
Pole Attachments, Pole Top Cellular Antennas



1. Scope

This standard covers the Seattle City Light (SCL) contractor requirements for installation of pole top cellular antennas on SCL wood poles.

Specific installation instructions are outside the scope of this standard.

2. Application

This standard provides information for approved contractors, as well as SCL engineers and crews, about SCL requirements for installing pole top cellular antennas in the SCL service territory.

Types of cellular antennas that may be installed on a pole top include:

- Macro cell antennas
- Small cell antennas
- Distributed antenna systems (DAS)

For installation of small cell and DAS on distribution wood poles between the primary and the common neutral, see SCL 0095.15.

For additional requirements regarding identification and labeling of pole attachments, see SCL 0093.12.

For additional requirements regarding attachments on wood poles, see SCL 0093.04.

3. Requirements

3.1 Code, Permits, and Approvals

All necessary permits shall be obtained by the wireless unit owner. This includes Federal Aviation Agency (FAA) permits and any easement on private property for pad-mounted communication equipment, down guys, and/or any aerial overhangs.

Only one cellular antenna installation shall be allowed per pole location.

Installation shall not be allowed on poles where no adequate clearance is available. This includes corner poles, poles with transformers, capacitors, primary cable terminations, primary switches, or primary metering equipment.

All work above the communication worker safety zone shall be performed by SCL crews or its approved contractors.

Permits and applications for all proposed work, which includes installations, modifications, or relocations shall be reviewed and approved by SCL Joint Use Engineering.

All installations shall meet or exceed all applicable structural and clearance requirements of the latest revision to the National Electrical Safety Code (NESC), as well as SCL construction standards. In case of conflict, the most stringent requirement will prevail. This may result in a pole replacement to accommodate the installation of the added antenna and its associated equipment.

All electrical service to provide power to the cellular antenna shall meet all applicable National Electrical Code (NEC).

A Non-Ionizing Electromagnetic Radiation (NIER) report shall be submitted to the pole owner(s) and retained on file for each equipment type/model. The NIER report shall be endorsed by a Radio Frequency (RF) Professional Engineer (PE) who is licensed in Washington state. The NIER report shall specify minimum approach distances to the general public (uncontrolled) as well as to the electrical and communication workers potentially working in a RF environment (controlled) when accessing the pole by climbing or by aerial lift.

Any variance from this standard shall require approval in writing from SCL Joint Use Engineering.

3.2 Service Voltage and Connection

A single phase 120/240 V service voltage will be available to power the cellular antenna.

Power to serve macro cell antenna shall be metered. Application for electrical service shall be submitted to the SCL Electrical Service Representative (ESR).

Power to serve small cell antenna and DAS will not be metered and will be provided by SCL Joint Use.

An external disconnect switch shall be required (Federal Communication Commission (FCC) Office of Engineering and Technology (OET) Bulletin 65; Washington Administrative Code (WAC) 296-62-09005) to allow the antenna to be de-energized before work can be performed within the area designated by the RF warning signs, per Section 3.6. The service disconnect switch shall isolate all electric services including any battery backups. The service disconnect switch shall be either mounted to the communication equipment enclosure or just below it, per Section 3.5.

SCL will make every reasonable effort to notify the antenna owner of outages 24 hours in advance when possible. However, SCL reserves the right to disconnect power to the installation without prior notice when necessary.

3.3 Grounding and Bonding

All conductive parts of the antenna installation on the pole, including the enclosure and antenna mounting bracket shall be bonded together and grounded to the SCL pole ground or system neutral. See NESC 092C3a and b.

All messengers shall be bonded together and grounded to the pole ground or system neutral.

A copper ground wire, #4 AWG minimum size, shall be installed from the base of the antenna bracket to the ground rod(s) at the base of the pole.

If no ground rod exists, one shall be installed. The installation shall meet or exceed the requirements of SCL 0451.01 and Seattle Electrical Code (SEC) 250.53, or the Authority Having Jurisdiction (AHJ).

All ground rods shall be bonded together, using an irreversible connection, with #4 AWG copper wire.

