1. Purpose

This standard provides information on the typical installation and clearance requirements for wireless antennas and PGE conductors used on a joint-use wood pole.

The Utility Asset Management (UAM) group manages the installation requirements and locations, and contracts with the various wireless communication providers.

2. References

IEEE	National Electrical Safety Code (NESC)
PGE	Safety Manual, current edition

3. Application

IMPORTANT: If an emergency repair is required on a pole that has wireless equipment, shut off all power to the radio components, and then bring both the pole and all attached wireless equipment to the appropriate line center. Notify the storeroom and the Network Operations Center (NOC) of the repair using the emergency contact information located on the wireless equipment cabinet. The wireless carrier is responsible for removing all radio components before disposal of the pole.

Follow these installation guidelines when installing wireless antennas and PGE electrical conductors on a pole that is shared with wireless communication providers.

- The wireless communications provider is responsible for providing the wireless antennas and all associated equipment.
- PGE line crews or PGE-approved contractors are responsible for installing all antennas, equipment, conduits, and conduit brackets in the supply space. Installations of equipment in the communications space may be performed by the communications company, PGE, or PGE approved contractors.
- PGE is responsible for installing metering equipment, including current transformers, conduit, and meter bases.
- Conduits and 18-inch brackets should be mounted directly above equipment cabinets on the street side of the pole to accommodate up to three 4-inch conduits. If needed, these components can be rotated on the pole to ensure existing communications cables are not trapped, and that proper climbing space is maintained. Replace an existing 8-foot primary distribution crossarm with a 10-foot crossarm to allow for additional conduit clearance.

- Preserve climbing space on the field side of the pole.
- Bond wireless communications equipment grounding to the PGE pole ground according to NESC requirements.
- The wireless communications provider is responsible for installing a label on the pole that shows the provider's company name and phone number.

NOTE: All work in the supply space will be performed by qualified personnel under the direction of PGE.

- If more than one wireless antenna is mounted, the antennas must be at least 3 feet from the pole. If only one wireless antenna is mounted, the distance may be reduced to 5 inches.
- To ensure adequate climbing space, a minimum of 5 inches is required between the face of the pole and the back of the grounded equipment cabinet or wire bundles (whichever is closer to the pole).
- Communication cables and equipment of different communication utilities must have not less than 4 inches of clearance anywhere in the span. An ambient temperature of 60 degrees F without wind is used to determine the 4-inch clearance (NESC 235H).
- Communication cable messengers of different communication utilities must have not less than 12 inches of vertical spacing at the support structure (NESC 235H).

IMPORTANT: When working near, or on, a transmitting antenna pole, follow all radio frequency (RF) safe work practices. Refer to Section 3600 of the PGE Safety Manual for information.

Figure 1 shows a typical transmission pole with wireless antennas installed below the transmission lines.

Figure 2 shows a typical transmission pole with wireless antennas installed above the transmission lines. In this installation, the area between the transmission line and the antenna is not climbable.

Figure 3 shows a typical distribution pole with wireless antennas installed above the primary lines.

NOTE: In Figure 1, Figure 2, and Figure 3, the minimum distance between the conductor and the antenna represents the safety zone for the lineman.

Figure 4 shows a typical distribution pole with wireless antennas installed below the primary lines, in the communications space.

Figure 5 shows the clearance required between the equipment cabinet's bracket and the top of the cabinet to the lowest communication line on the pole.

Figure 6 shows the wireless antenna site symbol used on Arc Facilities Manager Viewer (ArcFM).

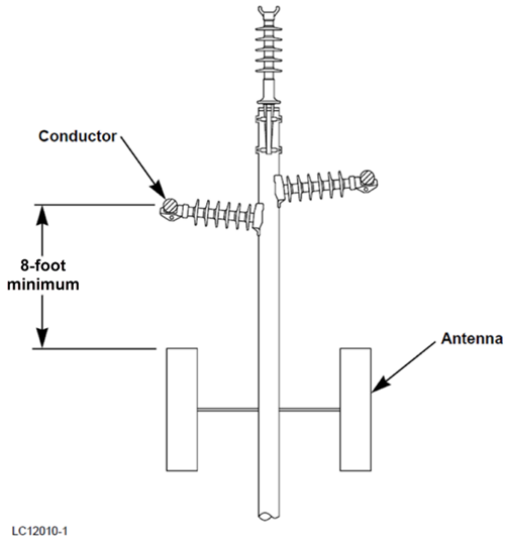

Figure 1. Transmission Pole with Antennas Installed Below the Transmission Line (NESC 235.6)

