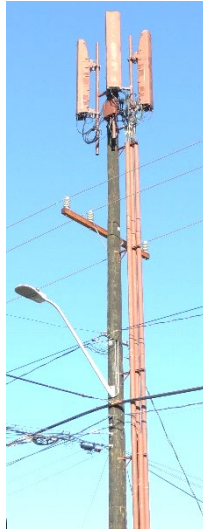


## Wireless Communications Antennas on Wood Pole Tops



### 1. Scope

This standard covers the information necessary to install wireless communications antennas on the tops of wood poles.

In this standard, “wireless communications antennas” refers to both macrocell antennas and antennas associated with small wireless facilities (SWFs). See SCL 0093.07.

Installation of wireless communications antennas on composite, steel, or laminated wood poles is outside the scope of this standard.

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

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

For requirements regarding attachments other than antennas and their associated enclosures on wood poles, see SCL 0093.04.

For working in the vicinity of wireless communications antennas, see SCL 0095.04.

### 2. Application

This standard provides direction to Seattle City Light (SCL) crews, engineers, customers, and approved contractors on the installation of pole-top wireless communications antennas in the SCL service territory.

### 3. Requirements

#### 3.1 Code, Permits, and Approvals

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

Only one antenna customer 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 communications 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 installations shall comply with the wireless permitting requirements of the Authority Having Jurisdiction (AHJ).

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

Each installation location shall require a Non-Ionizing Electromagnetic Radiation (NIER) report to be submitted to the pole owner(s) and retained on file for each equipment type/model. See SCL 0095.06.

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 for power.

Power to serve macrocell antennas shall be metered. An application for electrical service shall be submitted to the SCL Electric Service Representative (ESR).

Power to serve SWFs will not be metered and will be provided per SCL 0094.01.

An external disconnect switch shall be required (Federal Communications 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 radio frequency (RF) warning signs, per Section 3.6. The service disconnect switch shall isolate all electric services including any battery backups.

### 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 in length and shall be covered and protected.

### 3.4 Conduit Risers and Crossarms

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

The riser orientation shall be on the face of the pole. See Figure 3.4.

The crossarm orientation shall be on the backside of the pole to avoid being trapped by the conduit risers for the antenna. See Figure 3.4.

Steel conduit risers at the base of the pole shall be constructed per SCL 0224.34.

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

All conduits 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**

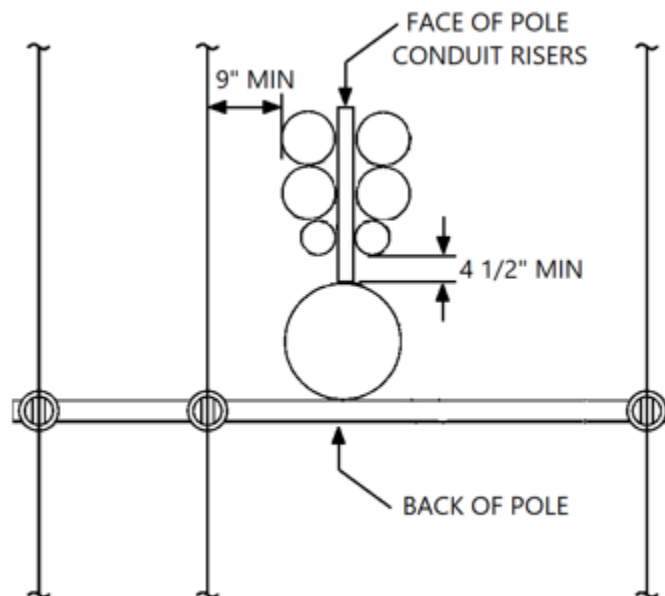
Conduit Quantity	Conduit Size	Type
4	4 in	Antenna coax and fiber
2	3 in	Electrical service to pole-mounted or pad-mounted enclosure
1	2 in	Telephone to pad-mounted equipment or ground wire to antenna above transmission line

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 Nos. 686796 and 686790 or a preapproved equivalent. See SCL 6867.50.

