

CONSTRUCTION NOTES

"11" 24-52

Lake DeMontreville.

ENGINEERS'
FIELD BOOK

No. 10403

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and
SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

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 $30.6 + (20 - 16) \div 2$ or 2 ft. added to $30.6 = 32.6$. For slopes of 1 on $1\frac{1}{2}$ see inside of back cover.

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W. H. Cook

120 - 339

54.50 - 7.1

$$32 + 50 = 33.05$$

$$33 + 00 = 33.30$$

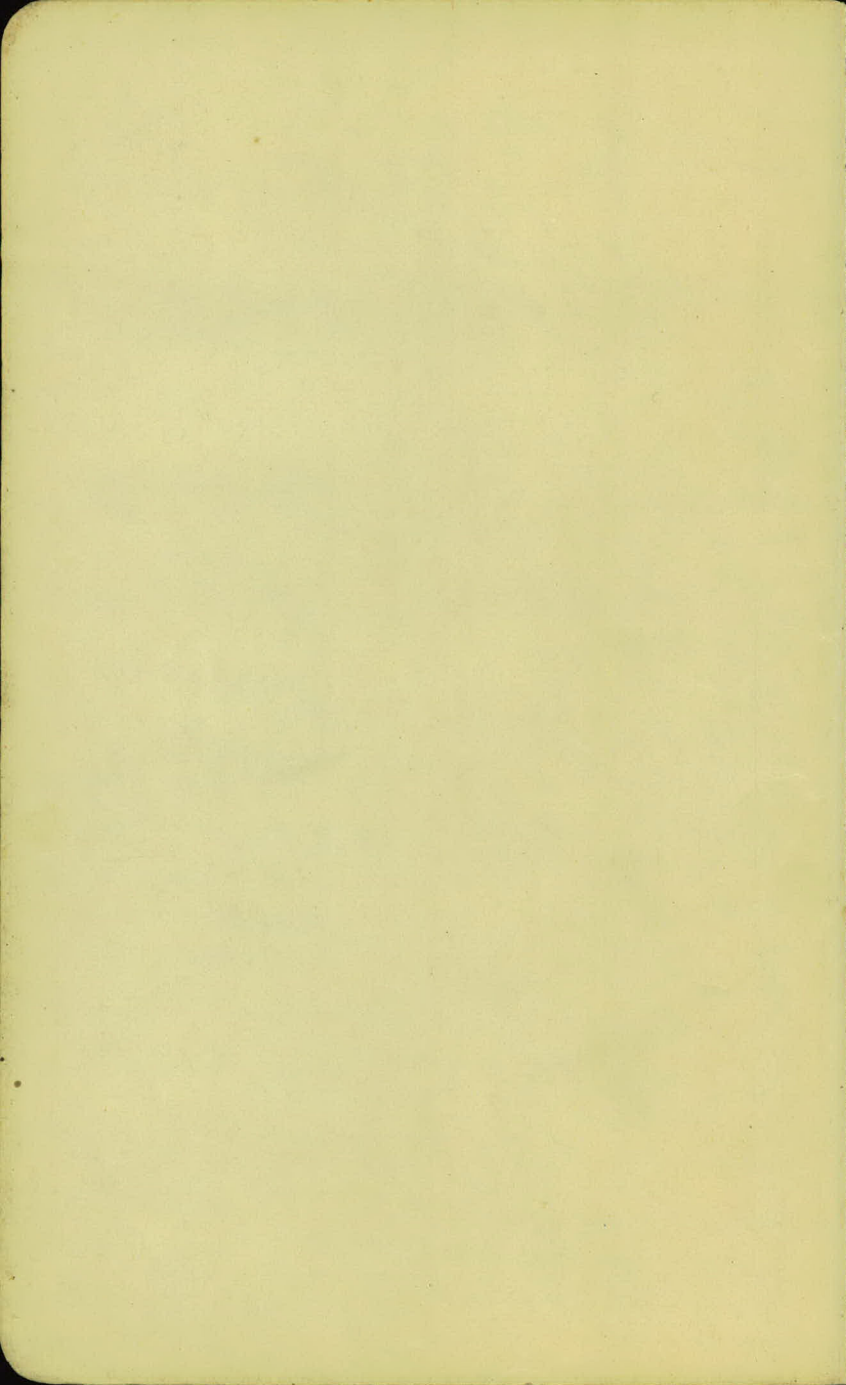
$$+ 60 = 34.00$$

$$34 + 00 = 34.80$$

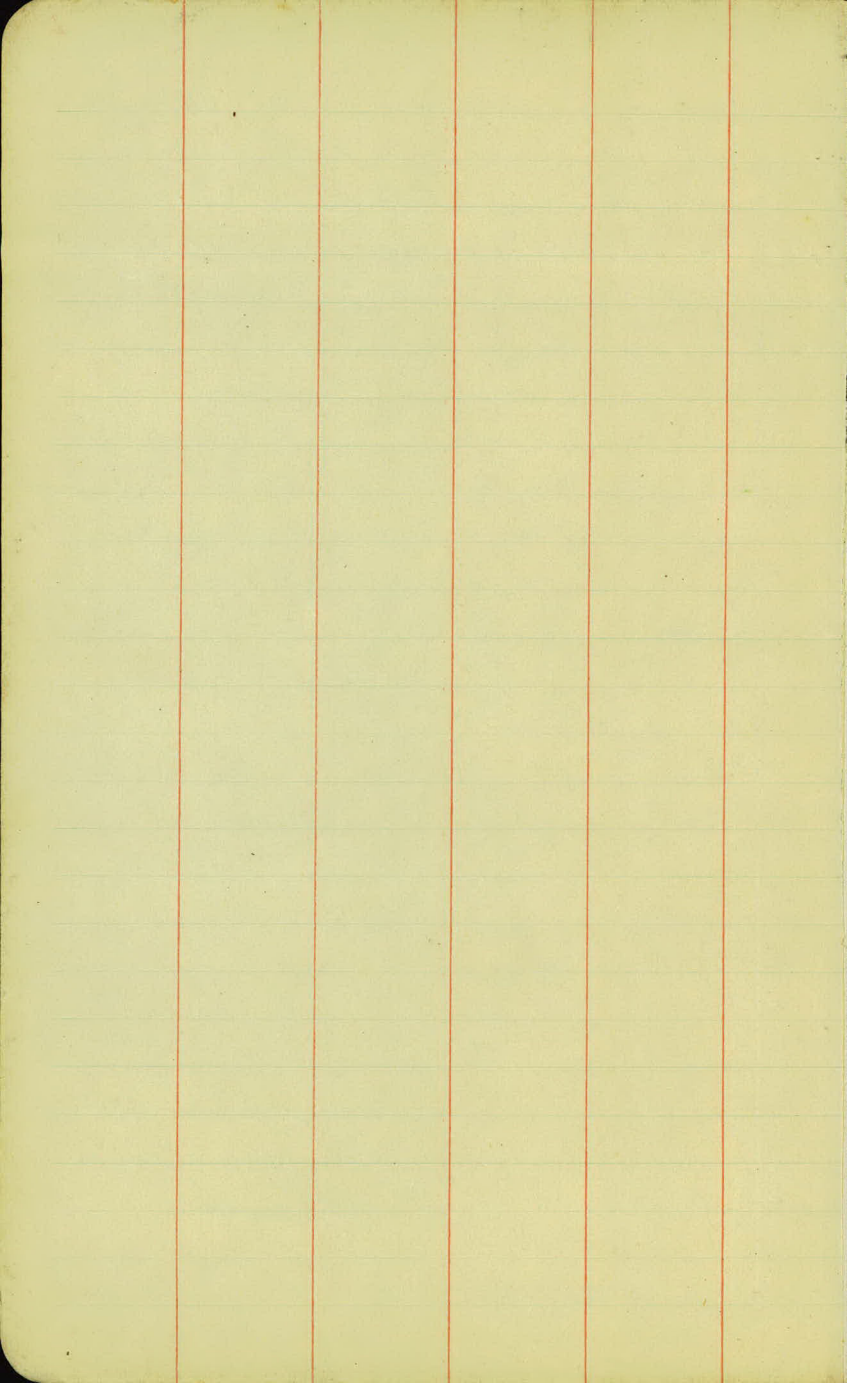
$$+ 50 = 36.00$$

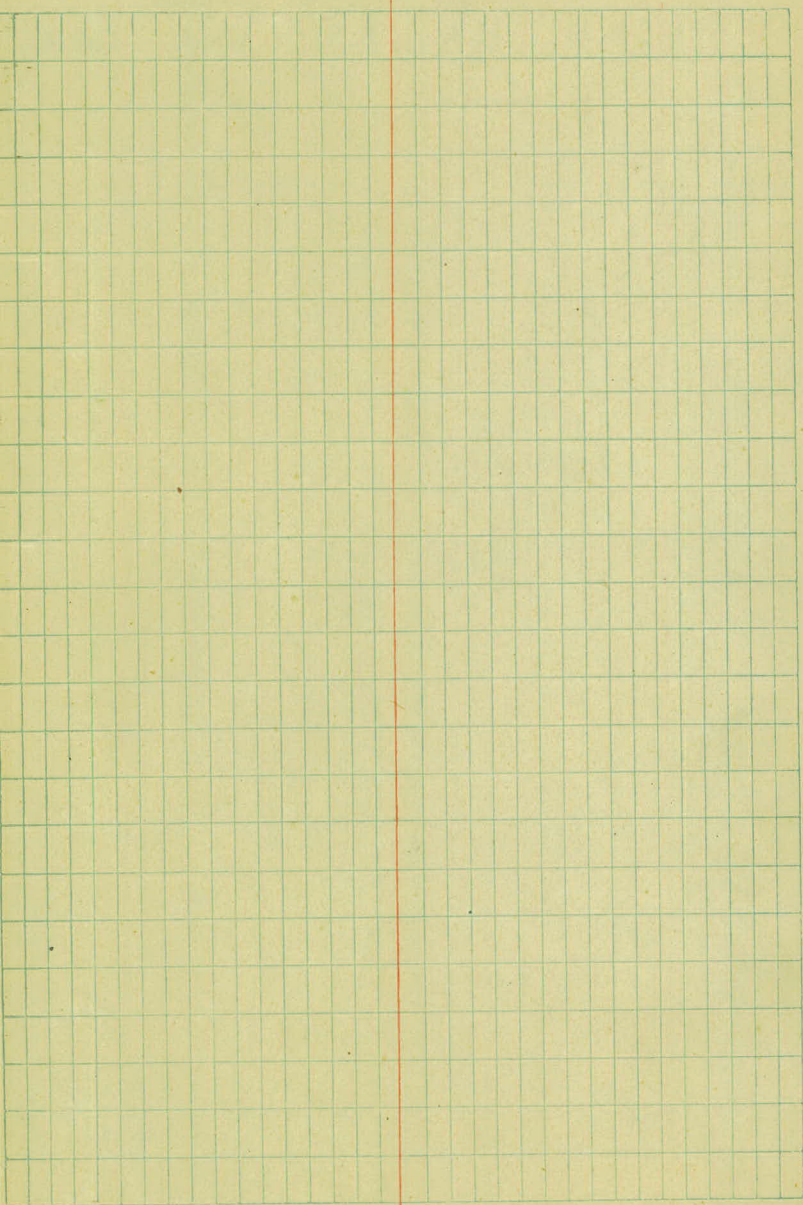
$$35 + 00 = 37.80$$

$$+ 50 = 39.80$$



Sta. to Sta.	Description	Page to Page
0+00 200+91	Original X sections	3 38
0+00 200+85 ⁴	Alignment	65 73
0+00 164	Check Levels	76 98
172+00 176+52 ²³ 176+30 ²	Original X-sections.	39





Original..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	5.60	996.77.		991.17	
0+00				991.4	5.4.
+28				91.4	5.4.
+35				91.4	5.4.
+50				91.4	5.4.
1+00				91.3	5.5.
+39				91.3	5.5.
2+00				91.2	5.6.
3+00				90.9	5.7.
4+00				90.6	6.2.
T.P.	3.97	994.80.	5.94	990.83	
5+00				90.4	4.4.
6+00				90.4	4.2.
T.P.	5.11	995.97.	3.94	990.86	
7+00				91.2	4.8.

Inst. C.T.G.M.S....

Rod. P.A.S.V.G.A.

Chain. Mahoney

3

Left

CL

Right

SP. in T.P. #23 N.W. Cor. of Co. Rd. C.												91.0	
33/5.4	32/5.2	5.2	15/5.3	33/5.3									
/00	/10.2	+0.2	+0.1	+0.1									
33/7.0	30/6.7	32/6.9	6.3	15/6.9	25/7.2	33/7.1							90.5
-1.6	-1.3	-1.5	-0.9	-1.5	-1.8	-1.7							
33/5.7	31/5.7	29/6.6	13/4.4	6.1	9/6.5	20/6.9	13.7	33/3.4					90.7
/00	-0.3	-1.2	-1.2	-0.7	-1.4	-1.5	+1.7	+2.0					
33/5.1													
+0.3													
5.0	30/6.3	19/6.4	15/6.0	5/5.7	6.0	9/6.6	12.9	21/3.2	22/3.2	33/2.6			90.8
0.4	-0.9	-1.0	-0.6	-0.3	-0.6	-1.2	-1.5	+2.2	+2.2	+2.2	+2.8		
2.6	2.6	6.50	4/4.9	7/4.4	4.9	5/5.5	4/5.7	18/2.7	24/2.0	11.9	22.09		
+2.9	+2.9	+0.5	+0.0	+1.1	+0.6	+0.0	-0.2	+2.8	+3.5	+2.6	+3.5		
33/1.5													
+4.0													
1.5	6/4.3	13/3.8	14/4.0	7/3.9	+1	6/4.3	10/4.3	21/2.5	33/2.3				92.1
+4.0	+1.2	+1.7	+1.5	+1.6	+1.4	+1.2	+1.0	+3.0	+3.2				91.4
33/3.3													
+2.3	+2.3	+2.3											
5.1	5/5.1	14/4.7	14/4.7	6/4.3	4.6	5/4.5	17/5.3	22/4.9	33/4.4				92.2
+0.5	+0.5	+1.2	+0.9	+1.6	+1.0	+1.1	+0.3	+0.7	+1.2				
33/4.7													
+0.8													
6.7	7/6.7	17/5.9	12/4.0	7/5.8	6.1	5/6.0	13/7.1	0/2.0	22/3.9	23/5.6	5.6		90.9
0.5	-1.2	0.0	-0.1	+0.1	-0.2	-0.1	-1.2	-1.1	0.0	+0.3	+0.3		
33/7.2													
-1.0													
8/8.7	21/8.3	18/8.4	14/6.1	7/6.3	6.5	9/6.7	5/7.5	9/7.9	11/5.1	13/7.5	17/7.4		90.3
+2.5	+2.1	-1.2	+0.1	-0.1	-0.3	-0.5	-1.3	-1.5	-1.9	-1.3	-1.2		
7.2	8/6.3	15/4.6	5/4.8	7/4.4	4.4	3/4.8	9/6.4	10/6.5	33/6.2				90.1
-2.8	-1.9	-0.2	-0.4	0.0	-0.3	-0.4	-2.3	-2.1	-1.8				
33/5.2													
-4.0													
33/8.1	19/7.8	15/4.9	7/4.0	4.9	3/5.2	6/6.3	10/6.9	13/6.8					29.7
-3.3	-5.0	-0.7	-0.4	-0.7	-1.0	-2.1	-2.7	-2.6					
9.3	8.0	16/8.1	13/6.4	5/5.7	5.9	2/5.7	6/5.2	10/7.3	33/9.3				90.1
-4.5	-3.2	+3.3	-1.2	-0.9	-1.1	-0.9	-3.4	-4.4	-4.3				

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		995.97			
+25				991.3	4.7.
+40				91.4	4.6.
+82				91.3	4.7. -
8+00				91.2	4.8.
+27				91.0	5.0.
+50				90.7	5.3.
B.M.	7.54	997.94.	5.54	990.41	990.38
9+00				89.8	8.1.
10				88.2	9.7.
+70				87.7	10.2.
11				87.4	10.3.
+60				87.5	10.4.
12				87.5	10.4.

Inst. Grane
 Rod. Parsons
 Chain. Marston

4

Left

CL

Right

33/9.5 -4.8	17/9.1 -4.4	15/8.4 -3.7	10/5.5 -0.8	5.7 -1.0	3/5.7 -1.0	9/8.1 -3.7	17/8.7 -4.0	27/6.3 -1.4	33/5.3 -0.6	90.3	
33/9.0 -4.4	27/9.0 -4.4	15/8.8 -4.2	11/5.4 -1.0	5.4 -0.8	4/5.7 -0.8	11/5.7 -1.1	18/5.2 -0.6	33/5.0 -0.4	90.6		
33/7.8 -3.1	28/7.0 -1.3	17/5.3 -0.6	12/4.9 -0.2	4.8 -0.1	4/4.6 +0.1	20/4.7 +0.0	33/4.8 -0.1	91.2			
33/5.7 -0.9											
5.4 -0.6	33/5.8 -1.0	15/5.9 -1.1	16/5.3 -0.5	7/4.4 +0.4	4.4 +0.4	6/5.0 -0.2	16/5.7 -0.9	18/6.6 -0.8	25/4.0 -1.2	33/7.6 -2.8	91.6
	33/5.8 -0.8	24/5.0 +0.0	13/5.4 -0.4	5.3 -0.3	5/5.3 -0.3	8/6.3 -1.3	23/8.7 -3.7	33/8.8 -3.8	90.7		
								33/9.0 -3.7			
5.0 +0.3	30/3.7 -0.4	15/5.6 -0.3	3/5.0 -0.3	11/6.0 -0.7	6.2 -0.9	3/6.2 -0.9	7/7.8 -2.5	5/8.8 -3.5	15/9.0 -3.7	30/7.0 -3.3	89.8
Spk in Cor. of Sign Board 50 ft. Sta. 10 + 90.											
14.0 -2.9	11/10.8 -2.7	12/10.5 -2.2	13/9.7 -1.6	11/9.5 -1.4	9.4 -1.3	4/9.7 -1.4	6/10.5 -2.4	10/11.0 -2.9	11/11.0 -2.9	33/10.9 -2.8	88.5
12.1 -2.4	5/11.2 -1.5	4/10.7 -1.1	11/9.4 +0.3	9/9.8 -0.1	9.9 -0.2	4/9.9 -0.2	8/11.5 -1.4	3/11.4 -1.7	33/11.5 -1.8	88.0	
3/10.3 -0.1	15/10.1 +0.1	13/9.7 +0.5	9/9.0 +1.2	11/9.2 +1.0	9.1 +1.1	7/9.1 +1.1	11/9.4 +0.6	19/10.5 -0.3	24/10.7 -0.5	33/9.8 +0.4	88.2
3/7.3 +1.0	7/7.6 +0.7	8/7.5 +0.8	15/8.7 +1.6	8/8.4 +1.7	8.5 +1.8	10/8.5 +1.8	10/10.2 +0.1	8/9.7 +0.6	13/7.5 +3.0	89.4	
5.2 +3.0	7/10.0 +0.4	10/10.2 +0.2	16/10.4 +0.0	9/7.5 +2.9	7.5 +3.1	11/7.8 +2.6	10/9.6 +0.8	24/9.5 +1.1	15/12.4 +8.0	4/12.4 +8.0	90.6
5/5.3 +5.1	7/7.2 +1.2	13/9.1 +1.3	11/8.5 +1.6	6/7.6 +2.8	2.6 +2.8	12/7.7 +2.7	20/9.3 +1.1	11/9.5 +1.1	16/9.7 +0.7	13/10.0 +4.4	90.3

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		997.94			
+32				87.5	10.4
13				87.4	10.5
14				87.3	10.6
T.P.	4.64	991.73	10.85	987.09	
15				87.2	4.5
16				87.1	4.4
17				86.5	5.2
+60				85.7	6.0
18				85.0	6.7
19				83.4	8.3
T.P.	4.37	987.37	8.75	982.98	
20				82.7	4.7
21				82.7	4.7
R.M.	4.42	989.24	1.57	984.80	984.82
22				83.4	5.4

