BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

SECTION G10.310.1
Issue A, March, 1949-N

RAILROAD CROSSINGS

GENERAL

Contents

1. SCOPE

1.01 This section describes the general requirements for construction and maintenance of communication lines crossing over or under the tracks and associated parallel communication lines of steam and electrified railroads, except street railways.

1.02 The construction and maintenance requirements for communication lines, crossing over or under the tracks of major and minor tracks are the same unless otherwise specified.

1.03 The standard practices applying to outside plant construction and maintenance, apply also to crossings of telephone lines over or under railroads, except as otherwise provided for in Sections G10.310.1 to G10.310.9, inclusive, or in the detail plans.

2. DEFINITIONS

2.01 Minor Tracks: Minor tracks mean railroad tracks included in the following:

(a) Spur tracks less than 2,000 feet long and not exceeding two tracks in the same crossing span.

(b) Narrow gauge or other tracks on which standard rolling stock cannot, for physical reasons, be operated.

(c) Tracks used only temporarily for construction or similar purposes for a period not exceeding one year.

(d) Tracks not operated as a public utility, such as industrial railways used in logging, mining, etc.

2.02 Major Tracks: Major tracks mean any tracks not included under the definition of minor tracks or street railway tracks.

2.03 Street Railway Tracks: Street railway tracks mean the tracks of a railway operated by whatsoever power for public use in the conveyance of passengers or freight which are mainly located upon, over, above, across, through or along public thoroughfares. The requirements of this section do not apply to crossings of street railway tracks. Such crossings should be constructed in accordance with standard practices and the requirements contained in Section G10.301S, "Clearances for Aerial Plant" in California or Section G10.301 in Nevada, for the voltages involved.

3. PERMITS AND NOTICES

3.01 Before planning to erect wires or cables across, make bridge attachments or place conduit under the tracks of a railroad, the Division Plant Engineer should obtain written consent from the Superintendent of Communication or other designated officer of the railroad. The application should be made as follows:

(a) Drawing 20181, Sheet 2, Appendix A, shall be used when submitting data with crossing license application to the Southern Pacific Company for aerial or underground crossing permits. An approved adaptation of Drawing 20181, Sheet 2, may be used in submitting data with license application to other railroad companies where the use of such a form has been established.

(b) Where specific arrangements for obtaining such permits have not been made, such notice shall include information regarding the location and general plan of the crossing, clearances and other data indicated on Typical Communication Line Crossing Data Sheet and Typical Drawings in Appendix B, and any other pertinent information in sufficient detail so that it can be determined whether or not the proposed construction will conform to these instructions.

3.02 Subsequent to obtaining the written permit to make the crossing, the Division Construction Superintendent shall give written notice to the Superintendent of Communication or other designated officer of the railroad at least thirty days in advance of starting construction. In cases where thirty days notice is impracticable because of service demands or emergency, the parties concerned shall cooperate to avoid unnecessary delay in the construction of the crossing.

4. MARKING OF POLES

4.01 Crossing poles, including jointly owned poles shall be marked with pole tag insignia to identify the owning company.

5. FIRE HAZARD

5.01 Crossing poles or other supporting structures shall be located as far distant as practicable from inflammable structures and the space around the poles or other supporting structures kept free from inflammable material.

6. PROTECTION FROM MOVING VEHICLES

6.01 Supporting structures adjacent to traveled highways shall be located with a view to reducing, as far as practicable, the danger of being struck by moving vehicles. Structures which are exposed to abrasion by moving vehicles or to other damage which would materially affect their strength, shall be protected by hub or other suitable guards.

7. INSPECTION

7.01 The crossing construction shall be subject to the inspection of the railroad company and shall comply with the requirements of standard practices except as otherwise indicated in Sections G10.310.1 to G10.310.9, inclusive. Defective material shall be rejected and replaced with acceptable material.

7.02 All parts of the supporting structures shall be inspected at such intervals as are necessary to assure adequate maintenance. A definite program should be established by the Division Plant Engineer to insure compliance with this requirement. All defective parts shall be promptly restored to good condition by replacement or reinforcement before they have deteriorated to less than two-thirds their required initial strength.

