

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

SECTION G51.105.1
Issue 1, July, 1955
AT&T Co Standard

SUSPENSION STRAND

ATTACHMENTS—GENERAL

Contents	Page
1. General	1
2. Selection of Hardware	2
3. Cable Suspension Bolts—Location	3
4. Cable Suspension Bolts—Types, Washers	5
5. Cable Suspension Screws	7
6. Suspension Clamps—Location	8
7. Suspension Clamps—Types and Spacing	8
8. Reinforcing Straps—Use	10
9. Reinforcing Straps—Installation	10
10. Reinforcing Links	12

1. GENERAL

1.01 This section covers the locations of suspension strand on poles and the uses of suspension bolts, suspension screws, washers, suspension clamps, reinforcing straps and reinforcing links, and of pole strand connectors for spacing. This section and Sections G51.105.2 and G51.105.3 replace Section G51.105, Issue 2.

2. SELECTION OF HARDWARE

2.01 The following charts summarize the hardware requirements most frequently encountered. Exceptions and limitations are covered in the paragraphs describing the particular items.

SUSPENSION STRAND HARDWARE REQUIREMENTS

Hardware	CableDiam.	6000 Pound Suspension Strand			10000 Pound Suspension Strand		
		Pull			Pull		
		Less than 10ft.	10ft. or more		Less than 5ft.	5ft. or more	
			Pull Toward	Pull-Away		Pull Toward	Pull Away
Suspension Clamp ^①	All Sizes	Cable ^③	Corner	Corner	Cable	Corner	Corner
Suspension Bolt Size	All Sizes	5/8 in.	3/4 in.	3/4 in.	5/8 in.	3/4 in.	3/4 in.
Washer	All Sizes	3/4 in. x 2 1/4 in. Square	E-Curved	E-Curved	3/4 in. x 2 1/4 in. Square	E-Curved	E-Curved
Suspension Clamp Spacing	1.6 or Less	1 Nut & Washer	2 Nuts & Washer	1 Nut & Washer	1 Nut & Washer	② 2 Nuts & Washer	1 Nut & Washer
	Over 1.6	2 Nuts & Washer	Pole Strand Connector	2 Nuts & Washer	2 Nuts & Washer	② Pole Strand Conn.	2 Nuts & Washer
Reinforcing Strap	1.6 or Less	None ^④	C	None ^④	S	Two C	C
	Over 1.6	S	C	C	S	Two C	C
Strap Attachment	1.6 or Less	None	1/2 in. x 4 1/2 in. Drive Screw	None	1/2 in. x 4 1/2 in. Drive Screw	5/8 in. Bolt	1/2 in. x 4 1/2 in. Drive Screw
	Over 1.6	1/2 in. x 4 1/2 in. Drive Screw	5/8 in. Bolt	1/2 in. x 4 1/2 in. Drive Screw	1/2 in. x 4 1/2 in. Drive Screw	5/8 in. Bolt	1/2 in. x 4 1/2 in. Drive Screw

① See Par. 7.01(b) for use of clamps with suspension screws.

② Pull 10 ft. or more. Less than 10 ft. use 1 or 2 nuts & washer depending on cable diameter.

③ At R.R. Crossings use corner clamp if pull exceeds 5 ft.

④ Reinf. Strap required for down pull of 1/10 or greater.

