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C4404R5

**CONSTRUCTION REQUIREMENTS FOR DISTRIBUTED ANTENNA  
SYSTEMS (DAS) ON DISTRIBUTION POLES**

1.0 Purpose

The purpose of this standard is to describe the general requirements and show the typical construction and clearances needed for distributed antenna systems (DAS) on electric distribution poles.

2.0 Bill of Materials - None

3.0 General Requirements

3.1 Any style of new antenna installations are not allowed on distribution poles that contain any of the following equipment or construction:

- A. Any primary connected equipment (transformers, switches, regulators, reclosers, capacitors, etc) operating over 600 Volts.
- B. Any other communications equipment or antenna belonging to NSTAR or another entity (i.e. CATV Power Packs).
- C. Primary risers, three phase secondary risers, multiple secondary risers or single phase secondary risers with conductors greater than 4/0 in size.
- D. Locations that are in backyards (backlot construction) or that otherwise cannot be accessed by a standard bucket truck.
- E. Three and Four-way primary junction poles.
- F. Major electric supply line DSS or double circuit poles.
- G. Poles that would require guying and anchoring to be added or upgraded to support wire and equipment loads until and unless rights are subsequently secured and guying and anchoring is installed.
- H. Poles with existing riser congestion (all utilities) that encircle more than 40% of pole circumference. Poles with existing riser congestion (all utilities) that encircle more than 40% of pole circumference.

3.2 Pole top style antennas are not allowed on:

- A. Any pole with existing primary conductors.
- B. Any pole where the installation of major equipment or circuit wire upgrades are anticipated in the foreseeable future based on the latest NSTAR 3 year project plan. This shall be determined by

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NSTAR engineering, and poles shall be categorized as “reserved primary space” poles.

3.3 Applicable codes and other approvals needed:

- A. All installations shall be in compliance with the applicable codes, wiring inspector requirements and the NSTAR “Information and Requirements for Electric Service”. Installation and maintenance will be performed in compliance with OSHA requirements and NSTAR Safety requirements for work in energized areas. The NESC minimum requirements shall be met or exceeded in all cases.
- B. The wireless company shall obtain permission from the local municipality and NSTAR prior to installation of the equipment. It is strongly recommended that preliminary approval be secured from the local authorities before siting work is begun with NSTAR.

3.4 Requirements from Requestor to NSTAR

- A. The requestor is required to submit construction drawings showing all equipment to be reviewed and approved by NSTAR. Deviations from proposed drawings or equipment are not allowed. Should there be any violation of the agreed to standard designs, the requestor will be required to make corrections at their expense.
- B. Requires that a study of the pole adequacy and integrity with the new equipment installed be performed, with cost borne by the requestor.
- C. Requestor pays all costs of new pole, transfer work and make-ready work to NSTAR before any work is to begin.
- D. If in the future a pole with a pole top antenna (Fig 4) is to be upgraded by NSTAR to add new primary wires, requestor shall change the antenna style, at their expense, to a secondary level design and with clearances as shown in (Fig 3).

3.5 Requestor shall provide and install the following – construction notes.

- A. Weatherhead in a location suitable to form a drip-loop and to make secondary connections.
  - 1) Supply wire for connection to leads from secondary shall be minimum #10 solid copper, 600 V insulated conductors, type RHW-2 or THWN, and made with UL approved connectors.
  - 2) Allow enough slack on temporary power and neutral connections so NSTAR crews can cut the temporary connections and attach the power and neutral leads to system secondaries/neutrals without additional splicing when the permanent connection is completed.

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- B. Conduit shall be ¾" PVC, secured to pole every three feet, direct connected and weather sealed to all enclosure(s).
- C. Each power supply shall be metered, and requires a ring-less meter socket and pole mount bracket. Meter is Form 12S, UL approved, sealable, with safety arc shield and approved single-handle operated bypass. Use of an automatic by-pass is not permitted. The meter socket will be located on the quarter of the pole downstream from traffic.
- D. Disconnect and overcurrent protection sized and designed in compliance with NEC requirements for outdoor installations. This may be located in a separate compartment.
- E. Bonding and grounding conductors for all equipment (#4 poly covered copper), including 5/8 in x 8 ft copperweld ground rod, protective molding and attachment hardware. Interconnect with existing grounds.
- F. All devices are to be mounted over one another on the same side of the pole (except meter socket). Arrange all pole equipment to allow at least one clear third of the pole, dimensions per NESC climbing space.
- G. Antenna and all mounting brackets shall have galvanized steel mounting bases. These shall be secured to the pole with galvanized hardware of adequate strength for the load.
- H. Radio Frequency (RF) radiation warning signage as required by OSHA shall be present and visible to persons working near antenna. Requester must submit documents that state the RF output of the antenna for each location.

