



Customer Requirements RF Antenna Installations

C-OH-2000

Application

Attachment requirements and clearances on the pole for Radio Frequency (RF) antenna equipment installations. This standard is intended to allow electrical workers to perform their normal job duties working on power lines and electrical equipment without requiring special training, having to take special precautions, or having to wear RF detectors to comply with Federal Communications Commission (FCC) standard for RF exposure limits for “General Population/Uncontrolled Exposure”. No antenna equipment installation is allowed if this intent is not met, as determined by Tacoma Power in its sole discretion based on the paramount operational needs and requirements of Tacoma Power’s electric utility system.

Terms

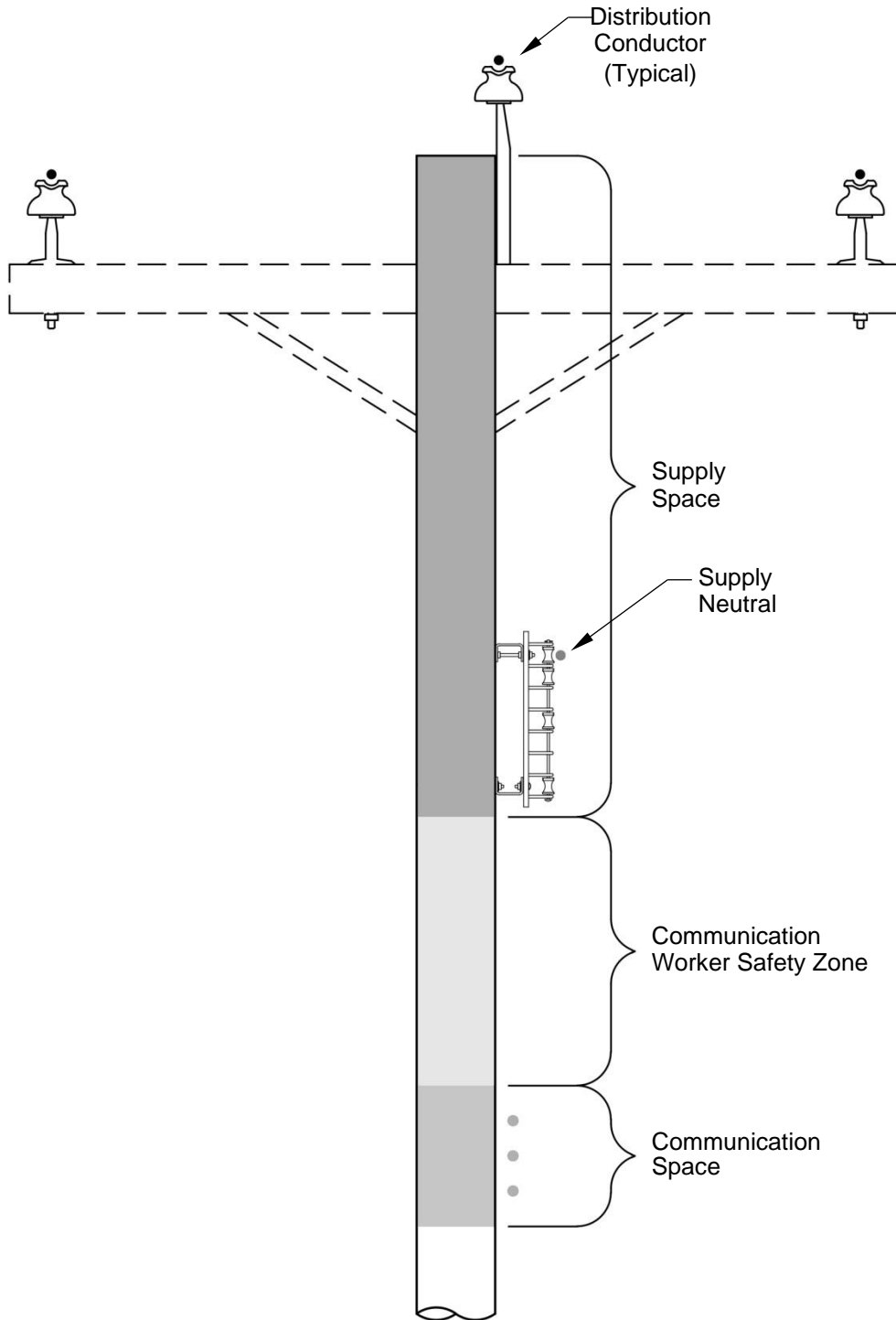
The following are definitions of terms used in this standard, which are also applicable to Tacoma Power joint-use Agreements including, but not limited to Master Pole Attachment Agreements:

