CLEARANCES FOR AERIAL CABLE AND GUYS INSTALLED IN THE LIGHT LOADING AREA

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1. GENERAL

1.01 This section contains clearance requirements for aerial cable (including self-supporting cable) and guys installed in the light loading area. These clearances apply at 60°F under conditions of no wind or ice. Except in the case of guys, ground clearances will be somewhat reduced at higher temperatures because of the increased sags involved. Conversely, lower temperatures mean greater ground clearances are required because placing sags are reduced. (See sag tables for differences due to temperature changes.)

1.02 This section has been reissued to:

- Combine all clearance and separation requirements for aerial cable and guys in the light loading area into one practice.
- Incorporate information previously covered in Sections 620-210-013, 620-215-012, 620-216-012, and 620-216-013.

1.03 Clearances in this section meet the requirements of the National Electrical Safety Code (Sixth Edition). They are to be used unless the detailed plans specify other values, or local ordinances, etc, require greater values.

1.04 There is no distinction between construction and maintenance clearances above ground or rails because there is little or no permanent stretching of the strand as a result of storm or other loading. However, clearances ***under*** power wires are likely to be reduced below construction values as the power wires may incur extra permanent sag because of stretching. Both construction and maintenance clearances are therefore specified for these situations.

1.05 Considerable savings in pole height can sometimes be obtained by locating poles so that the low point of a span will not occur above streets, alleys, or driveways. While there is no reduction in clearance for cable or guys in the light loading area, pole height can still be reduced since it need not be based upon 100 percent of midspan sag. The following table shows the approximate percentage of midspan sag to be used in determining the height of pole attachment when the far edge of the road, alley, or driveway is 50 and 100 feet from the pole. (See distance "X" shown in Fig. 1.)

SPAN (FT)	PERCENT OF MIDSPAN SAG "X" = 50 FT	SPAN (FT)	PERCENT OF MIDSPAN SAG "X" = 100 FT
180-200	80	260-290	95
201-225	75	291-325	90
226-250	70	326-360	85
251-275	65	361-400	80
276-305	60	401-440	75
306-340	55	441-490	70
341-385	50	491-540	65
386-440	45	541-600	60
441-515	40		
516-600	35		

Example: For a 500-foot span, the sag at 50 feet from the pole is approximately 40 percent of the midspan sag; the sag at 100 feet is 65 percent of midspan sag. If midspan sag were 90 inches, the sag at 50 feet would then be 36 inches and at 100 feet would be 58-1/2 inches. (Interpolate for distances between 50 and 100 feet.)

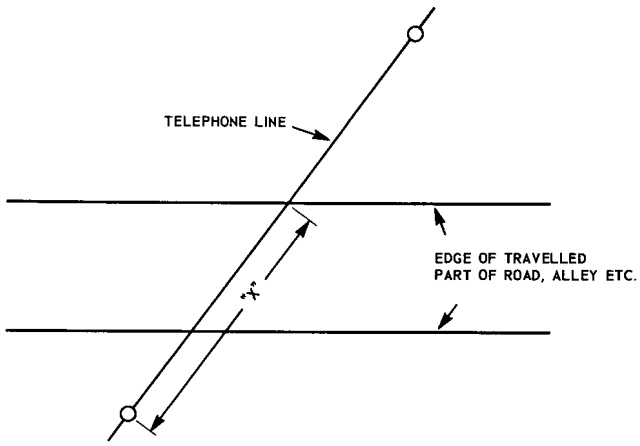


Fig. 1—Midspan Sag Diagram

1.06 Note that greater clearance is required for cable overhanging the travelled part of roads than for cable when no overhang is involved. Also, a distinction has been made between "major" and "minor" overhang as shown in Fig. 4. In the light loading area, this applies only to cable clearances above rural roads. Substantial savings in pole height may be realized by minimizing or eliminating road overhang.

1.07 To determine the clearances required from power conductors, it is necessary to know the voltage of the power wires and also whether they are, or are not, part of a grounded system. Clearances for grounded power systems are based upon their voltage to ground; for other systems, clearances depend upon the voltage between wires. Most grounded power systems include a grounded conductor which has many connections to ground. Such conductors are called multigrounded neutrals and are generally considered to be effectively grounded.

Caution: Power companies occasionally attach the neutral ABOVE the phase wire as shown in Fig. 2. Therefore, it is important to identify the neutral wire before determining separation requirements. The neutral can usually be identified by observing the presence of the following:

(a) The neutral is usually bonded to a vertical ground wire at least every 1300 feet and more often when transformers are present.

(b) The neutral is normally bonded to power guys which do not contain insulators.

(c) Neutrals are sometimes carried on smaller insulators than those carrying phase wires.

(d) The neutral is sometimes carried on a much lighter colored insulator than the phase wires.

(e) On transformer poles, the bushing for the neutral is usually smaller than the bushing for the phase connection. The neutral bushing is often located near the secondary bushings (Fig. 3).

(f) Where secondaries are dead ended, if the phase wire is carried through, the neutral will also be carried through.

