OFFICE OF

RAMSEY COUNTY ENGINEER

CONSTRUCTION NOTES

CENTERVILLE ROAD

CO. PROJ. NO 23-03

FILE NO. 4

ENGINEERS'

FIELD BOOK

No. 10-03

"4" (23-03)

Centerville

Distances from Center of Roadway for Cross-Sectioning

Roadway 16 feet wide. Side Slopes 1 on 1.

For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	0
1	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	1
2	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	2
3	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	3
4	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	4
5	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	5
6	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	6
7	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	7
8	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	8
9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	9
10	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	10
11	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	11
12	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	12
13	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	13
14	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	14
15	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	15
16	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	16
17	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	17
18	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	18
19	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	19
20	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	20
21	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	21
22	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	22
23	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	23
24	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	24
25	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	25
26	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	26
27	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	27
28	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	28
29	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	29
30	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	30
31	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	31
32	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	32
33	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	33
34	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	34
35	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	35
36	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	36
37	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	37
38	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	38
39	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	39
40	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 30.6. For same slopes but other widths of roadbed, correct above figures by one-half difference in width of roadbed; thus in example above, for 20 ft. roadbed distance will be 30.6+(20—16)÷2 or 2 ft. added to 30.6 =32.6. For slopes of 1 on 1½ see inside of back cover.

Lineal Feet Gaurd Rail

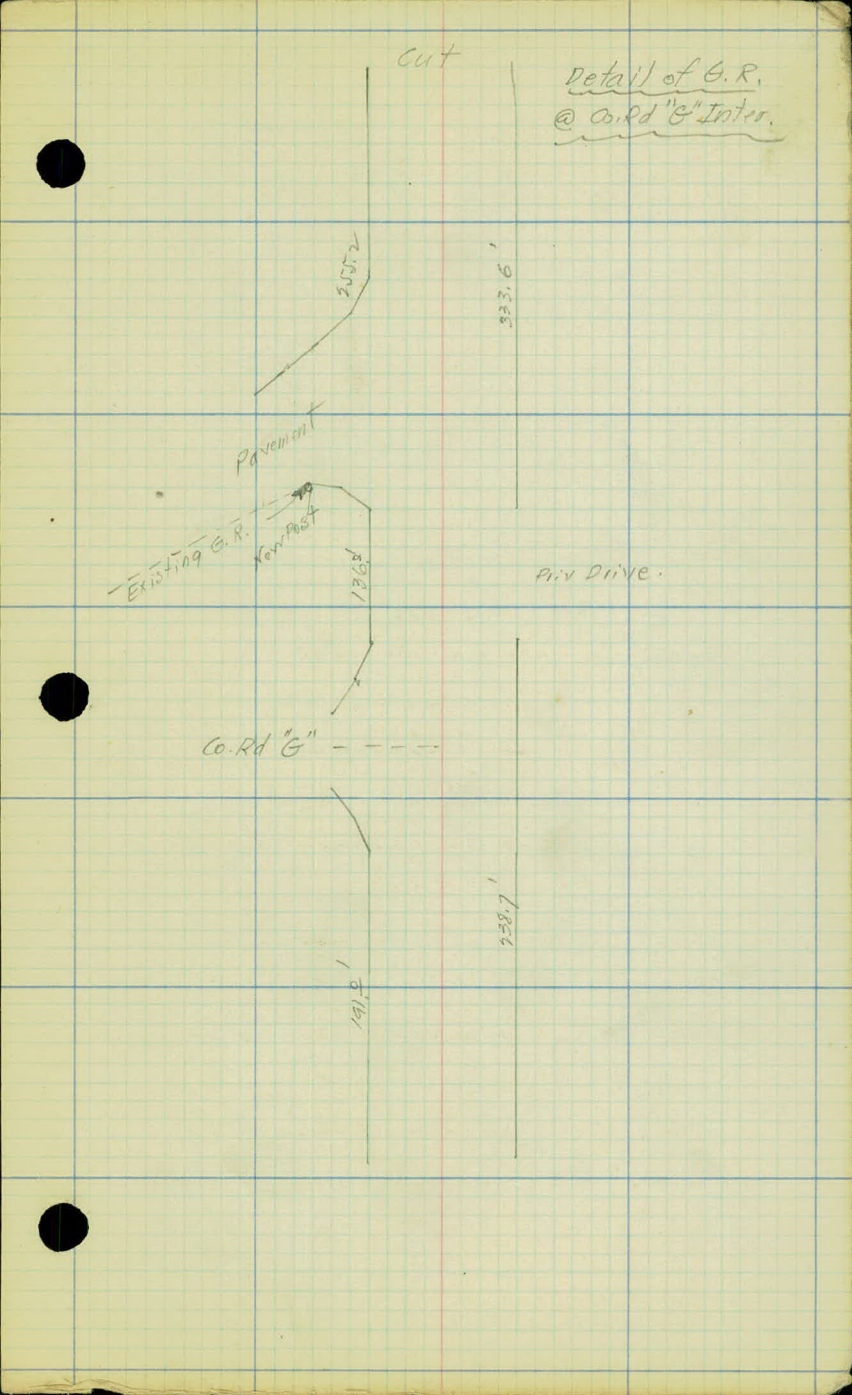
Centerville Road

Proj 28-03

W.F.C.
Eck.
Galvin
Franke

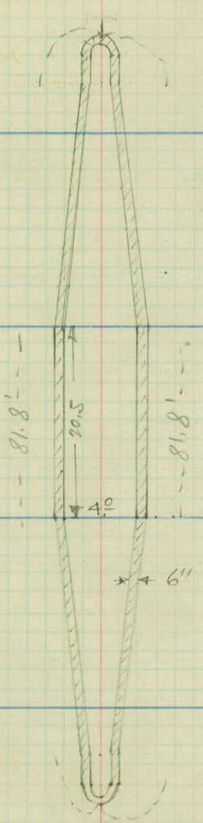
Sept 13, 1924

Approx. Loc.	Lt. Lineal Ft. G.R.	Rt.	
Vadnais Lake 7+70 – 12+32	West Side 462.5		Note: Meas. are the lengths of Planking
Under Pass to Cent. Rd	361.4	493.6	
Co. Rd "E" Int.	239.0		
Across new fill	421.6	858.8	
		794.4	
	303.0		
Near Rd. Int.		127.6	
Bet. Rd Int's		349.8	
Near Sta. 91	127.2		
" " 97	381.6		
Last Curve	286.2	524.8	
Near Sta. 118	238.6		
N. of S. Birch Lk Blvd.	143.1	143.0	No Black Paint
Near Sta 146	111.5		Not Painted
" " "		111.6	No Black Paint
Co. Rd. "G"	191.0		Not Painted
" "	136.0	238.7	" "
" "	255.2	333.6	" "
Near Sta. 261	317.7	221.6	" "
" " 266	285.6	443.7	" "
Sub Total	4,261.3 ✓	4,141.2 ✓	
Grand Total			8,402.5 ✓
N. Birch Lake Blvd. Int.	188.9 86.5	? Project.	


Cut
Detail of G. R.
@ Co. Rd "G" Inter.
333.6'
Pavement
Existing G. R.
Priv Drive.
Co. Rd "G"
338.7'
191.2'

Proj - 7303

Final Measurments of Curbing
@ Under Pass
to Accompany Final Topog.



Summary
Lin 6" Curbing

81.8
81.8
10.0
17.0
10.5
10.5
15.0
10.6
237.7 - Lin ft.

W.H.C.
Wilshusen
Persons
Frank
} Oct. 29, 1924

INDEX

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	10.10	225.59		215.49	
15			5.45	220.14	
16			4.66	220.93	
+50			4.50	221.09	
17			4.33	221.26	
18			3.95	221.64	
+50			3.75	221.84	
19			3.55	222.04	
T.P.	6.00	225.22	3.40	222.19	
+50			6.00	222.22	
20			5.80	222.42	
+50			5.60	222.62	
21			5.40	222.82	
+50			5.23	222.99	

Inst.
Rod.
Chain.

3

Left	C L	Right
	6.1	
	5.3	
	4.9	
	4.6	
	4.3	
	4.1	
	6.5	
	6.3	
	6.1	
	5.9	
	5.2	

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		228.22 ✓			
22			5.04	223.18	
+50			4.80	223.42	
22+92 = 2' +45 S.C. Line			4.64	223.58	
23			4.43	223.79	
23			4.02	224.20	
24			3.60	224.62	
T.P.	6.05	230.67 ✓	3.60	224.62 ✓	
25			5.65	225.02	
26			5.25	225.42	
P.M.			7.54	224.13	224.13
27	F. Ent. BT.		4.89	225.78	
28			4.49	226.18	
29			4.05	226.62	
30			3.65	227.02	

Inst.
Rod.
Chain.

Left O L Right

5.5
5.3
5.1
4.9
4.5
4.1
6.2
5.8
5.4
5.0
4.6
4.2

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		230.67			
T.P.	3.75	232.59	3.69	226.84	
31			5.30	227.43	
32			4.70	227.83	
33			4.52	225.21	
745			4.30	228.43	
34			4.02	228.71	
T.P.	8.54	237.19	4.08	233.65	
750			8.25	228.94	
766			8.15	229.04	
35			8.07	229.12	
36			7.20		
750			6.56	230.63	
37			5.90		

Inst.
Rod.
Chain.

Left						C L							Right
						5.8							
6.9/33	6.2/25.4	7.7/23	7.7/31	5.8/15	5.30/10	5.35/10	5.4/15	7.3/20	7.6/25	6.8/25.2	6.1/33		
						5.4							
5.6/33	5.8/25.4	7.3/22	7.3/19	5.0/15	4.96/10	5.00/10	5.0/15	7.1/20	7.3/24	6.2/25.4	5.6/33		
						5.0							
5.5/33	5.5/22.4	7.7/24	7.4/20	4.5/15	4.57/10	4.57/10	4.6/16	7.7/21	7.5/26	5.5/27.5	5.0/33		
						4.8							
5.8/33	5.7/19.2	8.5/16	8.4/22	4.5/14	4.40/10	4.40/10	4.85/16.6	4.7/17	5.1/21	7.4/25	7.7/30	5.5/31.5	5.0/33
						4.6							
5.8/33	5.7/18.7	8.1/16	7.8/22	4.2/16	4.10/10	4.04/10	4.80/22	5.44/37					
Nail in T.P. in Sta. 34+50						8.9							
8.4/33	10.3/30.4	12.3/28	12.9/24	8.5/10	8.32/10	8.25/10	8.30/20	8.40/33					
						8.8							
10.5/33	10.4/29.7	13.5/28	13.0/22	8.5/15	8.29/10	8.15/10	8.2/15	8.5/24	11.1/30	11.0/33			
						8.6							
11.0/33	10.9/29.4	13.7/27	13.3/23	8.2/16	8.15/10	8.12/10	8.2/15	9.6/18	9.7/33				
						7.7							
9.0/33	7.7/19	7.25/10	7.29/10	7.3/15	9.6/19	9.6/33							
						7.1							
10.4/33	11.3/31	10.5/22	6.6/15	6.64/10	6.62/10	6.6/15	8.7/19	9.8/33					
						6.4							
7.9/33	8.4/29.3	8.6/20	6.1/15	5.96/10	5.96/10	6.0/15	8.3/19	9.1/37					

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		237.19			
38			4.27		
39			3.95		
+50			3.65		
B.M.	3.63	237.11	1.70	235.49	235.48
40	Farm Ent. W		5.33		
+75			5.14		
41			5.08		
42			5.12		
43			5.42		
T.P.	3.40	236.97	5.54	233.57	
+50			3.35		
44			3.78		
B.M.			6.15	230.82	230.84
45			4.46		
44			5.14		

Inst. ....
Rod. ....
Chain. ....

Left					C L						Right
					5.3						
5.0/33	5.7/15.2	6.6/24	6.3/20	4.8/14.5	4.86/10	4.84/10	4.8/15	6.9/18	7.1/21	5.7/23.6	6.0/33
					4.5						
3.4/33	3.6/25.9	6.0/22	6.0/19	3.9/15	4.01/10	4.02/10	4.0/15	6.0/19	5.7/22	2.0/27.7	2.1/33
					4.2						
2.6/33	3.7/27.0	5.6/21	5.5/18	3.7/15	3.70/10	3.70/10	3.7/15	5.5/19	5.2/23	1.7/28	2.7/33
Lowest Conc. Step S.E. Cor. School House.											
		4.5/33	4.9/24	4.7/17	5.42/10	5.42/10	5.5/15	7.2/18	7.2/23	3.8/27.9	4.3/33
					5.8						
					5.6						
4.3/33	4.6/25.9	4.9/22	6.7/18	5.3/15	5.20/10	5.18/10	5.3/15	7.3/18	7.4/22.6	3.0/27.3	4.5/33
					5.6						
3.9/33	3.9/26.7	4.9/22	6.8/18	5.1/10 (circled; 15)	5.16/10	5.13/10	5.2/15	7.1/19	7.1/22	4.2/27.2	5.0/33
					5.6						
1.6/33	1.3/28	4.7/22	6.5/17	5.0/15	5.20/10	5.17/10	5.3/15	7.0/18	7.3/22	5.6/26.7	5.6/33
					5.9						
3.2/33	3.3/28	7.2/22	7.0/18	5.5/15	5.49/10	5.49/10	5.5/14.2	7.6/18	7.6/21	6.8/22.7	6.8/33
					4.1						
2.6/33	2.4/26.3	5.5/21	5.5/18	3.7/15	3.60/10	3.62/10	3.7/15	6.0/19	6.0/23	5.5/24.4	5.5/33
					4.4						
3.2/33	2.9/27.2	5.9/21	6.0/18	4.0/15	4.00/10	3.96/10	4.1/15	6.8/19	7.1/23	6.6/24.6	7.0/33
					5.10						
Spk in root 24" Maple 33' Rt Sta. 45+00											
5.0/33	4.7/25.4	6.9/22	6.6/19	4.6/15	4.55/10	4.55/10	4.6/14	7.4/19	7.6/22	6.9/23	4.9/33
					5.6						
5.1/33	4.7/27.6	7.2/22	6.8/19	5.0/15	5.11/10	5.23/10	5.3/14	4.6/26	7.0/33		

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		230.97			
+50			5.37		
47			5.69		
+65			6.18		
48			6.84		
T. P.	3.28	233.70	6.55	230.42	
+65			3.70		
49			4.05		
50			5.08		
B.M.			3.34	230.34	230.43
+50			5.65		
51			6.25		
52			7.55		
T. P.	4.53	230.88	7.35	226.35	
53			6.09		
54			7.71		

Inst. ....
Rod. ....
Chain. ....

Left | ℄ L | Right

6.0

5.2/33 4.5/26.5 7.7/22 7.5/19 5.4/15 5.45/10 5.45/10 5.6/14 8.0/18 8.4/22 7.3/23.6 7.2/33

6.3

5.2/33 4.4/26.7 8.1/21 8.1/18 6.0/15 5.72/10 5.83/10 5.9/15 8.6/18 8.6/21 7.8/24 7.8/33

5.4/33 4.8/27.3 7.9/22 8.1/18 4.0/15 4.05/10 4.40/9 4.1/9.9 4.3/15 8.9/18 9.2/22 8.9/24.3 8.9/33

7.1

5.6/33 4.6/27.7 7.8/22 8.0/18 4.2/15.4 4.20/10 4.75/9.3 4.52/10 6.6/15 9.2/18 9.3/22 8.0/23.6 8.1/33

4.7/33 4.0/28 3.5/19 3.27/10 4.25/9 4.0/10 4.1/14.3 6.6/18 6.9/23 4.5/26.2 4.6/33

4.7

2.6/33 3.1/25.8 5.7/23 5.7/18 3.5/15 3.62/10 4.61/9 4.3/10 4.2/15 7.0/19 6.8/23 4.6/26 4.6/33

5.7

5.5/34 3.7/30 3.7/24.5 6.2/21 4.3/18 4.4/15 4.44/10 5.63/9 5.4/10 5.4/15 8.0/18 8.3/22 4.7/26.7 4.7/33

Nail in Guy Pole Lt Sta 50+50

3.8/33 3.3/28.2 7.0/22 7.1/18 5.2/15 5.20/10 6.3 6.21/9 6.0/10 6.1/15 9.0/18 8.8/22 4.7/27 4.8/33

6.9

3.2/33 3.4/28.3 7.8/22 7.9/18 5.8/15 5.75/10 6.80/9 6.6/10 6.6/15 9.2/19 8.8/22 5.2/27.5 5.3/33

8.1

3.5/33 3.8/29.5 9.0/23 7.8/19 6.9/15 7.05/10 8.07/9 7.8/10 7.8/15 10.1/18 10.1/21 4.3/30.7 4.5/33

6.7

0.8/33 0.8/31 7.9/23 7.6/19 5.7/15 5.94/10 6.43/9 6.2/10 6.2/15 8.4/18 8.2/22 1.3/31.3 1.4/33

8.3

1.2/33 1.2/32.7 10.6/22 10.1/18 7.8/14.4 7.73/10 7.80/10 8.0/15 10.0/18 10.0/22 2.8/31.3 2.7/33

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		230.88 ✓			
+50			8.50		
55			9.30		
T.P.	2.65	224.09 ✓	9.44	221.44 ✓	
+37			3.09		
+50			3.28		
56			3.95		
57			5.23		
58			5.80		
+73			6.10		
59			6.10		
T.P.	8.34	223.64 ✓	8.99	215.30 ✓	215.38
+62			5.24		
+81			5.22		
60			5.18		

Inst.
Rod.
Chain.

Left | C L | Right

9.1

3.0/33 2.7/31.9 11.2/22 11.1/19 8.4/15 8.60/10 8.60/10 8.7/15 10.8/18 10.8/22 6.1/28.2 6.4/33

9.9

6.8/33 7.0/28.7 11.8/22 11.4/18 9.4/15 9.40/10 9.40/10 9.4/15 12.0/19 12.1/22 10.4/24.4 10.6/33

3.6

3.7/33 4.3/26.3 4.1/23 5.9/19 3.2/15 3.10/10 3.15/10 3.4/16 8.3/24 9.1/33

3.8

4.8/33 4.7/26.8 6.8/23 6.5/20 3.3/14 3.34/10 3.32/10 3.6/17 9.2/26 9.5/33

4.5

9.2/33 9.5/24 3.8/14 4.00/10 4.01/10 4.0/17 10.6/27 10.9/33

5.4

11.2/33 10.9/24 5.0/14 5.20/10 5.28/10 5.2/14 11.2/25 11.8/33

6.0

11.5/33 11.2/25 5.7/17 5.80/10 5.80/10 5.4/14 11.3/25 11.6/33

6.1

10.3/33 10.6/24 6.0/17 6.10/10 6.15/10 6.0/16 10.2/22 13.2/33

6.1

7.4/33 9.1/26.7 9.1/21 5.9/14 6.05/10 6.15/10 6.1/17 11.2/23 12.0/33

Nail in T.P. Rt Sta 59+10.

5.6

7.0/33 4.7/25.9 7.8/24 7.6/20 5.1/14 5.20/10 5.40/10 5.2/14 10.9/25 11.1/33

5.6

5.2/33 4.5/24 7.3/23 7.0/19 4.9/15 5.15/10 5.40/10 5.1/14 10.7/24 11.1/33

5.6

5.8/33 5.4/23.8 6.9/22 6.7/18 4.8/15 5.10/10 5.34/10 5.3/17 10.8/26 11.0/33

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		223.66			
+40			5.05		
+56			5.03		
+76			5.00		
61			4.94		
+50			4.87		
62			4.80		
63			4.65		
64			4.55		
+50			4.50		
65			4.40		
T. P.	5.58	224.71	4.53	219.13	
$+54^{6} = +52^{3}$			5.40		
T. P.			4.22	220.49	220.49
66			5.35		

Inst.
Rod.
Chain.

Left								Right	
6.9	5.8	7.2	7.1	5.0	5.02	5.22	5.1	10.6	11.0
33	232	22	18	15	10	10	17	25	33
7.8	6.1	6.1	7.2	7.0	5.1	5.00	5.14	5.1	10.7	11.0
33	29	238	22	18	15	10	10	16	25	33
8.4	8.0	6.6	6.2	7.6	7.2	5.0	5.02	5.12	5.2	10.6	11.1
33	31	28	237	22	18	15	10	10	17	25	33
8.6	7.7	6.5	7.4	7.2	5.1	5.00	5.06	5.2	10.9	11.1
33	27	234	21	18	15	10	10	16	26	33
		9.6	7.2	5.0	4.90	4.96	5.2	9.2	11.4
		33	22	16	10	10	16	22	33
	9.5	8.7	7.2	4.8	4.85	4.86	4.9	7.7	10.4	10.7
	33	26	20	15	10	10	16	21	29	33
	9.3	8.6	7.5	4.9	4.70	4.70	4.8	7.2	7.5	9.2
	33	29	23	15	10	10	15	21	27	33
	7.8	6.0	5.6	4.6	4.60	4.60	4.5	6.7	6.3	0.5	0.1
	33	23	19	15	10	10	15	20	24	30.8	33
	8.2	6.0	5.6	4.4	4.55	4.55	4.6	6.4	6.3	0.2	0.2
	33	22	18	15	10	10	15	19	23	32	33
	7.8	6.0	5.9	4.4	4.3	4.55	4.30	4.3	6.6	6.3	3.7	3.2
	33	25	20	15	10	9	10	15	19	23	27	33
		8.8	7.1	5.4	5.4	5.65	5.15	5.2	7.9	7.8	6.5	8.4
		33	18	15	10	9	10	15	20	23	25	33
Nail in T.P.			84	55+60								
			8.9	6.1	5.85	5.04	5.1	7.2	7.3	6.6	6.6
			33	19	7.4	10	15	21	24	25	33

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		224.71			
+50			5.30		
67			5.26		
+50			5.18		
68			5.14		
+50			5.10		
69			5.05		
+50			5.05		
70			4.96		
+50			4.90		
T. P.	4.59	224.94	4.36	220.35	220.35
71			5.15		
72			5.04		
73			4.87		

Inst.
Rod.
Chain.