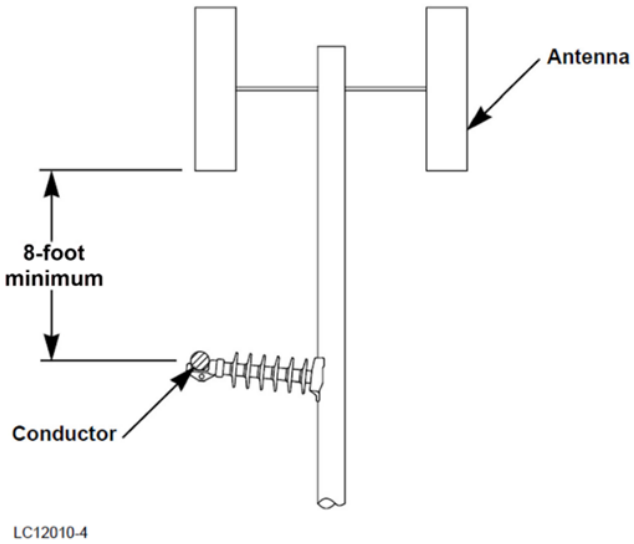

Figure 2. Transmission Pole with Antennas Installed Above the Transmission Line

NOTE: Clearances apply to transmission voltages of 230 kV and below only. Designer review is required for higher voltages.

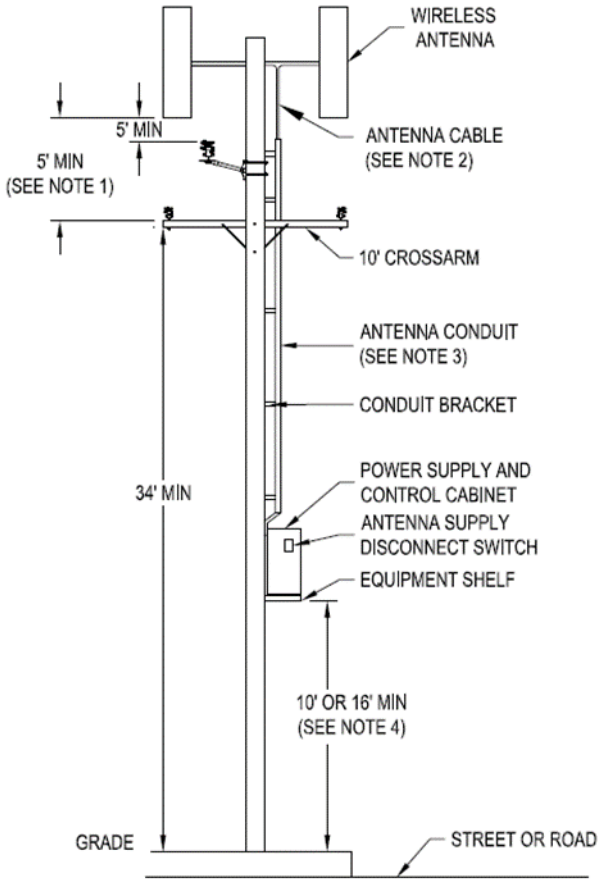

Figure 3. Distribution Pole with Antennas (STD-D-2400)

3.1. Notes for Figure 3

1. A minimum 5-foot clearance is required between the bottom of the antenna and secondary power. The term “antenna” includes all components associated with the antenna structure, including mounting brackets, wiring, and wiring harnesses. The clearance is measured from the lowest part of those components to the top of the closest conductor.
2. The antenna's ground wire must be insulated and in conduit.
3. A minimum 3-foot clearance is required between the top of the primary insulators and the opening of the antenna conduit.
4. The bottom of the equipment shelf on a distribution pole must be at least 10 feet above pedestrian sidewalks or restricted-traffic roads, and at least 16 feet over roads, streets, and alleys.

