SECTION 620-210-011CA
Issue D, December, 1971
Bell Canada
Standard

CLEARANCES AND SEPARATIONS FOR AERIAL COMMUNICATION PLANT

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1. GENERAL

1.01 This section provides the ***minimum*** clearances and separations to be used for aerial communication cables, line wires, drop wires, poles, stub poles and guys in Bell Canada territory, except for joint use clearances in the span and separations at the pole which are covered in 620-215-011CA. ***It is recommended that these values be increased where conditions permit.***

1.02 The term ***clearance*** as used in this section means the shortest distance existing between two objects, at least one of which is free to move, when there is no wind or ice. ***Separation*** is the shortest distance existing between two fixed objects (see Figure 1).

1.03 The clearances and separations shown in this section meet or exceed the requirements for the Heavy Loading Area of CSA Standard C22.3 No. 1-1970. For ease of administration all Bell Canada territory is assumed to be within the Heavy Loading Area. This requires that values used for construction or maintenance provide specified minimum clearances at 0° Fahrenheit with an assumed ½″ cylindrical ice coating around the outside diameter of the aerial plant.

1.04 Whenever two or more requirements apply to any one situation, the greater clearance or separation shall be used.

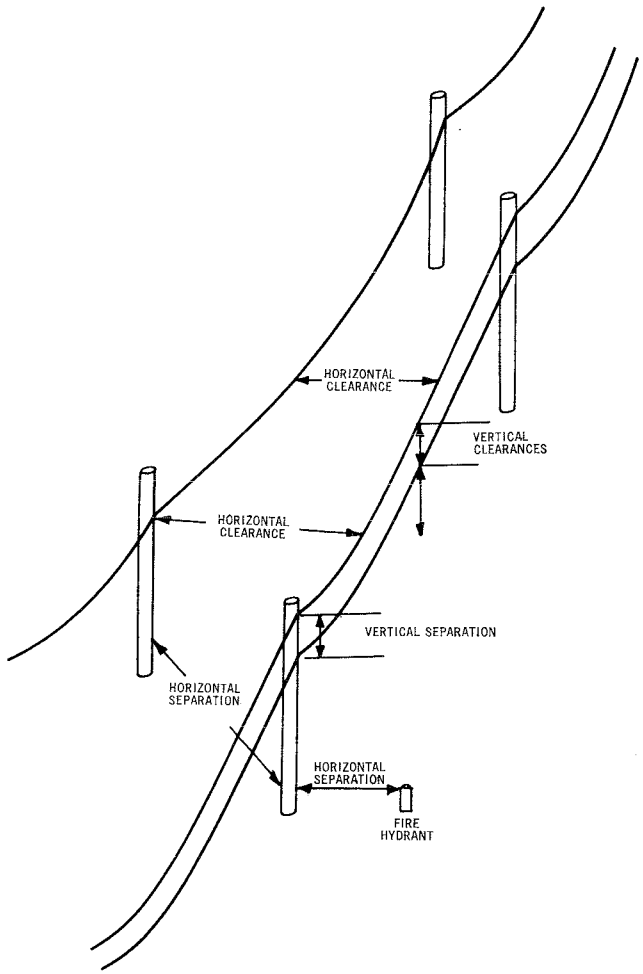


Fig. 1 — Illustration of Clearances and Separations

1.05 The tools to be used for measuring separations at the pole and clearances in the span, and the precautions to be taken when measuring in the vicinity of power plant are covered in 081-220-104CA.

1.06 This section has been reissued to incorporate all the clearance and separation requirements for aerial plant (except joint use) in one section and to adjust values in accordance with C22.3 No. 1-1970. Coincident with this revision Sections 620-210-012CA (Clearances for Telephone Pole and Stub Poles) and 620-210-013CA, 620-210-014CA (Clearances for Telephone Cables, Guys, Line Wires and Drop Wires for Heavy and Medium Loading Areas) are cancelled.

2. VERTICAL CLEARANCES FOR COMMUNICATION WIRES AND CABLES

Above Ground or Railway Tracks

2.01 Table A provides vertical clearances above ground and railway tracks for cables and wires. The values in Column I should be used for construction of new plant (including cases where new cable is placed on existing strand) except where other values are specified on the working plan. The values in Column II should be used for checking plant in place. The use of this column requires the calculation of the increase from the current sag to the maximum sag.

