BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

SECTION G23.140.1
Issue A, Jan., 1951-N

GROUNDING OR INSULATING

GUYS

GENERAL REQUIREMENTS

Contents

Contents (Cont'd)

1. GENERAL

1.01 This section provides general instructions for the grounding or insulation of guys where power conductors are involved in order to protect workmen and the public from electrical hazards. Information concerning methods of grounding, installation and location of strain insulators is contained in Sections G23.140.2 through G23.140.7.

1.02 For the purpose of these instructions, guys exposed to power conductors are defined as "exposed guys" or "guys in proximity," depending on the voltage and relative location of the power conductors involved.

1.03 Unexposed guys need not be sectionalized nor grounded except for guys supporting exposed isolated cable which are to be treated as specified in Paragraph 2.04.

2. DEFINITION OF "EXPOSED GUY"

2.01 Exposed Guy means a guy of which any part is within ten feet, measured horizontally, from the vertical plane of any power conductor of more than 250 volts (between conductors), that is, within the "zone of exposure" surrounding such power conductors. The following illustration shows what is considered the zone of exposure around a power line. It is the space surrounding a power line extending upward from the ground level and limited by those points which are at a distance of ten feet measured horizontally from a power conductor.

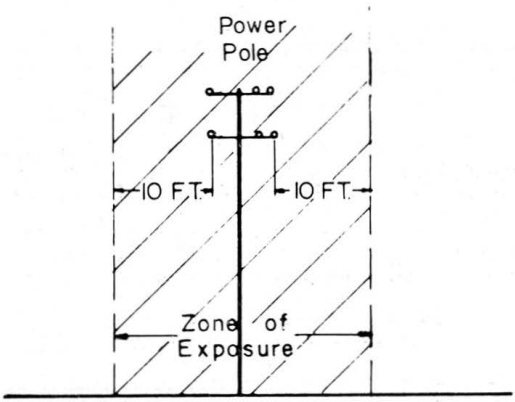

FIG. 101

2.02 In the case of guys within the "zone of exposure" of power circuits of less than 250 volts, where there is a possibility of the voltage being increased above 250 volts, thereby making an exposure, consider the guys as exposed.

2.03 A guy is not considered exposed merely because the telephone cable line or the open wire line which it supports is exposed elsewhere. To be considered exposed, the guy must be directly exposed itself, or electrically connected to the exposed portion of another guy on the same pole or stub which is directly exposed. See, however, the exception mentioned in the following paragraph.

2.04 There is an exception to the principle covered in Paragraph 2.03 in the case of an isolated aerial cable which is on a jointly used pole or is exposed at any point along its run. An isolated cable is defined for this purpose as a cable inserted between sections of an open wire line. All guys to such an exposed isolated cable line shall be considered exposed, even though individual guys are not directly exposed.

3. DEFINITION OF "GUY IN PROXIMITY"

3.01 Guy in Proximity means an exposed guy of which any

part is both within a vertical distance of less than 8 feet from the level of supply conductors of any voltage and a radial distance of less than 6 feet from the surface of a wood pole or structure, that is, within the "zone of proximity" around the power conductors. The following illustration shows what is considered the zone of proximity around power conductors:

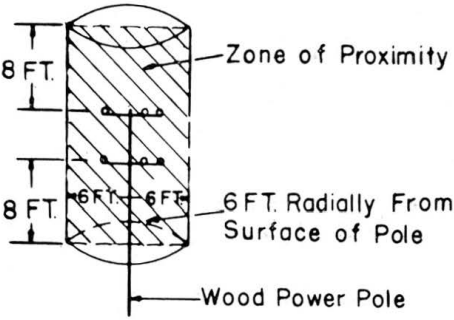

FIG. 102

4. PURPOSE OF GROUNDING OR PLACING STRAIN INSULATORS IN GUYS

4.01 The purpose of grounding guys or placing strain insulators in them is as follows:

(a) To protect pedestrians from guys which may be in accidental contact with power conductors.

