BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G31.175
Issue 1, March, 1931
Provisional Standard

OPEN WIRE

CATENARY LONG SPAN CONSTRUCTION

Contents **Page**

1. STANDARD NAMES OF SUPPLIES

1.01 All materials required for use under these instructions are covered elsewhere in the Outside Plant Construction and Maintenance Practices with the exception of the items listed below:

Crossarms: **SPECIAL STEEL ANGLE IRON CROSS-ARMS** (For use at the tops of fixtures).

Crossarm Hangers: **SPECIAL 2 IN. X 2 IN. GALVANIZED STEEL ANGLE** (Used in assembly of suspended fixtures).

Thimbles: **1/2 IN. GALVANIZED THIMBLES.**

2. GENERAL

2.01 These practices cover standard methods and materials for use in connection with the construction of long spans of the catenary type* in open wire toll lines.

*NOTE: Where it is necessary to locate transpositions in a long span a crossarm structure is located in the span and is supported by cable suspension strand. Since the line wires are in turn supported by the crossarms in the long span the line wires in the long span are of the same type and size as the wires elsewhere in the line. This type of construction is distinctly different from the non-catenary type of long span construction where the line wires in the long span crossing are given no intermediate support between the crossing fixtures.

3. DEFINITION OF LONG SPANS

3.01 A long span is defined for the purpose of these instructions as:

(a) An occasional span, when 12-inch spaced wires only are involved, whose length exceeds the average length of the five adjacent spans in each direction by 50 per cent. or more with a minimum length of:

LOADING AREA	MINIMUM LENGTH FOR LONG SPAN CONSTRUCTION
Heavy	225 feet
Medium	250 "
Light	325 "

(b) An occasional span, where 8-inch spaced wires are carried on the line, of more than 225 feet in length.

3.02 Catenary type construction is more expensive than the non-catenary type. Therefore, where under the provisions of paragraph (a) above, long span construction is required, make the long span of the non-catenary type unless it will be necessary to locate transpositions in the long span.

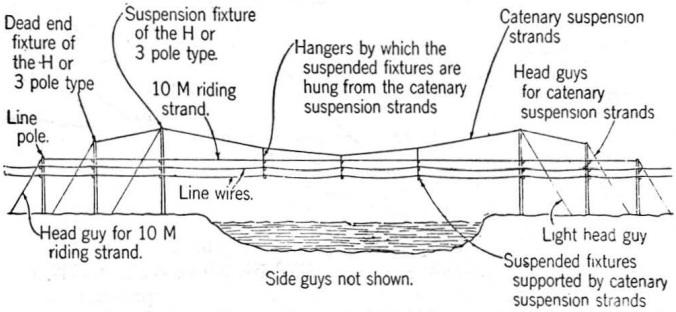
4. TYPES OF LONG SPAN FIXTURES

4.01 All long span fixtures covered by these practices are either of the H or 3 pole type.

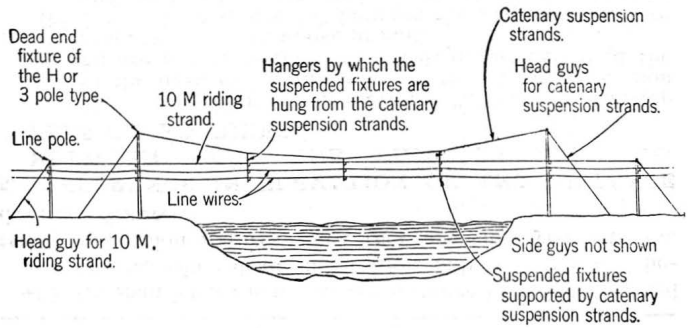
4.02 Dead end fixtures are the fixtures on which the catenary suspension strands are dead ended. The head guys to take the strain of the dead ended catenary suspension strands are located on the dead end fixtures.

4.03 Suspension fixtures are frequently used in conjunction with dead end fixtures in order to give the catenary suspension strands greater elevation.

4.04 The general arrangements of catenary type long spans both with and without suspension fixtures are indicated below:



Catenary Open Wire Long Span Crossing with Suspension Fixtures



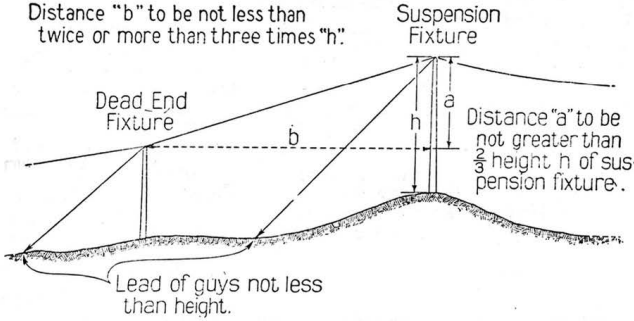
Catenary Open Wire Long Span Crossing without Suspension Fixtures.

4.05 By span length is meant the distance between dead end fixtures when dead end fixtures only are used and between suspension fixtures when they are employed with the dead end fixtures.

5. DIFFERENCE IN ELEVATION OF AND DISTANCE BETWEEN DEAD END FIXTURES AND SUSPENSION FIXTURES

(a) Make the difference in elevation "a" between the top of the dead end fixture and the top of the suspension fixture not more than two-thirds of the height of the suspension fixture above ground.

(b) Make the distance "b" between the suspension fixture and dead end fixture not less than twice or more than three times the height of the suspension fixture above ground.



6. LINE WIRE IN LONG SPAN

6.01 Use the same size and type of wire and the same pin spacing as used elsewhere in the line.

6.02 Place wire in the long span with the same sag and sag limitations as required elsewhere in the line and install transpositions as called for in the detail plans.

7. NUMBER, SIZE AND SAG OF CATENARY SUSPENSION STRANDS

7.01 The number, size and sag of catenary suspension strands for various crossarm loads and span lengths are given in the following tables.

7.02 Under the heading "Initial Sag and Tension for Catenary Suspension Strand" are shown the stringing sags for the catenary suspension strands together with the corresponding strand tensions. Sags in the catenary suspension strands should be measured by sighting in the usual way and tensions in the strands should be measured with the strand dynamometer. Both methods may be used as desired while pulling the catenary suspension strands up to the proper tension. In making the final check before clamping the suspension strands, however, the strand dynamometer should be used in cases where the sag is small and the tension high. Where the sag is great and the tension is low the sighting method should be used. This is for the reason that the dynamometer method is the more accurate where the strand tensions are high and the sags small while the sighting method is the more accurate with large sags and low tensions.

7.03 Where two catenary suspension strands are dead ended on one pole one strand is dead ended below the other. Where a long span is constructed without using a suspension fixture the lower of the two suspension strands should be installed first in accordance with the sag and tension information given below. The upper suspension strand should be installed so that it will sag down to a level with the lower strand at about the mid-point of the long span.

7.04 Under the heading "Separation Between Catenary Suspension Strand and Top Crossarm at Crossing Fixture" is shown the separation between the catenary suspension strand (the lower strand where one strand is below the other) and the crossarm carrying the 10M riding strand.

7.05 Under length of hangers is shown the length of the hangers required to hang the suspended fixtures from the catenary suspension strands so that with the wire in place the suspended fixtures will all hang in practically a straight line.

7.06 In the following tables the numbering of the suspended fixtures is from one long span crossing fixture to the other. The suspended fixtures should be evenly spaced across the span unless the detail plans state otherwise. For example, a 600-foot span with three suspended fixtures would have the first suspended fixture spaced 150 feet from the crossing fixture and the remaining two suspended fixtures located at 150 feet intervals.