2.02 The sag increment used in Column II is the difference between the sag at the time of measuring (i.e., at the appropriate temperature) and the sag at 0° Fahrenheit with an ice load. For suspension strand these values can be obtained from Sections 627-210-012CA, –013CA, –014CA, and –015CA using the cable weights specified in Table B (pair size and gauge available from Test Board or Engineering). For NEZ wire, sag values can be found in 624-700-902CA.

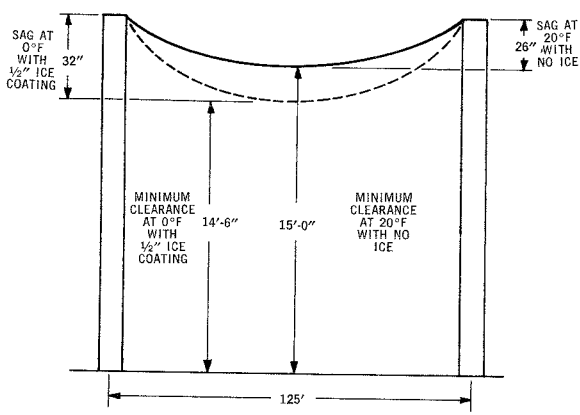
Example No. 1

Check existing road clearance to determine if it is adequate.

Temperature	20°F (no ice)
Cable Weight	4 lbs./ft.
Suspension Strand	10M
Span	125′
Measured Height Above Ground	17′ – 0″

627-210-013CA

Cable Weight (Lbs./Ft.)	Temp. (°F)	Span 125 Ft.	
		Sag (in.)	Tens Lbs.
4.0	0	26	3925
	20	26	3800
	40	27	3675
	60	28	3575
	80	29	3450
	100	30	3350
	*	32	4746



Sag at 0°F with ½″ ice	32″	(from 627-210-013CA)
Sag at 20°F with no ice	26″	(from 627-210-013CA)
Sag increment	6″	
Minimum clearance 0°F with ½″ ice	14′-6″	(Table A Column II)
Minimum clearance at 20°F (no ice)	15′-0″	

Therefore measured height of 17′-0″ is adequate.

TABLE A — VERTICAL CLEARANCE ABOVE GROUND OR RAILS FOR COMMUNICATION WIRES AND CABLES

Location of Cable or Wire (See Fig. 2 for examples)	Type of Plant	Maximum Span Length	Minimum Clearance	
			Constructing New Plant (Including Placing New Cable on Existing Strand) (Column I)	Checking Plant In Place (Column II)
1. (a) Over land likely to be travelled by road vehicles including highways, streets, lanes, alleys and driveways (other than to residences or residence garages).	Cable on Suspension Strand	300′	18′-0″	14′-6″ + Sag Increment (Para. 2.02)
(b) Over the right-of-way of underground pipelines.	NEZ Rural Wire	150′	18′-0″	
		200′	19′-0″	
(c) Alongside and within the limits of the right-of-way (fence line, property line, etc.) of streets and highways in densely populated areas.	NE Drop	100′	18′-0″	18′-0″
	X-Multiple Drop Wire	150′	18′-0″	
(d) Over or alongside farm land likely to be travelled by road vehicles.	C & D Urban C, D & E Rural Open Wire			18′-0″ (Para. 2.04)
2. (a) Over driveways to residences or residence garages.	Cable on Suspension Strand	300′	15′-0″	12′-0″ + Sag Increment (Para. 2.02)
(b) Over farm lands unlikely to be travelled by high farm vehicles e.g., steep slopes, sidehills, rocky ledges, etc., but excluding areas such as swamps that may be crossed by road vehicles in winter.	NEZ Rural Wire	150′	15′-0″	
		200′	16′-6″	
	NE Drop Wire	100′	15′-0″	15′-0″
		125′	16′-0″	
		175′	17′-0″	
	X-Multiple Drop Wire	150′	15′-0″	
	C & D Urban, C, D & E Rural, Open Wire			15′-0″ (Para. 2.04)

TABLE A — (CONT'D)