Inst. *C. & G. Co.*
 Rod. *Red. S. & S.*
 Chain. *Mahoney*

C.L

Right

$\frac{33}{70.1} / \frac{10.3}{70.1}$	$\frac{32}{70.3} / \frac{10.1}{70.3}$	$\frac{11}{70.9} / \frac{9.5}{70.9}$	$\frac{5}{71.8} / \frac{8.6}{71.8}$	$\frac{8.6}{71.8}$	$\frac{12}{71.8} / \frac{8.0}{71.8}$	$\frac{10}{70.6} / \frac{9.8}{70.6}$	$\frac{33}{70.8} / \frac{9.6}{70.8}$	89.2	
$\frac{33}{-1.9} / \frac{12.4}{11.1}$	$\frac{9}{-0.6} / \frac{11.1}{11.1}$	$\frac{9}{-0.7} / \frac{11.1}{11.1}$	$\frac{4}{+0.4} / \frac{10.1}{10.1}$	$\frac{9.8}{+0.7}$	$\frac{13}{+0.7} / \frac{9.8}{9.8}$	$\frac{10.5}{0.0} / \frac{10.5}{10.5}$	$\frac{9}{-0.1} / \frac{10.6}{10.6}$	88.1	
$\frac{35}{-2.4} / \frac{13.2}{12.4}$	$\frac{8}{-1.8} / \frac{12.4}{12.4}$	$\frac{9}{-1.5} / \frac{12.1}{12.1}$	$\frac{2}{-0.1} / \frac{10.7}{10.7}$	$\frac{10.3}{+0.3}$	$\frac{4}{+0.1} / \frac{10.5}{10.5}$	$\frac{6}{-0.4} / \frac{11.0}{11.0}$	$\frac{33}{-0.2} / \frac{10.8}{10.8}$	87.6	
$\frac{7.8}{-3.3} / \frac{17.1}{16.7}$	$\frac{10}{-2.2} / \frac{16.7}{16.7}$	$\frac{7}{-1.8} / \frac{16.3}{16.3}$	$\frac{3}{-0.3} / \frac{14.8}{14.8}$	$\frac{4.5}{0.0}$	$\frac{11}{+0.1} / \frac{14.7}{14.7}$	$\frac{9}{-0.9} / \frac{15.6}{15.6}$	$\frac{2}{-1.3} / \frac{15.8}{15.8}$	87.2	
$\frac{33}{-0.5} / \frac{5.1}{5.1}$	$\frac{20}{+0.2} / \frac{4.4}{4.4}$	$\frac{8}{+0.3} / \frac{4.3}{4.3}$	$\frac{4.5}{+0.1}$	$\frac{15}{+0.1} / \frac{4.5}{4.5}$	$\frac{9}{-0.7} / \frac{5.3}{5.3}$	$\frac{12}{+1.7} / \frac{6.9}{6.9}$	$\frac{33}{+1.1} / \frac{3.5}{3.5}$	87.2	
$\frac{30}{+0.6} / \frac{4.0}{4.0}$	$\frac{20}{+0.5} / \frac{4.7}{4.7}$	$\frac{10}{-0.1} / \frac{5.3}{5.3}$	$\frac{9}{-0.1} / \frac{5.3}{5.3}$	$\frac{6}{+0.3} / \frac{4.9}{4.9}$	$\frac{5.0}{+0.2}$	$\frac{12}{+0.1} / \frac{5.1}{5.1}$	$\frac{10}{-0.6} / \frac{5.8}{5.8}$	86.7	
$\frac{33}{-0.4} / \frac{6.4}{6.4}$	$\frac{20}{+1.1} / \frac{4.9}{4.9}$	$\frac{17}{-0.7} / \frac{6.7}{6.7}$	$\frac{8}{-0.5} / \frac{6.5}{6.5}$	$\frac{5}{+0.1} / \frac{5.9}{5.9}$	$\frac{5.8}{+0.2}$	$\frac{14}{+0.1} / \frac{5.9}{5.9}$	$\frac{17}{-0.4} / \frac{6.4}{6.4}$	85.9	
$\frac{33}{-2.1} / \frac{7.8}{7.8}$	$\frac{9}{-0.9} / \frac{7.6}{7.6}$	$\frac{13}{-0.6} / \frac{7.3}{7.3}$	$\frac{8}{-1.3} / \frac{8.0}{8.0}$	$\frac{4}{-0.2} / \frac{6.9}{6.9}$	$\frac{6.9}{-0.2}$	$\frac{15}{-0.2} / \frac{6.9}{6.9}$	$\frac{9}{-0.7} / \frac{7.4}{7.4}$	84.8	
$\frac{33}{-5.0} / \frac{18.3}{18.3}$	$\frac{9}{-4.3} / \frac{12.0}{12.0}$	$\frac{11}{-3.7} / \frac{12.0}{12.0}$	$\frac{4}{-3.1} / \frac{11.4}{11.4}$	$\frac{9}{-1.1} / \frac{7.4}{7.4}$	$\frac{17}{-0.9} / \frac{9.2}{9.2}$	$\frac{8}{-0.7} / \frac{9.0}{9.0}$	$\frac{9}{-1.0} / \frac{9.3}{9.3}$	82.3	
$\frac{33}{-4.9} / \frac{9.0}{9.0}$	$\frac{10}{-4.7} / \frac{9.4}{9.4}$	$\frac{12}{-7.3} / \frac{9.0}{9.0}$	$\frac{6}{-3.7} / \frac{8.4}{8.4}$	$\frac{6.8}{-2.1} / \frac{8.8}{8.8}$	$\frac{3}{-0.9} / \frac{5.6}{5.6}$	$\frac{9}{-0.7} / \frac{5.4}{5.4}$	$\frac{8}{-0.7} / \frac{5.6}{5.6}$	80.6	
$\frac{30}{-4.8} / \frac{9.5}{9.5}$	$\frac{2}{-2.5} / \frac{9.2}{9.2}$	$\frac{10}{-3.7} / \frac{8.4}{8.4}$	$\frac{5}{-2.3} / \frac{7.0}{7.0}$	$\frac{5.2}{-0.5} / \frac{8.8}{8.8}$	$\frac{9}{-0.6} / \frac{5.3}{5.3}$	$\frac{8}{-1.1} / \frac{5.8}{5.8}$	$\frac{5}{-0.8} / \frac{5.5}{5.5}$	82.5	
$\frac{33}{-0.7} / \frac{6.5}{6.5}$	$\frac{23}{-0.5} / \frac{6.1}{6.1}$	5.0 ft in cut wood					at Sta. 2.2 + 0.0		
$\frac{1}{-0.9} / \frac{6.5}{6.5}$	$\frac{18}{-0.7} / \frac{6.3}{6.3}$	$\frac{9}{-0.8} / \frac{6.4}{6.4}$	$\frac{5}{0.0} / \frac{5.9}{5.9}$	$\frac{5.6}{0.0}$	$\frac{8}{+0.1} / \frac{5.5}{5.5}$	$\frac{9}{-0.3} / \frac{5.9}{5.9}$	$\frac{6}{+0.4} / \frac{5.2}{5.2}$	$\frac{5}{+0.2} / \frac{5.4}{5.4}$	83.6

(46)

Sta.	B. S.	Cross Sections			Gr. R.
		H. I.	F. S.	Grade	
		989.24.			
23				985.1	4.0.
+50				866.2	3.0.
24				877.7	1.8.
+17				877.83	1.4.
T.P.	11.34	997.85.	8.75	998.49.	
+74				877.3	10.4.
25				877.7	10.0.
+80				918	8.1.
26				92.3	7.4.
+50				93.4	6.5.
B.M.			5.09	994.74	997.75
27				97.4	5.3.
T.P.	8.61	1004.09.	4.37	995.48.	
28				96.8	7.3.
29				77.0	5.1.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		1004.09,			
+64				1000.4	3.7.
T.P.	5.20	1005.53,	3.74	1000.33,	
30				01.5	4.0.
+40				1002.4	2.9.
31				04.5	1.0.
T.P.	10.59	1014.47,	1.45	1003.88,	
32				07.8	4.7.
33				11.1	3.4.
T.P.	10.16	1023.37,	1.24	1013.21,	
34				14.4	2.0.
B.M.	4.68	1023.34,	4.68	1018.67,	1018.64,
+50				16.0	7.3.
35				17.3	6.0.
34				18.1	5.2.
+60				17.5	5.8.
37				16.5	6.8.

Inst.
 Rod.
 Chain.

Left			C L			Right			
33/9.7 -6.2	21/10.0 -6.3	13/9.0 -5.3	4/4.9 -1.2	4/6 -0.9	12/4.6 -0.9	8/4.8 -1.1	18/4.2 -0.5	3/3.8 -0.1	99.5
33/8.3 -4.5	28/8.0 -4.0								
21/11.2 -7.2	19/11.8 -7.8	13/10.4 -6.4	4/5.7 -1.7	5.4 -1.4	12/5.6 -1.4	10/6.1 -2.1	33/6.5 -2.5		00.1
21/5.7 -2.8	17/6.1 -3.2	11/5.5 -2.6	7/4.2 -1.3	4.3 -1.6	9/4.6 -1.7	13/5.3 -2.4	17/5.7 -3.0	11/6.7 -3.8	01.0
10.5 +0.5	9/1.3 -0.5	10/3.0 -2.0	5/2.3 -1.3	4/2.8 -1.8	2.7 -1.7	5/2.5 -1.5	17/2.9 -1.9	22/3.2 -2.6	02.8
10/5.0 +1.7	2/5.7 +1.0	17/5.9 +1.0	12/6.9 -0.2	5/4.7 0.0	3.9 -1.2	10/2.3 -0.6	10/7.2 -0.5	19/7.3 -0.7	06.1
10/2.3 +1.1	2/2.3 +1.1	15/2.6 +0.2	7/3.6 -0.2	3.4 -0.6	12/4.2 -0.8	17/4.0 -0.6	22/7.3 -0.9	29/4.8 -1.4	11.1
33/10.0 -1.0	9/9.5 -0.5	13/9.4 -0.4	5/9.5 -0.5	9.3 -0.8	10/10.1 -1.1	13/10.3 -1.5	18/10.9 -1.9	18/12.0 -3.6	13.6
Nail in P.P. Lt. Sta. 34 + 5.0									
33/6.4 +0.9	9/5.8 +1.5	10/6.3 +1.0	12/7.1 +0.2	5/8.1 -0.8	8.0 -0.7	12/8.2 -0.9	20/9.2 -1.9	19/10.3 -3.0	15.3
10.4 -0.4	2/11.8 +1.4	21/4.6 +1.1	13/4.9 +0.6	7/5.4 -0.1	4/6.1 -0.1	6/6.0 0.0	10/6.4 -0.4	18/6.0 0.0	17.2
33/5.4 -0.2	10/4.8 +0.4	10/4.7 +0.5	12/4.3 +0.9	6/4.6 +0.6	4.7 +0.5	14/4.5 +0.2	18/4.7 +0.7	11/4.5 +0.7	18.6
33/6.4 -0.4	10/4.8 +1.0	8/5.2 +0.6	5/4.8 +1.0	4.4 +0.4	8/4.1 +1.7	19/4.5 +1.3	21/3.6 +2.2	19/2.7 +3.1	18.9
33/9.1 +0.3	9/6.9 -0.1	13/6.2 +0.6	8/6.6 +0.2	5.9 +0.9	10/5.9 +0.9	11/4.5 +1.3	11/4.4 +1.7	30/3.1 +3.7	17.4

Sta.	B. S.	H. I.	Cross Sections		
			F. S.	Grade	Gr. R.
		1023.34.			
T.P.	3.72	1016.68.	10.38	1012.94.	
+60				14.4	2.1.
38				13.2	3.5.
T.P.	6.82	1013.77.	3.73	1012.95.	
+67				10.9	2.9.
39				09.4	4.2.
+66				07.2	6.4.
40				06.2	7.6.
+65				04.5	7.3.
41				04.0	9.8.
+64				03.5	10.3.
T.P.	4.75	1007.54.	10.94	1002.81.	
42				03.5	4.1.
43				03.4	4.2.
B.M.	3.00	1007.53 V	3.00	1004.56.	1004.53.

Inst.
 Rod.
 Chain.

Left

GL

Right

33/7.4
-5.3

18/5.1
-9.0

10/4.4
-2.3

5/3.9
-1.8

3.4
-1.5

11/3.1
-1.0

10/3.7
-1.6

22/2.0
+0.1

29/0.0
+2.1

30/10.4
+2.4

53/2.8
+0.7

53/70.0
+2.7

13.3

33/13.3
-9.8

6/11.5
-8.0

13/8.5
-5.0

7/6.5
-2.8

5.5
-2.0

16/5.5
-2.0

22/5.7
-2.2

23/4.7
-1.2

30/2.8
+0.5

11.2

Nail in T.P. Lt. Sta. 38 + 10.

26/11.8
-9.7

10/10.2
-7.3

12/9.3
-6.4

4/5.1
-2.2

4.6
-1.7

11/4.2
-1.3

21/4.7
-1.8

29/4.1
-1.2

33/3.3
-0.4

9.2

8.5

11/8.7
-4.5

11/9.0
-4.8

11/8.8
-4.4

5/6.3
-2.1

5.3
-1.1

9/4.9
-0.7

13/5.1
-0.9

18/5.2
-1.0

21/4.9
-0.7

8.5

3/6.3
+0.3

6/6.3
+0.6

10/6.3
+0.3

5/6.6
+0.0

4.0
+0.6

5.5
+1.2

12/5.4
+1.6

21/5.2
+2.8

24/6.0
+2.6

35/7.8
+1.2

7.8

35/4.3
+2.8

7/3.7
-2.7

11/3.8
+3.8

3/5.8
+1.8

5.7
+1.7

5.5
+2.2

10/5.4
+2.5

15/5.1
+1.9

21/5.7
+1.7

24/5.9
+1.4

7.9

3/12.1
+2.8

6/9.3
+0.0

10/8.3
+1.0

7/7.3
+2.0

7.1
+2.2

12/6.5
+2.8

8/6.9
+2.4

11/7.4
+1.9

17/7.8
+1.5

21/7.0
+3.3

6.7

8/15.0
-5.2

4/14.0
-4.2

2/9.8
+0.0

2.7
+1.1

11/8.3
+1.5

7/8.7
+1.1

9/8.9
+0.9

17/9.0
+0.8

21/7.8
+2.0

5.1

33/12.6
-2.3

16/12.5
-2.2

4/11.5
-1.2

11.7
-1.1

10/10.8
-0.5

14/10.7
-0.4

5/10.8
-0.5

21/11.4
-1.4

24/11.7
-1.4

2.4

33/6.0
-1.9

7/6.0
-1.7

4/5.1
-1.8

7/5.9
-1.8

5.5
-1.4

10/4.6
-0.5

3.5
-0.9

17/5.0
-0.9

19/5.0
-0.8

21/5.9
-1.2

24/6.1
-2.0

2.2

3/5.3
-1.1

9/4.8
-0.4

11/4.8
-0.6

6/5.8
-1.6

5.1
-0.9

10/4.7
-0.5

17/5.1
-0.9

19/5.1
-1.1

21/5.9
-1.7

33/4.7
-0.5

2.6

Nail in T.P. Lt. Sta. 43 + 35

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		1007.53.			
755				03.4	4.1
44				03.3	4.2 ✓
741				02.8	4.7 ✓
45				02.5 03.4	5.0 4.4
735				02.2	5.3 ✓
74				01.2 02.6	6.3 7.9
T.P.	2.74	1007.04	3.23	1004.30	
750				00.2 01.8	6.8 5.2
47				99.3 02.8	7.7 6.2
755				97.9 997.5	9.1 7.5
48				96.7 984	10.3 7.2
730				75.8 97.0	11.2 10.2
T.P.	0.51	996.88	10.67	996.37	
49				93.5 74.2	3.4 2.7

Inst.
Rod.
Chain.

Left			C.L.			Right					
10/5.8 -17.1	16.0 -17.9	8/6.1 -2.0	7/6.3 -2.2	4/4.0 -1.9	5.3 -1.1	10/4.8 -0.7	17/5.2 -1.1	8/5.2 -1.1	15/5.4 -1.3	3/5.5 -1.2	2.0
22/3.0 -3.5	5/7.7 -3.5	8/8.0 -3.9	4/7.5 -3.3	2/6.1 -1.9	5.5 -1.3	11/5.1 -0.9	9/5.1 -0.9	20/5.0 -0.8	33/4.7 -0.6		2.0
11.5	5/10.8	15/8.7	3/6.8	1/5.0	4.7	11/4.4	18/4.9	6/4.1	33/3.5		2.8
		5/1.4 -0.4		0.0				10/7.3 -0.7	9/4.4 -0.1	3/3.3 +1.0	2.5
10/12.8	10/12.2	15/11.4	4/9.4	1/5.2	4.9	10/4.0	17/4.2	25/3.7	82/3.6		2.6
	11.5 -0.7					+2.6	6.3		0/3.3 -0.3		
33/7.2 -3.3	9/5.4 -2.5	4/4.1 -2.2	10/3.5 -1.4	7/3.9 -1.0	3.7	10/3.5 -1.4	17/3.9 -1.0	9/3.5 -0.8	2.1 -0.8		3.8
		20/6.7 -0.1				+2.2	6.8		10/1.3 -0.5		
33/8.5 -3.3	12/5.3 -0.1	5/4.5 -0.7	4/4.6 -0.6	6/3.0 -0.2	4.6	6/3.0 -0.2	13/3.1 -0.1	3/2.1 -0.1	0.0 -0.2		2.4
	4.7 -0.2					+3.2	7.7		1/3.0 -0.4		
33/7.7 -3.5	9/7.2 -2.8	12/6.2 -0.0	5/5.3 -0.2	4/5 -0.6	4.5	9/4.3 -0.6	14/4.6 -0.6	8/3.2 -0.5	3/1.5 -0.4		2.5
	5/6.8 -0.2					+2.8	9.1		10/1.3 -0.5		
13/7.1 -2.0	9/6.6 -0.9	11/6.0 -0.5	10/5.5 -0.0	8/4.1 -0.4	4.3	6/3.0 -0.5	13/6.2 -0.7	17/6.0 -0.5	2/4.7 -0.4	11/4.3 -0.3	00.7
	4/7.0 -0.4					+2.1	10.3		12/1.7 -0.3		
33/9.5 -2.5	4/7.6 -0.7	12/7.1 -0.9	10/8.4 -0.1	8/7 -0.8	8.7	12/8.5 -0.5	14/9.5 -0.7	15/8.2 -0.6	19/6.6 -0.4	11/4.4 -0.3	98.8
	2/9.3 -0.4					+1.0	11.2		10/6.2 -0.5		
13/11.7 -2.7	10/7.7 -0.9	14/8.9 -0.1	11/11.0 -0.2	10.2	10.2	11/10.5 -0.5	11/11.4 -0.5	15/10.3 -0.3	16/6.2 -0.3	13/3.5 -0.5	96.8
						+2.1	10.3		10/1.7 -0.3		
33/9.5 -2.5	9/7.0 -0.4	10/5.0 -0.3	4/3 -0.6	11/4.6 -0.9	4.3	11/4.6 -0.9	13/5.3 -0.6	9/3.7 -0.7	10/1.1 -0.4		92.6
						+3.4			10/1.3 -0.1		

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		994.88			
T.P.	2.20	990.32	8.74	988.12	
50				897	0.6
				989.5	0.5
				85.6	4.7
51				86.0	7.5
B.M.	4.93	987.34	7.93	982.39	782.91
+45				84.5	3.0
				84.7	2.6
				83.1	4.2
52				83.5	1.8
				82.6	4.7
+50				82.7	4.6
T.P.	4.04	985.87	5.51	981.63	
53				82.3	3.4
54				81.7	4.2
55				81.1	4.8
T.P.	7.90	988.53	5.24	970.63	
56				80.5	8.0
+60				80.1	8.4
57				79.9	8.6

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		988.53			
+42				779.6	2.9 ✓
58				772	9.3 ✓
+50				78.7	7.8
T.P.	3.02	980.37 ✓	11.18	777.35 ✓	
59				782	2.2 ✓
60				771	3.3 ✓
61				76.0	4.4 ✓
P.M.	1.97	979.54 ✓	1.82	777.55 ✓	777.59
62				75.1	4.5 ✓
63				74.7	4.9 ✓
64				74.5	5.1 ✓
T.P.	5.52	979.34 ✓	5.74	773.82 ✓	
65				74.33	5.0 ✓
T.P.	3.40	978.65 ✓	4.09	775.25 ✓	
64				74.15	4.5 ✓
67				73.94	4.7 ✓

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		978.65 ✓			
68				973.72	4.9 ✓
69				73.58	5.1 ✓
70				73.1	5.4 ✓
T.P.	7.00	979.18 ✓	4.17	972.18 ✓	
+75				72.0	7.2 ✓
71				71.8	7.4 ✓
72				70.4	8.8 ✓
B.M.	0.40	973.99 ✓	5.57	973.01 ✓	973.59
73				69.0	5.0 ✓
74				67.74	4.0 ✓
+70				66.7	7.2 ✓
T.P.	3.80	971.55 ✓	6.24	969.75 ✓	
75				67.6	4.0 ✓
76				67.3	4.3 ✓
77				67.0	4.4 ✓

Inst. Acme
 Rod. Texas
 Chain. Nakano

Left	CL	Right	
$\begin{matrix} \times \\ 9/9.9 \\ 5/5.0 \end{matrix}$	$\begin{matrix} 4.9 \\ 2/9.1 \\ 7.7 \\ -3.0 \end{matrix}$	$\begin{matrix} 5/6.3 \\ 11/6.4 \\ 8/6.7 \\ -1.3 \end{matrix}$	70.8
$\begin{matrix} \times \\ 3/9.5 \\ 19/9.1 \\ -4.0 \end{matrix}$	$\begin{matrix} 5.1 \\ 5/9.0 \\ 7.0 \\ -1.9 \end{matrix}$	$\begin{matrix} 9/6.3 \\ 11/6.4 \\ 20/7.0 \\ 15/6.7 \\ -2.0 \end{matrix}$	71.7
$\begin{matrix} \times \\ 3/6.3 \\ 4/6.4 \\ -1.2 \end{matrix}$	$\begin{matrix} 5.6 \\ 6.2 \\ -0.6 \end{matrix}$	$\begin{matrix} 11/6.3 \\ 5/7.4 \\ -1.4 \end{matrix}$	72.5
$\begin{matrix} 25 \\ 20/5.2 \\ 15/2.5 \\ 13/9.7 \\ 10/7.5 \\ 6.8 \end{matrix}$	$\begin{matrix} 7.2 \\ 17/8.1 \\ 8.8 \end{matrix}$	$\begin{matrix} 2/8.6 \\ 2/8.8 \\ 3/6.5 \\ 3/6.4 \end{matrix}$	72.4
$\begin{matrix} 30/10 \\ 2/4.3 \\ 7.1 \end{matrix}$	$\begin{matrix} 7.4 \\ 10/7.3 \\ 11.2 \end{matrix}$	$\begin{matrix} 24/8.5 \\ 27/9.1 \\ 2/6.7 \end{matrix}$	72.0
$\begin{matrix} 2/10.4 \\ 2/11.4 \\ 20/11.4 \end{matrix}$	$\begin{matrix} 8.8 \\ 12/9.4 \\ -0.4 \end{matrix}$	$\begin{matrix} 9/9.7 \\ 11/10.6 \\ 9/9.4 \\ -0.6 \end{matrix}$	70.0
$\begin{matrix} 23 \\ 8/9.2 \\ 17/5.8 \\ 15/5.0 \end{matrix}$	$\begin{matrix} 5.0 \\ 5.8 \\ -0.8 \end{matrix}$	$\begin{matrix} 4/6.2 \\ 5/6.7 \\ 14/7.2 \\ 12/7.0 \\ -2.0 \end{matrix}$	69.2
$\begin{matrix} 37.6 \\ 3/7.2 \\ 2/7.9 \end{matrix}$	$\begin{matrix} 6.0 \\ 4.2 \\ -0.2 \end{matrix}$	$\begin{matrix} 8/6.9 \\ 10/7.5 \\ 13/6.4 \\ 11/7.8 \\ 2/4.6 \\ -1.0 \end{matrix}$	67.8
$\begin{matrix} 20/20 \\ 3/6.4 \\ 10/6.1 \\ 15/6.3 \end{matrix}$	$\begin{matrix} 7.2 \\ 6.4 \\ 8/5.9 \end{matrix}$	$\begin{matrix} 7/6.7 \\ 9/7.3 \\ 15/4.0 \\ 20/3.2 \\ 13/2.6 \end{matrix}$	67.6
$\begin{matrix} 3/4.5 \\ 20/5.8 \\ 9/5.0 \\ -1.0 \end{matrix}$	$\begin{matrix} 4.0 \\ 4.2 \\ -0.4 \end{matrix}$	$\begin{matrix} 14/5.6 \\ 13/5.4 \\ 15/3.3 \\ 2/3.0 \\ 2/3.0 \\ +1.0 \end{matrix}$	67.0
$\begin{matrix} 37.0 \\ 3/7.2 \\ 1/6.3 \\ 3/5.4 \end{matrix}$	$\begin{matrix} 4.3 \\ 5.2 \\ -0.8 \end{matrix}$	$\begin{matrix} 4/5.7 \\ 12/6.0 \\ 6/5.8 \\ -1.3 \end{matrix}$	66.5
$\begin{matrix} 6/7.4 \\ 1/6.3 \\ 14/5.2 \\ 11/5.1 \end{matrix}$	$\begin{matrix} 4.6 \\ 5.1 \\ -0.5 \end{matrix}$	$\begin{matrix} 5/5.6 \\ 13/5.6 \\ 9/5.6 \\ -1.0 \end{matrix}$	66.5

Cross Sections

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

971.55 ✓

P.M.