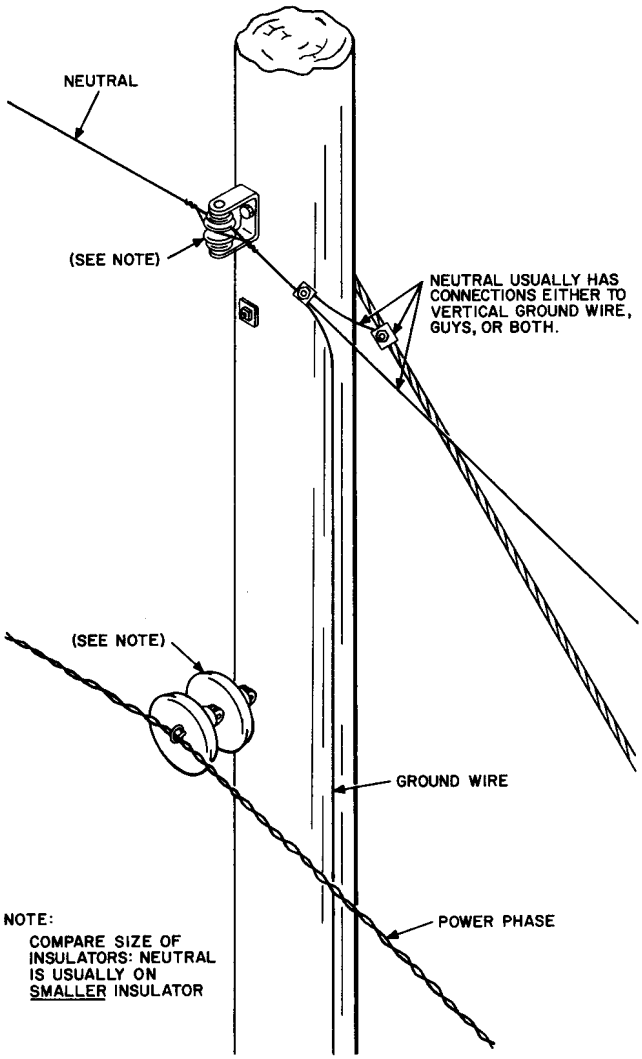


Fig. 2—Inverted Power Construction

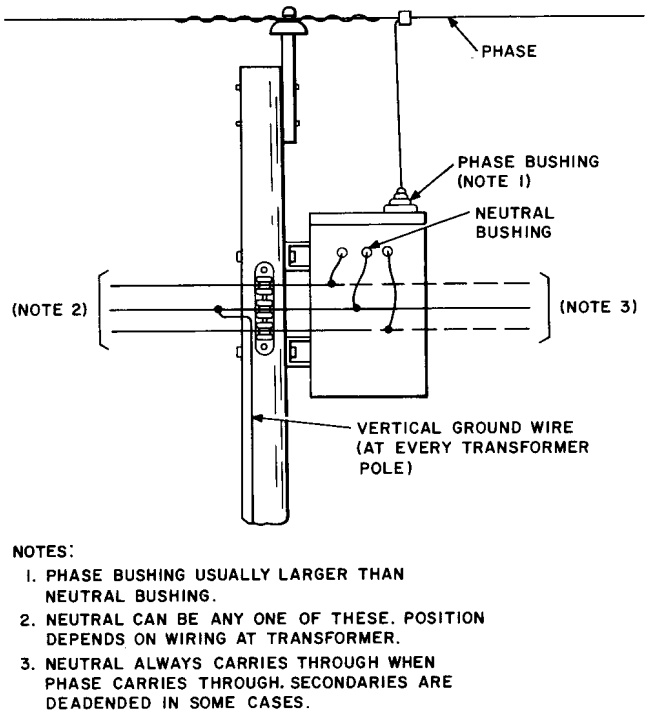


Fig. 3—Identification of Neutral at Transformer Location

Note: If, after considering these factors, sufficient identification of the neutral wire has not been made, consult your supervisor or the electric utility company. However, if the neutral is attached ***above*** the phase wire, provide the clearance specified for phase wires of appropriate voltage.

1.08 It will be noted that clearances from streetlights show one value for grounded fixtures and a larger value for nongrounded fixtures. Streetlight fixtures bonded to cable suspension strand that is connected to a low impedance ground or a ground wire of an MGN power system are considered to be sufficiently well grounded to use the smaller clearance. Fixtures which are merely grounded to a ground rod are ***not*** considered sufficiently well grounded to use the smaller clearance.

1.09 It will also be noted that clearances from grounded transformers, capacitors, etc, are smaller than for nongrounded transformers, etc. ***Local instructions will designate areas where transformer and/or capacitor cases are grounded, since it is not generally possible to determine whether power equipment is grounded or not by looking at it.***

1.10 Clearances for span lengths, voltages, and conditions not shown in this section are an engineering responsibility and will be shown on the detailed plans.

2. CLEARANCES ABOVE GROUND OR RAILS

2.01 Table 1 contains the minimum clearances above ground or rails for all sizes of strand and weights of cable including self-supporting cable.

These are 60°F values and apply to any span length up to the maximum shown.

2.02 The designation in Table 1 marked "No Overhang—Back of Obstr" means that the line is located back of a fence, ditch, embankment, etc, so that the ground beneath the line can ordinarily be travelled by pedestrians only. The designation "No Overhang—Not Back of Obstr" means that the line is not back of such obstructions. This category is intended to include ground not ordinarily travelled but which can be reached by vehicles. However, if farm machinery is likely to pass under the line, provide sufficient clearance so that the cable (or guy) at 60°F will be 2 feet above the highest part of the machinery or its load.

TABLE 1

ALL SIZES OF STRAND, ANY WEIGHT CABLE (INCLUDING SELF-SUPPORTING CABLE)

CROSSING ABOVE:	CLEARANCE FT IN.	SPAN (FT)	REMARKS
Railroad Tracks	25-0	150	See Note 1
Public Roads	18-0	600	See Fig. 5, Note 2
Public Alleys	15-0	600	See Note 2
Residential Driveways	10-0	600	
Walks and Lanes (Pedestrian)	8-0	600	
Flat Roof Bldgs	8-0	600	
Peak Roof Bldgs	2-0	600	
Billboards	2-0	600	
Neon Signs	4-0	600	See Note 3
Waterways	Must be shown on plans.		
RUNNING ALONG:			
Public Roads with:			
Major Overhang	18-0	600	See Fig. 4, Note 2
Minor Overhang			See Fig. 4, Note 2
Urban	18-0	600	
Rural (Lt Traffic)	14-0	600	See Note 4
No Overhang			
Back of Obstr	8-0	600	See Fig. 6, Par. 2.02
Not Back of Obstr	13-0	600	See Fig. 7, Par. 2.02
Public Alleys	15-0	600	

Note 1: Maximum span length for 6M strand or self-supporting cable = 150 feet. Maximum cable weight = 2-1/4 lb/ft.

Maximum cable weight for 10M strand = 5 lb/ft; if cable weighs over 2-1/4 lb/ft, maximum span is 150 feet. Longer spans permitted for cables weighing less than 2-1/4 lb/ft. See Paragraph 1.06.

Maximum cable weight for 16M strand = 8-1/2 lb/ft; if cable weighs over 5 lb/ft, maximum span length is 150 feet. Longer spans permitted for cables weighing less than 5 lb/ft. See Paragraph 1.06.

Note 2: Length of crossing or overhanging span should not exceed 350 feet unless adjacent spans are of somewhat greater length.

Note 3: Clearance for guys may be reduced to 1 foot.

Note 4: Lightly travelled country lanes only. If well travelled, consider as urban even if in rural area.