HEAVY LOADING AREA

1 SUSPENDED FIXTURE

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers
			20° F.		60° F.		100° F.			
			Sag	Tension	Sag	Tension	Sag	Tension		
			200′ Span							
2 Arms	2	16 M	0′ 6″	4420	0′ 6″	3900	0′ 7″	3560	4′	8″
4 Arms	2	16 M	6′ 4″	—	6′ 6″	—	6′ 9″	—	9′	8″
6 Arms	2	16 M	11′10″	—	12′ 1″	—	12′ 6″	—	14′	8″
			250′ Span							
2 Arms	2	16 M	1′ 7″	2010	2′ 0″	1590	2′ 5″	1310	6′	8″
4 Arms	2	16 M	12′ 5″	—	12′ 8″	—	12′11″	—	16′	8″
6 Arms	2	25 M	9′ 6″	—	9′11″	—	10′ 2″	—	12′	8″
			300′ Span							
2 Arms	2	16 M	5′ 7″	830	6′ 2″	750	6′ 9″	680	9′	8″
4 Arms	2	25 M	6′ 8″	880	7′ 4″	820	7′ 9″	760	10′	8″
6 Arms	2	25 M	15′ 9″	—	16′ 0″	—	16′ 4″	—	18′	8″

HEAVY LOADING AREA

2 Suspended Fixtures

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers
			20° F.		60° F.		100° F.			
			Sag	Tension	Sag	Tension	Sag	Tension		
			300′ Span							
2 Arms	2	16 M	5′ 0″	915	5′ 7″	815	6′ 4″	725	9′	8″
4 Arms	2	25 M	7′ 5″	800	7′10″	760	8′ 6″	700	11′	8″
6 Arms	2	25 M	17′ 2″	—	17′ 5″	—	17′ 8″	—	19′	8″
			350′ Span							
2 Arms	2	25 M	1′ 1″	7300	1′ 2″	6700	1′ 5″	5730	5′	8″
4 Arms	2	25 M	13′ 1″	615	13′ 6″	595	14′ 2″	565	16′	8″
6 Arms	2	25 M	25′ 0″	—	25′ 3″	—	25′ 6″	—	27′	8″
			400′ Span							
2 Arms	2	25 M	1′11″	5530	2′ 2″	4770	2′ 7″	4040	6′	8″
4 Arms	2	25 M	19′ 2″	550	19′ 6″	540	19′11″	530	21′	8″
6 Arms	4	25 M	10′ 5″	1010	11′ 2″	940	11′11″	880	14′	8″
			450′ Span							
2 Arms	2	25 M	3′10″	3500	4′ 7″	2880	5′ 6″	2410	9′	8″
4 Arms	2	25 M	26′ 0″	—	26′ 3″	—	26′ 7″	—	28′	8″
6 Arms	4	25 M	15′10″	840	16′ 4″	820	17′ 0″	780	19′	8″

HEAVY LOADING AREA

3 SUSPENDED FIXTURES

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers	
			20° F.		60° F.		100° F.			First and Third	Second
			Sag	Tension	Sag	Tension	Sag	Tension			
					400′ Span						
2 Arms	2	25 M	2′ 8″	3960	3′ 0″	3500	3′ 7″	2920	8′	2′6″	8″
4 Arms	2	25 M	21′ 0″	—	21′ 5″	—	21′ 8″	—	23′	6′4″	8″
6 Arms	4	25 M	12′ 7″	835	13′ 0″	810	13′ 5″	780	16′	4′6″	8″
					450′ Span						
2 Arms	2	25 M	5′ 1″	2610	6′ 0″	2220	6′11″	1930	11′	3′3″	8″
4 Arms	4	25 M	4′11″	2720	5′ 8″	2340	6′ 6″	2050	11′	3′3″	8″
6 Arms	4	25 M	17′10″	—	18′ 5″	—	18′ 9″	—	21′	5′8″	8″
					500′ Span						
2 Arms	2	25 M	9′ 7″	1710	10′ 7″	1550	11′10″	1390	15′	4′3″	8″
4 Arms	4	25 M	9′ 4″	1760	10′ 1″	1630	11′ 5″	1440	15′	4′3″	8″
6 Arms	6	25 M	9′ 6″	1730	10′ 5″	1580	11′ 8″	1400	15′	4′3″	8″
					550′ Span						
2 Arms	2	25 M	15′ 0″	1320	15′10″	1260	16′ 8″	1190	20′	5′4″	8″
4 Arms	4	25 M	14′10″	1340	15′ 7″	1270	16′ 6″	1200	20′	5′4″	8″
6 Arms	6	25 M	10′ 0″	1990	11′ 3″	1780	12′ 6″	1590	17′	4′7″	8″
					600′ Span						
2 Arms	4	25 M	3′ 5″	6950	3′ 7″	6570	4′ 0″	5900	8′	2′6″	8″
4 Arms	6	25 M	6′ 0″	3940	6′ 8″	3530	7′ 6″	3150	13′	3′6″	8″
6 Arms	6	25 M	19′ 5″	1220	20′ 1″	1175	20′10″	1135	24′	6′4″	8″

HEAVY LOADING AREA

ULTIMATE LOAD OF 2 CROSSARMS OF WIRE

SPANS OVER 600 FT. IN LENGTH

Length of Span (Feet)	Total Number of 25 M Catenary Suspension Strands Required	Number of Suspended Fixtures	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strand and Top Crossarm at Crossing Fixtures	Length of Hangers Suspended Fixture Number						
			20° F.		60° F.		100° F.									
			Sag	Tension	Sag	Tension	Sag	Tension		1	2	3	4	5	6	7
650	4	4	5′ 5″	5130	6′ 1″	4550	7′ 0″	3960	12′	4′ 8″	8″	8″	4′8″			
700	4	4	7′ 8″	4180	8′10″	3660	10′ 0″	3220	15′	5′ 9″	8″	8″	5′9″			
750	4	5	11′ 7″	3180	12′11″	2860	14′ 2″	2600	19′	8′ 8″	2′ 7″	8″	2′7″	8′8″		
800	6	5	6′ 3″	6720	7′ 0″	6000	7′10″	5400	13′	6′ 6″	2′ 6″	8″	2′6″	6′6″		
850	6	5	8′ 1″	5850	9′ 0″	5230	10′ 1″	4700	15′	7′ 0″	2′ 6″	8″	2′6″	7′0″		
900	6	6	10′ 5″	5100	11′ 6″	4620	12′ 8″	4180	18′	9′ 3″	3′ 6″	8″	8″	3′6″	9′ 3″	
950	6	6	13′ 5″	4400	14′10″	4000	16′ 5″	3600	21′	10′10″	4′ 1″	8″	8″	4′1″	10′10″	
1000	6	6	17′ 0″	3860	18′ 6″	3540	20′ 2″	3250	25′	12′ 7″	4′ 8″	8″	8″	4′8″	12′ 7″	
1056	6	7	21′ 0″	3440	22′ 7″	3200	24′ 4″	2980	29′	16′ 7″	7′10″	2′6″	8″	2′6″	7′10″	16′7″

HEAVY LOADING AREA

ULTIMATE LOAD OF 4 CROSSARMS OF WIRE

SPANS OVER 600 FT. IN LENGTH

Length of Span (Feet)	Total Number of 25 M Catenary Suspension Strands Required	Number of Suspended Fixtures	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strand and Top Crossarm at Crossing Fixtures	Length of Hangers Suspended Fixture Number				
			20° F.		60° F.		100° F.							
			Sag	Tension	Sag	Tension	Sag	Tension		1	2	3	4	5
650	6	4	11′10″	2350	13′ 0″	2130	14′ 1″	1960	18′	6′11″	8″	8″	6′11″	
700	6	4	16′ 2″	2000	17′ 5″	1850	18′ 7″	1730	22′	8′ 4″	8″	8″	8′ 4″	
750	6	5	21′10″	1690	22′11″	1610	23′11″	1540	27′	12′ 4″	3′7″	8″	3′ 7″	12′4″

MEDIUM LOADING AREA

1 Suspended Fixture

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers
			20° F.		60° F.		100° F.			
			Sag	Tension	Sag	Tension	Sag	Tension		
200′ Span										
2 Arms	2	16 M	0′ 4″	7800	0′ 4″	7140	0′ 4″	6550	3′	8″
4 Arms	2	16 M	0′ 6″	4500	0′ 7″	3840	0′ 8″	3330	5′	8″
6 Arms	2	16 M	2′11″	700	3′ 5″	600	3′10″	535	7′	8″
250′ Span										
2 Arms	2	16 M	0′ 6″	6750	0′ 7″	5970	0′ 8″	5280	4′	8″
4 Arms	2	16 M	1′ 6″	2160	1′10″	1740	2′ 3″	1460	7′	8″
6 Arms	2	16 M	7′ 5″	—	7′ 8″	—	8′ 0″	—	11′	8″
300′ Span										
2 Arms	2	16 M	0′ 9″	6100	0′10″	5450	1′ 0″	4860	4′	8″
4 Arms	2	16 M	5′ 2″	880	5′10″	790	6′ 6″	700	10′	8″
6 Arms	2	16 M	13′ 0″	—	13′ 4″	—	13′ 9″	—	16′	8″

