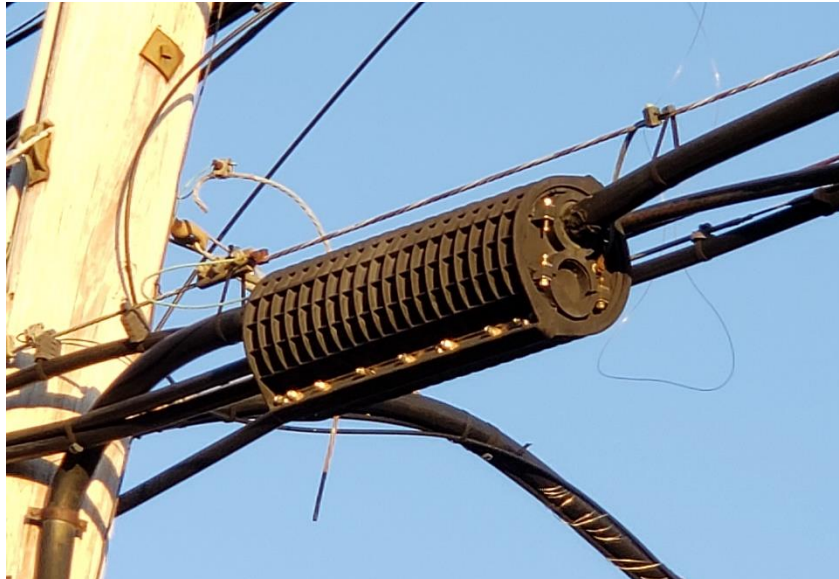


*Figure 4-6: Copper Cable Splice Case*



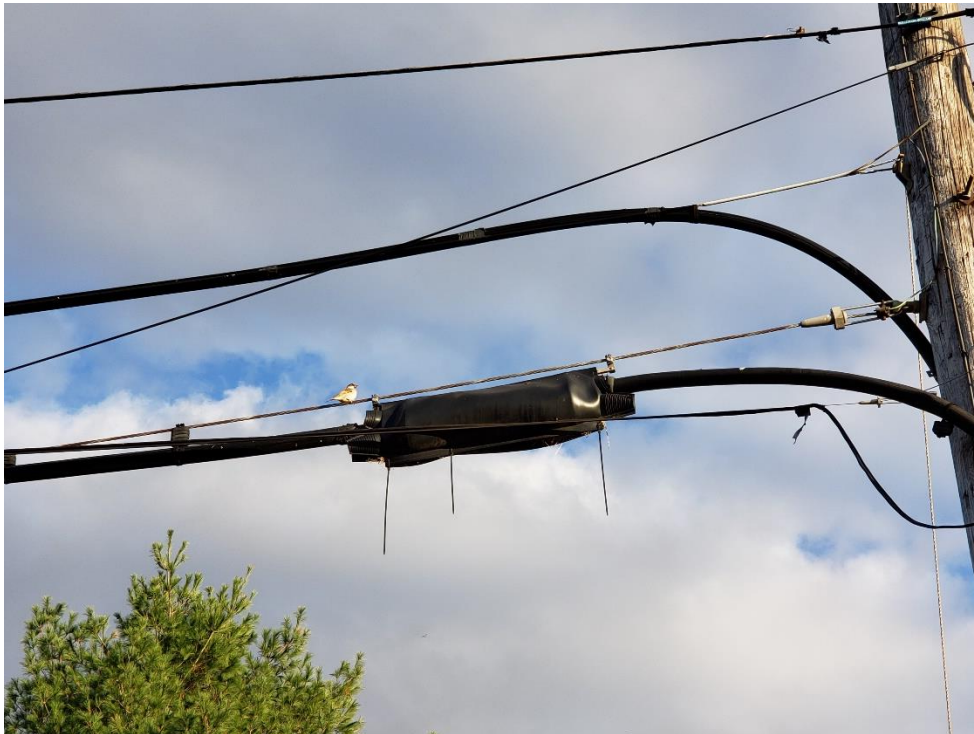
*Figure 4-7 and Figure 4-8: Copper Cable Splice Case*

- Some Verizon copper cable splice cases are often referred to as waffle cases (Figure 4-9).



*Figure 4-9: Waffle Splice Case*

- A Verizon boot splice case (Figure 4-10).