2.99

968.59 ✓

768.54

Inst.
Rod
Chain

.....

Left

CL

Right

50 ft in P.P. 17.579, 78763.

Inst.
Rod.
Chain.

.....

Left

C L

Right

Original..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	7.69	976.19		968.50	
78				67.14 967.6	9.1 8.7
79				69.00 69.5	7.1 6.7
80				71.43 72.3	4.5 3.8
T.P.	5.28	980.80	1.27	974.92	
81				73.5 94.6	7.3 6.4
82				74.9 75.9	5.9 5.1
83				75.50 76.5	5.2 4.4
84				79.7	1.1
T.P.	11.40	991.55	0.25	779.75	
+70				84.2	7.2
85				85.4	6.0
+70				89.7	1.7
T.P.	11.74	1002.39	0.70	990.65	
86				91.9	10.4
+40				94.0	8.4

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		1002.39			
87				997.2	5.2
B.M.	6.04	1002.35	6.04	996.35	996.35
+10				97.5	(4.9)
+44				98.4	4.0
88				98.4	4.0
+67				(96.9)	(5.5)
89				95.4	6.8
T.P.	2.11	993.54	10.93	991.43	
90				91.8	1.7
T.P.	1.82	996.22	4.14	989.40	
91				86.8	4.4
+56				83.4	7.8
92				80.4	10.8
T.P.	0.82	980.99	11.25	979.77	
+50				97.1	3.7
93				73.7	7.1

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		980.77 ✓			
T.P.	1.41	970.71 ✓	11.47	967.30 ✓	
	+64			969.4	1.3 ✓
94				66.9	3.8 ✓
	+65 ⁴			62.5	8.2 ✓
T.P.	2.13	961.57 ✓	11.27	957.41 ✓	
95				60.2	1.4 ✓
	+50			57.1	4.5 ✓
96				54.45	7.1 ✓
	+46			52.76	8.8 ✓
	+89 ⁴⁶			51.07	10.5 ✓
97				50.77	10.8 ✓
	+34			49.7	11.7 ✓
Eg. 97+40 =	96+94 ⁴³				
B.M.	8.47	961.54 ✓	8.47	953.07 ✓	953.25
97				49.6	11.9 ✓
T.P.	1.40	952.96 ✓	10.98	950.56 ✓	

Inst.
Rod.
Chain.

C L

Right

27/30 27/38 (1.5) 33/40
 23/33 17/33 15/1.7 11/1.8 4/1.2 0.9 7/1.7 10/1.2 12/1.2 13/2.0 2.9 2/1.6 69.8

33/56 27/5.6 27/5.8 -1.0 33/50
 24/50 23/5.6 24/5.4 12/5.1 11/4.6 4.3 8/5.0 7/4.5 11/4.6 13/6.0 10/5.6 2/1.3 66.4

33/11.2 2.5-Ext. W. (82) 22/0.2 31/10.2 33/11.0
 24/1.6 10/10.9 24/10.3 10/10.4 8/10.8 10.5 7/10.9 11/10.2 12/10.4 11/11.9 10/11.6 60.4

33/2.1 24/5.8 24/4.1 -2.7 4.8-Ext. W. (14) 18/5.2 -3.7
 20/4.4 8/4.0 13/3.7 7/4.3 5/4.2 3.7 7/4.0 10/5.0 17/4.7 25/2.3 28/6.0 5/4.9 57.7

5.0-Ext. W. (45) 4.6.7 = 2.4
 33/5.8 24/5.5 -1.0 15/5.8 5/5.9 6.1 11/6.2 10/7.3 33/7.8 55.5

4.9 Ext. W. (71) 8.8.3 -1.2 33/8.6 54.2
 33/5.8 15/8.3 8/6.7 7/7.2 7.4 4/7.0 13/7.4 18/8.3 33/8.6

2.5-Ext. W. (88) 10.7 53.5
 24/6.7 11/9.8 9/9.4 6/7.9 4/8.3 8.1 7/7.7 11/8.1 14/8.5 12/8.0 10/8.1 7/8.1 7/8.4

(10.5) 33/6.4 9/7.2 10/8.7 8/10.3 6/9.5 7.1 4/8.9 13/9.8 14/7.9 20/8.0 33/7.2 52.5

(10.8) 33/6.5 9/6.9 17/7.6 7/9.4 8/10.2 9.4 4/9.1 15/10.0 15/7.0 17/7.0 20/5.8.3 52.2
 7/7.3.9 7.4 11.4 7/7.8.5

(11.9) 33/8.0 8/9.0 7/10.9 6/12.9 9/11.5 11.3 5/10.9 12/11.9 14/10.4 17/9.0 13/9.3 50.3
 5 P.M. in Cal. Pt. Sta. 95 7.5
 33/8.4 11/8.7 9/11.5 7/12.2 5/11.6 11.7 5/11.1 12/12.2 13/11.1 15/9.9 11/9.6 49.8
 7/7.3.2 7.0.2 7/7.3

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		952.76			
98				946.9	6.1 ✓
99				44.20	8.7 ✓
+50				43.09	9.9 ✓
T. P.	5.28	948.94 ✓	9.90	945.64 ✓	
100				42.24	6.7 ✓
B. M.			8.15	946.77	940.77
+50				41.67	7.2 ✓
⁵⁰ 777				41.67	7.3 ✓
101				41.5	7.4 ✓
+50				41.45	7.4 ✓
T. P.	5.20	951.97 ✓	2.18	946.74 ✓	
102				41.7	10.6 ✓
+22 ⁵⁰				41.7	10.9 ✓
+23 ⁵⁰				41.7	10.9 ✓
103				41.2	10.5 ✓

Sta.	B. S.	Cross		Grade	Gr. R.
		H. I.	F. S.		
		951.99			
103 ⁶² +24				741.2	10.8
T.P.	3.27	944.33	10.93	941.06	3.1
+50				41.2	3.1
104				40.7	3.4
+50				40.2	4.1
T.P.	2.62	951.55	0.37	943.96	
105				39.7	11.7
+44 ⁶³				39.3	12.3
106				38.6	13.0
T.P.	8.01	948.00	11.59	939.99	
+50				38.0	10.0
107				37.4	10.4
T.P.	3.55	939.79	11.81	936.19	
+50				36.9	2.8
108				36.7	3.0
B.M.	1.75	740.28	1.43	938.31	957.33
+50				34.7	3.9

In t. Crane....
 Rod. Parsons
 Chain. Martin

Left	CL	Right
$\begin{array}{r} 30/7.0 \\ \times 47.2 \\ \hline 20/2.3 \\ 15/1.4 \end{array}$	$\begin{array}{r} +75-5.8 \\ 6/11.4 \\ 5/10.4 \\ 9.5 \\ 7/9.6 \\ 11/10.5 \end{array}$	$\begin{array}{r} 45-5.5 \\ 19/16.5 \\ 5/18.3 \\ 53/20.0 \\ 42.2 \end{array}$
$\begin{array}{r} 27 \\ \times 42.7 \\ \hline 19/2.9 \\ 5/4.7 \\ 5/2.2 \end{array}$	$\begin{array}{r} +55-5.5 \\ 2/2.7 \\ 3.2 \\ 2/3.0 \\ 11/8.6 \end{array}$	$\begin{array}{r} -5.5-5.5 \\ 20/2.1 \\ 21/3.4 \\ 25/10.4 \\ 41.1 \end{array}$
$\begin{array}{r} 33/3.7 \\ \times 24.4 \\ \hline 17/2.1 \\ 11/1.5 \end{array}$	$\begin{array}{r} +74-5.5 \\ 6/4.5 \\ 7.4 \\ 2/4.2 \\ 12/5.0 \end{array}$	$\begin{array}{r} -74-5.5 \\ 21/10.4 \\ 21/10.3 \\ 53/11.6 \\ 39.9 \end{array}$
$\begin{array}{r} 30 \\ \times 22.9 \\ \hline 2/10.0 \\ 17/5.1 \\ 7/5.2 \end{array}$	$\begin{array}{r} +74-5.5 \\ 7/5.2 \\ 5.2 \\ 10/5.4 \\ 12/12.0 \end{array}$	$\begin{array}{r} -74-5.5 \\ 2/12.0 \\ 2/7.2 \\ 53/12.4 \\ 39.1 \end{array}$
$\begin{array}{r} 7.7 \\ \times 18.8 \\ \hline 11/73.1 \\ 12/2.2 \\ 12/0.3 \end{array}$	$\begin{array}{r} +72-5.5 \\ 8/12.1 \\ 12.1 \\ 14/12.5 \end{array}$	$\begin{array}{r} -72-5.5 \\ 17/13.2 \\ 17/15.1 \\ 19/12.5 \\ 39.5 \end{array}$
$\begin{array}{r} 30/7.0 \\ \times 14.3 \\ \hline 5/17.0 \\ 28/4.6 \end{array}$	$\begin{array}{r} +53-5.5 \\ 9/11.2 \\ 11.5 \\ 2/11.2 \\ 10/12.0 \end{array}$	$\begin{array}{r} -53-5.5 \\ 9/13.8 \\ 8/16.4 \\ 53/17.0 \\ 40.1 \end{array}$
$\begin{array}{r} 1.7 \\ \times 11.5 \\ \hline 3/1.9 \\ 12/7.4 \\ 12/11.6 \end{array}$	$\begin{array}{r} +30-5.5 \\ 9/12.1 \\ 12.0 \\ 3/11.6 \end{array}$	$\begin{array}{r} -30-5.5 \\ 17/12.2 \\ 15/12.4 \\ 14/11.2 \\ 39.6 \end{array}$
$\begin{array}{r} 5/1.1 \\ \times 10.5 \\ \hline 5/10.5 \\ 7/3.9 \end{array}$	$\begin{array}{r} +27-5.5 \\ 7/10.3 \\ 10.4 \\ 2/10.0 \end{array}$	$\begin{array}{r} -10-5.5 \\ 17/10.3 \\ 17/12.0 \\ 9/12.2 \\ 37.6 \end{array}$
$\begin{array}{r} 27/3.9 \\ \times 56/5.0 \\ \hline 2/4.7 \\ 5/1.5 \end{array}$	$\begin{array}{r} 2/12.5 \\ 11.5 \\ 12/12.6 \\ 10/12.5 \end{array}$	$\begin{array}{r} 6/12.0 \\ 9/12.4 \\ 53/12.4 \\ 36.2 \end{array}$
$\begin{array}{r} 8/0.0 \\ \times 42.7 \\ \hline 17/3.3 \\ 13/5.6 \end{array}$	$\begin{array}{r} 4.2 \\ 7/8 \\ 7/5.6 \\ 12/7.7 \end{array}$	$\begin{array}{r} 7/9.6 \\ 53/10.3 \\ 35.1 \end{array}$
$\begin{array}{r} 2.6 \\ \times 5.0 \\ \hline 9/2.6 \\ 15/6.0 \end{array}$	$\begin{array}{r} 11/5.5 \\ 5.1 \\ 6/5.3 \\ 12/8.5 \end{array}$	$\begin{array}{r} 11/8.5 \\ 11/9.2 \\ 5/12.5 \\ 34.6 \end{array}$
$\begin{array}{r} 35/4.8 \\ \times 26.4 \\ \hline 16/6.6 \\ 11/5.9 \end{array}$	$\begin{array}{r} 11/5.9 \\ 5.0 \\ 7/5.5 \\ 10/6.6 \end{array}$	$\begin{array}{r} 14/6.5 \\ 8/6.8 \\ 53/8.0 \\ 35.3 \end{array}$

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		940.28 ✓			
109				36.9	3.4 ✓
T.P.	7.28	946.81 ✓	0.75	39.53 ✓	
+76 ²¹				37.4	2.4 ✓
110				37.4	2.2 ✓
+50				37.75	2.8 ✓
111				38.3	2.5 ✓
+51 ⁷⁶				38.52	2.3 ✓
T.P.	1.34	942.81 ✓	5.34	941.47 ✓	
+76 ⁴				38.8	2.0 ✓
112				39.0	3.2 ✓
+20 ²⁷				39.13	3.7 ✓
+50				39.2	3.4 ✓
113				39.2	3.4 ✓
T.P.	5.82	944.86 ✓	1.77	941.04 ✓	
+50				40.0	4.9 ✓

Inst.
Rod.
Chain.

Left		C L		Right	
17/29 15/37 12/50.1	11/33 5/29 70.2	34 -20-5.5	32 9/3.1	13/27 19/4.4 53/65	37.1
15/28 15/54 12/58 7/41 7/54 7/47	12/58 7/41 7/54 7/47	34 -53-5.6	32 58/16.1 11/64	17/23 2/10.3 2/10.3	41.0
18/5.1 2/7.9 7/54 4.9 14.3	2/7.9 7/54 4.9 14.3	32 -64-5.5	32 12/5.7	14/5.0 17/5.9 2/8.0 35/3.8	41.9
10/45 4/24 6.8 12.2	4/24 6.8 12.2	34 -74-5.5	32 9/6.6 12/6.3 11.8	2/10.3 2/10.3 2/12.0 2/12.4	40.0
11/8.1 7/22 9.0 5.9 -0.5	7/22 9.0 5.9 -0.5	34 -66-5.6	32 5.9 11/17	8/10.0 35/11.3 35/12.5	37.8
10/27 6/29 9.6 10.1 -1.9	6/29 9.6 10.1 -1.9	34 -45-5.5	32 10.1 9.8/11.8 -4.0	2/10.3 35/17.3	37.2
11/62 8/61 6.0 -2.0	8/61 6.0 -2.0	34 00-5.6	32 9/6.3 14/8.2	2/10.3 5.9/7 35/2.7	36.8
12/64 12/62 5.9 2.1 7/6.6	12/64 12/62 5.9 2.1 7/6.6	34 +20-5.1	32 7/6.6 14/9.1	1/9.7 35/12.4	36.9
10/61 5.7 9/6.5 8.7 -2.0	10/61 5.7 9/6.5 8.7 -2.0	34 +35-5.5	32 8.7 9.7.0	2/10.5 35/12.0	37.1
9/5.9 9/5.4 30/11.3 35/12.8	9/5.9 9/5.4 30/11.3 35/12.8	34 +67-5.2	32 5.6 11/5.7 15/8.3	1/9.7 30/11.3 35/12.8	37.2
11/4.1 4.0 6/4.4 8/3.9 10/4.3 15/7.0 8/5.8 5/10.5	11/4.1 4.0 6/4.4 8/3.9 10/4.3 15/7.0 8/5.8 5/10.5	34 +74-5.6	32 4.0 6/4.4 8/3.9 10/4.3 15/7.0	1/8.1 5/10.5	38.8
10/4.4 4.2 6/4.6 7/3.8 12/4.2 4.3/9.7 35/12.2	10/4.4 4.2 6/4.6 7/3.8 12/4.2 4.3/9.7 35/12.2	34 +70-5.5	32 4.2 6/4.6 7/3.8 12/4.2	4.3/9.7 35/12.2	40.7

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		947.84			
114				932.3	6.6 ✓
+39 ⁴				37.75	7.1 ✓
+83 ²				37.12	7.8 ✓
115				34.9	8.0 ✓
B.M.	11.34	948.95	7.27	937.59	937.59
113+50				40.0	9.0 ✓
114				38.3	10.7 ✓
+39 ³				37.75	11.2 ✓
B.M.	2.65	940.24	11.36	937.57	
115				36.9	3.3 ✓
+50				36.2	4.0 ✓
114				35.5	4.7 ✓
+25 ²⁷				35.15	5.0 ✓
T.P.	4.54	936.89	7.89	932.35	
117				34.1	2.8 ✓

Left

C L

Right

(66)
 $4.30 - 5.5 = .30 - 5.5$
 $\begin{array}{r} 17/4.2 \\ \times 2/4.2 \\ \hline 34.4 \\ 72.1 \end{array}$
 $\begin{array}{r} 3.2 \\ \times 6/4.6 \\ \hline 19.8 \end{array}$
 $\begin{array}{r} 9/4.2 \\ \times 2/3.6 \\ \hline 18.0 \\ -0.4 \\ \hline 17/10.1 \end{array}$
 $\begin{array}{r} 30/7.3 \\ \times 30/12.4 \\ \hline 360.0 \\ -0.4 \\ \hline 26/10.5 \end{array}$
 41.1

(71)
 $20 - 5.5 = 20 - 5.5$
 $\begin{array}{r} 18/6.2 \\ \times 14/6.3 \\ \hline 115.8 \\ +1.8 \end{array}$
 $\begin{array}{r} 5.3 \\ \times 7/5.8 \\ \hline 30.14 \end{array}$
 $\begin{array}{r} 14.5.3 \\ \times 15/4.2 \\ \hline 217.95 \end{array}$
 $\begin{array}{r} 17/5.4 \\ \times 4/5.7 \\ \hline 95.8 \\ +1.4 \\ \hline 21/11.4 \end{array}$
 39.6

(78)
 $-32.55 = 32 - 5.5$
 $\begin{array}{r} 33/5.6 \\ \times 22/5.0 \\ \hline 166.2 \\ 72.6 \end{array}$
 $\begin{array}{r} 7.7.3 \\ \times 4/2.8 \\ \hline 21.84 \end{array}$
 $\begin{array}{r} 7.6 \\ \times 2/7.8 \\ \hline 15.2 \end{array}$
 $\begin{array}{r} 5/7.9 \\ \times 12/8.0 \\ \hline 40.0 \\ 22/6.3 \end{array}$
 $\begin{array}{r} 58/12.3 \\ \times 58/12.3 \\ \hline 336.4 \end{array}$
 37.3

Nail in 8" Trench On A 20' R 5 to 115710

(910)
 $\begin{array}{r} 33/1.4 \\ \times 26/2.4 \\ \hline 85.8 \end{array}$
 $\begin{array}{r} 18/3.8 \\ \times 18/3.8 \\ \hline 68.4 \end{array}$

(107)
 $\begin{array}{r} 33/0.2 \\ \times 30/0.4 \\ \hline 13.2 \end{array}$
 $\begin{array}{r} 26/1.4 \\ \times 21/2.6 \\ \hline 67.6 \end{array}$

(112)
 $\begin{array}{r} 33/2.6 \\ \times 4/2.8 \\ \hline 92.4 \end{array}$
 $\begin{array}{r} 27/2.9 \\ \times 27/2.9 \\ \hline 72.9 \end{array}$

(33)
 $-48 - 5.5 = 48 - 5.5$
 $\begin{array}{r} 33/4.4 \\ \times 25/3.8 \\ \hline 125.2 \end{array}$
 $\begin{array}{r} 3/4.7 \\ \times 7/3.9 \\ \hline 11.73 \end{array}$
 $\begin{array}{r} 9.7 \\ \times 10/3.9 \\ \hline 38.13 \end{array}$
 $\begin{array}{r} 4/4.2 \\ \times 19/4.2 \\ \hline 75.6 \end{array}$
 $\begin{array}{r} 19/4.2 \\ \times 9/3.4 \\ \hline 64.6 \end{array}$
 $\begin{array}{r} 20/2.9 \\ \times 20/2.9 \\ \hline 116 \end{array}$
 36.5

(40)
 $-74 - 5.5 = 74 - 5.5$
 $\begin{array}{r} 33/10.8 \\ \times 21/10.4 \\ \hline 344.4 \end{array}$
 $\begin{array}{r} 9/3.3 \\ \times 6/6.9 \\ \hline 62.1 \end{array}$
 $\begin{array}{r} 6.1 \\ \times 10/6.0 \\ \hline 36.6 \end{array}$
 $\begin{array}{r} 15/6.7 \\ \times 19/8.5 \\ \hline 127.65 \end{array}$
 $\begin{array}{r} 27/7.6 \\ \times 25/10.1 \\ \hline 272.5 \end{array}$
 34.2

(47)
 $-64 - 5.5 = 64 - 5.5$
 $\begin{array}{r} 11.3 \\ \times 2/5.9 \\ \hline 13.26 \end{array}$
 $\begin{array}{r} 14/10.7 \\ \times 10/9.3 \\ \hline 130.2 \end{array}$
 $\begin{array}{r} 8/8.4 \\ \times 6/8.1 \\ \hline 64.8 \end{array}$
 $\begin{array}{r} 7.5 \\ \times 8/7.8 \\ \hline 59.4 \end{array}$
 $\begin{array}{r} 14/8.4 \\ \times 22/10.1 \\ \hline 140.88 \end{array}$
 $\begin{array}{r} 22/10.1 \\ \times 22/10.9 \\ \hline 239.8 \end{array}$
 $\begin{array}{r} 33/11.4 \\ \times 33/11.4 \\ \hline 376.2 \end{array}$
 32.7

(50)
 $-55 - 5.5 = 55 - 5.5$
 $\begin{array}{r} 33/11.4 \\ \times 21/10.7 \\ \hline 353.4 \end{array}$
 $\begin{array}{r} 17/10.3 \\ \times 12/7.5 \\ \hline 127.5 \end{array}$
 $\begin{array}{r} 9/8.4 \\ \times 7.7 \\ \hline 69.3 \end{array}$
 $\begin{array}{r} 7.7 \\ \times 7/8.2 \\ \hline 63.14 \end{array}$
 $\begin{array}{r} 12/5.2 \\ \times 13/3.9 \\ \hline 46.8 \end{array}$
 $\begin{array}{r} 18/10.2 \\ \times 27/10.8 \\ \hline 194.4 \end{array}$
 $\begin{array}{r} 27/10.8 \\ \times 27/10.8 \\ \hline 291.6 \end{array}$
 32.5

(28)
 $-30 - 5.5 = 20 - 5.5$
 $\begin{array}{r} 33/8.3 \\ \times 17/7.3 \\ \hline 240.9 \end{array}$
 $\begin{array}{r} 14/6.4 \\ \times 11/4.7 \\ \hline 65.8 \end{array}$
 $\begin{array}{r} 7/4.7 \\ \times 4.2 \\ \hline 29.4 \end{array}$
 $\begin{array}{r} 7.5.0 \\ \times 12/7.7 \\ \hline 58.5 \end{array}$
 $\begin{array}{r} 6/7.5 \\ \times 31/5.9 \\ \hline 177 \end{array}$
 $\begin{array}{r} 33/8.9 \\ \times 33/8.9 \\ \hline 292.41 \end{array}$
 32.7

Cross Sections					
Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		934.89			
118				932.7	4.2 ✓
T.P.	6.77	934.84	6.70	930.09 ✓	
+50				32.0	(4.9) ✓
119				31.7	5.5 ✓
+50				31.09	5.8 ✓
+75				(31.0)	(5.9) ✓
120				31.0	5.7 ✓
+50				31.1	5.8 ✓
121				31.3	5.6 ✓
+50				31.4	5.3 ✓
P.M.	10.27	943.36 ✓	3.74	933.10 ✓	933.09
119+75				(31.0)	(12.4) ✓
120				31.0	12.4 ✓
+50				(31.1)	(12.3) ✓

Inst.
Rod.
Chain.

