

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

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POLE LINES

USE OF POLE INSPECTION TABLES

USE OF POLE INSPECTION RULE

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1. GENERAL

1.01 The inspection of poles helps to maintain the aerial plant in a safe and serviceable condition by providing a basis for the replacement of poles, stubs and braces in advance of their failure through deterioration or inadequacy.

1.02 The inspection consists principally of determining the amount of sound wood at the section where the pole is likely to fail and comparing this existing sound wood with the minimum amount of sound wood required at that section for the pole being inspected. If the amount of sound wood is less than the minimum requirement, the pole should normally be considered inadequate. For convenience in this comparison, all measurements of sound wood are of circumferences, or are

converted to circumferences, and minimum allowable sound wood requirements are given in terms of minimum ground line circumferences, except as specifically noted.

2. MINIMUM GROUND LINE CIRCUMFERENCES

2.01 Minimum ground line circumferences for poles have been established for representative combinations of pole line classification, storm loading area, pole timber fibre strength, pole height, span length and attachment load. These dimensions are given in the pole inspection tables, use of which is described in Part 8, or they may be obtained from the pole inspection rule, use of which is described in Part 9. The two references give practically identical results and either one may be used. Parts 3 to 7 inclusive describe the essential information required in order to use either reference.

3. CLASSIFICATION OF POLE LINES

3.01 Telephone pole lines are divided into five classes, A, B, C, R and J, based on relative service values, and appropriate maintenance levels are recognized for each class. The division of telephone pole lines into the several classifications is as listed below:

<u>Class of Line</u>	<u>Designation of Line</u>
A	Toll—Open Wire or Cable
B	Toll—Open Wire Only
C	Toll—Open Wire Only Exchange—Open Wire or Cable
R	Exchange—Open Wire Only — Maximum of 10 Wires
J	Joint Use with Electrical Supply Circuits—Open Wire or Cable

3.02 Lines which naturally fall into more than one classification should be considered as being in the highest class represented, in the order of strength, which is A-J-B-C-R. For example, a pole line carrying a toll cable (Class A) and exchange open wire (Class C) should be considered as in Class A, while one carrying toll open wire (of Class B) and exchange cable (Class C) should be considered as in Class B.

3.03 The classification of any particular pole line may be obtained from the plant engineer.

4. STORM LOADING

4.01 In the engineering design and in the maintenance of aerial plant three degrees of storm loading intensity are generally recognized, and are designated respectively as heavy storm loading (H), medium storm loading (M) and light storm loading (L).

4.02 The storm loading which should be used for pole inspection in any area is based on storm experience in that area and may be obtained from the plant engineer.

5. FIBRE STRENGTH

5.01 The fibre strength to use in determining the minimum allowable dimension is determined by the kind of timber in the pole being inspected, which may be identified either by observation in the field or from the pole records. Pole timbers most frequently found on inspection and the fibre strengths of each are listed below. Where other timbers are encountered, information as to fibre strengths should be obtained from the engineer.

<u>Kind of Pole</u>	<u>Fibre Strengths in Pounds per Square Inch</u>
Northern White Cedar	3600
Western Red Cedar	5600
Chestnut	6000
Creosoted Southern Pine	7400

6. POLE LENGTH AND SPAN LENGTH

6.01 The pole length and span length are, of course, those actually obtaining for the pole being inspected.

6.02 The pole length may be ascertained either from the pole records, as discussed in Section G21.320, or by use of the pole scale.

6.03 The length of span is indicated on the toll pole records and may be shown on the pole records of certain exchange pole lines, as discussed in Section G21.320. The minimum dimensions given by the pole inspection tables and the pole inspection rule are for the average of the actual lengths of two adjacent spans. However, in determining the span length to use in referring to the tables or the rule, minor variations in length may be ignored and a uniform span length generally may be used for a pole line or section of line.

7. ATTACHMENT LOAD

7.01 Attachments to a pole may include telephone wires, cables, terminals, clothes-lines, power wires, power cables, transformers, etc. Attachments other than wires are translated into terms of wires for convenience in computing the load on the pole. For a pole having different numbers of attachments in the two adjacent spans, the condition causing the greater load should be assumed as applicable to that pole.