Left | ℄ L | Right

5.9

9.3/33 7.0/17 5.6/15 5.5/10 5.70/9 4.95/10 4.9/15 7.5/20 7.5/22 5.7/25 5.8/33

5.9

9.4/33 7.4/18 5.6/15 5.4/10 5.65/9 4.90/10 4.8/15 7.3/20 7.7/23 6.1/26 6.1/33

5.8

9.3/33 6.6/17 5.5/14.3 5.4/10 5.60/9 4.90/10 4.8/15 7.5/20 7.5/24 6.2/26 5.7/33

5.8

9.6/33 6.7/17 5.4/14 5.4/10 5.60/9 4.78/10 4.8/15 7.9/21 7.9/24 5.9/29 5.3/33

5.7

9.8/33 7.4/18 5.3/15 5.3/10 5.50/9 4.78/10 4.8/15 7.8/20 7.8/23 6.2/25 5.3/33

5.7

9.9/33 9.3/28 8.0/26 6.5/17 5.3/15 5.2/10 5.45/9 4.75/10 4.5/15 7.9/20 7.8/23 5.8/26 5.0/33

5.6

11.2/33 8.2/17 5.2/15 5.2/10 5.40/9 4.75/10 4.8/15 8.2/20 8.2/23 6.9/25 5.5/33

5.6

11.2/33 8.8/20 4.9/14 5.2/10 5.20/9 4.85/10 4.8/15 8.1/21 8.2/24 7.1/25 5.9/33

5.5

11.5/33 10.2/22 4.7/14.4 5.00/10 4.95/10 4.8/15 8.4/21 8.5/26 7.1/27 5.9/33

Nail in T.P. Rt. Sta. 20+85

12.0/33 10.7/24 5.1/15 5.21/10 5.7 5.21/10 5.0/15 8.7/22 8.6/27 7.4/28.5 6.6/33

5.6

11.9/33 11.4/26 10.8/23 4.9/15 5.10/10 5.06/10 5.0/15 8.4/22 8.3/26 6.7/30 6.3/33

5.5

11.3/33 7.7/24 6.8/17 4.8/15 4.8/10 5.10/9 4.70/10 4.6/15 7.6/20 7.6/24 5.4/18.5 5.0/33

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		224.94			
+62			4.80	220.14	
74			4.77	220.17	
+50			4.72	220.22	
75			4.65	220.29	
+50			4.62	220.32	
T.P.	6.24	226.10	5.10	219.84	
76			5.70		
+50			5.62		
77			5.60		
+50			5.50		
B.M.	5.78	226.08	5.78	220.32	220.30
78			5.44		
+50			5.32		
79			5.07		

Inst. ....

Rod. ....

Chain. ....

Left	℄	Right
	5.4	
9.5/33 7.0/24 7.7/22 7.3/18 5.0/15 5.0/10 5.22/9		4.45/10 4.4/15 7.0/21 7.0/24 5.0/27.7 6.0/33
	5.4	
7.8/33 7.5/24.6 7.9/24 7.2/18 5.0/15 5.1/10 5.30/9		4.30/10 4.3/15 4.6/20 6.8/23 4.8/26.4 5.5/33
	5.3	
6.8/33 7.4/23.7 8.2/24 7.8/19 5.0/15 5.1/10 5.30/9		4.20/10 4.2/15 7.0/21 6.9/23 5.0/26.6 5.3/33
	5.3	
4.4/33 7.3/28 6.6/23.4 7.7/21 7.6/18 4.9/15 5.0/10 5.25/9		4.15/10 4.1/15 6.8/21 6.9/23 4.9/27 4.6/33
	5.3	
5.4/33 5.4/25.5 7.2/23 7.0/19 4.8/15 4.9/10 5.20/9		4.10/10 4.0/15 6.9/21 7.0/25 4.7/29 4.7/33
	6.4	
6.4/33 6.2/25.8 8.3/23 8.3/19 5.9/15 6.0/10 6.30/9		5.17/10 4.7/24 6.4/27 6.9/33
	6.3	
5.4/33 5.7/24.6 7.8/21 8.0/18 5.8/15 5.9/10 6.19/9		5.10/10 5.0/21 5.2/33
	6.3	
5.8/33 6.0/26 8.3/23 7.7/19 6.0/15 5.9/10 6.22/9		5.06/10 5.0/15 7.6/20 7.7/24 6.4/25.6 4.7/33
	6.2	
6.0/33 6.0/25.7 8.2/22 8.0/18 6.0/15 5.9/10 6.10/9		5.00/10 5.0/15 7.7/21 8.1/25 6.8/27.9 6.5/33

R.R. Spk in 8" Oak Bt. Sta. 77 + 50

Left	℄	Right
6.0/33 6.0/23 8.0/21 8.0/18 5.6/14.2 5.8/10 6.05/9	6.1	4.90/10 4.9/15 7.8/22 7.6/27 6.9/33
5.9/33 6.0/24 7.7/21 7.6/18 5.6/15 5.6/10 5.85/9	6.0	4.80/10 4.6/15 7.3/20 8.1/25 8.1/33
5.6/33 5.9/15.4 7.7/22 7.6/20 5.3/15 5.4/10 5.70/9	5.8	4.65/10 4.5/15 8.4/23 8.7/27 7.2/30.4 7.2/33

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		226.08			
+50			4.90		
80			4.65		
T. P.	6.83	227.83	5.08	221.00	
+50			4.30		
81			6.05		
+24			6.00		
82			5.71		
+50			5.50		
+74			5.40		
83			5.29		
+50			5.10		
84			4.90		
+60			4.60		

Inst. ....

Rod. ....

Chain. ....

Left | C L | Right

5.6

5.4/33 5.5/25.5 7.7/23 7.7/19 5.4/15 5.2/10 5.47/9 | 4.40/10 4.3/15 8.1/21 8.1/24 7.2/26.5 7.2/33

5.4

4.5/33 5.5/25.4 7.7/22 7.6/18 5.1/15 4.8/10 5.15/9 | 4.30/10 4.3/15 7.6/20 7.7/23 6.3/25.5 5.7/33

6.9

7.0/33 7.6/25 9.0/23 8.8/19 6.4/15 6.2/10 6.55/9 | 6.10/10 6.1/15 8.8/20 8.8/23 5.8/26 6.3/33

6.9

7.2/33 7.1/24.5 8.6/22 8.3/18 6.3/15 6.20/10 | 6.05/10 5.9/15 8.3/20 8.3/23 3.8/27.7 3.8/33

6.6

7.0/33 7.2/24.3 8.4/23 8.4/20 6.1/15 6.10/10 | 6.00/10 5.9/15 7.8/19 7.8/23 2.9/28.5 3.0/33

6.3

7.2/33 6.7/24.7 7.8/22 7.7/20 6.0/14 5.95/10 | 5.60/10 5.5/15 7.3/20 7.2/23 1.0/30.7 0.9/33

6.1

5.9/33 5.7/25.5 7.8/22 7.8/18 5.6/15 5.6/10 5.85/9 | 5.20/10 5.2/15 7.1/19 7.0/23 3.2/29.3 4.0/33

6.0

5.2/33 5.1/26.2 8.1/22 8.0/19 5.6/15 5.5/10 5.85/9 | 5.00/10 4.7/17 7.3/21 7.0/24 4.3/24.7 3.9/33

5.9

5.3/33 5.0/27.5 8.1/23 7.5/19 5.4/15 5.5/10 5.80/9 | 4.85/10 4.4/25 4.6/33

5.7

4.3/33 4.3/31.2 8.3/26 8.1/20 5.5/15 5.4/10 5.70/9 | 4.58/10 4.4/21 5.7/24 5.7/27 3.4/29.7 3.6/33

5.5

4.7/33 4.8/31.8 8.5/26 8.0/20 5.1/15 5.2/10 5.40/9 | 4.30/10 4.3/15 7.0/20 7.1/24 3.7/28.6 3.8/33

5.3

4.9/33 3.0/31.7 7.5/26 7.0/20 4.7/15 4.8/10 5.05/9 | 4.25/10 4.3/15 7.0/20 7.0/25 5.0/29 5.6/33

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		227.83			
85			4.50		
86			4.10		
T.P.	6.17	227.82	4.20	223.63	
+50			6.00		
Eq. 86+75 = 86+96					
87			5.80		
+50			5.60		
88			5.35		
+50			5.18		
89			5.10		
+50			5.00		
90			5.03		
B.M.	4.18	228.84	5.18	224.66	224.66
+50			4.20		
91			4.35		

Inst.
Rod.
Chain.

Left	C L	Right

5.1
4.3/33 4.2/30 7.9/26 7.4/19 4.7/15 4.6/10 4.80/9 | 4.30/10 4.3/15 6.9/20 7.0/25 5.7/22.7 5.6/33

4.7
4.1/33 4.7/25.8 4.7/24 6.5/20 4.3/15 4.20/10 | 4.20/10 4.4/15 7.5/20 7.7/23 6.5/24.6 7.0/33

6.9
8.2/33 8.0/26.3 9.2/24 9.1/20 6.0/15 6.00/10 | 6.05/9 5.8/10 6.0/15 9.0/20 9.3/24 8.5/25.1 8.8/33

6.3
7.8/33 8.4/24.7 9.3/23 9.0/20 5.7/15 5.70/10 | 6.00/9 5.7/10 5.8/15 8.5/20 8.6/23 7.4/24.8 8.1/33

6.1
6.3/33 6.2/27.8 8.5/24 8.3/20 5.6/15 5.45/10 | 5.83/9 5.5/.10 5.7/15 8.0/19 8.2/22 6.3/25.2 6.1/33

5.9
5.5/33 5.6/30.2 8.6/26 8.1/21 5.3/15 5.20/10 | 5.60/9 5.3/10 5.4/15 7.8/19 7.9/22 4.7/26.6 5.0/33

5.7
3.9/33 3.7/31.3 8.4/26 8.1/21 5.2/15 5.04/10 | 5.40/9 5.1/10 5.2/15 7.9/19 8.0/23 4.3/27.3 4.1/33

5.6
2.8/33 2.9/32.8 7.9/27 7.6/21 4.9/15 4.90/10 | 5.36/9 5.2/10 5.2/15 7.7/19 7.6/22 4.0/26.8 3.8/33

5.6
4.2/33 4.0/30.9 7.4/26 7.0/21 4.8/15 4.85/10 | 5.25/9 4.9/10 5.2/15 7.8/19 7.9/22 5.2/25.6 5.0/33

5.6
4.7/33 4.5/31.7 7.6/26 7.3/21 5.0/15 4.96/10 | 5.15/9 4.9/10 4.8/15 7.2/19 7.2/22 5.4/24.6 6.0/33

Nail in 10" Oak Lt. Sta. 92+30.

4.7
4.8/33 7.0/22 4.30/15 4.25/10 | 4.22/10 4.1/15 6.2/18 6.3/21 3.8/24.2 2.6/28 2.8/33

4.9
9.3/33 8.7/23 4.5/15 4.40/10 | 4.40/10 4.6/14 6.7/18 6.7/22 4.9/23.6 4.8/33

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		228.84			
+50			4.56		
92			4.90		
+50			5.25		
93			5.65		
+50			6.15		
94			6.64		
+55			7.34		
95			7.85		
T.P.	2.47	223.72	7.58	221.24	221.25
+50			3.35		
96			4.00		
+50			4.55		
97			5.15		

Inst.
Rod.
Chain.

Left | C L | Right

5.1

7.2/33 9.0/21 4.7/15 4.60/10 4.60/10 4.7/15 7.0/19 7.0/21 5.6/23.4 4.2/33

5.4

4.6/33 7.7/25.4 8.2/25 7.8/21 5.1/15 4.95/10 4.95/10 5.0/15 7.3/20 7.6/23 6.7/24.2 5.6/33

5.8

3.3/33 3.3/32.7 7.6/25 7.6/21 5.2/15 5.30/10 5.30/10 5.4/15 7.8/21 7.8/25 3.9/29.6 4.1/33

6.2

0.8/37 0.6/33.5 8.8/24 8.3/20 6.0/15 5.70/10 5.70/10 5.6/15 7.8/21 8.2/24 3.6/31.9 3.2/33

6.7

2.4/37 2.3/33.2 9.4/23 8.7/19 6.3/15 6.15/10 6.24/10 6.2/16 8.4/22 8.2/27 3.2/33 3.0/35

7.3

1.9/33 1.8/32.1 9.2/23 9.0/19 7.0/15 6.55/10 6.84/10 6.7/15 9.5/23 9.5/27 4.2/34 4.9/36

8.0

6.9/33 7.7/26.3 9.4/24 9.0/19 7.3/16 7.02/10 7.68/9 7.4/10 7.5/15 10.3/21 10.5/26 4.7/34.3 4.6/36

8.5

9.5/33 9.8/24.6 10.5/23 10.9/20 7.7/14 7.41/10 7.44/10.6 8.2/11.5 8.3/16.4 10.5/21 10.7/24 8.7/28 8.8/33

Nail in 20" tree Rt. Sta. 95+00.

4.0

6.0/33 6.0/23 5.1/19 2.7/15 2.80/10 4.10/11 3.9/12 3.8/17 6.1/23 6.0/26 5.0/27.2 5.1/33

4.6

5.6/33 6.1/24 6.0/19 3.5/15 3.37/10 4.74/11.1 4.4/12.1 4.7/18 7.0/23 7.0/26 5.8/27.7 6.0/33

5.2

5.3/33 5.7/28 6.4/22.7 7.0/22 6.8/19 4.5/15 4.00/10 5.30/11 5.0/12 5.1/17 7.8/22 7.8/25 6.4/26.6 6.4/33

5.8

7.3/33 6.2/24.9 7.9/23 7.6/20 4.5/15 4.62/10 5.90/11 5.6/12 5.7/16 8.7/21 8.7/24 8.2/24.5 8.6/33

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		223.72			
+50			5.74		
98			6.42		
+50			7.05		
99			7.60		
+50			8.00		
100			8.15		
+50			8.10		
T. P.	8.44	223.78	8.20	215.58	
101			7.95		
+70			6.85		
+80			6.40		
102			6.05		
+43			4.95		

Inst.
Rod.
Chain.

15

Left					C L			Right	
					6.4				
6.7	6.8	8.8	8.5	5.3	5.32 6.52	6.2	6.4	8.8	9.3
33	20.5	21	21	15	10 11	12	17	21	33
					7.0				
	9.1	9.0	5.8	5.92	7.14	6.9	7.1	9.7	9.8
	33	21	15	10	11	12	17	21	33
					7.6				
	9.8	9.7	6.6	6.55	7.78	7.5	7.7	10.0	10.1
	33	19	15	10	11	12	17	21	33
					8.2				
	10.4	10.0	7.4	7.20	8.02	7.8	9.9	10.5	10.7
	33	20	16	10	10	11	16	21	33
					8.5				
	10.8	10.8	7.7	7.70	8.42	8.1	8.1	11.4	11.2
	33	22	15	10	9	10	15	20	33
					8.6				
11.4	11.5	12.1	8.2	8.10	8.42	8.4	11.5	12.0	
33	26	21	15	10	10	15	19	33	
					8.4				
	12.1	12.0	8.3	8.30	8.20	8.1	13.1	12.3	
	33	21	15	10	10	15	23	33	
					8.3				
	12.2	13.1	8.4	8.30	8.04	8.0	13.6	12.8	
	33	21	15	10	10	15	25	33	
					7.3				
	12.0	11.5	7.2	7.10	6.75	6.7	13.4	12.1	
	33	23	15	10	10	15	24	33	
					7.1				
13.1	13.1	6.6	6.5	6.90	6.45	6.5	11.5	12.0	
33	33	15	10	9	10	15	23	33	
					6.7				
11.3	9.7	9.8	6.1	6.0	6.30	5.90	5.8	11.1	11.1
33	26	32	15	10	9	10	15	25	33
					5.6				
	9.4	8.6	5.1	5.7	5.40	4.60	4.3	7.5	9.1
	33	23.5	17	11.5	10.5	10	15	21	33

Cross Sections

Sta.	B. S.	H. I.	I. S.	Grade	Gr. R.
		223.78			
103			3.30		
B.M.	3.59	223.96	3.59	220.37	220.37
+50			1.80		
+71			1.14		
T.P.	8.74	232.20	0.70	223.26	
104			8.50		
+54			6.96		
+64			6.65		
105			5.68		
T.P.	10.20	238.47	3.73	228.27	
+50			10.60		
106			9.45		
+50			8.25		
107			7.10		
+50			4.05		

Inst.
Rod.
Chain.

C L	Left	Right
4.0	5.8/33 5.3/27 6.2/25 5.8/22 3.7/18 3.8/12.8 4.05/12	2.80/10 2.7/15 5.3/20 5.5/30 4.8/33

R.R. Spk. in T.P. 33' Rt. Sta. 103+00

C L	Left	Right
2.5	3.0/33 3.5/27 4.3/25 4.2/33 2.4/18 2.3/13 2.60/12	1.20/10 1.0/15 3.3/18 3.3/21 1.4/23.5 4.7/30 3.7/33
1.9	2.4/33 2.7/27 3.6/25 3.4/22 1.8/19 1.6/13 1.90/12	0.60/10 0.4/15 2.2/19 2.7/24 1.8/26 1.9/33
9.2	8.8/33 8.4/28 10.6/24 10.4/21 9.0/18 8.9/13 9.15/12	7.95/10 7.8/15 10.1/20 11.4/33
7.6	5.0/33 5.0/29.6 9.0/25 9.1/20.5 7.3/17 7.2/11.5 7.49/10.5	6.50/10 6.4/15 7.3/18 8.3/21 7.9/23 4.9/33
7.6	4.5/33 4.6/29.5 8.8/24 8.9/20 7.0/16 6.8/11.0 7.15/10.4	6.30/10 6.3/15 8.3/18 8.3/20 7.2/22 0.6/32.3 0.6/33
6.3	2.7/33 2.7/28.5 7.5/23 7.7/19 5.7/15 5.7/10 6.00/9	5.48/10 5.2/15 7.4/19 7.3/22 0.4/31 0.3/33
11.3	8.4/33 8.4/28.3 12.5/23 12.1/19 10.5/15 10.5/10 10.70/9	10.52/10 10.4/16 12.1/19 12.0/23 5.8/30.6 6.0/33
10.0	4.2/33 4.3/30.8 11.7/22 11.9/19 9.6/15 9.45/10	9.50/10 9.2/16 10.7/19 10.6/23 5.2/30 5.0/33
8.9	4.8/33 4.7/29.5 10.8/22 11.0/18 8.3/14.4 8.30/10	8.30/10 8.3/15 10.4/19 10.2/22 5.7/28.8 5.9/33
7.7	5.5/33 4.7/28.4 9.4/22 9.5/18 7.5/15 7.15/10	7.15/10 7.2/15 10.0/19 9.7/22 4.2/28.9 5.0/33
6.7	5.9/33 5.7/26.7 8.5/22 8.6/19 6.2/15 6.08/10	6.10/10 6.0/15 8.6/19 8.4/22 5.0/26.8 5.7/33

Cross Sections

Sta:	B. S.	H. I.	F. S.	Grade	Cr. R.
		238.47			
108			5.00		
+50			4.11		
109			3.27		
110			1.75		
T.P.	7.71	244.53	1.65	236.82	
T.P.			3.78	240.75	

Inst.
Rod.
Chain.