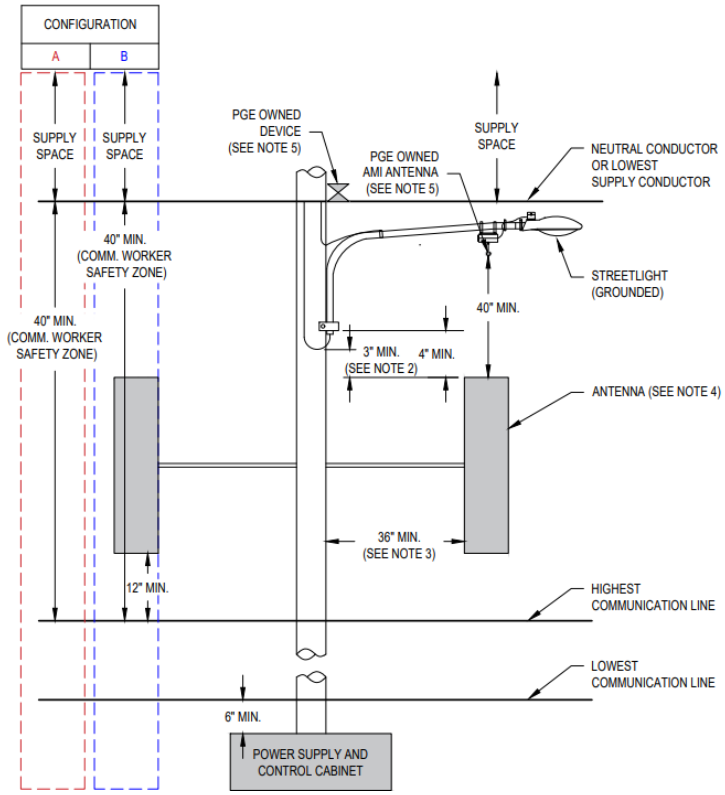

Figure 4. Minimum Clearances on a Pole with Antennas (STD-D-2401)

3.2. Notes for Figure 4

1. If a secondary drip loop exists and is the lowest supply conductor, there must be at least a 40-inch clearance between the bottom of the loop and the top of an antenna (or the highest communication line, if no antenna exists).
2. The distance between the top of the antenna and the bottom of the drip loop is 3 inches only if the power conductor is covered with a non-metallic sleeve and streetlight mount bonded. If the conductor is **not** covered or the streetlight is not bonded, then a minimum 40-inch clearance is required.
3. If only one antenna mount is attached the pole, this distance can be reduced to 5 inches.
4. The term antenna includes all components associated with the antenna structure, including mounting brackets, wiring, and wiring harnesses. The clearance is measured from the lowest part of these components.
5. These devices include AMI gateway repeaters, PGE fiber, outage monitors, etc.

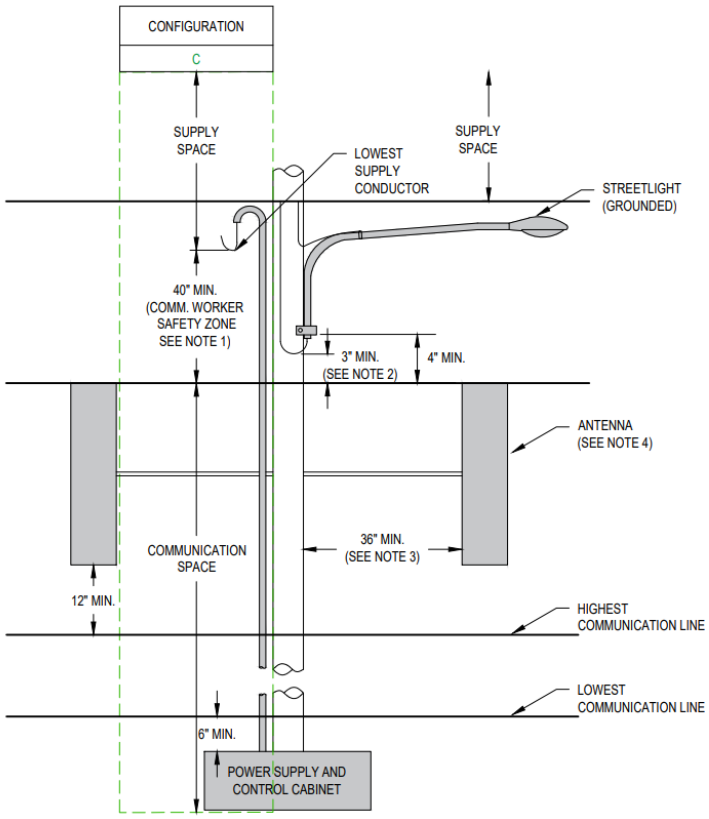

Figure 5. Minimum Clearances on a Pole with Antennas (STD-D-2402)