SUSPENSION STRAND HARDWARE REQUIREMENTS

Hardware	Cable Diam.	16000 Pound Suspension Strand			25000 Pound Suspension Strand		
		Pull			Pull		
		Less than 5ft	5 ft or more		Less than 5ft.	5 ft or more	
			Pull Toward	Pull Away		Pull Toward	Pull Away
Suspension Clamp ^①	All Sizes	Cable	Corner	Corner	Cable	Corner	Corner
Suspension Bolt Size	All Sizes	5/8 in.	3/4 in.	③ 3/4 in.	5/8 in.	3/4 in.	④ 3/4 in.
Washer	All Sizes	3/4 in. x 2 1/4 in. Square	E-Curved	③ E-Curved	3/4 in. x 2 1/4 in. Square	E-Curved	④ E-Curved
Suspension Clamp Spacing	1.6 or Less	1 Nut & Washer	② 2 Nuts & Washer	1 Nut & Washer	1 Nut & Washer	② 2 Nuts & Washer	1 Nut & Washer
	Over 1.6	2 Nuts & Washer	② Pole Strand Conn	2 Nuts & Washer	2 Nuts & Washer	② Pole Strand Conn	2 Nuts & Washer
Reinforcing Strap	1.6 or Less	S	Two C	C	S	Two C	C
	Over 1.6	S	Two C	C	S	Two C	C
Strap Attachment	1.6 or Less	1/2 in. x 4 1/2 in. Drive Screw	5/8 in. Bolt	1/2 in. x 4 1/2 in. Drive Screw	1/2 in. x 4 1/2 in. Drive Screw	5/8 in. Bolt	5/8 in. Bolt
	Over 1.6	1/2 in. x 4 1/2 in. Drive Screw	5/8 in. Bolt	1/2 in. x 4 1/2 in. Drive Screw	1/2 in. x 4 1/2 in. Drive Screw	5/8 in. Bolt	5/8 in. Bolt

① See Par. 7.01 (b) for use of clamps with reinforcing links.

② Pull 10 ft. or more. Less than 10 ft. use 1 or 2 nuts & washer depending on cable diameter.

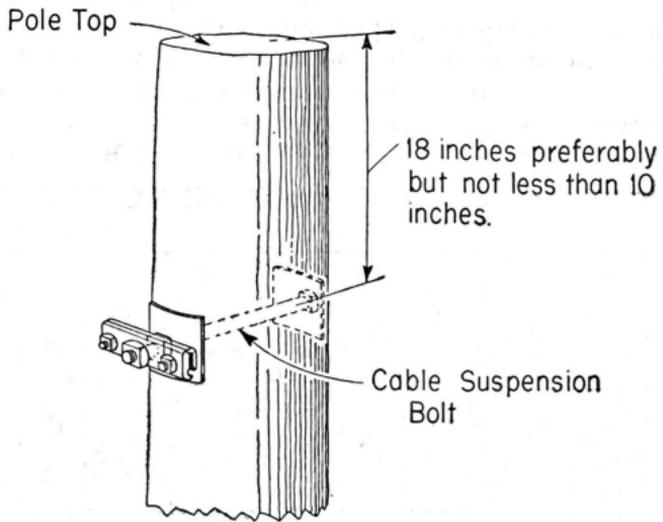
③ Pull more than 35 ft. - Use 1 inch guy bolt, C Curved Washer.

④ Pull more than 25 ft. - Use 1 inch guy bolt, C Curved Washer.

