

CONSTRUCTION OF AERIAL CABLE PLANT

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TABLES 1 to 3, Inclusive
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1. GENERAL

- 1.01 This section is intended to provide REA borrowers, consulting engineers, contractors and other interested parties with technical information for use in the design and construction of REA borrowers' telephone systems. It discusses in particular the construction of aerial cable plant.
- 1.02 This section replaces REA TE & CM-635, Issue No. 2, dated June 1956. The revision suggests methods for proper storage and handling of suspension strand; provides new data on strand stringing tensions; suggests precautions in construction work; and includes recent changes in construction practices.
- 1.03 Aerial cable in new plant and extensions to existing plant preferably should be lashed to the suspension strand whether it is lead or polyethylene sheathed.

- 1.04 Herein it is assumed that the cable is to be lashed to the suspension strand and that the cable plant design is in accordance with REA Form 511, "Telephone System Construction Contract," REA TE & CM-630, "Design of Aerial Cable Plant," and Addendum No. 2 to REA TE & CM-690, "Joint Use of Poles," and that the staking of the pole lines has been completed in accordance with REA TE & CM-626, "Staking," and complying with data in REA TE & CM-636, "Aerial Cable Plant Assembly Units."
 - 1.05 Information on the staking sheets will include class and length of each pole; the location of each pole, anchor and terminal; the tree trimming required; the cable sizes in numbers of pairs; the gauge of conductors; the beginning and end of each size for each section of the cable; the strand size for each size of cable; the required separation between telephone cable and power attachments on all poles in joint use; and loading point locations.
 - 1.06 If conditions require any deviation from the staking sheet data, the engineer shall be notified and work out a satisfactory solution for the construction forces. Such changes shall be posted on the staking sheets which become the permanent record of the construction.
 - 1.07 REA Form 511, section "g" contains certain cable plant construction specifications. Section "u" includes drawings of cable plant Assembly Units. Section "x" includes Guide Drawings of construction details.
2. HANDLING AND STORAGE OF SUSPENSION STRAND
- 2.01 Proper handling and storage of telephone suspension strand will prevent accelerated corrosion or physical damage. Improper handling or storage may decrease the normally expected service life and may also create construction problems. The storage methods suggested in REA TE & CM-616, "Construction of Bare Open Wire Plant," should be followed.
3. STRAND STRINGING
- 3.01 Guying shall be completed in a section of line before strand stringing begins.
 - 3.02 In running out strand the maximum practicable length should be placed in one pull. The length of one pull depends on the following:

- (a) Changes in grade.
 - (b) Interference from trees, wires and other cables.
 - (c) The number of corners and the corner angles.
- 3.03 Suspension strand usually will be supplied on a reel. The strand may be run out in one of the following ways:
- 3.031 Along the ground where no obstructions exist such as cables, guys, wires or trees which would interfere with raising the strand up to the suspension clamps on the poles.
 - 3.032 Through the strand groove of the suspension clamps. The clamp nuts should be tightened only enough to hold the strand in the clamp groove and not tight enough to bind the strand during pull-in or tensioning.
 - 3.033 Over the nut which is between the clamp and the pole. The strand should be placed in the clamp groove at about every fifth or sixth pole in straight sections of line and also where there is a high point or a dip. The clamps where the strand is placed in the groove should have the clamp nuts tightened as stated in paragraph 3.032.
 - 3.034 Over drive hooks or nails driven into the poles at or below the expected height of the cable through bolts. This method may be necessary in joint-use construction for temporary clearance reasons stated in paragraph 3.11. If hooks are used, they should be driven well into the poles leaving only space enough between the hooks and the pole to permit slipping the strand in the hook. As stated in paragraph 3.033, the cable should be placed in clamps at about every fifth or sixth pole. The hooks should be removed after the through bolts have been placed and the strand has been placed in the clamps.
- 3.04 Where it is necessary to place strand above power secondary wires (not primaries), above guys to a power line on separate poles, or over highways, the method shown in Figure 1 can be employed. With this method the rope between the poles should remain to support the strand until it has been tensioned and dead-ended.
- 3.05 Where there is a possibility of the strand whipping up into contact with the power wires during stringing or tensioning, the strand should be held down by 3/8-inch or larger ropes.

- 3.07 To permit the pay-out of strand the reel of strand can be placed on a pay-out frame shown in Figure 2; on a strand reel jack; on a strand reel hanger; or on cable reel jacks.
- 3.08 Strand can be cut with a strand cutter or hacksaw. To prevent the strand wires from spreading and to avoid flying of metal particles a double layer of friction tape should be wrapped around the strand for a length of two or three inches and then the cut should be made at the mid-point along the tape.
- 3.09 Factory splices in strand are marked by a band of paint. Such splices should not be bent around strand connectors, eye bolts or at small radius bends.
- 3.10 Where a cable diminishes in size and a smaller size of strand could be used for the smaller cable it is more practical to continue the larger strand rather than make a strand connection, if the extension beyond the diminishing point is 1000 feet or less. A false dead-end should be placed on the larger strand and guyed as shown on Guide Drawing 211 in REA Form 511.
- 3.11 Addendum No. 2 to REA TE & CM-690 explains the conditions under which strand must be placed in temporary locations on joint poles before cable is placed in order to prevent the small initial strand sag permitting the strand to contact the power wires.

4. STRAND SPLICES

- 4.01 Two methods are available for splicing suspension strands. One method uses guy clamps and strand connectors. Guy clamp use is shown on Guide Drawing 204 in REA Form 511, but the drawing states that an "equivalent device rated to develop the strength of the appropriate suspension strand" can be used. Approved devices are available in sizes for splicing two strands of the same size and for splicing a 6M to a 10M strand or a 10M to a 16M strand. These devices are preferred to the clamp method because they do not necessitate cutting and clamping the lashing wire at a strand splice and are more economical from the stand point of material and labor costs.

5. STRAND TENSIONING

- 5.01 At the time of strand tensioning the temperature should not be taken in direct sunlight. Hot sun on strand will increase the strand temperature above that in adjacent shade. The tension

required for the shade temperature, if applied to the strand at a hotter temperature, will result in some tension increase when the strand cools but this is unimportant.

- 5.02 The initial strand tension required depends on the size of the strand, the temperature at which it is tensioned and on the average span length involved. The initial 60° F. tension used for all span lengths in all three storm loading districts for 6M strand is 1100 pounds, for 10M it is 2100 pounds and for 16M it is 3600 pounds. For stringing at any temperature other than 60° F. the tensions will differ from the above stated values.
- 5.03 There is a definite tension for each of the three strand sizes for each average span length at each temperature. Tension data for various temperatures and average span lengths are given in Tables 1, 2, and 3 for 6M, 10M, and 16M strands, respectively.
- 5.04 The use of a dynamometer is recommended rather than sag measurements in strand tensioning because strand sag is difficult to measure accurately. The shunt type dynamometer is more useful than the tension type because it also can be used to test the tension after the strand is bolted in place. Figure 3 shows how dynamometer measurements are made. Figure 4 shows where tension readings should be made. The oscillation method for determining strand tension is not recommended.
- 5.05 Strand can be tensioned using a strand puller attached to a winch line as shown in Figure 3 or by block and tackle. Tension should be applied slowly while the entire length of strand being pulled is observed for evidence of snagging or failure to slip through its temporary attachments at poles. The strand puller jaws should be kept free of oil or grease to prevent slippage.
- 5.06 The strand shall be anchored at a dead-end pole before the first section of strand is tensioned and terminated preferably by the use of one of the types of boltless guy clamps (items P u-2 in the "List of Materials Acceptable for Use in Telephone Systems of REA Borrowers".) Successive pulls can be made from the end of the first pull. If there is a possibility that the strand and cable may be extended beyond a dead-end pole a three-foot tail should be left which will permit strand extension using a strand sleeve. Elsewhere a six-inch tail is sufficient. The tail ends should be served using stainless steel lashing wire or held by a guy wire clip (item dz in the "List of Materials").

Clips are available in three sizes to fit 6M, 10M, and 16M strands.

- 5.07 The use of dampers to protect the strand from fatigue failure is required if the cable is not to be placed immediately. For this purpose a piece of No. 14 bridle wire shall be placed along the top of the suspension clamp and wrapped around the strand extending two feet in both directions with the ends snubbed.