7.02 In computing the attachment load on a pole, allowance should be made for any additional attachments which it is known will be placed before the next inspection. Information as to anticipated increases in the number of attachments should be obtained from the engineer before starting the inspection.

7.03 Attachment load for reference to either the pole inspection tables or the pole inspection rule may be expressed in terms of "Actual Wire Load" or "Equivalent Wire Load." The former may be used only in the case of open wire lines carrying no other attachments, when the wire equivalent, telephone wire base (Paragraph 7.08) of each wire is 1; while the latter may be used in all cases.

Actual Wire Load

7.04 Actual Wire Load consists of the actual number of wires carried or supported, and, where applicable, is more convenient to use than equivalent load. Where poles carry only telephone wires on crossarms, the actual wire load is generally applicable. However, in the case of poles in the light loading area which carry any covered wire or open wire larger than 109, the equivalent wire load should be used, since the 104 equivalents of such attachments are greater than unity, see Table of Wire Equivalents, Paragraph 7.08.

Equivalent Wire Load

7.05 Equivalent Wire Load is computed by adding the "wire equivalents" of all "effective" wires and of all other attachments supported by the pole.

7.06 Effective wires are taken as the actual number of telephone and power wires supported, (1) in those cases in the heavy and medium storm loading areas where there are not more than 10 wires **on crossarms**, and (2) in all cases in the light storm loading area. In the heavy and medium loading areas, where the number of wires (telephone or power or both) **on crossarms** exceeds 10, the effective number of such wires is taken as two-thirds of the actual number, with a minimum of 10 effective wires.

7.07 The equivalent wire load is computed as follows:

- (a) Count the number of attachments of each kind supported by the pole or to be supported by it before the next inspection.
- (b) In the heavy and medium loading areas, if the total of all kinds of wires on crossarms (telephone, power or both) is more than 10, take two-thirds of the number of each kind to reduce to effective wires. Should the reduced numbers total less than 10, increase the number of wires in any one group so that the total of all groups will be 10.
- (c) In the light loading area and in cases of 10 wires or less on crossarms in the heavy and medium loading areas, consider all wires to be effective.
- (d) Multiply the number of effective wires and other attachments of each kind as determined in (a), (b) and (c) by the proper wire equivalent in terms of 104 telephone wires (telephone wire base), or of #4 power wires (power wire base), as desired, from the table of wire equivalents and add the results to obtain the total equivalent wire load.

Wire Equivalents

7.08 Wire equivalents are given below and on the pole inspection conversion table for various kinds of attachments carried on pole lines. For general use in all cases the telephone wire base should be used. For joint use lines, however, the power wire base may be used where it will facilitate joint inspection by inspectors from both power and telephone companies.

TABLE OF WIRE EQUIVALENTS

Attachment	Equivalent Effective 104 Telephone Wires			Equivalent No. 4 Covered Power Wires		
	Storm Loading Area			Storm Loading Area		
	Heavy	Me- dium	Light	Heavy	Me- dium	Light
Communication Plant						
Bare open wire, 109, 104 or smaller, per wire.....	1	1	1	0.8	0.7	0.3
Bare open wire, 128, 134 or larger, per wire.....	1	1	1.3	0.8	0.7	0.4
Covered paired wire, per pair, or covered single wire, per wire.....	1	1	2.5	0.8	0.7	0.7
Strand, all sizes.....	2	2	5	2	2	2
Cable and 6,000 lb. (5/16") strand.....	4	5	15	3	3	4
Cable and 10,000 lb. (3/8") strand.....	5	6	22	4	4	

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TABLE OF WIRE EQUIVALENTS (Cont.)