Conduits shall be painted to the requirements of Section 3.7.

**Figure 3.4. Riser and Crossarm Orientation for Pole-Top Antenna on Distribution Poles**



### 3.5 Equipment Mounting

All communications 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 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 communications equipment enclosure:

- Only one pole mounted communications 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.
- All power wires must be enclosed. The service wire entering the disconnect must be in rigid conduit, while the power between the disconnect and the enclosure may be in flex conduit.
- The communications equipment enclosure may be pad mounted, provided no equipment is located closer than 10 ft from the pole.

### 3.6 Labeling and Tag Installation

Antenna customer identification (ID) and RF Caution tags shall meet the requirements of SCL 0095.08.

For macrocell antennas, tags shall be installed on the pole as shown in figures 3.9a, 3.9b, and 3.9c.

For SWFs, the ID and RF caution tags shall be installed per SCL 0095.15.

### 3.7 Aesthetics and Inspection

All installations shall be done 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 a color matching Sherwin Williams Fairfax Brown SW2856.

### 3.8 Community Notification and Disputes

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

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

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

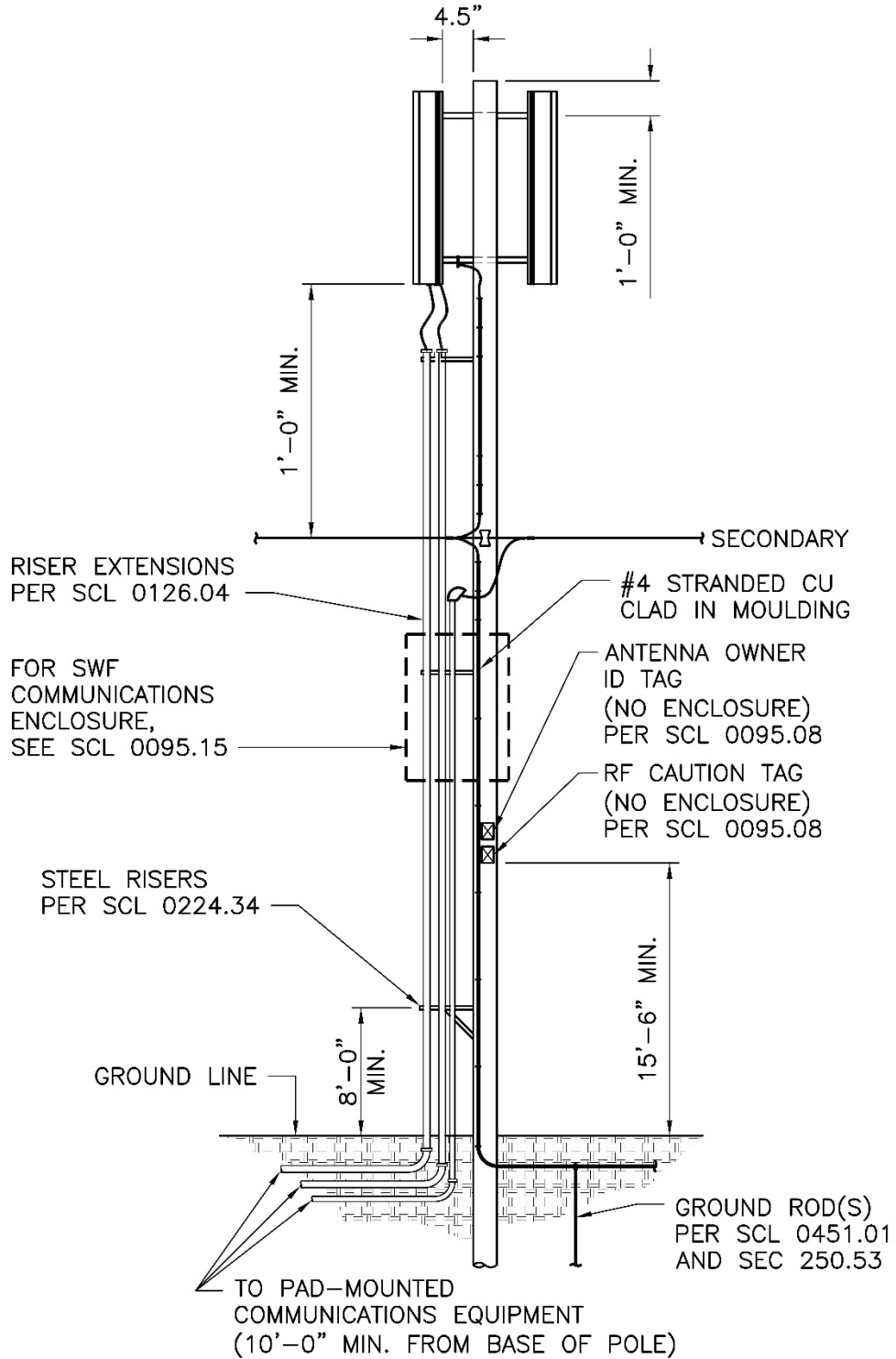
### 3.9 Clearances

Clearances shall be maintained as shown in Table 3.9 and figures 3.9a through 3.9c.