MEDIUM LOADING AREA

2 SUSPENDED FIXTURES

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers
			20° F.		60° F.		100° F.			
			Sag	Tension	Sag	Tension	Sag	Tension		
300′ Span										
2 Arms	2	16 M	0′ 9″	6230	0′10″	5680	0′11″	5280	4′	8″
4 Arms	2	16 M	6′ 1″	735	6′ 8″	670	7′ 5″	605	10′	8″
6 Arms	2	25 M	2′ 6″	2360	3′ 1″	1900	3′10″	1550	8′	8″
350′ Span										
2 Arms	2	16 M	1′ 2″	5400	1′ 5″	4440	1′ 7″	3880	6′	8″
4 Arms	2	16 M	10′10″	575	11′ 5″	545	11′11″	520	14′	8″
6 Arms	2	25 M	6′10″	1180	7′ 6″	1070	8′ 2″	980	12′	8″
400′ Span										
2 Arms	2	16 M	2′ 2″	3700	2′ 7″	3120	3′ 0″	2710	7′	8″
4 Arms	2	25 M	2′ 1″	5000	2′ 7″	4050	3′ 1″	3390	8′	8″
6 Arms	2	25 M	11′11″	880	12′ 7″	830	13′ 2″	790	16′	8″
450′ Span										
2 Arms	2	16 M	4′ 4″	2390	4′11″	2100	5′ 6″	1870	10′	8″
4 Arms	2	25 M	4′ 4″	3100	5′ 4″	2500	6′ 4″	2110	12′	8″
6 Arms	2	25 M	17′ 7″	755	18′ 1″	735	18′ 8″	710	21′	8″

MEDIUM LOADING AREA

3 Suspended Fixtures

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers	
			20° F.		60° F.		100° F.			First and Third	Second
			Sag	Tension	Sag	Tension	Sag	Tension			
					400′ Span						
2 Arms	2	25 M	0′11″	11600	1′ 0″	10900	1′ 1″	9900	5′	2′ 6″	8″
4 Arms	2	25 M	3′ 1″	3390	3′ 8″	2840	4′ 5″	2390	10′	3′ 0″	8″
6 Arms	2	25 M	14′ 6″	725	15′ 0″	700	15′ 6″	680	18′	5′ 0″	8″
					450′ Span						
2 Arms	2	25 M	1′ 3″	10500	1′ 4″	9750	1′ 6″	8700	6′	2′ 6″	8″
4 Arms	2	25 M	6′ 6″	2060	7′ 5″	1800	8′ 6″	1560	13′	3′10″	8″
6 Arms	2	25 M	20′ 1″	660	20′ 6″	650	21′ 0″	635	23′	6′ 4″	8″
					500′ Span						
2 Arms	2	25 M	1′ 9″	9400	1′10″	8900	2′ 1″	7800	7′	2′ 6″	8″
4 Arms	2	25 M	11′ 8″	1400	12′ 7″	1300	13′ 6″	1220	18′	4′10″	8″
6 Arms	4	25 M	3′ 5″	4800	4′ 0″	4100	4′ 7″	3600	11′	3′ 2″	8″
					550′ Span						
2 Arms	2	25 M	2′ 5″	8170	2′ 7″	7640	2′11″	6850	8′	2′ 6″	8″
4 Arms	4	25 M	2′ 3″	8750	2′ 5″	8280	2′ 8″	7350	8′	2′ 6″	8″
6 Arms	4	25 M	5′ 6″	3610	6′ 6″	3050	7′ 5″	2680	13′	3′10″	8″
					600′ Span						
2 Arms	2	25 M	3′ 4″	7150	3′ 8″	6380	4′ 1″	5750	10′	3′ 0″	8″
4 Arms	4	25 M	3′ 1″	7600	3′ 5″	6950	3′10″	6200	9′	2′ 9″	8″
6 Arms	4	25 M	9′ 2″	2560	10′ 6″	2250	11′10″	2000	17′	4′ 9″	8″

MEDIUM LOADING AREA

ULTIMATE LOAD OF 2 CROSSARMS OF WIRE

SPANS OVER 600 FT. IN LENGTH

Length of Span (Feet)	Total Number of 25 M Catenary Suspension Strands Required	Number of Suspended Fixtures	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strand and Top Crossarm at Crossing Fixtures	Length of Hangers Suspended Fixture Number								
			20° F.		60° F.		100° F.											
			Sag	Tension	Sag	Tension	Sag	Tension		1	2	3	4	5	6	7	8	9
650	2	4	4′10″	5775	5′ 5″	5140	6′ 1″	4550	14′	4′11″	8″	8″	4′11″					
700	2	4	6′10″	4740	7′ 8″	4180	8′11″	3620	16′	5′ 9″	8″	8″	5′ 9″					
750	2	5	10′ 4″	3580	11′ 7″	3180	12′11″	2860	21′	9′ 7″	2′11″	8″	2′11″	9′ 7″				
800	4	5	4′ 1″	*	4′ 6″	9450	4′10″	8750	11′	5′ 7″	2′ 6″	8″	2′ 6″	5′ 7″				
850	4	5	4′11″	9680	5′ 4″	8950	5′ 9″	8250	13′	6′ 2″	2′ 6″	8″	2′ 6″	6′ 2″				
900	4	6	5′10″	9150	6′ 4″	8450	6′11″	7700	14′	7′ 1″	2′10″	8″	8″	2′10″	7′10″			
950	4	6	7′ 0″	8450	7′ 7″	7780	8′ 5″	7050	16′	8′ 2″	3′ 2″	8″	8″	3′ 2″	8′ 2″			
1000	4	6	8′ 4″	7910	9′ 1″	7220	10′ 0″	6560	18′	9′ 1″	3′ 5″	8″	8″	3′ 5″	9′ 1″			
1050	6	7	6′10″	*	7′ 4″	9850	8′ 0″	9100	15′	9′ 1″	5′ 0″	2′ 6″	8″	2′ 6″	5′ 0″	9′ 1″		
1100	6	7	8′ 0″	10000	8′ 7″	9250	9′ 4″	8550	17′	9′11″	5′ 3″	2′ 6″	8″	2′ 6″	5′ 3″	9′11″		
1150	6	7	9′ 1″	9600	9′10″	8850	10′ 7″	8200	19′	10′10″	5′ 8″	2′ 6″	8″	2′ 6″	5′ 8″	10′10″		
1200	6	8	10′ 5″	9070	11′ 4″	8350	12′ 4″	7700	20′	12′ 1″	6′ 5″	2′ 7″	8″	8″	2′ 7″	6′ 5″	12′ 1″	
1250	6	8	11′ 7″	8850	12′ 7″	8150	13′ 7′	7550	22′	13′ 1″	6′11″	2′ 9″	8″	8″	2′ 9″	6′11″	13′ 1″	
1300	6	8	13′ 4″	8350	14′ 5″	7720	15′ 8″	7070	24′	14′ 6″	7′ 7″	3′ 0″	8″	8″	3′ 0″	7′ 7″	14′ 6″	
1350	6	9	15′ 2″	7920	16′ 5″	7300	17′11″	6700	28′	18′ 1″	10′10″	5′ 7″	2′ 6″	8″	2′ 6″	5′ 7″	10′10″	18′1″
1400	6	9	17′ 1″	7550	18′ 7″	6950	20′ 2″	6400	30′	19′ 7″	11′ 7″	5′11″	2′ 6″	8″	2′ 6″	5′11″	11′ 7″	19′7′

*Note: Tension greater than 10,000 lbs.

MEDIUM LOADING AREA

ULTIMATE LOAD OF 4 CROSSARMS OF WIRE

SPANS OVER 600 FT. IN LENGTH

Length of Span (Feet)	Total Number of 25 M Catenary Suspension Strands Required	Number of Suspended Fixtures	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strand and Top Crossarm at Crossing Fixtures	Length of Hangers Suspended Fixture Number						
			20° F.		60° F.		100° F.									
			Sag	Tension	Sag	Tension	Sag	Tension		1	2	3	4	5	6	7
650	4	4	4′5″	6300	5′ 0″	5600	5′ 7″	4950	13′	4′ 6″	8″	8″	4′6″			
700	4	4	6′1″	5280	6′11″	4670	7′11″	4080	15′	5′ 5″	8″	8″	5′5″			
750	4	5	9′0″	4120	10′ 1″	3660	11′ 4″	3250	19′	9′ 0″	2′9″	8″	2′9″	9′0″		
800	6	5	5′1″	8250	5′ 6″	7500	6′ 2″	6800	14′	6′ 7″	2′6″	8″	2′6″	6′7″		
850	6	5	6′4″	7520	7′ 0″	6780	7′ 8″	6150	16′	7′ 4″	2′6″	8″	2′6″	7′4″		
900	6	6	8′0″	6650	8′11″	5960	9′11″	5370	18′	9′ 4″	3′7″	8″	8″	3′7″	9′ 4″	
950	6	6	10′0″	5900	11′ 2″	5270	12′ 5″	4750	21′	10′ 7″	4′1″	8″	8″	4′1″	10′ 7″	
1000	6	6	12′5″	5290	13′ 8″	4800	15′ 1″	4350	24′	11′11″	4′6″	8″	8″	4′6″	11′11″	
1050	6	7	15′8″	4600	17′ 2″	4200	18′11″	3830	28′	16′ 0″	7′7″	2′6″	8 ″	2′6″	7′ 7″	16′0″