Attachment	Equivalent Effective 104 Telephone Wires			Equivalent No. 4 Covered Power Wires		
	Storm Loading Area			Storm Loading Area		
	Heavy	Me- dium	Light	Heavy	Me- dium	Light
Cable and 16,000 lb. (7/16") strand.....	6	7	30	5	5	8
Cable and 25,000 lb. (1/2") strand.....	7	8	35	6	6	10
Cable terminal, "B" or "BB" type, 202 pair and less.....	1	1	4	1	1	1
Cable terminal, "B" or "BB" type, more than 202 pair.....	1	1	6	1	1	2
Cable loading pot.....	1	1	4	1	1	1
Service drops, per unbal- anced drop.....	1	1	2	1	.5	.
Clothes-line on Class C line poles, per unbalanced clothes-line.....	8	14	50
Clothes-lines on Class J line poles, per unbalanced clothes-line.....	4	7	25	3	5	8
Power Plant						
Covered wire, #8 A.W.G. (approx. .26" o.d.) or smaller, per wire.....	1.1	1.3	2.5	0.9	0.9	0.7
Covered wire, #6 A.W.G. (approx. .32" o.d.) per wire.....	1.2	1.4	3.1	1.0	1.0	0.9
Covered wire, #4 A.W.G. (approx. .38" o.d.) per wire.....	1.3	1.5	3.7	1	1	1
Covered wire, #0000, A.W.G. (approx. .65" o.d.), per wire.....	1.5	1.9	6.3	1.2	1.3	1.
Covered wire, 500,000 circ. mils, (approx. 1.11" o.d.)..	2	3	11	2	2	3
Covered wire, 1,000,000 circ. mils, (approx. 1.53" o.d.).....	3	4	15	3	3	4
Covered wire, 2,000,000 circ. mils, (approx. 2.15" o.d.) or larger.....	3	5	20	3	4	6
Power cable on strand, (approx. diam. of cable 2.56" or less).....	6	7	30	5	5	8
Suspension wire extending transversely between two pole lines and supporting trolley contact wires. Wire equivalent for each pole line per contact wire supported.....		10	35	5	7	10

TABLE OF WIRE EQUIVALENTS (Cont.)

Attachment	Equivalent Effective 104 Telephone Wires			Equivalent No. 4 Covered Power Wires		
	Storm Loading Area			Storm Loading Area		
	Heavy	Medium	Light	Heavy	Medium	Light
Bracket and one trolley contact wire on one side of pole line.....	2	2	8	2	2	2
Brackets and two trolley contact wires, one on each side of pole line....	3	3	9	3	2	3
Bracket and two trolley contact wires, over tracks on same side of pole line..	5	6	19	4	4	5
Transformers, 37-1/2 K.V.A. or less.....	1	1	6	1	1	2
Transformers, over 37-1/2 K.V.A.....	1	2	9	1	2	3
Transverse clearance attachment for service drop above telephone attachments, per wire.....	1	2	4	1	2	1
Service drops, per unbalanced drop.....	1	1	3	1	1	1

Examples

7.09 The following examples illustrate the determination of wire loads:

(a) Heavy loading area—total wires on crossarms exceeds 10. Attachments:

- 3 power wires, #6, on crossarm
- 3 power wires, #4, on rack
- 20 telephone wires, 104, on crossarms
- 1 telephone cable and 5/16-inch strand

Computations for effective wires:

6 power wires — $3 \times 2/3 = 2$ effective
 104 telephone wires— $20 \times 2/3 = 13.4$ effective

15.4

Computations for equivalent wire load, telephone wire base:

6 power wires — 2 effective x 1.2 = 2.4
 # 4 power wires — 3 effective x 1.3 = 3.9
 104 telephone wires—13.4 effective x 1 = 13.4
 Telephone cable— 1 x 4 = 4.

Total Eq. Wire Load, Tel. Wire Base = 24

Computations for equivalent wire load, power wire base:

# 6 power wires	— 2	effective x 1	= 2
# 4 power wires	— 3	effective x 1	= 3
104 telephone wires	— 13.4	effective x .8	= 10.7
Telephone cable	—	1 x 3	= 3
			= 19

Total Eq. Wire Load, Power Wire Base = 19

- (b) Heavy loading area—total wires on crossarms slightly exceeds 10.

Attachments:

3 power wires, # 6, on crossarm
10 telephone wires, 104, on crossarm
2 telephone wires, 109, on brackets

Computations for effective wires:

# 6 power wires	— 3 x 2/3 = 2	— 2 effective
104 telephone wires	— 10 x 2/3 = 6.7	— 8 effective
		= 10.7

Computations for equivalent wire load, telephone wire base:

# 6 power wires	— 2 effective x 1.2	= 2.4
104 telephone wires	— 8 effective x 1	= 8
109 telephone wires	— 2 x 1	= 2
		= 13

Total Eq. Wire Load, Tel. Wire Base = 13

- (c) Heavy loading area—total wires on crossarms does not exceed 10.

