BELL SYSTEM PRACTICES **SECTION G23.115**
Outside Plant Construction **Issue 1, February, 1933**
and Maintenance **Standard**

GUYING

AERIAL CABLE LINES

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1. GENERAL

1.01 In accordance with Paragraph 1, Section G23.110, Head Guys for exchange cables shall be of the same size as the suspension strand, provided the $\frac{\text{Lead}}{\text{Height}}$ of the guy is 3/4 or greater.

1.02 When guying lines that are to support more than one cable, place sufficient guying for the additional cables if this can be done with a single guy not greater than 16M. Where more than one such guy would be required for guying the cables to be placed, install a double thimble guy rod and guy for the first cable. Place the second guy to the double thimble rod when the second cable is placed.

1.03 Where full-size cables are to be placed, for corners with a pull of 20 feet and less, the following table is useful in working out the guying combinations required in accordance with the guy rule.

GUYING COMBINATIONS FOR CABLE LINES - CORNERS UP TO 20 FT.					
Guying Required for A Cable Only	Guying Required for A and B Cables	Place for A Cable		Add for B Cable	
		Guy	† Rod	Guy	Rod
Up to 10M	Up to 10M	10M	3/4 S.T.	—	—
Up to 10M	12M	16M	1 S.T.	—	—
Up to 10M	16M	16M	1 S.T.	—	—
Up to 10M	20M	10M	1 D.T.	10M	*
Up to 10M	26M	§ 16M	1 1/4 D.T.	10M	*
12M	16M	16M	1 S.T.	—	—
12M	20M	16M	1 1/4 D.T.	10M	*
16M	20M	16M	1 1/4 D.T.	10M	*
16M	26M	16M	1 1/4 D.T.	10M	*
16M	30M	16M	1 1/4 D.T.	16M	*

Notes:

† The letters S.T. and D.T. refer to Single Thimble and Double Thimble Guy Rods.

§ The 16M Guy is placed first here to permit the stronger Guy to be attached in the upper position.

* Attach to Guy Rod already in place.

1.04 For corners with a pull of 6 feet or less, use a single guy for three cables supported on 16,000-pound strand.

1.05 For corners with a pull of more than 6 feet, where cables are supported on 16,000-pound strand, guy separately for the third cable.

1.06 If four cables are supported on 16,000-pound strand, guy for the second two cables independently of the first two.

1.07 Where practicable, in order to distribute the load on the pole in cases where the guys are wrapped, 1-10M and 1-16M guy generally should be used at corners in preference to a single 25M guy.

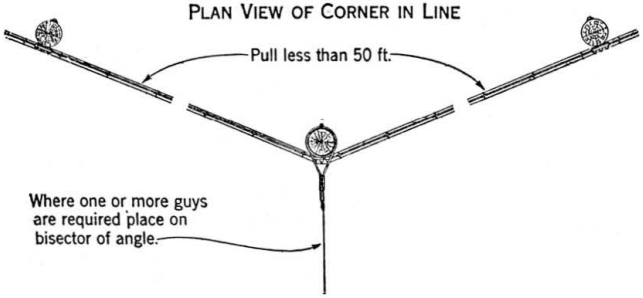
1.08 For exceptionally heavy cable loads 25M guys may be used in combination with other guys when the total guying required on one pole exceeds 32M.

2. CORNER POLES

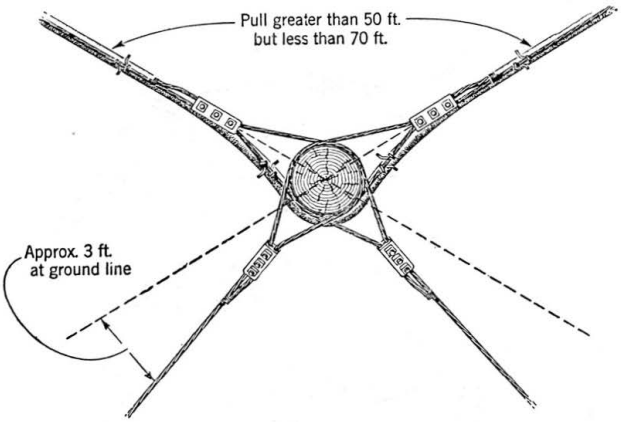
2.01 All corner poles on lines supporting aerial cable shall be guyed where the pull is greater than indicated in the following table:

Size of Suspension Strand (Pounds)	Pull Requiring Use of Guys (In Feet)
6,000	3 or more
10,000	2 or more
16,000 or more	Any "Pull" that can be detected.