(b) To protect workmen on poles from guys which may be in accidental contact with power conductors.

(c) To protect workmen on poles from the additional hazard of grounded guys in the working space around power conductors.

4.02 In addition to the above, strain insulators are placed in guys in special cases where required by electrolysis considerations.

5. EXPLANATION OF VOLTAGE DESIGNATIONS

5.01 In determining how to ground an exposed telephone guy or whether to place insulators in it, it is essential

to know the voltage of the power circuits to which the guy is exposed. In most cases, the voltage of the power circuits will be known, that is, the voltage of the circuits will clearly fall within the broad classification of being under 20,000 volts or over 20,000 volts. When the detail plans or other work orders do not indicate the voltage of the power exposure or there is any question as to the voltage classification, obtain this information from your supervisor before proceeding with the guying work.

5.02 The voltage for guying purposes is the maximum operating voltage between any two wires of the circuit involved.

6. TYPES OF GROUNDS

6.01 The following types of grounds are considered suitable for grounding guys which are exposed to voltages as indicated:

(a) Voltages of 250 - 20,000: A telephone suspension strand or cable sheath which is electrically connected to a buried or underground cable or to a central office ground.

(b) Voltages in excess of 20,000: A standard guy rod or ground rod installed in earth.

6.02 Rock anchors are not considered as providing a satisfactory ground connection.

6.03 Guy rods which have been treated with asphalt paint and tapecoat corrosion protection are not considered as providing a satisfactory ground connection.

6.04 Tree guys are not considered as providing a satisfactory ground connection.

7. REQUIREMENTS WHERE GUY IS EXPOSED TO VOLTAGES OF 250 - 20,000 ONLY (NOT IN PROXIMITY)

7.01 Where a guy is exposed to voltages of 250 - 20,000 only, ground the guy, if practicable, to a telephone suspension strand or cable sheath which is electrically connected to a buried or underground cable or to a central office ground, except as covered in Paragraph 7.03.

7.02 If it is impracticable to ground the exposed guy in accordance with the above, place strain insulators in the guy as follows:

(a) Anchor Guy

(1) Place a strain insulator in the guy not less than 8 feet above the ground as illustrated below:

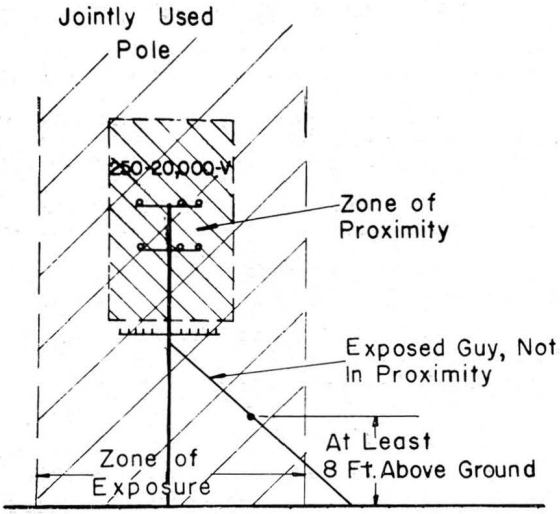

FIG. 103

(2) Where an exposure can be isolated by the use of two strain insulators, they should be employed as shown in the following illustration:

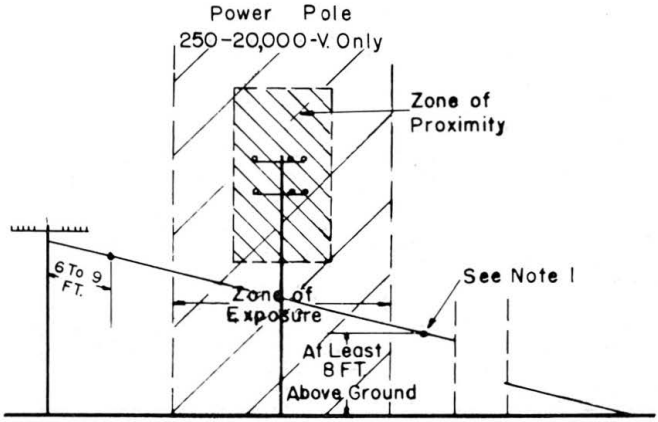

FIG. 104

Note 1: Omit this insulator if it cannot be located outside zone of exposure.