MEDIUM LOADING AREA

ULTIMATE LOAD OF 6 CROSSARMS OF WIRE

SPANS OVER 600 FT. IN LENGTH

Length of Span (Feet)	Total Number of 25 M Catenary Suspension Strands Required	Number of Suspended Fixtures	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strand and Top Cross-arm at Crossing Fixtures	Length of Hangers Suspended Fixture Number					
			20° F.		60° F.		100° F.								
			Sag	Tension	Sag	Tension	Sag	Tension		1	2	3	4	5	6
650	6	4	4′ 8″	5900	5′4″	5230	6′ 1″	4580	13′	4′ 8″	8″	8″	4′8″		
700	6	4	6′ 6″	4950	7′6″	4300	8′ 8″	3700	16′	5′ 6″	8″	8″	5′6″		
750	6	5	8′10″	4200	10′0″	3700	11′ 4″	3260	19′	8′11″	2′9″	8″	2′9″	8′11″	
800	6	5	12′ 1″	3470	13′6″	3100	14′10″	2840	23′	10′ 4″	3′1″	8″	3′1″	10′ 4″	
850	6	5	16′ 1″	2940	17′6″	2700	18′11″	2500	26′	11′11″	3′6″	8″	3′6″	11′11″	
900	6	6	21′ 0″	2530	22′5″	2370	23′10″	2230	30′	15′ 4″	5′7″	8″	8″	5′ 7″	15′4″

LIGHT LOADING AREA

1 Suspended Fixture

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers
			20° F.		60° F.		100° F.			
			Sag	Tension	Sag	Tension	Sag	Tension		
					200′ Span					
2 Arms	2	10 M	0′ 4″	4600	0′ 4″	4150	0′ 4″	3800	3′	8″
4 Arms	2	10 M	0′ 4″	3800	0′ 5″	3400	0′ 6″	3000	5′	8″
6 Arms	2	10 M	0′ 6″	2740	0′ 7″	2330	0′ 8″	1930	6′	8″
					250′ Span					
2 Arms	2	10 M	0′ 6″	4530	0′ 6″	4080	0′ 7″	3680	4′	8″
4 Arms	2	10 M	0′ 7″	3600	0′ 8″	3180	0′ 9″	2780	6′	8″
6 Arms	2	10 M	0′11″	2260	1′ 2″	1825	1′ 5″	1500	8′	8″
					300′ Span					
2 Arms	2	10 M	0′ 8″	4350	0′ 9″	4000	0′10″	3560	5′	8″
4 Arms	2	10 M	1′ 0″	3220	1′ 1″	2830	1′ 3″	2410	7′	8″
6 Arms	2	10 M	3′ 1″	980	3′ 9″	800	4′ 5″	675	11′	8″

LIGHT LOADING AREA

2 SUSPENDED FIXTURES

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers
			20° F.		60° F.		100° F.			
			Sag	Tension	Sag	Tension	Sag	Tension		
			300′ Span							
2 Arms	2	16 M	0′ 8″	7150	0′ 8″	6550	0′ 9″	5950	4′	8″
4 Arms	2	16 M	0′ 8″	7150	0′ 8″	6550	0′ 9″	5950	5′	8″
6 Arms	2	16 M	0′ 8″	6550	0′10″	5720	0′11″	5080	6′	8″
			350′ Span							
2 Arms	2	16 M	0′10″	7130	0′11″	6600	1′ 0″	5950	4′	8″
4 Arms	2	16 M	0′10″	7130	0′11″	6600	1′ 0″	5950	5′	8″
6 Arms	2	16 M	0′11″	6530	1′ 2″	5400	1′ 4″	4600	8′	8″
			400′ Span							
2 Arms	2	16 M	1′ 2″	7070	1′ 3″	6550	1′ 4″	5980	5′	8″
4 Arms	2	16 M	1′ 2″	6770	1′ 4″	6250	1′ 5″	5800	7′	8″
6 Arms	2	16 M	1′11″	4270	2′ 3″	3600	2′ 8″	3000	10′	8″
			450′ Span							
2 Arms	2	16 M	1′ 5″	7200	1′ 7″	6630	1′ 9″	6000	6′	8″
4 Arms	2	16 M	1′ 7″	6630	1′ 9″	5860	1′11″	5260	8′	8″
6 Arms	2	16 M	3′ 6″	2940	4′ 1″	2500	4′ 8″	2180	13′	8″

LIGHT LOADING AREA

3 Suspended Fixtures

Ultimate Wire Load	Total Number of Catenary Suspension Strands Required	Size of Catenary Suspension Strand	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strands and Top Crossarm at Crossing Fixtures	Length of Hangers	
			20° F.		60° F		100° F.			First and Third	Second
			Sag	Tension	Sag	Tension	Sag	Tension			
					400′ Span						
2 Arms	2	16 M	1′ 1″	7400	1′ 2″	6800	1′ 4″	5800	6′	2′ 6″	8″
4 Arms	2	16 M	1′ 4″	6250	1′ 5″	5800	1′ 7″	5100	8′	2′ 6″	8″
6 Arms	2	16 M	3′ 2″	2540	4′ 0″	2030	4′ 6″	1800	12′	3′ 6″	8″
					450′ Span						
2 Arms	2	16 M	1′ 5″	7350	1′ 6″	6900	1′ 7″	6450	7′	2′ 6″	8″
4 Arms	2	16 M	2′ 0″	5150	2′ 2″	4900	2′ 5″	4300	10′	3′ 0″	8″
6 Arms	2	16 M	5′ 5″	1900	6′ 7″	1560	7′ 5″	1390	15′	4′ 2″	8″
					500′ Span						
2 Arms	2	16 M	1′ 8″	7450	1′10″	6850	2′ 0″	6350	7′	2′ 6″	8″
4 Arms	2	16 M	2′ 8″	4700	3′ 1″	4100	3′ 7″	3530	12′	3′ 6″	8″
6 Arms	2	16 M	9′ 1″	1400	10′ 0″	1270	10′10″	1180	18′	5′ 0″	8″
					550′ Span						
2 Arms	2	16 M	2′ 1″	7300	2′ 3″	6830	2′ 5″	6400	8′	2′ 6″	8″
4 Arms	2	16 M	4′ 0″	3840	4′ 7″	3340	5′ 1″	3000	14′	4′ 0″	8″
6 Arms	2	25 M	2′ 4″	8450	2′ 7″	7800	2′ 9″	7220	12′	3′ 7″	8″
					600′ Span						
2 Arms	2	16 M	2′ 7″	7000	2′ 8″	6780	3′ 0″	6100	9′	2′10″	8″
4 Arms	2	16 M	5′ 8″	3200	6′ 4″	2860	6′11″	2650	17′	4′ 7″	8″
6 Arms	2	25 M	3′ 1″	7750	3′ 4″	7200	3′ 8″	6500	14′	4′ 0″	8″