2.02 Where the pull on the corner pole is 50 feet or less, place a side guy bisecting corner angle.

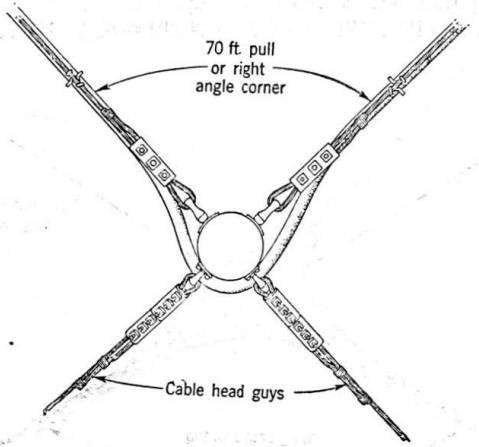


2.03 Where the pull on the corner pole exceeds 50 feet, but is less than a right angle, place two head guys. The strength of these guys shall be determined in accordance with Section G23.110 Paragraph 4.01.



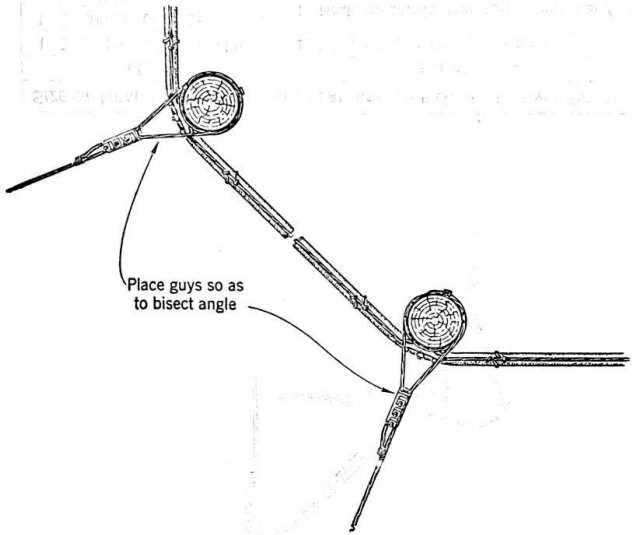
Note: Where full size cables are involved and it is necessary to have a single pole corner, the strand crossover method as covered in the instructions covering Aerial Cable Construction may be employed.

2.04 At right angle corners made on one pole, two head guys shall be placed. Each guy shall be in line with the suspension strand that it supports. The strength of the guys shall be determined in accordance with Section G23.110, Paragraph 4.01.

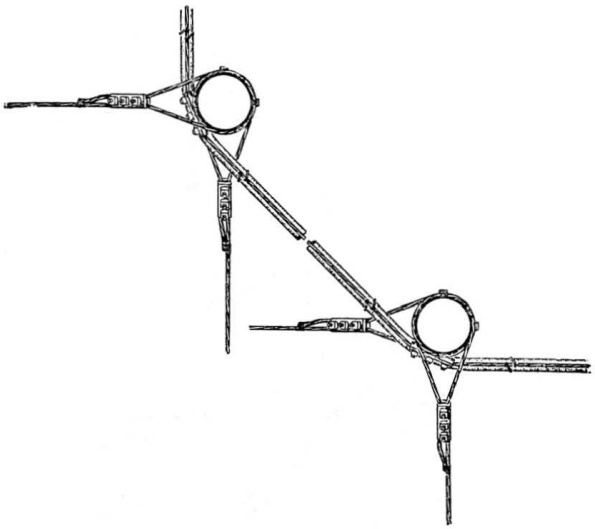


2.05 At right angle corners made on two poles, place guys as illustrated. Right-of-way conditions permitting, the first method is preferable.

(a) Side guy each corner pole with a guy bisecting the angle.