Attachments:

2 power wires, # 4, on crossarm
6 telephone wires, 104, on crossarm

Computations for equivalent wire load, telephone wire base

# 4 power wires	— 2 x 1.3	= 2.6
104 telephone wires	— 6 x 1	= 6
		= 9

Total Eq. Wire Load, Tel. Wire Base = 9

- (d) Light loading area—attachments include wire larger than 109.

Attachments:

20 telephone wires, 128, on crossarms
10 telephone wires, 104, on crossarms

Computations for equivalent wire load, telephone wire base:

128 telephone wires —	20 x 1.3 = 26
104 telephone wires —	10 x 1 = 10

—
Total Eq. Wire Load, Tel. Wire Base = 36

- (e) Heavy or medium loading area—telephone wire on cross-arms only.

Attachments:

4 telephone wires, 165, on crossarm
26 telephone wires, 104, on crossarm
Total Actual Wire Load = 4 + 26 = 30

- (f) Light loading area—telephone open wire not larger than 109.

Attachments:

40 telephone wires, 104, on crossarms
4 telephone wires, 109, on brackets
Total Actual Wire Load = 40 + 4 = 44

Unbalanced Service Drops

7.10 Service drops which are not balanced by service drops on the other side of the pole, or otherwise guyed, should be equated to line wires in accordance with the values given in the table of wire equivalents. In the heavy loading area one service drop on one side of a pole may be considered to balance three drops on the other side of the pole; in the medium loading area the ratio is 1 to 5; and in the light loading area the ratio is 1 to 7. The directions of the drops on either side of the pole may be neglected, except that when the angle at the pole between a drop and the line is less than about 45 degrees, the drop should be treated as a line wire rather than as a drop.

7.11 Power service drops may be considered to balance telephone drops, but telephone drops should not be considered to balance power service drops. For example, if a pole in the heavy loading area has two power drops and two telephone drops on one side and one power drop on the other side, the latter may be considered to balance or guy the two power drops and one telephone drop, and the other telephone drop should be equated to equivalent line wires in determining the attachment load. If, however, the single drop on the one side of the pole is a telephone drop, it may be considered to balance the two telephone drops on the other side of the pole, and the two power services should be converted to equivalent line wires and included in the attachment load.

Unbalanced Clothes-Lines

7.12 Clothes-lines which are not balanced by clothes-lines on the other side of the pole, or otherwise guyed, should be considered an attachment load and should be equated to line wires in accordance with the values given in the table of wire equivalents. Clothes-lines on one side of a pole in excess of the clothes-lines on the other side of the pole should be considered as unbalanced clothes-lines, unless the pole is guyed for the unbalanced load. Clothes-lines at an angle of less than about 45 degrees to the direction of the pole line should be omitted from this balancing, but may be given the same equivalents as strand in the line.

8. POLE INSPECTION TABLES

8.01 Minimum ground line circumferences are given in the pole inspection tables which appear in sections numbered G21.331 and upward. A separate table has been prepared for each combination of fibre strength, storm loading area and pole line class, and each such table includes a wide range of wire loads, pole lengths and span lengths.

Selection of Appropriate Table

8.02 The appropriate pole inspection table to use in the inspection of any pole may be identified by the symbols making up the table designation, as follows:

- (a) The fibre strength of the pole timber appears in the inspection table designation in hundreds of pounds per square inch, i.e. 56, 60, etc.
- (b) The storm loading exposure appears in the inspection table designation as H, M, or L.
- (c) The class of line appears in the inspection table designation as A, B, C, or R (telephone only) or J (joint use).

These symbols are arranged in the table designation in the order in which they are listed above. For example, the pole inspection table bearing the designation 56H-A is indicated thereby to be the proper table for use in the inspection of poles of a timber whose fibre strength is 5600 pounds per square inch, in a Class A line with heavy storm loading exposure.

Wire Load Reference

8.03 After the appropriate inspection table has been selected, Paragraph 8.02, and the wire load carried by the pole has been determined, Part 7, that group of minimum ground line circumferences should be located for which the wire load reference appearing in either the right-hand or left-hand column includes the determined wire load.

8.04 USE THE EQUIVALENT TELEPHONE WIRE LOAD REFERENCE (left-hand column in all tables) for any equivalent wire load computed on the telephone wire base, Part 7.