Left

C L

Right

$\begin{array}{r} 33/8.2 \\ -50 \end{array}$	$\begin{array}{r} 20/59.2 \\ -5.0 \end{array}$	$\begin{array}{r} 13/8.7 \\ -4.5 \end{array}$	$\begin{array}{r} 9/7.9 \\ -3.7 \end{array}$	$\begin{array}{r} 5/5.5 \\ -1.3 \end{array}$	$\begin{array}{r} 5.0 \\ -0.8 \end{array}$	$\begin{array}{r} 2/4.6 \\ -0.4 \end{array}$	$\begin{array}{r} 9/5.0 \\ -0.8 \end{array}$	$\begin{array}{r} 14/7.8 \\ -3.1 \end{array}$	$\begin{array}{r} 8/7.9 \\ -5.7 \end{array}$	$\begin{array}{r} 33/9.0 \\ -4.5 \end{array}$	31.9
----------------------------------------------	------------------------------------------------	-----------------------------------------------	----------------------------------------------	----------------------------------------------	--------------------------------------------	----------------------------------------------	----------------------------------------------	-----------------------------------------------	----------------------------------------------	-----------------------------------------------	------

47.2

Wall in 6 ft. 11 ft. 12 ft. 13 ft. 14 ft. 15 ft. 16 ft. 17 ft. 18 ft. 19 ft. 20 ft.

$\begin{array}{r} 33/9.0 \\ -10 \end{array}$	$\begin{array}{r} 10/8.4 \\ -7.6 \end{array}$	$\begin{array}{r} 9/7.6 \\ -4.5 \end{array}$	$\begin{array}{r} 4/5.4 \\ -5.1 \end{array}$	$\begin{array}{r} 5.1 \\ -3/4.6 \end{array}$	$\begin{array}{r} 11/5.1 \\ -14/6.9 \end{array}$	$\begin{array}{r} 21/8.0 \\ -33/8.4 \end{array}$	31.8
----------------------------------------------	-----------------------------------------------	----------------------------------------------	----------------------------------------------	----------------------------------------------	--------------------------------------------------	--------------------------------------------------	------

49

$\begin{array}{r} 3/7.0 \\ -5.5 \end{array}$	$\begin{array}{r} 6/6.7 \\ -1.4 \end{array}$	$\begin{array}{r} 4/7.0 \\ -1.6 \end{array}$	$\begin{array}{r} 12/8.8 \\ -5.2 \end{array}$	$\begin{array}{r} 4.8 \\ -0.7 \end{array}$	$\begin{array}{r} 11/5.6 \\ -1.9 \end{array}$	$\begin{array}{r} 8/7.4 \\ -2.0 \end{array}$	$\begin{array}{r} 30/7.5 \\ -2.0 \end{array}$	$\begin{array}{r} 33/8.0 \end{array}$	32.1
----------------------------------------------	----------------------------------------------	----------------------------------------------	-----------------------------------------------	--------------------------------------------	-----------------------------------------------	----------------------------------------------	-----------------------------------------------	---------------------------------------	------

55.5

$\begin{array}{r} 0/5.5 \\ -7.0 \end{array}$	$\begin{array}{r} 14/5.5 \\ -0.2 \end{array}$	$\begin{array}{r} 2/6.0 \\ -0.2 \end{array}$	$\begin{array}{r} 12/5.9 \\ -10/5.4 \end{array}$	$\begin{array}{r} 4.9 \\ -0.9 \end{array}$	$\begin{array}{r} 10/5.8 \\ -12/7.2 \end{array}$	$\begin{array}{r} 4/7.6 \\ -1.8 \end{array}$	$\begin{array}{r} 13/7.7 \\ -1.9 \end{array}$	$\begin{array}{r} 33/8.3 \end{array}$	32.0
----------------------------------------------	-----------------------------------------------	----------------------------------------------	--------------------------------------------------	--------------------------------------------	--------------------------------------------------	----------------------------------------------	-----------------------------------------------	---------------------------------------	------

58

$\begin{array}{r} 21/4.6 \end{array}$	$\begin{array}{r} 14/4.3 \end{array}$	$\begin{array}{r} 12/5.6 \\ -9/5.3 \end{array}$	$\begin{array}{r} 5.0 \end{array}$	$\begin{array}{r} 10/6.1 \end{array}$	$\begin{array}{r} 10/7.0 \end{array}$	$\begin{array}{r} 21/8.8 \end{array}$	$\begin{array}{r} 33/5.8 \end{array}$	31.9
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59

0.1 - 5. E.

$\begin{array}{r} 20/2.7 \end{array}$	$\begin{array}{r} 17/6.1 \end{array}$	$\begin{array}{r} 14/6.9 \end{array}$	$\begin{array}{r} 2/5.8 \\ -7.0 \end{array}$	$\begin{array}{r} 7/5.2 \end{array}$	$\begin{array}{r} 4.9 \\ -1.0 \end{array}$	$\begin{array}{r} 8/5.4 \\ -10/5.2 \end{array}$	$\begin{array}{r} 6/2.0 \\ -1.1 \end{array}$	$\begin{array}{r} 14/7.0 \end{array}$	$\begin{array}{r} 18/7.5 \\ -1.6 \end{array}$	$\begin{array}{r} 33/8.5 \end{array}$	32.0
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59

7.19 - 5. E. 19 - 5. E.

$\begin{array}{r} 22/5.6 \end{array}$	$\begin{array}{r} 20/5.8 \\ -0.0 \end{array}$	$\begin{array}{r} 15/6.4 \end{array}$	$\begin{array}{r} 10/5.9 \\ -0.1 \end{array}$	$\begin{array}{r} 7/5.1 \end{array}$	$\begin{array}{r} 5.0 \\ -10.8 \end{array}$	$\begin{array}{r} 12/5.6 \\ -12/2.0 \end{array}$	$\begin{array}{r} 4/7.4 \\ -1.4 \end{array}$	$\begin{array}{r} 8/7.7 \\ -1.9 \end{array}$	$\begin{array}{r} 33/8.6 \end{array}$	31.9
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58

7.41 - 5. E. 7.1 - 5. E.

$\begin{array}{r} 9/2/5.6 \end{array}$	$\begin{array}{r} 23/6.1 \end{array}$	$\begin{array}{r} 17/5.6 \end{array}$	$\begin{array}{r} 16/4.8 \end{array}$	$\begin{array}{r} 0/5.0 \\ -0.2 \end{array}$	$\begin{array}{r} 11/5.0 \end{array}$	$\begin{array}{r} 4.8 \\ -7.0 \end{array}$	$\begin{array}{r} 10/5.7 \\ -12/7.3 \end{array}$	$\begin{array}{r} 5/2.6 \\ -1.4 \end{array}$	$\begin{array}{r} 33/8.2 \end{array}$	32.1
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56

7.62 - 5. E. 7.62 - 5. E.

$\begin{array}{r} 33/3.0 \end{array}$	$\begin{array}{r} 13/3.9 \\ -7.4 \end{array}$	$\begin{array}{r} 0/4.4 \\ -7.2 \end{array}$	$\begin{array}{r} 6/5.1 \end{array}$	$\begin{array}{r} 7.8 \\ -7.0 \end{array}$	$\begin{array}{r} 9/5.7 \end{array}$	$\begin{array}{r} 12/6.1 \end{array}$	$\begin{array}{r} 5/7.5 \\ -1.4 \end{array}$	$\begin{array}{r} 8/7.8 \\ -1.9 \end{array}$	$\begin{array}{r} 33/8.8 \end{array}$	32.1
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63

Wall in 6 ft. 11 ft. 12 ft. 13 ft. 14 ft. 15 ft. 16 ft. 17 ft. 18 ft. 19 ft. 20 ft.

$\begin{array}{r} 33/5.3 \end{array}$	$\begin{array}{r} 30/6.2 \end{array}$	12.4
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12.4

$\begin{array}{r} 53/3.7 \end{array}$	$\begin{array}{r} 27/5.3 \\ -7.1 \end{array}$	$\begin{array}{r} 35/6.2 \end{array}$	12.4
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12.4

$\begin{array}{r} 33/3.7 \end{array}$	$\begin{array}{r} 27/6.2 \end{array}$	12.3
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12.3

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gf. R.
		943.35			
B.M.	3.22	936.91	10.27	933.09	
122				31.8	5.1 ✓
+50				32.0	4.9 ✓
123				32.1	4.8 ✓
+52 ¹²				32.15	4.7 ✓
T.P.	3.73	936.70	3.94	932.97	
124				32.2	4.5 ✓
+50				32.17	4.4 ✓
125				32.3	4.4 ✓
+50				32.35	4.3 ✓
+75 ⁶				32.38	4.3 ✓
126				32.40	4.3 ✓
+50				32.45	4.2 ✓

Inst.
Rod.
Chain.

Left

C L

Right

6.3 21/5.8 8/6.3 13/5.3 10/5.2 4.9 70.2	x 8/6.3 13/5.3 -0.9	x 7.74-5.5 4.9 70.2	49 -74-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.6	32.0
7.9 20/4.9 17/4.7 11/5.7 11/5.6 5.2 -0.3	x 20/4.9 17/4.7 11/5.7 11/5.6 5.2 -0.3	x 7.74-5.5 4.9 70.2	49 -74-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.6	31.7
33.1 2/4.2 17/4.6 13/5.3 13/5.6 7/5.3 4.9 -1.1	x 2/4.2 17/4.6 13/5.3 13/5.6 7/5.3 4.9 -1.1	x 7.74-5.5 4.9 70.2	48 -74-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.6	32.0
2.7 2/0.0 17/5.5 2/4.7 12/5.1 7/5.2 7/4.8 4.8 -0.1	x 2/0.0 17/5.5 2/4.7 12/5.1 7/5.2 7/4.8 4.8 -0.1	x 7.74-5.5 4.9 70.2	47 -53-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.4	32.1
12.4 2/2.4 2/2.1 2/4.0 2.4 2/4.3 10/3.6 13/5.1 12/5.2 7/4.8 4.1 104	x 2/2.4 2/2.1 2/4.0 2.4 2/4.3 10/3.6 13/5.1 12/5.2 7/4.8 4.1 104	x 7.74-5.5 4.9 70.2	45 -53-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/7.8	32.6
7/2.1 10/3.6 13/5.1 12/5.2 8/5.4 4.1 -0.2	x 7/2.1 10/3.6 13/5.1 12/5.2 8/5.4 4.1 -0.2	x 7.74-5.5 4.9 70.2	44 0.1-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.2	32.1
8/2.6 2/1.8 10/3.8 12/5.7 13/5.8 7/5.4 4.7 -0.5	x 8/2.6 2/1.8 10/3.8 12/5.7 13/5.8 7/5.4 4.7 -0.5	x 7.74-5.5 4.9 70.2	44 0.19-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.5	31.8
1/1.3 19/4.3 17/5.9 14/5.9 12/5.4 8/5.3 4.7 25.0 13/6.5 23/2.2 33/8.0	x 19/4.3 17/5.9 14/5.9 12/5.4 8/5.3 4.7 25.0 13/6.5 23/2.2 33/8.0	x 7.74-5.5 4.9 70.2	43 0.4-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.0	32.0
3.4 0.9 12/3.8 10/5.8 11/5.9 9/5.1 4.9 -0.4 11/6.6 7/2.8 -2.5 25/7.3 33/2.5	x 12/3.8 10/5.8 11/5.9 9/5.1 4.9 -0.4 11/6.6 7/2.8 -2.5 25/7.3 33/2.5	x 7.74-5.5 4.9 70.2	43 53-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/2.5	31.8
10/4.1 16/4.3 14/5.2 12/6.1 8/4.8 4.7 -0.4 10/5.6 12/6.6 16/6.9 -2.0 26/2.2 33/8.0	x 10/4.1 16/4.3 14/5.2 12/6.1 8/4.8 4.7 -0.4 10/5.6 12/6.6 16/6.9 -2.0 26/2.2 33/8.0	x 7.74-5.5 4.9 70.2	43 -41-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.0	32.0
13/4.9 9/4.3 13/4.4 12/4.7 14/6.5 7/6.7 -1.5 33/8.1	x 9/4.3 13/4.4 12/4.7 14/6.5 7/6.7 -1.5 33/8.1	x 7.74-5.5 4.9 70.2	42 -74-5.5 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	x 7.74-5.5 4.9 70.2	33/8.1	32.4

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		936.70	✓		
127				32.5	4.2 ✓
B.M.	1.07	937.47	✓	936.41	736.38 ✓
+50				32.55	4.9 ✓
128				32.0	4.9 ✓
+50				32.65	4.8 ✓
129				32.7	4.8 ✓
+50 ⁵⁶				32.75	4.7 ✓
130				32.8	4.7 ✓
T.P.	4.64	936.85	✓	932.31	✓
+50				32.85	4.0 ✓
131				32.9	4.0 ✓
+50				32.95	3.9 ✓
132			✓	33.0	3.9 ✓
T.P.	11.71	948.69	0.07	936.78	✓
129 + 56 ⁵⁰				32.75	15.9 ✓

Inst.
 Rod.
 Chain.

Left	C L	Right
4.7 x 2/30 2/7.2	x 77-5.5 8/5.4 10/5.5 4.8 -0.6 77-5.5	-74-5.4 x 9/5.2 10/5.2 11/5.5 21/8.0 21/8.0 28/9.5 33/10.4 31.9
x 10/3.4 2/7.0	x 77-5.5 9/5.2 7/4.9 5.0 -0.1	x 77-5.5 17+4.0 x 9/5.2 17/7.3 17/7.9 33/8.2 32.5
3.5 x 2/7.16	x 77-5.5 10/5.0 4.7 +0.2	x 77-5.5 8/5.5 13/4.2 14/6.8 23/7.4 33/8.2 32.8
2.1 x 2/7.22	x 77-5.5 10/4.8 7.0 +0.2	x 77-5.5 9/5.8 10/7.1 15/7.2 28/8.3 33/8.8 32.9
x 2/7.18 2/7.30	x 77-5.5 9/4.3 8/5.1 5.0 -0.2	x 77-5.5 8/5.8 12/6.6 13/7.2 16/7.5 33/9.0 32.5
141.9 x 2/7.11	x 77-5.5 10/5.1 9/5.0 5.8 -1.1	x 77-5.5 11/6.8 11/6.8 12/8.1 28/9.4 33/9.7 31.7
9/2.1 x 2/7.49 -0.5	x 77-5.5 10/5.4 10/5.5 5.7 -1.0	x 77-5.5 7/6.5 10/6.8 13/7.9 18/8.4 28/9.4 33/10.0 31.8
	x 77-5.5 7/4.9 +5 -1.5	x 77-5.5 11/5.2 10/6.1 14/7.3 17/7.7 33/9.1 32.4
x 2/7.24 2/7.17	x 77-5.5 10/4.8 5.0 -1.0	x 77-5.5 9/5.3 10/6.0 13/6.9 17/7.2 33/8.4 31.9
33 x 2/7.18 2/7.41	x 77-5.5 13/5.1 13/5.1 5.1 -1.2	x 77-5.5 4/5.3 8/6.0 12/6.7 15/7.6 33/8.7 31.8
2/7.18 x 2/7.35 2/7.44	x 77-5.5 11/4.9 11/4.9 5.2 -1.3	x 77-5.5 5/5.7 8/6.3 13/7.3 17/8.1 33/8.5 31.7
Nail in Stamp H.S.+9, 131+40 53/5.8 x 2/7.8 2/7.9		15.9

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		948.49			
130				932.8	15.9 ✓
+50				32.85	15.2 ✓
131				32.9	15.2 ✓
+50				32.95	15.7 ✓
T.P.	3.77	940.55	11.71	736.78 ✓	
132+50				32.05	7.5 ✓
133				33.1	7.5 ✓
+60				33.60	7.0 ✓
134				34.31	6.3 ✓
+50				35.60	5.0 ✓
T.P.	9.74	946.48 ✓ 946.78	3.93	794.72 ✓	
135				37.60	(7.2) 8.9
+50				37.80	(7.0) 6.7
136				42.0	(4.9) 4.5

Inst.
Rod.
Chain.