(b) Overhead Guy - Place a strain insulator in the guy not less than 6 feet and not more than 9 feet (measured along the guy) from each point of attachment to wood poles or structures. All insulators in overhead guys shall be not less than 8 feet above the ground. (See Figure 105.)

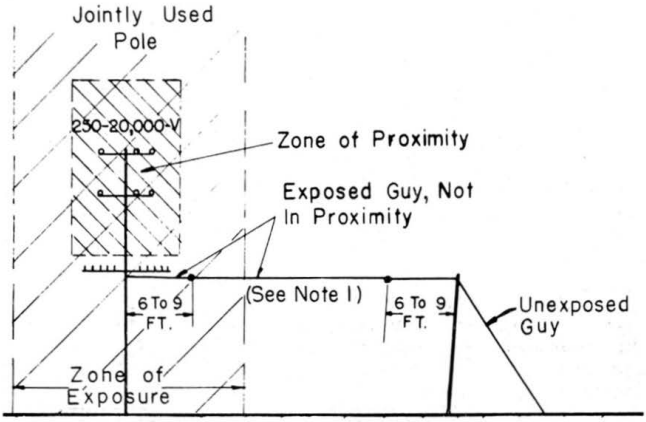

FIG. 105

Note 1: When overhead guy is less than 17 feet in length place only one insulator midway in overhead guy, and either place an insulator in anchor guy or maintain an electrical separation of 4-inches of pole surface between overhead and anchor guys on stub.

7.03 The practice of grounding exposed guys (not in proximity) rather than placing strain insulators is preferred where a satisfactory ground connection can conveniently be made, except in the following case:

(a) Where a guy must be placed over power conductors of 250 - 750 volts, 1 to 2 strain insulators shall be placed in the guy to isolate the exposure. (See Figure 106.)

Note: In no case shall a guy be placed over power conductors carrying in excess of 750 volts.

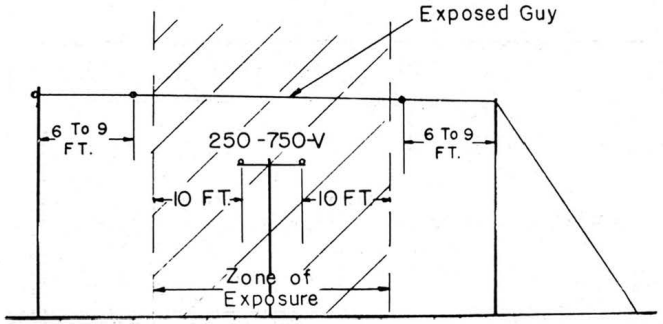

FIG. 106

8. REQUIREMENTS WHERE GUY IS EXPOSED TO VOLTAGES IN EXCESS OF 20,000 ONLY

8.01 Where a guy is exposed to voltages in excess of 20,000 only, ground the guy to a standard guy rod or ground rod installed in earth. Portions of guys exposed to voltages in excess of 20,000 only shall not be insulated.

8.02 A separation of at least four inches of pole surface shall be maintained between a guy exposed to voltages in excess of 20,000 and telephone suspension strand, cable, wires, and associated hardware.

8.03 In the case of an exposed guy attached to a rock anchor, place a standard ground rod near the butt of the pole or stub to which the guy is attached and connect the guy electrically to the ground rod. A separation of at least four inches of pole surface shall be maintained between the ground wire and telephone suspension strand, cable, wires, and associated hardware.

8.04 A guy in proximity to voltages in excess of 20,000 and not in proximity to voltages of less than 20,000 shall be treated as covered in Paragraphs 8.01 - 8.03.