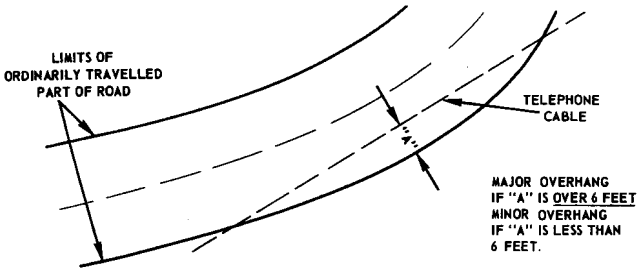


Fig. 4—Overhang—Running Along Public Roads

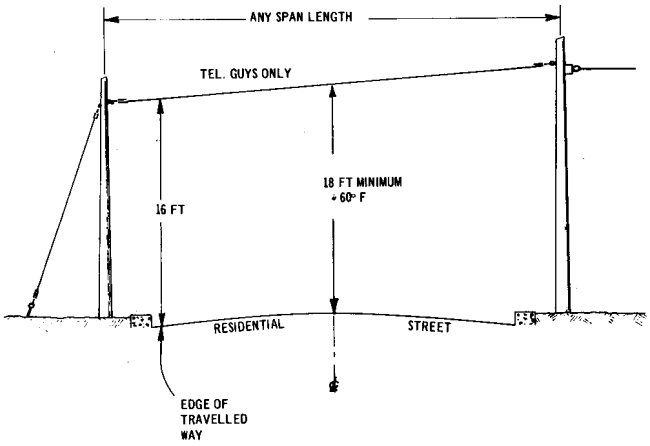


Fig. 5—Overhang—Crossing Public Roads

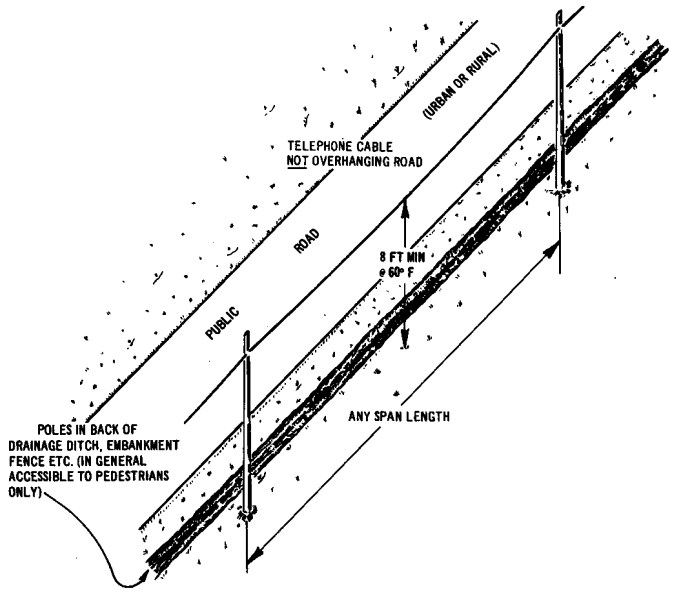


Fig. 6—Running Along Public Roads—Back of Ditches, Etc

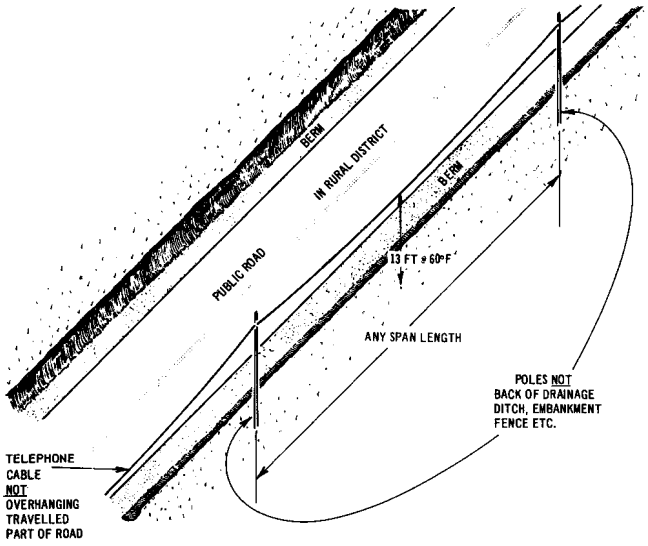


Fig. 7—Running Along, But Not Overhanging Public Roads

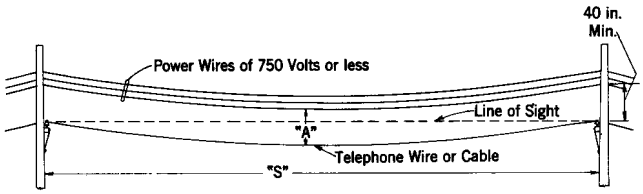
3. JOINT USE SEPARATION IN THE SPAN AND ON THE POLE FROM POWER CONDUCTORS

A. Power Conductors of 750 Volts or Less

750 VOLTS OR LESS: INCLUDES NEUTRALS, OTHER THAN MULTIGROUNDED, ASSOCIATED WITH CONDUCTORS OF 750 VOLTS OR LESS			
SPAN LENGTH (S) IN FEET	MIDSPAN SEPARATION (A) IN INCHES		CLEARANCE AT THE POLE IN INCHES
	CONSTRUCTION	MAINTENANCE	
150 — Less	32	30	40**
150 — 350	36 or sag of tel plus 6 if greater*	30 or sag of tel if greater*	40**

* Lowest power wire must be above the line of sight.

** May have to be greater than 40 inches to meet midspan requirements.



Example:

Span length 200 feet.

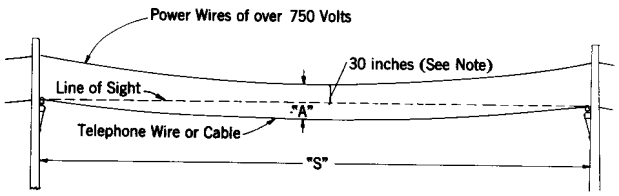
Power secondaries have 30-inch sag.

Telephone cable has 28-inch sag.

Required separation at midspan is 36 inches or telephone sag + 6 inches, if greater. However, telephone sag (28 inches) + 6 is only 34 inches; thus the 36-inch requirement governs. Standard 40-inch spacing at the pole will provide a midspan separation of (40–30) + 28, or 38 inches, which is adequate.

B. Power Conductors of Over 750 Volts

GROUNDED POWER SYSTEMS OF UP TO 15,000 VOLTS BETWEEN WIRES (8700 VOLTS TO GROUND) AND OTHER SYSTEMS OF UP TO 8700 VOLTS BETWEEN WIRES			
SPAN LENGTH (S) IN FEET	MIDSPAN SEPARATION (A) IN INCHES		CLEARANCE AT THE POLE IN INCHES
	CONSTRUCTION	MAINTENANCE	
150 — Less	32	30	40*
150 — 350	36 plus sag of tel cable	30 plus sag of tel cable	40*
GROUNDED POWER SYSTEMS OF 15,000 – 86,500 VOLTS BETWEEN WIRES (8700 – 50,000 VOLTS TO GROUND) AND OTHER SYSTEMS OF 8700 – 50,000 VOLTS BETWEEN WIRES			
150 — Less	47	45	60*
150 — 250	48 or tel sag plus 33 if greater	45 or tel sag plus 30 if greater	60*
250 — 350	51 or tel sag plus 36 if greater	45 or tel sag plus 30 if greater	60*
* Minimum clearance may have to be greater to meet midspan requirements.			



Note: Power wires must be at least 30 inches above the line of sight if "S" exceeds 150 feet.

Example:

Span length 340 feet.

Power conductors carry 34,000 volts between wires (20,000 volts to ground) and have 36-inch sag.