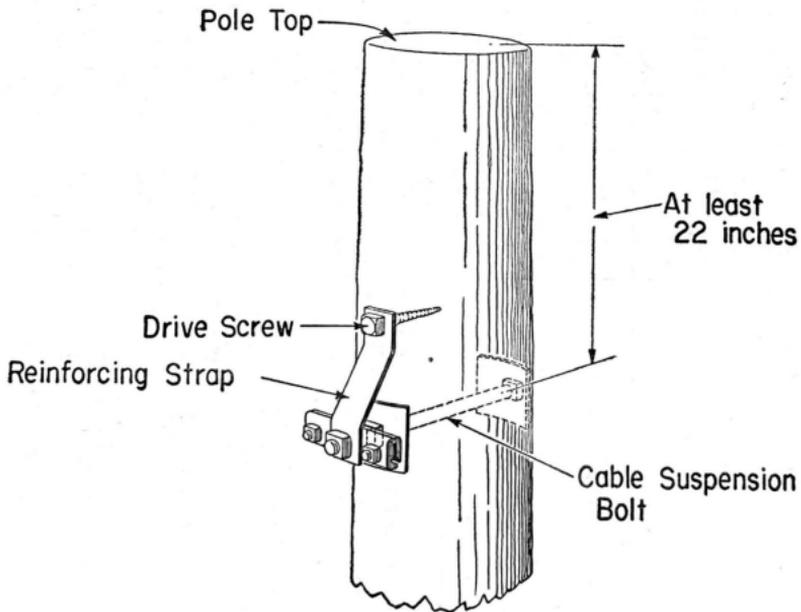
3. CABLE SUSPENSION BOLTS—LOCATION

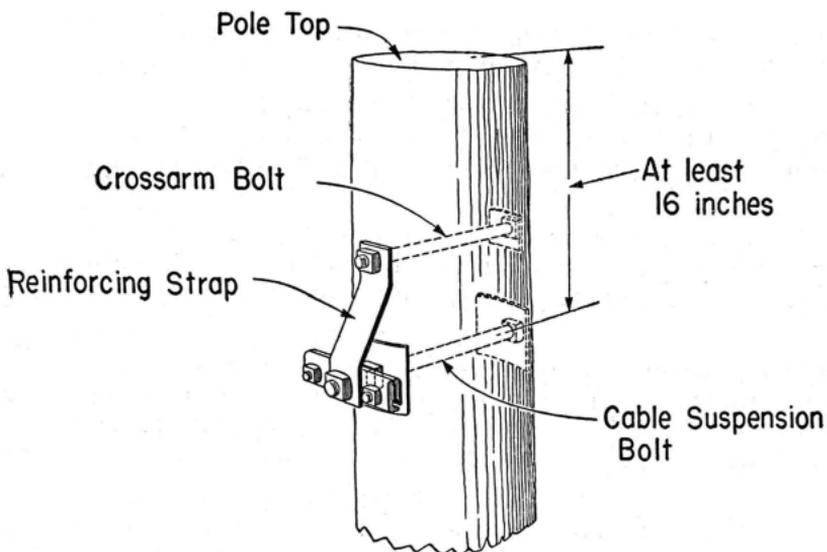
3.01 Locate the bolt in accordance with the following and so that the clearance requirements for all attachments, as outlined in the Clearance sections, will be met.

(a) On poles that will carry telephone attachments only, locate the bolt **18 inches** where practicable, but **not less than 10 inches**, below the pole top.



Where a reinforcing strap is to be used with the suspension bolt, locate the bolt at least **22 inches** below the pole top when a drive screw is used to secure the top of the reinforcing strap, and at least **16 inches** below the pole top when a bolt is used to secure the top of the reinforcing strap.





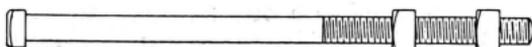
The cable should be as low on the pole as practicable and still provide proper clearances for any drops to be placed below the cable.

- (b) Where a tree limb interferes and permission can not be obtained to remove the limb, locate the suspension bolt, if practicable, so that the strand and cable will pass under the interfering limb rather than above it.
- (c) Locate the bolt so that changes in grade of the cable of over $1/10$ are avoided. In no case shall the change in grade exceed $1/5$.
- (d) Where the pole is stepped or bored for steps before the suspension strand is placed, locate the bolt 6 inches below the step nearest to grade, to avoid having to shift pole steps.
- (e) Where two or more suspension strands are to be installed on the same side of a pole line, locate the bolts **24 inches apart** if sufficient space is available on the pole, but not less than 12 inches apart. In no case shall the suspension strands with cable in place be less than **12 inches** apart at any point in the span.

4. CABLE SUSPENSION BOLTS—TYPES, WASHERS

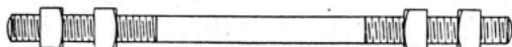
4.01 Select the type of bolt for attaching the suspension strand in accordance with the following:

- (a) Use a **Type A** Cable Suspension Bolt for attaching one suspension clamp. A crossarm bolt equipped with an extra nut may be used as the equivalent.



Type A Cable Suspension Bolt

(b) Use a **Type B** Suspension Bolt for attaching two suspension clamps to the same bolt, one on each side of the pole.



Type B Cable Suspension Bolt

(c) The size bolt required is indicated in the tables of Paragraph 2.01.