3.3. Notes for Figure 5

1. If a secondary drip loop exists and is the lowest supply conductor, there must be at least a 40-inch clearance between the bottom of the loop and the top of an antenna (or the highest communication line, whichever is higher or if no antenna exists).
2. The distance between the top of the antenna and the bottom of the streetlight drip loop is 3 inches only if the streetlight power conductor is covered with a non-metallic sleeve and streetlight is bonded. If the conductor is **not** covered, a minimum 40-inch clearance is required.
3. If only one antenna mount is attached the pole, this distance can be reduced to 5 inches.
4. The term antenna includes all components associated with the antenna structure, including mounting brackets, wiring, and wiring harnesses. The clearance is measured from the lowest part of those components.
5. These devices include AMI gateway repeaters, PGE fiber, outage monitors, etc.

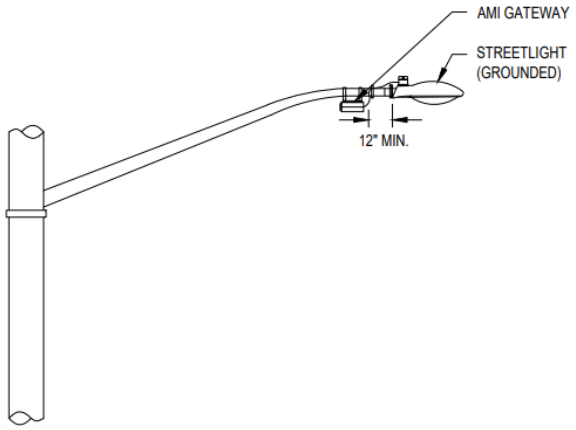

Figure 6. PGE AMI Gateway Repeaters (STD-D-2403)

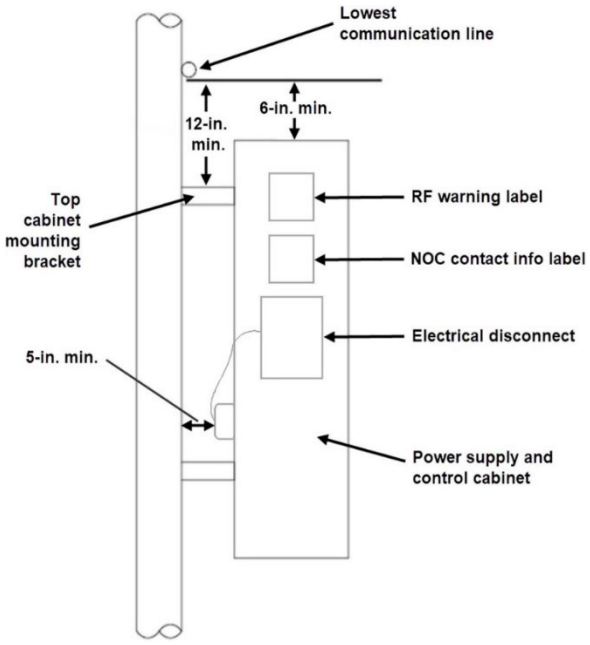

Figure 7. Clearances between Equipment Cabinet and Lowest Communication Line

Figure 8. Wireless Antenna Site Symbol

3.4. AC, DC, and RF Disconnects

Each wireless site in the PGE service territory must have a means to remove all RF hazards. This includes removing the hazards associated with electrical backup systems including battery backup, external generators, or anything else that could be a source of electrical energy used to generate RF radiation.

Some wireless sites built before 2010 may not have a readily accessible means to remove RF hazards. When a wireless communication provider applies for an upgrade to an existing site, PGE requires them to either install or provide access to a switch that interrupts power to the radio unit that generates the RF signal.