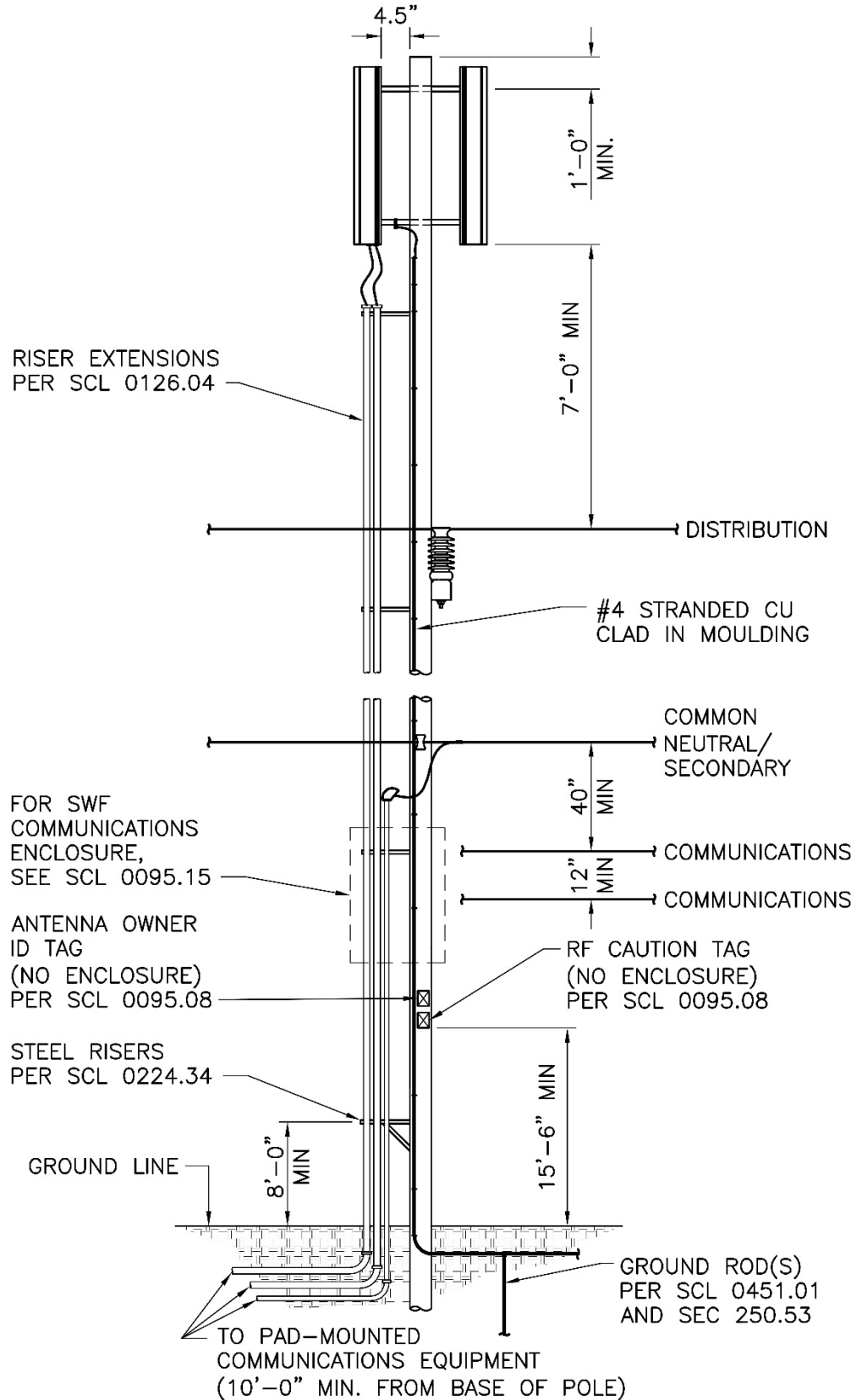
**Table 3.9. Clearances**

Description	Clearances
Antenna panels, ancillaries, and other pole-mounted equipment	<ul style="list-style-type: none"> <li>▪ 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.</li> <li>▪ Equipment enclosure shall be a minimum of 15'-6" above ground, and per SCL 0094.01.</li> <li>▪ Power disconnect switch shall be a minimum of 13'-6" above ground. See Section 3.5.</li> </ul>
Secondary service poles	<ul style="list-style-type: none"> <li>▪ A minimum vertical clearance of 1 ft shall be maintained between the bottom of the antenna and the secondary conductor.</li> </ul>
Distribution poles	<ul style="list-style-type: none"> <li>▪ A minimum vertical clearance of 7 ft shall be maintained between the bottom of the antenna and the primary conductor.</li> </ul>
Transmission poles	<ul style="list-style-type: none"> <li>▪ A minimum vertical clearance of 11 ft shall be maintained between the bottom of the antenna and the transmission conductor.</li> </ul>
Antenna Owner ID and RF Caution tags	<ul style="list-style-type: none"> <li>▪ Tags shall be a minimum of 15'-6" above ground.</li> </ul>
Pad-mounted communications equipment	<ul style="list-style-type: none"> <li>▪ Ground equipment shall be located a minimum of 10 ft from the base of the pole.</li> </ul>