8.05 USE THE EQUIVALENT POWER WIRE LOAD REFERENCE (right-hand column in all Class J tables) for any equivalent wire load computed on the power wire base, Part 7.

8.06 USE THE ACTUAL TELEPHONE WIRE LOAD REFERENCE (right-hand column in all except Class J tables) for any wire load consisting of telephone wires only, Part 7.

8.07 Actual telephone wire load references and equivalent telephone wire load references are identical in tables of minimum dimensions for the light loading area, since all wires are considered to be effective in that area.

8.08 Minimum circumferences for wire loads in excess of the wire load references shown in the tables may be obtained as explained in Paragraph 8.11.

Minimum Circumference from Tables

8.09 Having referred to the appropriate inspection table, and to the proper portion of that table for the wire load carried by the pole being inspected, the minimum ground line circumference in inches can be read directly for the particular combination of pole length and span length for that pole. The inspection tables are set up to read directly for all the commonly used pole lengths, and for a wide range of span lengths. Minimum circumferences for intermediate pole lengths or for intermediate span lengths may be obtained from the table by interpolation.

8.10 Minimum circumferences for span lengths in excess of the longest covered by the tables may be obtained with sufficient accuracy from the tables by extrapolation. For example, for a 6-wire rural line of 25 foot western red cedar poles in the heavy loading area, the minimum circumference for a 250 foot span is given by Table 56H-R as 18-1/2 inches and that for a 300 foot span is given as 19-1/2 inches, a difference of one inch. For a 350 foot span the minimum circumference would be approximately $19-1/2 + 1 = 20-1/2$ inches and for a 400 foot span it would be approximately $19-1/2 + 2 = 21-1/2$ inches, etc. If the line is located in the light storm loading area, the minimum circumference for a 250 foot span is given by Table 56L-R as 10-1/2 inches, that for a 300 foot span is given as 11 inches, a difference of 1/2 inch. For a 350 foot span the minimum circumference would be $11 + 1/2 = 11-1/2$ inches and

for a 450 foot span the minimum circumference would be $11 + 1\text{-}1/2 = 12\text{-}1/2$ inches, etc.

8.11 The minimum circumferences for wire loads in excess of those shown in the tables may be obtained with sufficient accuracy from the tables by extrapolation. For example, the minimum circumference for a 35 foot southern pine pole in a Class B line with heavy storm loading exposure, 130 foot spans and 50 actual wires is given by Table 74H-B as $27\text{-}1/2$ inches. For 60 wires the minimum circumference is given as $28\text{-}1/2$ inches, an increase of one inch. For 70 wires, the minimum circumference would be approximately $28\text{-}1/2 + 1 = 29\text{-}1/2$ inches.

8.12 Minimum circumferences given in the tables are rounded out to the nearest half inch, and in extrapolating it is usually desirable to check the increment obtained as above for reasonableness by comparing it with corresponding increments for other lengths of poles or other lengths of spans.

8.13 Minimum circumferences of anchored guy stubs, pole braces, double side guyed poles, double side guyed "H" fixtures, and "A" fixtures are not determined from the pole inspection tables, see Part 13.

9. POLE INSPECTION RULE

9.01 The pole inspection rule is essentially a circular slide rule consisting of a movable disc attached to a rectangular base and provided with suitable scales and with a table of "load factors." In use the inspection rule may be set for any combination of fibre strength, storm loading area, and pole line class, and when so set it will indicate the minimum dimensions for the various combinations of wire load, pole length and span length.

9.02 The HM Pole Inspection Rule is for use in the heavy and medium storm loading areas, while the L Pole Inspection Rule is for use in the light storm loading area. The Pole Inspection Conversion Table carries the table of wire equivalents, and tables of deductions for hollow hearts and pockets in poles, and is applicable in all storm loading areas.

Setting of Inspection Rule

9.03 The fibre strengths of pole timbers appear on the rule in hundreds of pounds per square inch, i.e. 56, 60, etc. Storm loading exposures, i.e. heavy, medium and light, are indicated by the letters H, M (on the HM Pole Inspection Rule) and L (on the L Pole Inspection Rule). Each combination of fibre strength and storm loading exposure is represented by

the hole in the disc bearing the figures and letter indicating that combination, as 74H on the HM Pole Inspection Rule and 36L on the L Pole Inspection Rule, etc. The classes of pole lines are designed by the letter A, B, C and R (telephone only) and J (joint use) visible through the holes in the disc.