Location of Cable or Wire (See Fig. 2 for examples)	Type of Plant	Maximum Span Length	Minimum Clearance	
			Constructing New Plant (Including Placing New Cable on Existing Strand) (Column I)	Checking Plant In Place (Column II)
3. Alongside roads and highways in areas unlikely to be travelled by road vehicles (with no plant overhanging the travelled portion of the road or highway) and including a 5 foot strip beyond the edge of the right-of-way (fence line, property line, etc.)	Cable on Suspension Strand	300′	14′-0″	10′-0″ + Sag Increment (Para. 2.02)
	NEZ Rural Wire	175′	14′-0″	
		200′	14′-6″	
	NE Drop Wire	100′	14′-0″	14′-0″
		175′	15′-0″	
	X Multiple Drop Wire	150′	14′-0″	
	C & D Urban C, D & E Rural, Open Wire			14′-0″ (Para. 2.04)
4. Over walkways or ground normally accessible to pedestrians only.	Cable on Suspension Strand	300′	12′-0″	8′-0″ + Sag Increment (Para. 2.02)
	NEZ Rural Wire	175′	12′-0″	
		200′	12′-6″	
	NE Drop Wire	100′	12′-0″	12′-0″
		175′	13′-0″	
	X Multiple Drop Wire	150′	12′-0″	
	C & D Urban C, D & E Rural, Open Wire			12′-0″ (Para. 2.04)

Table A Cont'd Next Page

TABLE A (CONT'D)

Location of Cable or Wire (See Fig. 2 for examples)	Type of Plant	Maximum Span Length	Minimum Clearance	
			Constructing New Plant (Including Placing New Cable on Existing Strand) (Column I)	Checking Plant In Place (Column II)
5. Above the highest rail at railway crossings (Figure 3).	Cable on Suspension Strand	300′	28′-6″	25′-0″ + Sag Increment (Para. 2.02)
	NE Drop	100′	28′-6″	28′-6″
	X Multiple Drop Wire	150′	28′-6″	
	C & D Urban, C, D & E Rural, Open Wire			28′-6″ (Para. 2.04)

TABLE B

CABLE WEIGHTS FOR CHECKING SAGS OF CABLES IN PLACE [3]

Gauge of Cable Pairs	CABLE WEIGHTS (LBS/FT) [1] Pic, Pulp and Paper Insulated Conductors (All Pairs in Same Sheath) [2]					
	Up to 100 Prs	101 to 400 Prs	401 to 600 Prs	601 to 900 Prs	901 to 1200 Prs	1201 to 1800 Prs
26	1	2	2	3	3	4
24	1	2	2	3	4	6
22	1	3	4	5	6	—
19	2	4	6	—	—	—

Note 1: Add 1 lb/ft for up to 3 coaxial cables on same strand.

Note 2: If there is more than one cable on the same strand determine weight of each cable separately and add their weights together for sag calculations.

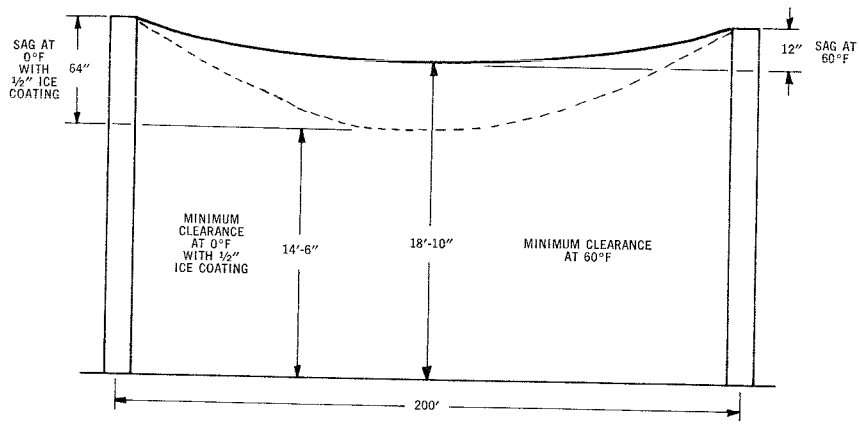
Note 3: Not to be used for constructing new cables (Construction values can be found in 626-200-103CA, etc.).

Example No. 2

Check existing road clearance to determine if it is adequate.