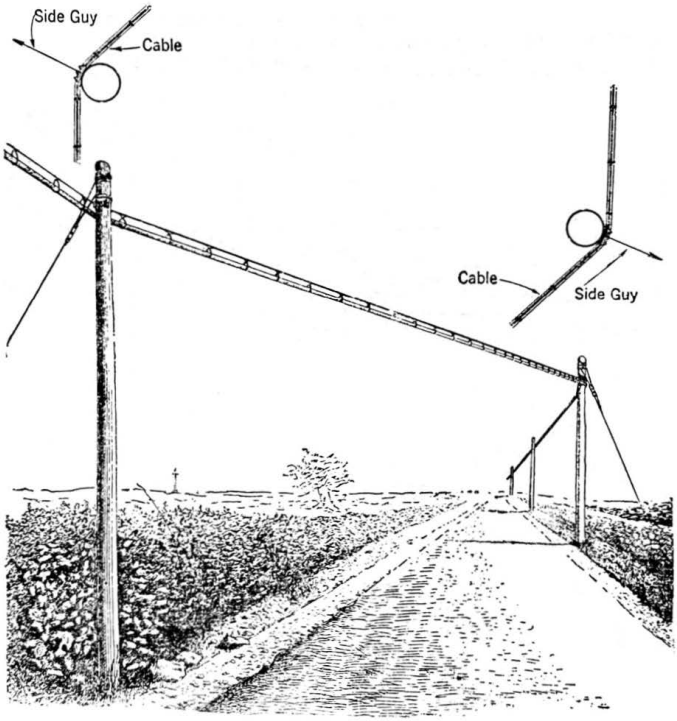
(b) Head and side guy each corner pole as shown. The head guys shall be in line with the suspension strand and the side guys shall be at right angles to it. The strength of the side guys shall be determined by the Guy Rule, considering each as a side guy bisecting the angle. The size of the head guy shall be selected in accordance with the following table and the $\frac{\text{Lead}}{\text{Height}}$ shall be about 1, if practicable.

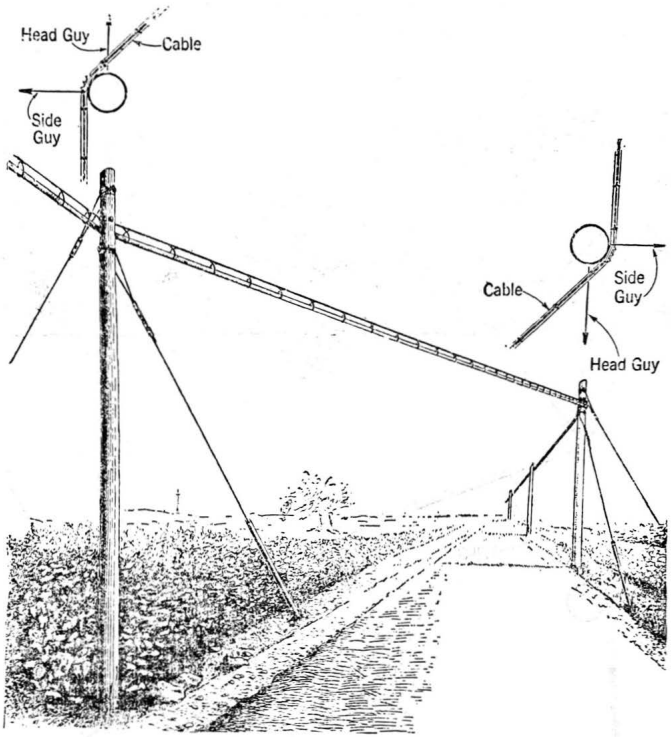


SIZE OF HEAD GUY REQUIRED ON HEAD AND SIDE GUYED CORNER POLES	
Size of Side Guy	Size of Head Guy
1 - 2,200 Lb. or 1 - 6,000 Lb.	1 - Same size as suspension strand
1 - 10,000 Lb. or 1 16,000 Lb. 1 - 25,000 Lb.	1 - Next size smaller than suspension strand
2 - Any size strand	•1 - Same size as suspension strand
3 or 4 - Any size strand	•2 - Same size as suspension strand

• If two or more strands of different size are used in the side guy, strands of the larger size shall be used for head guy.

2.06 Reverse corners at road crossings shall be treated as separate corners in the line. Where right-of-way conditions prevent the use of a guy bisecting the angle, head and side guys shall be placed at each corner. The head guy shall be in line with the lead and the side guy at right angles to it. The strength of the side guy shall be determined by the Guy Rule, considering it as a side guy bisecting the angle, and the head guy shall be selected in accordance with the table in the preceding paragraph.





Note: Where the line is not used jointly and it is planned to place a second cable, the first cable should be placed on the same side of the poles.