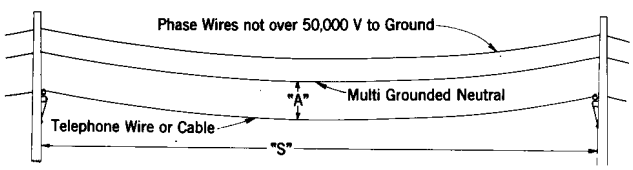
Telephone cable has 40-inch sag.

Required midspan separation is 51 inches or telephone sag + 36, if larger. The latter, 40 + 36, or 76 inches, is greater than 51 inches and therefore controls. Note that the standard 60-inch spacing at the pole will provide (60–36) + 40, or 64 inches, which is 12 inches less than the required 76 inches. The spacing at the pole would therefore have to be increased to 72 inches.

C. Multigrounded Neutrals

(See 1.07 and Fig. 2 and 3.)

22,000 VOLTS OR LESS TO GROUND 38,000 VOLTS OR LESS BETWEEN WIRES			
SPAN LENGTH (S) IN FEET	MIDSPAN SEPARATION (A) IN INCHES		CLEARANCE AT THE POLE IN INCHES
	CONSTRUCTION	MAINTENANCE	
150 — Less	32	30	40*
151 — 350	36	30	40*
22,000 TO 50,000 VOLTS TO GROUND 38,000 TO 86,500 VOLTS BETWEEN WIRES			
150 — Less	47	45	60*
151 — 350	51	45	60*
* Clearance at the pole is minimum; greater clearance may be necessary to meet midspan requirements.			

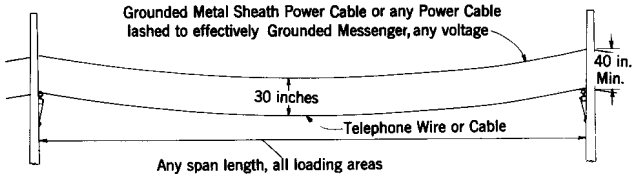


D. Power Cables (Except Spacer Cables)

GROUNDED POWER CABLE (EXCEPT SPACER CABLE) GROUNDED METALLIC SHEATH, NON-METALLIC SHEATH CABLES LASHED TO GROUNDED MESSENGER, ETC		
SPAN LENGTH (S) IN FEET	MIDSPAN SEPARATION (A) IN INCHES CONSTRUCTION AND MAINTENANCE	CLEARANCE AT THE POLE IN INCHES
Any	30	40*
NONGROUNDED POWER CABLES** 8700 VOLTS OR LESS		
Any	30	40*
NONGROUNDED POWER CABLES** 8700 – 50,000 VOLTS		
Any	45	60*

* Minimum clearance may be increased to meet midspan requirements.

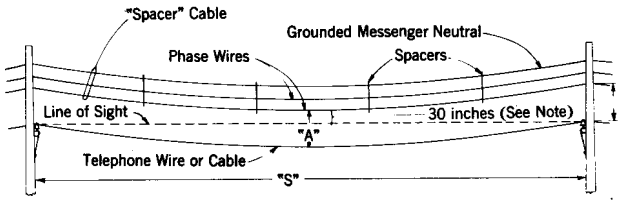
** Generally excludes spacer cable since the supporting messenger is usually grounded.



E. Spacer Type Power Cables

8700 VOLTS OR LESS TO GROUND 15,000 VOLTS OR LESS BETWEEN WIRES		
SPAN LENGTH (S) IN FEET	MIDSPAN SEPARATION (A) IN INCHES CONSTRUCTION AND MAINTENANCE	CLEARANCE AT THE POLE IN INCHES
150 — Less	30	40*
151 — Over	30 plus sag of tel	40*
8700 – 50,000 VOLTS TO GROUND 15,000 – 86,500 VOLTS BETWEEN WIRES		
150 — Less	45	60*
151 — Over	45 or if larger, 30 plus sag of tel	60*

* Minimum clearance may have to be increased to meet midspan requirements.



Note: Power wires must be at least 30 inches above the line of sight if "S" exceeds 150 feet.

4. CLEARANCES ON JOINT USE POLES—OTHER

A. Clearance From Power Transformers, Voltage Regulators, Capacitors, Pins, Racks, and Crossarms

POWER FACILITY	SEE TABLE	FIG. OR NOTE
Secondary racks	A	Fig. 8**
Steel pins	A	Fig. 8
Power transformers, capacitors, regulators, etc	A	Fig. 9*
Metal crossarm braces: Attached to metal crossarms within 1 inch of nongrounded transformer or capacitor cases or their supports	A	
Attached to wood crossarms less than 1 inch below top of arm	A	
Attached to wood crossarm 1 inch or more below top of arm and 1 inch or more from nongrounded transformer, etc	B	

* May be reduced to 30 inches for grounded power circuits if case is effectively grounded.

** 40 inches generally.

TABLE A FOR GROUNDED POWER CIRCUITS		
VOLTAGE TO GROUND	VOLTAGE BETWEEN LINES	CLEARANCE (INCHES)
8700 V — Less	15,000 V — Less	40
8701 V — 50,000 V	15,001 V — 86,500 V	60
FOR OTHER POWER CIRCUITS		
—	8700 V — Less	40
—	8701 V — 50,000 V	60

TABLE B FOR GROUNDED POWER CIRCUITS		
VOLTAGE TO GROUND	VOLTAGE BETWEEN WIRES	CLEARANCE (INCHES)
8700 V — Less	15,000 V — Less	12
8701 V — 50,000 V	15,001 V — 86,500 V	30
FOR OTHER POWER CIRCUITS		
—	8700 V — Less	12
—	8701 V — 50,000 V	30