4.02 Guy bolts may also be used for attaching suspension strand at corners where the strand pulls away from the pole. The size of the guy bolt is determined by the size of the guy required, except that when used to support suspension strand, the guy bolt shall never be smaller than the size required to support the strand.

4.03 On poles that will carry telephone attachments only, B cable suspension bolts should be placed if it is known that a second strand will be required later or when specified on the detail plans. If a second strand and cable are to be added, and existing cable and strand are not supported on B cable suspension bolts, do not change existing A bolts to B bolts unless this is indicated on the work prints.

4.04 Where A cable suspension bolts are used they should be of sufficient length to extend at least two complete threads beyond the outer nut. Where B cable suspension bolts are used, they should extend about 4 inches beyond each side of the pole.

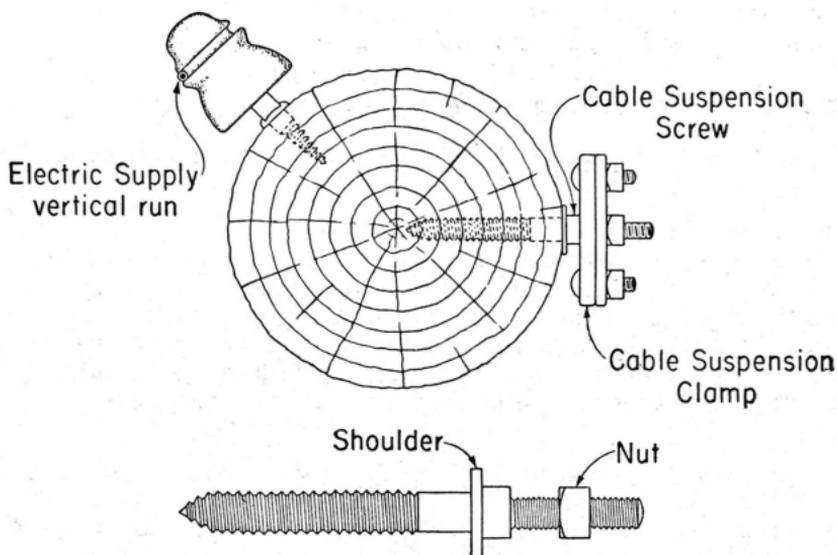
4.05 If a bolt extends more than 2 inches beyond the nut holding the suspension clamp, cut it off about 1/2 inch from the outside of the nut and remove any remaining burrs or sharp edges.

4.06 The hole for a 5/8-inch bolt shall be bored with an 11/16-inch bit; that for a 3/4-inch bolt with a 13/16-inch bit; and that for a 1-inch bolt with a 17/16-inch bit.

4.07 Use washers of proper size to fit the bolt and of the type specified in the tables, Paragraph 2.01.

5. CABLE SUSPENSION SCREWS

5.01 The **Cable Suspension Screw** is for use in securing a cable suspension clamp to a jointly used pole where the use of a cable suspension bolt would result in improper clearance from an electric supply vertical run or bracket and where it is impractical to have the supply attachment moved to provide clearance for the bolt.



5.02 **Do not** use cable suspension screws under the following conditions:

- At railroad crossings.
- In a bolt hole larger than $11/16$ " in diameter.
- Where the pole shows evidence of heart rot or where it appears that there would be a tendency for the screw to loosen due to excessive checking of the pole. Excessive checking may occur in dry areas where the pole timber is subjected to excessive drying out.

Note: Where a suspension screw is to be placed in a hole from which a $5/8$ -inch bolt has been removed, examine carefully the condition of the timber. If there is **any** evidence of decay at that point, place the suspension screw at least 4 inches above or below the bolt hole provided sound timber is encountered. If the amount of decay is extensive, consideration should be given to replacing the pole.