Term	Definition
Communication Space	The space on joint-use poles where communication facilities are separated from the supply space by the communication Worker safety zone. This space is below the communication worker safety zone.
Communication Worker Safety Zone	That space on joint-use poles as defined in National Electric Safety Code (NESC) Rule 235C4. This zone generally originates at the lowest point of the supply space (e.g., bottom of service wire drip loop). This space is intended to maintain a physical separation between supply and communication facilities. The minimum dimensions of this space shall at no time be violated.
Supply Space	The space on joint-use poles where supply facilities are separated from the communication space by the communication worker safety zone. This space is above the communication worker safety zone.
Transmission	Tacoma Power supply voltages of 115 kV or 230 kV.
Distribution	Tacoma Power supply voltages of 7.2 kV to 15 kV.
Secondary	Tacoma Power supply voltages of 600 V or less.
Supply Neutral	Multi-grounded conductor of the distribution system.

Customer Requirements RF Antenna Installations

C-OH-2000

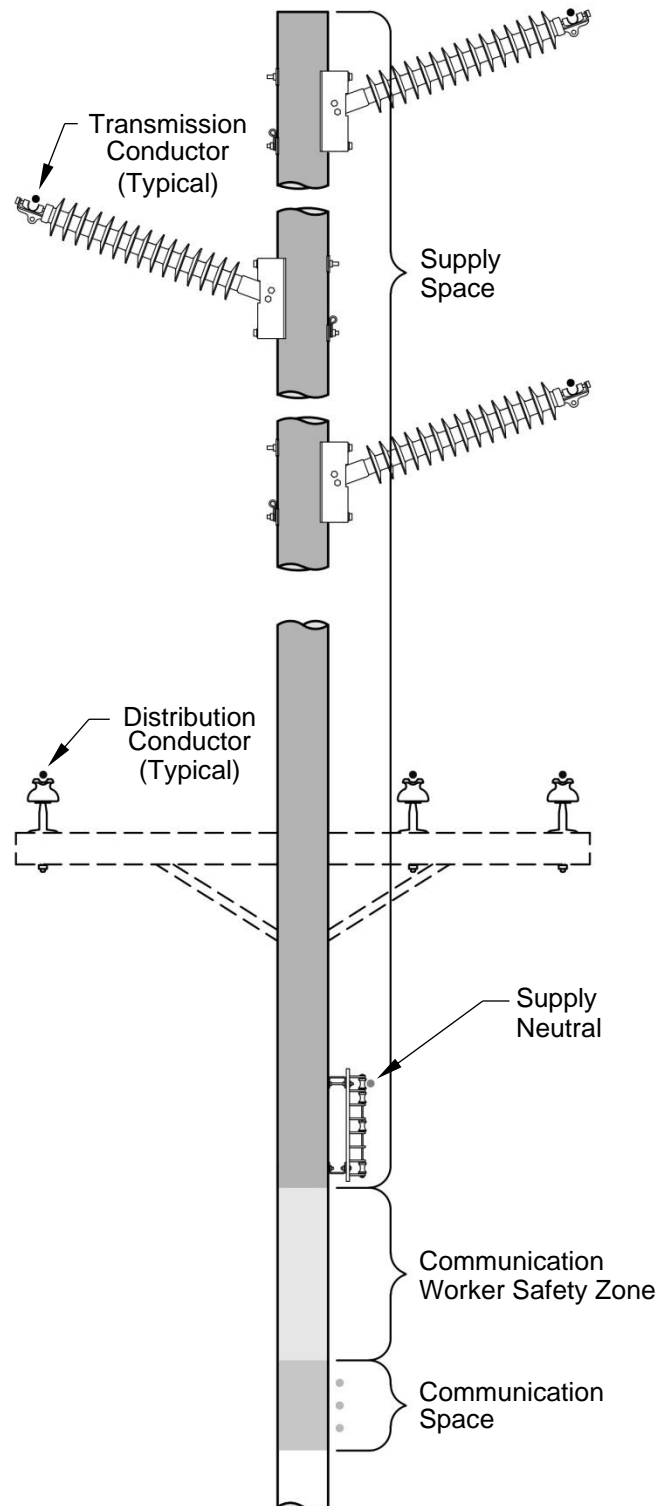
Figure 1 Illustration of Space Allocation on Pole (Distribution Only)