*Figure 4-10: Verizon Boot Splice Case*



### 4.3.2 Fiber Optic Splice Cases

Fiber Optic Splice cases. A typical FOCA splice case will have the majority, if not, all cables entering from one side of the splice case, with the opposing end being unoccupied (Figure 4-11).



*Figure 4-11: FOCA Splice Case*

### 4.4 Termination Points

**Description and Purpose:** Termination Points or cables dead-ending at pole-mounted equipment is another way of identifying cable owners. Verizon has numerous dead-end apparatus mounted to poles, including:

- FIOS Terminals. Small rectangular box mounted to the pole, with downward-facing individual terminations. Occasionally labeled with an H (for Hub) and 4 digits (Figure 4-12).



*Figure 4-12: FIOS Terminal*

- Copper Terminals (Figures 4-13 to 4-17)



Figure 4-13: Copper terminal

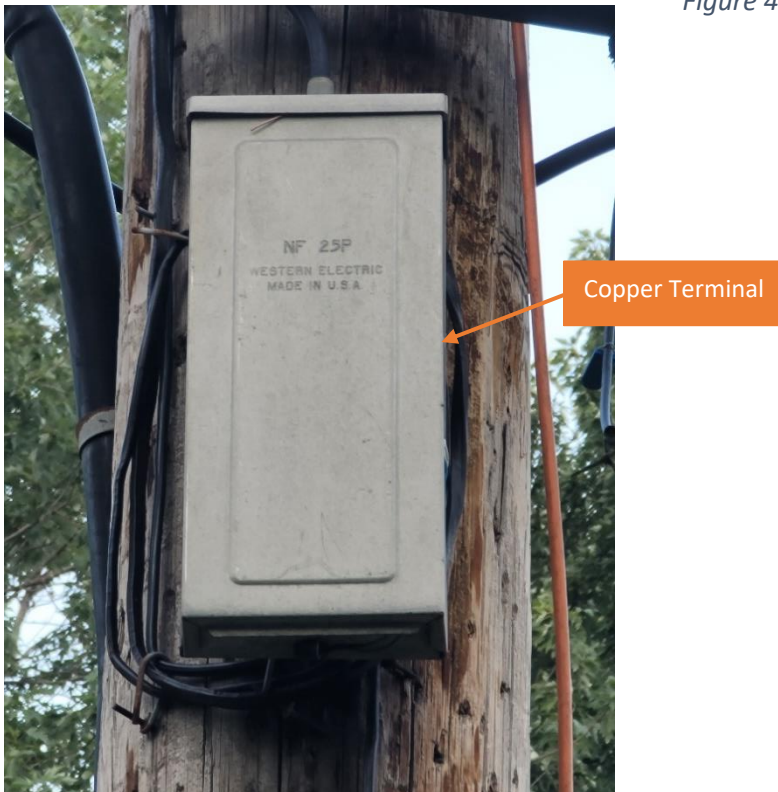


Figure 4-14: Copper terminal



*Figure 4-15: Copper terminal*

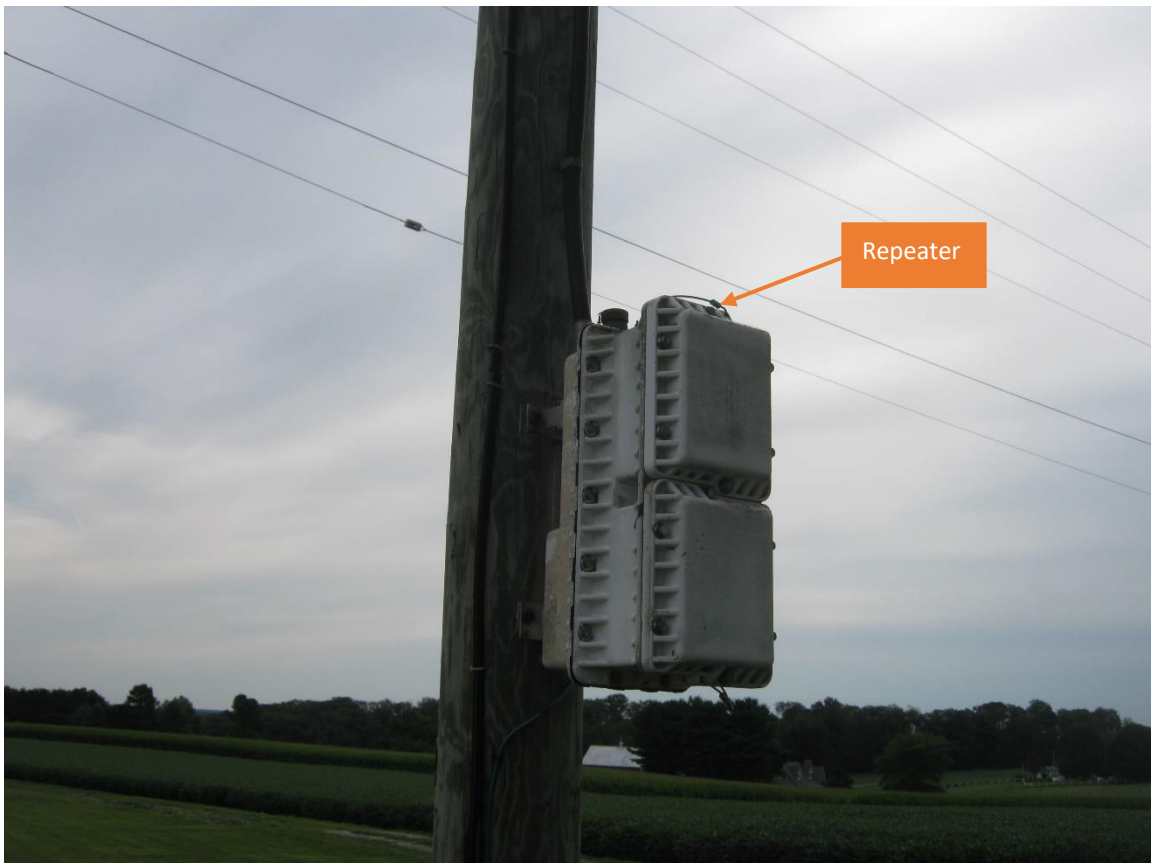


*Figure 4-16: Copper Terminals*



*Figure 4-17: Copper terminal*

- Repeaters. Usually, a single or double-stacked white ribbed rectangular box with a cable entering from the top or bottom, depending how mounted (Figure 4-18).



*Figure 4-18: Repeater*

- Another type of repeater is called a crab-pot. This is a silver domed case that covers the actual piece of gear, with the cable entering from the bottom (Figure 4-19).



Figure 4-19: Repeater

- Air valves/registers. Small plastic tubes stapled to a pole that end with a valve which resembles air valves on bicycle tires.
- Cabinets (Figure 4-20).



Figure 4-20: Cabinet

#### 4.5 Drops (Aerial Service Wire) and Their Attachments

**Field Identification:** One way that can help identify a Verizon drop is to trace the drop back to a Verizon terminal or boot. Another way is to identify the type of clamp used to attach the drop to a pole or midspan (Figures 4-22 & 4-23).

Comcast CATV coax services also have distinctive details that help identify them which can be found by tracing them back to their origin. Typically, there is a small box (approximately 3" X 3") attached to a nearby CATV coax cable, having anywhere from 0 to 4 inputs on its face for drops to attach (*Figure 4-21*).



*Figure 4-21: Coax Drop Box*

Each company's drops are attached to their own main cable's messenger. Rarely, they will be attached to other company's messengers.

**Description and Purpose:** Drops (aerial services wire) and their attachments exist for any communication company that offers hard-wired services to individual businesses or homeowners. Verizon and Comcast (CATV) are among the most common type found in the area.

**Considerations and Additional Information:** At times, a drop cannot be installed directly to the end user from the pole due to the presence of an obstruction. In this situation, a drop will be redirected along the pole span to a drop clamp installed midspan. Another scenario this might occur is when services cross property lines creating a midspan drop situation (*Figure 4-24*).