9.04 To set the pole inspection rule the disc is rotated until the hole representing the proper combination of fibre stress and storm loading exposure registers with the letter designating the class of pole line being inspected. For example, when the hole marked 56M on the disc of the HM Pole Inspection Rule is over the letter J, the setting is proper for determining the minimum dimensions of poles in a joint use line with medium storm loading exposure and of a timber whose fibre strength is 5600 pounds per square inch. Similarly, when the hole marked 74L on the disc of the L Pole Inspection Rule is over the letter A, the setting is proper for determining the minimum dimensions of poles in a Class A toll line with light loading exposure and of a timber whose fibre strength is 7400 pounds per square inch.

Reference to Load Factor Table

9.05 After the wire load carried by the pole has been determined, reference should be made to the load factor table on the reverse side of either the HM Pole Inspection Rule or the L Pole Inspection Rule, as determined by the storm loading exposure. That group of load factors should be located for which the wire load reference appearing in the right-hand or the left-hand column includes the determined wire load.

9.06 **USE THE EQUIVALENT TELEPHONE WIRE LOAD REFERENCE** (left-hand column) for any equivalent wire load computed on the telephone wire base, Part 7.

9.07 **USE THE EQUIVALENT POWER WIRE LOAD REFERENCE** (right-hand column) for any equivalent wire load computed on the power wire base, Part 7.

9.08 **USE THE ACTUAL TELEPHONE WIRE LOAD REFERENCE** (left-hand column) for any wire load consisting of telephone wires only, Part 7.

9.09 Actual telephone wire load references and equivalent telephone wire load references are identical on the L Pole Inspection Rule, as all wires are considered to be effective in the light loading area.

9.10 Load factors for wire loads in excess of the references shown in the load factor tables may be obtained with sufficient accuracy from the tables by extrapolation. For ex-

ample, the load factor for a 35 foot pole with heavy or medium storm loading exposure, 130 foot spans and 50 actual wires is given as 86. For 60 actual wires the load factor is given as 90, an increase of 4. For 70 actual wires it is sufficiently accurate to use a load factor of $90 + 4 = 94$, for 80 actual wires $90 + 8 = 98$, etc.

9.11 Having referred to the appropriate group of load factors for the wire load carried by the pole being inspected, the load factor can be read for the particular combination of pole length and span length for that pole. The load factor tables are set up to read directly for all the commonly used pole lengths and for a wide range of span lengths. Load factors for intermediate pole lengths or for intermediate span lengths may be obtained by interpolation.

9.12 Load factors for span lengths in excess of the longest shown in the tables may be obtained with sufficient accuracy from the tables by extrapolation. For example, for a 6-wire rural line of 25 foot poles with heavy or medium storm loading exposure, the load factor for a 250 foot span is 66 and the load factor for a 300 foot span is 70, a difference of 4. For a 350 foot span the load factor would be $70 + 4 = 74$, and for a 400 foot span the load factor would be $70 + 8 = 78$, etc. If the line is located in the light storm loading area, the load factor for a 250 foot span is 37, the load factor for a 300 foot span is 39, a difference of 2. For a 350 foot span the load factor would be $39 + 2 = 41$, and for a 450 foot span the load factor would be $39 + 6 = 45$, etc.

Minimum Circumference from Rule

9.13 After the HM Pole Inspection Rule (in the heavy or medium storm loading area), or the L Pole Inspection Rule (in the light storm loading area), has been set as described above, and after the load factor has been determined as also described above, the minimum ground line circumference in inches for the pole being inspected should be read on the outer scale of the inspection rule, opposite the load factor on the inner scale.

9.14 Except for Class R lines, the minimum circumference should never be less than 16" for 3600 fibre strength, 13" for 4600, 11" for 5600, 10" for 6000 and 6600 and 9" for 7400.

9.15 Minimum circumferences of anchored guy stubs, pole braces, double side guyed poles, double side guyed "H" fixtures, and "A" fixtures are not determined from the pole inspection rule, see Part 13.