Customer Requirements RF Antenna Installations

C-OH-2000

Figure 2 Illustration of Space Allocation on Pole (Transmission with Distribution Underbuild)





Customer Requirements RF Antenna Installations

C-OH-2000

Attachment Requirements

Agreements, Permits and Codes

- Prior to attaching equipment to poles owned by Tacoma Power, a pole attachment agreement must be signed by all parties involved and the related pole attachment permit approved. Please contact Tacoma Power *Business and Financial Mgmt Dept* at pwrjointutilities@cityoftacoma.org.
 - All attachments must meet the requirements for clearance and strength as specified by standard C-OH-9000 "Customer Requirements, Clearance Requirements for Overhead Joint Utility Construction" and the NESC, along with statutory, code, and other regulatory requirements established by the State of Washington, Pierce County, and local governments including the City of Tacoma.
 - Attachments within the city limits of Tacoma must comply with the requirements of City of Tacoma Municipal Code, Title 16 and City of Tacoma franchise agreement.
-

Complaints

It shall be the responsibility of the antenna owning company to resolve any and all complaints resulting from the installation of the antenna equipment. The owning company shall provide Tacoma Power a phone number to receive and resolve the complaints.

Outage Notification

Tacoma Power will make reasonable effort to notify the antenna owning company of outages 24 hours in advance when possible, but reserves the right to disconnect power without notice when necessary in cases of emergency and/or based on the paramount operational needs and requirements of Tacoma Power's electric utility system as determined by Tacoma Power in its sole discretion.

Who will Install and Maintain the Antenna Equipment

The antenna owning company shall hire an approved Tacoma Power Pre-qualified Electrical Contractor with qualified electrical employees as defined in Chapter 296-45 of the Washington Administrative Code (WAC) to install and maintain the antenna equipment in the supply space.

Serving Voltage

Tacoma Power will provide 120/240V single phase service to RF antenna equipment installations.

Customer Outages

Antenna equipment will be installed and maintained so that Tacoma Power customers will not be taken out of service, with the exception of customers whose services are directly attached to the pole that supports the antenna equipment.



Customer Requirements RF Antenna Installations

C-OH-2000

Attachment Requirements *(continued)*

Pole Selection Criteria

- Antenna equipment shall be mounted on clean tangent poles when possible.
- Antenna equipment shall not be installed above any transmission conductors.
- Antenna equipment shall not be installed on a pole where there are transmission conductors above and not attached to that pole.
- RF emitting antennas shall not be installed in or below the Communication Worker Safety Zone.
- Antenna equipment shall not be mounted on 4 way or 3 way corner poles (buck leads) or poles with:
 - primary switches.
 - primary cable terminations.
 - transformers.
 - capacitors.
 - sectionalizers.
 - regulators.
 - primary metering.
 - locations where adequate clearance is not available.
- Installations are approved on a pole-by-pole basis and Tacoma Power reserves the right to approve or deny attachment to any pole in its sole discretion based on the paramount operational needs and requirements of Tacoma Power's electric utility system.