9. REQUIREMENTS WHERE GUY IS EXPOSED TO VOLTAGES IN EXCESS OF 20,000 AND ALSO TO VOLTAGES OF 250 - 20,000 (NOT IN PROXIMITY)

9.01 Where the guy is exposed simultaneously to voltages both above and below 20,000 (not in proximity) proceed in accordance with the instructions given in Part 8.

10. REQUIREMENTS WHERE GUY IS IN PROXIMITY TO VOLTAGES OF 20,000 OR LESS

10.01 Where a guy is in proximity to a wood pole and to voltages of 20,000 or less, the guy shall be sectionalized by means of strain insulators located as described below and no portion in proximity to such voltages shall be grounded. See Paragraph 10.02 for exception to this requirement which permits grounding of a guy to cable suspension strand under certain conditions.

(a) Anchor Guy - Place a strain insulator in the guy located not less than 8 feet above the ground and either:

(1) Not less than 8 feet below the lowest supply conductor or,

(2) Not less than 6 feet from surface of pole and one foot below the lowest supply conductor. (See Figs. 107 and 108.)

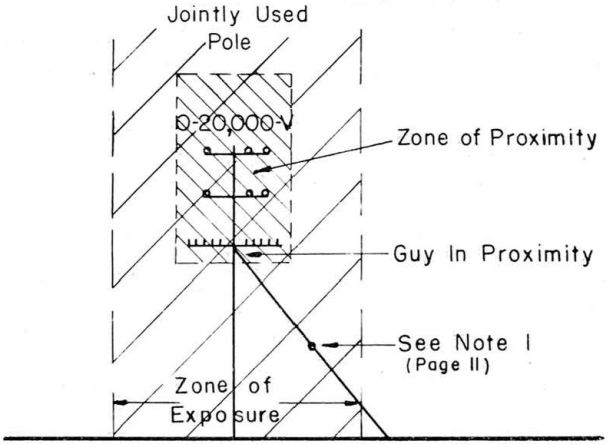

FIG. 107

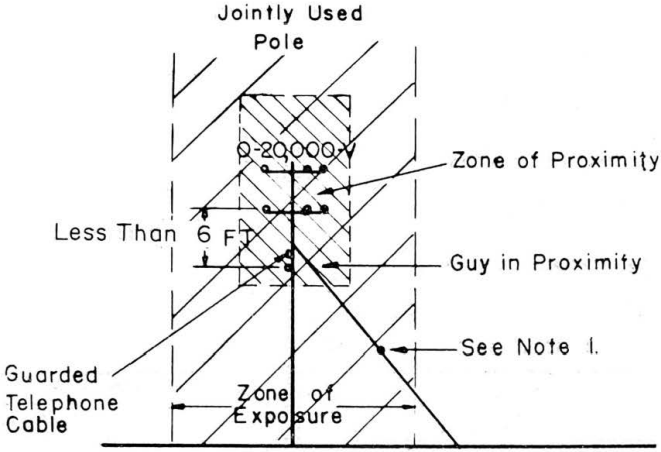

FIG. 108

Note 1: Locate insulator not less than 8 feet above ground and either (1) not less than 8 feet below lowest power wire or, (2) not less than 6 feet from pole and one foot below lowest power wire. Short guys or other conditions may require insulators at two locations to meet this requirement, one location being not less than 8 feet above ground and the other location either not less than 8 feet below the lowest power conductors, or not less than 6 feet from pole and not less than one foot below the lowest power conductors.

(b) Overhead Guys - Place a strain insulator in the guy not less than 6 feet and not more than 9 feet (measured along the guy) from each point of attachment to poles, crossarms or structures. All insulators in overhead guys shall be not less than 8 feet above the ground. (See Figs. 109 and 110.)