IMPORTANT: Use these methods to remove RF hazards:

- Remove electrical power to radios.
- Break the connection between the radio and antenna(s).
- Before shutting down a wireless site, you are required to alert the Network Operations Center (NOC) about the shutdown. NOC contact information is posted on a sign on the wireless equipment cabinet (see Figure 14).

The first two of the figures below show a DC disconnect:

Figure 9 shows the location of a disconnect on pad-mounted equipment.

Figure 10 shows a close-up of the disconnect.

Figure 11 shows a DC switch inside a disconnect panel.

Figure 12 shows the location of an AC disconnect switch on pole-mounted equipment.

Figure 13 shows a close-up of the switch.

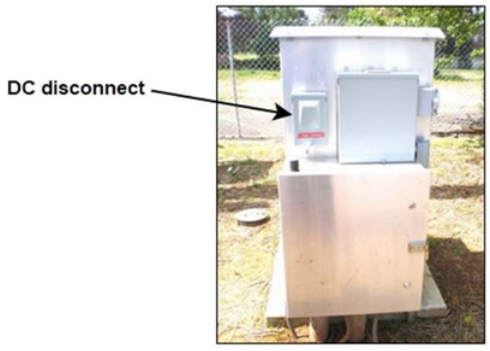

Figure 9. DC Disconnect on Pad-Mounted Equipment

Figure 10. Close-Up of DC Disconnect

Figure 11. DC Switch Inside a Disconnect Panel

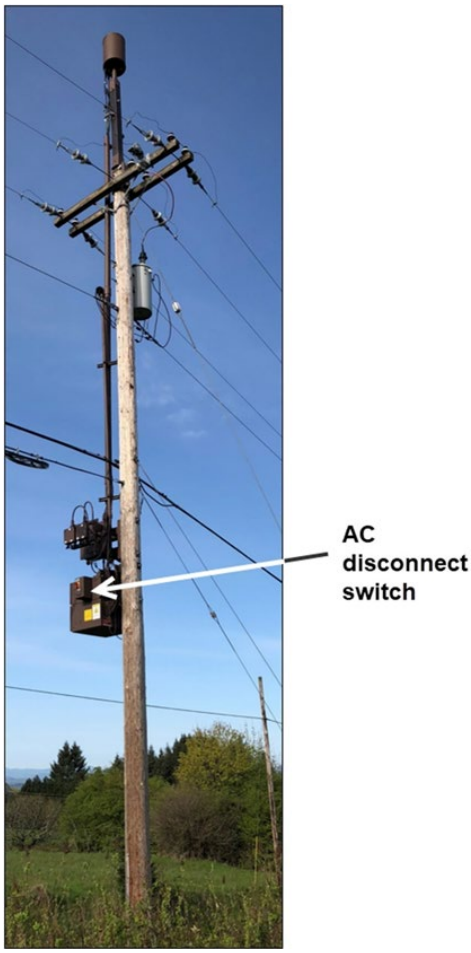

Figure 12. AC Disconnect Switch on Pole-Mounted Equipment

Figure 13. Close-Up of AC Disconnect Switch

3.5. Required Network Operations Center and RF Safety Signs

NOC information and RF safety signs must be placed on the wireless equipment cabinet on the same side as the disconnect switch (see Figure 14).

If the NOC information cannot be read from ground level without an optical aid, then an additional NOC sign must be mounted 8 feet above ground level. Consult with the PGE Wireless Project Manager to determine the best location for the sign and the appropriate materials and methods for use when attaching it.

Figure 14. NOC Information and RF Safety Signs on Wireless Equipment Cabinet

4. Wireless Equipment on Ductile Iron Poles

This standard provides the requirements for the assembly and installation of Wireless equipment on distribution and transmission line wood pole equivalent ductile iron poles (WPE poles). Additional construction requirements may apply for WPE poles as determined by a PGE Design Project Manager.

4.1. General Information

Ductile iron poles will be used in High Fire Risk Zones (HFRZ) due to their high resistance to fire and their imperviousness to rot, insects, and woodpecker damage. These poles are comparable to wood poles in sizing and application and are slightly lighter than traditional wood poles. Ductile iron poles are available in lengths ranging from 30 to 95 feet, in Classes 1 through 3 and H1 through H10, and will be direct-embedded and guyed as required based on site conditions. PGE's minimum

allowable size for ductile iron poles installed in the HFRZ is a 45-foot Class 2 pole. Fiberglass crossarms must be used on all ductile iron pole installations.