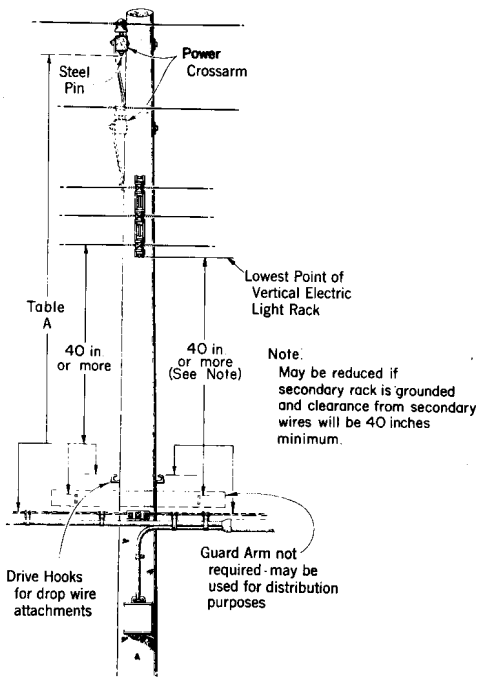


Fig. 8—Vertical Clearances Between Cable and Power Attachments

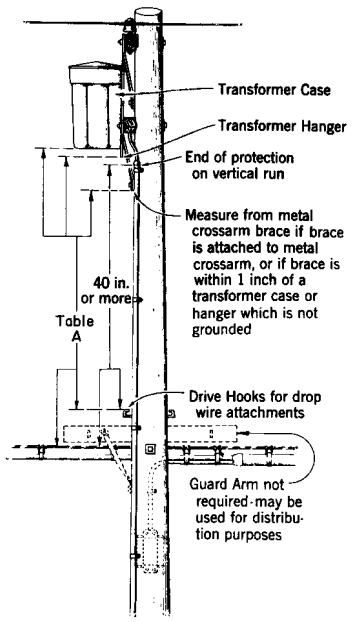


Fig. 9—Vertical Clearances Between Power Transformers and Cables

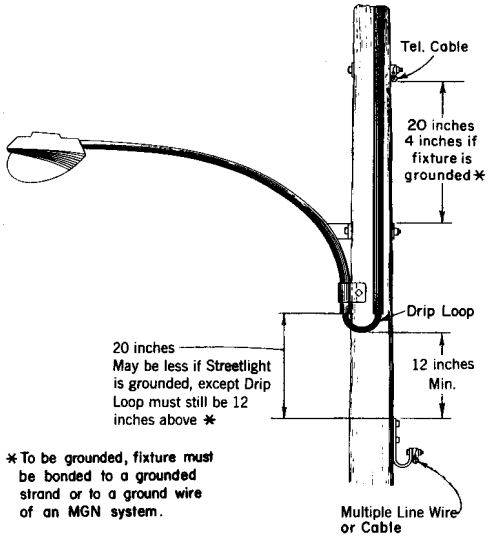


Fig. 10—Clearance From Streetlight Fixture Drip Loop Above Cable or Multiple Line Wire

B. Clearance From Streetlight, Traffic Light, Trolley Wires and Associated Fixtures, Brackets, and Wiring

STREETLIGHT FIXTURES FIG. 10, 11, 12, 13, AND ASSOCIATED WIRING			
FACILITY	TELEPHONE PLANT	CLEARANCE-INCHES	
		GROUNDED	NOT GROUNDED
Streetlight fixtures and span wires	Cable Guys	4	20
Drip loop entering fixture from surface of pole	Cable Guys	12	
Streetlight feed on pins and insulators	Cable Guys	6 5	
Streetlight feed run direct to fixture 40 inches from surface of pole	Cable Guys	20 6	
TRAFFIC LIGHT FIXTURES AND ASSOCIATED WIRING			
Traffic light fixtures and span wires	Cable Guys	4	20
Traffic light control cables	Cable Guys	24 below 12 if necessary	
Vertical runs for traffic light fixtures and controls	Cable Guys	Same as power Vertical Runs	
TROLLEY SPAN WIRES FIG. 14, 15, 16, AND BRACKETS			
Span wires and brackets	Cable Guys	4	12

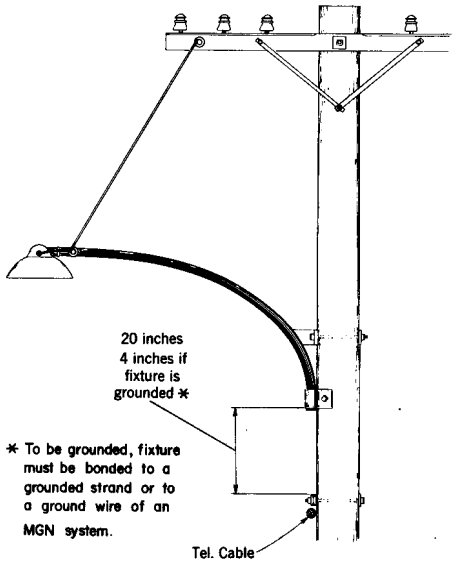


Fig. 11—Clearance of Cable From Streetlight Fixture Mounted Above Cable

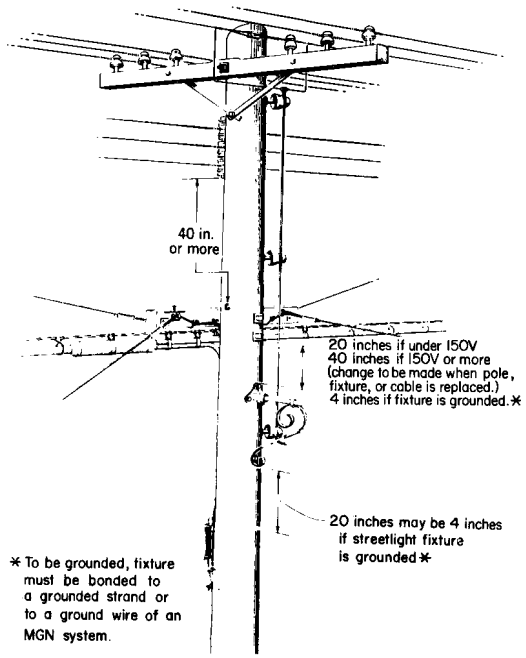


Fig. 12—Clearances of Cable and Pole-Mounted Terminal From Streetlight Fixture Mounted Below Cable