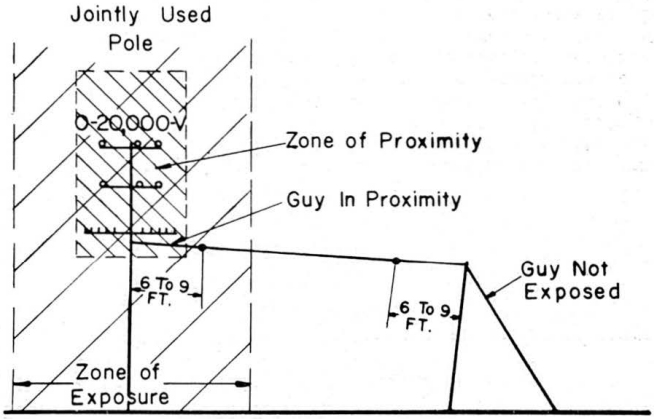

FIG. 109

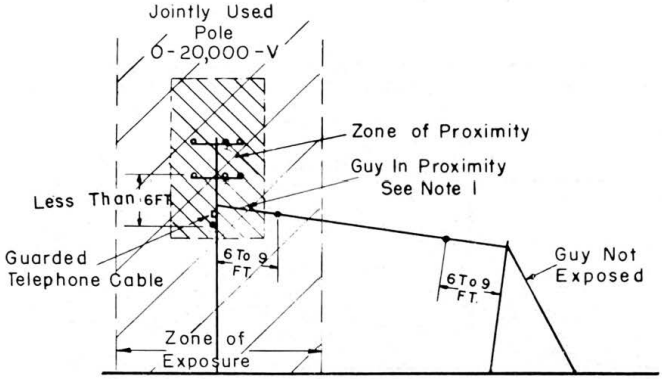

FIG. 110

Note 1: Portion of guy in proximity must not be grounded to suspension strand or cable sheath.

10.02 Anchor guys and overhead guys are excepted from the requirements given in Paragraph 10.01 and need not be sectionalized because of proximity to voltages of 0 - 20,000 under the following conditions:

(a) The guys are attached to poles not less than six feet below the level of the lowest supply conductors provided the level of the guy attachment is at or below the level of cable messenger attached to the same pole and that the guy is grounded to the cable messenger.

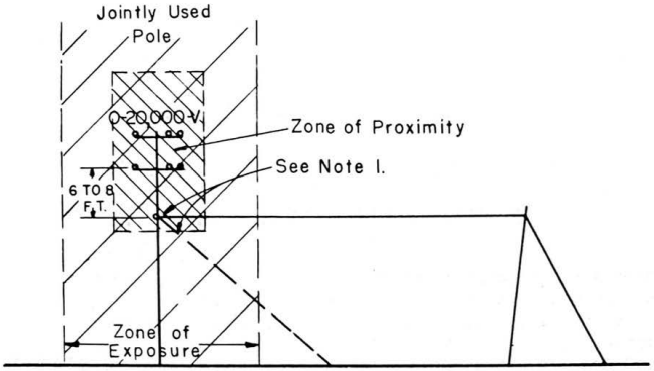

FIG. III

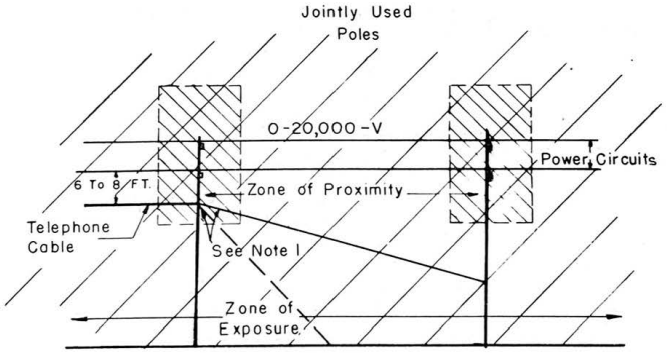

FIG. 112

Note 1: Guys attached at or below level of cable messenger and grounded by connection to cable messenger.