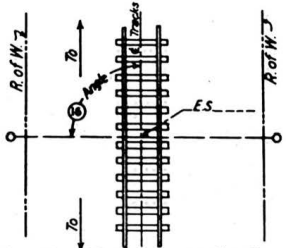
7.03 The ground line circumference of various classes and species of poles whose strengths have deteriorated to two-thirds their strength when new, is given in Appendix C. In the replacement inspection of treated poles where decay is usually internal, the extent of the decay shall be determined and evaluated in terms of external decay so that the tables in Appendix C may be applied. The following list of pole species and fiber strengths are provided as a basis for entering the tables in Appendix C:

Species	Fiber Strength (Pounds per Square Inch)
Western Red Cedar	5,600
Ponderosa Pine (Creosoted)	6,000
Douglas Fir (Creosoted)	7,400
Southern Pine (Creosoted)	7,400
Western Larch (Creosoted)(Butt treated)	7,400

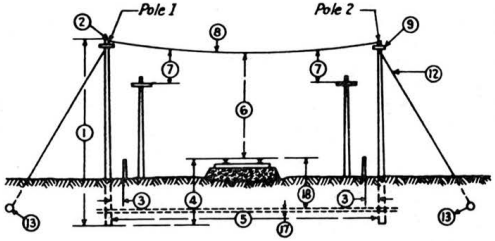
7.04 Bridge attachments and underground crossings shall be properly maintained.

REFER TO DOCUMENT AUDIT No. 57100

C.E.
Drawing 20181
Sheet 2



Show Location of Poles, Guys and Direction of approach of line to Crossing Span.



NOTE: Construction must comply with requirements of State or National Codes having jurisdiction for Telegraph, Telephone and other Communication Crossings.

* Exceptions permitted by State or N.E.S. Code will be allowed. For Power Crossings see Dwg. C.E. 20104

POLES:
1 Length overall, Pole 1 ____ ft. Pole 2 ____ ft.
2 Circumference at top, Pole 1 ____ in. Pole 2 ____ in. (Top must not be less than 19 inches circumference.)*
3 Location with reference to R.R. Right of Way:
Inside of R. of W., Pole 1 ____ ft. Pole 2 ____ ft.
Outside of R. of W., Pole 1 ____ ft. Pole 2 ____ ft.
(Must be off R. of W. if practicable.)

POLE BUTT:
4 Below top of Rail, Pole 1 ____ ft. Pole 2 ____ ft.
Above top of Rail, Pole 1 ____ ft. Pole 2 ____ ft.
Depth of setting, Pole 1 ____ ft. Pole 2 ____ ft.
(Depth of setting must not be less than 5 feet in soil.)

CONDUCTORS:
5 Length of crossing span ____ ft.
6 Height above top of rails. (Actual) ____ ft.
7 Actual clearance above (or below) any wire on R. of W. ____ inches
8 Kind and size.

	Initial		Ultimate	
	Size	Number	Size	Number
Cable				
Open Wire				
Insulated				
Duplex Wire				

FIXTURES:
9 Dimensions of Cross Arms, (must be double) ____
10 Type of Line Insulators ____
11 Type of Brackets (Must be double.) ____
NOTE: For insulated duplex wire a single metal bracket capable of withstanding full Deadend Pull of wires may be used. Each metal bracket must be attached to pole by two 3/8" x 4" or larger lag screws.
12 Guy Wire: Pole 1 - dia. ____ strength ____ lb. Pole 2 - dia. ____ strength ____ lb.
13 Type of Guy Anchors, Pole 1 ____ Pole 2 ____
14 Messenger for supporting cable, Dia. ____ Strength ____ lb.

LOCATION:
15 Distance from some well established structure such as culvert, bridge, etc., ____
16 Angle of crossing with tracks, ____ deg.
17 Diameter and type of conduit, ____
18 Depth below top of rail, ____

REMARKS ____

SOUTHERN PACIFIC COMPANY
PACIFIC LINES
COMMUNICATION LINE CROSSING OF
THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY
ACROSS RIGHT OF WAY OF
SOUTHERN PACIFIC COMPANY