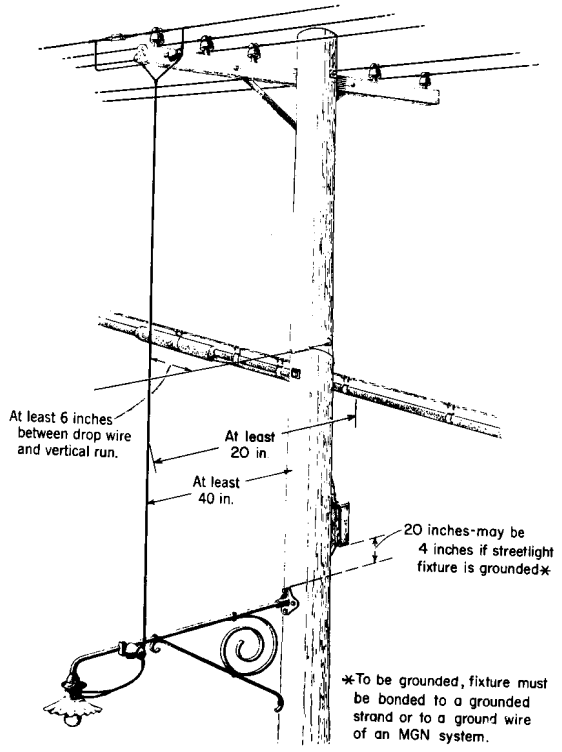


Fig. 13—Clearances From Vertical Feed Wire of Streetlight Fixture

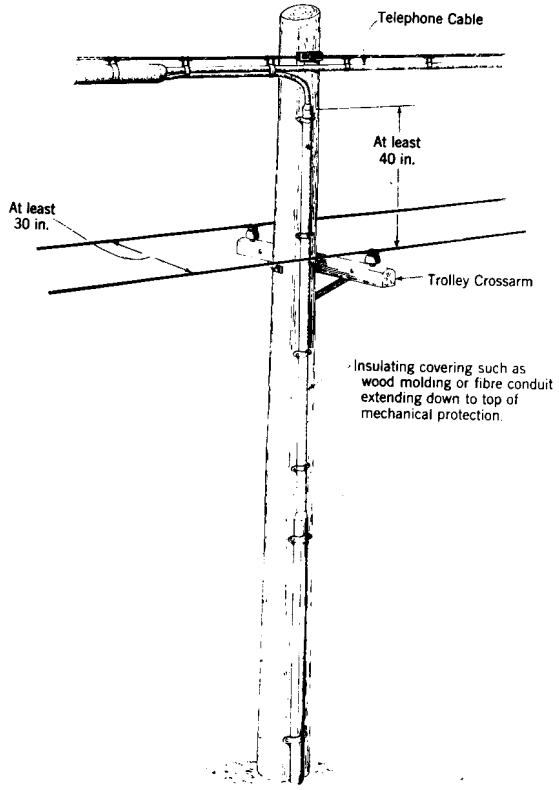


Fig. 14—Clearances Between Trolley Crossarms and Telephone Cable

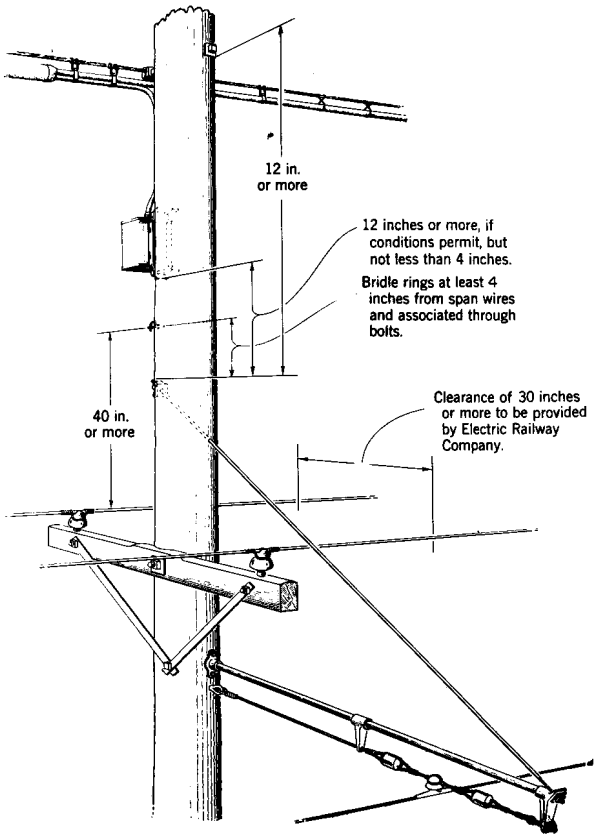


Fig. 15—Clearances Between Telephone Attachments and Trolley Wire Attachments

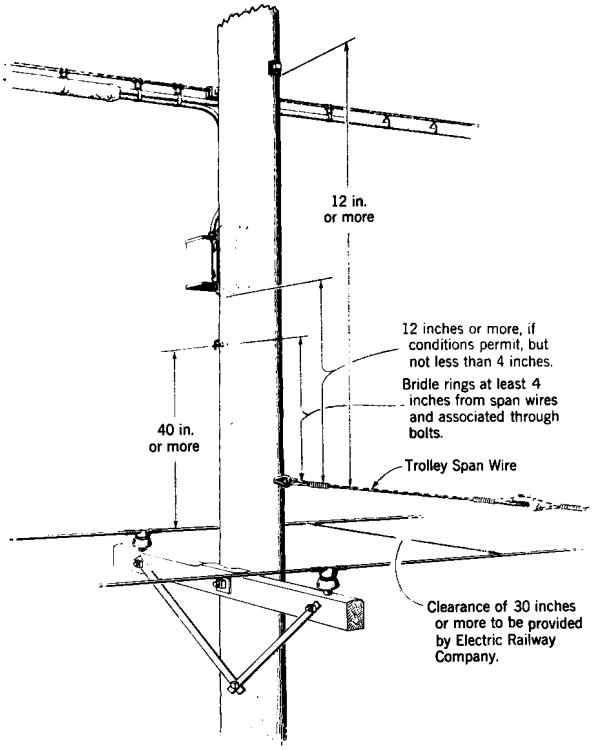


Fig. 16—Clearances Between Telephone Attachments and Trolley Span Wire

C. Clearance From Power Guys and Clearance of Telephone Guys From Telephone Wire or Cable

POWER GUYS (FIG. 17)	
CONDITION	CLEARANCE IN INCHES
Power side guys attached above primary wires	40*
Pole-to-pole power guys attached above primary wires	30*
Power guys attached to transmission line poles 15,000 volts to ground or higher	24
Pole-to-pole power guys not attached above primary wires but within 12 inches of bare secondary wires and within 12 inches of tel cable or guys	3**
TELEPHONE GUYS	
From telephone wire or cable	6 where practical but not less than 3

*From any part of guy which lies between guy insulator and pole, refer to Section 621-405-201 for information on placing insulators.

**Power guy should be grounded, covered with suitable insulation where they pass power conductors or contain insulator below lowest power conductor and above highest telephone cable. If none of these conditions have been met, notify your supervisor before continuing work operations.

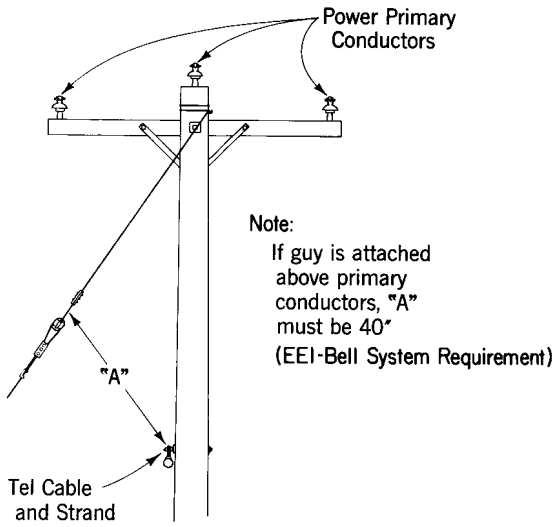


Fig. 17—Clearance Between Power Guy and Telephone Cable and Strand

D. Clearance From Power Vertical Runs

VERTICAL RUNS (FIG. 18)	
KIND OF VERTICAL RUN	CLEARANCE IN INCHES
Power service under 750 volts on pins and insulators	3
Power service on surface of pole from telephone hardware (pole steps, through bolts, lags, etc)	2-min 1/8 Pole Circumference Generally
Bare vertical grounding conductors from lag screws, through bolts, etc	1