For installation above transmission lines, the ground wire shall be insulated copper installed in 2-inch PVC conduit. See Figure 3.9c.

Ground bus bars installed on the poles shall not exceed 12 inches and shall be covered and protected.

3.4 Conduit Risers

Only one riser installation set shall be allowed on the pole.

For pole top installations on distribution poles, the riser orientation shall be on the field side, away from traffic flow per Figure 3.4 and Figure 3.9b.

For pole top installations on transmission poles, the riser orientation shall be on the face of the pole per Figure 3.9c

Steel conduit risers at the base of the pole shall comply with SCL 0224.34, except where the riser orientation is dictated by this standard. See Figure 3.4.

Riser extensions up the pole shall be constructed per SCL 0126.04.

All conduits larger than 2-inch nominal diameter shall be installed on standoff brackets.

The minimum space between the pole and the closest part of the conduit shall be 4.5 inches.

The maximum number of conduits allowed on the standoff bracket is shown in Table 3.4.

Table 3.4 Maximum Allowable Conduit Quantities

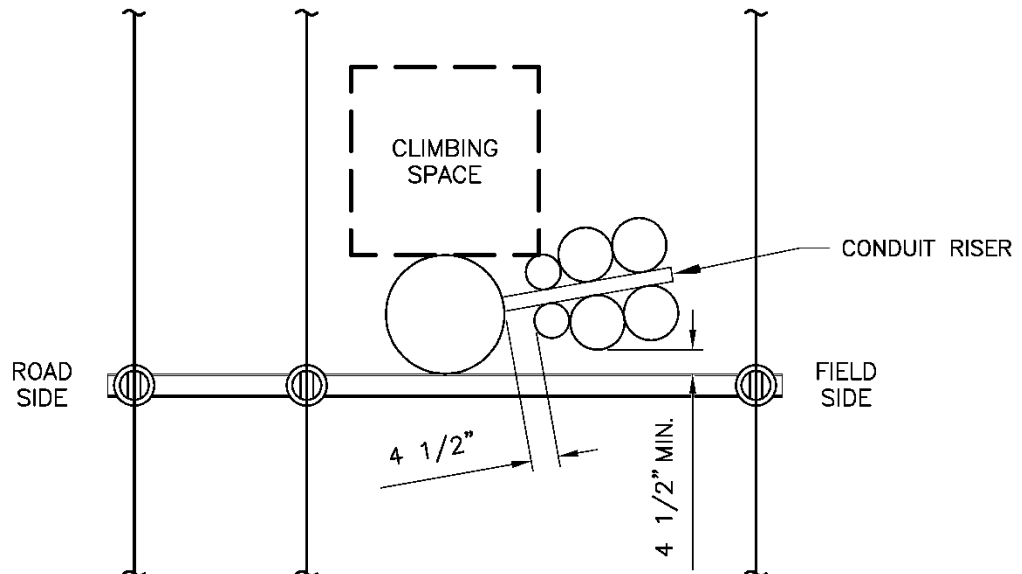
Conduit Quantity	Conduit Size	Type
4	4 in	Antenna coax and fiber
1	3 in	Electrical service to pole-mounted or pad-mounted enclosure
1	2 in	Telephone to pad-mounted equipment or ground wire to antenna above transmission line

Conduits and stand-off brackets at the base of the pole shall not be readily climbable up to 8 feet above the ground line.

Standoff brackets shall be Stock No. 686796 and 686790 or preapproved equivalent. See SCL Material Standard 6867.50.

Conduits shall be painted to the requirements of Section 3.7.

Figure 3.4 Riser Orientation for Pole Top Antennas on Distribution Poles



3.5 Equipment Mounting

All communication equipment shall be mounted in a configuration that preserves the climbing space on the pole.

For antenna panels and ancillary equipment:

- Mounting of more than one RAD center may be allowed on a pole, but no more than three antennas shall be allowed at each RAD center. The RAD center, or center of radiation, is the height above ground line a carrier specifies an antenna installation.
- Only collar-mounted antennas shall be allowed.
- Only one item of ancillary equipment shall be allowed per antenna panel. The item shall be mounted behind or below the antenna as space permits.