10. CABLE LINES IN THE LIGHT LOADING AREA

10.01 With both the pole inspection tables and the pole inspection rule an adjustment is necessary when the center of load on the pole is appreciably higher than it would be if the load consisted entirely of open wires on crossarms. This is the case with heavy cable loads in the light storm loading area when the cables are located at or near the tops of the poles. Under this condition, therefore, assume for purposes of determining the minimum ground line circumference that the pole is longer than it actually is by the following amounts:

- (a) 5 Feet, if the equivalent telephone wire load is between 35 and 85, inclusive.
- (b) 10 Feet, if the equivalent telephone wire load is greater than 85.

11. SHELTERED LOCATIONS

11.01 Pole lines or portions of pole lines are sometimes protected so adequately and permanently from the wind that they will not require so much sound wood at the ground line as where fully exposed. Such lines may be sheltered by solid rows of trees, hills or other permanent wind breaks, or the general direction may approximate that of the prevailing winds so that the wires and attachments will seldom receive the full force of the wind. It is desirable that the inspector should use his judgment in such cases, making sure, of course, that the treatment of joint use poles is agreeable to both companies. Accordingly, if the inspector feels certain of the effectiveness and permanency of the sheltered condition, he should not recommend poles for replacement or reinforcement as rigidly as otherwise. As a guide under such conditions, the minimum circumferences indicated by the pole inspection rule or the pole inspection tables may be reduced by approximately 10 per cent.

12. MINIMUM CIRCUMFERENCES ABOVE GROUND LINE

12.01 In cases of defect above the ground line the remaining sound wood should be compared with the minimum circumference for the section of the pole at which the defect occurs. Directions for determining minimum circumferences of above ground sections of anchored guy stubs, pole braces, double side guyed poles, double side guyed "H" fixtures, and "A" fixtures are given in Part 13. Minimum circumferences of above ground line sections of all other poles may be obtained as follows:

- (a) If the section is below a point one-fourth the distance from the ground line to the top of the pole, the required circumference is that given by the pole inspection rule or the pole inspection tables for the ground line.
- (b) If the section is between the quarter point referred to in (a) and the midpoint of the pole, the required circumference is 10% less than that shown by the pole inspection rule or the pole inspection tables, but not less than 14 inches, except for poles in rural lines. For example, if the required ground line circumference is 30 inches, the circumference required at the higher point is 30 inches — 3 inches, or 27 inches.
- (c) If the section is between the midpoint and the top of the pole, the required circumference is 20% less than that shown by the pole inspection rule or the pole inspection tables but not less than 14 inches, except for poles in rural lines. For example, if the required ground line circumference is 30 inches, the circumference required at the higher point is 30 inches — 6 inches, or 24 inches.

13. STUBS, BRACES, "A" FIXTURES, ETC.

13.01 In the inspection of anchored guy stubs, pole braces, double side guyed poles, double side guyed "H" fixtures, and "A" fixtures, the minimum ground line circumferences given by the inspection rule or the inspection tables are not applicable. In such cases it is recommended that the minimum allowable circumference at the ground line be taken as two-thirds of the original circumference. The original circumference may be determined with sufficient accuracy by measuring the sound wood just above the ground line.

13.02 In case of defect above the ground line the remaining sound wood should be compared with the minimum circumference for the section of the pole at which the defect occurs. It is recommended that the minimum allowable circumferences for above ground sections of anchored guy stubs, pole braces, double side guyed poles, double side guyed "H" fixtures, and "A" fixtures be taken as nine-tenths of the original circumferences of the sections.

13.03 The minimum circumferences for guyed corner poles and for "H" fixtures without side guys are as given by the inspection rule or the inspection tables.

13.04 The minimum allowable circumferences shown by the inspection rule or the inspection tables should not be used in the inspection of such unguyed corner poles, unguyed dead-end poles and unguyed stub poles as may exist, whether

ground braced or not. In general, the minimum allowable circumferences of these poles are the same as the required circumferences for new poles at the locations and, therefore, such poles should be recommended for replacement when measurable decay or other weakening defect is discovered. The inspection report should indicate unguayed corner and dead-end poles, and unguayed stubs, whether or not replacement is recommended, together with attachments.

13.05 In cases of doubt regarding the adequacy of sound poles to hold existing attachments, or regarding the necessity of replacing poles which are indicated by the above standards as being inadequate, the plant engineer should be consulted.