3.6 Minimum clearances from non-pole top antenna to energized wires:

- A. If primary voltage exists or is planned (reserved) on the pole top, antenna and mounting brackets shall be such that they will maintain a minimum clearance of six (6) feet in any direction from RF emitting surface panel or mast to the nearest or lowest primary conductor. See Fig 3.
- B. Reserved primary space requirements shall be identified by NSTAR engineering based on the type of primary construction that is anticipated for the pole in question.
- C. Antenna and mounting brackets shall be such that they will maintain minimum clearance of 4 feet in any direction from an RF emitting surface panel or mast to the secondary main cable. Secondaries may be at the pole top or below a primary. See Fig 3.
- D. Antenna shall be mounted on a bracket or out-rigged and braced cross arm construction such that the mast or panel surfaces will be at least 2 feet from the pole surface, and be located on the opposite side of the pole where the secondary conductors are attached. See Fig 3.

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3.7 Minimum clearances from pole top style antennas to secondary wires.

- A. Antennas may be installed, when approved, at the tops of good condition poles with no primary or no primary reserved space. These include side street secondary distribution poles, guy stub poles, or street light only poles. On existing poles, clearance from the lowest RF emitting surface to the secondaries shall be no less than 48 inches. If this clearance cannot be met, an extension may be installed (see 3.7B) or a new pole may be set at expense of Requestor. If guy stub use poles are to be used, they will require a service cable be run to the pole to provide power. NSTAR must support the viability of each of these locations. See Fig 4.
- B. Any pole top extensions are limited to a 5 ft. pole height extension length, and can only be installed on poles that are less than 20 years old (per pole mfr. date brand mark), and class 4 size or larger.
- C. In the future, to accommodate NSTAR space requirements to distribute power pole top antenna designs may need to be replaced and lowered on the pole (see 3.4 D).

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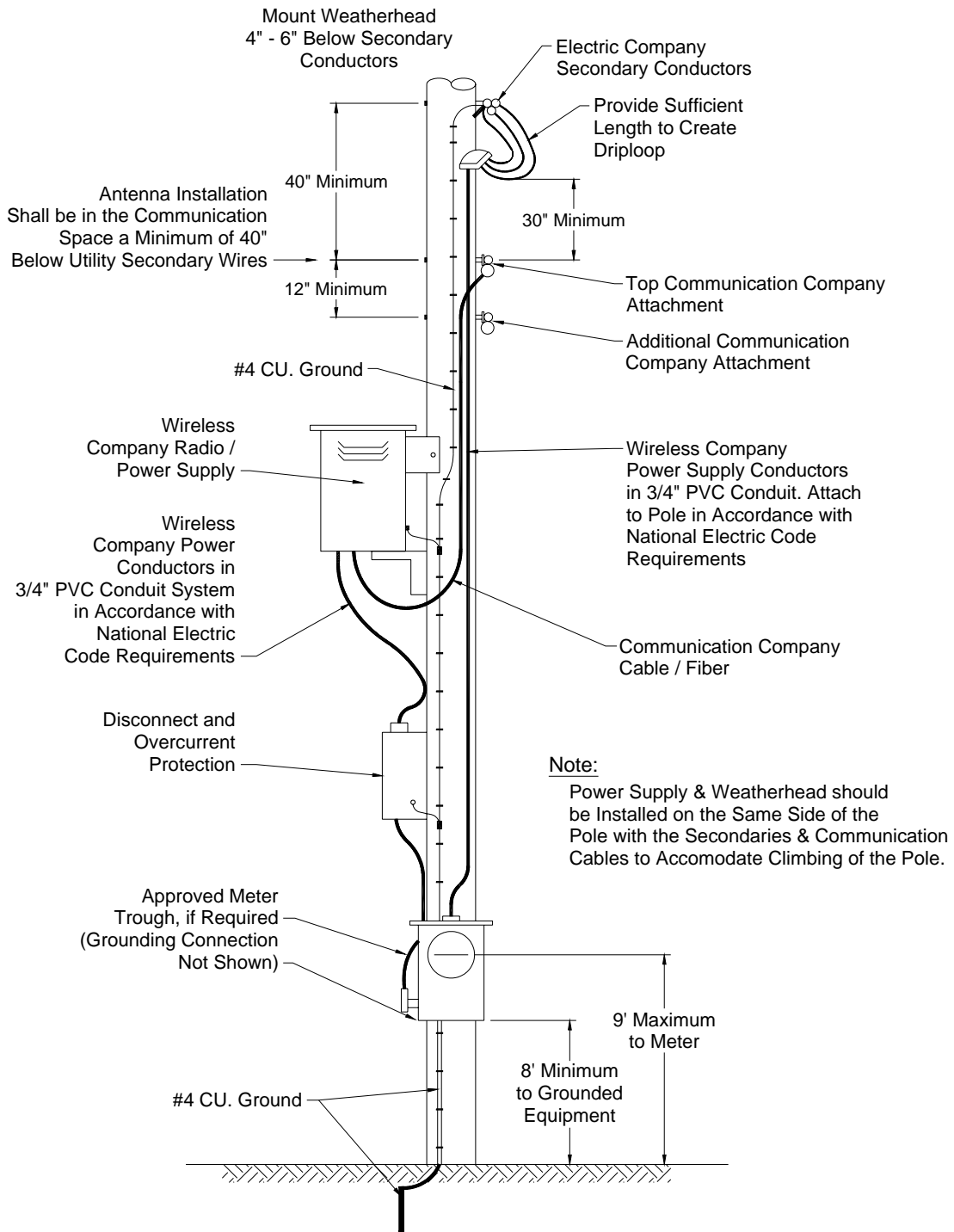