For the communication equipment enclosure:

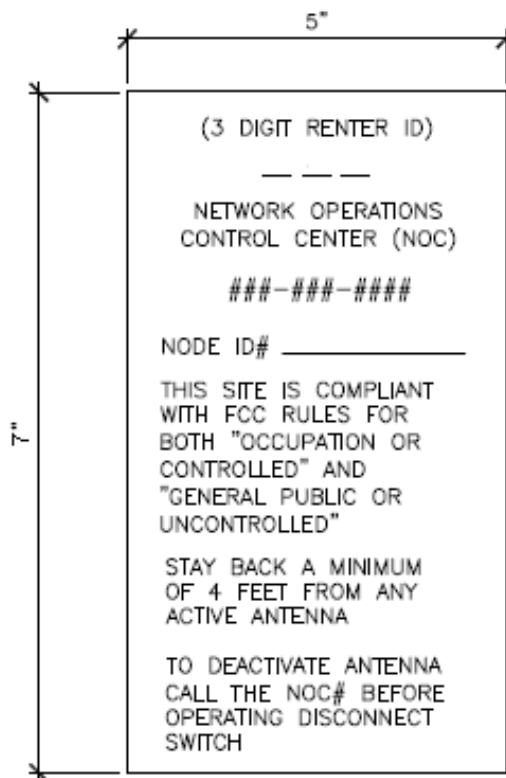
- Only one pole mounted communication equipment enclosure shall be allowed per pole. The maximum dimensions, weight, and orientation of the enclosure shall comply with SCL 0094.01.
- The power disconnect switch shall be mounted on the same side as the equipment enclosure. It may be mounted directly to the enclosure or below the enclosure if it meets the clearance requirements of Section 3.9.
- The communication equipment enclosure may be pad mounted, provided no equipment is located closer than 10 ft from the pole.

3.6 Labeling and Caution Tags

The following tags shall be employed for each macro and small cell antenna or DAS installation:

- **Antenna owner identification (ID) and RF notification tags** shall be installed on all equipment enclosures or entries and be clearly visible from the ground. Tags shall contain a unique company equipment ID number and site name as approved by SCL Joint Use Engineering, working clearance, and a 24-hour contact phone number for deactivation notification. See Figure 3.6a
- **RF caution tags for macro cell antennas** shall be prominently displayed at the entrance gate.
- **RF caution tags for small cell antennas or DAS equipment** shall be applied on the equipment enclosure. These shall be clearly marked and visible from the ground and approved by SCL Joint Use Engineering prior to application. See Figure 3.6b.

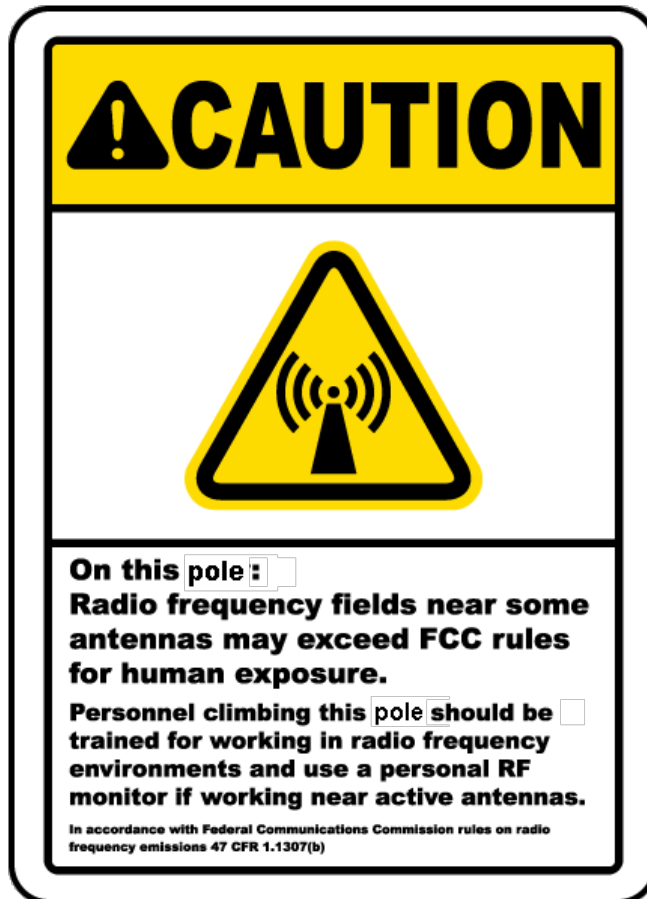
Figure 3.6a. Example of RF Notification Tag