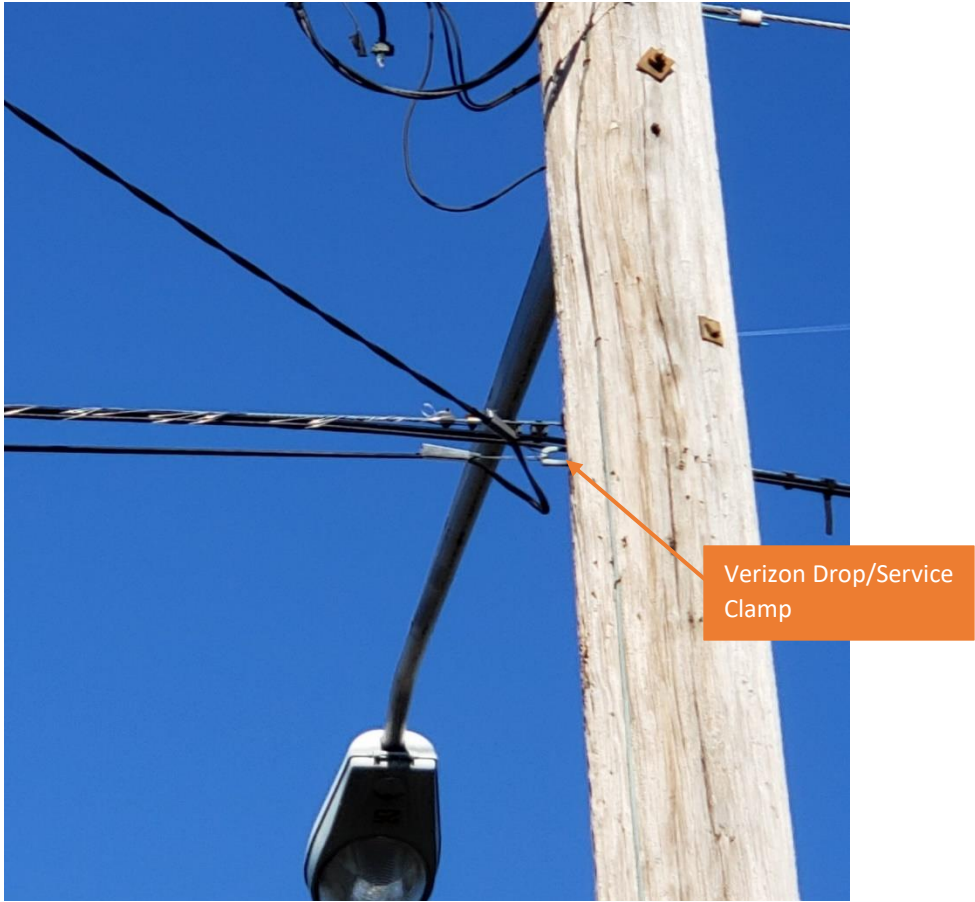


Figure 4-22: Verizon Drop/Service Clamp



Figure 4-23: Verizon Drop Clamp



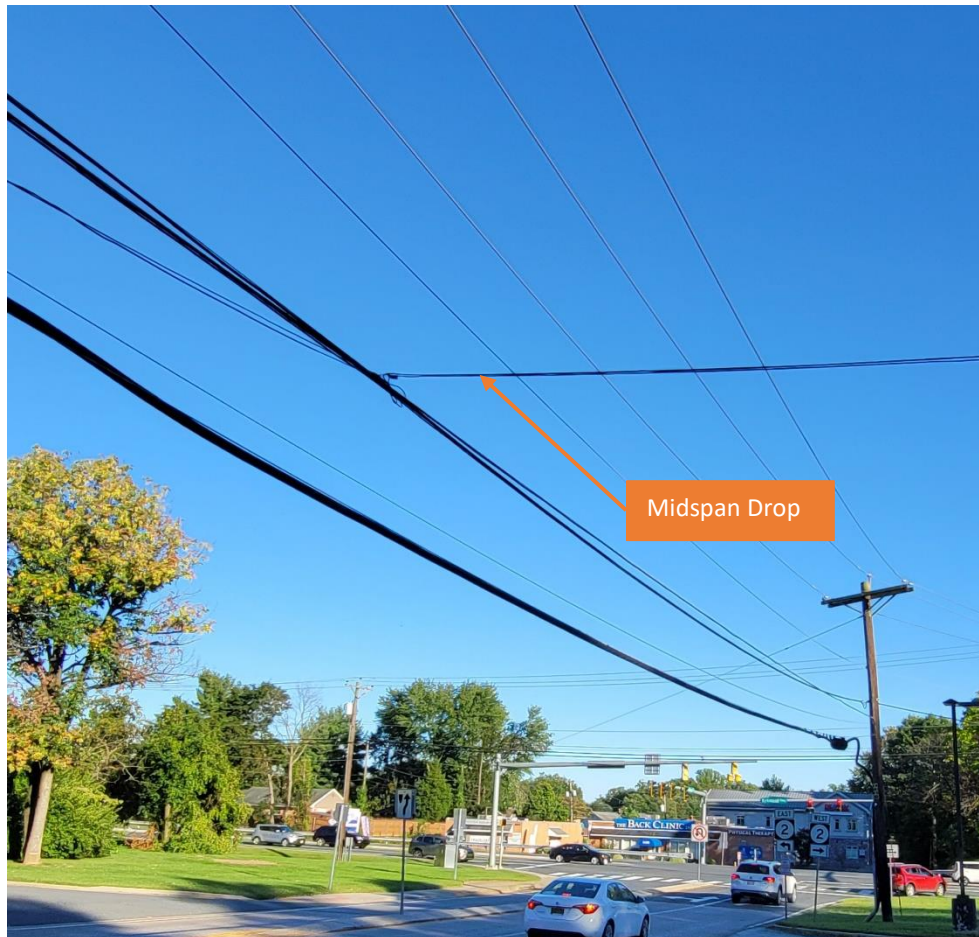


Figure 4-24: Midspan Drop

#### 4.6 CATV /COAX Equipment

**Field Identification:** CATV providers have many specific pieces of equipment that support differentiating a CATV cable from a telecom cable. One of the most frequently used features for CATV is the trapezoidal shaped coax expansion loop at the poles, these were previously discussed under Section 4.

Another commonly used feature is the CATV pole-mounted power supply (Figure 4-25). These are typically mounted lower on the pole and usually consists of 3 separate components, an electric meter, an electric connection box, and a large, often green, CATV cabinet.

There are a couple pieces of CATV equipment that are attached horizontally on the messenger, one is the CATV power amplifier which is a metal box approximately the size of a shoe box (*Figures 4-26 to 4-28*); another being the CATV drop box/terminal which is a small box approximately the size of a pack of cigarettes or a cell phone (*Figure 4-29*).