4.2. Attaching Methods to Ductile Iron Poles

All hardware installations must follow approved practices for ductile iron poles. Thru-bolt mounted hardware may be installed in the same manner and configuration as used on wood poles. Welding is not permitted under any circumstances. When drilling new bolt holes is required, tungsten carbide-tipped hole cutters shall be used to ensure proper installation and to prevent damage to the pole. See Table 1 below for a list of Tungsten Carbide tipped bits.

Table 1. Recommended Bits/Hole Cutters for Drilling into Ductile Iron Poles

Milwaukee Bits		CS Unitec Bits	
Part Number	**Size**	**Part Number**	**Size**
49-57-0035	Arbor w/ Pilot Bit	1-1-122	11/16th Hole Saw
49-57-8201	11/16th Hole Saw	1-1-126	13/16th Hole Saw
49-57-8205	13/16th Hole Saw	1-1-130	15/16th Hole Saw
49-57-8209	15/16th Hole Saw	1-1-132	1" Hole Saw
49-57-8211	1" Hole Saw	1-1-136	1 1/8 Hole Saw
49-57-0038	Replacement Pilot bit	1-1-Drill	Pilot Bit

4.3. Attaching Equipment to Ductile Iron Poles

4.3.1. Hardware Options and Acceptable Practices

Lag screws shall not be used on ductile iron poles. Any equipment normally attached using lag screws must be modified to allow attachment by either steel banding or thru-bolting methods. The sizing and selection of steel banding shall be determined by the operator based on the application and loading requirements. PGE utilizes Aluma-Form hardware, including stainless steel banding (1-1/4-inch, part number 201-SSB-100), Bolt-A-Band fasteners (BAB 58) for securing banding to the stainless steel strap, and standoff bracket hardware, seen in Table 2; all of which are available through approved vendors such as Anixter and Portland Foundry. See Figure 15 below. PGE requires pole identification tags be installed using a strong, UV-resistant, two-part epoxy designed for use with metals.

Figure 15. Standoff Bracket Hardware/Banding

Table 2. Standoff Bracket Hardware/Banding Required Frequency of Attachment

Description	Quantity
2-inch PVC conduit	1 per 10 feet
3-inch PVC conduit	
4-inch PVC conduit	
6-inch PVC conduit	
2-inch duct strap	2 per 10 feet
3-inch duct strap	
4-inch duct strap	
6-inch duct strap	
12-inch bracket assembly for metal poles	2 per 10 feet
18-inch bracket assembly for metal poles	

4.3.2. Access/Climbing

Pole steps shall be installed when climbing is required on poles where bucket access is not available. Steps are reusable and shall be removed upon completion of work; no pole steps shall remain within 8 feet of the ground or any climbable surface. Pole steps shall be installed by inserting the L-shaped section into the pre-drilled one 1-inch hole and tightening the securing bolt. PGE-approved pole steps are manufactured by VAF Industries (Part No. 1002) and include an integrated fall arrest loop on the step bolt. Before climbing a WPE pole, the qualified worker must check that all fall protection devices are installed. See Figure 16 below.

NOTE: The fall arrest safety loop on the pole step must not be used for hoisting or activities other than fall protection. Additionally, pole steps are prohibited from being used as a communications arm under any circumstances.

Figure 16. Pole Steps with Fall Arrest Loop

4.3.3. Climbing Space

Due to the challenges of working with a non-wood pole, PGE Designers, Engineers, and line crews must take additional care to place equipment to maintain an adequate climbing route. To do this, mount all equipment on a single longitudinal face while keeping the other face of the pole free from conflicts. This may deviate from typical wood pole practices and prevent the attachment of some equipment normally allowed on a pole.

4.3.4. Neutral Grounding

WPE poles are conductive and act as an equivalent to copper ground wire. Because of this, the pole itself may be used as a ground path and does not require a copper ground wire. Line crews must install WPE neutral grounding when this is done, as shown in Figure 17.