Left					C L			Right			
					3.17						
5.6	5.6	7.7	7.6	5.1	5.15	5.10	5.0	7.0	6.9	5.5	5.5
33	23.5	21	19	15	10	10	15	19	24	25	33
					4.17						
5.6	5.4	6.4	6.2	4.2	4.20	4.17	4.1	6.3	6.5	5.3	5.0
33	23	22	20	15	10	10	15	20	23	25	33
					3.9						
5.5	5.1	6.0	6.0	3.3	3.30	3.30	3.2	5.8	6.1	5.1	5.0
33	24	23	20	15	10	10	15	20	23	25	33
					2.4						
4.8	4.3	4.9	4.9	2.0	1.80	1.80	1.9	4.7	4.7	3.9	3.6
33	23	22	19	15	10	10	15	20	23	24	33

Nail in T.P. H. Sta. 1124+50

"L" Line

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	0.88	220.83			
T.P.	7.40	221.80	6.43		
-3+00			4.50	217.30	
-2+00			3.89	217.91	
-1+00			4.59	217.21	
-0+50			6.03	215.77	
0+00			8.16	213.64	
0+50			10.67	211.13	
T.P.	1.35	211.19	11.96		
0+90			2.11	209.08	
1+00			2.56	208.63	
1+17			3.40	207.79	
1+46			4.86	206.33	

Inst. W.H.C.
Rod. [illegible]
Chain. Franke

Oct. 15, 1924 — 18

Left	C L	Right

✓ 214.95 — 50, Root 24" Elm 29' R. 2408

✓ 214.40

(5.0)
5.6/33 6.2/28 6.5/24 6.5/21 5.1/16 4.55/10 — 4.50 — 4.35/10 5.0/16 7.7/21 7.7/25 6.8/26 6.8/33

(4.4)
3.6/33 3.8/30 4.0/25 5.8/22 5.4/19 3.9/15 4.00/10 — 3.89 — 4.00/10 3.9/15 5.9/18 6.0/23 5.5/26 5.3/33

(5.2)
3.3/33 3.6/26.4 6.2/24 6.0/19 4.6/15 4.65/10 — 4.59 — 4.65/10 4.6/15 6.8/19 6.8/23.5 2.8/27.5 3.1/33

(6.7)
2.4/33 3.3/28.5 8.1/23 7.9/19 6.2/15 6.10/10 — 6.03 — 6.11/10 6.2/15 7.8/19 7.9/24 2.8/30 2.8/33

(8.8)
8.7/33 8.8/20 8.3/15 8.25/10 — 8.16 — 8.25/10 8.2/16 9.4/18 10.1/21 9.5/24 9.1/27.5 2.1/32.5 2.1/36

(11.3)
14.1/33 10.79/10 — 10.67 — 10.71/10 10.9/15 12.3/18 12.7/20 12.0/23 11.5/26 2.1/35

✓ 209.84 Top Pave ℄ Sta. 0+75±

(2.7)
cont'd 2.5/39 3.2/33.5 3.7/31 3.1/28 2.9/26 2.8/22 2.19/10 — 2.71 — 2.19/10 2.5/15 3.6/18 4.0/20 3.1/21 cont'd

(3.2)
cont'd 2.4/36 3.5/31 4.1/28 3.6/25 3.1/19 3.65/10 — 2.56 — 2.70/10 3.9/16 3.8/18 4.4/20 3.3/22 3.4/27 cont'd

(4.1)
cont'd 3.2/30 4.0/26 4.3/24 4.2/21 3.6/16 3.50/10 — 3.40 — 3.53/10 3.9/14 2.8/36

(5.5)
cont'd 4.1/25 5.5/17 5.1/14 4.90/10 — 4.86 — 4.97/10 3.12/18 3.0/27 2.1/33

"Z" Line

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		211.14 ✓			
1+56				5.35	206.84
1+72				6.14	205.05
2+00				7.57	203.62
2+50			✓	10.06	201.13
T.P.	2.30	200.88		12.61	
3+00				2.30	198.58
3+50				4.80	196.08
3+75				5.97	194.91
4+00				6.95	193.93
4+20				7.73	193.15
4+40				7.86	193.02
4+60			✓	8.4	192.44
T.P.	9.45	201.45		8.88	

Inst.....
Rod.....
Chain.....

18

Left — C L — Right

6.0

	4.7	5.4	6.0	5.46	5.35	5.43	5.6	6.2	5.4	4.7	
Contd	24	17	15	10°		10°	11	14	17	22	Contd

6.8

	5.5	6.1	6.7	6.25	6.14	6.29	6.8	7.0	6.3	5.7	
Contd	22	16	13.5	10°		10°	12	14	16	21	Contd

4.2

	6.9	7.6	8.2	7.3	7.57	7.46	7.6	8.4	7.7	7.3	
Contd	21	16	14	10°		10°	12	14	16	20	Contd

10.7

	9.4	10.2	10.1	10.16	10.24	10.14	10.2	10.8	10.0	9.4	
Contd	21	16	14	10.0		10.0	12	14	16	20	Contd

198.58 ✓ Top Rive D Sta. 3+00

2.9

	1.9	2.4	3.1	2.4	2.57	2.38	2.4	3.0	2.2	2.2	
Contd	20	16	14	12	10°	10°	11	14	17	18	Contd

5.4

	4.2	4.6	5.4	4.9	4.85	4.80	4.86	4.8	5.6	4.8	4.8
Contd	19	16	14	11.5	10°		10°	11	14	16	17

6.6

	5.2	5.9	6.8	6.3	6.03	5.97	6.06	6.1	6.6	6.9	6.6
Contd	18	6.5	14.5	12.5	10.2		10.9	12.5	15	17	18

7.6

	6.8	7.4	7.2	7.1	6.95	7.03	7.1	7.4	6.9	6.2	
Contd	17	15	13	10.8		11.2	13	15	17.5	20	Contd

8.3

	7.2	7.9	7.8	7.79	7.7	7.63	7.8	7.42	7.48	7.77	7.8	7.9	7.6	7.2	
Contd	15	17	15	12	1.9	1.0		1.5	1.8	11.5	14	16	18	24	Contd

9.0

	7.6	8.1	8.60	7.38	7.86	7.86	7.86	7.81	8.45	8.5	8.6	8.1	
Contd	22	16.2	15.2	2.4	2.4		2.4	2.4	2.5	8.5	18.5	22	Contd

9.5

	8.8	8.7	9.2	8.96	9.24	8.44	8.44	8.42	9.02	7.79	8.8	8.5	
Contd	14	10.5	16.5	12.5	24		2.5	2.5	2.5	14.5	14.5	23.5	Contd

✓ 192.00 Top Curb 4+80

2"Line

Final Cross Sections

201.45

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
4+80			9.5	191.90	
5+00			10.30	191.15	
5+19			10.55	190.90	
5+50			10.80	190.65	
6+00			10.79	190.66	
6+50			10.25	191.20	
7+00			9.06	192.39	
7+50			7.28	194.17	
8+00			5.30	196.15	
8+50			3.29	198.16	
9+00			1.34	200.11	
T.P.			1.34		

Inst. ....
Rod. ....
Chain. ....

Left	C L	Right
	(16.6)	
cont'd 10.2/24 [illegible]/18 10.2/16.5 9.9/12.9 9.40/12.8 9.43/0.3 9.15/0.8	9.45	9.45/0.8 9.95/0.8 10.00/11.8 10.20/14.8 9.70/14.8 9.2/23 cont'd
	(11.5)	
cont'd 10.6/25 10.8/18 10.7/16 10.1/15 10.20/12.8	10.30	10.47/1.5 10.40/12.2 10.4/14 10.9/16 10.8/18 10.2/23 cont'd
	(11.3)	
cont'd 11.0/26 10.7/19 11.2/17 10.4/13 10.41/12.3	10.55	10.75/11.2 10.65/12.2 10.9/15 11.4/17 10.6/19.5 10.4/24 cont'd
	(11.5)	
cont'd 10.8/26 11.1/24 11.8/22 11.1/18 10.5/13 10.50/11.7	10.80	11.20/11.5 10.5/12.2 11.2/18.5 12.0/22 11.3/24 11.3/55 cont'd
	(11.5)	
cont'd 11.8/24 11.8/22 12.3/20 11.7/16 10.3/12 10.33/10.0	10.79	11.28/11.0 11.35/11.6 11.20/12.8 11.9/20 12.8/23 12.0/25 11.8/30 cont'd
	(10.9)	
8.0/33 9.1/24 9.65/10	10.28	10.94/13.0 10.77/13.8 10.9/19 12.2/22 12.7/27 4.0/56.6
	(9.6)	
6.7/33 8.50/10.0	[illegible]	9.83/13 9.62/13.6 9.6/19 10.5/22 10.8/26 11.4/33.4
	(8.0)	
5.6/33 6.84/10.0	7.28	9.09/13 7.85/13.6 8.2/20.5 9.2/23 9.2/26 8.0/29 7.5/33
	(6.0)	
4.4/33 4.84/10.0	5.20	6.18/13 5.70/13.5 6.1/19 8.2/24 7.9/33
	(4.0)	
12.8/41 3.1/29 2.8/20 2.79/10.0	3.29	4.20/13.2 3.96/14.0 4.2/20 7.7/27 7.8/33
	(2.0)	
10.5/33 10.5/32 0.9/12 1.00/10.0	1.34	1.37/11.0 1.62/11.7 1.6/17.5 5.8/25 5.4/33

200.11 Top Pave E 9+00

cont'd page 22

"L" Line.

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
	High X-Sec for Incomplete Sections.				
B.M	0.95	220.90			
				Top of Pave	
0+90				209.08	
1+00				208.63	
1+17				207.79	
1+46				206.33	
1+56				206.84	
1+72				205.05	
2+00				203.62	
2+50				201.13	
3+00				198.58	
3+50				196.08	

Inst.
Rod.
Chain.

219

219.95 Sp. Root 24" Elm 29' R. 2+08

Left		C L	Right
	2.8/49	12.4	2.3/35
	4.8/46	12.9	2.0/35
	5.0/41	13.8	2.1/46.5
	5.0/35	15.2	
	4.3/34	15.7	2.5/34
	4.8/34.	16.5	2.0/36.5
5.4/40	5.4/33	17.9	1.4/37.5
8.8/40	8.2/32	20.4	3.0/36.5
11.3/40	10.7/31	22.9	4.1/37.
12.8/35	12.0/31	25.4	6.5/37

High X Section cont'd "L" Line

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		220.90			
3+75				194.91	
4+00				193.93	
4+20				193.65	
4+40				193.02	
4+60				192.44	
T.P. & Top Rail El.	0.17	209.66	11.41		
4+60				192.44	
4+80				191.90	
5+06				191.15	
5+19				190.90	
5+50				190.65	
6+00				190.66	
T.P.			9.53		

Inst.
Rod.
Chain.

Left		C L	Right		
15.6/35	15.6/30	(26.6)	8.2/36		
13.5/43	14.5/30.5	(27.6)	11.4/36		
16.9/37	14.4/38	(24.3)	11.2/36		
	12.9/37	(29.0)	14.9/34		
		(29.5)	14.9/36		

209.49 Top. Rail ℄ South Rail

Left		C L	Right		
4.1/40	4.1/36	(18.3)			
4.6/40	4.6/37.5	(18.8)	4.0/35	4.0/43	
5.1/43	5.1/38	(19.2)	2.5/37	2.5/42.5	2.0/42.5
5.5/43	5.5/38	(19.5)	3.0/38	3.0/43	
6.2/43	6.2/38	(19.7)	5.1/39	5.1/45	
7.7/42	7.7/36	(19.7)	7.2/42	7.2/46	

200.13 - Top Rail ℄ Sta [illegible] see page, 19

contd from page 9, 2nd Line

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
T. P.	10.69	210.82			
9+81			7.41	203.41	
10+00			6.66	204.16	
10+15			6.06	204.76	
10+30			5.58	205.37	
10+45			4.93	205.89	
11+00			3.07	207.75	
11+50			0.72	210.10	
11+72				210.05	
12+00				212.24	
12+38				213.67	
T.P.	11.10	221.39	0.53		
11+72			10.34	210.05	

Inst.

Rod.

Chain.

200.13 . 700 rave 9 Sta. 9+00

Left						CL						
	16.4/33	15.6/30.5	7.7/17	7.56/10°	7.41/—	(8.1)	7.60/9.5	7.36/10°	7.5/16	12.7/25	12.7/33
		6.8/33	6.6/16	6.65/10°	6.68/—	(7.3)	6.83/7.5	6.57/10°	6.6/15	12.3/26	11.9/33
17.2/33		17.2/32	6.3/16	6.10/10°	6.06/—	(6.7)	6.22/10.°	6.3/17	11.0/25		11.3/33
		17.7/35	5.6/16	5.60/10°	5.50/—	(6.1)	5.59/10°	5.7/16	9.8/25		10.1/33
		16.8/34	4.8/16	4.95/10	4.90/—	(5.5)	4.86/10°	4.9/17	9.3/26		8.8/33
	7.9/33	9.7/28	3.4/17	3.13/10	3.07/—	(3.3)	3.35/10	3.6/16	9.2/27 x	9.8/31	7.8/33
	6.9/33	6.6/26	1.1/17	0.89/10°	0.72/—	(1.3)	0.96/10	0.9/15	14.7/36		
						(0.4)			11.5/35		
									13.8/39		
											9.2/48

Dunn pt off.

210.29

Left						CL					
	15.5/33	15.5/26	10.4/16	10.55/10	10.34/—	(11.0)	10.33/10	10.8/15			

"L" Line

Final ..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		221.39			
12+00			9.15	212.24	
12+38			7.72	213.67	
12+80			7.34	214.05	
B.M.	7.92	223.41	5.90		
12+89			8.06	215.35	
13+00			7.71	215.70	
13+50			6.30	217.11	
13+73			5.69	217.72	
14+00			5.09	218.32	
15+00	for check.		3.25	220.16	

Inst. W.H.C.
Rod. Willshusen & Persons Oct 16, 1924.
Chain. Franke

Left							C L	Right							
							(9.9)								
13.3/33	14.7/24	9.4/15	9.03/10.0	9.3/9.2			9.15	9.06/10	9.2/17						
							(8.3)								
8.0/33	7.7/27	9.9/22	9.9/20	7.8/15	7.88/10	8.05/9.2	7.12	7.53/10.0	7.5/17	10.9/25	10.9/27	6.9/27			
							(8.0)								
6.9/33	6.5/27	9.5/25	9.7/19	7.3/15	7.38/10.0	7.65/9.2	7.84	7.07/10.0	7.07/17	9.0/23	9.0/26	5.7/28	9.5/33		

2 15.49 Top N.W. Cor. of N.E. Conc. Wing Wall Cattle Pass under Old Road.

Left							C L	Right							
5.6/33	5.8/31	10.6/28	10.9/22	8.4/17	8.42/11.7	8.60/11.0	8.06 (8.6)	7.63/10	7.8/15	9.8/19	9.8/23	5.6/27.5	5.7/29	10.5/30	4.4/33
							(8.3)								
4.0/33	4.2/32.5	10.8/27	10.8/23	8.0/18	8.05/12.6	8.38/11.8	7.71	7.75/10.0	7.3/14	9.6/19	9.6/23	6.3/26.5	7.0/31	6.8/33	
							(6.9)								
3.4/35	3.4/33.4	9.8/27	9.7/25	8.4/22	6.7/18	6.85/13.8	7.11/13	6.30	5.76/10.0	6.2/19	6.7/33				
							(6.2)								
7.7/33	8.9/27	8.9/24 Assumed	6.3/19	6.32/12.8	6.48/12.1		5.69	5.16/10.0	5.3/17	6.8/28	6.4/30	6.6/33			
							(5.7)								
7.7/35	7.7/34	7.6/28	8.0/23	5.5/18	5.6/13.6	5.84/12.9	5.09	4.65/10	4.6/15	6.1/19	6.8/30	6.0/32	6.0/33		
							3.25								

continued on page 3 Fin. Oct. 16, 1924

"C"-"E" Line & "C"-"E" Extn

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	3.30	223.25			
0+00	"C" "E"				
1+00					
1+35	0.0 Ditch		2.8	220.5	
2+00			2.8	220.5	
3+00			5.2	218.1	
3+85			8.6	214.7	
11+00			9.3	214.0	
11+35.6			10.8	212.5	
11+75			12.7	210.6	
5			12.7	210.6	
5+50			16.0	207.3	

Inst. W. H. C.
Rod. Wilshusen & Persons
Chain. Franke

Oct. 16, 1924

Left	C L	Right

219.95 Sp. Root 24" Elm 79' R. 2108 – "L" Line

Same as original

Same as Original

(2.8)
2.7/33 3.0/22 4.0/20 4.1/15 3.2/13 4.8 | 3.3/10 3.9/14 4.3/18 3.0/21 2.8/33

(3.2)
2.5/33 3.7/25 4.7/23 4.6/18 3.0/15 2.8 | 3.3/15 4.2/17 4.5/22 2.8/24 3.4/33

(5.3)
2.6/33 2.7/28 7.4/24 7.7/18 5.4/13 5.2 | 5.5/14 7.4/18 7.5/23 3.5/27 3.5/33

(9.3)
7.9/33 7.9/31 10.4/23 10.4/17 8.8/13 8.6 | (8.8/18) 10.1/17 9.8/21 3.6/29 3.6/33
15?

(9.3)
2.7/33 2.7/32 10.0/27 10.8/22 10.8/18 9.5/15 9.5 | 7.4/16 10.1/19.5 10.8/25 6.3/29 5.4/33 Orig Gr. Disturbed

3.3/38 3.3/35.6 11.8/28 12.4/24 13.0/22.5 12.9/19 11.2/14 10.8 (11.1)

3.6/41 3.6/41 14.0/30 14.0/26 14.6/24 13.6/20 12.7 (13.3)

6.6/44 6.1/40 14.3/32 15.2/26 15.5/24 15.0/20 12.7/1.0 P. 12.7 (14.3)

7.9/44 7.9/38 16.0/26 16.7/23. 17.1/21 16.3/15.5 16.10/10.0 P. 16.0 (16.8)

Contd.

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		223.25 ✓			
C.-E Line Ext'd					
0+00 = PI Sta 0+75.2 2" Line				See p. 24 Orig. Book.	
0+61			12.4	210.9	
0+86			10.3	213.0	
1+00			9.4	213.9	
1+30			7.5	215.8	
1+45			5.5	217.8	
1+90			3.6	219.7	
2+00	Original Ground	✓	3.6	219.7	
B.M.	3.67	223.62	3.30		
X-Sec. Farm Ent Sta 1+80					
0+00 = 9' Rt.					
0+09					
0+22					
0+40					

Inst.
Rod.
Chain.

Sta.	Left					C L	Right				
					12.6/14	12.4	13.2/8	4.6/15 x	4.7/20		
		7.1/22	8.1/19 x		10.9/15	10.3	10.6/9	5.2/16 x	5.2/20		
		4.4/28	4.5/19 x		9.7/13	9.4	9.4/10	5.0/16 x	5.0/20		
	4.3/27	3.9/19 x	8.4/13		8.0/10	7.5	8.0/11	4.4/17 (Assumed)			F. Ent.
	4.4/29	4.1/22	6.2/19		5.6/12	5.5	5.9/4	6.5/8	6.3/11	4.3/15 x	4.6/19
	4.4/33	4.5/25	4.8/23	4.0/16	3.5/9	3.6	4.1/4	4.8/7	4.9/10	4.3/11	4.6/18
	4.6/26	5.0/24	4.7/22	4.0/20	3.4/8	3.6	4.8/11	4.2/20			
219.95 ✓					℄ old Rd						
					North 8.2/10	7.6 0.0 cut	South 9.4/16				
				4.6/13	6.1/10	6.9	7.3/10	5.1/15			
				4.4/13	5.0/12	5.7	5.5/3	4.4/6			

0 0 Cut 3.5

"C"-"E" Line

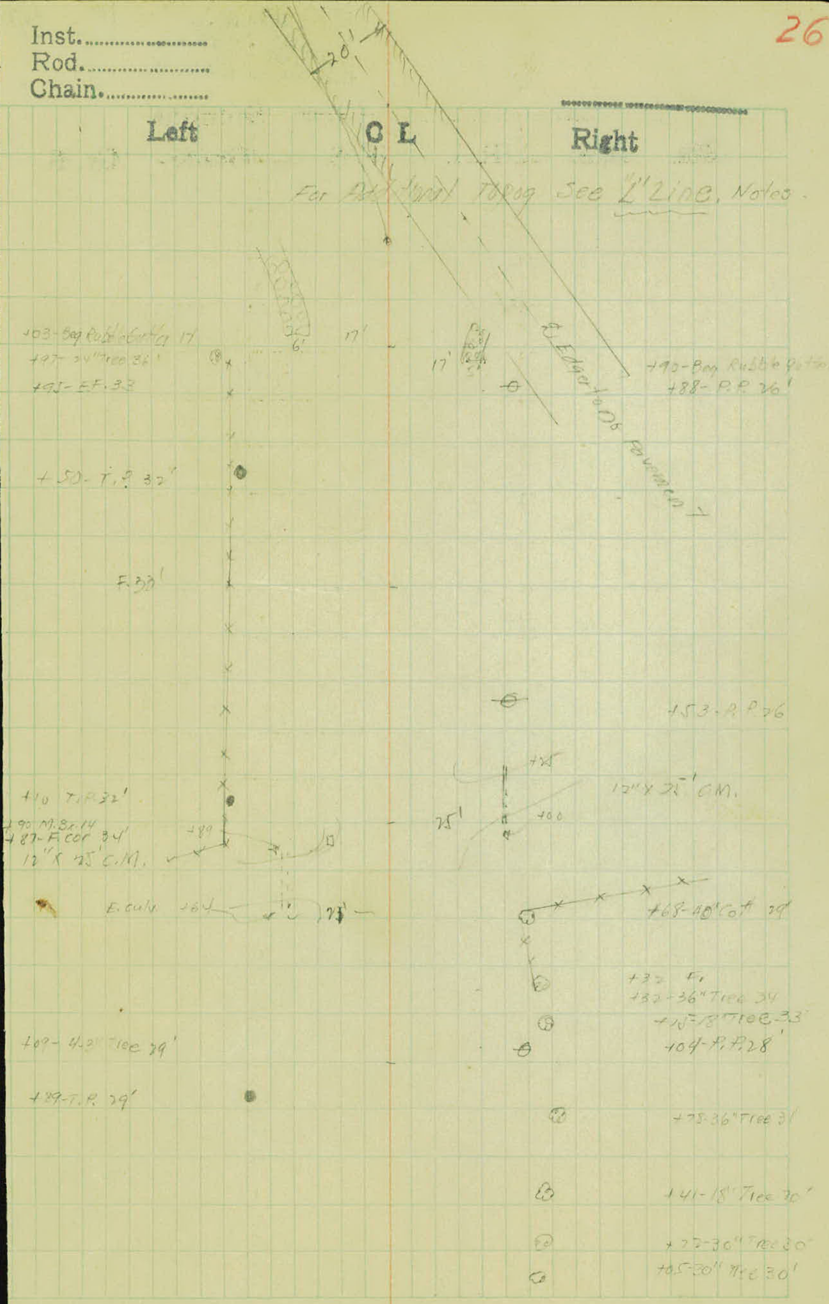
Art. Topog.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
5+00					
145.6 P.C.					
4+00					
3+00					
+11 ℄ F. Ent Ry.					
2+00					
+88 - ℄ F. Ent ℄. E. & W.					
1+00					
0+00					

Inst.
Rod.
Chain.