6. CABLE PLACING AND LASHING

- 6.01 Direct lashing of a cable to a strand can be accomplished as shown in Figure 5. Also, cable can be placed by using temporary supports, either cable blocks or temporary rings, through which the cable is pulled from a stationary reel after which it is lashed.

- 6.02 Moving Reel Method. If the terrain is suitable this is the most desirable method and is a faster method than the stationary reel method. It is practicable if the cable reel trailer and its towing vehicle can move along the side of the pole line on which cable is to be placed provided there are no obstructions such as trees, guys, etc., which would prevent raising the cable to the strand.

- 6.03 Stationary Reel Method. The methods of supporting cable during this operation can be one of the following:

- 6.031 Cable block method.
- 6.032 Sliding ring method.
- 6.033 Temporary ring method.

These methods are shown in Figure 6. The supports shall be close enough together to prevent excessive bending of the cable between supports. Cable made under REA Specification PE-22 for "Fully Color-Coded, Polyethylene-Insulated, Polyethylene-Jacketed Telephone Cables," has a corrugated metal shield under the jacket. This shield will be damaged if the cable is permitted to bend excessively.

- 6.04 The cable block method requires the use of a tree pruner handle to place the blocks and lock them to the strand. A lifter is required with the pruner handle. A cable block pusher is a 3 foot tube designed for placing over the strand to push the blocks ahead of the lashing machine. The blocks are lifted off at the poles and lowered by hand line. Blocks are placed at various spacings depending on the cable weight. The following table is a guide:

Cable Weight, (Pounds per foot)	Maximum Block Spacing
1.0 or less	35 feet
1.5	33 feet
2.0	25 feet
2.5	20 feet
3.0	16 feet
3.5	14 feet

- 6.05 Line wire should not be used for pulling in cable where blocks are used because it may bind in the blocks. Wire rope (1/4 or 3/16) inch, a winch line, 2200 pound strand or manila rope (1/2 inch diameter or larger) are preferable to line wire. Rope should be used in cable placing in joint use to prevent electrical hazards that result if metal rope or strand is used which can flip up into power wires.
- 6.06 A typical cable lashing machine in use is shown in Figure 7. There are several types of lashing machines. One type will lash cables not exceeding 1-5/8 inches in diameter. Another type will lash cables as large as 3-1/4 inches in diameter. Some lashers for 1-5/8 inch cable will hold two 1200 foot reels of 0.045 inch diameter stainless steel lashing wire. A lasher for the larger cables uses reels of 0.061 inch diameter stainless steel lashing wire. All types of lashers wrap the lashing wire counter clockwise around the cable and strand. Where grades are involved it is preferable to lash downhill.
- 6.07 Two kinds of lashing wire clamps are necessary in lashing cable to strand. One is a temporary clamp having a wooden handle for opening and closing the clamp jaws and the other is the permanent clamp. The temporary clamp is removed after the permanent clamp is placed. Figures 5 and 7 show how the temporary clamp is used. Guide Drawings 241, 242, and 243 of REA Form 511 show how lashing wire is clamped in various situations. Lashing wire shall be clamped at each side of each pole.
- 6.08 When cable, either paper or plastic insulated is lashed at temperatures below 30° F. it should be tensioned more than is usual at higher temperatures. This will tend to prevent bowing in hot weather by causing the cable to be lashed snugly against the strand.
- 6.09 Lashing wires shall be spliced using approved types of stainless steel compression sleeves of appropriate sizes. Stainless steel lashing wire of .045 and .061 inch diameter are approved for use.

6.10 Lashing Two Cables to Same Strand

- 6.101 Due to changing requirements of service and materials, or other reasons, it may be necessary to lash two cables to the same strand. A new cable may be lashed over an existing cable to the same strand. The combined diameters of the two cables cannot exceed the diameter for which the particular lasher was designed.
- 6.102 In order to promote firm lashing, the diameter of one cable should not be more than twice the diameter of the other cable.
- 6.103 If the diameter of the two cables exceeds two inches, two nuts shall be placed between the suspension clamp and washer to provide clearance between pole and cable.
- 6.104 If the existing cable is lashed to the strand the lashing wire should be examined carefully, and if it is found to be severely corroded, pitted, or broken, or if it has sharp points or edges which would damage the new cable, it should be removed. However, it is generally not necessary to remove existing lashing wire.

7. SAG AND TENSION AFTER CABLE IS PLACED

- 7.01 The sag and tension in a strand and cable after the cable is placed depends on the temperature, the strand size, the weight of the cable per foot, and the span length. This is called the "initial" cable sag and tension. If it ever is necessary to check the tension in a strand after a cable is placed, a shunt type dynamometer can be used.

8. LONG SPANS, RAILROAD CROSSINGS AND OTHER SPECIAL CONSTRUCTION

- 8.01 For special construction such as at heavy grades, slack spans, large angles, railroad crossings, etc., see Figure 8.
- 8.02 For railroad crossing construction details see REA TE & CM-617, "Railroad Crossing Specifications."

9. CENTRAL OFFICE ENTRANCE CABLES

- 9.01 The central office cable entrance specified may be aerial, buried, or in underground conduit. The plan will be detailed by the engineer. If splices between tip and entrance cables

are required beneath the floor, the splice closures must be completely moisture proof because splicing pits under floor troughs and splicing vaults tend to be damp.

- 9.02 Sheaths of lead-covered cables and shields of polyethylene-jacketed cables shall be bonded from the central office splice to the central office ground as required by REA TE & CM-810, "Central Office Protection."

10. CABLE SPLICING

- 10.01 Splicing of lead-sheathed cable can be performed using lead sleeves "wiped" to the sheath. This method is described in REA PC-1, "Splicing Standard for Joining Paper or Pulp-Insulated, Lead-Sheathed Cable to Paper or Pulp-Insulated Cable." However, cast aluminum splice cases for splice enclosures usually will be specified.
- 10.02 Splice cases should be used for splice enclosures on plastic-sheathed cable having either paper, pulp, or polyethylene-insulated conductors. The cases also can be used for splices of lead cable to plastic-sheathed cable.
- 10.03 Splicing of polyethylene-insulated conductor cables should be performed in accordance with PC-2, "REA Standard for Splicing and Terminating Plastic-Insulated, Plastic-Jacketed Cables Used on Telephone Systems of REA Borrowers." Ready-access enclosures are used for these splices.
- 10.04 Experience indicates that tension splicing at low temperatures is not necessary on lashed plastic-insulated, plastic-sheathed cable. It should be considered in splicing heavy lead cable at temperatures below 30° F. The method consists of pulling up the cable by an amount approximating its shrinkage at the low temperature from its length at 60° F. Data for determining this amount is given in a table on Figure 9. This figure shows the suggested method. Tension splicing should have the approval of the engineer.
- 10.05 When a cable is to be opened in cold weather for such work as splicing to branch cable or placing a terminal, the method shown on Figure 10 is suggested. This loosens the core so that pairs can be located and identified. Without this slack the core may be so tight that the pairs cannot be separated enough to permit identification of desired pairs.

11. CABLE TERMINALS

11.01 Terminals for use where ready-access enclosures are not applicable should be either of two strand mounted arrangements. For terminating 11 or 16 cable pairs, one splice case is paired with and bolted to a "terminal, aerial cable." For terminating 26 pairs, two "terminals, aerial cable" are paired and bolted together. Each "terminal" comprises a terminal box permanently attached to the side of a splice case with the wires from the terminal lugs entering the splice case through a sealed hole. These terminals can be used to enclose a splice in addition to providing for drop wire connections to the terminal lugs. Drop and bridle wires enter the terminals through self-sealing plastic grommets in the bottom of the box.

11.02 Ready-access enclosures, in addition to being used for splice enclosures, provide for mounting one to four six-pair terminal blocks for splicing to a cable conductor. Drop and bridle wires enter through slits in the bottom of the neoprene case.

11.03 The cable layout map will show the pair numbers to be terminated at each terminal enclosure and the pair numbers which are to be spliced to each branch cable.

12. CABLE LOADING

12.01 Loading coils in cases having paper-insulated stubs should be specified for use with paper or pulp-insulated cable; with plastic-insulated stubs for use with plastic-insulated cable; encapsulated, for use in ready-access enclosures on plastic-insulated cable; or in fiber cases for use in splice cases or with lead sleeve splices, where moisture is excluded. The cable layout map will show the pair numbers to be loaded at each loading point.