Left

C L

Right

$\begin{array}{r} 1.3 \\ 17.3 \\ +10.5 \\ \hline 27.8 \end{array}$	$\begin{array}{r} 10.0 \\ 157.8 \\ +15.4 \\ \hline 173.2 \end{array}$	$\begin{array}{r} 20.5 \\ 27.4 \\ +2.2 \\ \hline 29.6 \end{array}$	$\begin{array}{r} 25.6 \\ 25.6 \\ \hline 51.2 \end{array}$	15.9	
$\begin{array}{r} 10.5 \\ 16.3 \\ +16.3 \\ \hline 32.6 \end{array}$	$\begin{array}{r} 27.2 \\ 149.2 \\ +16.3 \\ \hline 165.5 \end{array}$	$\begin{array}{r} 14.9 \\ 13.0 \\ \hline 27.9 \end{array}$	$\begin{array}{r} 13.0 \\ 13.0 \\ \hline 26.0 \end{array}$	15.8	
$\begin{array}{r} 13.9 \\ 8.7 \\ +12.2 \\ \hline 26.6 \end{array}$	$\begin{array}{r} 27.6 \\ 17.3 \\ +12.2 \\ \hline 39.5 \end{array}$	$\begin{array}{r} 17.3 \\ 18.7 \\ +7.7 \\ \hline 26.4 \end{array}$	$\begin{array}{r} 14.0 \\ 13.9 \\ \hline 27.9 \end{array}$	15.4	
$\begin{array}{r} 15.7 \\ 15.7 \\ \hline 31.4 \end{array}$	$\begin{array}{r} 32.3 \\ 32.3 \\ \hline 64.6 \end{array}$	$\begin{array}{r} 42.1 \\ 13.6 \\ +7.6 \\ \hline 55.7 \end{array}$	$\begin{array}{r} 42.1 \\ 55.7 \\ \hline 97.8 \end{array}$	15.7	
$\begin{array}{r} 10.1 \\ 1.1 \\ +1.1 \\ \hline 2.2 \end{array}$	$\begin{array}{r} 5.0 \\ 5.2 \\ +4.8 \\ \hline 14.8 \end{array}$	$\begin{array}{r} 4.8 \\ 8.0 \\ +2.2 \\ \hline 11.0 \end{array}$	$\begin{array}{r} 1.1 \\ 1.1 \\ +1.1 \\ \hline 3.3 \end{array}$	16	32.1
$\begin{array}{r} 15.8 \\ 15.8 \\ \hline 31.6 \end{array}$	$\begin{array}{r} 0.5 \\ 110.4 \\ +0.5 \\ \hline 110.9 \end{array}$	$\begin{array}{r} 11.2 \\ 8.7 \\ +12.8 \\ \hline 32.7 \end{array}$	$\begin{array}{r} 2.8 \\ 7.8 \\ +12.8 \\ \hline 23.4 \end{array}$	7.5	32.8
$\begin{array}{r} 17.5 \\ 17.5 \\ \hline 35.0 \end{array}$	$\begin{array}{r} 0.7 \\ 170.7 \\ +0.7 \\ \hline 171.4 \end{array}$	$\begin{array}{r} 11.2 \\ 8.7 \\ +12.8 \\ \hline 32.7 \end{array}$	$\begin{array}{r} 2.8 \\ 7.8 \\ +12.8 \\ \hline 23.4 \end{array}$	7.0	33.2
$\begin{array}{r} 17.8 \\ 17.8 \\ \hline 35.6 \end{array}$	$\begin{array}{r} 17.2 \\ 17.2 \\ \hline 34.4 \end{array}$	$\begin{array}{r} 8.1 \\ 7.5 \\ +0.4 \\ \hline 16.0 \end{array}$	$\begin{array}{r} 2.4 \\ 10.7 \\ +2.2 \\ \hline 15.3 \end{array}$	6.3	33.8
$\begin{array}{r} 33.1 \\ 33.1 \\ \hline 66.2 \end{array}$	$\begin{array}{r} 24.3 \\ 2.0 \\ +10.3 \\ \hline 36.6 \end{array}$	$\begin{array}{r} 6.7 \\ 6.8 \\ -0.9 \\ \hline 2.6 \end{array}$	$\begin{array}{r} 9.2 \\ 7.3 \\ -0.5 \\ \hline 6.0 \end{array}$	5.9	33.8
$\begin{array}{r} 33.5 \\ 33.5 \\ \hline 67.0 \end{array}$	$\begin{array}{r} 8.5 \\ 9.2 \\ +10.2 \\ \hline 27.9 \end{array}$	$\begin{array}{r} 5.2 \\ 5.1 \\ -0.1 \\ \hline 10.2 \end{array}$	$\begin{array}{r} 6.3 \\ 6.3 \\ \hline 12.6 \end{array}$	5.9	35.5
$\begin{array}{r} 4.6 \\ 4.6 \\ \hline 9.2 \end{array}$	$\begin{array}{r} 6.8 \\ 10.0 \\ +10.9 \\ \hline 27.7 \end{array}$	$\begin{array}{r} 7.2 \\ 5.1 \\ -0.4 \\ \hline 11.9 \end{array}$	$\begin{array}{r} 9.6 \\ 9.6 \\ \hline 19.2 \end{array}$	8.9	36.9
$\begin{array}{r} 33.7 \\ 33.7 \\ \hline 67.4 \end{array}$	$\begin{array}{r} 8.2 \\ 3.8 \\ +1.8 \\ \hline 13.8 \end{array}$	$\begin{array}{r} 7.4 \\ 7.4 \\ -0.4 \\ \hline 14.4 \end{array}$	$\begin{array}{r} 7.7 \\ 7.7 \\ \hline 15.4 \end{array}$	6.7	39.1
$\begin{array}{r} 33.6 \\ 33.6 \\ \hline 67.2 \end{array}$	$\begin{array}{r} 2.0 \\ 10.0 \\ +10.0 \\ \hline 22.0 \end{array}$	$\begin{array}{r} 4.2 \\ 4.2 \\ +1.6 \\ \hline 9.8 \end{array}$	$\begin{array}{r} 4.3 \\ 8.1 \\ \hline 12.4 \end{array}$	4.5	48.3

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		946.48 946.78			
T.P.	9.92	955.80 ✓	0.60	945.88 ✓	
+50				943.90	11.9 ✓
137				45.20	10.6 ✓
+55				45.70	10.1 ✓
B.M.	9.58	955.73 ✓	7.04	948.16 ✓	948.15 ✓
138				45.90	7.6 ✓
T.P.	3.46	948.17 ✓	11.02	944.71 ✓	
+60				45.12	3.1 ✓
139				44.1	4.1 ✓
+60				42.3	5.9
140				41.3	6.9 ✓
+40				40.4	7.8 ✓
141				39.5	8.7 ✓
T.P.	9.27	948.18 ✓	9.29	938.91 ✓	
+50				39.1	9.1 ✓

Inst.
Rod.
Chain.

C L

Right

53/25	$\begin{array}{r} 7/2.7 \\ 2/14.2 \end{array}$	$\begin{array}{r} 11/8.6 \\ 1/7.6 \end{array}$	$\begin{array}{r} +72-5.4 \\ 09.6 \\ 8/10.4 \\ 10.0 \\ 11.9 \end{array}$	(11.9)	$\begin{array}{r} 72-5.4 \\ 8/10.6 \\ 9/11.0 \\ 12/11.6 \\ 2/14.2 \end{array}$	$\begin{array}{r} x \\ 2/11.7 \\ 33/13.0 \end{array}$	45.8
53/45	$\begin{array}{r} 4/5.0 \\ 2/7.56 \end{array}$	$\begin{array}{r} 14/4.8 \\ 1/7.8 \end{array}$	$\begin{array}{r} x+50-5.5 \\ 07.8 \\ 7/9.3 \end{array}$	(10.6)	$\begin{array}{r} 50-5.5 \\ 08.0 \\ 12/12.8 \\ 2/12.0 \end{array}$	$\begin{array}{r} x \\ 25/8.6 \\ 33/12.1 \end{array}$	48.4
53/1.9	$\begin{array}{r} 6/1.5 \\ 2/7.86 \end{array}$	$\begin{array}{r} 15/5.2 \\ 1/7.42 \end{array}$	$\begin{array}{r} +26-5.5 \\ 05.6 \\ 7/5.9 \\ 7.51 \end{array}$	(10.1)	$\begin{array}{r} 26-5.5 \\ 11/5.9 \\ 2/14.0 \end{array}$	$\begin{array}{r} x \\ 2/16.7 \\ 31/12.1 \\ 2/12.6 \end{array}$	50.8
53/1.8	$\begin{array}{r} 2/11.9 \\ 2/17.9 \end{array}$	$\begin{array}{r} 2/12.0 \\ 1/12.1 \end{array}$	$\begin{array}{r} +07-5.5 \\ 07.6 \\ 10/9.7 \\ 12.1 \end{array}$	(9.8)	$\begin{array}{r} -07-5.5 \\ 14/8.4 \\ 2/11.6 \end{array}$	$\begin{array}{r} x \\ 2/10.1 \\ 2/11.8 \\ 2/11.9 \end{array}$	48.3
53/1.0	$\begin{array}{r} 2/11.9 \\ 2/11.2 \end{array}$	$\begin{array}{r} 17/1.8 \\ 2/4.6 \end{array}$	$\begin{array}{r} x \\ 2/4.6 \\ 11/5.3 \end{array}$	(3.1)	$\begin{array}{r} 4.2 \\ -1.7 \end{array}$	$\begin{array}{r} 10/3.6 \\ 2/6.6 \\ -3.5 \\ 22/9.1 \\ 33/13.3 \end{array}$	48.4
53/7.2	$\begin{array}{r} 2/5.6 \\ 2/1.5 \end{array}$	$\begin{array}{r} 17/6.9 \\ 1/1.7 \end{array}$	$\begin{array}{r} 10/7.2 \\ 6.2 \\ -2.1 \end{array}$	(4.1)	$\begin{array}{r} 8/6.9 \\ 12/7.3 \\ 1/7.4 \\ 1/-3.3 \end{array}$	$\begin{array}{r} x \\ 22/7.7 \\ 3/13.2 \end{array}$	42.0
53/6.5	$\begin{array}{r} 10/2.0 \\ 12/2.1 \end{array}$	$\begin{array}{r} 10/2.5 \\ 7.5 \end{array}$	$\begin{array}{r} 8/7.8 \\ 22/8.4 \end{array}$	(5.9)	$\begin{array}{r} 33/17.0 \end{array}$	40.7	
53/6	$\begin{array}{r} 0/3.9 \\ 2/1.00 \end{array}$	$\begin{array}{r} 12/7.2 \\ 12/8.5 \end{array}$	$\begin{array}{r} -0.1-5.5 \\ 9/8.0 \\ 7.7 \\ -0.8 \end{array}$	(6.9)	$\begin{array}{r} 10.4-5.5 \\ 8/8.0 \\ 12/7.7 \\ 10/8.6 \end{array}$	$\begin{array}{r} x \\ 2/13.0 \\ 2/15.1 \\ 2/15.9 \end{array}$	40.6
53/5.4	$\begin{array}{r} 1/6.4 \\ 2/11.4 \end{array}$	$\begin{array}{r} 9/7.0 \\ 13/7.0 \end{array}$	$\begin{array}{r} -0.2-5.4 \\ 5/8.4 \\ 8.0 \\ -0.2 \end{array}$	(7.8)	$\begin{array}{r} 2.2-5.5 \\ 7/8.6 \\ 15/7.3 \end{array}$	$\begin{array}{r} x \\ 6/16.0 \\ 23/17.5 \\ 3/15.8 \end{array}$	40.2
53/5.6	$\begin{array}{r} 2/13.6 \\ 2/15.1 \end{array}$	$\begin{array}{r} 9/4.0 \\ 1/7.1 \end{array}$	$\begin{array}{r} -0.47-5.5 \\ 5/9.5 \\ 8.7 \\ -0.5 \end{array}$	(8.7)	$\begin{array}{r} +0.47-5.5 \\ 7/9.4 \\ 11/9.0 \end{array}$	$\begin{array}{r} x \\ 11/13.6 \\ 2/16.5 \\ 2/16.8 \end{array}$	39.5
53/5.8	$\begin{array}{r} 2/14.6 \\ 2/14.6 \end{array}$	$\begin{array}{r} 14/10.3 \\ 1/10.3 \end{array}$	$\begin{array}{r} -0.68-5.4 \\ 11/10.3 \\ 7.7 \\ -0.5-0.4 \end{array}$	(9.7)	$\begin{array}{r} +0.68-5.4 \\ 8/10.1 \\ 11/10.6 \end{array}$	$\begin{array}{r} x \\ 23/16.0 \\ 5/16.4 \\ 2/17.5 \end{array}$	38.5

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		748.18	✓		
142				958.9	9.3 ✓
	+64 ²			38.5	9.7 ✓
T.P.	4.84	948.44	✓	943.78	✓
143				58.4	10.2 ✓
	+70 ⁴			38.0	10.6 ✓
144				37.7	10.7 ✓
T.P.	7.19	944.91	✓	937.72	✓
	+50			37.6	7.3 ✓
	+85 ²			57.0	7.3 ✓
145				37.6	7.3 ✓
	+76 ²			38.7	6.2 ✓
146				59.3	5.6 ✓
	+67 ²			41.7	3.2 ✓
T.P.	5.14	947.48	✓	942.32	✓
147				43.2	4.3 ✓

Inst. *Gravimetric*
 Rod. *Parsons*
 Chain. *Nahansy*

Left	CL	Right	
33/37 x 4/5.3 6/7.4 11/9.0 10/10.7 10.5 11/10.3 12/10.3 9/10.4 22/11.9 33/12.1	-0.74 - S.E. (9.3) +0.77 - S.E.		\$7.7
33/43 x 5/5.5 +4.2 11/8.0 11/11.2 8/10.9 10.5 9/11.1 13/11.1 10/11.1 3/14.1 33/15.3	-0.53 - S.E. (9.7) +0.53 + S.E.		37.7
40/44 x 4/6.2 2/4.0 11/6.2 4/9.3 11/12.0 11/11.5 11.2 3/11.9 4/12.0 17/13.1 2/15.9 33/17.7	+0.17 - S.E. (10.2) -0.17 - S.E.		37.4
33/61 x 2/7.2 2/3.4 11/10.0 14/10.3 10/12.0 10/11.0 11.7 7/12.0 11/12.0 15/14.5 9/15.1 33/17.1	+0.53 - S.E. (10.6) -0.53 - S.E.		37.2
33/59 x 2/8.2 2/13.8 11/9.5 11/10.3 11/12.0 11/11.4 11.3 11/12.5 15/14.4 8/15.2 33/17.1	+0.66 - S.E. (10.1) -0.66 - S.E.		37.3
33/55 x 1/15.2 +7.1 17/6.5 9/7.2 11/8.0 9/8.2 7.0 9/9.1 11/9.0 6/11.1 33/13.3	+0.68 - S.E. (10.3) -0.68 - S.E.		36.9
33/53 x 2/14.0 2/13.5 11/4.7 11/7.0 12/8.3 11/7.8 7.7 11/8.9 11/10.0 17/11.1 22/12.0 33/13.3	+0.53 - S.E. (10.3) -0.53 - S.E.		37.1
33/55 x 2/14.8 2/12.5 11/4.7 11/7.0 12/8.3 11/7.8 7.7 11/8.9 11/10.0 17/11.1 22/12.0 33/13.3	+0.46 - S.E. (10.3) -0.46 - S.E.		37.1
33/60 x 11/4.0 11/4.7 11/7.0 12/8.3 11/7.8 7.7 11/8.9 11/10.0 17/11.1 22/12.0 33/13.3	+0.46 - S.E. (10.3) -0.46 - S.E.		37.1
33/58 x 2/14.0 2/13.0 11/5.2 15/7.2 11/7.7 10/7.4 7.0 10/7.6 13/9.1 5/9.9 33/11.0	0.00 - S.E. (10.2) -0.00 - S.E.		37.5
33/58 x 2/14.0 2/13.0 11/5.2 15/7.2 11/7.7 10/7.4 7.0 10/7.6 13/9.1 5/9.9 33/11.0	-0.36 - S.E. (10.6) +0.36 - S.E.		38.0
33/67 x 11/5.2 12/5.1 7/4.8 4.1 7/4.8 9/5.0 13/12.0 5/11.7 33/12.2	-0.53 (10.2) +0.53		40.8
33/60 x 2/14.0 2/13.4 11/5.2 12/5.1 7/4.8 4.1 7/4.8 9/5.0 13/12.0 5/11.7 33/12.2	-0.66 - S.E. (10.3) +0.66 - S.E.		41.5

71

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		747.48			
+50				946.0	1.5 ✓
T.P.	11.01	757.42	1.07	946.41	✓
148				49.52	2.1 ✓
+29 ^u				51.58	5.8 ✓
+50				53.2	4.2 ✓
T.P.	10.50	765.99	1.93	955.45	✓
+65				(57.4)	(11.6)
B.M.	7.42	766.04	7.42	958.57	758.62
149				57.4	8.6 ✓
+63 ^{2d}				62.6	3.4 ✓
T.P.	7.14	772.47	0.71	965.33	✓
150				44.7	7.6 ✓
+50				67.2	5.3 ✓
151				28.5	9.0 ✓
+37				(69.0)	(3.5)
152				67.7	2.6 ✓

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		972.47			
+60				(70.7)	(1.8)
T.P.	10.44	981.48	1.43	971.04	
153				971.3	10.2
+50				72.6	9.5
154				72.4	8.9
+50				72.9	8.6
155				73.7	9.8
T.P.	2.25	978.05	5.68	975.80	
+50				73.0	5.1
156				72.8	5.3
T.P.	4.24	973.83	8.44	969.61	
+55				72.4	12
157				72.5	1.3
B.M.	5.64	974.27	5.21	968.62	968.63
+60				72.5	1.8
158				72.5	1.8

Inst.
 Rod.
 Chain.

.....

Left	CL	Right	
	(1.8)		
53/1.2 15/1.9 10/2.2 8/1.9	1.7	7/2.0 33/2.7	70.8
	(10.2)		
33/9.2 20/7.8 12/10.0 9/10.2	10.2	4/10.2 8/9.7 11/10.8 3/10.9 4/10.8 5/11.0	71.3
	(9.5)		
37/0 12/7.3 15/7.4 10/8.0 8/8.3	8.3	4/8.4 6/8.1 12/8.6 10/8.8 33/9.5	73.2
	(8.9)		
33/4.1 5/3.8 15/4.4 7/5.7	5.6	4/5.9 7/5.7 7/6.0 11/5.0 9/5.1 33/5.5	75.9
	(4.6)		
4/4.2 12/4.1 14/3.8 14/4.3 10/4.4	4.4	4/4.6 6/4.5 8/4.2 10/2.0 10/1.7	77.1
	(7.4)		
33/9.8 9/7.9 10/7.4 10/6.9 13/7.0 7/6.5	6.0	5/6.3 7/6.3 10/6.4 12/4.0 15/3.9 5/2.5 15/2.0	75.5
	(5.1)		
33/9.3 6/6.5 9/5.7 11/6.0	5.1	10/5.4 15/3.0 12/2.3 33/1.3	73.0
	(5.3)		
8/11.8 5/11.0 14/7.8 10/7.8	7.1	5/7.5 9/7.8 12/7.9 14/7.3 6/7.3 22/7.2	71.0
	(1.2)		
3/2.7 3/2.0 10/2.4 7/2.9 6/2.7	2.4	8/2.8 7/2.5 12/6.0 7/6.5 33/4.3	69.4
	(1.3)		
33/5.7 6/6.2 4/6.4 10/5.0 6/4.9	4.9	6/5.2 14/6.6 6/7.3 33/7.4	69.0
	(157+80)		
4.5 17/5.7 15/5.8 13/5.7 11/4.8 6/4.8 4.5	4.5	7/5.4 10/6.0 11/6.5 7/6.3 33/6.6	69.8
	(1.4)		
33/2.5 15/2.5 13/4.5 7/3.5 5.5	5.5	10/4.3 5/3.0 8/2.8 8/3.0 33/3.5	71.1

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		974.27 ✓			
T.P.	7.74	980.59 ✓	1.62	972.45 ✓	
+60				972.6	8.0 ✓
159				72.6	8.0 ✓
T.P.	3.71	975.91 ✓	8.07	972.50 ✓	
+50				72.7	3.2 ✓
160				72.7	3.2 ✓
T.P.	4.60	976.57 ✓	3.94	971.97 ✓	
+50				72.8	3.8 ✓
T.P.	4.92	977.50 ✓	3.97	972.58 ✓	
161				72.6	4.7 ✓
T.P.	1.91	977.52 ✓	1.89	975.61 ✓	
+50				72.85	4.6 ✓
162				72.9	4.6 ✓
T.P.	6.37	978.77 ✓	5.10	972.42 ✓	
+50				73.2	5.4 ✓
163				74.1	4.7 ✓
+55				75.8	3.0 ✓
T.P.	9.78	987.25 ✓	1.32	997.47 ✓	

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		987.25	✓		
164				777.4	9.7
+50				79.9	17.4
165				82.2	5.1
+50			✓	84.3	3.0
B.M.	10.88	993.62	4.50	982.75	982.74
166				85.9	9.7
+50				87.0	6.9
167				87.7	5.9
+50				87.83	5.8
168				87.4	6.0
+25 ²				87.35	6.2
169			✓	86.6	7.0
T.P.	3.41	990.82	6.21	987.41	✓
+37				84.2	7.6

Sta.	B. S.	Cross Sections			Grade	Gr. R.
		H. I.	F. S.			
		274.12				
170					785.6	5.20
	+50				85.1	5.90
171					84.6	6.20
T.P.	2.55	787.01	4.34		914.46	
	+47 ²⁰	+42 ²⁹			84.1	2.90
172					83.6	3.40
	+24 ⁰⁷				83.36	3.60
173					82.4	4.4
150					82.9	4.7
174					82.5	4.5
150					83.0	4.0
175					84.0	3.0
P.M.	6.25	788.90	4.34		782.67	782.66
	+50				85.4	3.5

Void See loose
 prof notes.

Inst.
Rod.
Chain.

.....