Temperature	60°F
NEZ rural wire	
Span	200 feet
Measured height above ground	18 feet

624-700-902CA							
Span Length (Feet)	Temperature — Degrees Fahrenheit						
	100°	80°	60°	40°	20°	0°	*
	Sag (inches)						
200	14½	13	(12)	11	10	9½	(64)



Sag at 0°F with ½" ice	64" (from 624-700-902CA)
Sag at 60°F	12" (from 624-700-902CA)
Sag increment	52" or 4'-4"
Minimum clearance at 0°F ½" ice	14'-6" (Table A Column II)
Minimum clearance at 60°F	18'-10"

Therefore measured height of 18 feet is inadequate. Raise wire to construction clearance of 19'-0" (Table A Column I)

2.03 Table A restricts span lengths for NEZ wire and X-Multiple Drop Wires to values that will not produce a permanent stretch in the wire under ice load. This ensures that minimum clearances will be maintained through repeated ice loading cycles. NE Drop Wire has been similarly restricted in locations accessible to fast moving motor vehicles and trains. In other locations, lengths of up to 175 feet may be used provided that an additional foot is added to the recommended clearance value at the time of construction to compensate for the permanent elongation that will occur following an ice load.

2.04 As C and D urban, C, D and E rural, and open wire have been destandardized for new construction, there are no values shown in Table A Column I and no maximum spans given. Values shown in Column II are for use in checking plant in place, subject to the following:

(a) For C Rural Wire spans in excess of 150 feet, increase the clearances of Column II as follows:

Span Length (Feet)	Required Clearance Increase
151-175	1 foot
176-200	2 feet
201-225	3 feet
226-250	4 feet

(b) For C and D urban and D and E rural wire in spans of 226 to 250 feet, increase the clearance of Column II by one foot.

(c) For open wire, clearances in excess of those shown in Column II are desirable, especially for road crossing spans in excess of 100 feet.

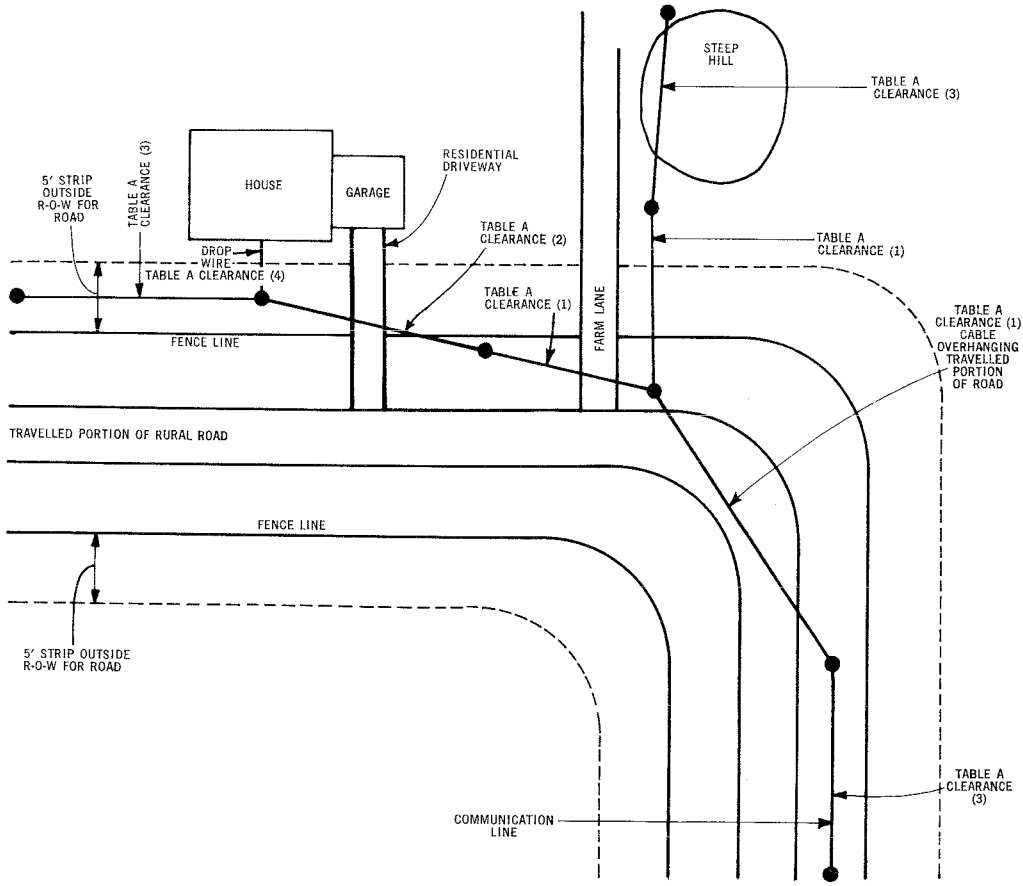


Fig. 2 — Illustration of use of Vertical Clearances of Table A (Not to Scale)