Notes:

1. 5" x 7" aluminum (yellow with black lettering)
2. Located on side of equipment cabinet
3. Made of weather and corrosive resistant material

Figure 3.6b. Example of RF Caution Tag



Notes:

1. 5" x 7" aluminum (yellow with black lettering)
2. Located on side of equipment cabinet
3. Made of weather and corrosive resistant material

3.7 Aesthetics and Inspection

Antennas and DAS equipment shall be installed in a manner that allows for maintenance and climbing of the pole by all parties.

Antenna cables shall be installed in a manner that minimizes cabling.

The antenna and conduits shall be painted Sherwin Williams Fairfax Brown SW2856.

3.8 Community Notification and Disputes

All required community notifications shall be the responsibility of the antenna owner.

All questions and inquiries resulting from the antenna installation shall be resolved by the antenna owner.

The antenna owner shall provide SCL Joint Use Engineering with a current contact for referral of citizen inquiries.

3.9 Clearances

Description	Clearances
Antenna panels, ancillaries, and other pole-mounted equipment	<ul style="list-style-type: none">▪ The minimum horizontal clearance from the surface of the pole to the antenna panels, ancillaries, and other pole mounted equipment shall be 4.5 inches.▪ Equipment enclosure shall be a minimum of 15'-6" above ground.▪ Power disconnect switch shall be a minimum of 13'-6" above ground. See Section 3.5.
Secondary service poles	<ul style="list-style-type: none">▪ Antennas and DAS equipment shall have a minimum clearance of 1 ft. above the secondary conductor.
Distribution poles	<ul style="list-style-type: none">▪ A minimum vertical clearance of 7 ft shall be maintained between the bottom of the antenna panels and the primary conductor.
Transmission poles	<ul style="list-style-type: none">▪ A minimum vertical clearance of 11 ft shall be maintained between the bottom of the antenna panels and the transmission conductor.

See figures 3.9a through 3.9c.