Left

C L

Right

33/6.3	1/26.0 0.57 -0.2	2/5.4 6/5.4 +0.2	5.0 10/4.7 +0.2	5.0 10/4.7 +0.2	7/0.74 -5.4 +0.74 -5.4	10/5.3 6/4.9 -0.4	7/4.2 9/3.7 +1.3	33/3.2	85.8
1/6.5	1/26.4 -0.7	12/4.4 12/5.9 +0.5	7/4.0 7/4.0 -0.1	5.5 12/5.6 -0.6	7/0.74 -5.4 +0.74 -5.4	10/5.8 8/5.0 +0.6	6/5.1 33/4.4	33/3.1	85.0
32/7.0	1/26.8 -0.6	15/4.8 10/6.4 +0.8	9/4.6 9/4.6 -0.1	6.5 9/6.5 -0.1	0.74 -5.4 +0.74 -5.4	9/6.5 14/7.4 -0.9	15/6.2 5/5.7 +0.5	33/5.6	84.5
3/5.0	3/4.1 -1.2	15/5.4 11/5.7 -0.3	10/5.3 10/5.3 -0.4	5.3 10/5.3 -0.4	12/1+15.0 10.53 -5.4	14/8.9 14/8.9 -0.9	33/2.7 2.9 +0.1	33/3.1	83.7
3/5.9	8/5.3 -1.9	11/4.4 12/4.3 -0.1	7/4.2 7/4.2 -0.4	3.6 7/4.2 -0.4	0.18 -5.4 +0.18 -5.4	14/4.4 13/4.2 -1.2	14/4.4 10/3.5 -0.1	33/3.1	83.2
3/6.3	2/5.4 -0.2	13/4.5 12/4.5 -0.9	7/4.4 7/4.4 -0.4	4.0 8/4.4 -0.4	0.0 -5.4 +0.0 -5.4	5/4.6 15/4.0 -1.0	20/3.6 2.0 +0.0	33/2.9	83.0
3/7.2	1/27 -0.5	14/5.4 12/5.4 -0.3	7/5.2 7/5.2 -0.3	4.7 7/5.2 -0.3	0.54 -5.4 -0.54 -5.4	13/5.1 13/4.5 -0.6	2/6.3 1.4 +0.4	33/3.1	
3/6.9	2/6.8 -1.1	14/5.7 14/5.7 -0.5	8/4.9 8/4.9 -0.5	5.2 6/5.3 -0.5	-0.74 -5.4 -0.74 -5.4	6/5.0 12/4.9 -0.4	5/5.2 33/3.8 +0.5	33/3.8	
3/5.0	30/5.3 -1.0	19/5.5 15/5.2 -0.2	10/5.1 10/5.1 -0.9	4.4 10/5.1 -0.9	0.74 -5.4 +0.74 -5.4	12/5.2 12/5.0 -0.5	5/5.0 33/4.9 -0.5	33/4.9	
3/5.8	3/5.5 -1.5	15/5.4 15/5.4 -2.1	12/5.4 12/5.4 -1.2	7.2 12/5.4 -1.2	0.74 -5.4 +0.74 -5.4	12/5.2 12/5.0 -0.6	3/5.0 3/5.0 -0.8	3/5.0	
3/4.7	3/5.2 -1.8	11/5.1 11/5.1 -1.8	6/4.9 6/4.9 -1.8	4.4 6/4.9 -1.8	0.74 -5.4 -0.74 -5.4	12/5.2 12/5.0 -0.6	3/5.0 3/5.0 -0.8	3/5.0	
3/4.7	1/4.2 -0.9	15/4.1 11/3.8 -1.1	6/4.7 6/4.7 -0.9	4.4 6/4.7 -0.9	0.74 -5.4 +0.74 -5.4	12/5.2 12/5.0 -0.8	1/4.3 3/3.7 -0.8	3/3.7	

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		988.90			
T.P.	4.77	995.15	0.52	988.38	✓
174				987.3	7.9
<i>Void</i>					
174				88.7	6.2
T.P.	6.00	998.58	2.57	992.52	✓
177				91.3	7.3 ✓
150				93.4	5.2 ✓
T.P.	4.77	1000.09	3.24	995.32	✓
178				94.4	5.7 ✓
T.P.	5.55	1002.72	2.72	997.37	✓
177				96.7	6.0 ✓
T.P.	5.69	1005.47	2.92	997.50	✓
180				998.9	6.6 ✓
160				1000.2	5.3 ✓
181				60.7	4.8 ✓
T.P.	4.40	1006.37	3.50	1001.97	✓
150				1008.4	6.0 ✓
182				997.4	7.0 ✓
T.P.	2.74	1004.32	4.81	1001.58	✓

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		1004.32			
+50				977.4	6.9 ✓
T.P.	6.03	1001.30	7.05	975.27	
183				950	6.9 ✓
T.P.	4.45	997.07	8.68	972.62	
+50				92.6	4.5 ✓
T.P.	1.22	994.97	3.30	993.77	
184				90.2	+8 ✓
+30				89.0	6.0
+55				88.2	6.8 ✓
185				87.4	7.4 ✓
T.P.			8.17	980.12	
T.P.	0.65	984.25	11.39	983.60	
184+30				89.0	+4.7
184+55				88.2	+1.9 ✓
185				87.4	+3.1 ✓
T.P.			0.65	983.60	
T.P.	0.28	986.40		986.12	
185+50				87.4	+1.0 ✓

Inst.
Rod.
Chain.

Left

C L

Right

$\frac{33}{4.0}$ $\frac{9.5}{2.7}$ $\frac{12.5}{5.9}$ $\frac{4}{6.4}$ $\frac{3}{5.6}$ $\frac{6.2}{7.7}$ $\frac{4}{4.4}$ $\frac{9}{6.0}$ $\frac{1}{7.7}$ $\frac{1}{2.2}$ $\frac{23}{1.9}$
 173.5 155.7 125.9 $4/6.4$ $3/5.6$ 6.2 $4/4.4$ $9/6.0$ $1/7.7$ $1/2.2$ $23/1.9$

98.1
97.9

$\frac{15.1}{19.5.2}$ $\frac{21.3}{17.6.3}$ $\frac{12.1}{11.1}$ $\frac{10}{6.4}$ $\frac{10}{6.6}$ $\frac{4}{6.1}$ $\frac{6.5}{-0.3}$ $\frac{3}{6.6}$ $\frac{9}{6.0}$ $\frac{1}{3.0}$ $\frac{1}{1.6}$ $\frac{33}{1.4}$
 173.5 176.3 $121/6.4$ $10/6.6$ $4/6.1$ 6.5 $3/6.6$ $9/6.0$ $1/3.0$ $1/1.6$ $33/1.4$

94.8

$\frac{15.6}{8.1}$ $\frac{11.5}{8.1}$ $\frac{10.5}{1.3}$ $\frac{10.5}{-2.9}$ $\frac{9}{5.4}$ $\frac{9}{5.0}$ $\frac{5.1}{-0.4}$ $\frac{12.5}{-0.4}$ $\frac{6}{4.9}$ $\frac{17}{7.0}$ $\frac{3}{3.2}$ $\frac{33}{2.6}$
 15.6 11.5 10.5 $9/5.4$ $9/5.0$ 5.1 12.5 $6/4.9$ $17/7.0$ $3/3.2$ $33/2.6$

91.0

Nail in fence Post 1.9
 $\frac{3.4}{2.1}$ $\frac{2.4}{1.9}$ $\frac{8.6}{1.1}$ $\frac{12}{6.2}$ $\frac{10}{5.7}$ $\frac{5.5}{-0.7}$ $\frac{5}{5.7}$ $\frac{8}{5.7}$ $\frac{5}{6.4}$ $\frac{8}{6.9}$ $\frac{3}{5.9}$

89.5

$\frac{17}{11.4}$ $\frac{12}{6.2}$ $\frac{8}{2.0}$ $\frac{6.7}{-0.28-3.6}$ $\frac{10}{2.2}$ $\frac{17}{2.9}$ $\frac{4}{2.4}$ $\frac{33}{8.1}$

88.3

$\frac{11}{12.9}$ $\frac{7}{8.0}$ $\frac{7}{-0.9}$ $\frac{7}{8.1}$ $\frac{11}{2.5}$ $\frac{17}{2.9}$ $\frac{28}{9.9}$ $\frac{33}{2.7}$

87.3

$\frac{7}{19.5}$ $\frac{9.0}{-1.4}$ $\frac{3}{8.6}$ $\frac{10}{2.3}$ $\frac{13}{19.0}$ $\frac{9}{11.7}$ $\frac{30}{12.9}$

86.0

On Stake

On Rock

$\frac{39}{4.0}$ $\frac{15}{2.2}$ **(+4.7)**

$\frac{63}{4.9}$ $\frac{53}{11.4}$ $\frac{24}{5.7}$ $\frac{17}{5.8}$ **(+3.9)**

$\frac{40}{11.9}$ $\frac{53}{10.9}$ $\frac{27}{8.7}$ **(+3.1)**

On Stake

$\frac{3}{2.5}$ $\frac{3}{5.9}$ $\frac{1}{6.8}$ $\frac{2}{2.8}$ $\frac{0.8}{-1.8}$ $\frac{6}{2.4}$ $\frac{13}{2.3}$ $\frac{4}{2.5}$ $\frac{6}{2.7}$ $\frac{11}{5.7}$ $\frac{8}{4.6}$

85.6

Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		986.40			
T.P.	4.60	990.09	0.71	985.79	
186				988.4	1.7
T.P.	7.10	996.03	1.16	988.73	
+50				899	6.1
B.M.	4.31	996.70	5.65	990.38	990.3
187				91.4	5.3
+30				92.3	4.4
T.P.	4.64	999.97	1.37	995.33	
+50				92.9	7.1
T.P.	8.12	1003.89	4.22	995.75	
188				94.4	9.5
T.P.	4.97	1001.24	7.58	996.29	
+60				96.0	5.3
189				96.9	4.4
T.P.	6.42	1005.95	1.73	999.53	
+57				92.0	8.0
190				98.4	7.4
T.P.	5.99	1008.53	3.41	1002.54	
+55				99.2	7.3

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		1002.53			
191				999.4	9.1
T.P.	4.18	1003.16	9.55	997.98	
+57				99.4	3.1
192				97.2	4.0
+65				98.8	4.7
193				98.6	4.6
T.P.	2.24	1101.94	4.04	999.10	
194				98.0	3.5
+54				97.7	3.6
T.P.	5.00	1006.11	5.23	996.11	
195				99.4	3.7
+50				97.1	7.0
+85				96.9	4.2
T.P.	12.05	1109.85	3.31	997.80	
195				99.4	12.5
195+50				97.1	12.8

Cross Sections

Sta.	B. S.	H. L.	F. S.	Grade	Gr. R.
		1009.85			
195+85				996.9	130 ✓
T.P.	3.29	1006.09	12.05	997.80 ✓	
196				96.8	4.3 ✓
197				90.2	4.9 ✓
T.P.	11.75	1009.27	5.57	995.52	
+60				95.8	11.5 ✓
198				95.4	11.7 ✓
+50				95.3	12.0 ✓
T.P.			1.74	1005.83	
T.P.	3.75	1006.72	7.40	997.87 ✓	
199				95.0	4.7 ✓
+45				94.7	7.0 ✓
B.M.			7.21	994.51	994.47
T.P.	7.76	1013.59		1005.83	
199				95.0	18.6 ✓
T.P.			7.76	1005.83	
B.M.	3.85	998.32		994.47	
199+77				94.5	3.8

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		998.32			
200				974.4	3.9
+48				94.1	4.2
+80				93.7	4.4
+91				93.8	4.5
B.M.			3.85	974.47	974.4

Cross Sections

Sta.	B. S.	H. L.	F. S.	Grade	Gr. R.
B.M.	4.30	786.95 ✓			982.65
172+00	0.27			83.6	3.7
+50	0.0			83.1	3.9
173+00	0.1			82.6	4.4
+50	0.44			82.45	4.5
174+00 ³	P.C. 0.53			82.60	4.8
+50	0.8			83.00	7.0
175+00	0.8			83.80	3.2
T.P.	5.68	788.93 ✓	7.30		982.65
+52 ³⁵	P.T. 0.53			84.9	3.4
176+00	0.44			86.2	2.1
T.P.	6.70	789.36 ✓	0.67	787.64 ✓	
+54 ²³	= 176+13.05			88.0	4.4
176+40	0.0			88.9	

Inst.
 Rod.
 Chain.

Left

G L

Right

1924 Cottonwood, A. Sta 175+00

5.9 $\frac{4}{50}$ 17/40 $\frac{9}{4.8}$ $\frac{6}{4.2}$ $\frac{3}{6}$ $\frac{10}{4.3}$ $\frac{3}{0.38}$ $\frac{20}{0.34}$ $\frac{33}{3.0}$ 83.3

6.5 $\frac{3}{56}$ $\frac{17}{56}$ 17/4.9 $\frac{9}{4.8}$ $\frac{4}{4.6}$ 4.2 $\frac{4}{4.5}$ $\frac{7}{4.5}$ $\frac{13}{4.9}$ $\frac{13}{4.6}$ $\frac{14}{4.4}$ $\frac{20}{4.8}$ 82.7

7.4 $\frac{17}{6.4}$ $\frac{10}{5.8}$ $\frac{5}{5.3}$ $\frac{4}{4.9}$ $\frac{4}{7}$ $\frac{6}{4.8}$ $\frac{9}{5.3}$ $\frac{10}{4.5}$ $\frac{2}{4.0}$ $\frac{33}{5.1}$ 82.2

7.5 $\frac{9}{6.7}$ $\frac{1}{6.6}$ $\frac{5}{5.9}$ $\frac{5}{5.5}$ $\frac{5}{5.0}$ $\frac{6}{5.1}$ $\frac{7}{5.4}$ $\frac{9}{4.6}$ $\frac{33}{4.0}$ 81.9

7.6 $\frac{4}{7.0}$ $\frac{1}{6.9}$ $\frac{12}{5.8}$ $\frac{5}{5.7}$ $\frac{5}{5.2}$ $\frac{6}{5.3}$ $\frac{2}{5.7}$ $\frac{14}{5.3}$ $\frac{33}{5.1}$ 81.7

8 $\frac{5}{6.7}$ $\frac{23}{5.9}$ $\frac{4}{5.5}$ $\frac{11}{5.5}$ $\frac{5}{5.9}$ $\frac{9}{5.5}$ $\frac{15}{5.5}$ $\frac{33}{5.3}$ 81.0

8.3 $\frac{53}{5.6}$ $\frac{5}{4.0}$ $\frac{6}{4.6}$ $\frac{7}{4.7}$ $\frac{5}{5.2}$ $\frac{6}{5.3}$ $\frac{13}{5.4}$ $\frac{33}{5.4}$ 81.7

8.4 $\frac{33}{5.2}$ $\frac{22}{5.7}$ $\frac{7}{4.7}$ $\frac{4}{4.6}$ $\frac{5}{4.8}$ $\frac{7}{5.8}$ $\frac{15}{5.6}$ $\frac{33}{6.0}$ 83.7

8.5 $\frac{39}{12}$ $\frac{2}{1.9}$ $\frac{3}{2.8}$ $\frac{10}{2.7}$ $\frac{10}{2.7}$ $\frac{1.7}{-0.6}$ $\frac{5}{3.6}$ $\frac{4}{3.6}$ $\frac{18}{-0.1}$ $\frac{33}{4.3}$ 85.6

8.7 $\frac{6}{3.3}$ $\frac{10}{3.8}$ $\frac{17}{6.1}$ $\frac{3}{6.5}$ $\frac{5}{7}$ $\frac{7}{6.6}$ $\frac{7}{7.0}$ $\frac{9}{7.1}$ $\frac{18}{-0.1}$ $\frac{33}{7.6}$ 88.4

Inst.
Rad.
Chan.

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. No.

Inst.
Rod.
Chain.

45

.....

Left

C L

Right

Cross Sections

Sta. B. S. H. 4. F. S. Grade Gr. R.

Inst.
Rod.
Chain.

Left

C L

Right

Inst.
Rod.
Chain.

Left

G L

Right

10

Cross Sections

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

Inst.
Rod.
Chain.

48

Left

C L

Right

Cross Sections

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

Inst.
Rod.
Chain.

Left

C L

Right

Inst.
Rod.
Chain.

50

Left

C L

Right

Cross Sections

Sta.

B. S.

H. I.

F. S.

Grade

Gr. F

Inst.
Rod.
Chain.

51

Left

C L

Right

Inst.
Rod.
Chain.

.....

Left

G I

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. L. 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.

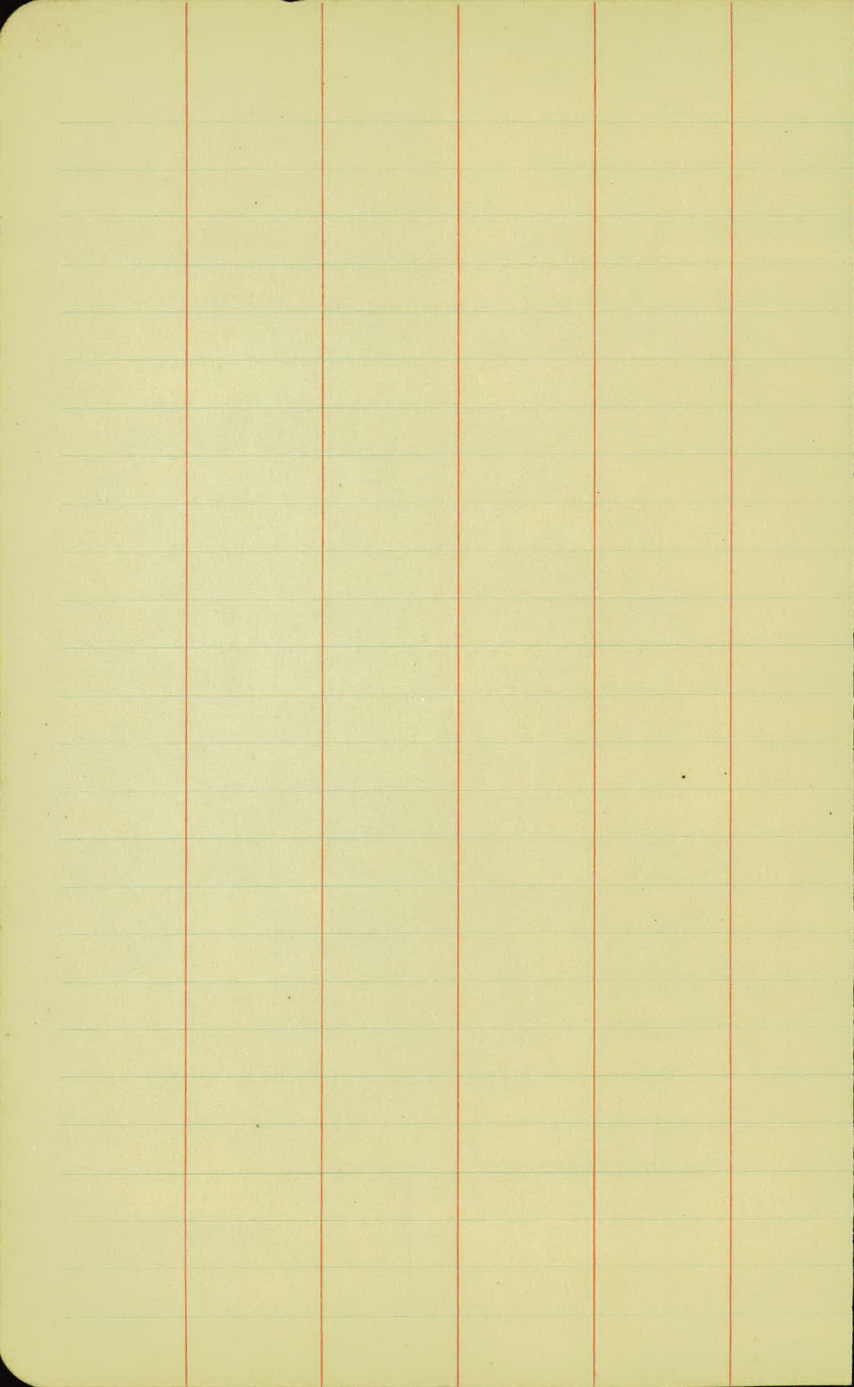
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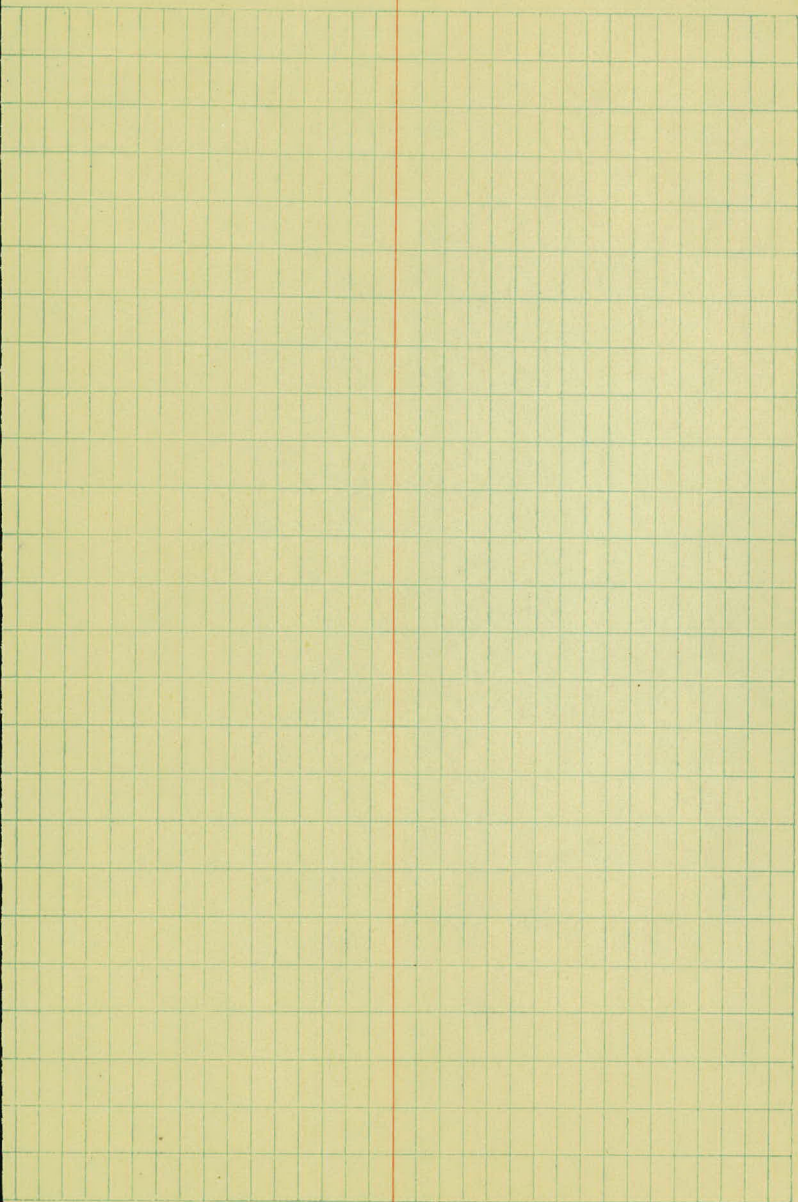
Left

C L

Right

The page contains a large grid of graph paper. A vertical red line runs down the center of the page, dividing it into two equal halves. The grid consists of 20 columns and 30 rows. The left half of the grid is labeled 'Left' and the right half is labeled 'Right'. The center line is labeled 'C L'. The grid is intended for recording data from a surveying instrument.