From Foreign Power or Communication Plant (Non Joint Use Construction)

2.05 Where Bell plant (except drop wires Para. 2.06) passes under or over foreign plant without attaching to a common crossing pole, or runs parallel to foreign plant carried on a separate pole line, Engineering will specify the appropriate clearance as its value is dependent on the sag of the foreign conductors under specified thermal or ice loading conditions and the power voltage. Such cases include the following:

(a) A power line passing over Bell plant. (Bell plant must not pass over a power line.)

(b) A foreign communication line passing over or under Bell plant.

(c) A power line running parallel to Bell plant on a separate pole line.

2.06 Minimum vertical clearances between communication drops and power conductors are specified in 620-220-011CA.

From Swimming Pools

2.07 Communication wires or cables must not be placed above a swimming pool nor above,

or in the immediate vicinity of any associated diving structure.

Above Buildings, Signs, Etc.

2.08 The minimum vertical clearance of communication wires or cables from buildings, signs, etc., under the sag conditions produced by a ½ inch ice coating on these wires or cables is as follows:

Roofs that can be readily walked upon	8 feet
Other roofs	3 inches
Signs, etc.	3 inches

3. HORIZONTAL CLEARANCES AND SEPARATIONS FOR COMMUNICATION WIRES, CABLES, POLES AND STUBS

From Rails

3.01 Table C specifies the minimum horizontal clearance or separation required between the vertical projection of the inside edge of the nearest rail and:

(a) the closest communication wire or cable paralleling the tracks (unless it exceeds the vertical clearance value shown in Table A) or

(b) a pole, stub pole or guy associated with either a crossing or parallel line.

3.02 At loading sidings sufficient space must be left for a driveway in accordance with the stated needs of the railway.

3.03 Communication plant must not obstruct the view of signals, signs and similar equipment.

(1) TABLE C — MINIMUM HORIZONTAL CLEARANCE OR SEPARATION BETWEEN RAILWAY TRACKS AND COMMUNICATION PLANT FOR SPANS NOT EXCEEDING 175 FEET (WIRES AND CABLES AT REST) (3)

Clearance or Separation Between Communication Wires, Cables, Poles, Stub Poles, or Guys and the Inside Edge of the Vertical Projection of the Nearest Rail For (Fig. 3):	Main Tracks	Sidings
Straight Tracks	10′-0″ (2)	8′-0″ (2)
Curved Tracks	12′-6″ (2)	10′-6″ (2)

Note 1: Not required for wires or cables that meet the vertical clearance requirements of Table A.

Note 2: For NEZ wire use 30 feet.

Note 3: Limit NE drop wire spans to 100 feet unless horizontal clearance to tracks is 30 feet or more.