(b) The guys are attached to poles not less than 4 feet below the level of supply conductors 0 - 750 volts provided that the guys are extensions of or are attached to a cable messenger, are in the same vertical plane as the messenger, and are below the guard arms required for such clearance.

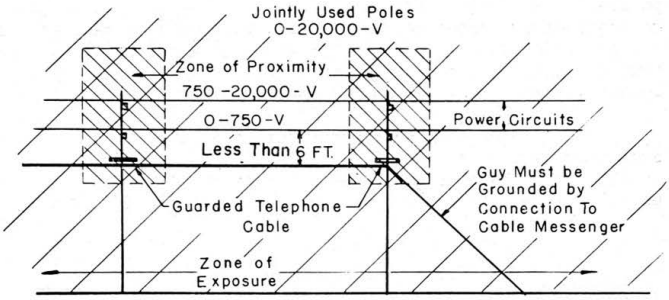

FIG. 113

11. REQUIREMENTS WHERE GUY IS IN PROXIMITY TO VOLTAGES OF 20,000 OR LESS AND EXPOSED TO VOLTAGES IN EXCESS OF 20,000

11.01 Where a guy is in proximity to voltages of 20,000 or less and is exposed to voltages in excess of 20,000 proceed as follows:

(a) The portions of the guy in proximity shall be sectionalized in accordance with the requirements given in Paragraph 10.01.

(b) The portions of the guy not in proximity shall be attached to or otherwise connected electrically to a guy rod placed in earth. If this is not practicable, place a ground rod near the pole or stub and connect the guy electrically to the ground rod.

11.02 A separation of at least four inches of pole surface shall be maintained between a guy exposed to voltages in excess of 20,000 and telephone suspension strand, cable. wires and associated hardware.

12. SPECIAL REQUIREMENTS

12.01 Anchor guys which pass through the level of supply conductors at positions other than between pole pin positions or outside of the outer supply conductor pin positions shall have an insulator placed not less than 2 feet above the supply conductor level. This requirement is in addition to the requirements for insulators in the guy because of proximity to a wood pole and voltages of 0 - 20,000. (See following illustration.)

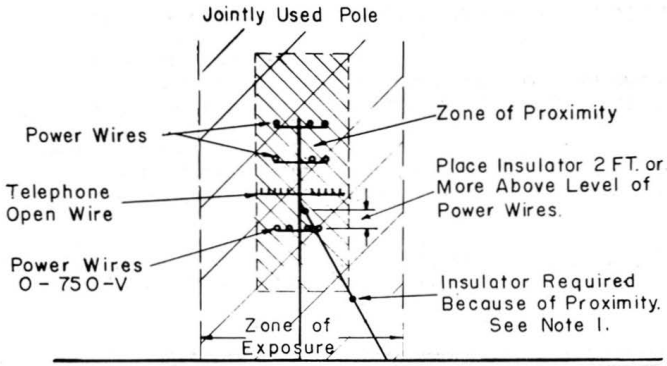

FIG. 114

Note 1: Locate insulator not less than 8 feet above ground and either (1) not less than 8 feet below lowest power wire or, (2) not less than 6 feet from pole and one foot below lowest power wire.

12.02 An insulator shall be located in sidewalk anchor guys in proximity to voltages of 0 - 20,000 so that no horizontal brace which is less than 8 feet below the lowest supply conductor is grounded. This requirement is in addition to the other requirements for insulators in the guy because of proximity to a wood pole and voltages of 0 - 20,000. (See following illustration.)

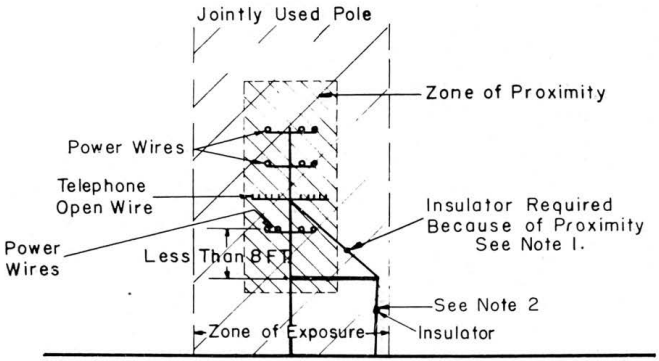

FIG. 115

Note 1: Locate insulator not less than 8 feet above ground and either (1) not less than 8 feet below lowest power wire or, (2) not less than 6 feet from pole and one foot below lowest power wire.