13. CABLE POLE STEPPING

13.01 Poles shall be stepped where called for on staking sheets, with steps placed as shown on Assembly Unit Drawing PM-5 in REA Form 511.

14. MECHANICAL PROTECTION OF AERIAL CABLE

14.01 Mechanical protection of cable from chafing by trees or poles is required. The more usual places where such protection will be needed are shown on Figures 11 and 12. These situations

may not always be known in advance of construction by the engineer and, therefore, the construction forces should request instructions from the engineer. Longitudinally split cable guards of plastic are available, 8 inches long and of various diameters. Cable guards of plastic spirally cut are available in various diameters and lengths.

15. PREVENTION OF CABLE DANCING

- 15.01 In areas where high winds prevail, cable dancing may occur and can be minimized on a lashed aerial cable by spiraling the cable around the strand. This will present an irregular configuration of cable and strand to the wind pressures, thereby tending to break up movement of cable and reduce dancing. This method may be used on lead-sheathed cables and on plastic-sheathed cables of all sizes.
- 15.02 Where cable dancing or evidence of dancing has been observed, the engineer will specify on the cable layout map where the cable should be spiraled around the strand as indicated on Guide Drawing 250 in Form 511.
- 15.03 Two adjacent spans are spiraled at the same time by performing the operation at alternate poles throughout the length of the affected section of the cable lead. The spiraling operation will not be affected by the presence of straight splices.
- 15.04 Prior to spiraling, it will be necessary to loosen the lashing wire clamps temporarily so that the lashing wire will not tighten unnecessarily. After the spiraling, the lashing wire should be readjusted and reclamped.
- 15.05 If necessary, the spiraling operation can be performed at poles where there are strand mounted terminals providing that care is exercised to prevent damage to the terminal stub and splice.
- 15.06 In areas where high winds prevail and light weight cable is constructed on unusually long spans, the cable may require additional spiraling in order to obtain satisfactory results. The engineer should specify on the cable layout map the number of additional twists to be inserted.

16. PRECAUTIONS

- 16.01 This document does not provide all of the construction practices required in erecting poles, placing strand, placing cable and cable splicing. Certain actions are mentioned below which are worthy of special mention herein whether the construction work is done by contract or by force account procedure.
- 16.02 Strand cutting can be dangerous and should be done as suggested in paragraph 3.08.
- 16.03 Strand that has been tensioned and on which cable is not to be placed immediately requires the use of temporary vibration dampers to prevent fatigue failure. See paragraph 5.07.
- 16.04 Strand that has a broken wire should be considered too dangerous to ride in a cable car, to attach a cable splicer's platform or to permit workmen to place a ladder against for working aloft.
- 16.05 Strand placed on joint-use poles should be kept grounded at all times during the stringing operations and permanently grounded immediately after stringing.
- 16.06 The precaution mentioned in paragraph 3.11 shall be observed in placing strand on joint-use poles to prevent its small initial sag causing it to contact power wires above the strand before the cable is placed.
- 16.07 Rubber gloves which meet ASTM Specification D 120-59T (which have been tested and found free of pinholes) shall be worn by the personnel who string strand on joint use poles. Suitable leather overgloves can be worn over the rubber gloves.
- 16.08 The REA Telephone Operation Manual contains safety practices which should be consulted before cable construction begins. These are Section 1208, "Safety Practices," Section 1208.1, "Safety Practices, Construction of Telephone Facilities on Joint Use Pole Lines."

Table 1

6M Strand Stringing Tensions at Various Temperatures
for Various Average Span Lengths for All Storm Loading Districts
Stringing Tension is 1100 Pounds at 60°F

Temperature	Average Span Lengths - Feet										
	100	150	200	250	300	350	400	450	500	550	600
	Tension in Pounds										
-30	1757	1737	1714	1688	1650	1615	1579	1534	1492	1458	1425
0	1551	1578	1517	1496	1468	1437	1412	1381	1350	1328	1308
15	1500	1475	1413	1398	1374	1350	1329	1306	1285	1268	1252
30	1329	1321	1308	1299	1282	1262	1251	1235	1218	1208	1197
60	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
90	870	883	903	921	937	952	971	982	993	1004	1016
120	642	681	720	760	798	826	857	877	898	918	937

Table 2

10M Strand Stringing Tensions at Various Temperatures
for Various Average Span Lengths for All Storm Loading Districts
Stringing Tension is 2100 Pounds at 60°F

Temperature	Average Span Lengths - Feet											
	100	150	200	250	300	350	400	500	600	700	800	900
	Tension in Pounds											
-30	2969	2961	2947	2935	2915	3901	2877	2830	2788	2723	2666	2613
0	2694	2690	2682	2676	2658	2644	2624	2591	2551	2512	2468	2431
15	2549	2543	2535	2529	2518	2504	2493	2466	2437	2408	2371	2345
30	2405	2399	2391	2389	2377	2375	2360	2341	2322	2300	2280	2264
60	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
90	1781	1789	1795	1809	1821	1827	1839	1863	1888	1912	1932	1950
120	1455	1469	1490	1514	1544	1571	1589	1645	1693	1738	1772	1810

Table 3

16M Strand Stringing Tensions at Various Temperatures
for Various Average Span Lengths for All Storm Loading Districts
Stringing Tension is 3600 Pounds at 60°F

Temperature	Average Span Lengths - Feet							
	200	300	350	400	500	600	700	800
	Tension in Pounds							
30	4811	4789	4773	4747	4704	4652	4585	4536
0	4432	4406	4392	4381	4348	4306	4267	4218
15	4236	4210	4200	4189	4161	4128	4085	4059
30	4022	4007	3999	3990	3975	3950	3929	3903
60	3600	3600	3600	3600	3600	3600	3600	3600
90	3152	3175	3181	3196	3222	3250	3280	3308
120	2691	2740	2768	2795	2852	2910	2968	3022

Note: Data from copyrighted Data Sheets, by permission
of Indiana Steel and Wire Company.

The strand stringing tensions given in Tables 1, 2, and 3 are for average span lengths in a section of line. When strung and tensioned at other than 60°F the tensions will approximate the values given for 60°F when that temperature occurs before the cable is placed. Flexibility of supports allow sags to decrease in the shorter spans and increase in the longer spans in any section of line between deadends but the tensions will be relatively uniform along that section.

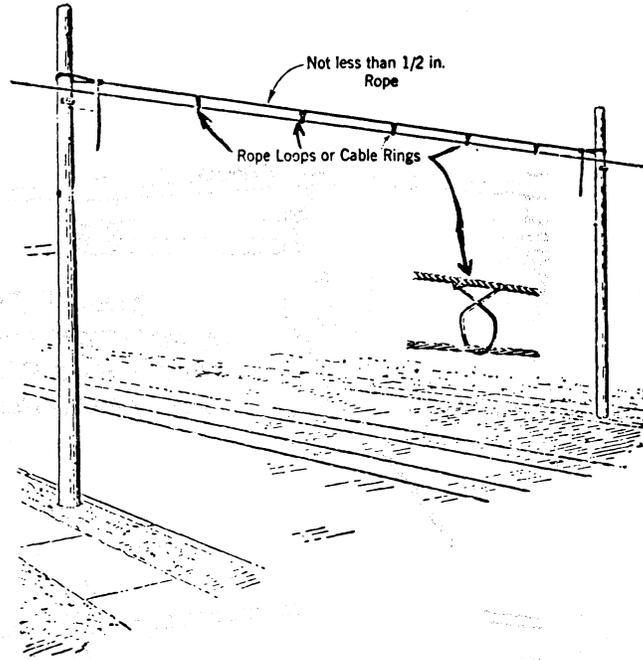


Figure 1

STRAND PAY-OUT FRAME

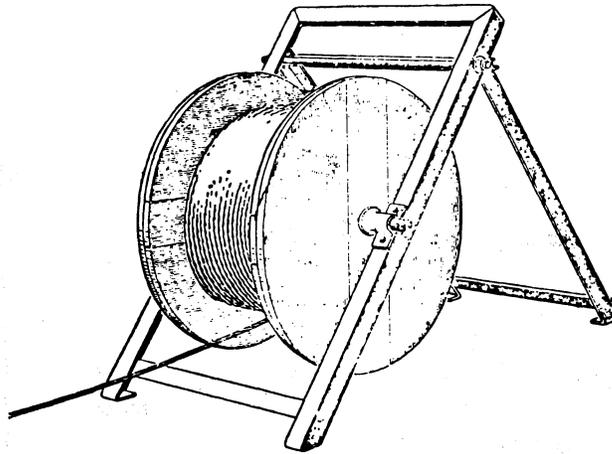


Figure 2

STRAND DYNAMOMETERS.