APPENDIX B

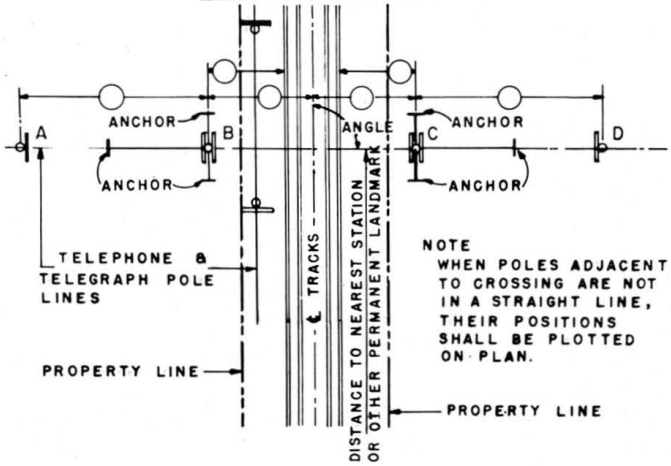
TYPICAL COMMUNICATION LINE CROSSING DATA SHEET

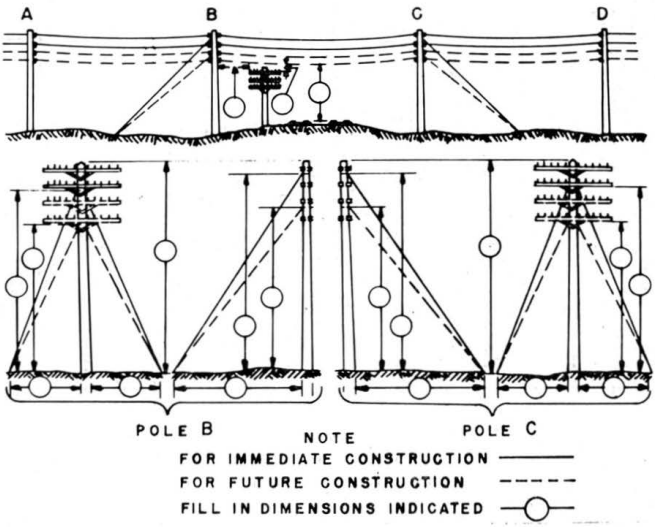
(A data sheet of the type illustrated below shall be filled out by the party planning to erect wires across the railroad and forwarded to the Superintendent of Communication or other designated officer, together with the plan and other pertinent information as a part of the notice required by Paragraph 3.01.)

Name of party desiring crossing.....
Location of proposed crossing.....

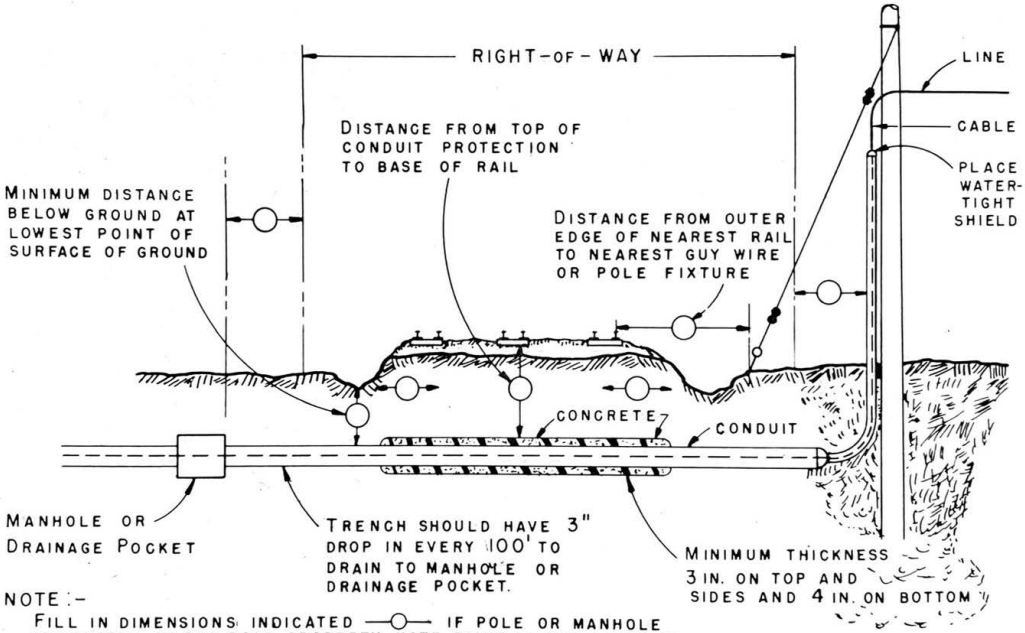
1. Poles - Kind of timber - Treated or untreated.....
2. Poles - Class and length.....
3. Poles - Depth of setting.....
4. Poles - Setting - Kind of earth; i.e., rock, firm earth or.. swampy ground.....
5. Guys, Side - Number, kind and size.....
6. Guys, Side - Nominal breaking strength.....
7. Guys, Head - Number, kind and size.....
8. Guys, Head - Nominal breaking strength.....
9. Guy Clamps - Kind and size.....
10. Guy Clamps - Number at pole end.....
11. Guy Clamps - Number at guy rod end.....
12. Guy Rods - Kind and size.....
13. Anchors - Kind and size.....
14. Anchors - Depth of setting.....
15. Crossarms - Number, immediate construction.....
16. Crossarms - Number, future construction.....
17. Crossarms - Material.....
18. Crossarms - Size.....
19. Crossarms - Number of pins per arm.....
20. Pins - Material.....
21. Pins - Type.....
22. Pins - Size.....
23. Pins - If metal, state if galvanized.....
24. Insulators - Material.....
25. Insulators - Type.....
26. Wires - Material and number.....
27. Wires - Size and gauge.....
28. Wires, supply, involved in crossing - Voltage.....
29. Suspension Strand - Kind and size.....
30. Suspension Strand - Nominal breaking strength.....
31. Suspension Strand Attachment - Kind and size of through bolt
32. Suspension Strand Attachment - Type of suspension clamp.....
33. Suspension Strand Attachment - Type of reinforcing strap....
34. Suspension Strand Attachment - Kind and size of reinforcing strap bolt.....
35. Suspension Strand Attachment - Type of reinforcing links....
36. Suspension Strand Attachment - Kind and size of reinforcing link screws.....
37. Cable, if any, diameter, inches.....
38. Cable, if any, weight, pounds, per foot.....
39. Cable Rings - Material.....
40. Cable Rings - Type.....
41. Cable Rings - Spacing.....
42. Lashing Wire - Kind and size.....