LIGHT LOADING AREA

ULTIMATE LOAD OF 2 CROSSARMS OF WIRE

SPANS OVER 600 FT. IN LENGTH

Length of Span (Feet)	Total Number of 25 M Catenary Suspension Strands Required	Number of Suspended Fixtures	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strand and Top Crossarm at Crossing Fixtures	Length of Hangers Suspended Fixture Number									
			20° F.		60° F.		100° F.												
			Sag	Tension	Sag	Tension	Sag	Tension		1	2	3	4	5	6	7	8	9	10
650	2	4	2′ 1″	*	2′ 3″	*	2′ 4″	*	8′	3′ 0″	8″	8″	3′0″						
700	2	4	2′ 5″	*	2′ 7″	*	2′ 9″	*	9′	3′ 5″	8″	8″	3′5″						
750	2	5	2′10″	*	3′ 1″	*	3′ 3″	*	12′	5′10″	2′ 6″	8″	2′6″	5′10″					
800	2	5	3′ 4″	*	3′ 6″	*	3′ 9″	*	13′	6′ 3″	2′ 6″	8″	2′6″	6′ 3″					
850	2	5	3′10″	*	4′ 1″	*	4′ 5″	*	14′	6′ 8″	2′ 6″	8″	2′6″	6′ 8″					
900	2	6	4′ 5″	*	4′ 9″	*	5′ 1″	*	16′	8′ 0″	3′ 2″	8″	8″	3′ 2″	8′ 0″				
950	2	6	5′ 1″	*	5′ 6″	*	5′11″	*	17′	8′ 8″	3′ 5″	8″	8″	3′ 5″	8′ 8″				
1000	2	6	5′10″	*	6′ 3″	*	6′ 8″	9800	19′	9′ 6″	3′ 7″	8″	8″	3′ 7″	9′ 6″				
1050	4	7	5′ 4″	*	5′ 8″	*	6′ 1″	*	15′	8′ 8″	4′10″	2′ 6″	8″	2′ 6″	4′10″	8′ 8″			
1100	4	7	6′ 0″	*	6′ 4″	*	6′ 9″	*	16′	9′ 2″	5′ 0″	2′ 6″	8″	2′ 6″	5′ 0″	9′ 2″			
1150	4	7	6′ 7″	*	7′ 0″	*	7′ 6″	*	17′	9′11″	5′ 4″	2′ 6″	8″	2′ 6″	5′ 4″	9′11″			
1200	4	8	7′ 4″	*	7′10″	*	8′ 4″	*	18′	10′ 8″	5′ 8″	2′ 6″	8″		8″	2′ 6″	5′ 8″	10′ 8″	
1250	4	8	8′ 0″	*	8′ 6″	*	9′ 0″	*	19′	11′ 4″	6′ 0″	2′ 6″	8″		8″	2′ 6″	6′ 0″	11′ 4″	
1300	4	8	8′10″	*	9′ 4″	*	9′11″	*	20′	12′ 1″	6′ 6″	2′ 7″	8″		8″	2′ 7″	6′ 6″	12′ 1″	
1350	6	9	8′11″	*	9′ 5″	*	10′ 0″	*	19′	12′ 7″	7′11″	4′ 6″	2′6″		8″	2′ 6″	4′ 6″	7′11″	12′7″
1400	6	9	9′ 7″	*	10′ 2″	*	10′10″	*	20′	13′ 6″	8′ 5″	4′ 8″	2′6″		8″	2′ 6″	4′ 8″	8′ 5″	13′6″
1450	6	9	10′ 5″	*	11′ 1″	*	11′ 8″	*	21′	14′ 1″	8′ 8″	4′10″	2′6″		8″	2′ 6″	4′10″	8′ 8″	14′1″
1500	6	10	11′ 2″	*	11′11″	*	12′ 7″	*	22′	15′ 0″	9′ 6″	5′ 5″	2′6″		8″	8″	2′ 6″	5′ 5″	9′6″	15′0″

*Note: Tension greater than 10,000 lbs.

LIGHT LOADING AREA

ULTIMATE LOAD OF 4 CROSSARMS OF WIRE

SPANS OVER 600 FT. IN LENGTH

Length of Span (Feet)	Total Number of 25 M Catenary Suspension Strands Required	Number of Suspended Fixtures	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strand and Top Crossarm at Crossing Fixtures	Length of Hangers Suspended Fixture Number									
			20° F.		60° F.		100° F.												
			Sag	Tension	Sag	Tension	Sag	Tension		1	2	3	4	5	6	7	8	9	10
650	2	4	2′7″	*	2′10″	9900	3′ 1″	9050	13′	4′ 7″	8″	8″	4′ 7″						
700	2	4	3′2″	*	3′ 6″	9350	3′ 9″	8600	15′	5′ 2″	8″	8″	5′ 2″						
750	2	5	4′1″	9000	4′ 6″	8300	4′10″	7600	18′	8′ 3″	2′ 7″	8″	2′ 7″	8′3″					
800	4	5	3′2″	*	3′ 6″	*	3′ 7″	*	12′	6′ 0″	2′ 6″	8″	2′ 6″	6′0″					
850	4	5	3′9″	*	4′ 0″	*	4′ 3″	*	13′	6′ 5″	2′ 6″	8″	2′ 6″	6′5″					
900	4	6	4′6″	*	4′10″	*	5′ 3″	*	15′	7′11″	3′ 1″	8″	8″	3′1″	7′11″				
950	4	6	5′0″	*	5′ 4″	*	5′ 8″	*	16′	8′ 1″	3′ 2″	8″	8″	3′2″	8′ 1″				
1000	4	6	5′7″	*	6′ 0″	*	6′ 6″	*	17′	8′10″	3′ 5″	8″	8″	3′5″	8′10″				
1050	4	7	6′5″	*	6′11″	*	7′ 5″	9800	21′	12′ 0″	6′ 1″	2′ 6″	8″	2′6″	6′ 1″	12′ 0″			
1100	6	7	6′3″	*	6′ 8″	*	7′ 1″	*	17′	10′ 2″	5′ 5″	2′ 6″	8″	2′6″	5′ 5″	10′ 2″			
1150	6	7	7′0″	*	7′ 4″	*	7′10″	*	18′	10′ 9″	5′ 7″	2′ 6″	8″	2′6″	5′ 7″	10′ 9″			
1200	6	8	7′8″	*	8′ 2″	*	8′10″	*	20′	12′ 0″	6′ 5″	2′ 7″	8″	8″	2′ 7″	6′ 5″	12′ 0″		
1250	6	8	8′6″	*	9′ 0″	*	9′ 7″	*	21′	12′10″	6′10″	2′ 8″	8″	8″	2′ 8″	6′10″	12′10″		
1300	6	8	9′4″	*	10′ 0″	*	10′ 8″	*	23′	13′ 7″	7′ 2″	2′10″	8″	8″	2′10″	7′ 2″	13′ 7″		
1350	6	9	10′4″	*	11′ 1″	*	11′11″	*	26′	17′ 2″	10′ 4″	5′ 5″	2′ 6″	8″	2′ 6″	5′ 5″	10′ 4″	17′ 2″	
1400	6	9	11′4″	*	12′ 1″	*	13′ 0″	9900	28′	18′ 1″	10′10″	5′ 8″	2′ 6″	8″	2′ 6″	5′ 8″	10′10″	18′ 1″	
1450	6	9	12′4″	*	13′ 1″	*	14′ 0″	9850	29′	18′11″	11′ 4″	5′10″	2′ 6″	8″	2′ 6″	5′10″	11′ 4″	18′11″	
1500	6	10	13′8″	*	14′ 7″	*	15′ 7″	9450	31′	20′11″	12′10″	6′11″	2′10″	8″	8″	2′10″	6′11″	12′10″	20′11″

* Note: Tension greater than 10,000 lbs.