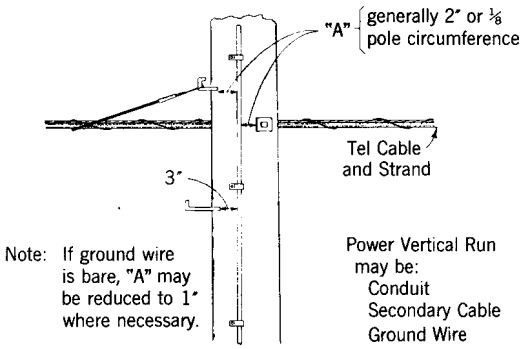


Fig. 18—Clearances Between Power Vertical Run on Pole Surface and Telephone Hardware

E. Clearance From Licensee Cable, Wire, and Attachments

LICENSEE ATTACHMENTS (FIG. 19 THRU 23)	
LICENSEE ATTACHMENT	CLEARANCE IN INCHES
Licensee cable and telephone cable on opposite sides of pole (See Fig. 19)	12** Diagonal
Suspension bolts of licensee and telephone cables (See Fig. 19)	Not less than 4
Licensee cable and telephone cable or between two or more licensee cables (See Fig. 20)	12*
Licensee strand mounted equipment or expansion loops and telephone cable (See Fig. 20)	6
Power vertical run to licensee amplifier or meter and cable, bolts, washers, etc (See Fig. 21 thru 23)	2 in any Direction

* May be reduced by agreement of both licensee companies.