APPENDIX B (Continued)





Typical Drawing for Communication Lines Crossing Over Railroads

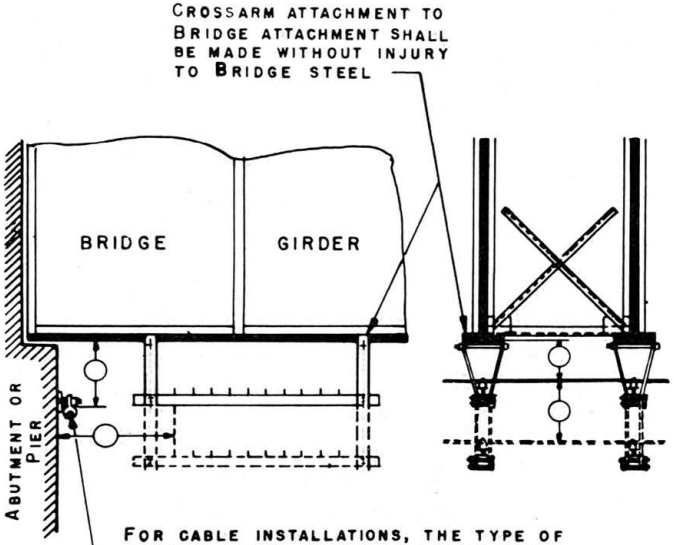


NOTE:-

FILL IN DIMENSIONS INDICATED —○— IF POLE OR MANHOLE IS LOCATED ON RAILROAD PROPERTY, NOTE RIGHT-OF-WAY LINES IN PROPER LOCATIONS, INCLUDING DISTANCE FROM POLE OR MANHOLE TO RIGHT-OF-WAY LINE.

Typical Arrangement of Underground Crossing

APPENDIX B (Continued)



NOTE

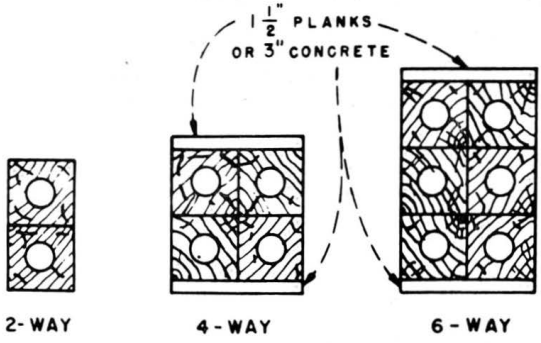
FOR IMMEDIATE CONSTRUCTION ————

FOR FUTURE CONSTRUCTION - - - - - -

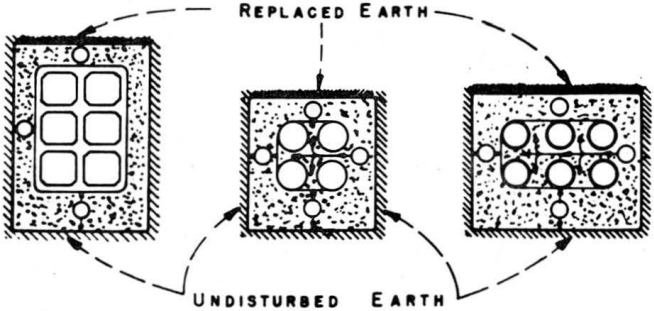
FILL IN DIMMENSIONS INDICATED —○—

Typical Drawing for Communication Lines Crossing Under Bridges

APPENDIX B (Continued)