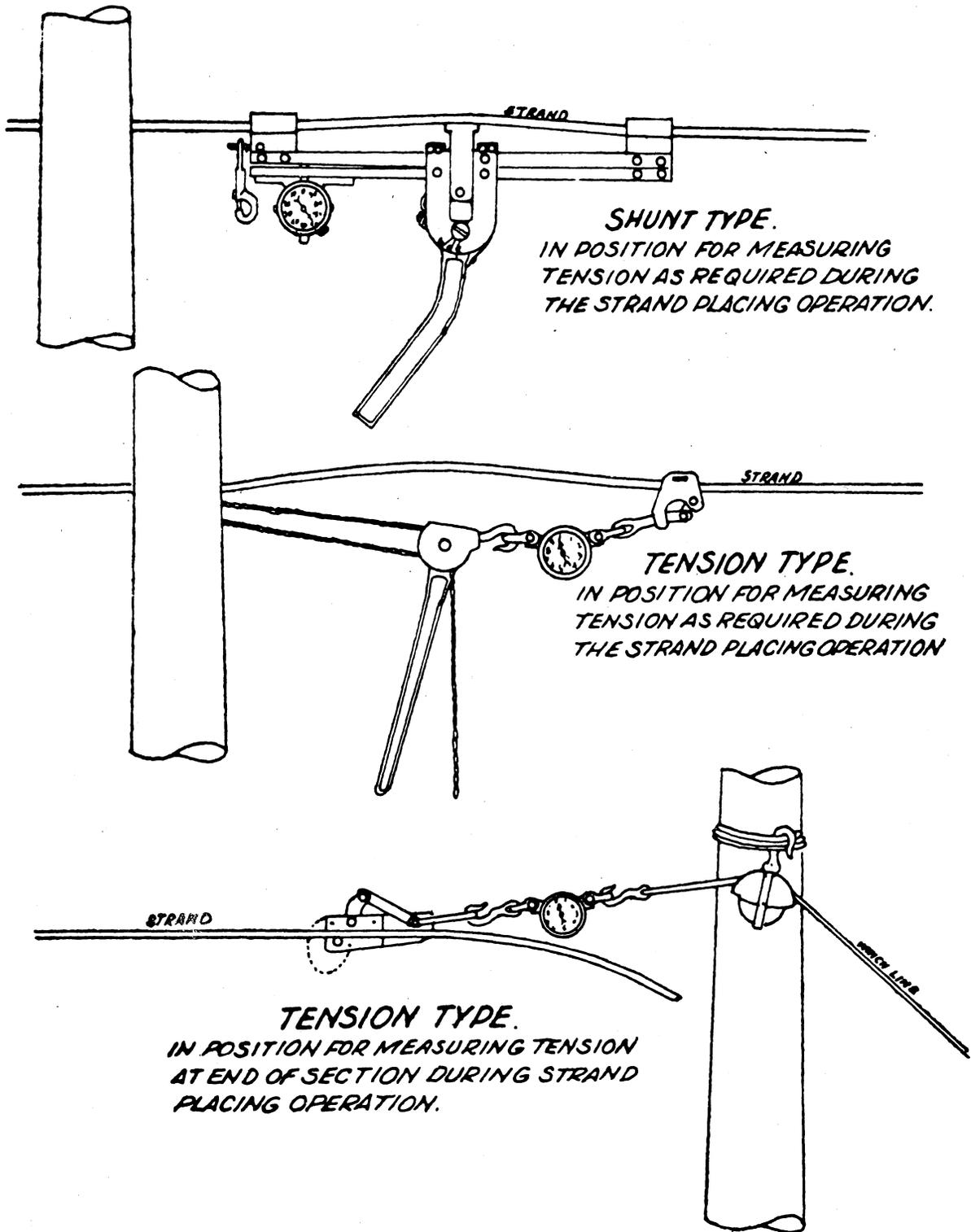
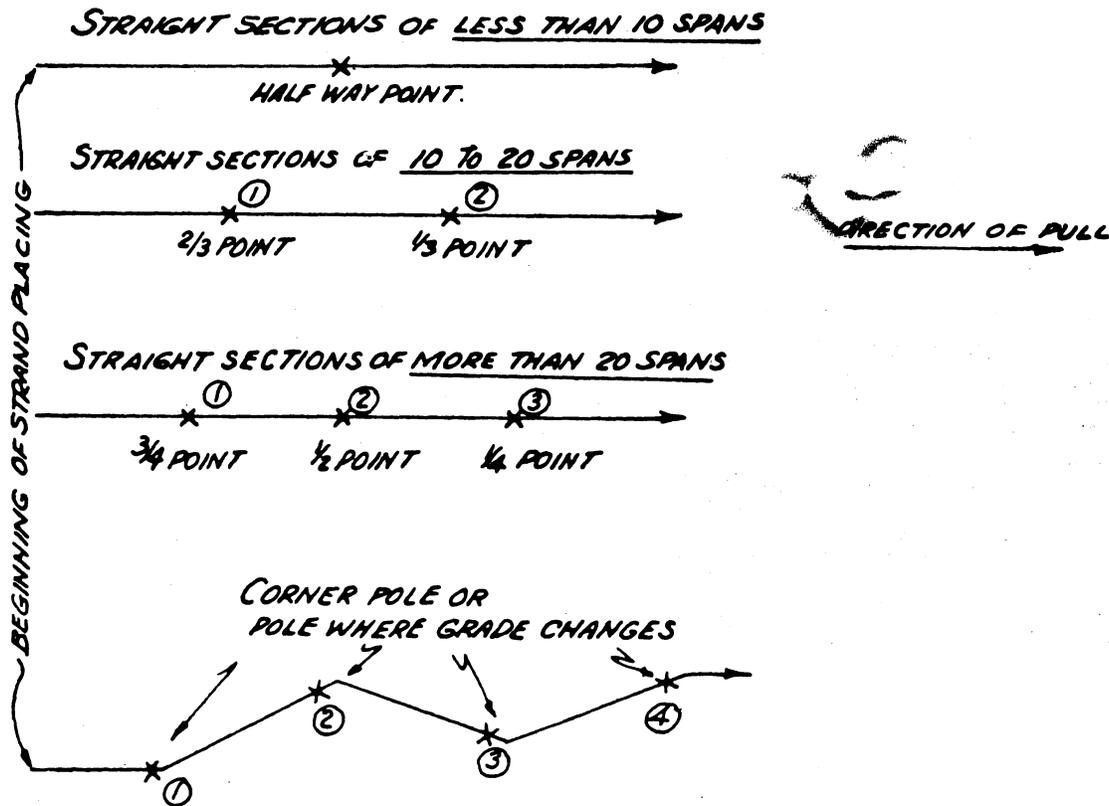


Figure 3

SELECTION OF POINTS FOR READING AND EQUALIZING STRAND TENSIONS.

① INDICATES SEQUENCE OF PROCEEDURE
 X INDICATES POINT OF TENSION EQUALIZATION.
 READING IS GENERALLY TAKEN NEAR A POLE.



GENERAL NOTE :

IN INITIAL PLACING OF STRAND THE CABLE SUSPENSION CLAMPS SHOULD BE FREE ENOUGH TO ALLOW THE STRAND TO SLIDE THRU

IT SHALL FIRST BE PULLED UP UNTIL IT IS SOMEWHAT TIGHTER THAN THE REQUIRED TENSION.

IT SHALL THEN BE EASED OFF AS THE TENSION IS EQUALIZED AT THE ABOVE POINTS, AFTER WHICH THE CLAMPS SHALL BE PERMANENTLY TIGHTENED.

WHEN THE ABOVE PROCEEDURE IS FOLLOWED, IT WILL CONTRIBUTE TO THE REDUCTION OF CABLE DANCING.