Figure 3.9a. Pole Top Antenna Attachment on Secondary Service Pole

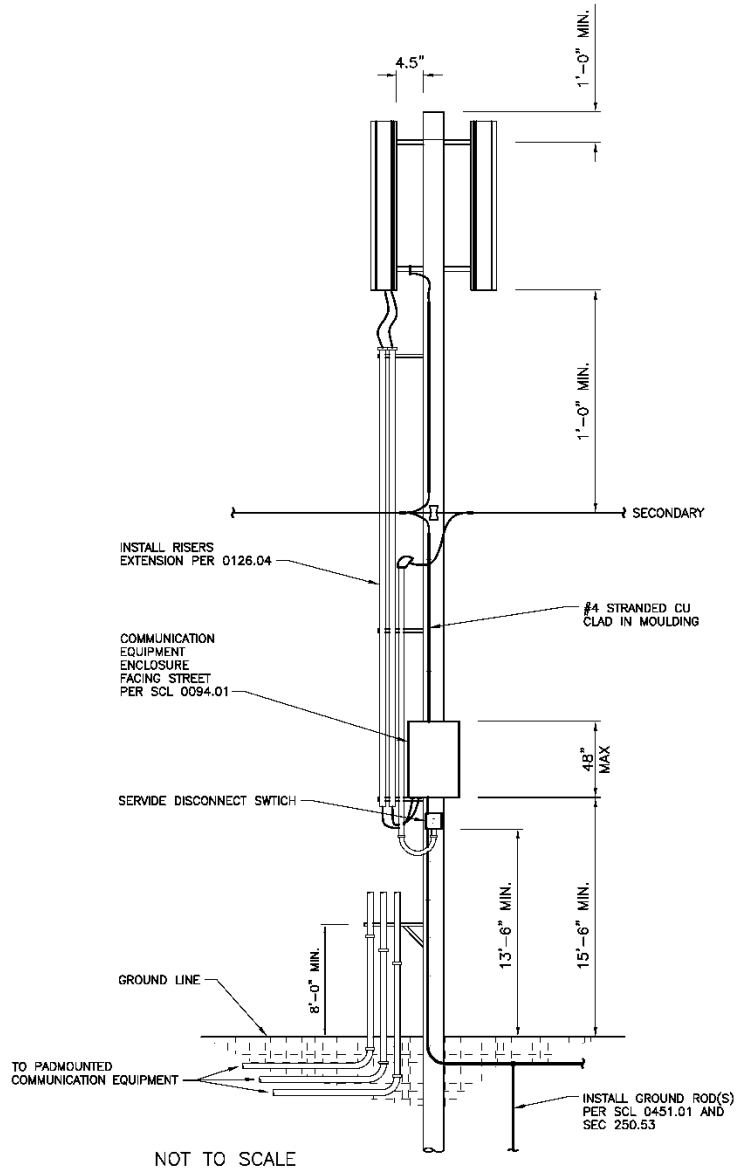