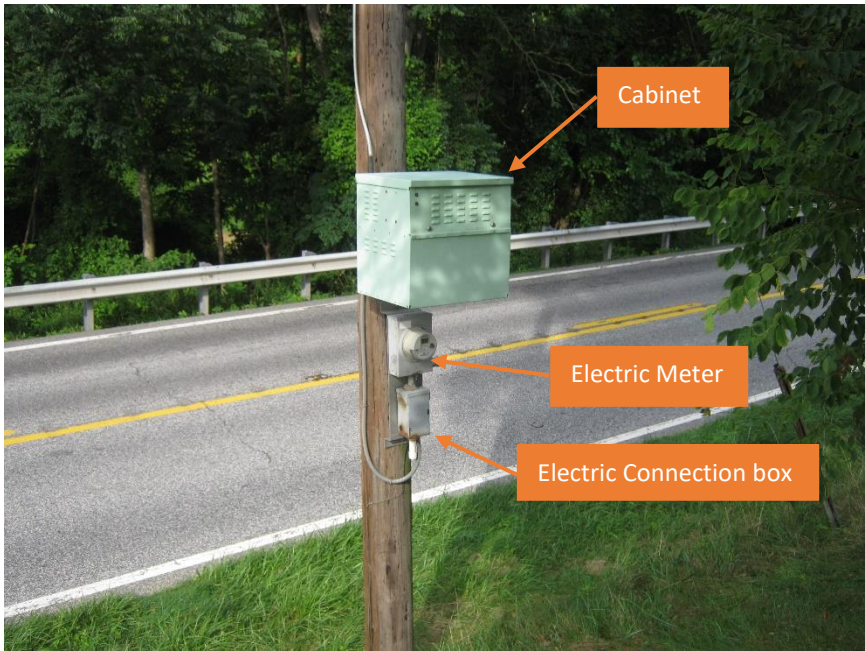


Figure 4-25: CATV Power Supply

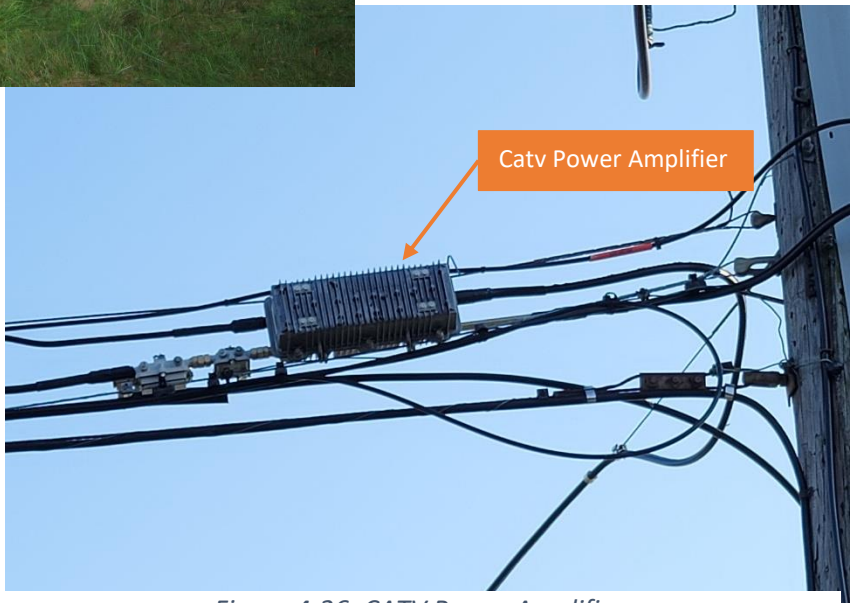


Figure 4-26: CATV Power Amplifier

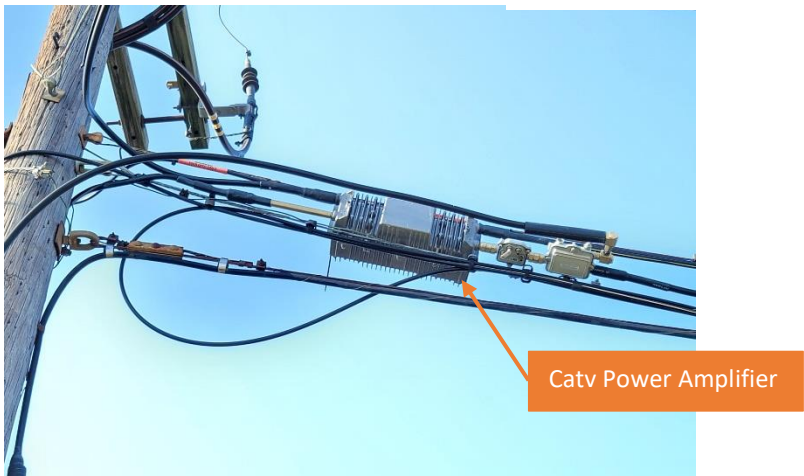


Figure 4-27: CATV Power Amplifier



Figure 4-28: CATV Power Amplifier



Figure 4-29: CATV Drop Box/Terminal

## 5.0 Aerial to Underground Transition

**Field Identification:** Another type of cable frequently encounter on a pole line is the aerial to underground cables. Utility owners will transition their facilities to accommodate capacity, service demand and right of way permitting compliance. This transition presents another opportunity for cable identification, as there will typically be some type of surface or underground structure that would be receiving the cables; those structures will frequently have the owner's logo printed on it. Examples of those structures may include pedestals, cabinets, underground vaults, or hand boxes (*Figures 5-1 to 5-4*).