Figure 4

LASHING CABLE DIRECTLY FROM MOVING REEL

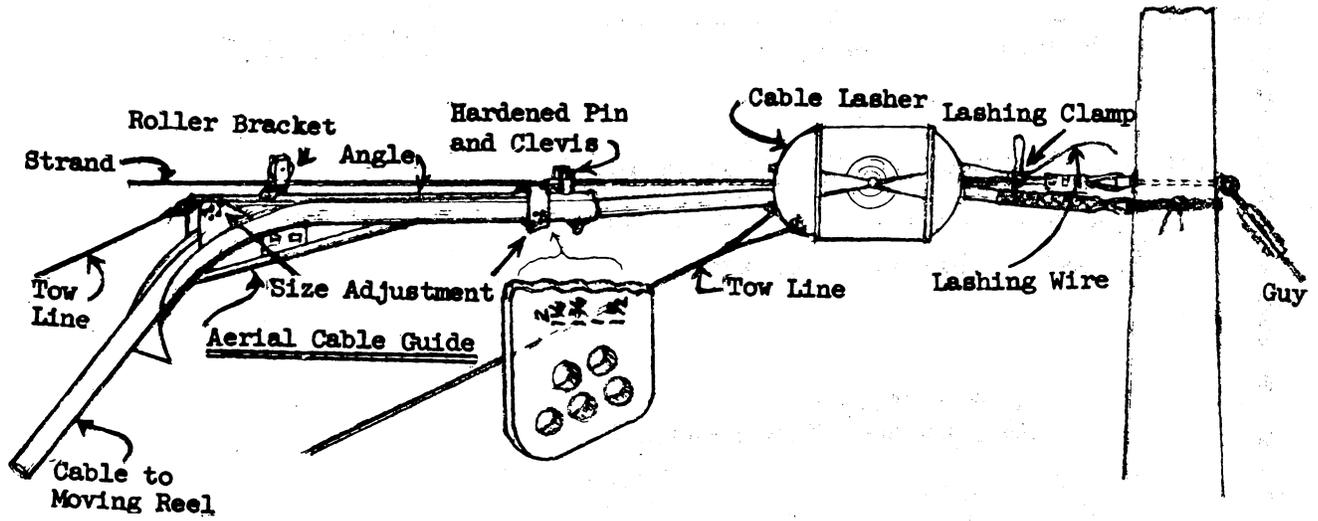
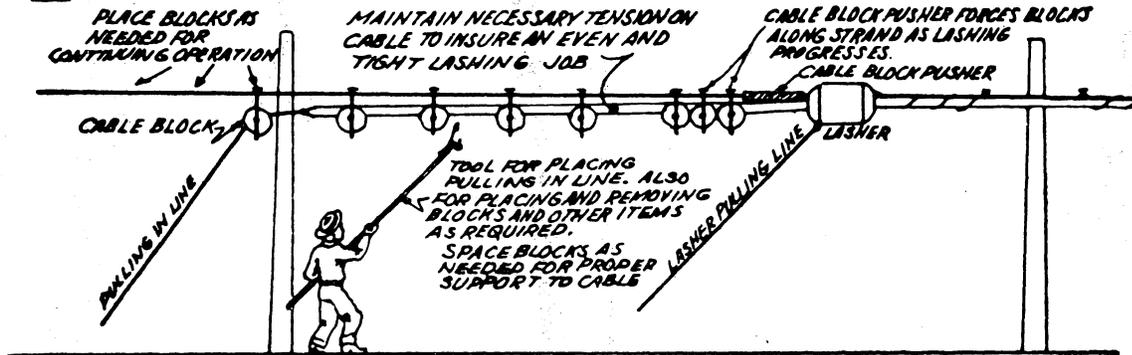


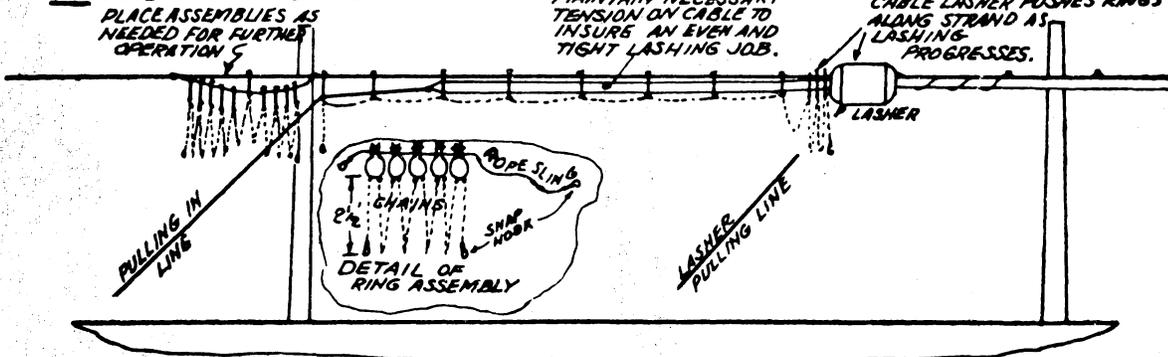
Figure 5

TEMPORARY METHODS OF SUPPORTING CABLE FOR LASHING OPERATION

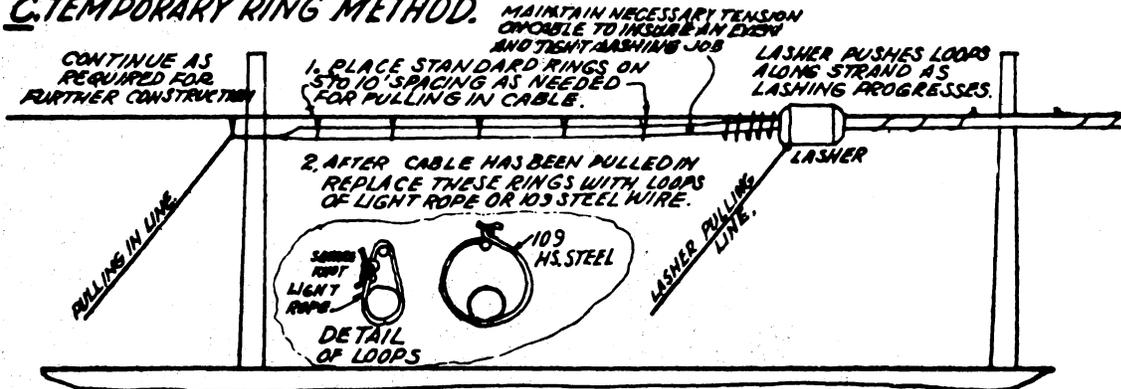
A. CABLE BLOCK METHOD.