Sta.	Point	Lt.	Rt.
53+05 ^s	P.T.		Δ 1°-36'
52+25 ^s	P.I.	1°-36'	D. 1°-00' L. T. 80.0' L. 160.0'
51+45 ^s	P.C.		
46+28 ⁴⁵	P.O.T.		
35+94 ⁰⁵	P.O.T.		
25+79 ⁸	P.I.		0°-02'
0+00	Start		

51+45

52 0°-16'

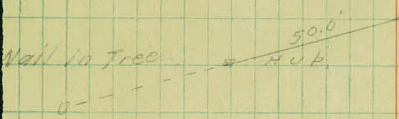
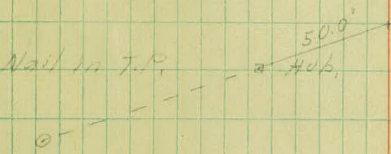
73.0 0°-31' F.P. 0 43.8

53 0°-46'

725 0°-48'

41.05 @ 10" Oak

T.P. 0 56.48'
Hub. 0 33.0'



See Profile

Sta.	Point	Lt.	Rt.
100+02 ⁶	P.T.		$\Delta 3^{\circ}-55'$ L.
99+53 ²	P.I.	$3^{\circ}-55'$	D. $4^{\circ}-00'$
			T. 48.98
99+04 ²²	P.C.		L. 97.91

Eg. 97+40²⁴ = 96+74⁴⁸ = 06 P.T.

96+39 ⁴⁰	P.T.		$\Delta 95^{\circ}-38'$ L.
			D. $55^{\circ}-00'$
95+85 ⁰	P.I.	$95^{\circ}-38'$	T. 119.41
			L. 173.87
94+65 ⁵²	P.C.		

91+42² P.O.T

89+64⁸ P.O.T.

+65²
 78+63⁴ P.I.
 P.O.T. $0^{\circ}-14'$

1000
9000
5.00

Sight on middle
Weather vain on Red Barn



344
100
3043

+50 0°-54 1/2'

180+100 1°-57 1/2'

Nail in 20" Oak

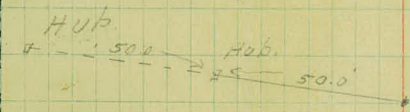
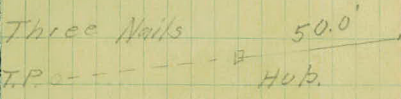
- 97+125⁵⁹
- 95 90°-27 5' 1.02 00-
- +50 23°-12 8' 1.47
- 90 36°-57 8' 1.47
- +39⁴⁰ 77°-49' 1.16



1000
1000
10.00



Nail in
Tree



Sta.	Point.	Lt.	Rt.
111+31 ⁷⁶	P.T.		Δ 23°-20' D. 15°-00' RT. T. 79.09 L. 155.55
110+55 ²	P.T.	23°-20'	
109+76 ²¹	P.C.		
105+44 ⁶⁹	P.T.		Δ 44°-00' D. 20°-00' RT.
104+40 ⁷	P.I.	44°-00'	T. 116.38 L. 220.00
103+24 ⁶⁷	P.C.		
102+22 ⁵⁹	P.T.		Δ 29°-00' L D. 20°-10'
101+52 ⁰³	P.I.	29°-00'	T. 94.47 L. 145.00
100+77 ⁵⁶	P.C.		

Hub
 50.0
 3 Nail in Oak

103+26²

110 1°-47'

+50 5°-32'

111 7°-17'

+31²⁶ 11°-40'

.11 Cor.

25.0'

* Hub.

103+24²²

+50 2°-32'

104 7°-32'

+50 12°-32'

105 17°-32'

+44²⁰ 22°-00'

.19 Cor.

100+77⁵⁶

101 2°-14 1/2'

+50 7°-14 1/2'

102 12°-14 1/2'

+22⁵⁶ 14°-30'

.19 Cor.

Sight in middle

Nail in oak on top of oak

50.0'

* Hub.

Sta.	Point	Lt.	Rt.
121+25 ⁸²	P.T.		$\Delta 15^{\circ}-00'$
			D. 12'-00' Lt.
120+65 ⁶	P.I.		$15^{\circ}-00'$
			T. 62.98
			L. 125 ²⁰
120+05 ⁸³	P.C.		
116+25 ³⁷	P.T.		$\Delta 14^{\circ}-10'$
			D. 10'-00' Lt.
115+55 ²	P.I.	$14^{\circ}-10'$	T. 71.3
			L. 141 ⁶⁷
114+83 ²	P.C.		
113+75 ³⁴	P.T.		$\Delta 31^{\circ}-20'$
			D. 18'-00' Rt.
			T. 89.63
113+10 ²	P.I.	$31^{\circ}-20'$	L. 174.07
112+20 ⁹⁷	P.C.		
112+21.5=			

Hub \square 28.58'

Hub \square 31.8'

120 + 100³²

+50 2°-59'

121 5°-59'

+25³³ 7°-30'

06 Cor.

114 + 33³²

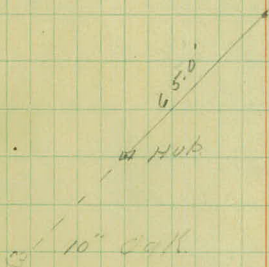
115 0°-49'

+50 3°-19'

116 5°-49'

+25³³ 7°-05'

05 Cor.



15 Cor.

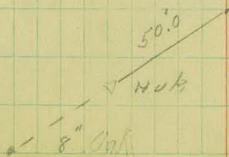
112 + 20³²

+50 2°-37'

113 7°-09'

+50 11°-37'

+95⁰⁴ 15°-40'



Sta	Point	Lt.	Rt.
127+56 ⁵⁰	P.T.		A 72°-50' P. 18°-00' R.
128+43 ²⁵	P.I.	42°-50'	T. 125 ³⁶ L. 237 ²⁰
127+18 ⁰	P.C.		
		27+18 ⁶ 40.5 ²⁴ 13 ³⁰	
127+05 ³⁵	P.T.		A 6°-20' P. 5°-00' R.
120+42 ⁰	P.T.	6°-20'	T. 63.4 L. 126.65
125+78 ⁰	P.C.		
123+52 ¹²	P.T.		A 47°-30' P. 22°-00' R.
144+47 ⁹	P.T.	49°-50'	T. 120.8 L. 225.0
121+27 ¹²	P.C.		

215 Cor.

127+18⁶

2" Oak 3 29.06

+50 2°-50'

128 7°-20'

+50 11°-50'

2" Oak 3 26.84

129 16°-20'

+50 20°-50'

+56⁵⁰ 21°-25'

2" Oak

135+78⁶

126 0°-32'

+50 1°-47'

127 3°-02'

+56²⁵ 3°-10'

Hub. 500



23 Cor.

121+27¹²

5" Poplar 3 17.91

+50 2°-31'

122 8°-51'

+50 13°-51'

4" Poplar 3 10.1

123 19°-01'

+52¹² 24°-45'

Sta. Point Lt. Pt.

Eg^o $\frac{144+125}{144+185} = \frac{43}{25}$ P.T.

$\Delta 23^{\circ}-00'$

$\frac{144+129}{+29^{\circ}}$ P.I.

$23^{\circ}-00'$

D. $20^{\circ}-00'$ R.

T. 58.58

L. 115.00

$\frac{143+70}{+2}$ P.C.

$\frac{142+47}{+2}$ P.T.

$\Delta 63^{\circ}-10'$

$\frac{142+00}{+2}$ P.I. $63^{\circ}-10'$

D. $42^{\circ}-00'$ L.

T. 85.7

L. 150.4

$\frac{141+14}{+3}$ P.C.

$\frac{136+92}{+2}$ P.T.

$\Delta 41^{\circ}-20'$

$\frac{135+52}{+4}$ P.I.

$41^{\circ}-20'$

D. $14^{\circ}-00'$ R.

T. 154.75

L. 295.44

$\frac{133+77}{+5}$ P.C.

141 to 8" Oak

143 + 70⁰²

19-cor

Hup.

144

2°-57⁵'

50.01

+50

7°-57⁵'

+85⁴³

11°-30'

141 + 14²

Cor, 0.85

+50

7°-30'

3 4" Oak, 24
30.4 37

3 8" Birch.

142

18°-00'

+50

18°-30'

+64³

31°-35'²⁴

12" Bl. Oak

33

55.70

24" Oak 3

18.98

133 + 97⁶⁵

09-cor

134 + 50

3°-40'

135

7°-10'

+50

10°-40'

136

14°-10'

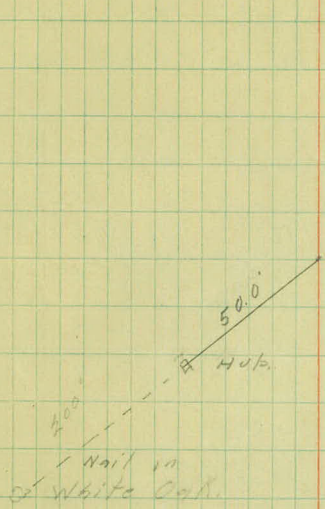
+50

17°-40'

+92⁹

20°-40'

Sta.	Point.	Lt.	Rt.
156+14 ⁸²	P.T.		Δ 11°-00'
177 ²			P. 4°-00' Lt.
154+77 ²	P.I.		11°-00' T. 137 ⁹³
			L. 275 ⁸⁸
153+39 ⁸³	P.C.		
149+63 ⁸⁴	P.T.		Δ 20°-55'
171 ⁵			P. 20°-00' Lt.
148+98 ³	P.I.	16°-55'	T. 68.9
			L. 134 ⁸⁸
148+29 ⁴	P.C.		
147+94 ⁵⁴	P.T.		Δ 36°-50'
			P. 29°-00' Lt.
147+34 ²	P.I.	36°-50'	T. 66 ⁴²
			L. 127 ⁰¹
146+67 ⁵³	P.C.		



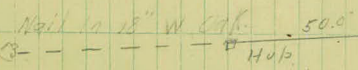
153+39 ⁰³	
+50	0°-13'
154	1°-13'
+50	2°-13'
155	3°-13'
+50	4°-13'
154	5°-13'
+14 ⁰⁰	5°-30'

01-Cor.

142+39 ⁴	17-Cor.
+50	2°-03'E
147	7°-03°
+50	12°-03°
+43 ²⁸	13°-26'E

39 ⁷²	4 F.P.
255 ²	Lowest Brick Gate Post.
	□
	□

W
7471
3470



146+67 ³³	04-Cor.
147	4°-43'
+50	11°-58'
+94 ⁵⁴	18°-25'

Sta.	Point	H.	RT.
171+49 ²⁷			
171+49 ²²	P.T.		A. 53°-10'
170+52 ⁷	P.I.	53°-10'	P. 25°-00' L
			T. 115 ⁶⁰
			L. 212 ⁶⁷
169+37 ¹	P.C.		
147+14 ³	P.T.		A. 31°-00'
			P. 10°-00' R
165+63 ⁴	P.I.	31°-00'	T. 159 ¹⁰
			L. 310 ⁰⁰
164+04 ²	P.C.		
160+78 ⁰⁵	P.T.		A. 40°-10'
			P. 20°-00' L
182 ⁷⁸			T. 105 ²⁸
159+82 ⁵	P.I.	40°-10'	L. 200 ⁵³
158+77 ³²	P.C.		

0.30 - Cor.

167+37'

+50

1°-55'

170

7°-50'

+50

14°-05'

171

20°-20'

+49²⁹

26°-35'

100⁰⁰

Hub

Hub About 100' from P.I.

0.15 Cor.

167+27³

+50

2°-17'

165

4°-47'

+50

7°-17'

166

9°-47'

+50

12°-17'

167

14°-47'

+14³

15°-30'

Nail in 6" W. Oak

50.0'

158+79²²

Nail in 18" Oak

159

2°-16.7'

+50

7°-16.7'

160

12°-16.7'

+50

17°-16.7'

+78²⁶

20°-05'

40.0'

Hub

Sta. Point Lt. Mt.

200785⁰ Iron Mont.

190717² P.O.T.

158722⁰¹ P.T.

187711³ P.I. 89°-33'

185715²² P.C.

190703³ P.O.T.

Eg. 175754²² = 176715⁰⁵

175752³⁵ P.T.

175702³ P.I.

174700¹³ P.C.

Δ 89°-33'

P. 29°-00'

T. 198⁰⁰

L. 308²³

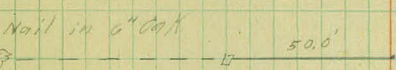
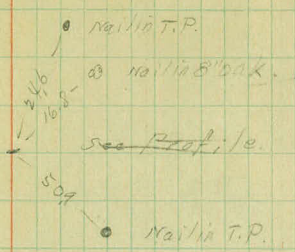
Δ. 91°-20'

P. 60°-00' N

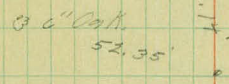
T. 102³⁷

L. 152²²

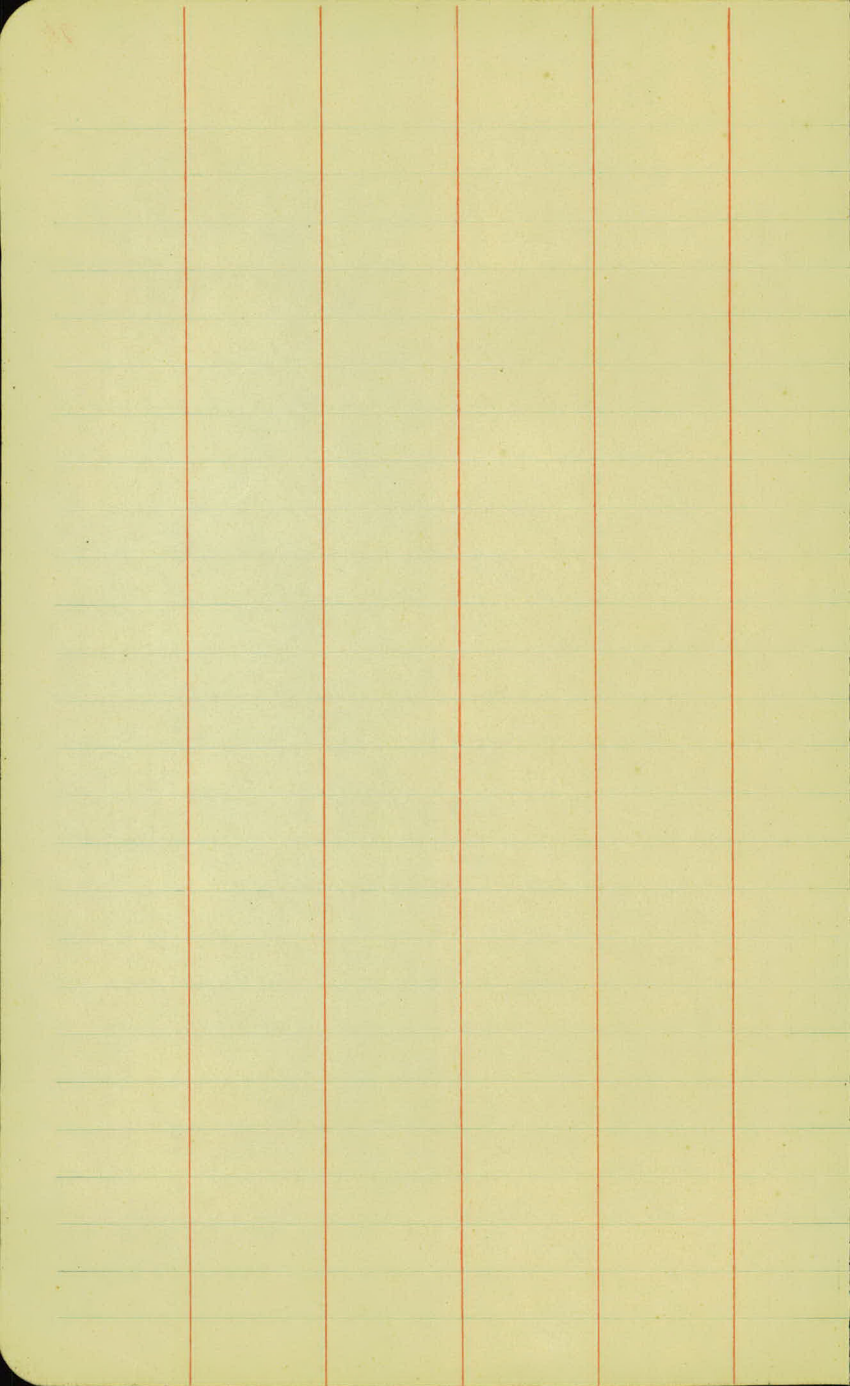
50
57
771 =

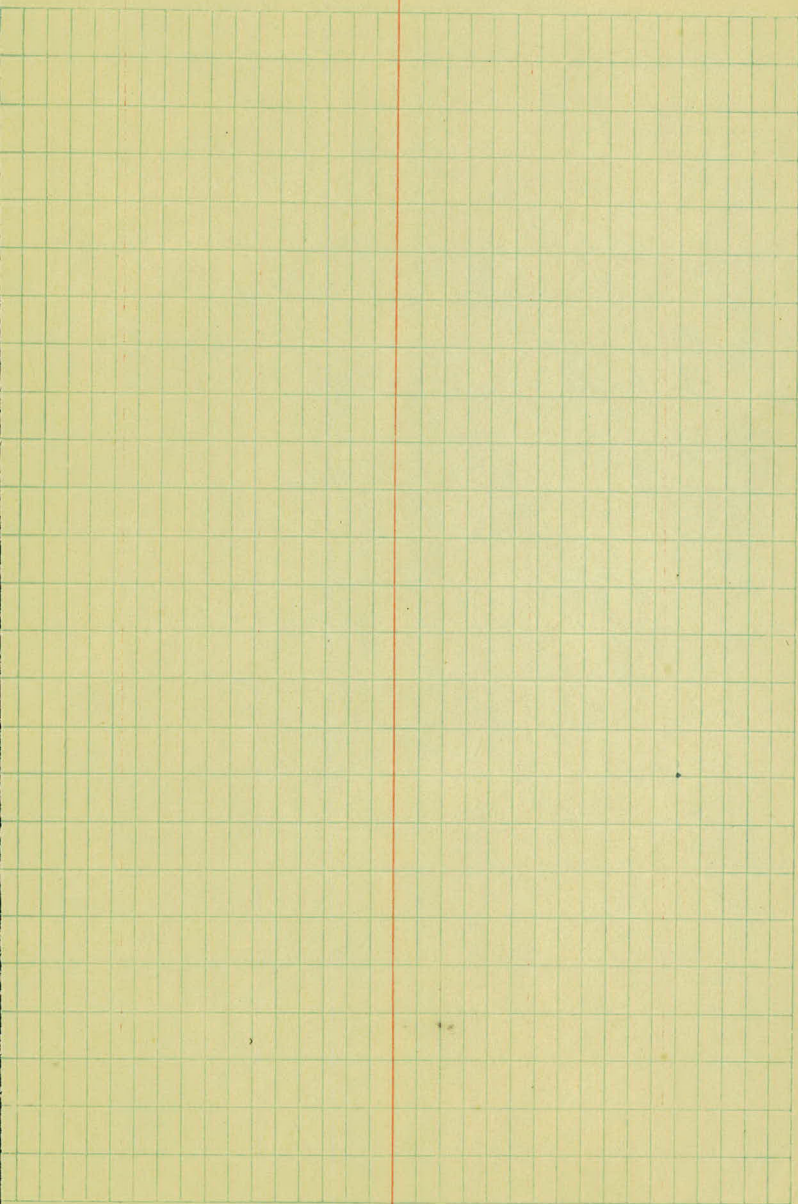


T.P.O.	185 + 13 ²²	0.40 - cor
	+ 50 ⁵⁷	5° - 20'
	186	12° - 35'
	+ 50	19° - 50'
	187	27° - 05'
	+ 50	34° - 30'
	188	41° - 35'
	+ 22 ⁰¹	47° - 46 ⁵



F.P.	177 + 00 ¹³	
	176	+ 50 - 14° - 57'
	176	175 - 29° - 57'
	1.83	+ 52 ⁵⁵ - 45° - 40'





H. L. Wilshusen.

Sta.	+	H.I.	-	Elev.	Plan Elev.
B.M.	6.22	997.39		991.17	991.17
T.P.	4.34	994.84	6.89	990.50	
T.P.	3.71	994.22	4.33	990.51	
B.M.			3.84	990.38	990.38
T.P.	4.36	992.15	6.43	987.79	
T.P.	4.32	987.28	9.17	982.96	
B.M.			2.46	984.82	984.82
T.P.	11.07	996.57	1.78	985.50	
B.M.	5.24	1000.01	1.84	994.72	994.75
T.P.	9.81	1008.62	1.20	998.81	
T.P.	11.38	1012.97	1.03	1007.59	
B.M.	3.39	1022.05	0.31	1018.66	
T.P.	2.91	1013.53	11.43	1010.62	
T.P.	5.31	1008.21	10.63	1002.70	
B.M.			3.68	1004.53	
T.P.	1.11	999.80	9.52	998.69	
T.P.	1.14	989.99	11.15	988.65	
B.M.			7.37	982.42	982.41
B.M.			1.68	988.11	
B.M.	5.10	987.51		982.41	
T.P.	3.99	984.51	6.99	980.52	
T.P.	3.08	978.76	8.83	975.68	
B.M.			1.17	977.59	
T.P.	4.04	976.21	6.59	972.17	
B.M.			2.62	973.59	973.58

Spl. in T.P. N.W. Cor. Co. Rd. C. 713

Spl. on Cor. of Sign Board 50' Lt. Sta. 10490

Spl. on 20" Cotton Wood 60' Rt. Sta. 22+00

Spl. in 30" Maple 30' Rt. Sta. 26+70

Nail in T.P. H. Sta. 34+50.

Nail in T.P. Lt. Sta. 43+55.