Poles shall be Climbable

Unless otherwise specifically designated by Tacoma Power, all antenna equipment shall be mounted on the pole so that the pole is climbable to the requirements of the NESC.

Materials Provided by Antenna Owner

Materials shall meet or exceed Tacoma Power material standards where Tacoma Power specifications exist.

Antenna Location on Pole

- Antenna equipment can be installed in the supply space:
 - between the supply neutral and the distribution conductors.
 - above the distribution conductors where there are no transmission conductors above that are not attached to the pole.
 - below the transmission conductors.
- Only one antenna installation per pole.
- Strand mounting is not allowed.



Customer Requirements RF Antenna Installations

C-OH-2000

Attachment Requirements *(continued)*

Disconnect

- All antenna equipment must be equipped with a quick means of electrical service disconnect, to turn off all RF energy. Installation of the service disconnect shall meet applicable safety regulations including, but not limited to, elimination of RF exposure to Tacoma Power employees in accordance with WAC 296-62-09005.
 - This disconnect will also prevent any backup energization of the antenna.
- The disconnect shall be mounted 15 ft above grade accessible to Tacoma Power crews.
- Tacoma Power reserves the right to disconnect power to installations when determined necessary in its sole discretion, and without prior notice, based on the paramount operational needs and requirements of Tacoma Power's electric utility system.

Service Conductors and Data Lines

The energized service conductors and data lines to the antenna shall be protected with a suitable non-metallic covering within the Supply Space. These conductors and lines shall not be stapled to the pole.

Backup Energization

Any backup energization shall be designed and constructed so that it cannot back-feed into the Tacoma Power system.

Ground Mounted Equipment

- Antenna equipment should be installed on the pole. If ground mounted pedestal must be installed, it shall follow the requirements of C-SV-3200 "Customer Requirements, Commercial Secondary Service".
- Ground mounted equipment shall be:
 - located on the road or field side of the pole or grouped with any existing handholes/pedestals.
 - a minimum 4 ft (6 ft to 10 ft preferred) from base of pole.
- Do not install ground mounted equipment or underground conduit in the pole line where it would conflict with the future replacement of the pole.
- When the equipment must be placed in line with the pole, it should be located on the transformer, distribution crossarm, or other power equipment side of the pole.

Customer Requirements RF Antenna Installations

C-OH-2000

Attachment Requirements *(continued)*

Labeling

Antenna equipment shall be clearly labeled as follows:

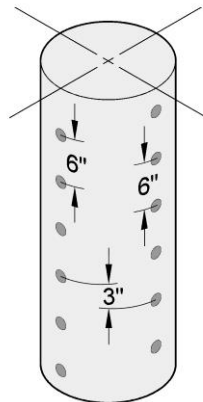
- Labelling shall be mounted on the disconnect or within 12 in. below.
- Labels shall be a reflective, weather and UV resistant sign or decal.
- Labels shall follow all Occupational Safety and Health Administration (OSHA) and FCC Guidelines on labeling of wireless equipment.
- Labels shall also have the following information:
 - Name of owner.
 - Reference, site or equipment ID number.
 - 24 hr. phone number to responsible person that will respond to emergencies in a timely manner.

Pole Hole Drilling (see Figure 3)

- Holes drilled on the same side of pole shall be no closer than 6 in.
- Holes that are perpendicular shall be no closer than 3 in.
- Hole Treatment:
 - For Douglas Fir Poles: Treat holes with Tacoma Power's current approved preservative.
 - For Cedar Poles: No treatment required.
- Any bolt holes for antenna equipment shall be 1 ft. min. from top of pole.