Left	C L	Right



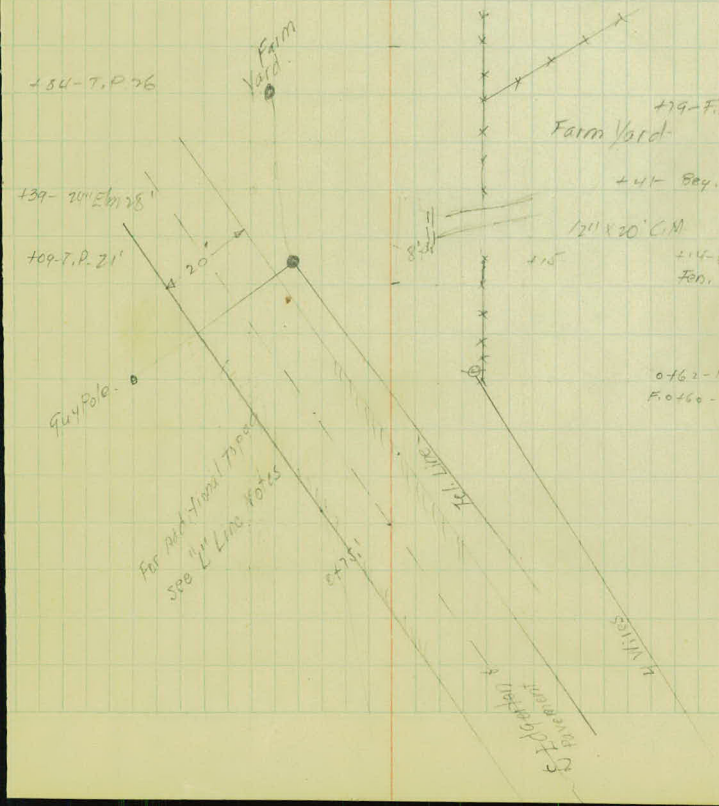
"C"-"E" Line Extd
Art. Topog.

Cross Sections

Sta.	B. S.	H I	F. S.	Grade	Gr. R.
7+00					
+30 ℄ F. Ent. Rt					
1+00					
0+00					

Inst. W.H.C.
Rod. Wilkinson, Parsons Oct 16, 1924.
Chain. Frank C.

Left C L Right



"V-L" Line

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	5.97	206.52			
0+00					
0+23					
0+50					
1+00					
1+50					
2+00					
2+50					
2+60					
2+80					
2+94					
3+00					

Inst. W.H.C.
Rod. Wilshusen & Persons
Chain. Franke

Oct. 16, 1924

Left					C L					

200.55 Sp. N.E. Cor. Ice House 22 R. (Sta 0+45

Left				CL	(circled)	Right				
19.8/33	15.6/26	11.6/25	7.6/17	7.2	7.5	7.4/14	11.0/21	11.0/31	3.8/33	
	10.3/25	8.9/20	7.2/17	6.6	7.1	7.0/15	8.4/17	8.1/18	7.3/19	7.4/33
11.6/33	8.6/24	7.7/18	6.2/15	6.0	6.7	6.2/15	6.5/18	6.7/27		
	18.4/42		5.6/22	4.8	5.9	5.2/16	5.6/20	5.5/23		
	19.0/44		5.5/27	4.8	5.2	4.8/10	5.0/21	5.4/26	5.5/30	4.9/33
	18.9/48		5.4/28	4.4	4.9	3.8/19	5.3/22	5.3/26	4.2/28	4.3/33
	11.8/36		5.4/25	4.3	4.8	4.5/18	6.0/21	6.1/27	4.6/29	4.3/33
	10.9/33		5.5/23	4.3	4.9	4.6/17	6.0/20	6.2/25	4.1/28	4.0/33
12.3/37	11.7/31		5.7/22	4.4	5.0	4.5/18	6.4/21	6.5/27	4.7/30	4.5/33
12.9/33	12.0/31		6.0/22	4.8	5.1	4.8/17	6.2/20	6.4/24	4.7/27	4.7/33
12.9/33	17.4/31		6.2/21	4.7	5.1	4.9/17	6.2/20	6.5/25	4.9/27	4.4/33

"Y-L" Line

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		206.52			
3+50					
T.P.	1.78	203.38	4.92		
4+00					
4+50					
5+00					
5+50					
6+00					
6+50					
7+00					
7+50					
8+00					
8+50					

Inst.
Rod.
Chain.

201.60 ✓

Circled	Left	C L	Right
5.5	15.0/34, 6.5/21	5.0	5.1/18, 6.5/21, 6.8/24, 5.2/27, 4.8/33
2.8	2.1/33, 3.6/20, 3.5/16	1.8	2.9/16, 4.4/19, 4.7/24, 2.9/26, 1.8/33
3.2	12.2/34, 3.0/21, 2.7/16	2.1	3.0/14, 5.5/19, 5.5/22, 4.2/24, 1.8/33
3.6	13.0/34, 3.4/20, 3.3/13	2.7	3.8/16, 5.7/19, 6.4/22, 5.2/25, 3.3/33
4.0	13.7/33, 4.2/20	3.2	4.3/18, 6.5/21, 7.0/25, 6.3/26, 4.2/33
4.4	13.5/33, 4.6/20	3.7	4.5/17, 5.5/20, 5.7/23, 4.5/25, 2.4/33
4.8	13.3/33, 4.9/20	4.2	4.7/15, 5.9/19, 5.9/23, 0.3/29, 0.3/33
5.2	12.4/33, 12.1/31, 4.9/20	4.6	5.0/15, 6.8/18, 6.6/22, 202.3/30, 202.3/33
5.6	13.3/33, 12.6/31, 5.3/20	4.5	5.0/15, 7.3/18, 7.2/22, 5.4/23, 3.7/29, 2.4/33
6.0	12.8/33, 12.8/31, 5.9/19	5.3	5.8/14, 8.1/19, 8.1/24, 7.7/26, 6.5/33
6.4	13.6/35, 6.3/24	6.4	6.7/9, 8.5/25, 9.5/33

V-L Line

Final ..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		203.38 ✓			
9+00					
9+18					
9+34					
9+50					
9+62					
10+00					
10+50					
T.P	for check		3.26		
B.M.	for check		11.73		

Inst. ....
Rod. ....
Chain. ....

Left **℄** **Right**

13.0/53 6.7/41 6.4/33 6.2/17 6.7 (6.8) 7.3/9 8.5/20 9.9/33

14.6/67 6.6/49 6.0/20 6.6 (6.9) 8.2/18 9.6/33

6.4/23 7.0 (7.1) 8.4/18 7.9/33

Ree 2" Lina Ext'g = 84-6 PI.

6.3/33 7.2 (7.1) 8.3/14 9.5/29 = Pave Edge.

6.0/33 7.3 (7.2) 7.1/25 Pave. Edge

6.0/33 7.0 (7.2) 7.4/10 – Pave Edge.

14.8/53 6.0/34 4.5/20 5.0/12 5.5/1.5 Pave 5.6 (6.6)

200.12 ✓ Top Pave ℄ Sta. 9+60

191.65 ✓ Sp. 10" Oak 90' L. 0+00 "L" Ext'g.

"L" Line Extended

Final Cross Sections

Sta.	B.S.	H.I.	F.S.	Grade	Gr. R.
0+00 = P.I = 7461.7					
B.M.	10.60	202.21			
0+00					
1+00					
H21 F. Ent. Rt.					
2+00					
3+00					
4+00					
44 - F. Ent Rt					
5+00					
T.P.	9.39	209.21	2.36		
6+00					
6+75					
7+00					
7+40					
B.M.			1.50		

Inst. WHC
Rod. Wilshwant Persons   Oct 17 1924
Chain. Franke

Left	C L	Right
191.68 Sp. 10" Oak 90' Lt. Sta 0+00		
12.8/62 5.1/46 5.0/33 5.4/10	5.4 (9.5)	6.7/33
12.7/35 5.6/19	4.6 (9.8)	4.6/17 14.8/32
12.7/32 5.4/21	4.9 (9.7)	5.0/20 11.7/30 13.2/32 12.7/34
12.4/33 12.4/31 4.7/20	4.4 (9.1)	5.1/20 13.1/32 13.8/34
11.7/33 11.4/31 3.9/19	3.6 (8.6)	4.0/18 10.3/29 11.8/33
11.5/33 11.5/31 3.6/21	3.4 (7.4)	3.5/19 10.5/30 10.5/33
199.92 top Hub Sta 5		
13.3/33 13.1/26 8.8/19	8.3 (8.3)	8.8/18 11.1/22 10.3/25 9.8/33
5.1/33 8.6/25 9.5/23 7.9/20 7.3/17	7.3 (8.3)	7.4/16 7.8/20 6.5/26 6.6/33
4.2/33 7.7/25 8.6/24 7.5/23 6.8/19 6.6/16	6.6 (7.1)	6.6/13 7.1/21 6.0/25 6.0/33
	0.0	
208.71 Nail top F.P. 33' Lt 7+78		

Farm Ent. Lt. 4+12 2" Line Extd

Final. Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
T.P.	1.20	201.12		199.92	
0+00 = 20' Lt. 4+12					
0+15					
0+30					
0+53					

Inst.
Rod.
Chain.

Left			C L			Right
	North					South
t. stake sta 5						
		0.0 / 11	0.0 Fill.	0.0 / 3		
	14.0 / 17	6.6 / 9	5.8	5.8 / 2	10.2 / 8	
	10.3 / 10	8.2 / 6	8.2	8.2 / 4	10.6 / 7	
		10.3 / 5		11.3 / 5		0.0 Fill.

Farm Ent. Lt. 1+21 "L" Line Exld.

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	7.43	199.11			
0+00 = 15' Lt. 1+21					
0+05					
0+18					
0+50					
1+00					

Inst.....
Rod.....
Chain.....

Left	C L	Right
South		North

10/68- Sp. in 10" Oak Lt 98' Lt 0+00

6.0 Fill

7.8 / 15	7.8	2.8 / 7		
9.9 / 25	4.6 / 11	4.6	4.6 / 5	9.6 / 13
9.5 / 17	6.4 / 10	6.4 / 1	6.4 / 5	13.1 / 10
	11.0 / 10	11.0	11.0 / 6	0.0 Fill

Hand Ditch (End culv to Lake)

Rt. Δ to sta. 8+35 Bag Ditch 34' Rt. of ℄ "Y" "L" Line

Final

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M	2.64	194.32			
0+00					
0+50					
1+00					
1+15					
1+35					
1+55					

Inst.
Rod.
Chain.

Left		C L		Right	
South.				North	
19.68					
4.3 / 3	7.5 / 1		7.5 / 1	4.2 / 3	
4.2 / 3.5	7.8 / 1		7.8 / 1	4.2 / 3.5	
4.6 / 3	7.9 / 1		7.9 / 1	4.7 / 3	
6.3 / 2.5	8.3 / 1		8.3 / 1	6.3 / 2.5	
8.1 / 2	8.7 / 1		8.7 / 1	8.1 / 2	
	9.3 / 1		9.0 / 1		

Obs computed 69 en. yoke.

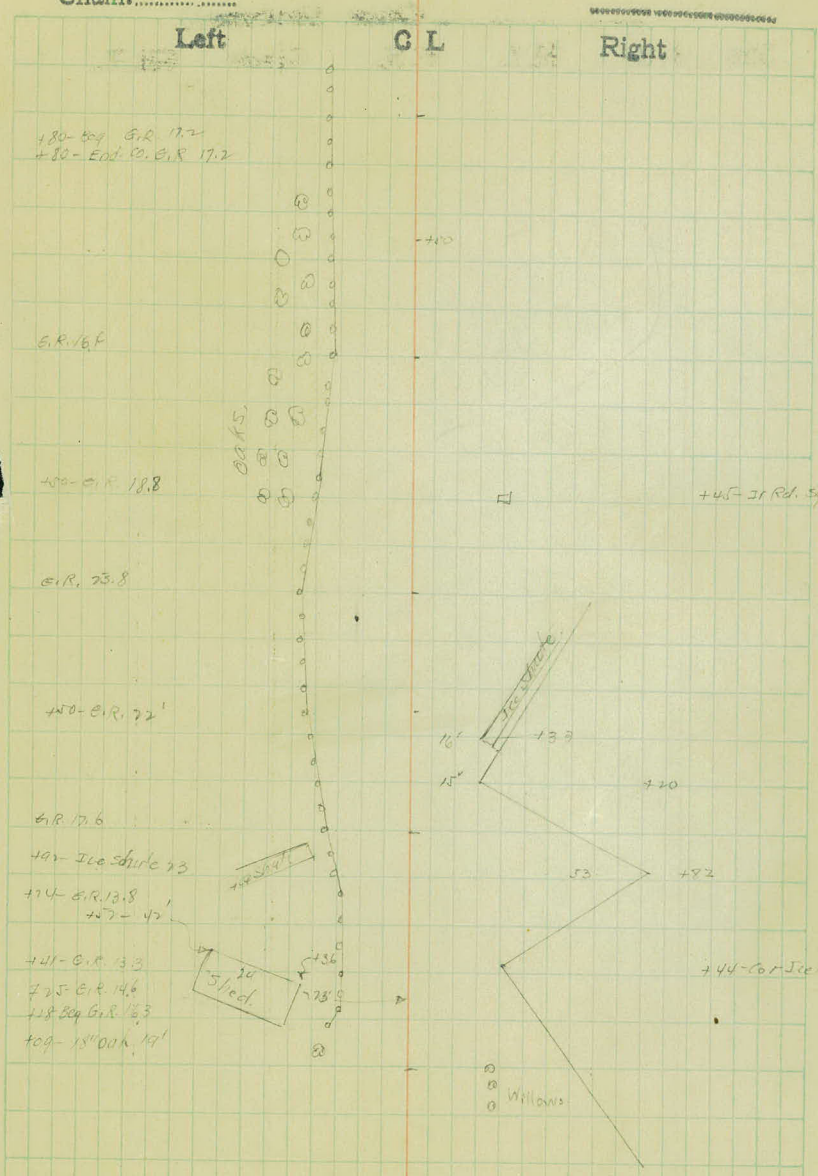
10/20/24

V-L- Line Final Topog.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
4+00					
			3+80		
3+00					
			343.2 Lin Ft Sand Fill By County Forces Oct 1924		
2+00					
1+00					
			0+18		
0+00					

Inst.
Rod.
Chain.



V-L. Line
Final Topog.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. I
7+00					
7+00					
6+00					
5+00					
4+00					

Inst.

Rod.

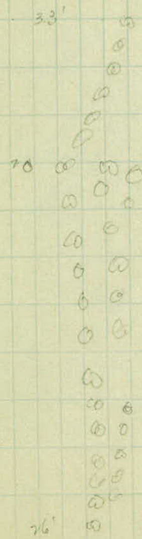
Chain.

Left	C L	Right

+15-I.O.Rd. Sta 17

G.R. 16.8

+65-End Trees & Brush



G.R. 16.6

G.R. 16.8

+56-Beg Trees & Brush

+80-Beg G.R. 17.2

Y-L. Line

.... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R

12+00

11+00

90.8 Lin F. County Guard Rail 8+40 to Sta 9+24

10+00

9+00

+40- End of Contracted G. R. Lt.

+73 = 2.6X2.6 Brick C.B. 7' deep. Conc. Frame 4'X4' C.I. Frame 3'X3' C.I. Cover 2.5X2.5

8+00

Plan.

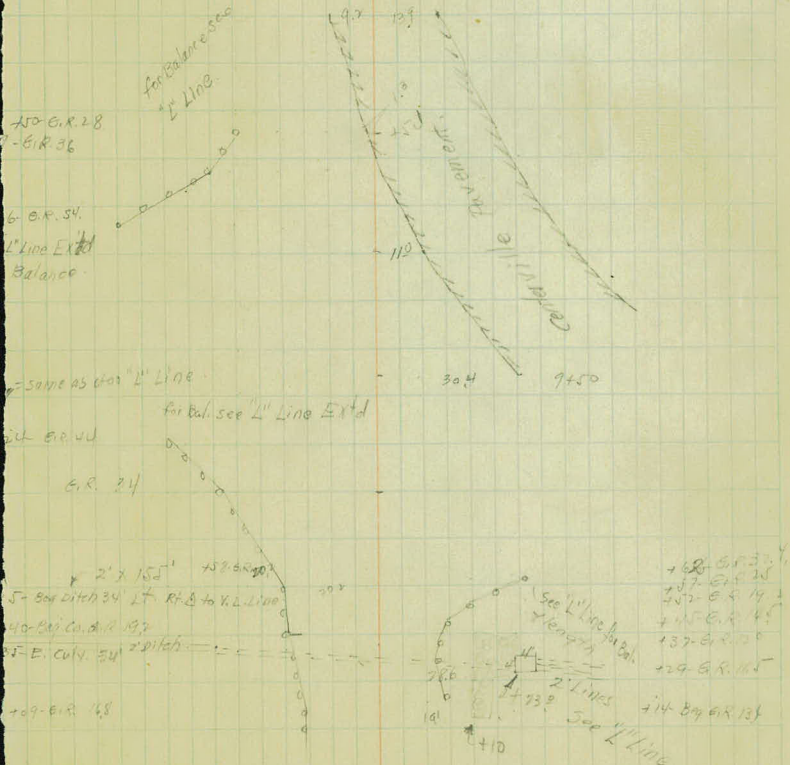
Grate Open

West X-Sec. E. X-Sec.

24"X 64" P 3, Ex. 29.3 Rt.

Inst.
Rod.
Chain.

Left	G L	Right



2" Line Extended
Final Topog.

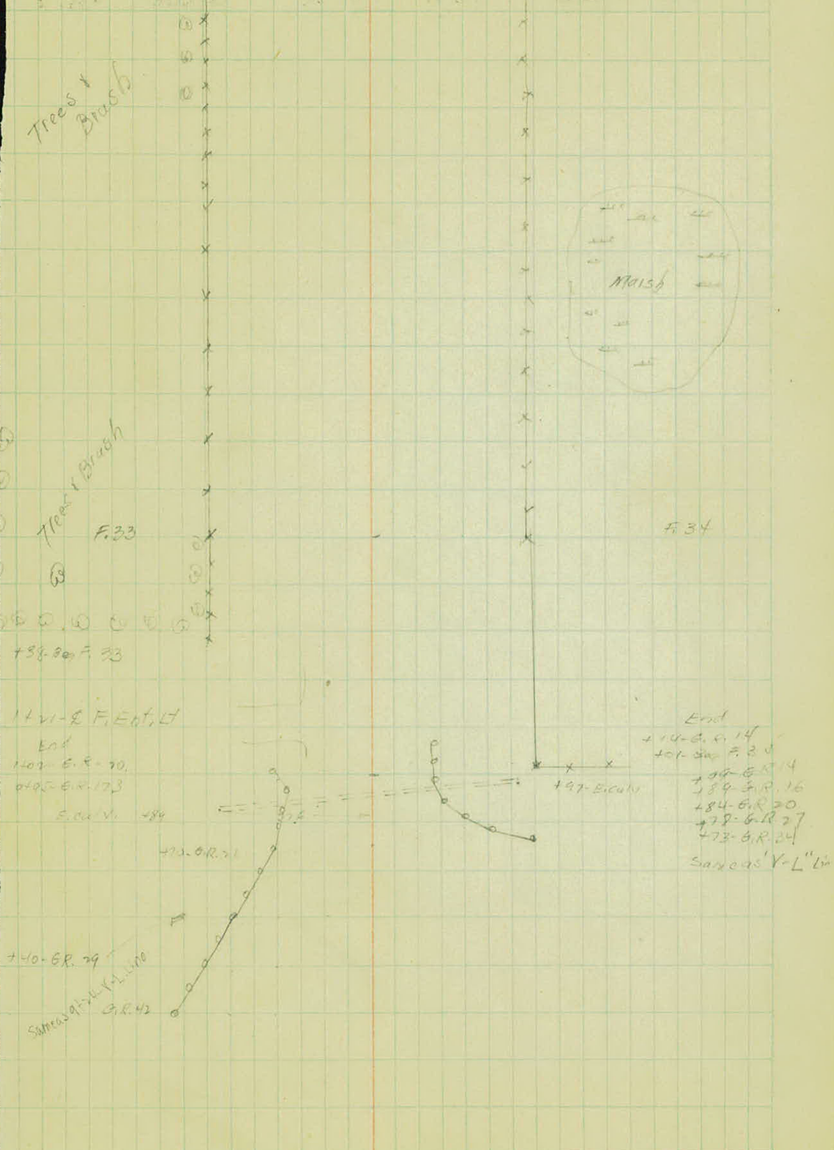
Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. I
4+00					
3+00					
2+00					
1+00					
+91	24"x64' P.S.		Dr. Lt		
0+00	= P.I.				