3. DEAD-ENDS

3.01 Place a head guy at the end of a suspension strand. Determine the strength of the guy in accordance with Part 1, Section G23.110, Sizes of Guys.

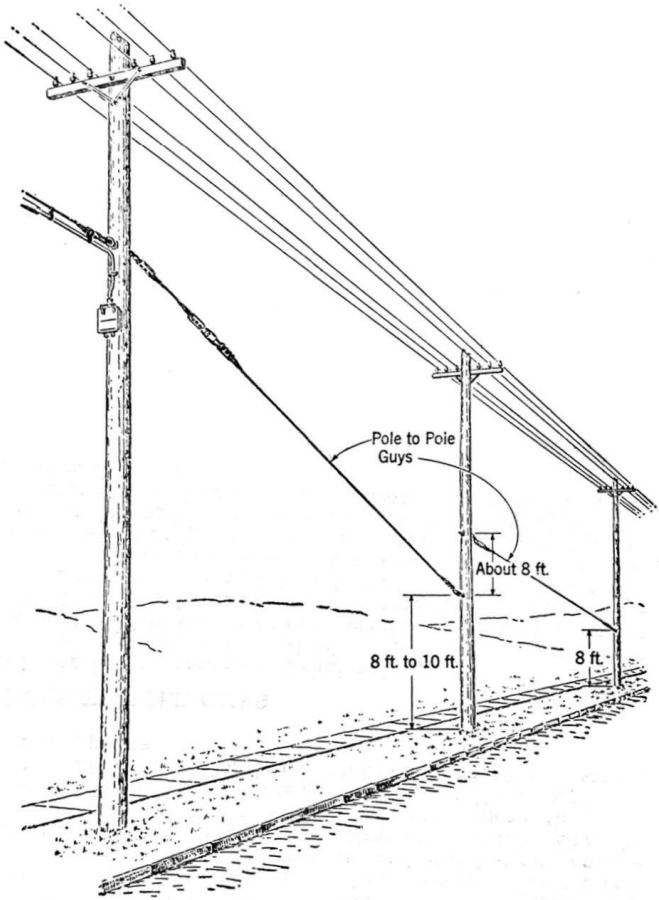
4. STRAND DIMINISHING POINTS

4.01 Head guy away from the heavier strand at strand diminishing points. Determine the strength of the guy on the basis of the difference in size of the suspension strands. For example, if a 16,000-pound strand diminishes to 10,000 pounds, the last pole supporting the heavier strand shall be head guyed away from the larger strand as though a 6,000-pound strand were terminated at the pole. Determine the strength of the guy in accordance with Part 1, Section G23.110, considering the guy as a "Cable Head Guy." See Sections G23.145 and G23.150 for details of construction at strand diminishing points.