5.03 Install the cable suspension screw as follows:

- (1) Bore a lead hole in the pole 5 inches deep using an 11/16-inch bit. Locate the lead hole to obtain proper separation between the Telephone Plant and the nearest electric supply attachment as covered in the sections on Joint-Use Separations.
- (2) Turn the cable suspension screw into the lead hole using a lineman's wrench until the entire surface of the shoulder of the screw bears firmly against the pole. Where difficulty is experienced in turning the screw, apply soap or lubricating oil to the threads. **Do not drive the screw into the pole** as such driving weakens the wood fibres and impairs the holding power.

6. SUSPENSION CLAMPS—LOCATION

6.01 If the pole line is to carry telephone plant only, the cable shall be placed on the road side unless otherwise specified.

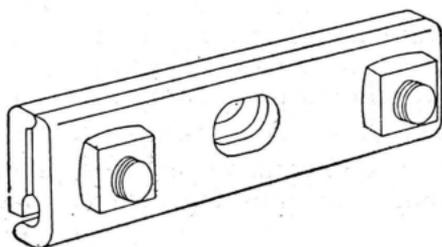
6.02 On jointly-used poles, **when proper arrangements have been made with the Electric Company**, or when the detail plans or other instructions so specify, the telephone cable should be placed on the road side of poles to facilitate lashing.

6.03 Where two cables are to be supported by B cable suspension bolts, it is generally desirable to keep each cable on the same side of the pole line throughout its length. If the pole line shifts from one side of the road to the other, some placing economies and advantages may be realized by changing the location of the first cable on the pole line at certain points, for example by maintaining the road side location throughout.

7. SUSPENSION CLAMPS—TYPES AND SPACING

7.01 The **Cable Suspension Clamp** is used to support suspension strand as follows:

- (a) At all in-line poles and at corners with less than 10 feet pull with 6000 pound suspension strand and less than 5 feet pull with larger sizes of suspension strand.
- (b) At all poles where reinforcing links are used. (For use of reinforcing links see Part 10.)

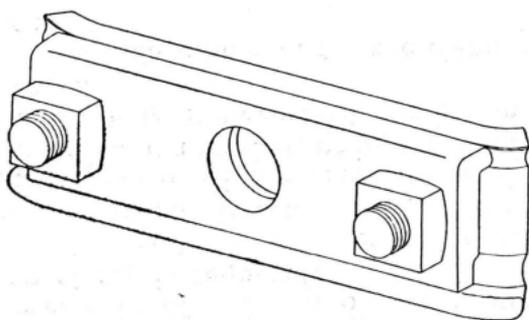


Cable Suspension Clamp

7.02 Place the suspension clamp so that the strand groove will be below the bolt. The lip of the suspension clamp should point toward the pole, except where the pull of the suspension strand is toward the pole.

7.03 The **Corner Suspension Clamp** is used at corners where:

- (a) The pull is 10 feet to 50 feet with 6000 pound suspension strand and 5 feet to 50 feet with larger sizes of suspension strand.
- (b) At railroad crossings where the pull is 5 feet to 50 feet regardless of size of suspension strand.
- (c) A 3/4-inch or larger guy bolt is required for a guy and is also used to support the suspension clamp.



Corner Suspension Clamp

7.04 Space the suspension clamp away from the pole as indicated in the tables in Paragraph 2.01. Use nuts and washers of the proper size for the suspension bolt being used.

8. REINFORCING STRAPS—USE

8.01 Reinforcement of the bolt or screw supporting a suspension clamp is required:

- (a) Where the cable is supported by 10,000 pound or larger suspension strand.
- (b) Where the suspension clamp is spaced from the pole by two nuts and a washer, or by a pole strand connector.
- (c) Where there is a downward change in grade of 1/10 or greater.
- (d) Where the pole timber under the clamp may be subject to decay.

8.02 Use one S reinforcing strap where straps are required to support a 5/8-inch cable suspension bolt or a cable suspension screw.

8.03 Use two C reinforcing straps to support 3/4-inch or larger bolts for 10,000 pound and larger suspension strand where the corner pull is toward the pole.

8.04 Use one C reinforcing strap for all other conditions where support is required for 3/4-inch or larger suspension bolts.