100' Lin Ft. County Guard Rail

Inst. ....
Rod. ....
Chain. ....

Left	C L	Right



"L" Line Extended

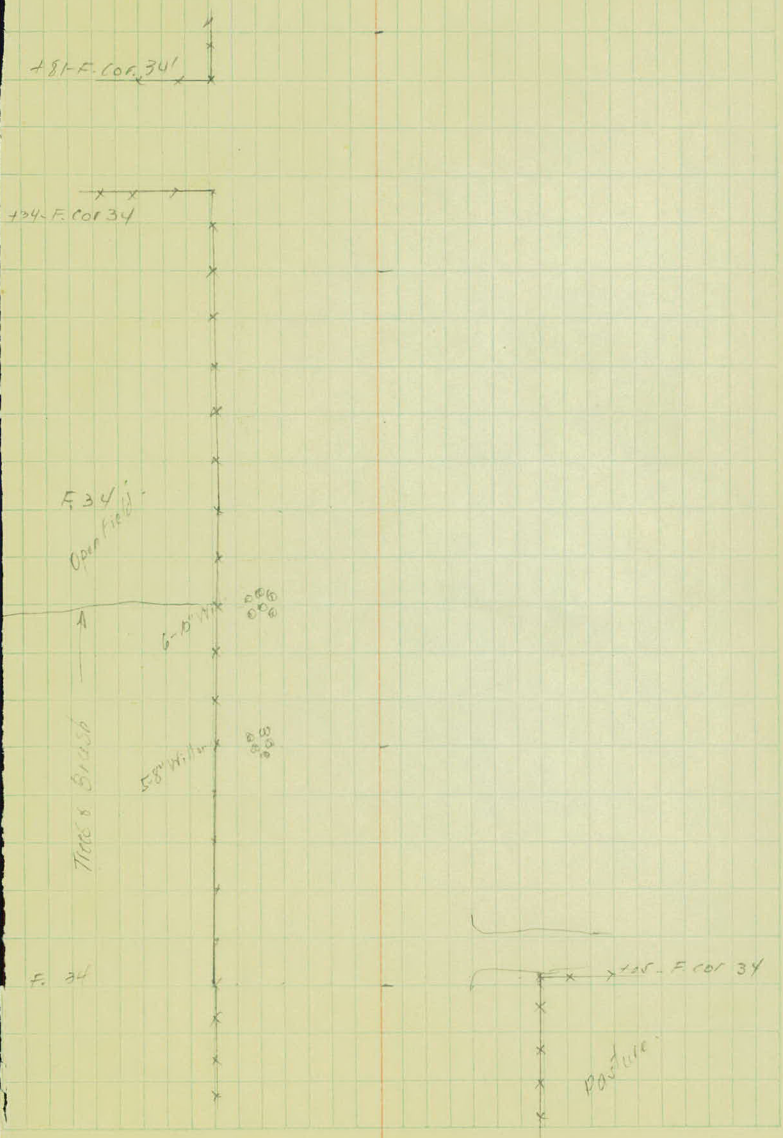
Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. F.
8+00					
	+55 & Rd. Lt.				
7+00					
6+00					
5+00					
	+12	F. Ent Rt			
4+00					

Inst. 20446.
Rod.
Chain.

Oct. 17, 1924

Left | C L | Right



.... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R

Inst.....

Rod.....

Chain.....

Left	C L	Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.

Inst.
Rod.
Chain.

Left	C L	Right

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.

Inst.....
Rod.....
Chain.....

Left	C L	Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
13+78	Farm Ent. on Lt.				
0+00	Shoulder line 18' Lt. ℄				
+03					
+10					
+16					
15+66	Farm Ent. Rt.				
0+00	Shoulder line 15' Rt. of ℄				
+05					
+07					
+09					
+18					
31+72	Farm Ent. Rt.				
0+00	Shoulder line 15' R. of ℄				
+04					
+08					
+11					
41+71	Farm Ent, Lt.				
0+00	Shoulder line 15' L. of ℄				
+04					
+09					
+11					

Inst.
Rod.
Chain.

Left	G L	Right
-0.7	0.0	-0.7
15	0	15
-2.7	0.0	+0.3 -0.4 -2.1
14	10	8 9 13
-3.5	+0.5	+0.5 +0.2 -2.6
13	7	8 8 12
+2.3	+1.0	+1.1 +1.4 +2.6
8	5	6 6 8
	0.0	0.0 -0.1
	13	8
-3.2	-0.7	-0.4 -0.8 -3.7
13	11	8 8 16
-2.6	-1.7	-0.9 -1.2 -3.7
13	11	8 11
-2.3	-1.7	-1.2 -1.7 -2.3
13	8	10 10 14
	-2.8	-2.5 -2.8
	8	8 8
	-0.1	0.0 -0.1
	13	8 14
-1.9	-0.3	-0.1 -0.4 -2.3
14	11	8 11 15
-3.0	-0.6	-0.7 -0.9 -2.7
11	9	8 12 17
	-1.0	-0.6 -0.9
	10	8 10
	0.0	0.0 0.0
	11	8 13
-1.9	-0.1	+0.1 -0.3 -1.9
14	11	8 12 15
-3.6	-0.7	-0.5 +0.5 -2.4
13	13	8 11 12
	-0.2	-0.4 -0.2
	12	8 12

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R
24+37	Farm Ent. on Lt.				
0+00	Shoulder line 15' Lt. of ℄				
7+04					
7+08					
7+10					
26+23	Farm Ent. on Lt.				
0+00	Shoulder line 15' Lt. of ℄				
7+05					
7+09					
7+10					
27+00	Farm Ent. on Rt.				
0+00	Shoulder line 15' Rt. of ℄				
7+04					
7+08					
7+10					
36+00	Road on Lt.				
0+00	Shoulder line 15' Lt. of ℄.				
7+07					
7+13					
7+18					
39+62	School Ent. Lt.				
	6 Cu. Yd. of fill.				

Inst.
Rod.
Chain.

Left	C L	Right
	00 00 00	
	12 6 13	
	-2.0 -0.7 -0.1 -0.3 -2.9	
	13 11 3 10 13	
	-2.5 -0.3 -0.2 -0.7 -2.6	
	12 3 2 10 13	
	-0.5 -0.1 -0.3	
	9 2 11	
		4.9
	00 00 -0.1	
	7 2 7	
	-2.9 -0.3 -0.1 -0.7 -2.6	
	7 5 2 5 7	
	-2.7 -0.4 -0.7 -0.5 -2.6	
	10 4 6 4 6	
	-0.8 -0.5 -0.6	
	6 2 6	
		5.7
	00 00 00	
	13 2 10	
	-2.1 -0.6 -0.2 -0.6 -1.9	
	16 13 2 9 11	
	-3.0 -1.0 -0.8 -1.1 -2.2	
	11 7 2 12 14	
	-0.9 -1.1 -1.4	
	10 2 12	
		8.54
	-0.3 0.0 +0.1	
	39 2 24	
-6.6 -3.6 -2.0 -0.7 -0.6 -0.0 -3.6		
45 37 27 21 2 17 35		
46 -6.8 -6.8 -4.0 -3.7 -1.4 -0.9 -1.9 -4.0		
44 43 38 34 23 19 2 13 38		
6.4 6.4 -6.8 -5.7 -5.6 -2.6 -1.4 -2.6 -5.0		
31 30 28 26 17 14 2 12 26		

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
40+00	School Ent. Lt.				
	9 Cu. yd. of fill.				
45+91	Farm Ent. Rt.				
0+00	Shoulder line 15' Rt. of ℄				
+04					
+07					
+11					
48+04	Farm Ent. Lt.				
	12 Cu. yd. of fill.				
48+50	Farm Ent. Rt.				
	1 Cu. yd. of fill.				
76+26	Road on Rt.				
0+00	Shoulder line 15' Rt. of ℄				
+05					
+08					
+11					
+17					
83+11	Road on Rt.				
0+00	Shoulder line 15' Rt. of ℄				
+03					
+08					
+10					

Inst.
Rod.
Chain.

Left	C L	Right
	00 00 -0.3	
	14 0 15	
-2.1	-0.4 -0.4 -0.5	-2.1
13	11 2 12	16
-2.0	-1.4 -0.7 -1.0	-2.1
12	0 0 11	15
	2.0 -1.4 -1.4	-2.0
	10 0 11	15
	-0.9 0.0 -0.6	
	31 0 46	
-3.0	-1.1 0.0 -0.5	-3.0
31	27 0 33	48
-1.0	-1.0 -0.3 -0.8	-2.0
28	26 0 26	35
	-1.3 0.0 -0.5	-1.5
	28 0 21	37
	-1.4 -0.5 -1.1	
	30 0 3	
	00 00 -0.8	
	49 0 35	
-2.0	0.0 0.0 -0.4	-3.0
32	46 0 32	35
-2.1	-0.5 0.0 -0.4	-3.0
31	35 0 34	36
	0.0 0.0 0.0	
	19 0 34	

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
94+70	Farm Ent. Lt. 17 Cu. Yd. of fill.				
120+00	Farm Ent. Rt. 11 Cu. Yd. of fill.				
123+84	Farm Ent. Lt. 15 Cu. Yd. of fill.				
130+90	Road on Rt. 21 Cu. Yd. of fill				
132+31	Farm Ent. Lt. 7 Cu. Yd. of fill				
136+56	Farm Ent. Rt. 5 Cu. Yd. of fill				
139+72	Farm Ent. Lt. 12 Cu. Yd. of fill.				
152+25	Farm Ent. Lt. 4 Cu. Yd. of fill.				

Inst.
Rod.
Chain.

Left	G L	Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. 1
157+24	Rd on Lt				
0+00	Shoulder line		15' Lt of ℄		
+08					
+19					
158+06	Farm Ent. Rt.				
	7 Cu. Yd of fill				
158+49	Farm Ent Rt.				
	12 Cu. Yd. of fill				
159+64	Farm Ent Lt				
	7 Cu. Yd. of fill				
171+30	Farm Ent. Rt.				
	17 Cu. Yd. of fill				

Inst. ....

Rod. ....

Chain. ....

Left		C L		Right
	0.0 / 21	[illegible] / 0	-0.4 / 21	
-4.5 / 20	-1.0 / 15	-0.5 / 0	-1.3 / 14	3.0 / 19
	-1.3 / 12	-1.0 / 0	-1.5 / 13	

.... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R

Inst.
Rod.
Chain.

Left	G L	Right

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. 1
150					
149					
148					
147					
146					
145					
144					
143					
142					

Inst.
Rod.
Chain.

Left	C L	Right
		F. 31 R.
7 T.P. 27' L.		
8 T.P. 23' L.		
		F. 31 R.
13 T.P. 30' L.		
		F. 31' R.
3 T.P. 27' L.		
		+67 Stump 21' R.
		+39 Stump 27' R.
		F. 30' R.
55 T.P. 29' L.		
45 T.P. 30' L.		
		F. 30' R.
17 T.P. 29' L.		
07 T.P. 27' L.		
		F. 30' R.
		+11 F. Cor. 30' R.
37 T.P. 29' L.		
53 T.P. 57' L.		
63 T.P. 27' L.		

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
158					
157+34.5 = 157+23.5					
157					
156					
155					
154					
153					
152					
151					
150					

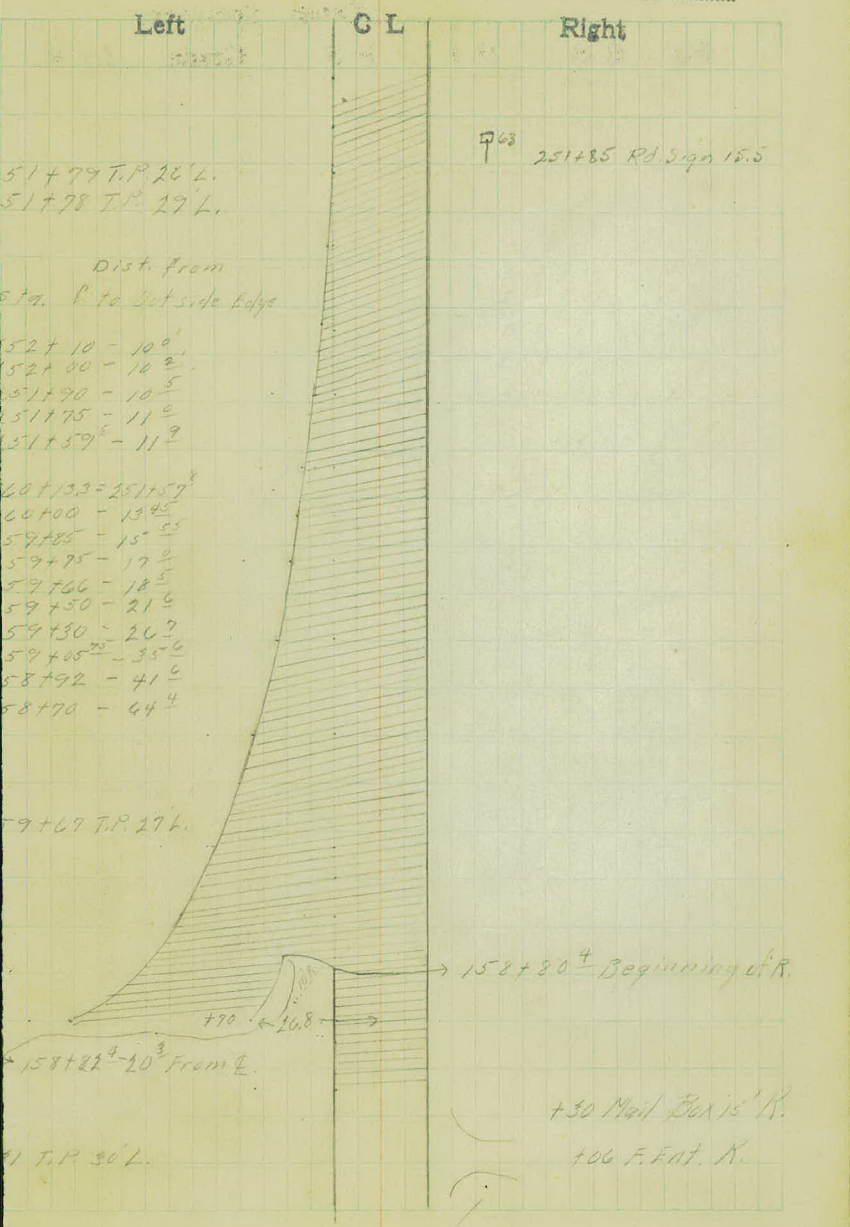
Inst.
Rod.
Chain.

Left	C L	Right
+41 Rd. Sign 23' L		+93 F. Cor. 31' R.
		+24 Sign Start 22' R
24 Road on Lt.		+24 Rd. Sign 20 R.
		F. 33 R.
94 T.P. 31' L.		
		F. 31' R.
85 T.P. 30' L.		
56 T.P. 32' L.		
		F. 34' R.
29 T.P. 33' L.		
29 T.P. 31' L		
		F. 57' R.
+82 T.P. 32' L.		
		F. 33' R.
73 T.P. 30' L.		
8 F. Ent. L		+36 T. 22' R.
		F. 33' R.
48 T.P. 32' L.		
+12 T.P. 31' L.		
		F. 31' R.
		+78 T. 28' R.
		+64 T. 28' R.
		+52 T. 31' R.
46 T.P. 32' L.		+17 T. 30' R.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
252					
		252+07 End of Cork on Lt.			
		631.5 of Cork			
		Beginning of Cork on Rice St. Project.			
160+13.3 = 251+57.8					
159					
158					

Inst.
Rod.
Chain.



Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
260					
259					
258					
257					
256					
255					
254					
253					
252					

Inst. ....
Rod. ....
Chain. ....

Left	C L	Right
95 T.P. 31' L.		+ 86 T.P. 31' R.
		+ 05 Mail Box 11' R.
54 T.P. 32' L.		
		+ 42 T.P. 31' R.
55 T.P. 32' L.		
		+ 17 T.P. 31' R.
42 T.P. 32' L.		
+00 Rd. Sign 14' L.  Sharp Turn		
		+ 98 T.P. 31' R.
		+ 09 T.P. 31' R.
80 T.P. 36' L.		
		+ 32 T.P. 29' R.
71 Rd Sign - 14.5' Lt  63 R		
54 T.P. 30' L.		
50 T.P. 21' L.		

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
268					
267					
266					
265					
264					
263					
262					
261					
260					

Inst.
Rod.
Chain.

Left — S L — Right

57 T.P. 32'L.
57 T.P. 32'L.

15' T.P. 32'L.
03 T.P. 32'L.

47 T.P. 32'L.
47 T.P. 32'L.

11 T.P. 23'L.
03 T.P. 33'L.

64 F. Ent L.

90 T.P. 32'L.

49 T.P. 31'L.

+87 F.Cor. 31'R
+34 T.P. 31'R

F. 32'R

+55 T.P. 31'R.

+35 T.P. 32'R.

F. 33 R.

+03 T.P. 32'R.

F. 32'R.

F. 33'R
+78 T.P. 32'R.
+05 Mail Box 14'R

+90 F. Cor. 33'R
+38 T.P. 31'R.

+16 T.P. 31'R.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. E
+07[55] End of Proj					
273					
	273 + 07[55]				
	64[6] of Curv				
	272 + 42[5] Beginning of Curv on R.				
272					
271					
270					
269					
268					

Inst.

Rod.

Chain.

Left | C L | Right

R.R. Xing Sign
73+16 20' Rt

+07 5.5 Gr. Rail 14' Lt.

12.5' – 273+07 5.5

11.4 +97.5

+89 T. 32' R.

10.9 +87.5 +80 T.P. 31' R.

10.4 +77.5 +42.5 Beg. of

10.2 +67.5 Curb in R.

+21 Rd. Sign 14' ht. 63

+57.5 Beg. of Ext. Wid.

10.0

13.4 Beg. of Gr. Rail 14' L.

+14 F. Cor. 32' R.

+97 T.P. 30' L.

+97 T.P. 29' L.

+86 F. Cor. 32' R.

63/R +63 T.P. 36' R.

+77 Rd. Sign 15.5' Rt

+07 Mail Box 14' R.

+51 T.P. 33' L.

+51 T.P. 31' L.

+12 T.P. 31' R.

Sharp Turn +04 Rd. Sign 15' R.

+10 T.P. 36' L.

+10 T.P. 33' L.

+02 T.P. 31' R.

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. K

Instr.....
Rod.....
Chain.....

5-3

Left C L Right

Sta.

20

19

18

17

16

✓

+23 P.I. 28° R.

+72 T.P. 26° R.

+78 P.I. 23° L.

(17+ R.R. Xing Sign
laying in Ditch)

+49 T.P. 24° R

12"x18" C.M.P.

+34 P.I. 28° L.

+38
21.5

+26 T.P. 22° R

24

23

22

$22 + 9^2 = 21 + 45^\circ$

22

21

20

F. 22' L.

61 P.P. 27' L.

+22 T.P. 28' R.

30 F.Cor. 23' L.

+49 T.P. 29' R.

+90 P.P. 22' L.

+47 Mail Box 17' L

22 +70 T.P. 29' R

+60 P.P. 22' L.

+35 T.P. 27' R.

+84 Cup P. 28' L.

+05 T.P. 23' R.

29

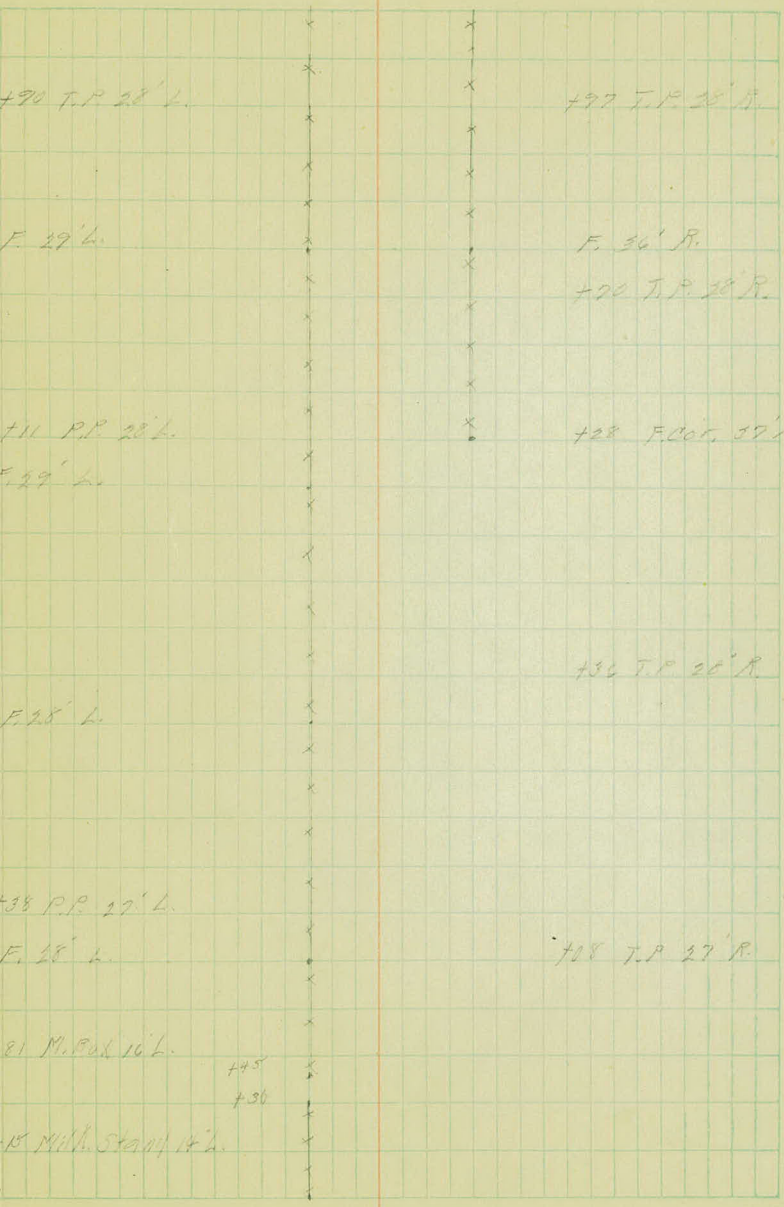
28

27

26

25

24


+30 T.P 28' L.
F. 29' L.
+31 P.P 28' L.
F. 29' L.
F. 28' L.
+38 P.P 27' L.
F. 28' L.
81 M. Box 16' L.
+45
+30
15 Mill Stone 14' L.
+37 T.P 28' R.
F. 36' R.
+30 T.P 28' R.
+28 F. Coal 37' R.
+36 T.P 26' R.
+18 T.P 27' R.