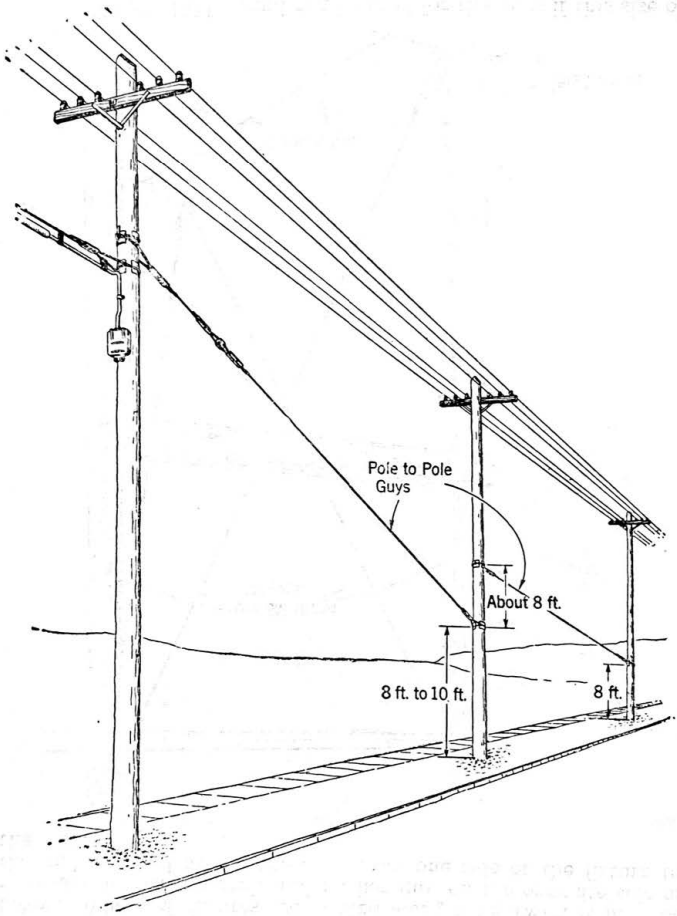
5. POLE-TO-POLE GUYS

5.01 Anchor guys are more desirable than pole-to-pole guys and, accordingly, the latter should be used only where necessary on account of right-of-way or other conditions, such as when the line is to be extended at a later date. Determine the size of pole-to-pole guys in accordance with Part 1, Section G23.110, and in the manner described for guy to stub. Where two or more pole-to-pole guys are placed in adjacent spans the separation between the lower end of the first and the upper end of the second guy should not exceed about 8 feet. The lowest attachment usually should be about 8 feet from the ground.

Eye Bolt Method



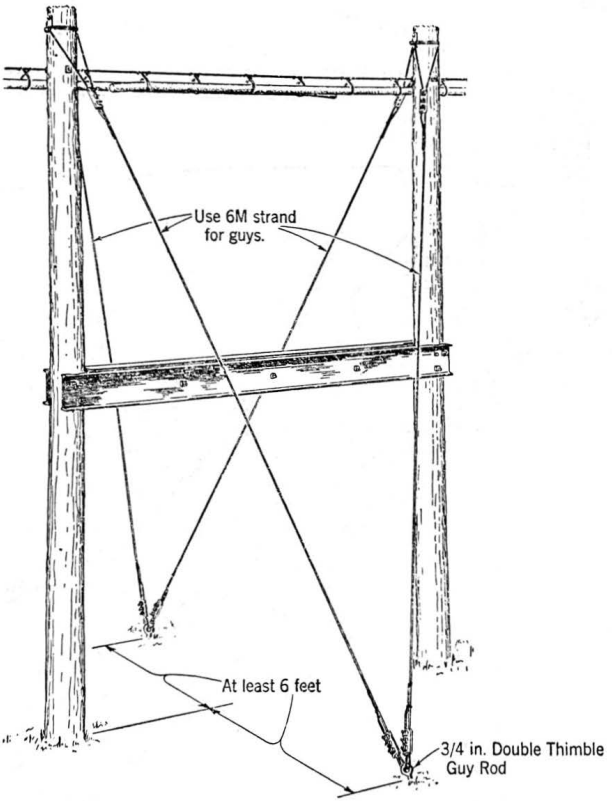
Wrap Method



6. STORM GUYING

6.01 The storm guying of pole lines supporting only exchange aerial cable is, in general, not recommended.

6.02 Toll Aerial Cable Lines. Although storm guying is not ordinarily required on toll aerial cable lines, in straight sections that cross over swampy ground, H fixture and single pole loading points should be side storm guyed. Place the guys as shown below. Where H fixtures are located along a highway, it may be necessary to place a stub and anchor guy on the opposite side of the highway and attach the guys from one side of the fixture to the stub.



Note: 10M strand can be used for the guys if this size of strand is more readily obtainable.

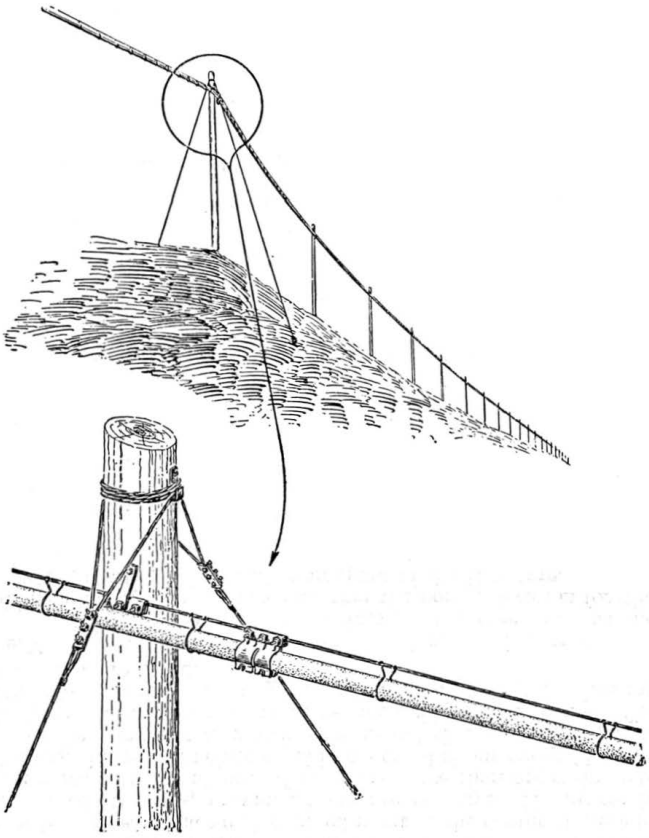
6.03 In exposed sections where a toll cable crosses flat areas and the ground is soft to a depth of several feet at certain times in the year, place a side guyed point at the center of straight sections of 30 spans, provided there are no guyed H fixtures in accordance with the above. If there are more than approximately 30 spans, side guyed points should be located about every 15 poles. Where the ground is extremely soft, install side ground braces of plank on the intermediate poles between side guyed points. The detail plans should cover any additional storm guying and bracing that may be required.