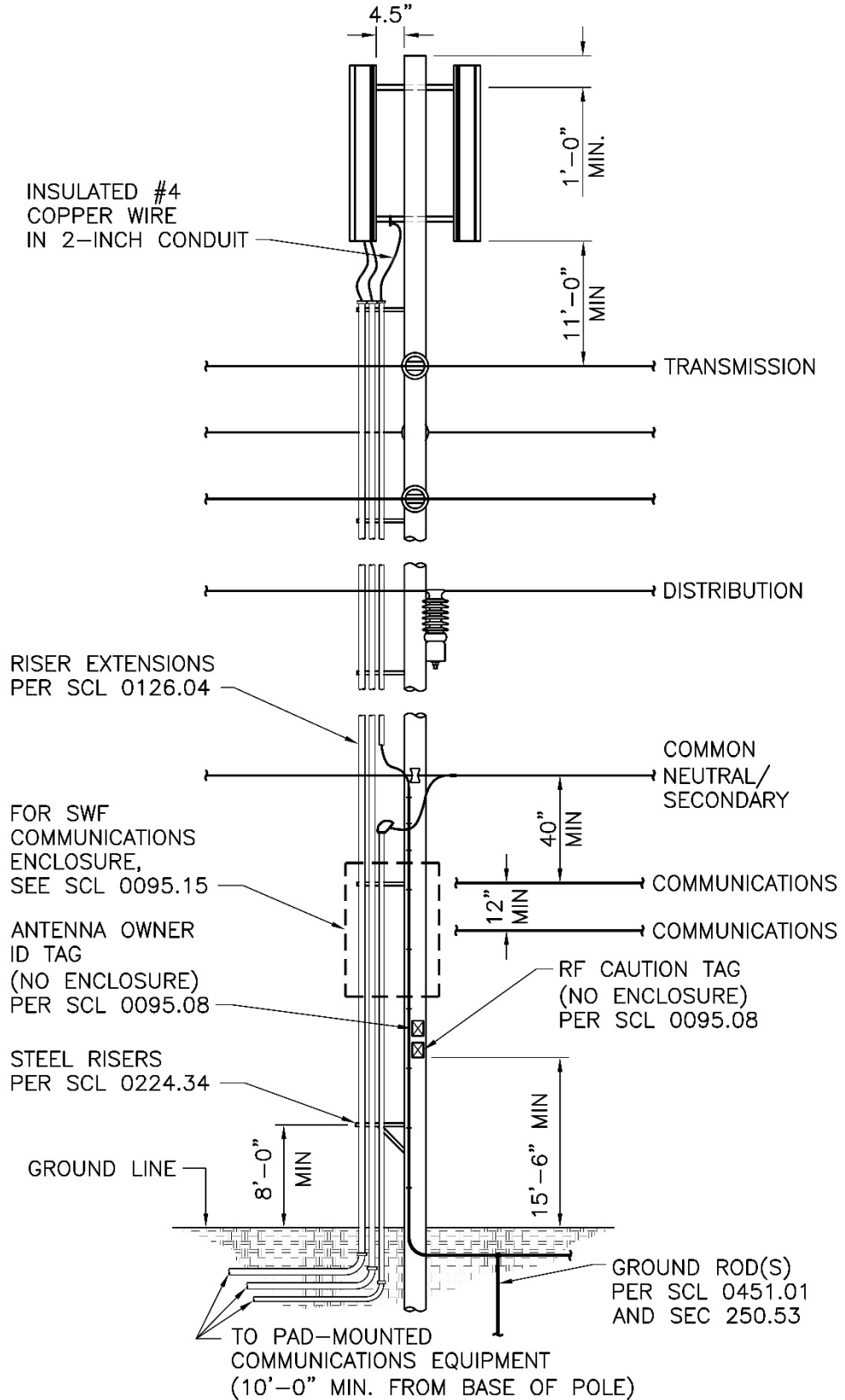
**Figure 3.9a. Pole-Top Antenna on a Secondary Service Pole**



**Figure 3.9b. Pole-Top Antenna on a Distribution Pole**



**Figure 3.9c. Pole-Top Antenna on a Transmission Pole**





#### 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 cables to minimize flapping and entanglement.

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#### 5. Materials

All materials shall be provided by the antenna customer.

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.

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#### 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**; "Communications Enclosures on Wood Poles"

**SCL Construction Standard 0095.06**; "Non-Ionizing Electromagnetic Radiation (NIER) Report Requirements"

**SCL Construction Standard 0095.08**; "Wireless Communication Antenna Tags Requirements"

**SCL Construction Standard 0095.15**; "Small Wireless Facilities on Wood Poles"

**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"

**SCL Work Practice 0093.07**; "Field Guide to Third-Party Attachments on Poles"

**SCL Work Practice 0095.04**; "Working in the Vicinity of Wireless Communications Antennas"

**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

**Neuansourinh, Ponet;** SCL Standard Engineer, originator, and subject matter expert for 0095.20

**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”