34

46 4' of Curb.

53+00 Beg. of 4' Curb on Rt.

33

32

31

30

29

+70 F. 41' R.
+45 F. 36' R.

+45 I.S.P. 30' R.
+32 T.P. 28' R.
+20 F. 32' R.

Sta.	dist. from E. to outside
+44	17'
+30	14.5'
+20	12.8'
+10	11.9'
33+00	11.3'
+90	10.6'
+80	10.3'
+67	10

F. 32' R.

54 I.P. 31' L.

F. 32' L.

+38 T.P. 28' L.

F. 31' L.

+36 T.P. 28' R.

F. 33' R.

+33 T.P. 28' R.

F. 34' L.

F. 34' R.

+50 T.P. 28' L.

+27 T.P. 28' R.

F. 30' L.

F. 35' R.

F. 27' L.

F. 33' R.

39

38

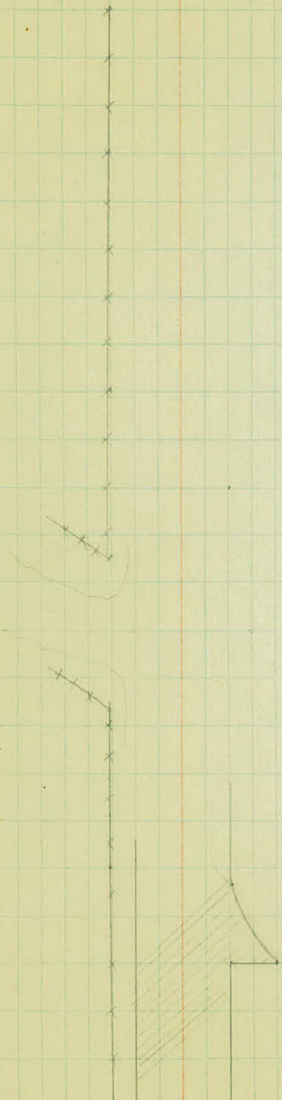
37

36

35

34

91 T. 37' L.
89 F.Cor. 35' L.



F. 34' L.

+83 T.P. 28' R.

F. 34' L.

34 I.S.P. 23' L

+52 T.P. 28' R.

34 F.Cor. 34

00 Rd. on Lt.

72 F.Cor. 34

+65 T.P. 28' R.

58 M.Box 14' L.

+87 I.S.P. 18' R.
+79 T.P. 28' R.
+77 I.S.P. 37' R.

F. 33' L.

Dist. from
Sta. ℄ to Out Side Edge
+83 - 10'
+71 - 12 3/4
+65⁸ - 25

Co. Rd. E.

F. 32' L.

F. 57' R.

44

43

42

41

40

39

F. 38' L.

F. 28' L.

F. 27' L.

93 Buffalo 29' L.
99 Fox 29' L.
91 T. 31' L.

50 T. 30' L.
28 T. 32' L.
10 T. 32 L.

90 T. 33' L.

70 T. 33' L.
49 T. 35' L.

29 T. 35' L.

+65 T. 27' R.
+44 T. 27' R.
+21 T. 28' R.
+19 T. P. 28' R.
+10 T. 29' R.

+89 T. 23' R.

+92 T. 29' R.

+80 T. P. 27' R.

+00 T. P. 29' R.

+40 T. P. 28' R.

+04 T. P. 28' R.

49

48

53+57.5 End of Curb
613.0' Lineal ft. of Curb
47+34 Beginning of Curb

47

46

45

44

F. 35' L.

+12 T. P. 28' R.

F. 29' L.

F. 29' L.

+85 T. P. 28' R.

+72 F. Cor. 31

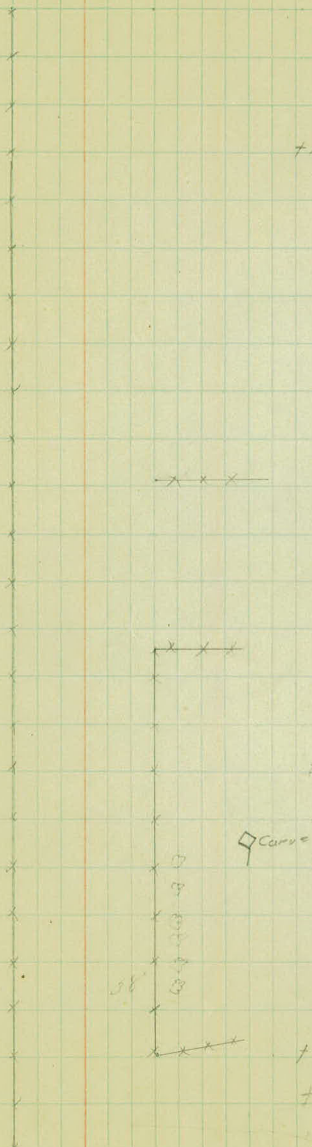
+14 F. Cor. 31' R.

F. 29' L.

+70 Milk Stand 13' R.

+60 T. P. 28' R.

+41 S. P. 14' R



F. 28' L.

+47 F. Cor. 30' R.

+37 T. P. 28' R

Caution School Zone

+11 S. P. 14' L.

+15 T. 27' R.

54

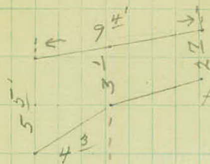
53

52

51

50

49



+54 Spill Way.

27 Guy Pole 33' L.

+87 T.P. 31 R

+72 T.P. 30' R

+46 T.P. 27' R.

E. 48' L.

+31 Guy Pole 29' L.

+33 T.P. 25' R.

59

58

57

56

55

54

F. 31' R.

F. 33' R.

+11 T.P. 31' R.
+11 T.P. 25' R.

F. 33' R.

F. 34' R.

+19 T.P. 31' R.
+19 T.P. 25' R.

F. 33' R.

+L.S. F.Cor. 32' R.

+03 T.P. 31' R.

64

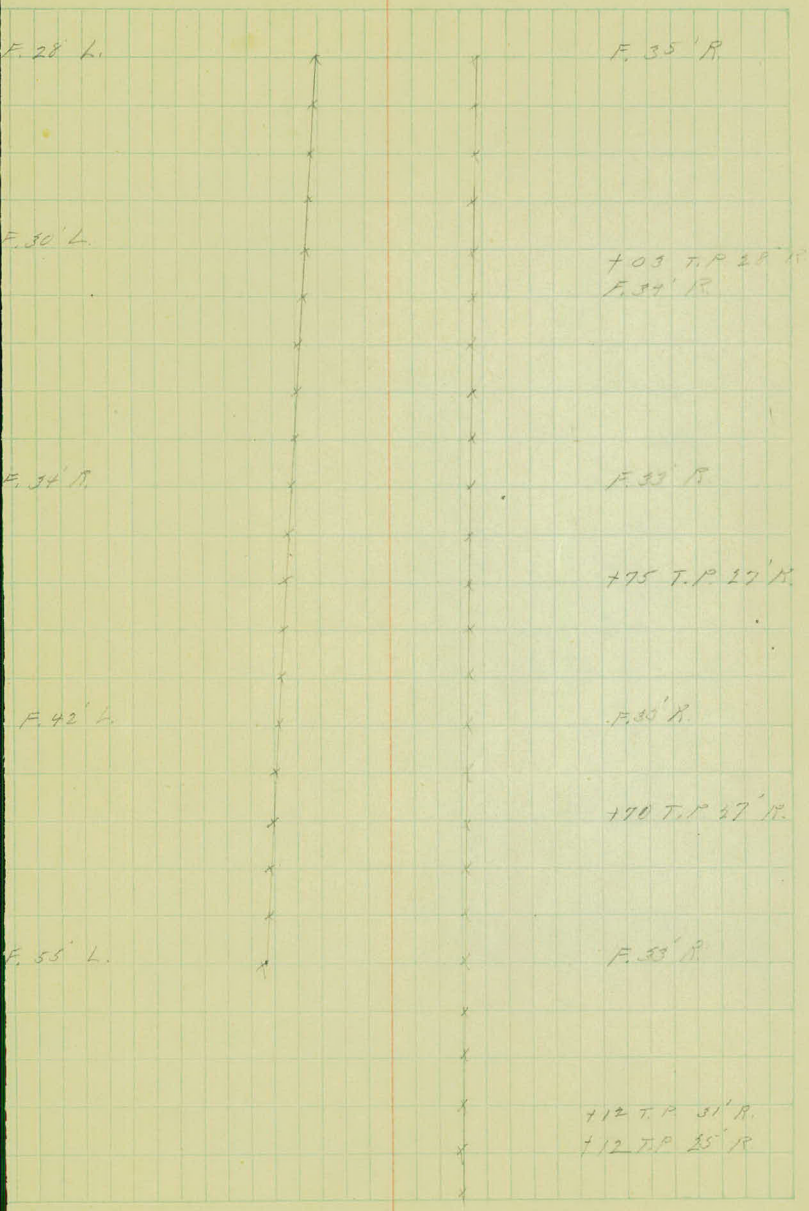
63

62

61

60

59


F. 28' L.
F. 35' R.
F. 30' L.
+09 T.P 28' R.
F. 34' R.
F. 33' R.
+75 T.P 27' R.
F. 42' L.
F. 39' R.
+70 T.P 37' R.
F. 55' L.
F. 53' R.
+12 T.P 31' R.
+12 T.P 35' R.

67

68

67

70+49 End of Curb on Lt

$470\frac{7}{}$ of Curb

66+05 Beginning of Curb on Lt

66

$65+54^{6} = 65+52^{3}$

65

65+69 End of Curb on Lt

102^{6} of Curb

64+79 Beginning of Curb on Lt

64

F. 32' L.

F. 30' R.

+71

F. Ent.

+57

+32 T.P. 27' R.

F. 30' L.

F. 40' R.

+68 F. 45' R.

+59 T.P. 34' R

+50 F. 35' R

F. 29' L.

F. 34' R.

+87 T.P. 29' R.

+01 Spill Way

F. 29' L

+96

+84

+90 F. Ent.

F. 33' R.

+60 T.P. 27' R

F. 27' L.

F. 34' R.

+34 T.P. 28' R

74

73

80+71 End at Curb on Lt

770 at Curb

72+87 Beginning at Curb on Lt

72

71

70

69

F. 37' L.

F. 30' L.

+95. End F. 29' R.
+95 T. P. 36 R.

+36 T. 21 L.

F. 26' L.

F. 30' R.

+95 T. P. 38' R.

+64 T. 16' L.

+37 T. 14' L.
30 T. 13 L.

F. 25' L.
+74 T. 15' L.
+26 T. 14' L.

F. 30' R.

+86 T. P. 27' R.

F. 29' L.
+98 T. 21 L.

F. 29' R.

+59 T. P. 26' R.

79

78

77

76

75

74

F. 28' L.

+60 F. 25' L.

F. 23' L.

F. 32' L.

+74 T. 28' L.

+35 T. 23' L.
F. 34' L.

+00 Bd on Rt
F. 41' R.
+64 F. Cor. 32' R.

+35 Cup Pole 28' L.
+31 I.S.P. 27' L.
F. 36' L.

+32 T.P. 22' R.

11 Spill Way.

+21 T.P. 18' R.

F. 37' L.

84

83

85+20.5 End of Curb on Rt.
322' of Curb
82+03 Beginning of Curb on Rt

82

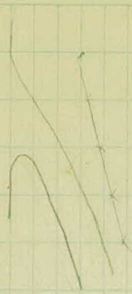
81

80

79

F. 34' L.

F. 40' R.



+90 Road L.

+50 T.P. 44' R.

F. 58' R.

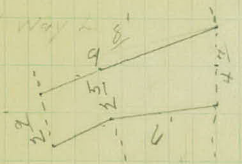
F. 32 L.

+50 Rd. S. 29' R.

+33 Rd. S. 14' L. Curve

+00 Spill Way L

F. 28' L.



F. 28' L.

F. 28' L.

87

88

87

90+77 End of Curb on Rt.
405.5' of Curb
86+40 Beginning of Curb on Rt.

86

85

84

F. 34' L.

+476 Guy Pole 29' L.

F. 32' L.

F. 33' L.

F. 31' L.

F. 31' L.

F. 34' R.

+67 T.P. 31' R.

F. 38' R.

+37 T.P. 35' R.

F. 38' R.

+38 Soil Way.

+07 T.P. 36' R.

F. 37' R.

F. 37' R.

+83 T.P. 36' R.

F. 46' R.

94

93

92

91

90

89

F. 37' L.

F. 37' R.

F. 37' L.

F. 35' R.

+35 T. 30' L.

+37 T. 30' R.

F. 36' L.

F. 33' R.
+72 Stump 27' R.
+71 T. 30' R.

+00 Stump 25' R.

+37 Stump 23' R.
+18 Stump 23' R.

F. 36' L.

F. 32' R.

+44 T. 27' L.

+00 T. F 43' R.

F. 31' L.

F. 31' R.

F. 34' L.

F. 34' R.

99

98

97

96

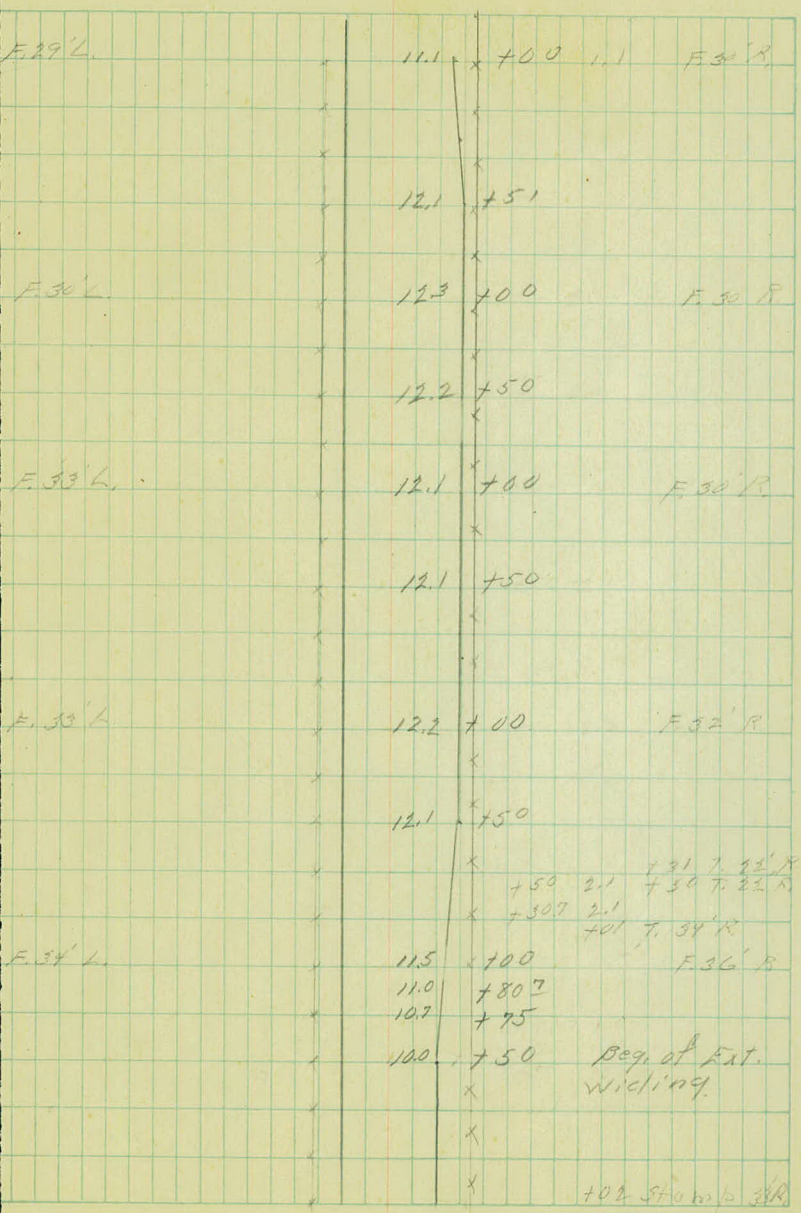
95

$99+79\frac{5}{}$ End of Curb on Rt.

$561\frac{3}{}$ of Curb.

$99+04$ Beginning of Curb on Rt

94


F.29'L.
11.1
+00
1.1
F.3' R.
12.1
+51
F.30'L.
12.3
+00
F.30' R.
12.2
+50
F.33'L.
12.1
+00
F.32' R.
12.1
+50
F.33'L.
12.2
+00
F.32' R.
12.1
+50
+31 T. 33' R
+50 2.1 +30 T. 32' R
+30.7 2.1
+01 T. 34' R.
F.34' L.
11.5
+00
F.36' R.
11.0
+80.7
10.7
+75
10.0
+50
Beg. of Ext.
Widening
+02 Station 38 R.

104

103

102

374.0' of Cork

101+05 Beginning of Cork

101

100

99

99+73.5

+00 T.P. 27' L. +00 13.0
+00 P. 30' L.

+02 T. 29 R.
+47 T. 29 R.
+44 T. 29 R.

+50 13.0

F. 31 L. +00 13.0

+93 13.0

+95 T.P. 30' R.

+60 12.3

+60 End of F. 31 R.

+43 11.5

+20 10.3

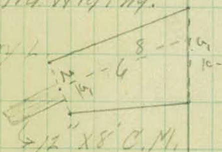
F. 30 R.

F. 32 L.

+93 10.0

+93 Beg. of Extra Widing.

+69. Spill Way L.



F. 30' L.

F. 30 R.

F. 30' L.

F. 30' R.

00 +51 End of Extra Widing

10.3 +25

F. 19' L.

F. 30' R.

111

110

109

108

107

106

105

104

F. 33' L.

F. 33' L.

+90 T.P. 28' L. +90 Bill Board 27' R.

F. 33' L.

+65 T.P. 28' L.

F. 33' L.

+27 T.P. 28' L.

F. 33' L.

+02 T.P. 30' L.

F. 33' L.

+04 End of Ext. Widing.