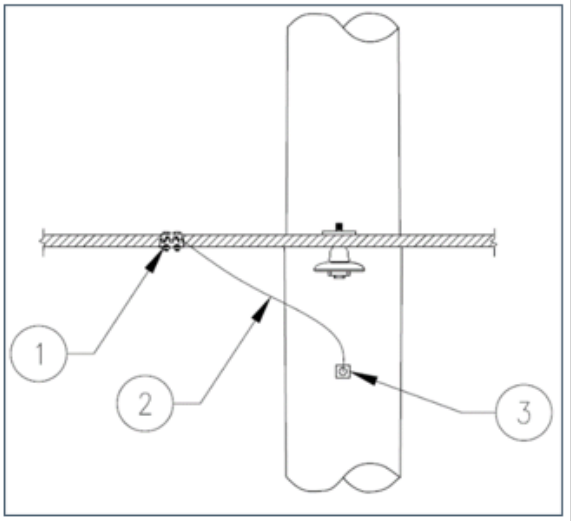

Figure 17. Neutral Grounding Details

4.3.5. Equipment Grounding

All cellular equipment requiring grounding will be bonded to the ductile iron pole as shown in Figure 18 and Figure 19.

Figure 18. Equipment Grounding Details

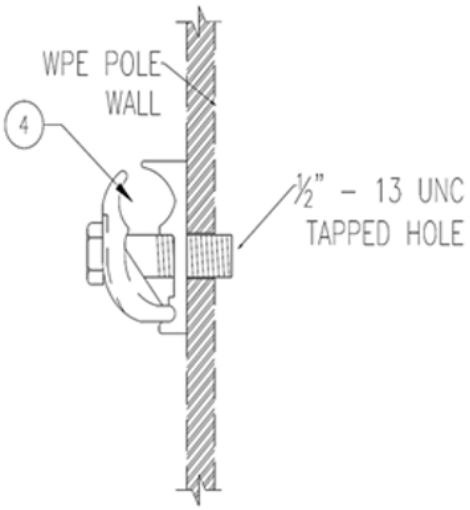

Figure 19. Equipment Grounding Details

4.3.6. Guying on Ductile Iron Poles

Not all ductile iron poles are provided with pre-drilled holes extending into the communications space. If a ductile iron pole does not include pre-drilled holes and steel banding is not preferred by the pole occupant, a new hole shall be drilled in accordance with the specified drill bit requirements shown in Table 1 PGE utilizes a guy hook specifically designed for use on ductile iron poles. See examples below in Figure 20, Figure 21, and Figure 22.

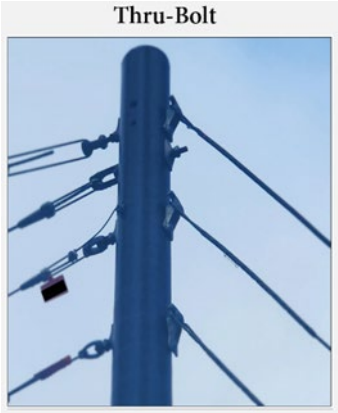

Figure 20. Thru-Bolt Guy Hook

Figure 21. Thru-Bolt Guy Hook

Figure 22. Banded Hook

5. Revision History

Review this document within ten (10) years of the effective date, as required by the Document Governance program.

Rev. No.	Revision Date	Reason for Revision	Affected Pages
0	03/15/2011	Standard Issued for implementation	ALL
1 – 5	2/16/2021	See eRecords for version history.	—
6	2/28/2023	Revised Standard to reflect updated NESC reference requirements. NESC has moved 235I2 to 238F in 2023 edition. Figure 1 and Figure 2 were updated to show the required 8-foot minimum clearance; not new 2023 requirement. Figure 3 updated to show new PGE framing.	ALL
7	4/27/2023	Minor fixes throughout, including adding drawing number on Figure 3.	4
8	2/3/2025	Updated template. Updates to Figure 4. Addition of new figures 5 and 6.	5-7
9	01/22/2026	Page 4 section 1, added measurement locations for determining clearances. Page 5 section 2 and 4 added clarifying language regarding the bonding of streetlights and measurement locations for determining clearances. Page 6 section 1,2, and 4: added clarifying language regarding the bonding of streetlights and measurement locations for determining clearances. Added details of requirements for wireless carriers to attach to wood pole equivalent ductile iron poles. (WPE). Added pages 13-17.	4, 5, 6, 13-16