** Where agreement with the power utility permits.

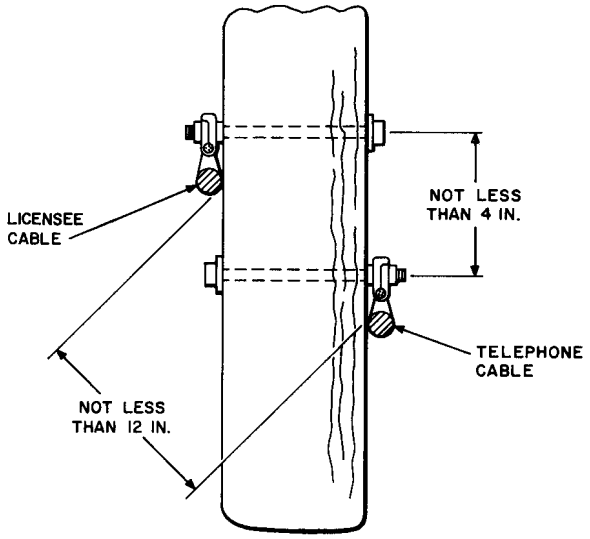


Fig. 19—Diagonal Clearance Between Licensee and Telephone Cables

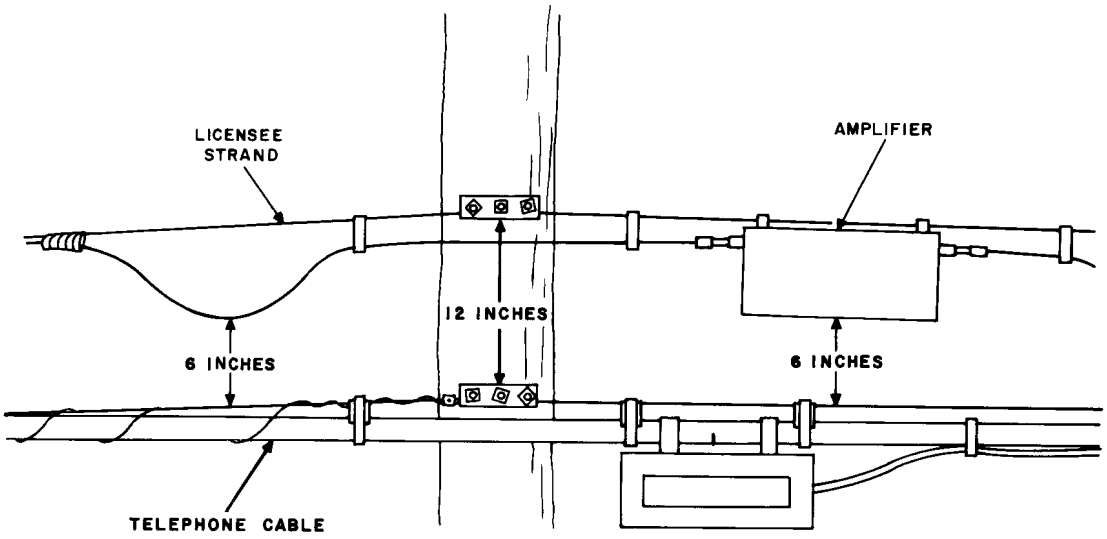


Fig. 20—Clearance Between Licensee Equipment and Telephone Company Cable

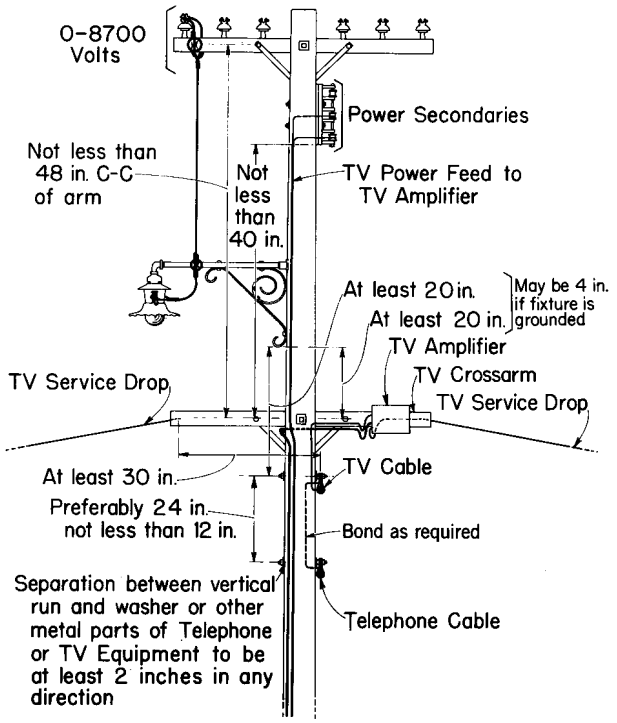


Fig. 21—Clearances on Joint Use Pole With TV Amplifier Mounted on Crossarm

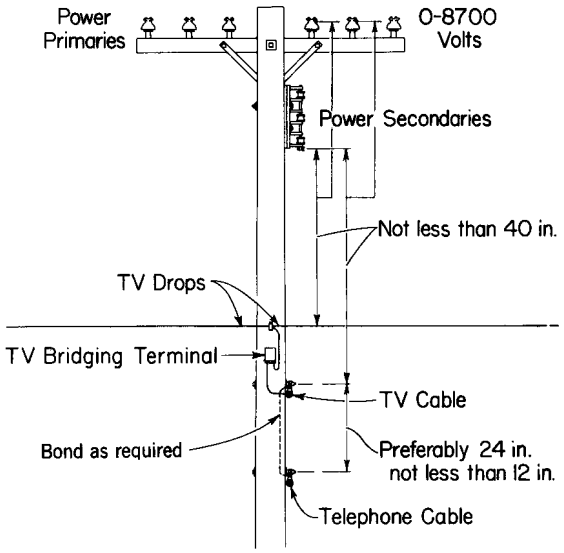


Fig. 22—Clearances on Joint Use Pole With No TV Amplifier or Meter

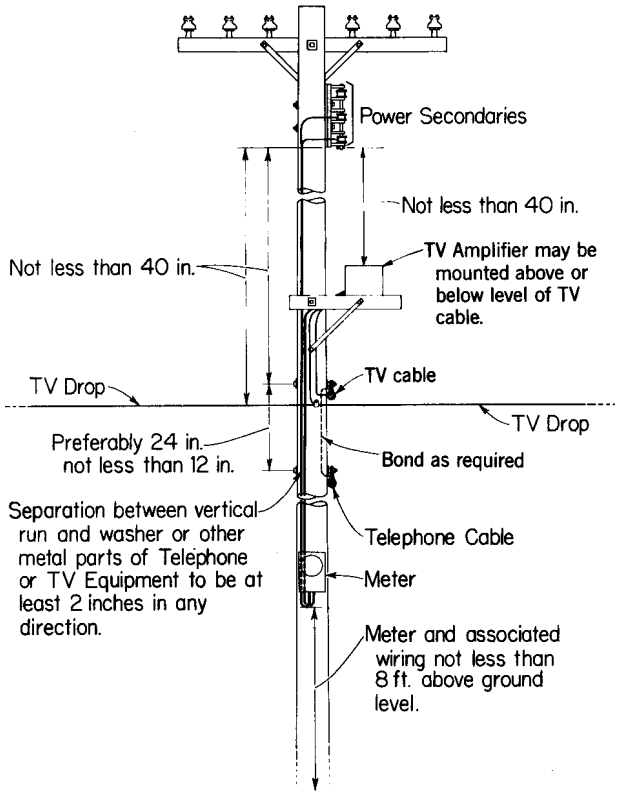


Fig. 23—Clearances on Joint Use Pole With TV Amplifier and Meter Mounted on Pole

5. CLEARANCES FOR TELEPHONE GUYS AND CABLES CROSSING BELOW POWER WIRES OR CABLES—NONJOINT

POWER FACILITY	CONSTRUCTION			MAINTENANCE
	SPAN LENGTH IN FEET OF POWER FACILITY			
OPEN POWER CONDUCTORS**	150 – LESS	151 – 250	251 – 350	350 – LESS
	CLEARANCE IN FEET-INCHES			
300 Volts or Less				
Service Wires or Cables	2-0	2-3	2-6	2-0
Line Wires Generally	2-0	2-3	2-6	2-0
Within 6 ft of Tel Pole*	4-0	4-3	4-6	4-0
301 — 750 Volts — Phase Wires				
Above Telephone Cable	4-0	4-3	4-6	4-0
Above Telephone Guy	2-0	2-3	2-6	2-0
751 — 8700 Volts — Phase Wires				
Above Telephone Cable or Guy	4-0	4-3	4-6	4-0
Within 6 ft of Tel Pole*	6-0	6-3	6-6	6-0
8701 — 50,000 Volts — Phase Wires				
Above Telephone Cable	6-0	6-3	6-6	6-0
Above Telephone Guy	4-0	4-3	4-6	4-0
Grounded Neutrals				
22,000 Volts or Less to Gnd	2-0	2-3	2-6	2-0
Above 22,000 Volts to Gnd	Same as Associated Phase Wires			
Other Neutrals	See 1.07 and Fig. 2 and 3			
	Same as Associated Phase Wires			
Grounded Metal Sheath Cables, or any Cable Lashed to Grounded Strand, any Voltage	2-0	2-0	2-0	2-0
Spacer Cable**				
300 Volts or Less — Phase Wires	2-0	2-0	2-0	2-0
Within 6 ft of Tel Pole*	4-0	4-0	4-0	4-0
301 — 750 Volts — Phase Wires				
Above Telephone Cable	4-0	4-0	4-0	4-0
Above Telephone Guy	2-0	2-0	2-0	2-0
751 — 8700 Volts — Phase Wires				
Above Tel Guy or Cable	4-0	4-0	4-0	4-0
Within 6 ft of Tel Pole*	6-0	6-0	6-0	6-0
8701 — 50,000 Volts — Phase Wires				
Above Telephone Cable	6-0	6-0	6-0	6-0
Above Telephone Guy	4-0	4-0	4-0	4-0

* Every effort shall be made to avoid these situations and establish a common crossing pole instead.

** Voltage to ground if power circuit is grounded, voltage between wires if not.

6. MISCELLANEOUS CLEARANCES

FACILITY	CLEARANCE IN FEET-INCHES TELEPHONE SPANS 350 FEET OR LESS
TELEPHONE CABLE AND GUYS ABOVE	
Power service drops or wires. 300 volts — less Trolley span wires Foreign Communication wires, cables, guys	2-0*
Trolley contact wires 750 volts — less	4-0**
TELEPHONE CABLES ALONGSIDE	
Neon signs	4-0
TELEPHONE GUYS ALONGSIDE	
Neon signs	1-0
Fire hydrants, Fig. 24 Signal pedestals	3-0
TELEPHONE CABLE AND GUYS BELOW	
Foreign guys	2-0
Neon signs	4-0***
Foreign communication cables	2-0

* If cable crosses open power wires, increase clearance by 2 feet.

** Place guard at point of crossing, increase clearance if practical.

*** Clearance for telephone guys is 1 foot.

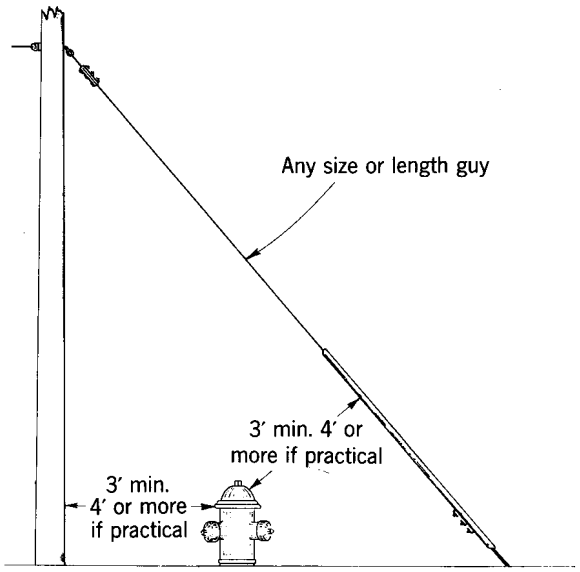


Fig. 24—Telephone Cable or Guys Above or Alongside Fire Hydrants, Signal Pedestals