Note 2: This insulator may be omitted if horizontal brace is more than 8 feet below lowest power wire.

12.03 Strain insulators may be placed in guys where required by electrolysis considerations and will be shown on the detail plans.

13. GROUNDING OR INSULATING TWO OR MORE EXPOSED TELEPHONE GUYS ON A POLE

13.01 When a pole carries a grounded telephone cable and, in addition, telephone wire or other telephone attachments and two or more guys are required to support the telephone load, all telephone guys on that pole should be handled in the same manner, that is, they all should be grounded or all insulated.

14. EXTENSIONS OF SUSPENSION STRAND

14.01 A suspension strand sometimes extends one or more spans beyond a pole at which the aerial cable is terminated and crosses over or under electric power wires, thereby introducing an exposure. Consider such extensions as sus-

pension strand except where the extension would create an additional exposure to voltages over 20,000. In this case, provide a 4-inch separation between the cable messenger and extension at the last pole supporting cable and treat the extension as an overhead guy.

15. CONNECTIONS BETWEEN DIFFERENT AERIAL CABLE SYSTEMS

15.01 Where the ends of two cables approach each other from (opposite directions), it is sometimes advantageous to provide a continuous strand and thereby avoid dead-ending two suspension strands and placing head guys. Ordinarily, no electrical separation between the two cables is required. If, however, because of electrolysis or other reasons it is desirable to separate the two cables electrically, this may be done by installing a strain insulator in the suspension strand at a point between the ends of the cables.

15.02 Install a strain insulator as covered in Paragraph 15.01 only when called for in the detail plans or other instructions.

16. TABULAR SUMMARY OF REQUIREMENTS FOR GROUNDING OR INSULATING GUYS

		Grounding	Insulating
A.	Exposed Guys		
1.	Voltages of 250 - 20,000 only (not in proximity).	Ground guy to suspension strand or cable sheath which is electrically connected to a buried or UG cable or C.O. ground (Par. 7.01). (See exception in Par. 7.03.)	If not practicable to ground the guy place one or two insulators in guy (Par. 7.02).
2.	Voltages in excess of 20,000 only.	Ground guy to standard guy rod or ground rod installed in earth. (Par. 8.01) See Note 1.	Exposed portions of guys shall not be insulated (Par. 8.01).
3.	Voltages in excess of 20,000 and also to voltages of 250-20,000 (not in proximity).	Ground guy to standard guy rod or ground rod installed in earth (Par. 8.01). See Note 1.	Exposed portions of guys shall not be insulated (Par. 8.01).
B.	Guys in Proximity		
1.	Voltages of 0-20,000 only.	Portions of guy in proximity shall not be grounded (Par.10.01)(See exceptions for cable guys in Par. 10.02.)	Portions of guy in proximity shall be sectionalized by means of strain insulators (Par.10.01). (See exceptions for cable guys in Par. 10.02.)
2.	In proximity to voltages of 0-20,000 and exposed to voltages in excess of 20,000.	Portions of guy not in proximity shall be grounded to a standard guy rod or ground rod installed in earth (Par. 11.01 (b). See Note 1.	Portions of guy in proximity shall be sectionalized by means of strain insulators (Par. 11.01 (a)).

Note 1: A separation of at least 4 inches of pole surface shall be maintained between a guy exposed to voltages in excess of 20,000 and telephone suspension strand, cable, wires and associated hardware. Rock anchors and guy rods which have been treated with corrosion protection are not considered as providing a satisfactory ground connection.