Figure 3

Pole Drilling



Attachment Requirements *(continued)*

Conduit Risers

Riser conduit for RF antenna installations shall meet the following requirements:

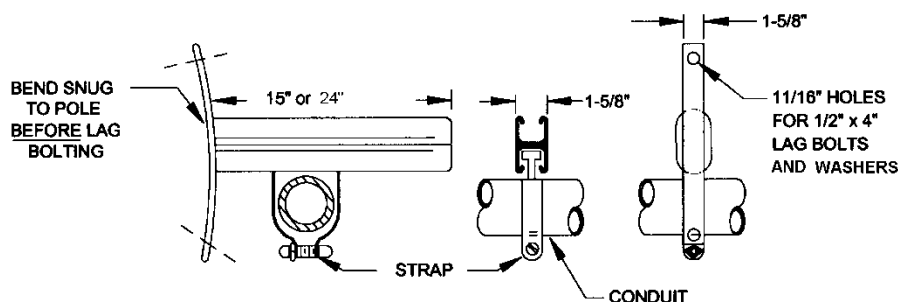
- Risers shall be installed on standoff brackets (see “Standoff Brackets” and Fig. 4). Standoff brackets shall be:
 - no lower than 8 ft. from the ground or other accessible surface.
 - mounted within 6 in. of the top end of any stick of conduit.
 - evenly spaced along the pole and no more than 10 ft. apart.
- If standoff brackets are already installed on the pole, the new riser(s) shall be attached to these standoffs.
- Spacing between the pole and any conduit riser shall be a minimum of 4 in.
- Any part of a conduit riser assembly shall maintain the following minimum clearances in any direction from conductors in the supply space:
 - Supply Neutral = 3 in.
 - Distribution Conductors = 6 in.
- Risers shall be located on the field side of the pole and the pole quadrant most protected from traffic.
- If more than one conduit will be on the same side of the bracket, the higher voltage will be closest to the pole.
- The entire length of conduit riser should parallel the structure or pole, regardless of taper of the pole.
- The top of the service riser weatherhead shall be 12 inches minimum below the bottom of the supply neutral/secondary wire clevis bracket.
- The lowest portion of the antenna service drip loop shall be 40 in. min. above the highest communications messenger and/or cable.

Standoff Brackets
(see Figure 4)

Standoff brackets for risers and other equipment shall be:

- hot dip galvanized with 1-5/8 in. C channel, 15 to 24 in. length.
- 2-piece steel galvanized binding member clamps suited to conduit size and type. Wire clamps are not acceptable.
- Fit closely to pole shape by bending straps before lag-bolting and firmly lag-bolt to pole.

Figure 4 Standoff Bracket Requirements



Customer Requirements RF Antenna Installations

C-OH-2000

Bonding and Grounding

- A separate grounding electrode system for the antenna equipment installation shall be installed as follows:
 - Two (2) 5/8 in. x 8 ft. min. copper-clad ground rods shall be driven at least 6 in. below surface of final grade at a minimum of 6 ft. apart.
 - The ground rod nearest the pole shall be a minimum of 4 ft. from base of pole.
 - The ground rods shall be bonded to the existing pole ground with minimum #4 AWG copper-clad wire.
 - All metallic antenna equipment shall be bonded to the existing pole ground with minimum #4 AWG copper-clad wire.
 - All connections shall be non-reversible, compression type.
 - Any bonding or grounding conductor installed on the pole below 8 ft. from grade shall be minimum #4 AWG **copper-clad** conductor and shall meet the following requirements:
 - Staped to the pole with min. 1-7/8 in. long, galvanized pole ground wire staples every 3 to 6 in.
 - Covered with 1/2 in. wire molding and stapled again every 3 to 6 in.
-

Clearances

Antenna Equipment in Communication Space (see Figures 5 and 6)

- Spacing between the pole and any antenna equipment shall be 4 in. min.
 - Any part of the antenna equipment and/or associated mounting brackets shall be 12 in. min. below the lowest existing communications messenger and/or cable.
-

Antenna Equipment in Supply Space (see Figures 5, 6 and 7)