B. SLIDING RING METHOD.



C. TEMPORARY RING METHOD.

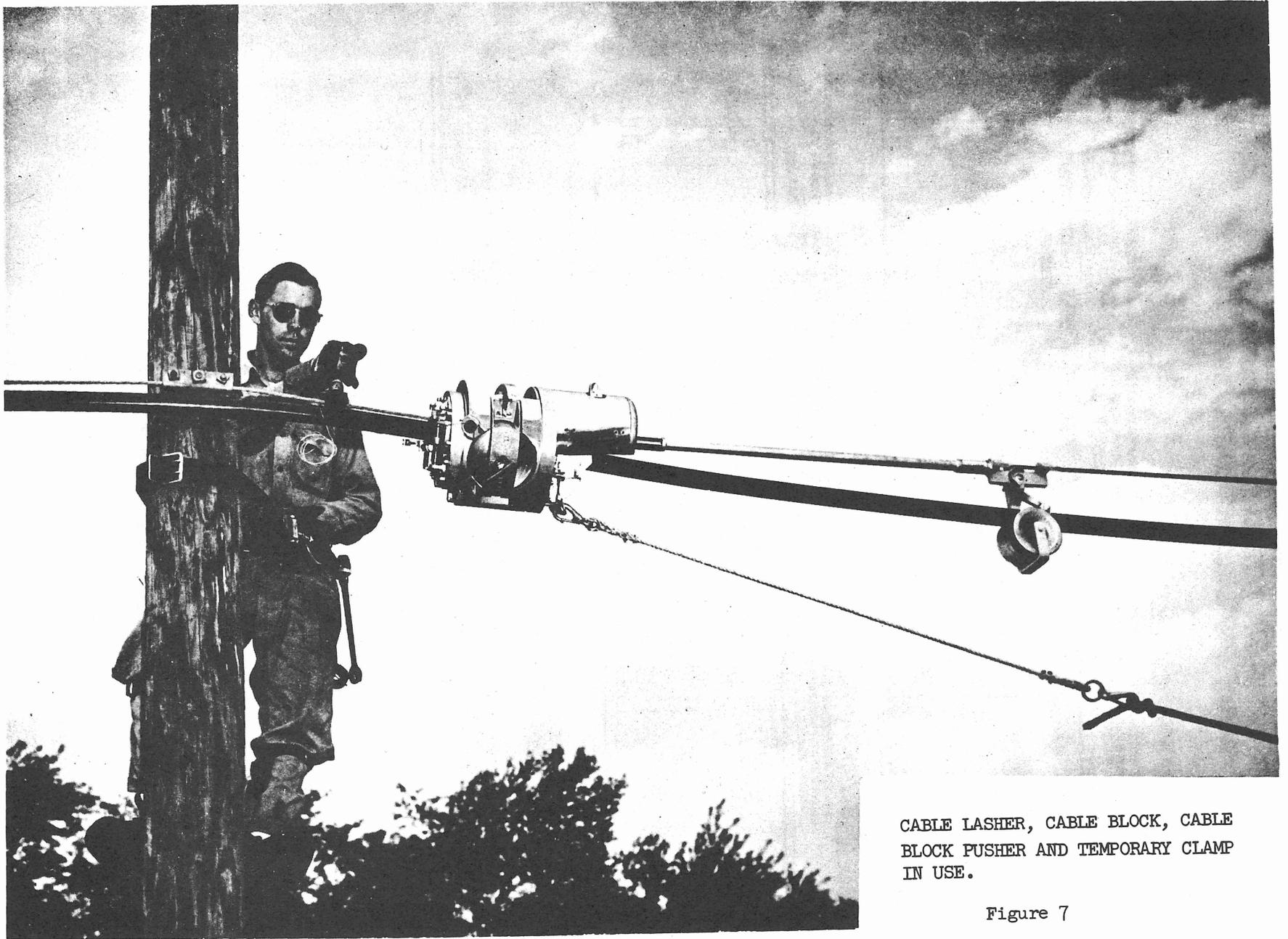


GENERAL NOTE: ON CHANGES IN GRADE AND ON HEAVY CORNERS TAKE NECESSARY STEPS TO PREVENT CABLE FROM RIDING OUT OF BLOCKS OR UPSETTING OTHER SUPPORTS.

ON INSIDE CORNERS PLACE SHEAVE BLOCKS AS NEEDED TO MAKE A SMOOTH AND EVEN BENDING OF THE CABLE.

ON OUTSIDE CORNERS PLACE MATS OR FOLDED CLOTH TO PROTECT THE CABLE WHILE BEING PULLED AROUND THE POLES.

Figure 6



CABLE LASHER, CABLE BLOCK, CABLE
BLOCK PUSHER AND TEMPORARY CLAMP
IN USE.

Figure 7

**- SPECIAL CONSTRUCTION -
GENERAL FEATURES
AND FALSE DEAD ENDS**

FALSE DEAD ENDS ARE GENERALLY PLACED AT LOCATIONS ON STRAND WHERE UNBALANCED LOADS OCCUR, AND ARE ASSOCIATED WITH

- ① CHANGE IN SIZE OF STRAND
- ② SLACK SPAN CONSTRUCTION
- ③ HEAVY GRADE CONSTRUCTION
- ④ (MODIFIED) WHERE ANGLE AT CORNER POLE IS MORE THAN 60° AND PULL IS AGAINST POLE.

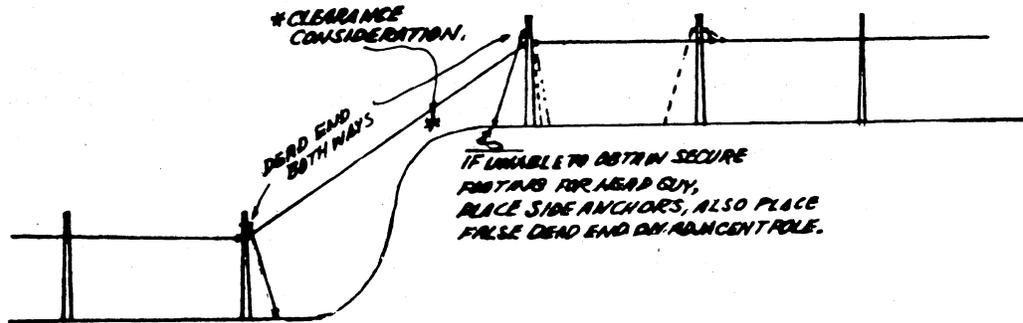
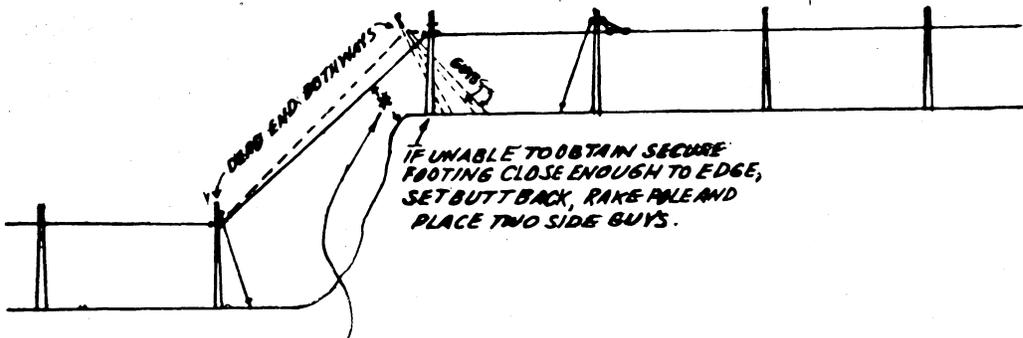
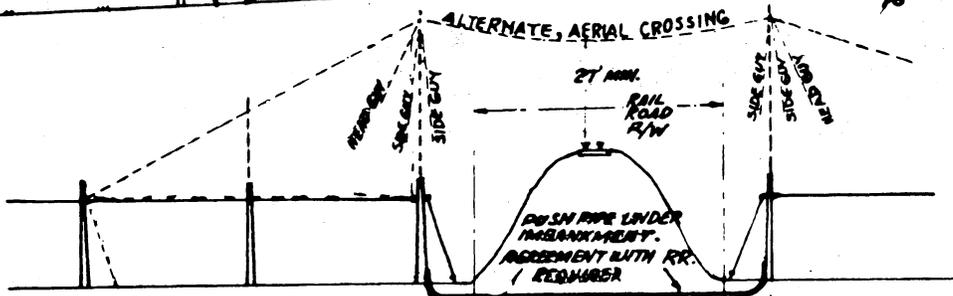
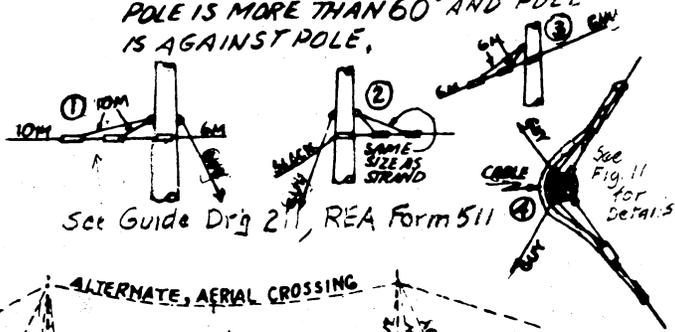
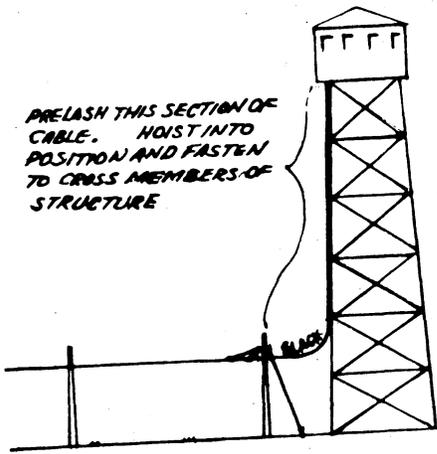
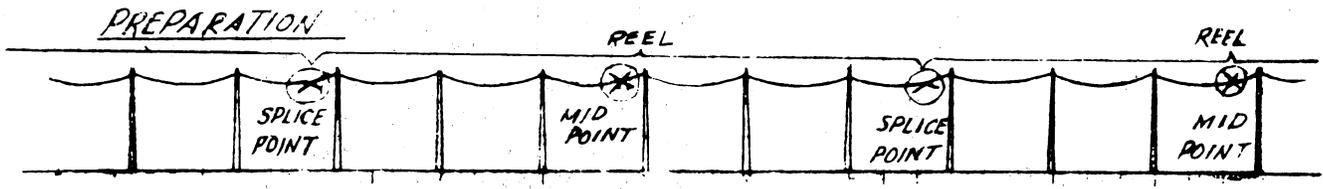