*Figure 5-1: Aerial to Underground Cable and Equipment*

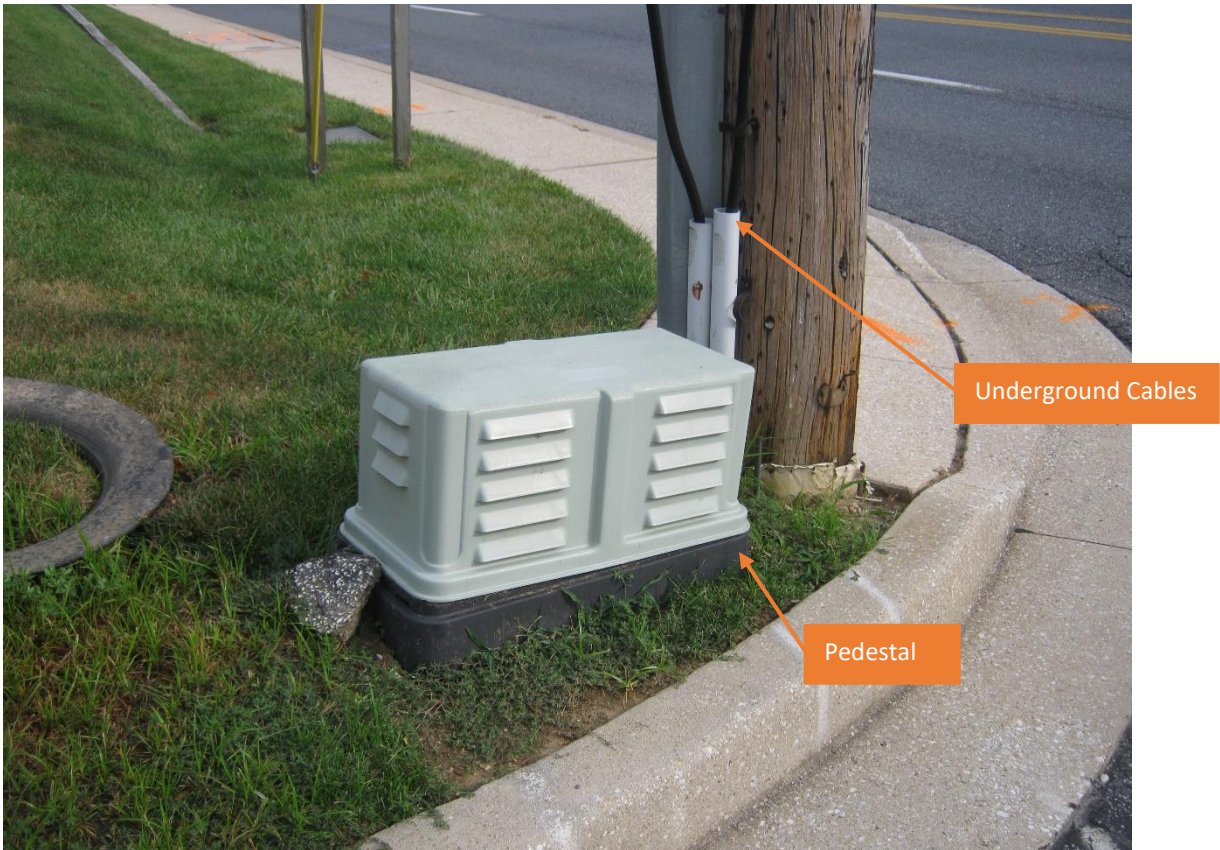


Figure 5-2: Aerial to Underground Cable and Equipment



Figure 5-3: Aerial to Underground Cable and Equipment



*Figure 5-4: Aerial to Underground Cable and Equipment*

## 5.1 Samples to consider for add grade facilities

- Verizon Double Lid Manhole



Figure 5-5: Double Lid Manhole

- Verizon CEV



Figure 5-6: Verizon CEV

## 6.0 Aerial Communication Cables Identification Summary

The following table summarizes helpful cable identifiers that can be used for field reference.

<b>Cable/Equipment/Physical Characteristics</b>	<b>Possible Owner</b>
Legible tag affixed to the cable.	See name on tag
Coax Trapezoidal Expansion Loop.	Local CATV provider
Untagged cable overlashed to an already ID'ed cable	Same owner as ID'ed cable
Boxed cable attachment (same bolt) to already ID'ed cable.	Same owner as ID'ed cable
Cable enters a labeled piece of equipment on the pole.	See equipment label
Cable connects directly to a piece of nearby labeled equipment, not mounted on the pole.	See equipment label
Cable that has a slack coil or is coiled at a pole	Verizon
Large and medium diameter cables (2" or larger) mounted in the bottom positions of the communication zone, with various attached splice cases.	Verizon
Cable that has sno-shoes attached to a messenger for tying up slack in a FOCA.	Comcast
Cables transitioning from aerial to underground. Look for nearby existing utility structures with owner's logo printed on it.	See structures label