Figure 1 - Pole Installation Details

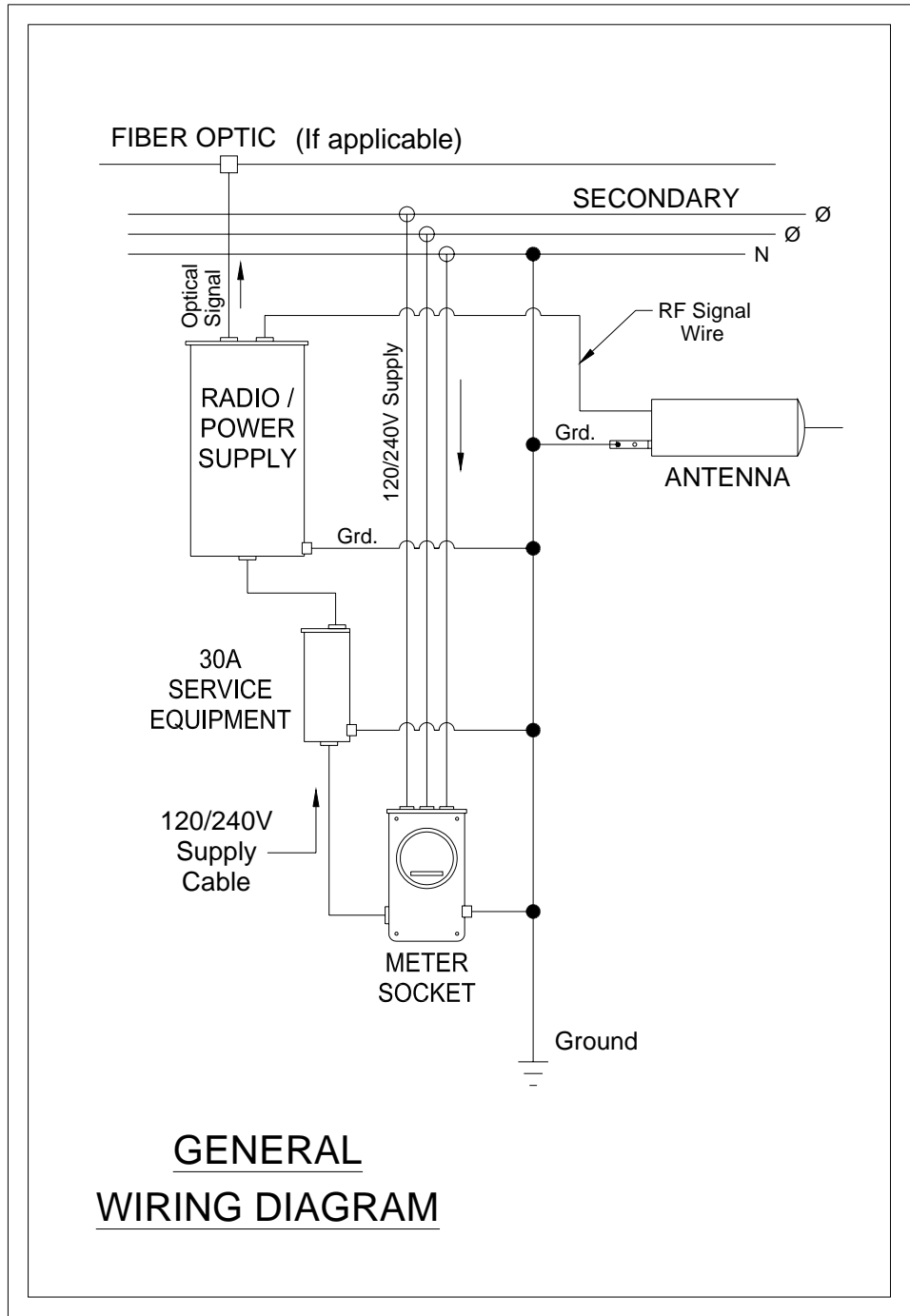
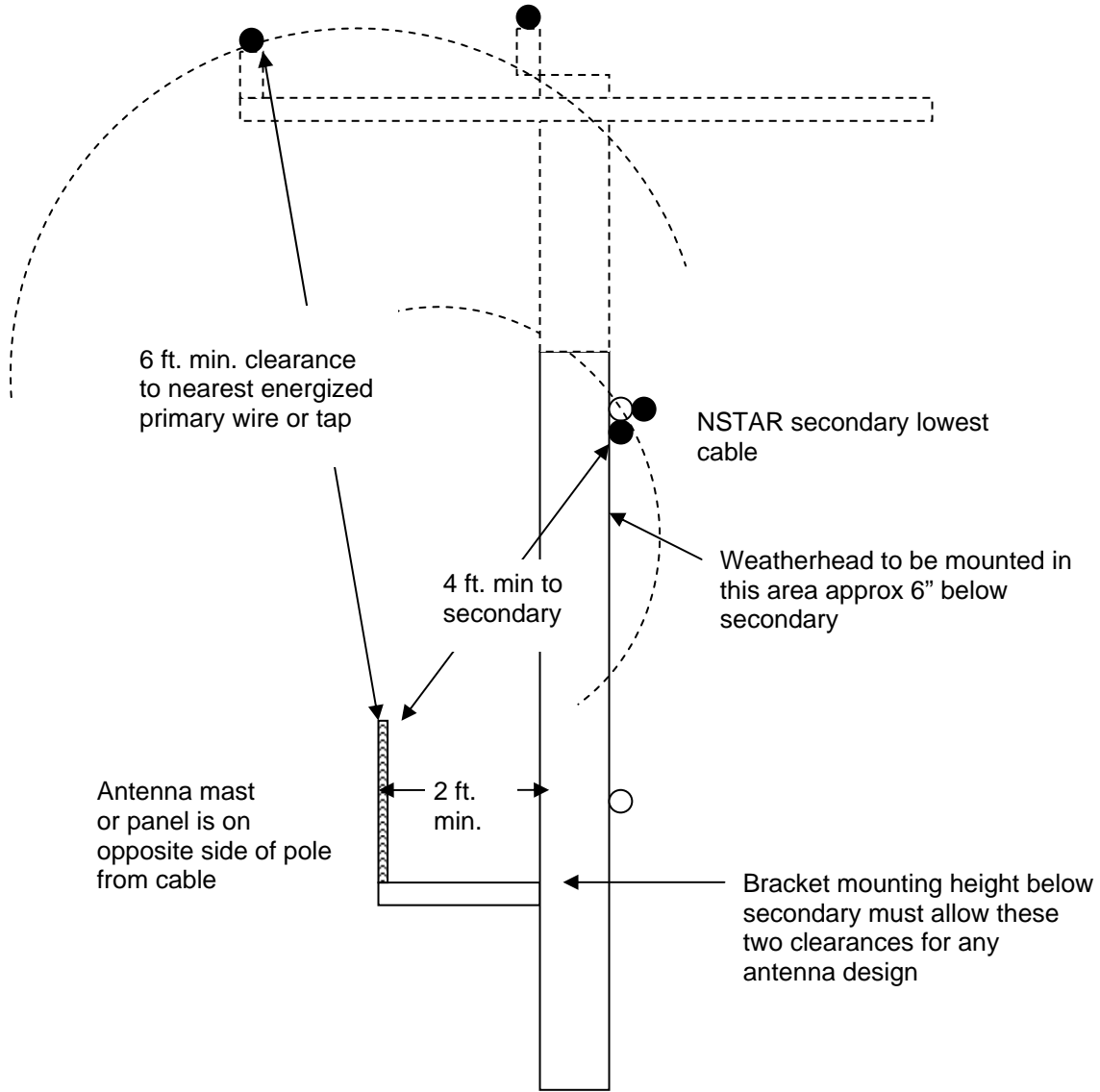
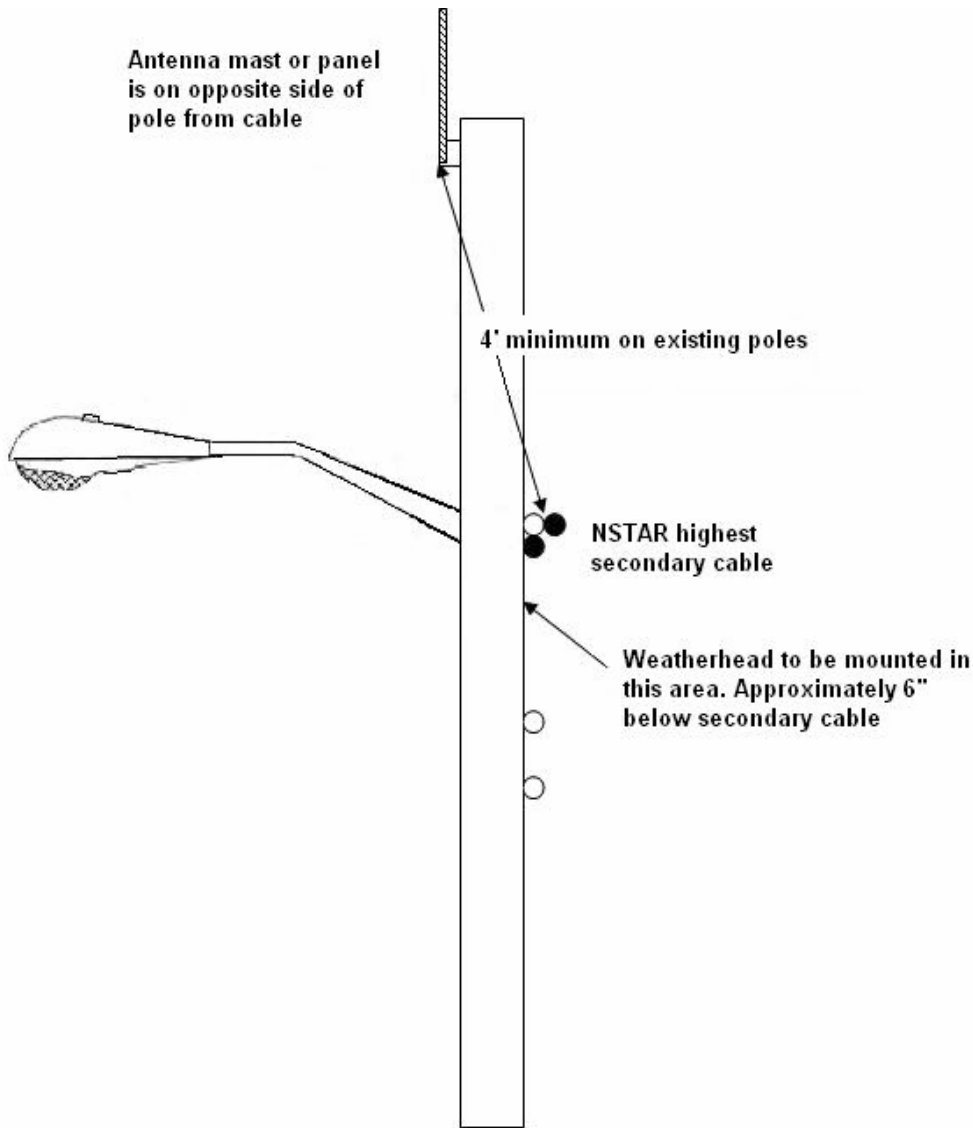


Figure 2 - General Wiring Diagram



**Figure 3 – Non-pole top antenna clearance from pole, primary (or reserved primary space), and secondary conductors**

Note: Reserved primary space requirement shall be identified by NSTAR engineering based on the type of construction that is expected for the pole.



**Figure 4 – Pole top antenna clearance**

Approved by:           Amin Jessa            
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