	+04	0.0	
F. 33' L.	+00		
	+79	10.3	+80 T. 32' R
+80 T.P. 31' L	+54	11.4	
	+29	12.6	
	+04	13.0	

119

118

117

116

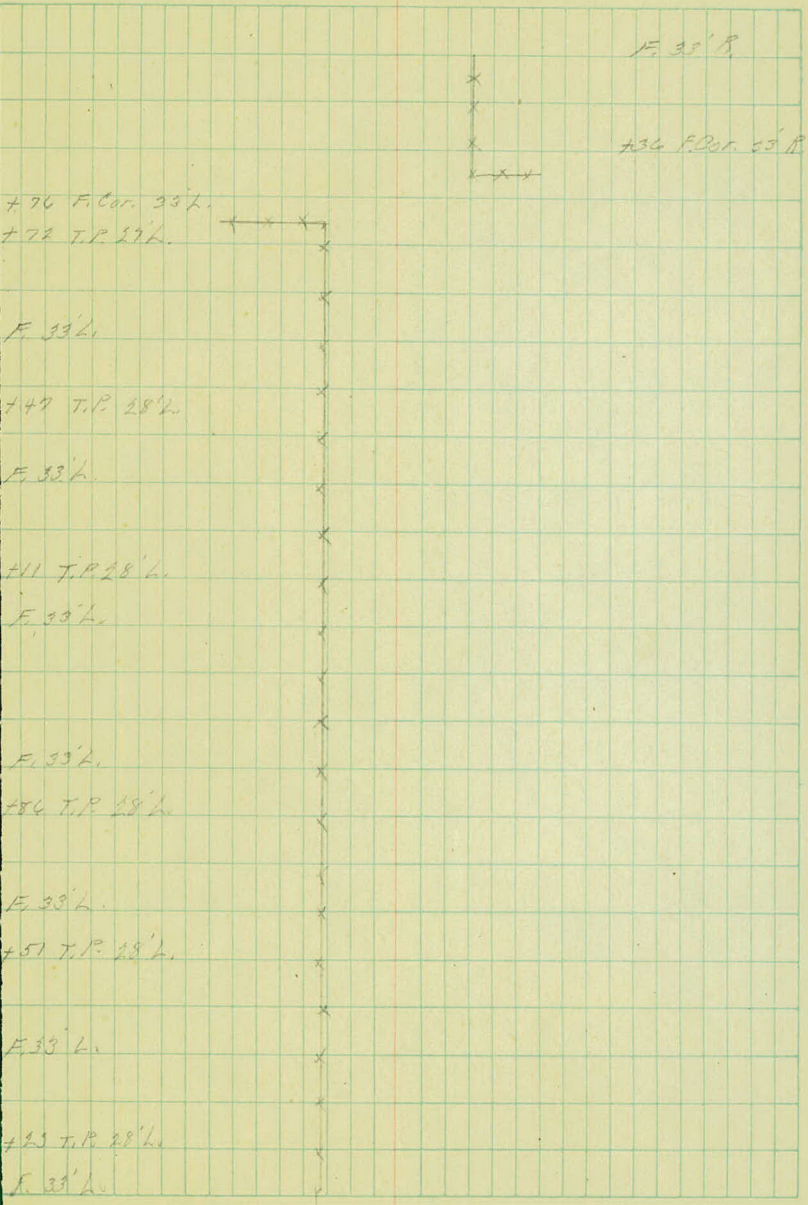
115

114

113

112

111


F. 33' R.
#36 F.Cor. 33' R.
#76 F.Cor. 33' L.
#77 T.P. 28' L.
F. 33' L.
#47 T.P. 28' L.
F. 33' L.
#11 T.P. 28' L.
F. 33' L.
F. 33' L.
#86 T.P. 28' L.
F. 33' L.
#51 T.P. 28' L.
F. 33' L.
#23 T.P. 28' L.
F. 33' L.

127

126

125

124

123

122

121

120

119

+90 T.P. 23'L.
+93 T.P. 28'L.

+64 T.P. 24'L.
+58 T.P. 28'L.

+35 T.P. 28'L.

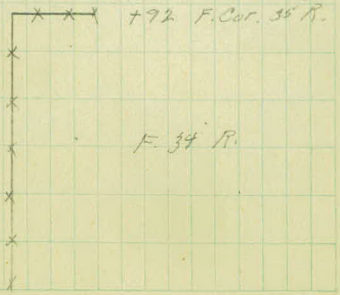
+59 Mill Stand 15'L.

+97 T.P. 28'L.

+73 T.P. 28'L.

+38 T.P. 27'L.

+10 T.P. 28'L.



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+81 T.P. 27 L.
+50 T.P. 26 L.

+45 T.P. 27 L.

+00 T.P. 26 L.

+18 T.P. 27 L.
+17 F. Col. 34 L.

F. 34 L.

+07 T.P. 26 L.

F. 34 L.
+98 T.R.S. 25 L
+93 F. Col 34 L.
+93 T.P. 30 L
+93 T.P. 25 L.

+54 T.P. 28 L.
+50 T.P. 26 L

+39 T.P. 27 L.
+21 T.P. 28 L

+70 T. 28 R.

+39 S Mail Box
15 R.

Cont. on Page 47.

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171

170

139

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137

136

135

+97 T.P. 24' L.

+27 T.P. 20' L.

+49 T.P. 25' L.

+04 T.P. 20' L.

+47 T. 35' L.

+03 T. 34' L.

+85 T.P. 25' L.

+05 T.P. 27' L.

+25 T.P. 27' L.

+21 T.P. 27' L.

+06 T.P. 27' L.

+96 T.P. 25' L.

+25 F. Cor. 25' R.

+34 T. 20' R.

+16 T. 20' R.

F. 31' R.

+79 Wire Stand 15' R.

+75 T. 23' R.

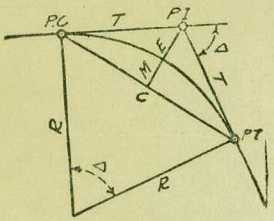
+69 F. Cor. 32' R.

+56 F. Ent. R.

+31 Mail Box. 15' R.

+61 T. 32' R.

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

Radius=R=$\frac{50}{\text{sin. } D/2}$ (1) Degree of Curve=D and sin. $\frac{D}{2}=\frac{50}{R}$ (2)

Tangent=T=R tan $\frac{\Delta}{2}$ (3) Length of Curve=L=$100\frac{\Delta}{D}$ (4)

Middle ordinate=M= R(1—cos. $\frac{\Delta}{2}$) (5) =R vers $\frac{\Delta}{2}$ (6)

External=E=T tan $\frac{\Delta}{4}$ (7) =R ÷ cos. $\frac{\Delta}{2}$ —R (8)=R exsec $\frac{\Delta}{2}$ (9)

Long Chord=C=2 R sin. $\frac{\Delta}{2}$ (10) Δ=Central Angle

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.=Sta. 161+60.35 to find Sta. of P. C. and P. T. Δ=62° 10′ D=8° 20′. From Table IV for 1° curve T=3454.1 and ÷8⅓=414.49 ft. From Table V correction=.36 or T=414.85 ft. P. C.=Sta. P.I.—T=157+45.50. Also from (4) L=746.00 and P. T.=Sta. P. C. +L=164+91.50.

Offsets.—Tangent offsets vary (approximately) directly with D and with square of the distance. Thus tangent offset for Sta. 158 on above curve is 2.16 ft. found as follows. From Table III tangent offset for 100 ft.=7.27 ft. Distance=158—Sta. P. C.=54.50, hence offset=7.27 $(54.50 \div 100)^2$=2.16 ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus $(54.50)^2 \div (2 \times 688.26)$=2.16 ft.

Deflections.—Deflection angle=½ D for 100 ft., ¼ D for 50 ft., etc. For c ft.=(in minutes) .3 x C x D° or=defl. for 1 ft. from Table III x C. For Sta. 158 of above curve=.3 x 54.5 x 8⅓=136.2′ or 2° 16.2′, or=2.50 x 54.5=136.2′ from Table III. For Sta. 159 deflection angle=2° 16.2′ +8° 20′ ÷2=6° 26.2′, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 91.37. For from Table IV for 1° curve E=960.6 for 8° 20′=960.6 ÷8⅓=91.27 and from Table V correction=.10 or E=91.37 ft. Or suppose Δ=32° and E is measured and found to be 42 ft. What is D? From Table IV E=230.9 and ÷42=5.5 or D=5° 30′.

Table I.—Minutes in Decimals of a Degree.

1′	.0167	11′	.1833	21′	.3500	31′	.5167	41′	.6833	51′	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

Table II.—Inches in Decimals of a Foot.

1–16	3–32	1/8	3–16	1/4	5–16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Table III.—Radii, Ordinates and Deflections.

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan Offset	Def. for 1 Foot
0° 10′	34377.5	.036	.145	0.05′	7°	819.02	1.528	6.105	2.10′
20	17188.8	.073	.291	0.10	20′	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25					
					8	716.78	1.746	6.976	2.40
1	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
10	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
30	3819.83	.327	1.309	0.45					
40	3437.87	.364	1.454	0.50	9	637.28	1.965	7.846	2.70
50	3125.36	.400	1.600	0.55	20	614.56	2.037	8.136	2.80
					30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65					
20	2455.70	.509	2.036	0.70	10	573.69	2.183	8.716	3.00
30	2292.01	.545	2.181	0.75	30	546.44	2.292	9.150	3.15
40	2148.79	.582	2.327	0.80	11	521.67	2.402	9.585	3.30
50	2022.41	.618	2.472	0.85	30	499.06	2.511	10.02	3.45
					12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15					
					15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.64	1.273	5.088	1.75					
					25	231.01	5.476	21.64	7.50
6	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
10	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
20	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
30	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
40	859.92	1.455	5.814	2.00	30	193.18	6.583	25.88	9.00

Note. Chord Deflection=2 times tangent deflection.

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10′	58.34	.30	10′	560.11	27.31	10′	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
31°	1589.0	216.3	41°	2142.2	387.4	51°	2732.9	618.4
10′	1598.0	218.7	10′	2151.7	390.7	10′	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	42	2199.4	407.6	52	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	43	2257.0	428.5	53	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	44	2314.9	450.0	54	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	45	2373.3	472.1	55	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	494.8	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	518.2	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	542.2	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	566.9	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	592.3	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

Table IV.—Tangents and Externals to a 1° Curve.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
61°	3375.0	920.2	71°	4086.9	1308.2	81°	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	72	4162.8	1352.6	82	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	73	4239.7	1398.0	83	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	74	4317.6	1444.6	84	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	75	4396.5	1492.4	85	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	76	4476.5	1541.4	86	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	77	4557.6	1591.6	87	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	78	4639.8	1643.0	88	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	79	4723.2	1695.8	89	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	80	4807.7	1749.9	90	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

Table IV.—Tangents and Externals to a 1° Curve.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
91°	5830.5	2444.9	101°	6950.6	3278.1	111°	8336.7	4386.1
10′	5847.5	2457.1	10′	6971.3	3294.1	10′	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	102	7075.5	3374.9	112	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	103	7203.2	3474.4	113	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	104	7333.6	3576.8	114	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	105	7467.0	3682.3	115	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	106	7603.5	3791.0	116	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	107	7743.2	3902.9	117	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	108	7886.2	4018.2	118	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	109	8032.7	4137.1	119	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	5808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	110	8182.8	4259.7	120	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

Table V.—Corrections for Tangents and Externals.

These corrections are to be added to the approximate values, found by dividing the tangent, or external, for a 1° curve (Table IV) by the degree of curve, in order to obtain the true tangents, or externals. Intermediate values may be obtained by interpolation.

For Tangents Add

Central Angle	Degree of Curve													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.70	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.40	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34
110°	.51	1.03	1.56	2.08	2.61	3.14	3.67	4.21	4.76	5.31	5.86	6.43	7.01	7.60
120°	.62	1.25	1.93	2.52	3.16	3.81	4.45	5.11	5.77	6.44	7.12	7.80	8.50	9.22

For Externals Add

Central Angle.	Degree of Curve													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.711	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.985	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96
110°	.268	.536	.806	1.08	1.35	1.63	1.91	2.20	2.48	2.76	3.05	3.35	3.66	3.96
120°	.360	.721	1.08	1.45	1.82	2.19	2.57	2.95	3.33	3.72	4.11	4.50	4.91	5.32

Table VI.—Corrections for Sub-Chords and Long Chords.

FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.57
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.57
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

Note.—When a chord of less than 100 ft. is used the corrections given in the above table should be added to the nominal length of chord to get the length which should be used in order that the 100 ft. points will check with those obtained by using the standard 100 ft. chord. Thus in locating a 14° curve by 25 ft. chords measure 25′.06 for each chord. **Long chords are useful in passing obstacles.**

Table VII.—Middle Ordinates for Rails in Feet.

Deg. of Curve	LENGTH OF RAILS							Deg. of Curve	LENGTH OF RAILS.						
	32	30	28	26	24	22	20		32	30	28	26	24	22	20
1°	.022	.020	.016	.013	.011	.009	.008	16°	.356	.313	.273	.236	.200	.170	.139
2	.045	.038	.034	.029	.025	.021	.017	17	.378	.333	.290	.252	.213	.180	.148
3	.037	.058	.051	.044	.037	.031	.026	18	.400	.351	.306	.265	.225	.190	.156
4	.089	.079	.069	.060	.050	.042	.035	19	.423	.371	.324	.280	.238	.201	.165
5	.112	.099	.086	.074	.063	.053	.044	20	.445	.392	.341	.296	.250	.212	.174
6	.134	.117	.102	.088	.076	.064	.052	21	.466	.410	.357	.309	.262	.222	.182
7	.156	.137	.120	.104	.088	.074	.061	22	.487	.430	.375	.325	.275	.233	.191
8	.179	.158	.137	.119	.100	.085	.070	23	.509	.450	.390	.338	.287	.243	.199
9	.201	.175	.153	.133	.112	.095	.078	24	.531	.469	.408	.354	.299	.253	.208
10	.223	.196	.171	.148	.125	.106	.087	25	.552	.486	.424	.367	.311	.263	.216
11	.245	.216	.188	.163	.139	.117	.096	26	.573	.506	.441	.382	.323	.274	.225
12	.268	.236	.206	.179	.151	.128	.105	27	.594	.524	.457	.396	.335	.284	.233
13	.290	.254	.222	.192	.163	.138	.113	28	.618	.545	.475	.411	.348	.294	.242
14	.312	.275	.239	.207	.175	.148	.122	29	.638	.564	.491	.424	.361	.303	.250
15	.334	.295	.257	.223	.188	.159	.131	30	.660	.583	.508	.438	.374	.313	.259

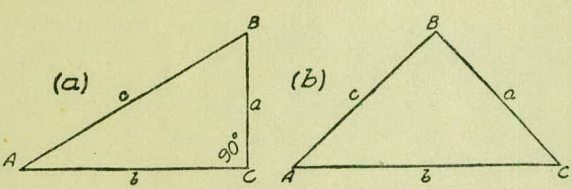
SLOPE REDUCTIONS.

When distances are measured on a slope they may be reduced to the equivalent horizontal distance by the following approximate rule:—subtract from the slope distance the square of the rise divided by twice the slope distance. Thus for a slope distance of 250.3 ft. and a rise of 15 ft. correction=$15^2 \div 2 \times 250.3$=.45 (by slide rule) or horizontal distance=250.3—.45=249.85. When vertical angle=V. A. is measured horizontal distance=slope distance—slope distance (1—Cos. V. A.). Thus for slope distance of 248.7 ft. and V. A. of 4° 20′ from Table VIII Cos=.99714 and correction=1—.99714=.00286 per foot or total of .286×2½ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

TRIGONOMETRICAL FORMULAS.

See fig. (a).

sin. $A=\frac{a}{c}$ cos. $A=\frac{b}{c}$ tan. $A=\frac{a}{b}$ cot. $A=\frac{b}{a}$ sec. $A=\frac{c}{b}$ cosec. $A=\frac{c}{a}$



Formula for Solving Triangles.

Given	Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A=\frac{a}{c}$, $\cos. B=\frac{a}{c}$, $b=\sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan. A=\frac{a}{b}$, $\cot. B=\frac{a}{b}$, $c=\sqrt{a^2+b^2}$.
A, a	B, b, c	$B=90°-A$, $b=a \cot. A$, $c=\frac{a}{\sin. A}$.
A, b	B, a, c	$B=90°-A$, $a=b \tan. A$, $c=\frac{b}{\cos. A}$.
A, c	B, a, b	$B=90°-A$, $a=c \sin. A$, $b=c \cos. A$
Given	Sought.	Oblique triangles. See fig. (b).
A, B, a	b	$b=\frac{a \sin. B}{\sin. A}$
A, a, b	B	$\sin. B=\frac{b \sin. A}{a}$
a, b, C	$A - B$	$\tan. \frac{1}{2}(A-B)=\frac{(a-b) \tan. \frac{1}{2}(A+B)}{a+b}$
a, b, c	A	If $s=\frac{1}{2}(a+b+c)$, $\sin. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{bc}}$, $\cos. \frac{1}{2}A=\sqrt{\frac{s(s-a)}{bc}}$, $\tan. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$, $\sin. A=\frac{2\sqrt{(s-a)(s-b)(s-c)s}}{bc}$
A, B, C, a	area	$\text{area}=\frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area}=\frac{1}{2} b c \sin. A$
a, b, c	area	$s=\frac{1}{2}(a+b+c)$, $\text{area}=\sqrt{s(s-a)(s-b)(s-c)}$

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
∞						∞					
0	0	0	00	1	90	8	.1392	.1405	7.115	.99027	82
10	.0029	.0029	343.8	I	50	10	.1421	.1435	6.968	.98986	50
20	.0058	.0058	171.9	.99998	40	20	.1449	.1465	6.827	.98944	40
30	.0087	.0087	114.6	.99996	30	30	.1478	.1495	6.691	.98902	30
40	.0116	.0116	85.94	.99993	20	40	.1507	.1524	6.561	.98858	20
50	.0145	.0145	68.75	.99989	10	50	.1536	.1554	6.435	.98814	10
1	.0175	.0175	57.29	.99985	89	9	.1564	.1584	6.314	.98769	81
10	.0204	.0204	49.10	.99979	50	10	.1593	.1614	6.197	.98723	50
20	.0233	.0233	42.96	.99973	40	20	.1622	.1644	6.084	.98676	40
30	.0262	.0262	38.19	.99966	30	30	.1650	.1673	5.976	.98629	30
40	.0291	.0291	34.37	.99958	20	40	.1679	.1703	5.871	.98580	20
50	.0320	.0320	31.24	.99949	10	50	.1708	.1733	5.769	.98531	10
2	.0349	.0349	28.64	.99939	88	10	.1736	.1763	5.671	.98481	80
10	.0378	.0378	26.43	.99929	50	10	.1765	.1793	5.576	.98430	50
20	.0407	.0407	24.54	.99917	40	20	.1794	.1823	5.485	.98378	40
30	.0436	.0437	22.90	.99905	30	30	.1822	.1853	5.396	.98325	30
40	.0465	.0466	21.47	.99892	20	40	.1851	.1883	5.309	.98272	20
50	.0494	.0495	20.21	.99878	10	50	.1880	.1914	5.226	.98218	10
3	.0523	.0524	19.08	.99863	87	11	.1908	.1944	5.145	.98163	79
10	.0552	.0553	18.07	.99847	50	10	.1937	.1974	5.066	.98107	50
20	.0581	.0582	17.17	.99831	40	20	.1965	.2004	4.989	.98050	40
30	.0610	.0612	16.35	.99813	30	30	.1994	.2035	4.915	.97992	30
40	.0640	.0641	15.60	.99795	20	40	.2022	.2065	4.843	.97934	20
50	.0669	.0670	14.92	.99776	10	50	.2051	.2095	4.773	.97875	10
4	.0698	.0699	14.30	.99756	86	12	.2079	.2126	4.705	.97815	78
10	.0727	.0729	13.73	.99736	50	10	.2108	.2156	4.638	.97754	50
20	.0756	.0758	13.20	.99714	40	20	.2136	.2186	4.574	.97692	40
30	.0785	.0787	12.71	.99692	30	30	.2164	.2217	4.511	.97630	30
40	.0814	.0816	12.25	.99668	20	40	.2193	.2247	4.449	.97566	20
50	.0843	.0846	11.83	.99644	10	50	.2221	.2278	4.390	.97502	10
5	.0872	.0875	11.43	.99619	85	13	.2250	.2309	4.331	.97437	77
10	.0901	.0904	11.06	.99594	50	10	.2278	.2339	4.275	.97371	50
20	.0929	.0934	10.71	.99567	40	20	.2306	.2370	4.219	.97304	40
30	.0958	.0963	10.39	.99540	30	30	.2334	.2401	4.165	.97237	30
40	.0987	.0992	10.08	.99511	20	40	.2363	.2432	4.113	.97169	20
50	.1016	.1022	9.788	.99482	10	50	.2391	.2462	4.061	.97100	10
6	.1045	.1051	9.514	.99452	84	14	.2419	.2493	4.011	.97030	76
10	.1074	.1080	9.255	.99421	50	10	.2447	.2524	3.962	.96959	50
20	.1103	.1110	9.010	.99390	40	20	.2476	.2555	3.914	.96887	40
30	.1132	.1139	8.777	.99357	30	30	.2504	.2586	3.867	.96815	30
40	.1161	.1169	8.556	.99324	20	40	.2532	.2617	3.821	.96742	20
50	.1190	.1198	8.345	.99290	10	50	.2560	.2648	3.776	.96667	10
7	.1219	.1228	8.144	.99255	83	15	.2588	.2679	3.732	.96593	75
10	.1248	.1257	7.953	.99219	50	10	.2616	.2711	3.689	.96517	50
20	.1276	.1287	7.770	.99182	40	20	.2644	.2742	3.647	.96440	40
30	.1305	.1317	7.596	.99144	30	30	.2672	.2773	3.606	.96363	30
40	.1334	.1346	7.429	.99106	20	40	.2700	.2805	3.566	.96285	20
50	.1363	.1376	7.269	.99067	10	50	.2728	.2836	3.526	.96206	10
					82						74
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.	
o/					
16	.2756	.2867	3.487	.96126	74
10	.2784	.2899	3.450	.96046	50
20	.2812	.2931	3.412	.95964	40
30	.2840	.2962	3.376	.95882	30
40	.2868	.2994	3.340	.95799	20
50	.2896	.3026	3.305	.95715	10
17	.2924	.3057	3.271	.95615	73
10	.2952	.3089	3.237	.95545	50
20	.2979	.3121	3.204	.95459	40
30	.3007	.3153	3.172	.95372	30
40	.3035	.3185	3.140	.95284	20
50	.3062	.3217	3.108	.95195	10
18	.3090	.3249	3.078	.95106	72
10	.3118	.3281	3.048	.95015	50
20	.3145	.3314	3.018	.94924	40
30	.3173	.3346	2.989	.94832	30
40	.3201	.3378	2.960	.94740	20
50	.3228	.3411	2.932	.94646	10
19	.3256	.3443	2.904	.94552	71
10	.3283	.3476	2.877	.94457	50
20	.3311	.3508	2.850	.94361	40
30	.3338	.3541	2.824	.94264	30
40	.3365	.3574	2.798	.94167	20
50	.3393	.3607	2.773	.94068	10
20	.3420	.3640	2.747	.93969	70
10	.3448	.3673	2.723	.93869	50
20	.3475	.3706	2.669	.93769	40
30	.3502	.3739	2.675	.93667	30
40	.3529	.3772	2.651	.93565	20
50	.3557	.3805	2.628	.93462	10
21	.3584	.3839	2.605	.93358	69
10	.3611	.3872	2.583	.93253	50
20	.3638	.3906	2.560	.93148	40
30	.3665	.3939	2.539	.93042	30
40	.3692	.3973	2.517	.92935	20
50	.3719	.4006	2.496	.92827	10
22	.3746	.4040	2.475	.92718	68
10	.3773	.4074	2.455	.92609	50
20	.3800	.4108	2.434	.92499	40
30	.3827	.4142	2.414	.92388	30
40	.3854	.4176	2.394	.92276	20
50	.3881	.4210	2.375	.92164	10
23	.3907	.4245	2.356	.92050	67
10	.3934	.4279	2.337	.91936	50
20	.3961	.4314	2.318	.91822	40
30	.3987	.4348	2.300	.91706	30
40	.4014	.4383	2.282	.91590	20
50	.4041	.4417	2.264	.91472	10
					66
	Cosin.	Cotg.	Tan.	Sine.	Angle.