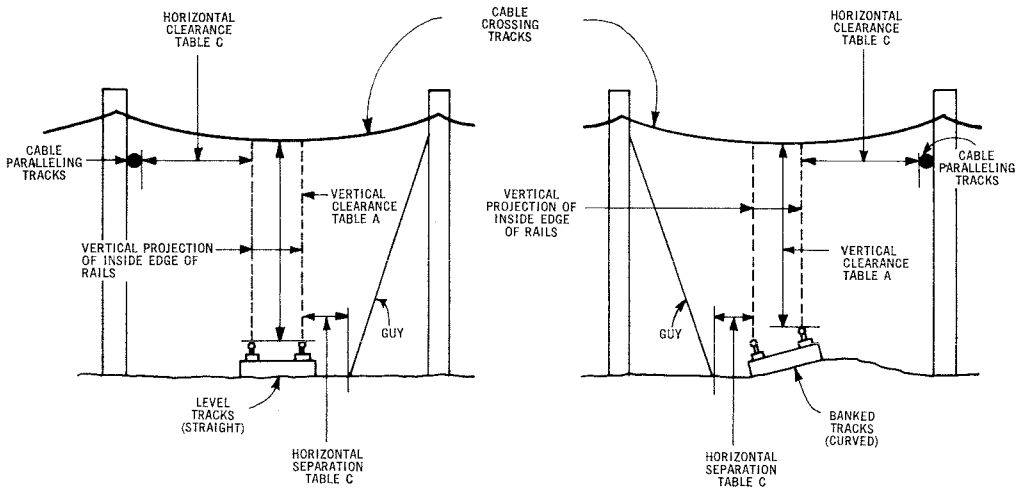


Fig. 3 — Clearance and Separation Between Communication Plant and Railway Tracks

From Power Wires Carried on a Separate Pole Line

3.04 Engineering will specify the appropriate horizontal clearance between a Bell pole line and a paralleling power line when joint use construction is not present.

Separation of Poles and Stubs from Fire Hydrants and Curbs

3.05 The minimum horizontal separation between a pole or stub pole (including any attachments 8 feet or less above ground level) and a fire hydrant is 3 feet.

3.06 Poles or stub poles including any attachments projecting from them within 14'-6" from the ground shall be set back a minimum of 6 inches from the vertical edge of a curb (or its vertical projection), measured away from the travelled portion of the road.

Wires and Cables Passing By (But Not Attached To) Buildings, Signs, Billboards, Lamp and Traffic Signs, Standards and Antennas

3.07 Wires or cables whether at rest or swinging under maximum ice and wind loading conditions must not interfere with the normal use of balconies, doors, fire escapes windows, permanent ladders, catwalks, etc.

3.08 Where buildings exceed three stories (or 50 feet) in height and ladders are used by the local fire department, a clear vertical space at least 6 feet wide is required adjacent to the building or beginning within 8 feet of it for the purpose of raising ladders. This space may be either parallel to or at right angles to the adjacent building wall and must be of sufficient length to accommodate the longest ladders used by the local fire department.

3.09 The minimum horizontal clearance to buildings, signs, etc., shall be sufficient to prevent the conductors from hitting or rubbing against these objects under maximum horizontal swing conditions with ice and wind loading. Allowance must also be made for the swing of the object (e.g., a sign) where applicable.

4. CLEARANCES FOR GUYS

Communication Guys

4.01 A minimum clearance of 3 inches is required between communication guys and

(a) communication conductors attached to the same pole; or (b) span wires supporting luminaires or similar equipment (span wires attached to the same pole may require strain insulators — 620-215-011CA).

4.02 The minimum clearance in any direction between a communication guy and a foreign power or communication guy not associated with the same pole line is 24 inches.

4.03 Guys passing over or in the vicinity of railway tracks or over land used for vehicular or pedestrian traffic require a ***minimum*** vertical clearance equivalent to the values for suspension strand in Table A Column II assuming a sag increment of one foot (e.g., 15'-6" over a roadway), or the ***minimum*** horizontal clearance of Table C.

4.04 The minimum horizontal separation between a guy and a fire hydrant is 3 feet unless the guy is more than 6 feet above the top of the hydrant.

4.05 Guys and guy rods shall be set back a minimum of 6 inches from the edge of the curb, measured away from the travelled portion of the road.

4.06 Guys in locations where they pose a hazard to motor vehicles, pedestrians, skiers, snow vehicles, etc., must be equipped with substantial and conspicuous guards.

4.07 On joint use poles, communication guys shall be attached below the neutral space (620-215-011CA).

4.08 Clearances from swimming pools, buildings, signs, billboards, lamp and traffic signs, standards and antennas shall be the same as those required for wires and cables in Paras. 2.07, 2.08, 3.07 and 3.08.

Power Guys Attached to Poles Carrying Communication Wires and Cables

4.09 On joint use poles, power guys shall be attached at least 30 inches above or below the communication space.

4.10 If, on a joint use pole, a power guy is attached above current carrying power plant operating at 300 volts or more to ground and it comes within 40 inches of communication conductors or the communication space on the pole (excluding communication guys) it must be effectively grounded. If this cannot be done the portion having the inadequate clearance must be insulated with guy insulators.

4.11 Power guys attached to a joint use pole and meeting the requirements of Para. 4.10 require the following clearances from communication plant:

— guys parallel to the direction of the line - 3 inches

— transverse guys - 6 inches

4.12 Guys from remote power poles may be attached to poles carrying communication plant if they meet the same requirements as those for joint use poles (Paras. 4.09 and 4.10).