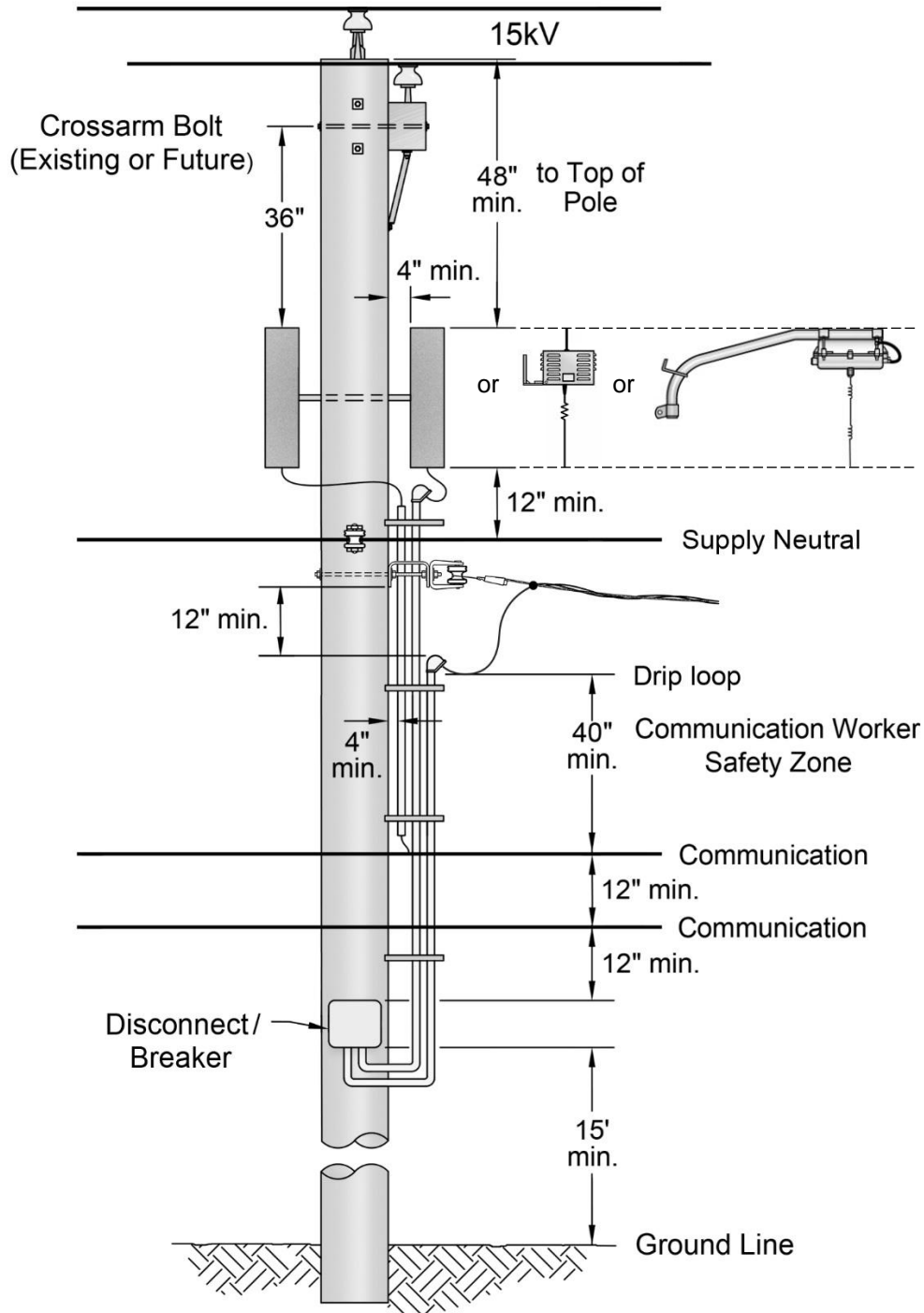
- Spacing between the pole and any antenna equipment shall be 4 in. min.
 - Below the distribution conductors:
 - The highest portion of the antenna shall be 48 in. min. below the top of the pole.
 - The lowest portion of the antenna shall be 12 in. min. above the supply neutral if present.
 - Above the distribution conductors:
 - The lowest portion of the antenna shall be 5.0 ft. above the distribution conductor.
 - The highest portion of the antenna shall be 10.0 ft. below the lowest mounting bolt of the transmission insulators.
-