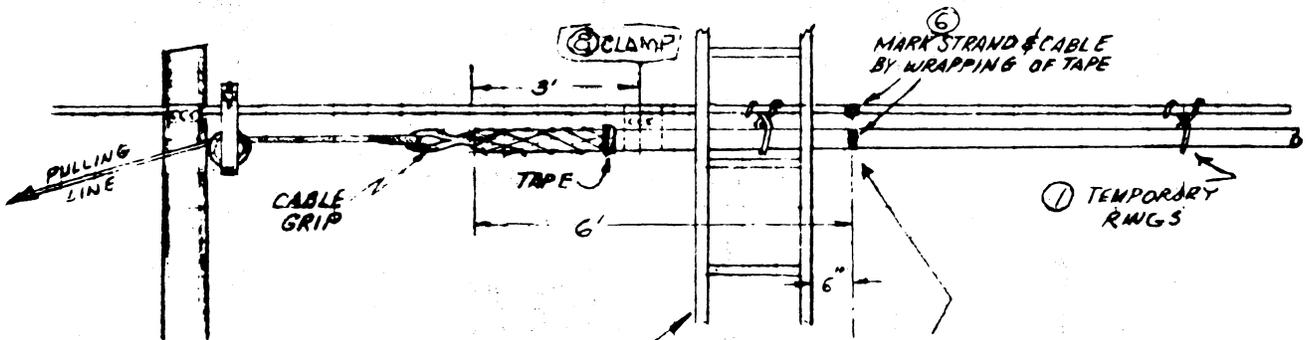
Figure 8

— LEAD SHEATHED CABLES —

TENSION SPLICING FOR LASHED CABLES WEIGHING 2 POUNDS (PER FOOT) OR MORE WHEN TEMPERATURE IS 30° OR LESS. ENGINEER SHALL BE CONSULTED AS TO PROCEDURE



- ① PULL CABLE INTO TEMPORARY RINGS SPACED APPROXIMATELY 5 FT. APART.
- ② SECURE CABLE TO STRAND AT MID POINT (GRADE CLAMP MAY BE USED).
- ③ PLACE BLOCKS OR MATS AT CORNERS AS MAY BE REQUIRED.
- ④ AFTER PULLING IN KEEP ENOUGH TENSION ON CABLE TO PREVENT SAGGING BETWEEN THE TEMPORARY RINGS.



- ⑤ PLACE LADDER AGAINST STRAND
- ⑥ MARK STRAND AND CABLE
- ⑦ PULL UP CABLE UNTIL MARKS ON STRAND AND CABLE ARE SEPARATED TO EQUAL STRETCH INDICATED FOR TEMPERATURE OBSERVED AT START OF WORK. SEE TABLE BELOW.

AVERAGE SPAN LENGTH	CABLE STRETCH IN 32 ^{NBS} OF AN INCH FOR 100 FT OF CABLE TENSIONED AT TEMPERATURES (FAHRENHEIT) INDICATED							
	-20	-10	0	10	20	30	40	50
200 FT. OR LESS	12	10	7	5	3	2	-	-
201 FT. TO 250 FT	16	13	10	8	6	4	-	-
251 FT. TO 300 FT	11	9	8	5	3	2		

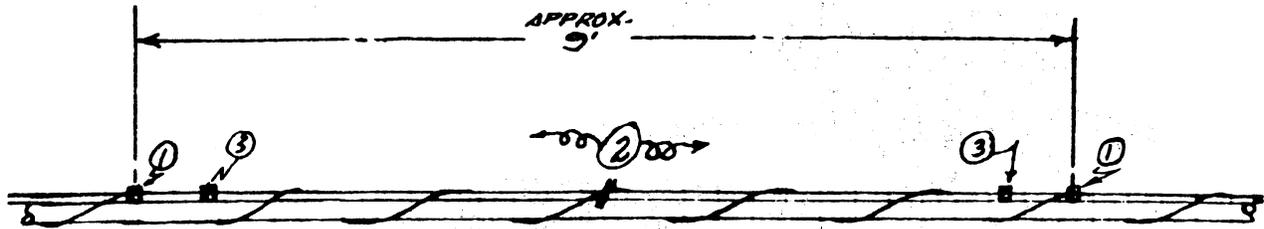
- ⑧ WHEN THE CABLE IS IN PROPER TENSION CLAMP IT TO THE STRAND ABOUT 3 FT. FROM END OF CABLE. RELEASE PULLING IN LINE AND REMOVE CABLE GRIP. NOTE: GRADE CLAMPS SHALL NOT BE REMOVED UNTIL AFTER CABLE IS SPLICED.
- ⑨ PROCEED WITH LASHING IN USUAL MANNER.
- ⑩ SPLICE CABLE THROUGH. REMOVE CLAMPS ETC. IN SPLICING, KEEP CABLE AS NEAR TO STRAND AS POSSIBLE.

— SMALLER SIZE CABLES —

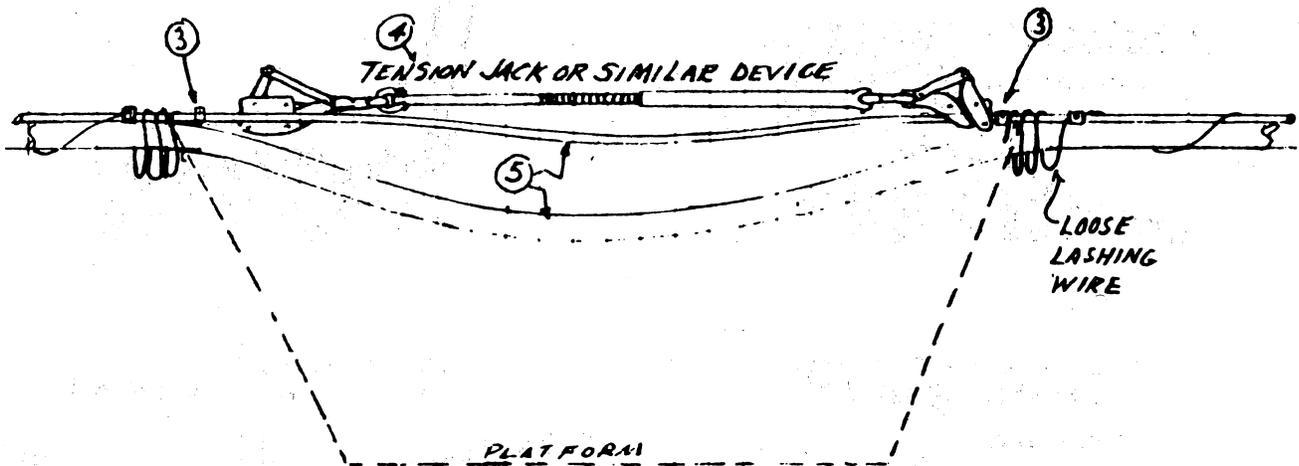
IN COLD WEATHER, THE USE OF SOME WHAT HIGHER TENSION IN THE CABLE DURING THE LASHING OPERATION AS CABLE IS PLACED, WILL TEND TO MINIMIZE BOWING. ENGINEER SHALL BE CONSULTED AS TO PROCEDURE.

Figure 9

OPENING CABLE IN COLD WEATHER
LASHED CABLE



1. SECURE LASHING WIRE TO STRAND
2. CUT LASHING WIRE AT SPLICE LOCATION AND PUSH LOOSE COILS BACK IN EACH DIRECTION TO FASTENING ① ALLOWING CABLE TO HANG FREE
3. PLACE ADDITIONAL CLAMP OR BOLT ON STRAND ABOUT 6" FROM FASTENING ① IN ORDER TO PREVENT PLATFORM HOOKS FROM SLIPPING.
4. PLACE TENSION JACK OR SIMILAR DEVICE
5. OPERATE JACK TO INDUCE REQUIRED SLACK IN STRAND AND CABLE IN PREPARATION FOR SPLICING.