Figure 3.9b. Pole Top Antenna Attachment on Distribution Pole

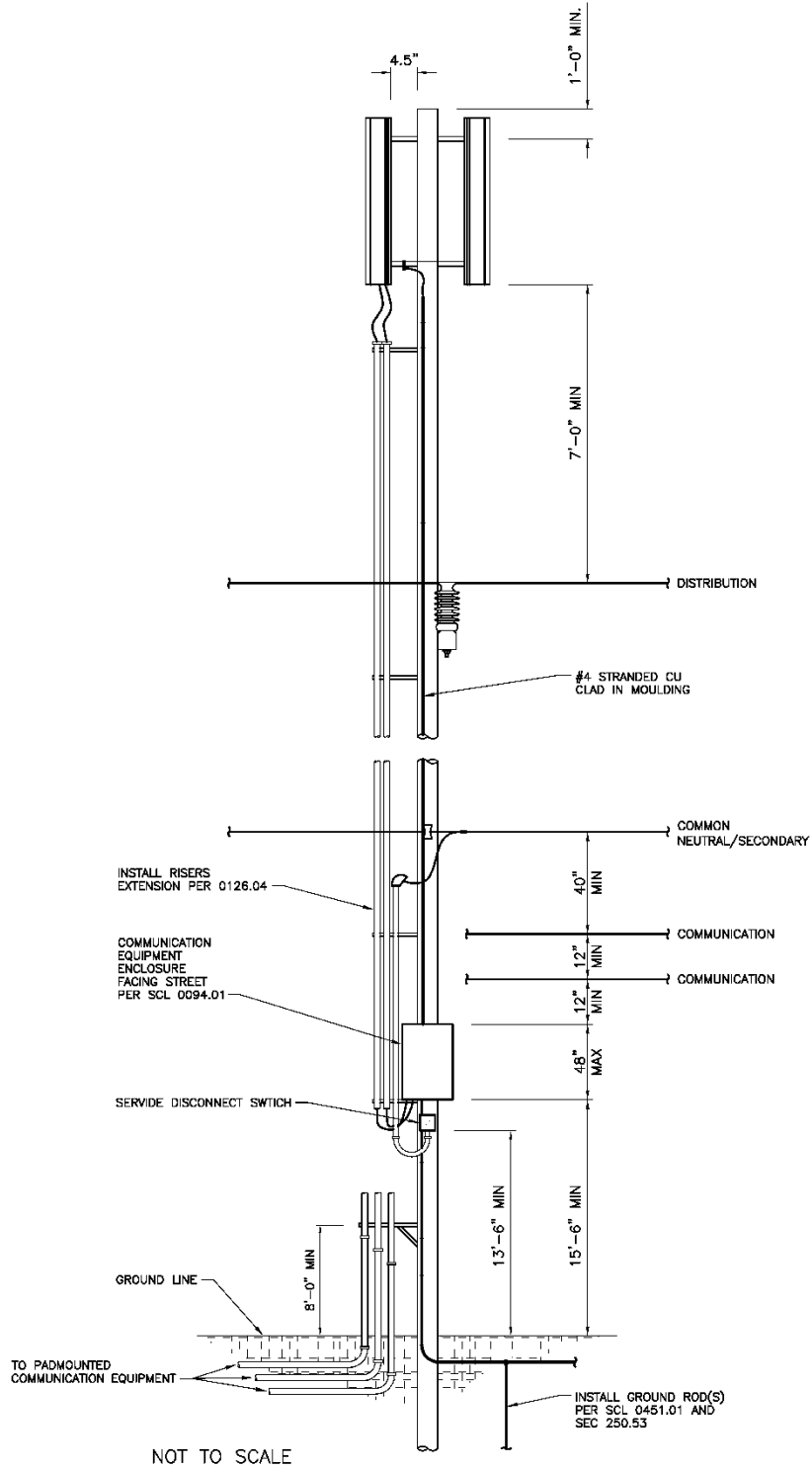
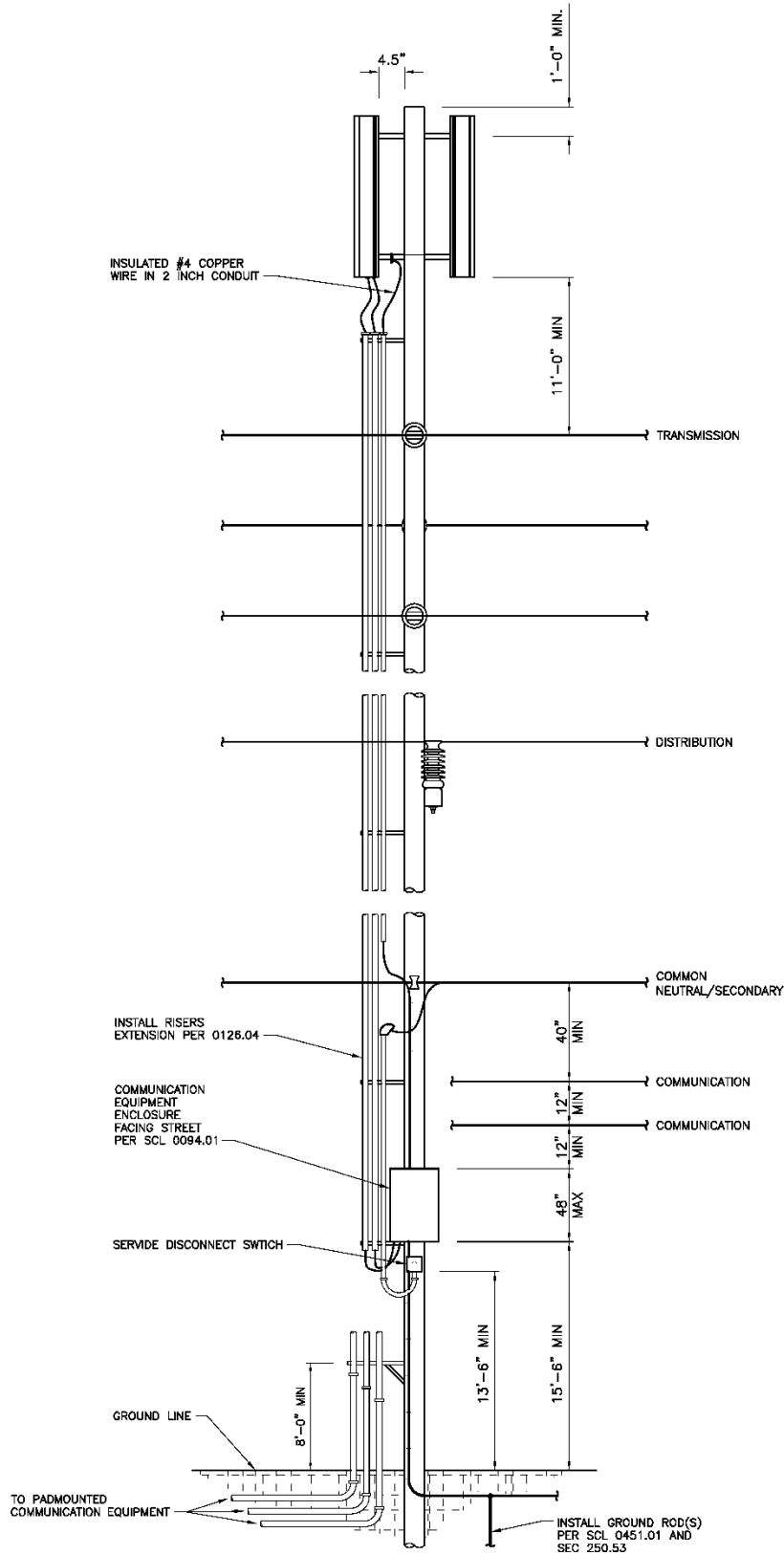