LIGHT LOADING AREA

ULTIMATE LOAD OF 6 CROSSARMS OF WIRE

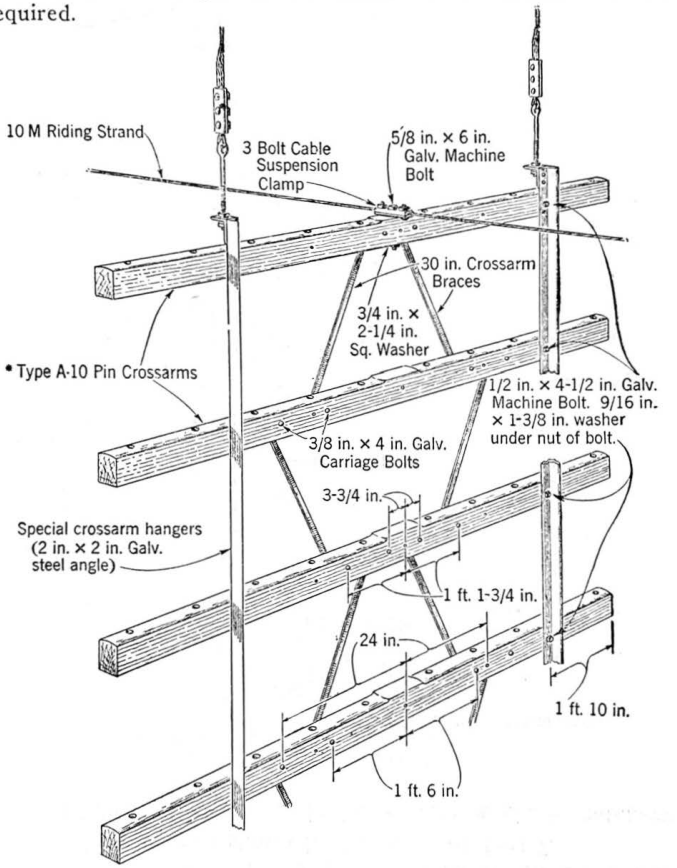
SPANS OVER 600 FT. IN LENGTH

Length of Span (Feet)	Total Number of 25 M Catenary Suspension Strands Required	Number of Suspended Fixtures	Initial Sag and Tension for Catenary Suspension Strand						Separation Between Catenary Suspension Strand and Top Crossarm at Crossing Fixtures	Length of Hangers Suspended Fixture Number						
			20° F.		60° F.		100° F.									
			Sag	Tension	Sag	Tension	Sag	Tension		1	2	3	4	5	6	7
650	2	4	4′ 4″	6450	4′10″	5750	5′ 6″	5050	18′	6′ 6″	8″	8″	6′6″			
700	4	4	2′ 8″	*	2′11″	*	3′ 1″	*	11′	4′ 1″	8″	8″	4′1″			
750	4	5	3′ 3″	*	3′ 6″	*	3′ 9″	9850	14′	6′10″	2′ 6″	8″	2′6″	6′10″		
800	4	5	3′10″	*	4′ 1″	*	4′ 5″	9550	16′	7′ 5″	2′ 6″	8″	2′6″	7′ 5″		
850	4	5	4′ 6″	*	4′10″	*	5′ 2″	9850	17′	8′ 0″	2′ 6″	8″	2′6″	8′ 0″		
900	6	6	4′ 4″	*	4′ 7″	*	4′11″	*	14′	7′ 4″	2′11″	8″	8″	2′11″	7′ 4″	
950	6	6	4′10″	*	5′ 2″	*	5′ 7″	*	16′	8′ 1″	3′ 2″	8″	8″	3′ 2″	8′ 1″	
1000	6	6	5′ 7″	*	6′ 0″	*	6′ 5″	*	17′	8′10″	3′ 6″	8″	8″	3′ 6″	8′10″	
1050	6	7	6′ 5″	*	6′10″	*	7′ 4″	9850	21′	11′11″	6′ 1″	2′6″	8″	2′ 6″	6′ 1″	11′11″
1100	6	7	7′ 2″	*	7′ 8″	*	8′ 5″	9450	22′	12′10″	6′ 5″	2′6″	8″	2′ 6″	6′ 5″	12′10″
1150	6	7	8′ 1″	*	8′ 8″	9950	9′ 5″	9250	24′	13′ 8″	6′ 9″	2′6″	8″	2′ 6″	6′ 9″	13′ 8″
1200	6	8	9′ 2″	*	10′ 0″	9450	10′10″	8750	26′	15′10″	8′ 4″	3′2″	8″	3′ 2″	8′ 4″	15′10″
1250	6	8	10′ 4″	9950	11′ 1″	9250	12′ 0″	8550	28′	17′ 0″	8′11″	3′6″	8″	3′ 6″	8′11″	17′ 0″
1300	6	8	11′ 6″	9650	12′ 5″	8950	13′ 5″	8300	30′	18′ 4″	9′ 6″	3′7″	8″	3′ 7″	9′ 6″	18′ 4″

*Note: Tension greater than 10,000 lbs.

8. ASSEMBLY OF SUSPENDED FIXTURES

8.01 The assembly of a suspended fixture for use where two or four catenary suspension strands are used is shown below. Where six catenary suspension strands are used a third crossarm hanger at the center of the fixture will be required.

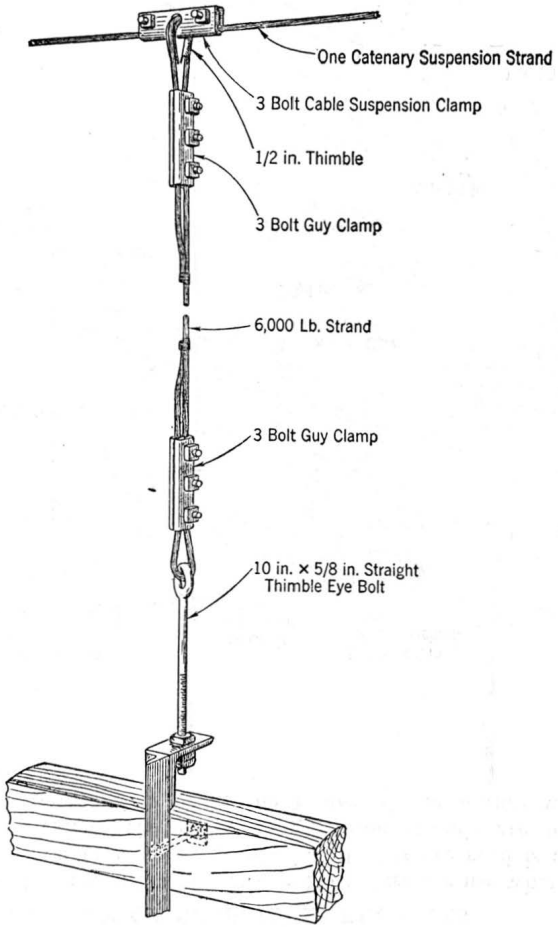


• Note: Where C-10 pin crossarms are used on the line use C-10 pin crossarms for the corresponding crossarms on the suspended fixtures.

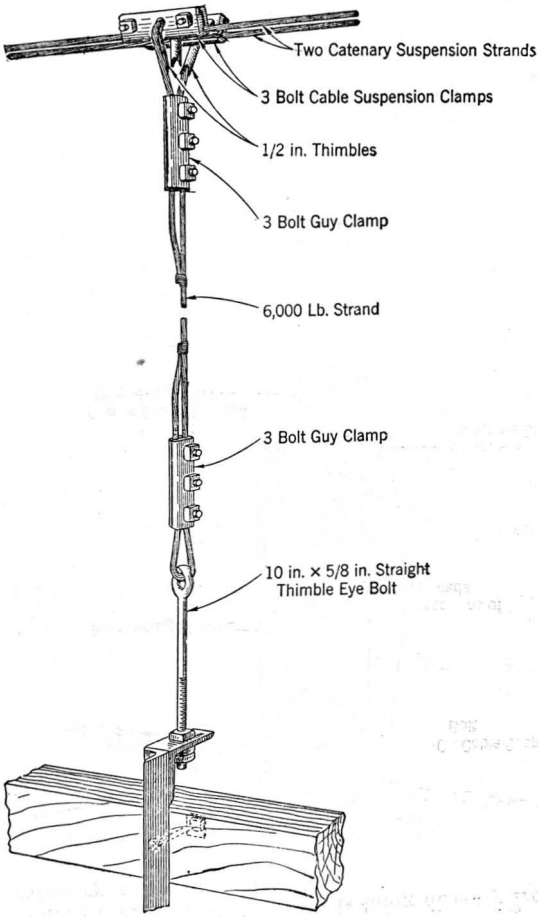
9. SUSPENSION STRAND HANGERS

9.01 Make suspension strand hangers as shown below and of the lengths shown in the tables of Part 7.

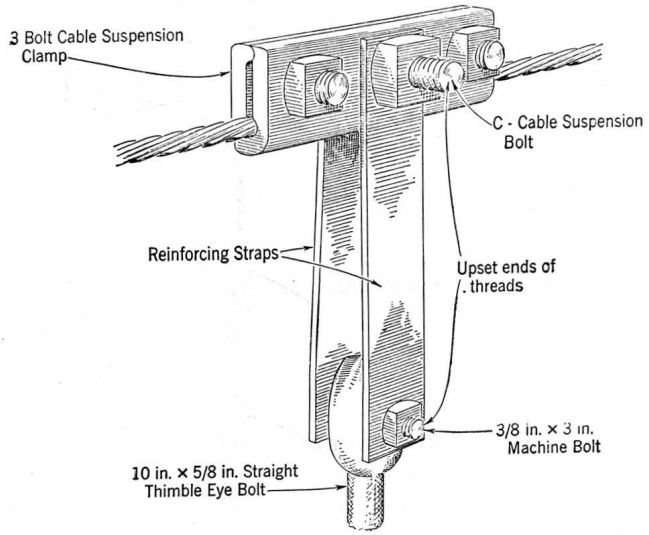
(a) Where the hanger is hung from a single catenary suspension strand.

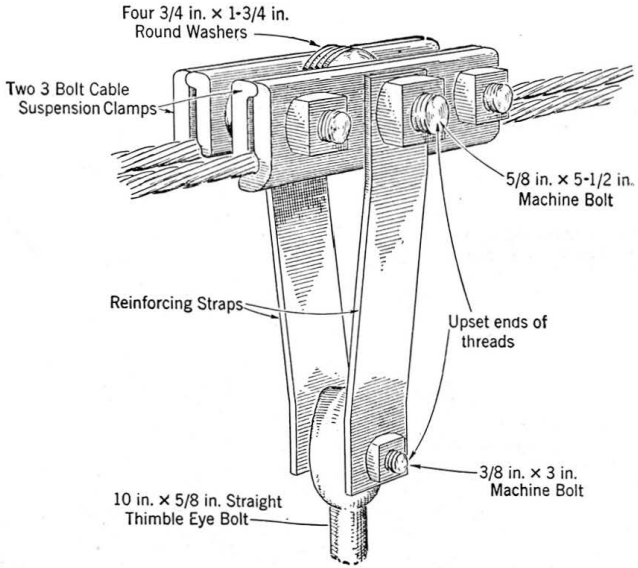


(b) Where the hanger is hung from two catenary suspension strands.