6.04 Where cable is placed on a lead supporting open wire, locate the storm guyed points for the open wire at the cable loading H fixtures, provided that the normal location for the storm guying would be within four spans of the H fixture.

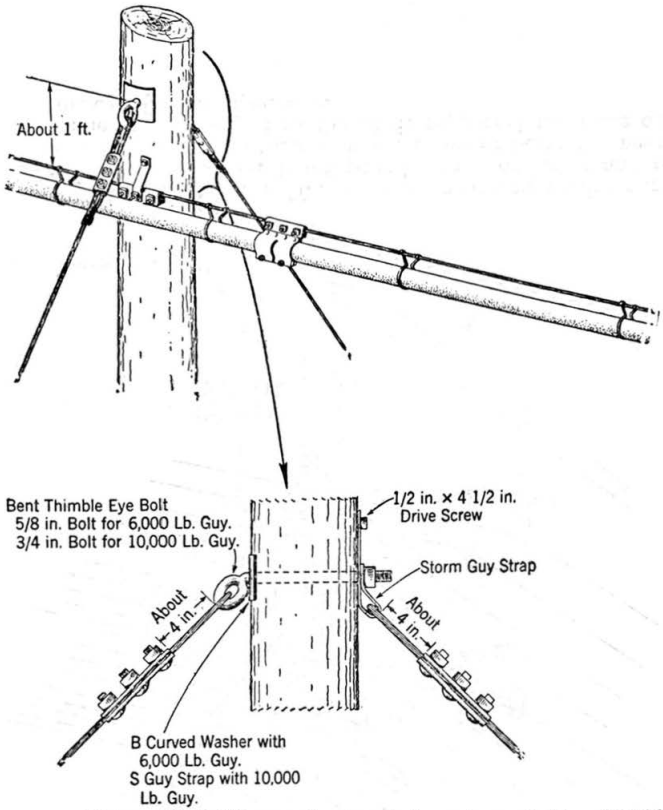
7. GUYING TOLL CABLE LINES ON GRADES

7.01 Where there are more than three spans of cable on a steep grade (about 20 per cent. 20 feet rise in 100 feet or greater), side guy the pole at the top of the grade with 6,000-pound strand.

Wrap Method



Eye Bolt Method



Note: If 6,000-pound strand is not available, 10,000-pound strand may be used.

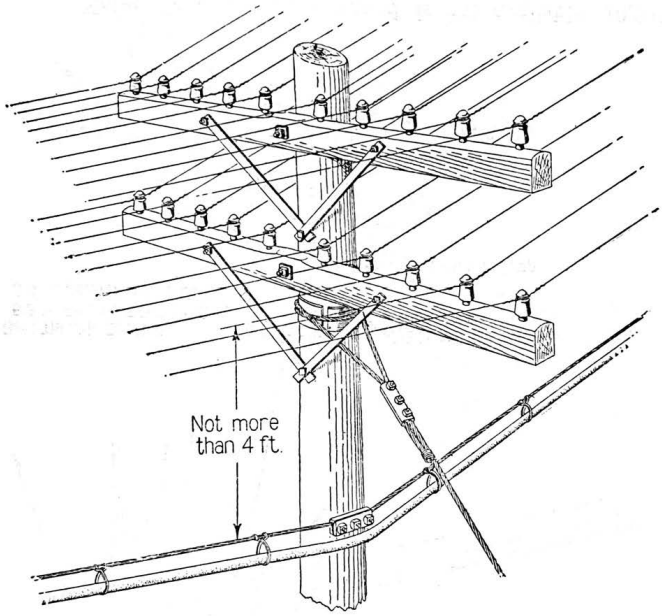
Note: A double-ended bolt and two guy straps may be used if desired. If a stub guy is placed, a straight eye bolt and one guy strap can be used.