6. COMPLETE WIRE WORK, THEN BACK OFF TENSION JACK AND REMOVE IT FROM STRAND.
 7. COMPLETE SPLICING WORK, RESTORE LASHING WIRE AND PLACE SUPPORTS AS NEEDED.
- NOTE: UNDER SOME CONDITIONS ON SMALLER SIZE CABLES THE USE OF A SLACK PULLER MAY SIMPLIFY THE OPERATION



Figure 10

CONSTRUCTION OF AERIAL CABLE MECHANICAL PROTECTION

REA TE & CM-635

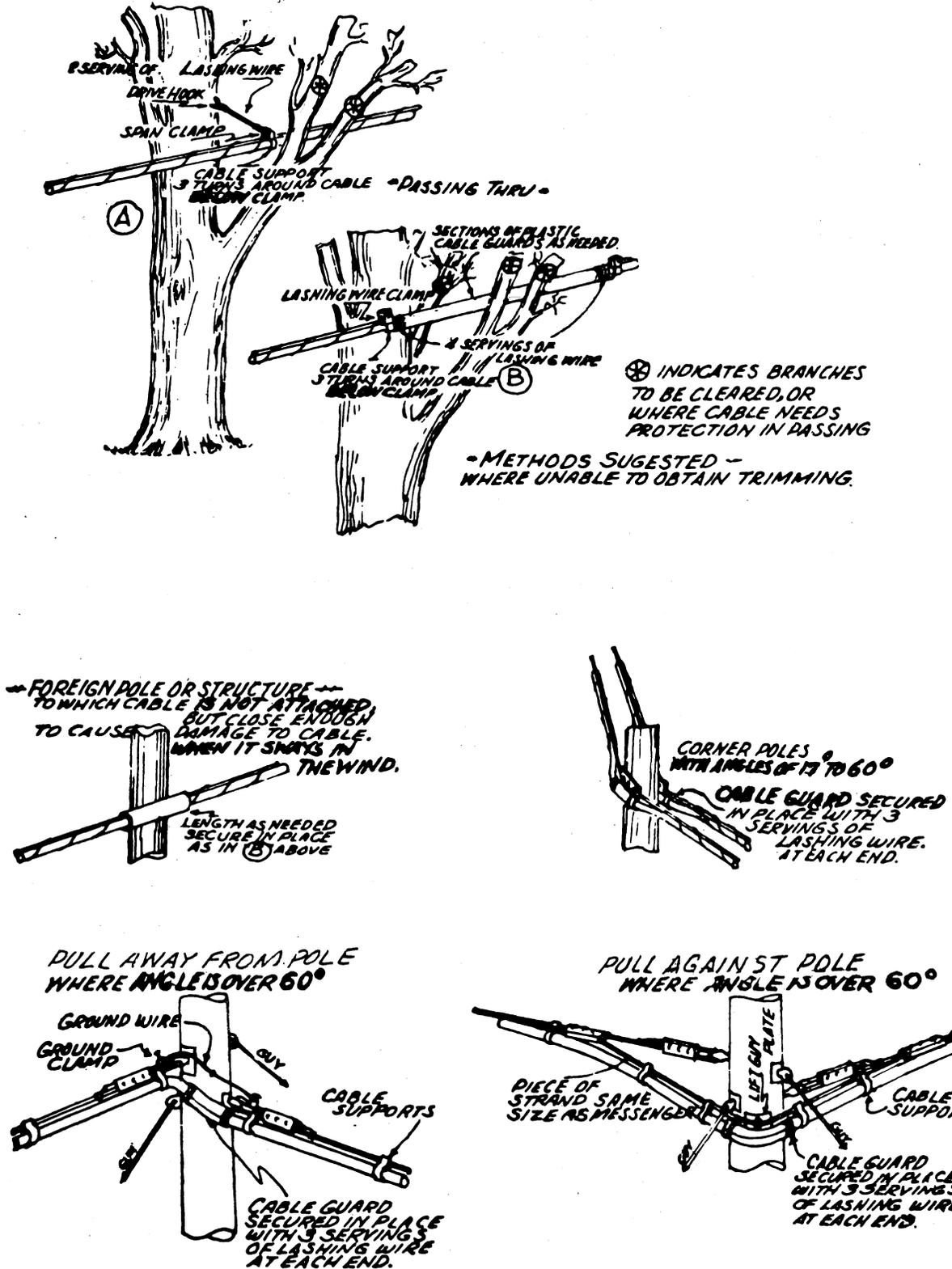


Figure 11

CONSTRUCTION OF AERIAL CABLE MECHANICAL PROTECTION PLASTIC CABLE GUARDS

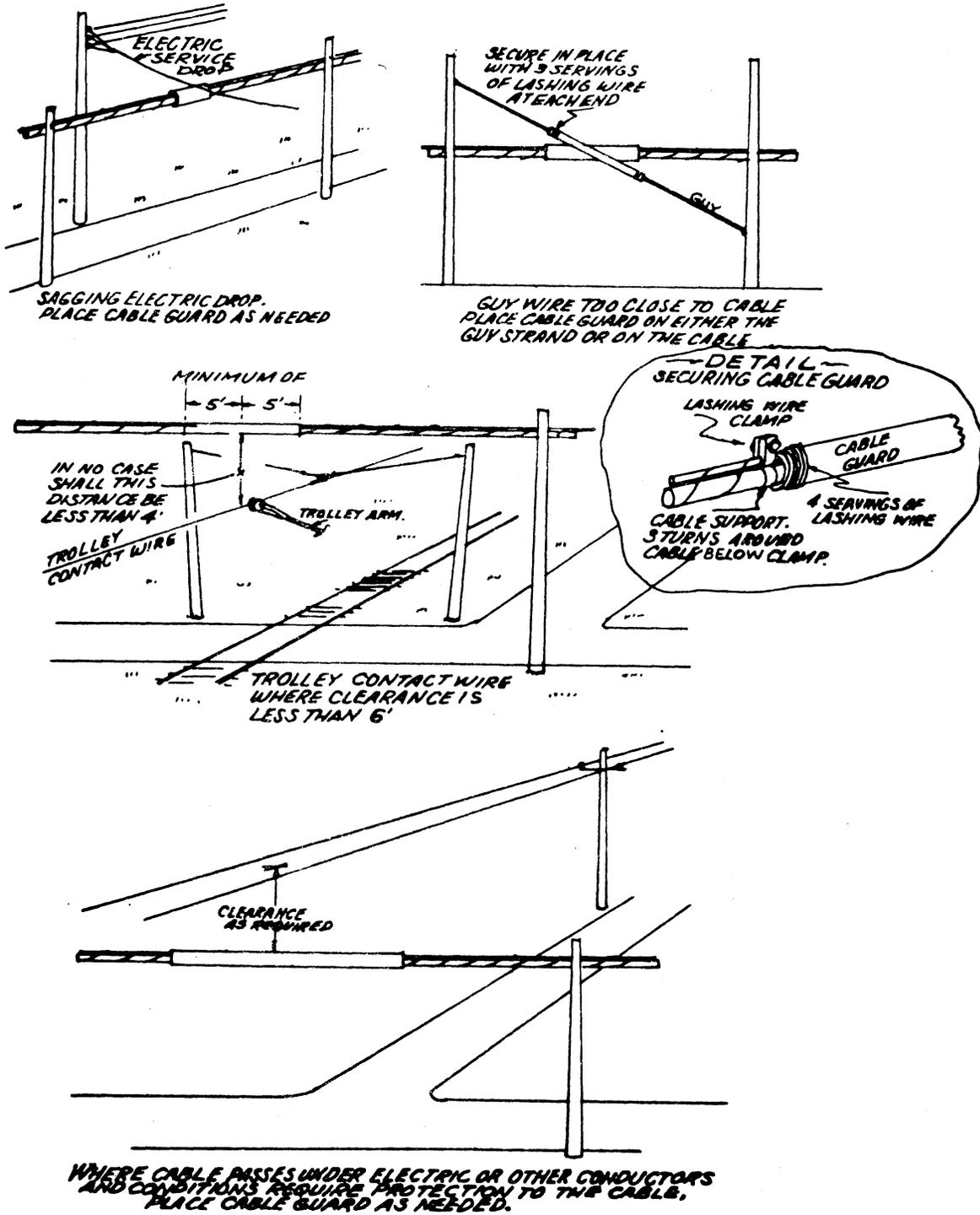


Figure 12