9. REINFORCING STRAPS—INSTALLATION

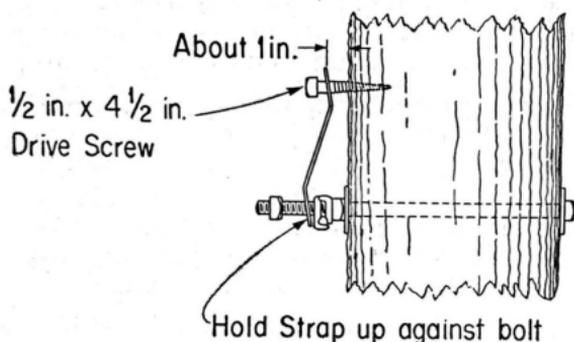
9.01 Where reinforcing straps are required, use a 1/2-inch by 4-1/2-inch drive screw to attach the top of the strap **except** as follows. These conditions require the use of a 5/8-inch bolt.

- (a) Where two reinforcing straps are used to support the bolt.
- (b) Where a pole strand connector is used as a suspension clamp spacer.
- (c) Where the cable suspension bolt is less than 22 inches from the pole top.
- (d) At corners where the pull is 5 feet to 50 feet and 25,000-pound suspension strand is being used.
- (e) At railroad crossings.
- (f) Where there is a downward change in grade of 1/10 or greater with 10,000 pound or larger suspension strand. (Note: Use reinforcing links, rather than straps, where a cable suspension screw is used.)

(g) Where two suspension strands on opposite sides of the pole are attached to a single suspension bolt and both require reinforcing straps.

9.02 Install the strap using a drive screw as follows:

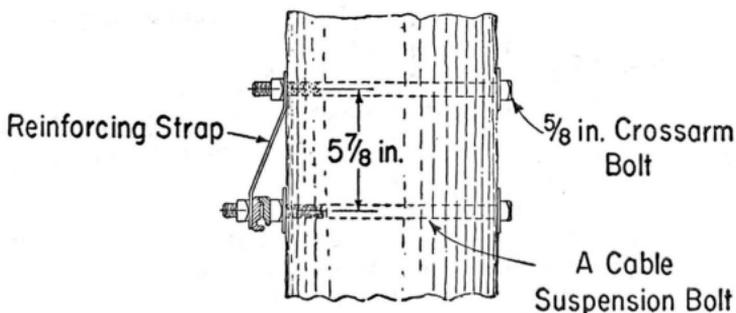
- (1) Place the strap and nut on the suspension bolt or screw and hold strap so that the top is about 1 inch from the pole.
- (2) Use the top hole as a guide and drive in the drive screw.



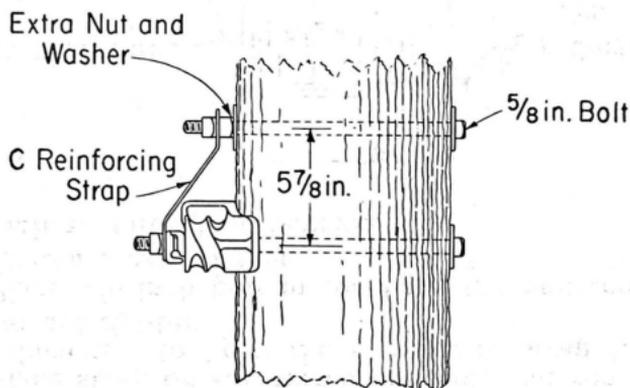
(3) Tighten the nut on the suspension bolt securely.

9.03 Install the strap using a bolt as follows:

- (1) Bore an $\frac{11}{16}$ -inch hole for the strap bolt $5\frac{7}{8}$ inches above, and parallel to the suspension bolt hole. Bore from strand side of pole.
- (2) Place strap on the suspension bolt and run the nut up sufficiently to keep the clamp and strap from falling off. Do not tighten.
- (3) Place $\frac{5}{8}$ -inch bolt in top hole, through the strap and tighten strap to pole.
- (4) Tighten nut on suspension bolt.



9.04 When a pole strand connector is used to space the clamp, use a nut and washer to space the reinforcing strap or straps from the pole.