Angle	Sine.	Tan.	Cotg.	Cosin.	
o/					
24	.4067	.4452	2.246	.91355	66
10	.4094	.4487	2.229	.91236	50
20	.4120	.4522	2.211	.91116	40
30	.4147	.4557	2.194	.90996	30
40	.4173	.4592	2.177	.90875	20
50	.4200	.4628	2.161	.90753	10
25	.4226	.4663	2.145	.90631	65
10	.4253	.4699	2.128	.90507	50
20	.4279	.4734	2.112	.90383	40
30	.4305	.4770	2.097	.90259	30
40	.4331	.4806	2.081	.90133	20
50	.4358	.4841	2.066	.90007	10
26	.4384	.4877	2.050	.89879	64
10	.4410	.4913	2.035	.89752	50
20	.4436	.4950	2.020	.89623	40
30	.4462	.4986	2.006	.89493	30
40	.4488	.5022	1.991	.89363	20
50	.4514	.5059	1.977	.89232	10
27	.4540	.5095	1.963	.89101	63
10	.4566	.5132	1.949	.88968	50
20	.4592	.5169	1.935	.88835	40
30	.4617	.5206	1.921	.88701	30
40	.4643	.5243	1.907	.88566	20
50	.4669	.5280	1.894	.88431	10
28	.4695	.5317	1.881	.88295	62
10	.4720	.5354	1.868	.88158	50
20	.4746	.5392	1.855	.88020	40
30	.4772	.5430	1.842	.87882	30
40	.4797	.5467	1.829	.87743	20
50	.4823	.5505	1.816	.87603	10
29	.4848	.5543	1.804	.87462	61
10	.4874	.5581	1.792	.87321	50
20	.4899	.5619	1.780	.87178	40
30	.4924	.5658	1.767	.87036	30
40	.4950	.5696	1.756	.86892	20
50	.4975	.5735	1.744	.86748	10
30	.5000	.5774	1.732	.86603	60
10	.5025	.5812	1.720	.86457	50
20	.5050	.5851	1.709	.86310	40
30	.5075	.5890	1.698	.86163	30
40	.5100	.5930	1.686	.86015	20
50	.5125	.5969	1.675	.85866	10
31	.5150	.6009	1.664	.85717	59
10	.5175	.6048	1.653	.85567	50
20	.5200	.6088	1.643	.85416	40
30	.5225	.6128	1.632	.85264	30
40	.5250	.6168	1.621	.85112	20
50	.5275	.6208	1.611	.84959	10
					58
	Cosin.	Cotg.	Tan.	Sine.	Angle.

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.	
° /					
32	.5299	.6249	1.600	.84805	58
10	.5324	.6289	1.590	.84650	50
20	.5348	.6330	1.580	.84495	40
30	.5373	.6371	1.570	.84339	30
40	.5398	.6412	1.560	.84182	20
50	.5422	.6453	1.550	.84025	10
33	.5446	.6494	1.540	.83867	57
10	.5471	.6536	1.530	.83708	50
20	.5495	.6577	1.520	.83549	40
30	.5519	.6619	1.511	.83389	30
40	.5544	.6661	1.501	.83228	20
50	.5568	.6703	1.492	.83066	10
34	.5592	.6745	1.483	.82904	56
10	.5616	.6787	1.473	.82741	50
20	.5640	.6830	1.464	.82577	40
30	.5664	.6873	1.455	.82413	30
40	.5688	.6916	1.446	.82248	20
50	.5712	.6959	1.437	.82082	10
35	.5736	.7002	1.428	.81915	55
10	.5760	.7046	1.419	.81748	50
20	.5783	.7089	1.411	.81580	40
30	.5807	.7133	1.402	.81412	30
40	.5831	.7177	1.393	.81242	20
50	.5854	.7221	1.385	.81072	10
36	.5878	.7265	1.376	.80902	54
10	.5901	.7310	1.368	.80730	50
20	.5925	.7355	1.360	.80558	40
30	.5948	.7400	1.351	.80386	30
40	.5972	.7445	1.343	.80212	20
50	.5995	.7490	1.335	.80038	10
37	.6018	.7536	1.327	.79864	53
10	.6041	.7581	1.319	.79688	50
20	.6065	.7627	1.311	.79512	40
30	.6088	.7673	1.303	.79335	30
40	.6111	.7720	1.295	.79158	20
50	.6134	.7766	1.288	.78980	10
38	.6157	.7813	1.280	.78801	52
10	.6180	.7860	1.272	.78622	50
20	.6202	.7907	1.265	.78442	40
30	.6225	.7954	1.257	.78261	30
40	.6248	.8002	1.250	.78079	20
50	.6271	.8050	1.242	.77897	10
39	.6293	.8098	1.235	.77715	51
10	.6316	.8146	1.228	.77531	50
20	.6338	.8195	1.220	.77347	40
30	.6361	.8243	1.213	.77162	30
40	.6383	.8292	1.206	.76977	20
50	.6406	.8342	1.199	.76791	10
40	.6428	.8391	1.192	.76604	50
10	.6450	.8441	1.185	.76417	50
20	.6472	.8491	1.178	.76229	40
30	.6494	.8541	1.171	.76041	30
40	.6517	.8591	1.164	.75851	20
50	.6539	.8642	1.157	.75661	10
41	.6561	.8693	1.150	.75471	49
10	.6583	.8744	1.144	.75280	50
20	.6604	.8796	1.137	.75088	40
30	.6626	.8847	1.130	.74896	30
40	.6648	.8899	1.124	.74703	20
50	.6670	.8952	1.117	.74509	10
42	.6691	.9004	1.111	.74314	48
10	.6713	.9057	1.104	.74120	50
20	.6734	.9110	1.098	.73924	40
30	.6756	.9163	1.091	.73728	30
40	.6777	.9217	1.085	.73531	20
50	.6799	.9271	1.079	.73333	10
43	.6820	.9325	1.072	.73135	47
10	.6841	.9380	1.066	.72937	50
20	.6862	.9435	1.060	.72737	40
30	.6884	.9490	1.054	.72537	30
40	.6905	.9545	1.048	.72337	20
50	.6926	.9601	1.042	.72136	10
44	.6947	.9657	1.036	.71934	46
10	.6967	.6713	1.030	.71732	50
20	.6988	.9770	1.024	.71529	40
30	.7009	.9827	1.018	.71325	30
40	.7030	.9884	1.012	.71121	20
50	.7050	.9942	1.006	.70916	10
	.7071	1.	1.	.70711	45
					°
	Cosin.	Cotg.	Tan.	Sine.	Angle.
	Cosin.	Cotg.	Tan.	Sine.	Angle.

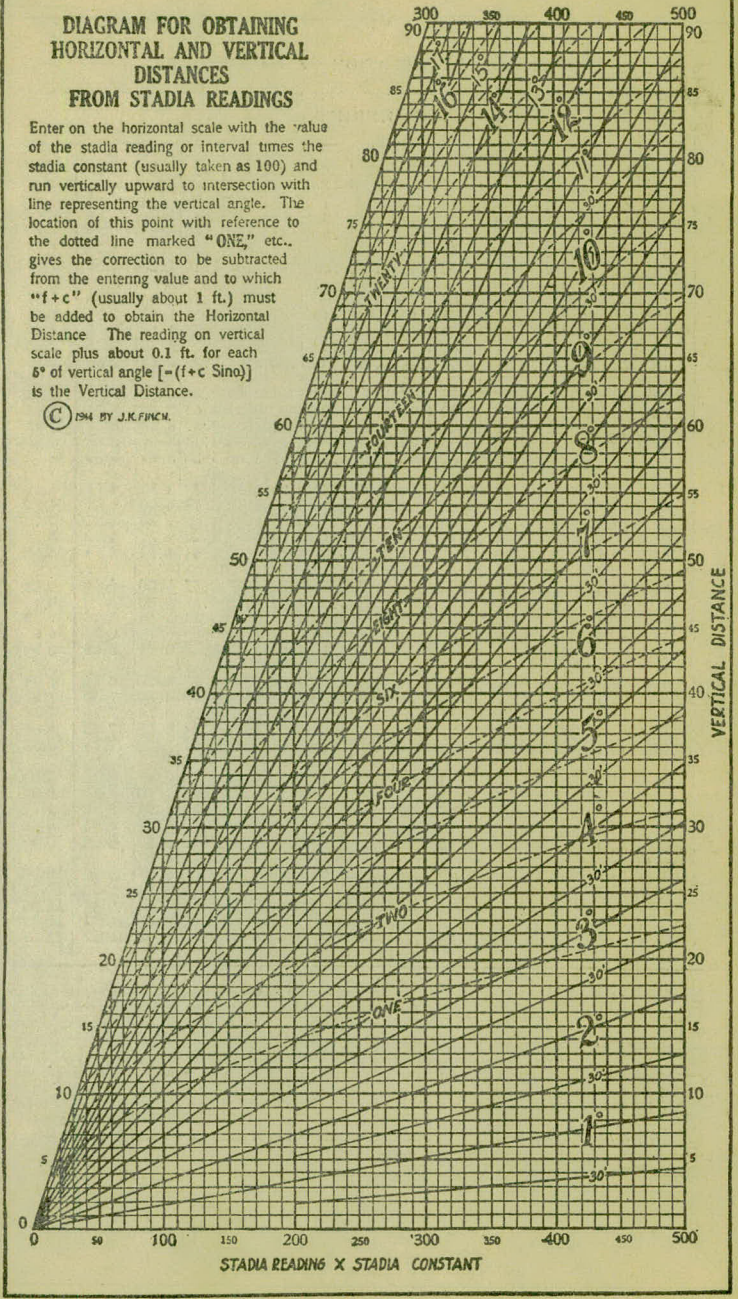
Table IX.—Calculation of Earthwork.

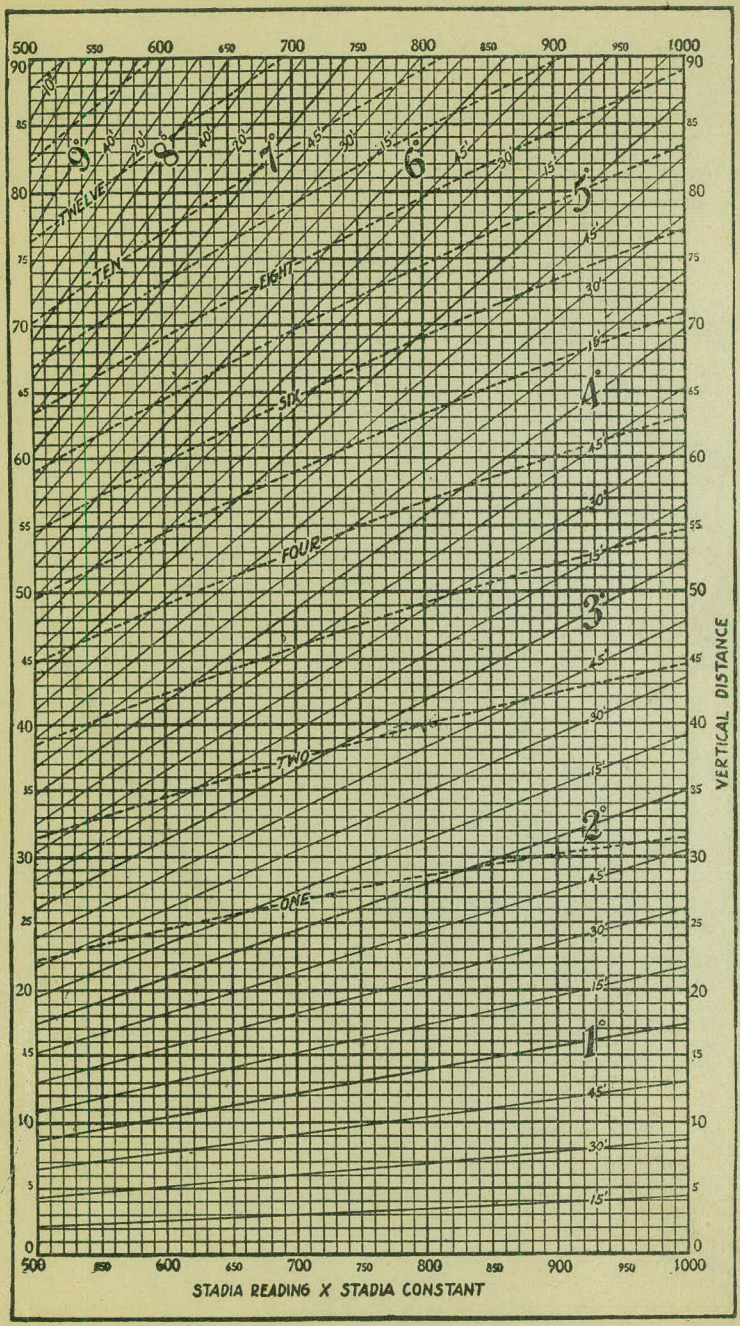
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.15	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.83
22	.41	.81	1.22	1.63	2.04	2.44	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11
23	.43	.85	1.28	1.70	2.13	2.56	2.98	3.41	3.83	4.26	4.68	5.11	5.54	5.96	6.39
24	.44	.89	1.33	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67
25	.46	.92	1.39	1.85	2.31	2.78	3.24	3.70	4.17	4.63	5.09	5.56	6.02	6.48	6.94
26	.48	.96	1.44	1.92	2.41	2.89	3.37	3.85	4.33	4.82	5.30	5.78	6.26	6.74	7.24
27	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
28	.52	1.04	1.55	2.07	2.59	3.11	3.63	4.15	4.67	5.18	5.70	6.22	6.74	7.26	7.78
29	.54	1.07	1.61	2.15	2.68	3.22	3.76	4.30	4.83	5.37	5.91	6.44	6.98	7.52	8.06
30	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	5.55	6.11	6.67	7.22	7.78	8.33
31	.57	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.32	6.89	7.46	8.04	8.61
32	.59	1.18	1.78	2.37	2.96	3.56	4.15	4.74	5.33	5.92	6.52	7.11	7.70	8.30	8.89
33	.61	1.22	1.83	2.44	3.05	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.17
34	.63	1.26	1.89	2.52	3.15	3.78	4.40	5.04	5.67	6.29	6.95	7.56	8.18	8.81	9.44
35	.65	1.30	1.94	2.59	3.24	3.89	4.53	5.18	5.83	6.48	7.13	7.78	8.42	9.08	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.11	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.15	8.89	9.63	10.37	11.11

Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering the heights from 1 to 9 as tenths. Thus if w =16.2 and h =5.3, cu. yds. =1.48+.028+.089 =1.597 cu. yds. or practically 160 cu. yds. per 100 ft. If w exceeds 40 ft., use one half and multiply result by 2, if both w and h are large use one half of each and multiply result by 4. Any cross-section may be divided into triangles by the following rule. To the triangle of the sum of the outside cuts (or fills) =h, and ½ the roadbed =w, add the triangles formed by taking the distance out to each break in turn (=w's) by the difference between the cuts (or fills) on each side of it (=h's) always subtracting the outer from the inner.

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the correction to be subtracted from the entering value and to which "f + c" (usually about 1 ft.) must be added to obtain the Horizontal Distance. The reading on vertical scale plus about 0.1 ft. for each 5° of vertical angle [= (f + c Sino)] is the Vertical Distance.




500 550 600 650 700 750 800 850 900 950 1000
90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0
9° 40' 20'
8° 40' 20'
7° 45' 30' 15'
6° 45' 30' 15'
5° 45' 30' 15'
4° 45' 30' 15'
3° 45' 30' 15'
2° 45' 30' 15'
1° 45' 30' 15'
TWELVE
TEN
EIGHT
SIX
FOUR
TWO
ONE
VERTICAL DISTANCE
STADIA READING X STADIA CONSTANT

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.

For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.1	9.2	9.4	0
1	9.5	9.7	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.9	1
2	11.0	11.2	11.3	11.5	11.6	11.8	11.9	12.1	12.2	12.4	2
3	12.5	12.7	12.8	13.0	13.1	13.3	13.4	13.6	13.7	13.9	3
4	14.0	14.2	14.3	14.5	14.6	14.8	14.9	15.1	15.2	15.4	4
5	15.5	15.7	15.8	16.0	16.1	16.3	16.4	16.6	16.7	16.9	5
6	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.1	18.2	18.4	6
7	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.9	7
8	20.0	20.2	20.3	20.5	20.6	20.8	20.9	21.1	21.2	21.4	8
9	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.6	22.7	22.9	9
10	23.0	23.2	23.3	23.5	23.6	23.8	23.9	24.1	24.2	24.4	10
11	24.5	24.7	24.8	25.0	25.1	25.3	25.4	25.6	25.7	25.9	11
12	26.0	25.2	26.3	26.5	26.6	26.8	26.9	27.1	27.2	27.4	12
13	27.5	27.7	27.8	28.0	28.1	28.3	28.4	28.6	28.7	28.9	13
14	29.0	29.2	29.3	29.5	29.6	29.8	29.9	30.1	30.2	30.4	14
15	30.5	30.7	30.8	31.0	31.1	31.3	31.4	31.6	31.7	31.9	15
16	32.0	32.2	32.3	32.5	32.6	32.8	32.9	33.1	33.2	33.4	16
17	33.5	33.7	33.8	34.0	34.1	34.3	34.4	34.6	34.7	34.9	17
18	35.0	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	18
19	36.5	36.7	36.8	37.0	37.1	37.3	37.4	37.6	37.7	37.9	19
20	38.0	38.2	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.4	20
21	39.5	39.7	39.8	40.0	40.1	40.3	40.4	40.6	40.7	40.9	21
22	41.0	41.2	41.3	41.5	41.6	41.8	41.9	42.1	42.2	42.4	22
23	42.5	42.7	42.8	43.0	43.1	43.3	43.4	43.6	43.7	43.9	23
24	44.0	44.2	44.3	44.5	44.6	44.8	44.9	45.1	45.2	45.4	24
25	45.5	45.7	45.8	46.0	46.1	46.3	46.4	46.6	46.7	46.9	25
26	47.0	47.2	47.3	47.5	47.6	47.8	47.9	48.1	48.2	48.4	26
27	48.5	48.7	48.8	49.0	49.1	49.3	49.4	49.6	49.7	49.9	27
28	50.0	50.2	50.3	50.5	50.6	50.8	50.9	51.1	51.2	51.4	28
29	51.5	51.7	51.8	52.0	52.1	52.3	52.4	52.6	52.7	52.9	29
30	53.0	53.2	53.3	53.5	53.6	53.8	53.9	54.1	54.2	54.4	30
31	54.5	54.7	54.8	55.0	55.1	55.3	55.4	55.6	55.7	55.9	31
32	56.0	56.2	56.3	56.5	56.6	56.8	56.9	57.1	57.2	57.4	32
33	57.5	57.7	57.8	58.0	58.1	58.3	58.4	58.6	58.7	58.9	33
34	59.0	59.2	59.3	59.5	59.6	59.8	59.9	60.1	60.2	60.4	34
35	60.5	60.7	60.8	61.0	61.1	61.3	61.4	61.6	61.7	61.9	35
36	62.0	62.2	62.3	62.5	62.6	62.8	62.9	63.1	63.2	63.4	36
37	63.5	63.7	63.8	64.0	64.1	64.3	64.4	64.6	64.7	64.9	37
38	65.0	65.2	65.3	65.5	65.6	65.8	65.9	66.1	66.2	66.4	38
39	66.5	66.7	66.8	67.0	67.1	67.3	67.4	67.6	67.7	67.9	39
40	68.0	68.2	68.3	68.5	68.6	68.8	68.9	69.1	69.2	69.4	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 41.9. For same slopes but other widths of roadbed correct above figures by one-half difference in width of roadbed; thus in example above for 20 ft. roadbed distance will be 41.9 + (20—16) ÷ 2 or 2 ft. added to 41.9 = 43.9. For slopes of 1 on 1 see inside of front cover.

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