Customer Requirements RF Antenna Installations

C-OH-2000

Clearances (continued)

Figure 5 Clearance Requirements for RF Antenna Equipment Below the Distribution Conductors

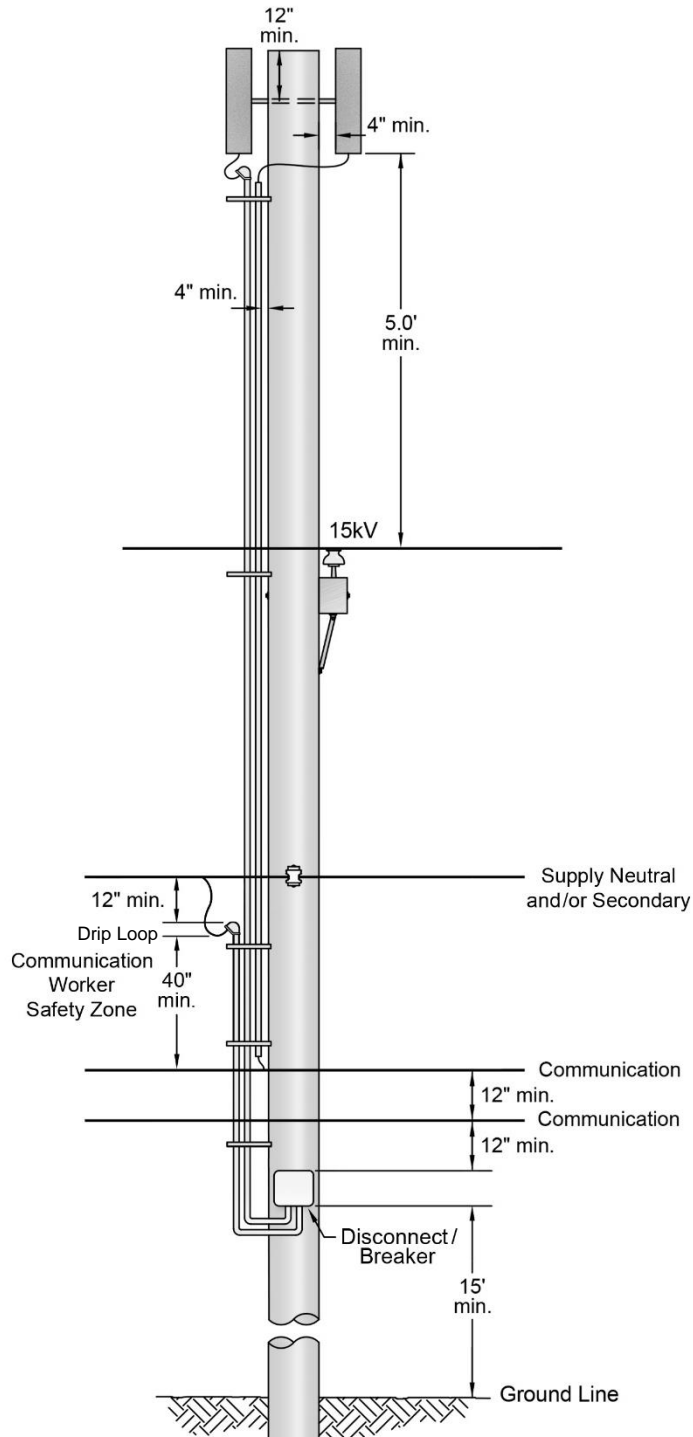


Customer Requirements RF Antenna Installations

C-OH-2000

Clearances (continued)

Figure 6 Clearance Requirements for RF Antenna Equipment Above the Distribution Conductors



Clearances *(continued)*

Figure 7 Clearance Requirements for RF Antenna Equipment Below the Transmission Conductors