7.02 Where it is necessary to side guy an H fixture on a grade place guys as shown in 6.02, except where the I-beam between the two poles of the fixture is less than five feet above the ground at the point of attachment to the pole on the uphill end of the fixture. Under such conditions side guy only the pole on the downhill side of the fixture.

8. CABLE AND WIRE ON SAME POLE

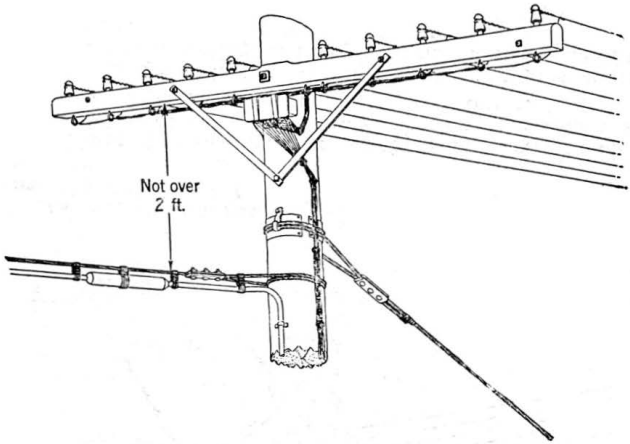
8.01 Where cable and open wire are carried on the same pole, guy separately for each, except as indicated below.

(a) Where there is only one cable supported by a suspension strand not exceeding 10,000 pounds and the separation between the cable and lowest arm of wire does not exceed four feet, a single guy strand having sufficient strength for both open wire and cable may be used. Determine the size of this guy in accordance with Part 1, Section G23.110.

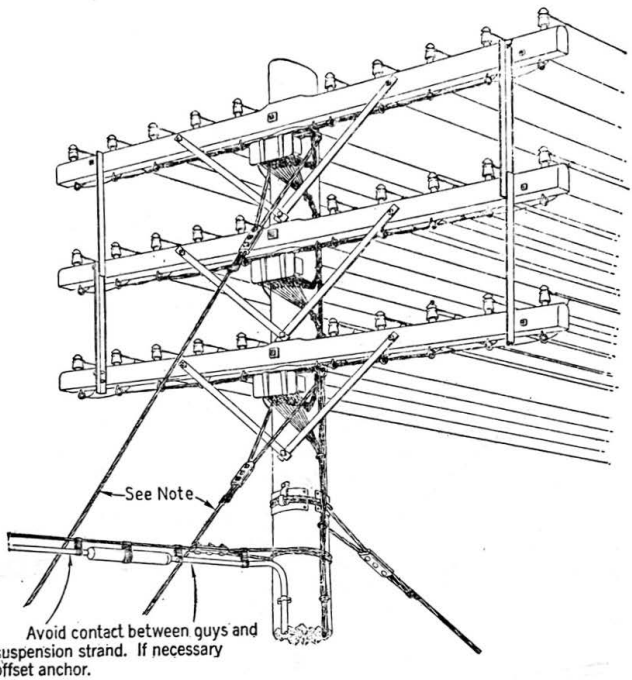


(b) Where the pull is 20 feet or less, a pole supporting one or more cables on 16,000-pound strand or larger and one crossarm not more than four feet above or below the nearest cable may be guyed as though it supported the cable only, disregarding the open wire.

8.02 Poles on which open wire and cable terminate from opposite directions shall be guyed separately for the cable and wire, except that a guy for the wire is not required where there is one arm of wire and the separation between the cable and arm does not exceed two feet.



8.03 The following shows the method of guying 3 arms of wires:



Note: The guy under the lowest crossarm may be omitted where the distance between the lowest crossarm and suspension strand does not exceed two feet.

If eye bolts are used for attaching the guys the protector mountings can be placed on the field side of the pole.

9. SPECIAL GUYING

9.01 Long spans should be guyed in accordance with the provisions of Sections G52.170 and G52.172.

9.02 Spans in which fire-protection is installed should be guyed in accordance with the provisions of Section G52.145.