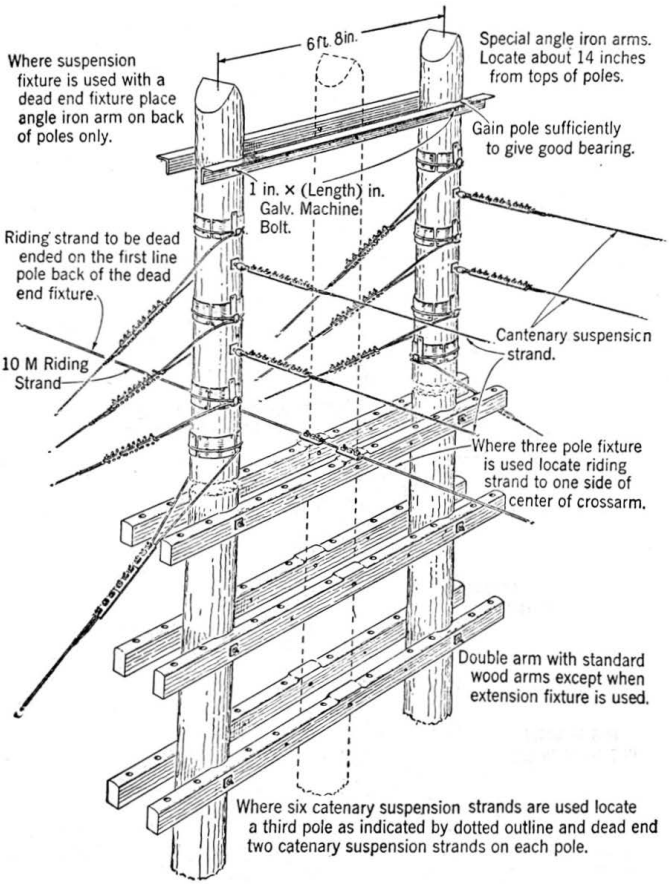
(c) Where the suspended fixture is hung directly from the catenary suspension strand.




Four 3/4 in. × 1-3/4 in.
Round Washers
Two 3 Bolt Cable
Suspension Clamps
5/8 in. × 5-1/2 in.
Machine Bolt
Reinforcing Straps
Upset ends of
threads
3/8 in. × 3 in.
Machine Bolt
10 in. × 5/8 in. Straight
Thimble Eye Bolt

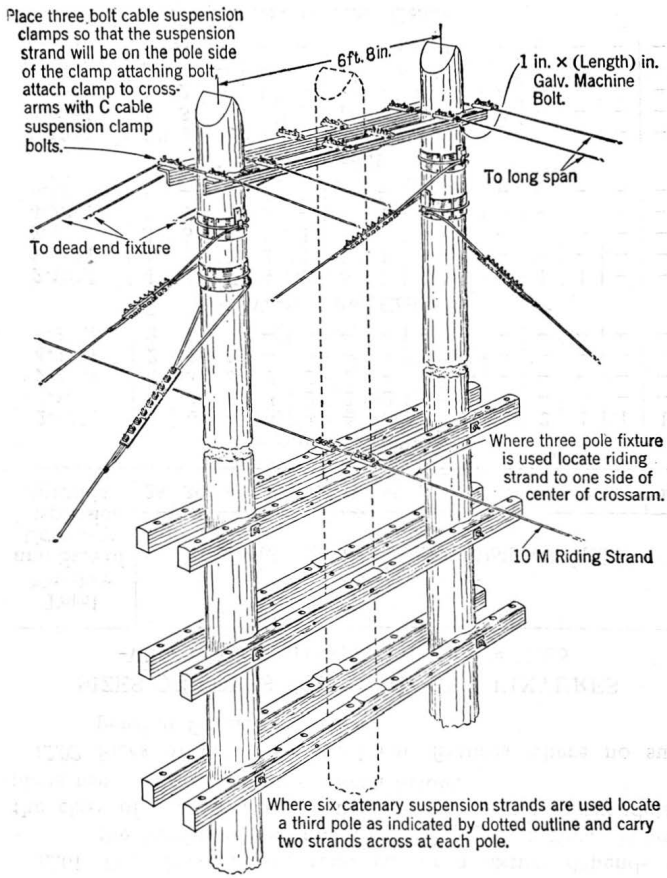
10. CROSSARM ARRANGEMENTS AT DEAD END FIXTURES

10.01 The crossarm arrangement at dead end fixtures shall be as indicated below.



11. CROSSARM ARRANGEMENTS AT SUSPENSION FIXTURES

11.01 The crossarm arrangement at suspension fixtures shall be as indicated below.



12. SIZES OF POLES FOR FIXTURES

12.01 The class of pole required for a fixture depends on the height of pole and the load to be carried. Where the class of the poles to be used is not shown in the detail plans use poles of the class shown below.

12.02 Sizes of poles for dead end fixtures where no suspension fixture is used.

SIZES OF POLES FOR DEAD END FIXTURES
WHERE NO SUSPENSION FIXTURE IS USED

Total Number and Size of Catenary Suspension Strands	Class of Pole for Length of Pole Indicated													
	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Creosoted Yellow Pine														
2-10M	4	4	4	4	4	4	3	3	2	2	2	1	1	1
2-16M	4	4	3	3	2	2	2	1	1	–	–	–	–	–
2-25M	4	3	3	2	2	1	–	–	–	–	–	–	–	–
4-25M	2	1	1	–	–	–	–	–	–	–	–	–	–	–
6-25M	2	1	–	–	–	–	–	–	–	–	–	–	–	–
Western Red Cedar														
2-10M	4	4	4	4	3	3	2	2	2	1	1	1	–	–
2-16M	4	3	3	2	1	1	1	–	–	–	–	–	–	–
2-25M	3	3	2	1	1	–	–	–	–	–	–	–	–	–
4-25M	1	1	–	–	–	–	–	–	–	–	–	–	–	–
6-25M	1	–	–	–	–	–	–	–	–	–	–	–	–	–
Chestnut														
2-10M	4	4	4	4	3	3	2	2	1	1	–	–	–	–
2-16M	4	3	2	2	1	1	–	–	–	–	–	–	–	–
2-25M	3	2	2	1	–	–	–	–	–	–	–	–	–	–
4-25M	1	–	–	–	–	–	–	–	–	–	–	–	–	–
6-25M	1	–	–	–	–	–	–	–	–	–	–	–	–	–
Northern White Cedar														
2-10M	4	4	4	4	3	3	3	2	–	–	–	–	–	–
2-16M	4	4	3	2	2	1	1	–	–	–	–	–	–	–
2-25M	4	3	2	1	1	–	–	–	–	–	–	–	–	–
4-25M	2	1	–	–	–	–	–	–	–	–	–	–	–	–
6-25M	1	1	–	–	–	–	–	–	–	–	–	–	–	–

12.03 Sizes of poles for dead end fixtures where suspension fixtures are used.

SIZES OF POLES FOR DEAD END FIXTURES

Where Suspension Fixtures Are Used

Total Number and Size of Catenary Suspension Strands	Class of Pole for Length of Pole Indicated													
	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Creosoted Yellow Pine														
2-10M	4	4	4	4	4	4	4	3	3	2	2	2	1	1
2-16M	4	4	4	4	3	3	2	2	1	1	1	–	–	–
2-25M	4	4	4	3	3	2	2	1	1	–	–	–	–	–
4-25M	3	2	1	1	–	–	–	–	–	–	–	–	–	–
6-25M	3	2	1	1	–	–	–	–	–	–	–	–	–	–
Western Red Cedar														
2-10M	4	4	4	4	4	3	3	2	2	2	1	1	1	1
2-16M	4	4	3	3	2	2	1	1	–	–	–	–	–	–
2-25M	4	4	3	2	2	1	1	–	–	–	–	–	–	–
4-25M	2	1	1	–	–	–	–	–	–	–	–	–	–	–
6-25M	2	1	1	–	–	–	–	–	–	–	–	–	–	–
Chestnut														
2-10M	4	4	4	4	4	3	3	2	2	2	–	–	–	–
2-16M	4	4	3	3	2	2	1	1	–	–	–	–	–	–
2-25M	4	3	3	2	1	1	–	–	–	–	–	–	–	–
4-25M	2	1	–	–	–	–	–	–	–	–	–	–	–	–
6-25M	2	1	–	–	–	–	–	–	–	–	–	–	–	–
Northern White Cedar														
2-10M	4	4	4	4	4	3	3	3	–	–	–	–	–	–
2-16M	4	4	4	3	2	2	1	1	–	–	–	–	–	–
2-25M	4	4	3	2	2	1	1	–	–	–	–	–	–	–
4-25M	3	2	1	–	–	–	–	–	–	–	–	–	–	–
6-25M	3	2	1	–	–	–	–	–	–	–	–	–	–	–