CREOSOTED WOOD DUCT



6-WAY VITRIFIED CLAY CONDUIT

FIBER DUCT

METAL PIPE

WHERE NOT MORE THAN FOUR METAL PIPES NOT EXCEEDING 4 IN. IN DIAMETER ARE USED NO PROTECTION IS REQUIRED.

Typical Arrangement of Conduits for Underground Crossing

APPENDIX C

GROUND LINE CIRCUMFERENCE OF POLES VARIOUS CLASSES AND SPECIES WHICH HAVE DETERIORATED TO TWO-THIRDS THEIR STRENGTH WHEN NEW

Poles-Fiber Strength of 5,600 Pounds Per Square Inch

Length of Pole Feet	Class of Pole						
	1	2	3	4	5	6	7
	Ground Line Circumference-Inches						
20	30	28	26-1/2	24-1/2	22-1/2	21	19-1/2
25	32-1/2	31	29	26-1/2	25	23	21-1/2
30	35-1/2	33-1/2	31	28-1/2	26-1/2	25	23-1/2
35	37-1/2	35-1/2	33-1/2	30-1/2	28-1/2	26-1/2	24-1/2
40	40	37-1/2	35	32-1/2	30-1/2	27-1/2	
45	42	39	37	34	31-1/2		
50	43-1/2	41	38-1/2	35	32-1/2		
55	45-1/2	42-1/2	39-1/2	37	34		
60	46-1/2	43-1/2	41	38			
65	48-1/2	45	42	39-1/2			
70	50	46-1/2	43-1/2	40-1/2			
75	50-1/2	47-1/2	44-1/2	41-1/2			
80	52	48-1/2	45-1/2	42			
85	53	49-1/2	46-1/2				
90	56	52-1/2	47-1/2				

APPENDIX C (Continued)

Poles-Fiber Strength of 6,000 Pounds Per Square Inch

Length of Pole Feet	Class of Pole 1	2	3	4	5	6	7
	Ground Line Circumference-Inches						
20	29	27-1/2	25-1/2	24	22	20-1/2	19-1/2
25	32-1/2	30-1/2	28-1/2	26	24-1/2	22-1/2	21
30	34-1/2	32-1/2	30-1/2	28-1/2	26	24	22-1/2
35	37	34-1/2	32-1/2	30-1/2	28	25-1/2	24-1/2
40	39	36-1/2	34-1/2	31-1/2	29-1/2	27	25-1/2
45	41	38-1/2	36	33-1/2	31	28-1/2	26-1/2
50	42-1/2	40	37-1/2	34-1/2	32-1/2	30	27-1/2
55	44	41-1/2	38-1/2	36	33-1/2	30-1/2	
60	45-1/2	43	40	37			
65	47	44	41	38-1/2			
70	48	45-1/2					

APPENDIX C (Continued)

Poles-Fiber Strength of 7,400 Pounds Per Square Inch

Length of Pole Feet	Class of Pole 1	2	3	4	5	6	7
	Ground Line Circumference-Inches						
20	27-1/2	25-1/2	24	22-1/2	20-1/2	19	18
25	30	28	26-1/2	24	23	21	19-1/2
30	32-1/2	30-1/2	28-1/2	26-1/2	24-1/2	22-1/2	21
35	34-1/2	32	30-1/2	28-1/2	26	24-1/2	22-1/2
40	36-1/2	34	32	29-1/2	27-1/2	25-1/2	24
45	38-1/2	35-1/2	33-1/2	31	29	26-1/2	25
50	40	37	35	32-1/2	30	28	26
55	41-1/2	39	36	33-1/2	31	29	
60	42-1/2	40	37-1/2	35	32	29-1/2	
65	44	41	38-1/2	35-1/2			
70	45	42	39-1/2	36-1/2			
75	46-1/2	43	40-1/2				
80	47	44	41-1/2				
85	48	45					
90	51	48					