10. REINFORCING LINKS

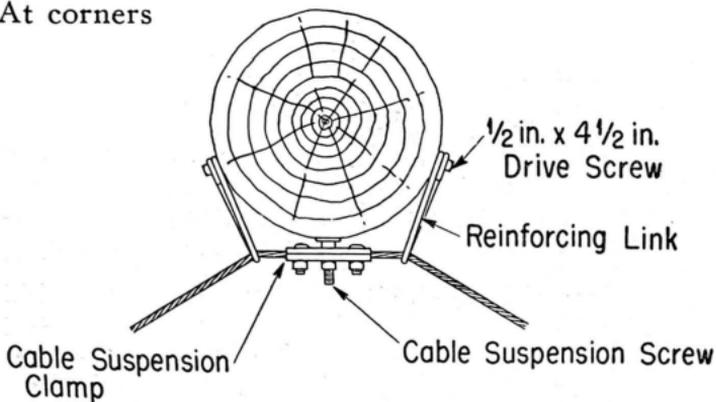
10.01 Use reinforcing links:

- (a) On poles where it is necessary to reinforce the cable suspension bolt and where there is a guard arm or where, for other reasons, it is impractical to employ a reinforcing strap.
- (b) At corners where cable suspension screws are used and the pull away from the pole is 10 feet or more for 6000-pound suspension strand or 5 feet or more for larger strand.
- (c) Where a cable suspension screw is used to support 10,000-pound and larger suspension strand and there is a downward change in grade of 1/10 or greater.

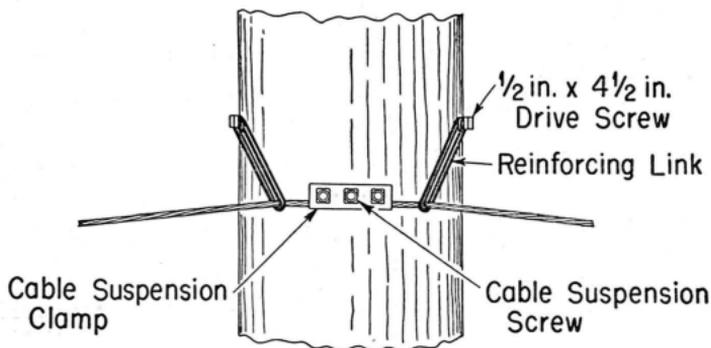
10.02 Use S reinforcing links where the pole diameter is 7 inches or less at the point of attachment and L reinforcing links where the pole diameter is more than 7 inches.

10.03 When required, place the reinforcing links after the strand has been run out but before it is tensioned and so that the links will support any corner pull or downward change in grade as shown.

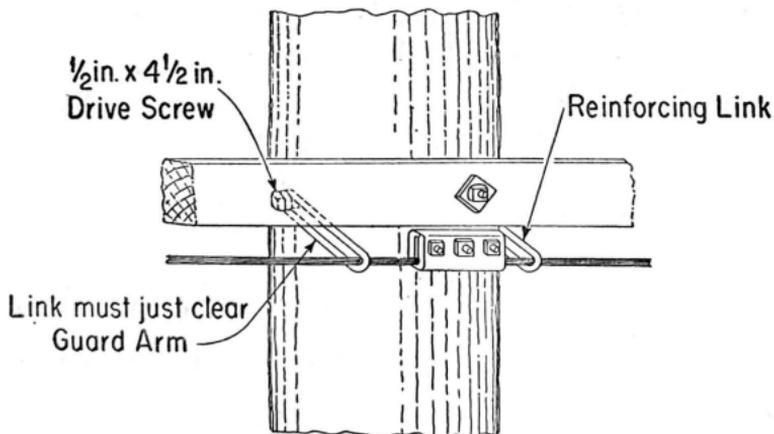
(a) At corners



(b) Downward change in grade.



10.04 Where a guard arm is used, attach the links as far above the level of the suspension strand as the clearance between the link and the guard arm will permit.



G51.105.1