Figure 3.9c. Pole Top Antenna Attachment on Transmission Pole, Macro Cell Only



4. Construction Notes

Contact SCL Joint Use Engineering for concerns regarding the following:

- Avian and wildlife protection
- Clearances
- Site-specific conflicts

Secure (with nylon zip ties) all loose wires and jumpers to minimize flapping and entanglement.

5. Materials

All materials shall be provided by the antenna owner.

These materials shall meet or exceed SCL specifications where SCL specifications exist. If needed, specialized tools, and training for those tools, shall be provided to SCL as required to assist with the antenna installation.

6. References

Federal Communications Commission (FCC), Office of Engineering & Technology (OET) Bulletin 65; "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 97-01, August 1997

National Electrical Safety Code (NESC), C-2 2017 Edition, Institute of Electrical and Electronics Engineers (IEEE) Inc., New York, NY, 2016

NFPA 70, National Electrical Code (NEC); 2014 Edition; National Fire Protection Association, Quincy, MA, 2010

SCL Construction Standard 0093.04; "Attachments on Wood Poles"

SCL Construction Standard 0093.12; "Pole Attachments, Identification and Tagging"

SCL Construction Standard 0094.01; "Communication Enclosures on SCL Wood Poles"

SCL Construction Standard 0095.15; "Pole Attachments, Small Cell Antenna and Distributed Antenna System (DAS) Below the Distribution Conductor"

SCL Construction Standard 0126.04; "Riser Extensions"

SCL Construction Standard 0224.34; "Steel Conduit Risers"

SCL Construction Standard 0451.01; "Grounding Electrodes for Distribution Poles"

SCL Material Standard 6867.50; "Bracket, For Pole Riser Conduit"

Seattle Electrical Code (SEC) 250.53; "Grounding Electrode System Installation," 2017

Washington Administrative Code (WAC) 296-62-09005; "Nonionizing Radiation"

7. Sources

City of Seattle Standard Specifications for Road, Bridge and Municipal Construction; 2017

Federal Aviation Administration (FAA) Regulations, Section 77; "Objects Affecting Navigable Airspace," July 2010

Federal Communications Commission (FCC); Order 11-50

Haberman, Douglas; SCL Joint Use Strategic Advisor and subject matter expert for 0095.20 (douglas.haberman@seattle.gov)

Neuansourinh, Ponet; SCL Standard Engineer, originator, and subject matter expert for 0095.20 (ponet.neuansourinh@seattle.gov)

RCW 80.36.375; “Personal Wireless Services – Siting Microcells, Minor Facilities, or a Small Cell Network – Definitions”

Seattle Electrical Code (SEC) 230.43; “Wiring Methods for 1000 Volts, Nominal, or Less”