12.04 Sizes of poles for suspension fixtures.

SIZES OF POLES FOR SUSPENSION FIXTURES

Total Number and Size of Catenary Suspension Strands	Class of Pole for Length of Pole Indicated										
	40	45	50	55	60	65	70	75	80	85	90
Creosoted Yellow Pine											
2-10M	4	4	4	4	4	4	4	4	4	3	3
2-16M	4	4	4	4	3	3	3	2	2	2	1
2-25M	4	4	3	3	2	2	2	1	1	–	–
4-25M	2	2	1	1	–	–	–	–	–	–	–
6-25M	2	1	1	–	–	–	–	–	–	–	–
Western Red Cedar											
2-10M	4	4	4	4	4	4	4	3	3	3	3
2-16M	4	4	3	3	3	2	2	2	1	1	1
2-25M	3	3	2	2	1	1	1	–	–	–	–
4-25M	1	1	–	–	–	–	–	–	–	–	–
6-25M	1	–	–	–	–	–	–	–	–	–	–
Chestnut											
2-10M	4	4	4	4	4	4	2	–	–	–	–
2-16M	4	4	3	3	3	2	2	–	–	–	–
2-25M	3	2	2	2	1	1	1	–	–	–	–
4-25M	1	1	–	–	–	–	–	–	–	–	–
6-25M	1	–	–	–	–	–	–	–	–	–	–
Northern White Cedar											
2-10M	4	4	4	4	4	–	–	–	–	–	–
2-16M	4	4	4	3	3	–	–	–	–	–	–
2-25M	3	3	2	2	2	–	–	–	–	–	–
4-25M	2	1	1	–	–	–	–	–	–	–	–
6-25M	1	–	–	–	–	–	–	–	–	–	–

13. LEAD OF GUYS

13.01 Make the lead of all head guys as nearly as practicable 1-1/4 times the height of the guy and the lead of all side guys not less than the height of the side guy.

14. HEAD GUYING DEAD END FIXTURES

14.01 Head guy dead end fixtures away from the long span as follows.

Catenary Suspension Strands		Head Guys	
Number per Pole	Size	Number per Pole	Size
1	10,000	2	10,000
1	16,000	2	16,000
1	25,000	2	25,000
2	25,000	3	25,000

15. HEAD GUYING SUSPENSION FIXTURES

15.01 Head guy each pole of a suspension fixture away from the long span using one 6M strand attached directly below the angle iron crossarms supporting the catenary suspension strands.

16. HEAD GUYING FOR THE 10M RIDING STRAND

16.01 Dead end the 10M riding strand on the first line pole beyond the dead end fixture and head guy with one 10M guy.

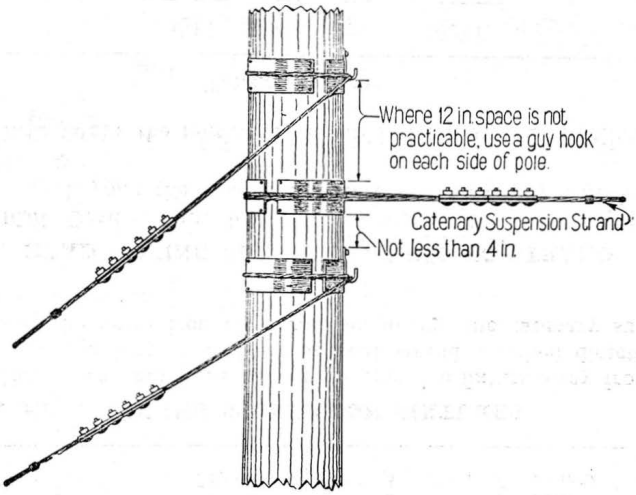
16.02 Make the tension in the 10M riding strand as follows.

Tension (Pounds)

20° F.	60° F.	100° F.
3900	3500	3100

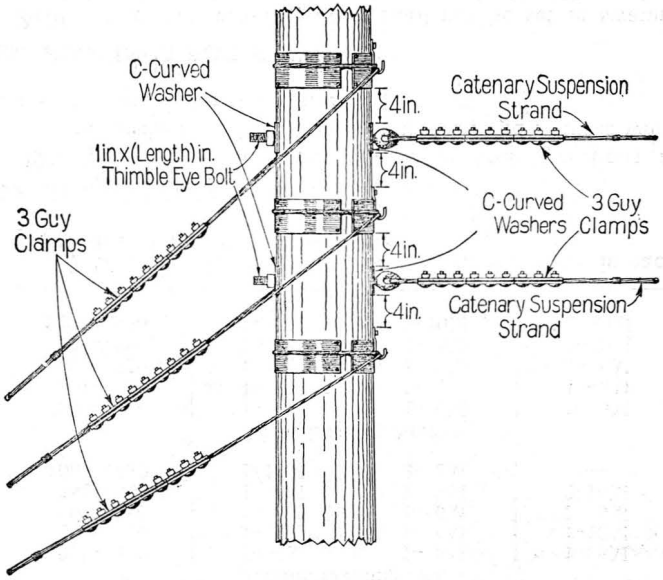
17 METHOD OF DEAD ENDING CATENARY SUSPENSION STRANDS

17.01 Where one catenary suspension strand per pole is used,



Catenary Suspension Strand (Pounds)	Number of Guy Clamps	Guy Strand (Pounds)	Number of Guy Clamps
10,000	1	2 - 10,000	1
16,000	2	2 - 16,000	2
25,000	3	2 - 25,000	3

17.02 Where two catenary suspension strands per pole are used.



18. SIDE GUYING DEAD END FIXTURES

18.01 Side guy dead end fixtures in both directions as indicated below.

(a) When no suspension fixture is used.

Span Length Feet	Number and Size of Guys for Ultimate Wire Load of		
	2 Arms	4 Arms	6 Arms
	Heavy Loading Area		
200– 400	1– 6M	1– 6M	1–10M
401– 600	1– 6M	1–10M	2– 6M
601– 750	1–10M	2–10M	2–10M
751–1050	2– 6M	—	—
	Medium Loading Area		
200– 400	1– 6M	1– 6M	1– 6M
401– 600	1– 6M	1– 6M	1–10M
601– 750	1– 6M	1–10M	2– 6M
751–1000	1– 6M	2– 6M	2–10M
1001–1450	1–10M	2– 6M	—
	Light Loading Area		
200– 400	1– 6M	1– 6M	1– 6M
401– 600	1– 6M	1– 6M	1 –6M
601– 750	1– 6M	1– 6M	1– 6M
751–1000	1– 6M	1– 6M	1–10M
1001–1500	1–10M	1–10M	2–10M

(b) When suspension fixtures are used. Side guy in each direction with one 6-M guy.

19. SIDE GUYING SUSPENSION FIXTURES

19.01 Side guy suspension fixtures in both directions as prescribed in Part 18.01-(a) for dead end fixtures when no suspension fixtures are used.

20. FOOTINGS FOR FIXTURES

20.01 Long span crossing poles shall not be set in swampy locations where practicable to avoid it. Where it is necessary to set long span crossing poles in swampy ground the

matter should be referred to the chief engineer's office for design of the proper foundations.

20.02 Where long span crossing poles are set in solid rock or the butts rest on solid rock no additional footing is required except to provide a flat bearing surface between the butt of the pole and the rock using a pad of a few inches of sand between the butt of the pole and the rock if required to give an even footing.

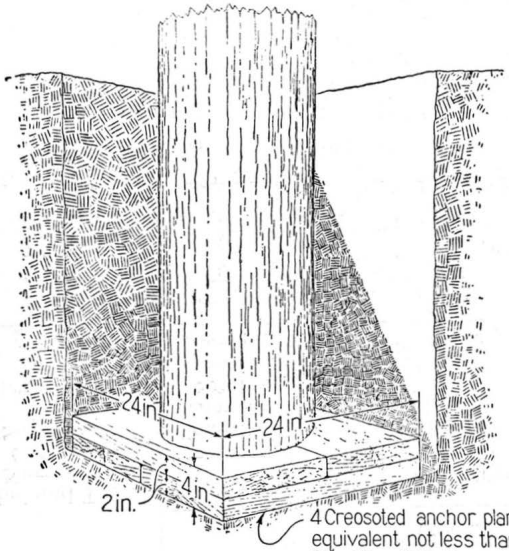
20.03 The types of footing for use in ordinary soils are shown below and the type of footing to be used for a particular kind of crossing is indicated in the following table:

TYPE OF FOOTING FOR LONG SPAN CROSSING POLES

Kind and Total Number of Catenary Suspension Strands per Fixture	Type of Fixture			
	Dead End		Suspension	
	Compact Gravel Sand or Loam	Pure Clay	Compact Gravel Sand or Loam	Pure Clay
2-10M	—	—	—	—
2-16M	—	A	—	A
2-25M	—	A	—	A
4-25M	A	B	A	B
6-25M	A	B	A	B

Catenary Long Span Construction

Type A Footing



Type B Footing