R.P. Spl. in P.P. 22' Rt. Sta. 50+17

Nail in Oak 55' Rt. Sta. 51+00

Spl. in Twin Oak 75' Rt. Sta. 62+50

Spl. in 15" Oak Rt. Sta. 71+05

STG.	+	H.I.	-	E/ct.	
		976.21			
T.P.	4.64	972.85	8.00	968.21	
B.M.			4.31	968.54	968.50
B.M.	9.19	977.69		968.50	
T.P.	9.84	985.97	2.06	975.63	
T.P.	10.91	995.29	1.07	984.38	
T.P.	9.32	1002.75	1.84	993.43	
B.M.			6.43	996.32	
T.P.	0.54	992.04	11.27	991.48	
T.P.	0.21	982.72	7.53	982.51	
T.P.	1.02	974.65	9.09	973.63	
T.P.	0.42	964.52	10.55	964.10	
T.P.	2.88	958.88	8.52	956.00	
B.M.			5.83	953.05	
T.P.	0.50	948.98	12.40	948.48	
B.M.	7.62	945.41	8.14	940.82	940.79
T.P.	1.45	941.69	5.17	940.24	
B.M.			3.34	938.33	
T.P.	4.73	944.44	2.14	939.53	
T.P.	2.44	941.55	5.37	939.09	
B.M.			3.75	937.60	937.59
B.M.	1.70	939.19		937.59	
T.P.	7.85	937.94	9.18	930.11	
B.M.			4.87	933.09	
T.P.	4.70	937.30	5.34	932.60	

Spl. in RR 75 Lt Sta 78+63

Spl. in Oak. 50' RR. Sta. 86+80.

Spl. in Oak. Rt Sta. 95+85.

Spl. 10 14" T. RR Sta. 100+13.

Nail in 20" Oak. Lt. Sta. 107+80.

Nail in 8" Twin Oak. 20' RR. Sta. 115+10.

Nail in 6" Poplar 35' Lt. Sta. 121+70.

Sta.	+	H.I.	-	Elev.	
		937.30			
B.M.	1.14	937.52	0.89	936.41	936.38
T.P.	2.24	941.11	4.65	932.87	
T.P.	11.21	952.10	0.82	940.29	
B.M.			3.95	948.15	
T.P.	1.85	942.85	11.10	941.00	
T.P.	9.72	946.57	0.00	936.85	
T.P.	11.43	954.89	1.11	945.46	
T.P.	7.75	962.88	1.99	954.73	
B.M.	4.72	965.34	4.24	958.62	958.62
T.P.	10.37	975.50	0.21	965.13	
T.P.	4.77	977.49	0.78	974.72	
T.P.	4.43	975.10	8.82	970.67	
B.M.			6.47	768.63	
T.P.	6.39	777.62	3.87	771.23	
T.P.	10.00	785.97	1.65	775.97	
B.M.			3.25	782.72	782.74

R.P. SpK. in 8" Oak 33' L. Sta. 127+40.

Nail in 14" Oak Pt. Sta. 137+40.

R.P. SpK. in 10" Oak 25' L. Sta. 149+00.

Nail in 15" Oak 75' Pt. Sta. 157+80.

77

6

x

5

x

4

3

x

2

5

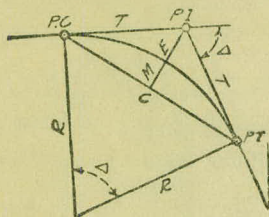
1

1

5200
10
32

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

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CURVE FORMULAS

Radius= $R = \frac{50}{\sin. D/2}$ (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) $= R \text{vers} \frac{\Delta}{2}$ (6)

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

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

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.=Sta. 161 + 60.35 to find Sta. of P. C. and P. T. $\Delta = 62^\circ 10'$ $D = 8^\circ 20'$. From Table IV for 1° curve $T = 3454.1$ and $+8\frac{1}{3} = 414.49$ 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 = $\frac{1}{2} D$ for 100 ft., $\frac{1}{4} D$ for 50 ft., etc. For c ft. = (in minutes) $.3 \times C \times D^\circ$ or = defl. for 1 ft. from Table III $\times C$. For Sta. 158 of above curve = $.3 \times 54.5 \times 8\frac{1}{3} = 136.2'$ or $2^\circ 16.2'$, or = $2.50 \times 54.5 = 136.2'$ from Table III. For Sta. 159 deflection angle = $2^\circ 16.2' + 8^\circ 20' \div 2 = 6^\circ 26.2'$, 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 $8^\circ 20' = 960.6 \div 8\frac{1}{3} = 91.27$ and from Table V correction = .10 or $E = 91.37$ ft. Or suppose $\Delta = 32^\circ$ and E is measured and found to be 42 ft. What is D ? From Table IV $E = 230.9$ and $\div 42 = 5.5$ or $D = 5^\circ 30'$.

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					
1		5729.65	.218	.873	0.30	8	716.78	1.746	6.976	2.40
	10	4911.15	.255	1.018	0.35	20	688.16	1.819	7.266	2.50
	20	4297.28	.291	1.164	0.40	30	674.69	1.855	7.411	2.55
	30	3819.83	.327	1.309	0.45	40	661.74	1.892	7.556	2.60
	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
2		2864.93	.436	1.745	0.60	30	603.80	2.074	8.281	2.85
	10	2644.58	.473	1.891	0.65	40	593.42	2.110	8.426	2.90
	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
3		1910.08	.655	2.618	0.90	12	478.34	2.620	10.45	3.60
	10	1809.57	.691	2.763	0.95	30	459.28	2.730	10.89	3.75
	20	1719.12	.727	2.908	1.00	13	441.68	2.839	11.32	3.90
	30	1637.28	.764	3.054	1.05	30	425.40	2.949	11.75	4.05
	40	1562.88	.800	3.199	1.10	14	410.28	3.058	12.18	4.20
	50	1494.95	.836	3.345	1.15	30	396.20	3.168	12.62	4.35
4		1432.69	.873	3.490	1.20	15	383.07	3.277	13.05	4.50
	10	1375.40	.909	3.635	1.25	30	370.78	3.387	13.49	4.65
	20	1322.53	.945	3.718	1.30	16	359.27	3.496	13.92	4.80
	30	1273.57	.982	3.926	1.35	30	348.45	3.606	14.35	4.95
	40	1228.11	1.018	4.071	1.40	17	338.27	3.716	14.78	5.10
	50	1185.78	1.055	4.217	1.45	18	319.62	3.935	15.64	5.40
5		1146.28	1.091	4.362	1.50	19	302.94	4.155	16.51	5.70
	10	1109.33	1.127	4.507	1.55	20	287.94	4.374	17.37	6.00
	20	1074.68	1.164	4.653	1.60	21	274.37	4.594	18.22	6.30
	30	1042.14	1.200	4.798	1.65	22	262.04	4.814	19.08	6.60
	40	1011.51	1.237	4.943	1.70	23	250.79	5.035	19.94	6.90
	50	982.64	1.273	5.088	1.75	24	240.49	5.255	20.79	7.20
6		955.37	1.309	5.234	1.80	25	231.01	5.476	21.64	7.50
	10	929.57	1.346	5.379	1.85	26	222.27	5.697	22.50	7.80
	20	905.13	1.382	5.524	1.90	27	214.18	5.918	23.35	8.10
	30	881.95	1.418	5.669	1.95	28	206.68	6.139	24.19	8.40
	40	859.92	1.455	5.814	2.00	29	199.70	6.360	25.04	8.70
						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	483.3	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	6808.2	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	.79	.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	.771	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.266	.353	.430	.518	.608	.697	.787	.877	.971	1.07	1.18	1.29
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	.955	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

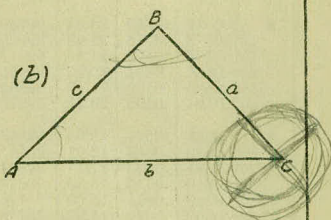
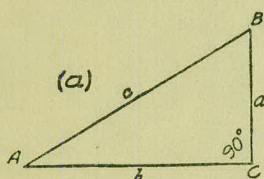
SLOPE REDUCTIONS.

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= $\text{slope distance} - \text{slope distance} (1 - \text{Cos. } V. A.)$. Thus for slope distance of 248.7 ft. and $V. A.$ of $4^\circ 20'$ from Table VIII $\text{Cos} = .99714$ and correction= $1 - .99714 = .00286$ per foot or total of $.286 \times 2\frac{1}{2}$ (near enough) = .57 and horizontal distance= $248.7 - .57 = 248.13$ ft.

See fig. (a).

TRIGONOMETRICAL FORMULAS.

$$\begin{aligned} \sin. & A = \frac{a}{c} \\ \cos. & A = \frac{b}{c} \\ \tan. & A = \frac{a}{b} \\ \cot. & A = \frac{b}{a} \\ \sec. & A = \frac{c}{b} \\ \text{cosec.} & A = \frac{c}{a} \end{aligned}$$



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	$B = 90^\circ - A, b = a \cot. A, c = \frac{a}{\sin. A}$
A, b	B, a, c	$B = 90^\circ - A, a = b \tan. A, c = \frac{b}{\cos. A}$
A, c	B, a, b	$B = 90^\circ - A, a = c \sin. A, b = c \cos. A$
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	$\left\{ \begin{aligned} \text{If } s = \frac{1}{2}(a + b + c), \sin. \frac{1}{2} A &= \sqrt{\frac{(s-b)(s-c)}{bc}} \\ \cos. \frac{1}{2} A &= \sqrt{\frac{s(s-a)}{bc}}, \tan. \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}, \\ \sin. A &= \frac{2\sqrt{(s-a)(s-b)(s-c)s}}{bc} \end{aligned} \right.$
A, B, C, a	area	$\text{area} = \frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area} = \frac{1}{2} bc \sin. A$
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	∞	1	90						
10	.0029	.0029	343.8	1	50	8	.1392	.1405	7.115		
20	.0058	.0058	171.9	.99998	40	10	.1421	.1435	6.968		
30	.0087	.0087	114.6	.99996	30	20	.1449	.1465	6.827		
40	.0116	.0116	85.94	.99993	20	30	.1478	.1495	6.691		
50	.0145	.0145	68.75	.99989	10	40	.1507	.1524	6.561		
						50	.1536	.1554	6.435		
1	.0175	.0175	57.29	.99985	89	9	.1564	.1584	6.314		
10	.0204	.0204	49.10	.99979	50	10	.1593	.1614	6.197		
20	.0233	.0233	42.96	.99973	40	20	.1622	.1644	6.084		
30	.0262	.0262	38.19	.99966	30	30	.1650	.1673	5.976		
40	.0291	.0291	34.37	.99958	20	40	.1679	.1703	5.871		
50	.0320	.0320	31.24	.99949	10	50	.1708	.1733	5.769		
2	.0349	.0349	28.64	.99939	88	10	.1736	.1763	5.671		
10	.0378	.0378	26.43	.99929	50	10	.1765	.1793	5.576		
20	.0407	.0407	24.54	.99917	40	20	.1794	.1823	5.485		
30	.0436	.0437	22.90	.99905	30	30	.1822	.1853	5.396		
40	.0465	.0466	21.47	.99892	20	40	.1851	.1883	5.309		
50	.0494	.0495	20.21	.99878	10	50	.1880	.1914	5.226		
3	.0523	.0524	19.08	.99863	87	11	.1908	.1944	5.145		
10	.0552	.0553	18.07	.99847	50	10	.1937	.1974	5.066		
20	.0581	.0582	17.17	.99831	40	20	.1965	.2004	4.989		
30	.0610	.0612	16.35	.99813	30	30	.1994	.2035	4.915		
40	.0640	.0641	15.60	.99795	20	40	.2022	.2065	4.843		
50	.0669	.0670	14.92	.99776	10	50	.2051	.2095	4.773		
4	.0698	.0699	14.30	.99756	86	12	.2079	.2126	4.705		
10	.0727	.0729	13.73	.99736	50	10	.2108	.2156	4.638		
20	.0756	.0758	13.20	.99714	40	20	.2136	.2186	4.574		
30	.0785	.0787	12.71	.99692	30	30	.2164	.2217	4.511		
40	.0814	.0816	12.25	.99668	20	40	.2193	.2247	4.449		
50	.0843	.0846	11.83	.99644	10	50	.2221	.2278	4.390		
5	.0872	.0875	11.43	.99619	85	13	.2250	.2309	4.331		
10	.0901	.0904	11.06	.99594	50	10	.2278	.2339	4.275		
20	.0929	.0934	10.71	.99567	40	20	.2306	.2370	4.219		
30	.0958	.0963	10.39	.99540	30	30	.2334	.2401	4.165		
40	.0987	.0992	10.08	.99511	20	40	.2363	.2432	4.113		
50	.1016	.1022	9.788	.99482	10	50	.2391	.2462	4.061		
6	.1045	.1051	9.514	.99452	84	14	.2419	.2493	4.011		
10	.1074	.1080	9.255	.99421	50	10	.2447	.2524	3.962		
20	.1103	.1110	9.010	.99390	40	20	.2476	.2555	3.914		
30	.1132	.1139	8.777	.99357	30	30	.2504	.2586	3.867		
40	.1161	.1169	8.556	.99324	20	40	.2532	.2617	3.821		
50	.1190	.1198	8.345	.99290	10	50	.2560	.2648	3.776		
7	.1219	.1228	8.144	.99255	83	15	.2588	.2679	3.732		
10	.1248	.1257	7.953	.99219	50	10	.2616	.2711	3.689		
20	.1276	.1287	7.770	.99182	40	20	.2644	.2742	3.647		
30	.1305	.1317	7.596	.99144	30	30	.2672	.2773	3.606		
40	.1334	.1346	7.429	.99106	20	40	.2700	.2805	3.566		
50	.1363	.1376	7.269	.99067	10	50	.2728	.2836	3.526		
				82					74		
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.	Angle	Sine.	Tan.	Cotg.	Cosin.		
16	.2756	.2867	3.487	.96126	74	24	.4067	.4452	2.246	.91355	66
10	.2784	.2899	3.450	.96046	50	10	.4094	.4487	2.229	.91236	50
20	.2812	.2931	3.412	.95964	40	20	.4120	.4522	2.211	.91116	40
30	.2840	.2962	3.376	.95882	30	30	.4147	.4557	2.194	.90996	30
40	.2868	.2994	3.340	.95799	20	40	.4173	.4592	2.177	.90875	20
50	.2896	.3026	3.305	.95715	10	50	.4200	.4628	2.161	.90753	10
17	.2924	.3057	3.271	.95615	73	25	.4226	.4663	2.145	.90631	65
10	.2952	.3089	3.237	.95545	50	10	.4253	.4699	2.128	.90507	50
20	.2979	.3121	3.204	.95459	40	20	.4279	.4734	2.112	.90383	40
30	.3007	.3153	3.172	.95372	30	30	.4305	.4770	2.097	.90259	30
40	.3035	.3185	3.140	.95284	20	40	.4331	.4806	2.081	.90133	20
50	.3062	.3217	3.108	.95195	10	50	.4358	.4841	2.066	.90007	10
18	.3090	.3249	3.078	.95106	72	26	.4384	.4877	2.050	.89879	64
10	.3118	.3281	3.048	.95015	50	10	.4410	.4913	2.035	.89752	50
20	.3145	.3314	3.018	.94924	40	20	.4436	.4950	2.020	.89623	40
30	.3173	.3346	2.989	.94832	30	30	.4462	.4986	2.006	.89493	30
40	.3201	.3378	2.960	.94740	20	40	.4488	.5022	1.991	.89363	20
50	.3228	.3411	2.932	.94646	10	50	.4514	.5059	1.977	.89232	10
19	.3256	.3443	2.904	.94552	71	27	.4540	.5095	1.963	.89101	63
10	.3283	.3476	2.877	.94457	50	10	.4566	.5132	1.949	.88968	50
20	.3311	.3508	2.850	.94361	40	20	.4592	.5169	1.935	.88835	40
30	.3338	.3541	2.824	.94264	30	30	.4617	.5206	1.921	.88701	30
40	.3365	.3574	2.798	.94167	20	40	.4643	.5243	1.907	.88566	20
50	.3393	.3607	2.773	.94068	10	50	.4669	.5280	1.894	.88431	10
20	.3420	.3640	2.747	.93969	70	28	.4695	.5317	1.881	.88295	62
10	.3448	.3673	2.723	.93869	50	10	.4720	.5354	1.868	.88158	50
20	.3475	.3706	2.699	.93769	40	20	.4746	.5392	1.855	.88020	40
30	.3502	.3739	2.675	.93667	30	30	.4772	.5430	1.842	.87882	30
40	.3529	.3772	2.651	.93565	20	40	.4797	.5467	1.829	.87743	20
50	.3557	.3805	2.628	.93462	10	50	.4823	.5505	1.816	.87603	10
21	.3584	.3839	2.605	.93358	69	29	.4848	.5543	1.804	.87462	61
10	.3611	.3872	2.583	.93253	50	10	.4874	.5581	1.792	.87321	50
20	.3638	.3906	2.560	.93148	40	20	.4899	.5619	1.780	.87178	40
30	.3665	.3939	2.539	.93042	30	30	.4924	.5658	1.767	.87036	30
40	.3692	.3973	2.517	.92935	20	40	.4950	.5696	1.756	.86892	20
50	.3719	.4006	2.496	.92827	10	50	.4975	.5735	1.744	.86748	10
22	.3746	.4040	2.475	.92718	68	30	.5000	.5774	1.732	.86603	60
10	.3773	.4074	2.455	.92609	50	10	.5025	.5812	1.720	.86457	50
20	.3800	.4108	2.434	.92499	40	20	.5050	.5851	1.709	.86310	40
30	.3827	.4142	2.414	.92388	30	30	.5075	.5890	1.698	.86163	30
40	.3854	.4176	2.394	.92276	20	40	.5100	.5930	1.686	.86015	20
50	.3881	.4210	2.375	.92164	10	50	.5125	.5969	1.675	.85866	10
23	.3907	.4245	2.356	.92050	67	31	.5150	.6009	1.664	.85717	59
10	.3934	.4279	2.337	.91936	50	10	.5175	.6048	1.653	.85567	50
20	.3961	.4314	2.318	.91822	40	20	.5200	.6088	1.643	.85416	40
30	.3987	.4348	2.300	.91706	30	30	.5225	.6128	1.632	.85264	30
40	.4014	.4383	2.282	.91590	20	40	.5250	.6168	1.621	.85112	20
50	.4041	.4417	2.264	.91472	10	50	.5275	.6208	1.611	.84959	10
					66						58
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
<i>or</i>						<i>or</i>					
32	.5299	.6249	1.600	.84805	58	30	.6225	.7954	1.257	.78261	30
10	.5324	.6289	1.590	.84650	50	40	.6248	.8002	1.250	.78079	20
20	.5348	.6330	1.580	.84495	40	50	.6271	.8050	1.242	.77897	10
30	.5373	.6371	1.570	.84339	30						
40	.5398	.6412	1.560	.84182	20	39	.6293	.8098	1.235	.77715	51
50	.5422	.6453	1.550	.84025	10	10	.6316	.8146	1.228	.77531	50
33	.5446	.6494	1.540	.83867	57	20	.6338	.8195	1.220	.77347	40
10	.5471	.6536	1.530	.83708	50	30	.6361	.8243	1.213	.77162	30
20	.5495	.6577	1.520	.83549	40	40	.6383	.8292	1.206	.76977	20
30	.5519	.6619	1.511	.83389	30	50	.6406	.8342	1.199	.76791	10
40	.5544	.6661	1.501	.83228	20	40	.6428	.8391	1.192	.76604	50
50	.5568	.6703	1.492	.83066	10	10	.6450	.8441	1.185	.76417	50
34	.5592	.6745	1.483	.82904	56	20	.6472	.8491	1.178	.76229	40
10	.5616	.6787	1.473	.82741	50	30	.6494	.8541	1.171	.76041	30
20	.5640	.6830	1.464	.82577	40	40	.6517	.8591	1.164	.75851	20
30	.5664	.6873	1.455	.82413	30	50	.6539	.8642	1.157	.75661	10
40	.5688	.6916	1.446	.82248	20	41	.6561	.8693	1.150	.75471	49
50	.5712	.6959	1.437	.82082	10	10	.6583	.8744	1.144	.75280	50
35	.5736	.7002	1.428	.81915	55	20	.6604	.8796	1.137	.75088	40
10	.5760	.7046	1.419	.81748	50	30	.6626	.8847	1.130	.74896	30
20	.5783	.7089	1.411	.81580	40	40	.6648	.8899	1.124	.74703	20
30	.5807	.7133	1.402	.81412	30	50	.6670	.8952	1.117	.74509	10
40	.5831	.7177	1.393	.81242	20	42	.6691	.9004	1.111	.74314	48
50	.5854	.7221	1.385	.81072	10	10	.6713	.9057	1.104	.74120	50
36	.5878	.7265	1.376	.80902	54	20	.6734	.9110	1.098	.73924	40
10	.5901	.7310	1.368	.80730	50	30	.6756	.9163	1.091	.73728	30
20	.5925	.7355	1.360	.80558	40	40	.6777	.9217	1.085	.73531	20
30	.5948	.7400	1.351	.80386	30	50	.6799	.9271	1.079	.73333	10
40	.5972	.7445	1.343	.80212	20	43	.6820	.9325	1.072	.73135	47
50	.5995	.7490	1.335	.80038	10	10	.6841	.9380	1.066	.72937	50
37	.6018	.7536	1.327	.79864	53	20	.6862	.9435	1.060	.72737	40
10	.6041	.7581	1.319	.79688	50	30	.6884	.9490	1.054	.72537	30
20	.6065	.7627	1.311	.79512	40	40	.6905	.9545	1.048	.72337	20
30	.6088	.7673	1.303	.79335	30	50	.6926	.9601	1.042	.72136	10
40	.6111	.7720	1.295	.79158	20	44	.6947	.9657	1.036	.71934	46
50	.6134	.7766	1.288	.78980	10	10	.6967	.9713	1.030	.71732	50
38	.6157	.7813	1.280	.78801	52	20	.6988	.9770	1.024	.71529	40
10	.6180	.7860	1.272	.78622	50	30	.7009	.9827	1.018	.71325	30
20	.6202	.7907	1.265	.78442	40	40	.7030	.9884	1.012	.71121	20
						50	.7050	.9942	1.006	.70916	10
							.7071	1.	1.	.70711	45
											<i>or</i>
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE IX.—CALCULATION OF EARTHWORK.

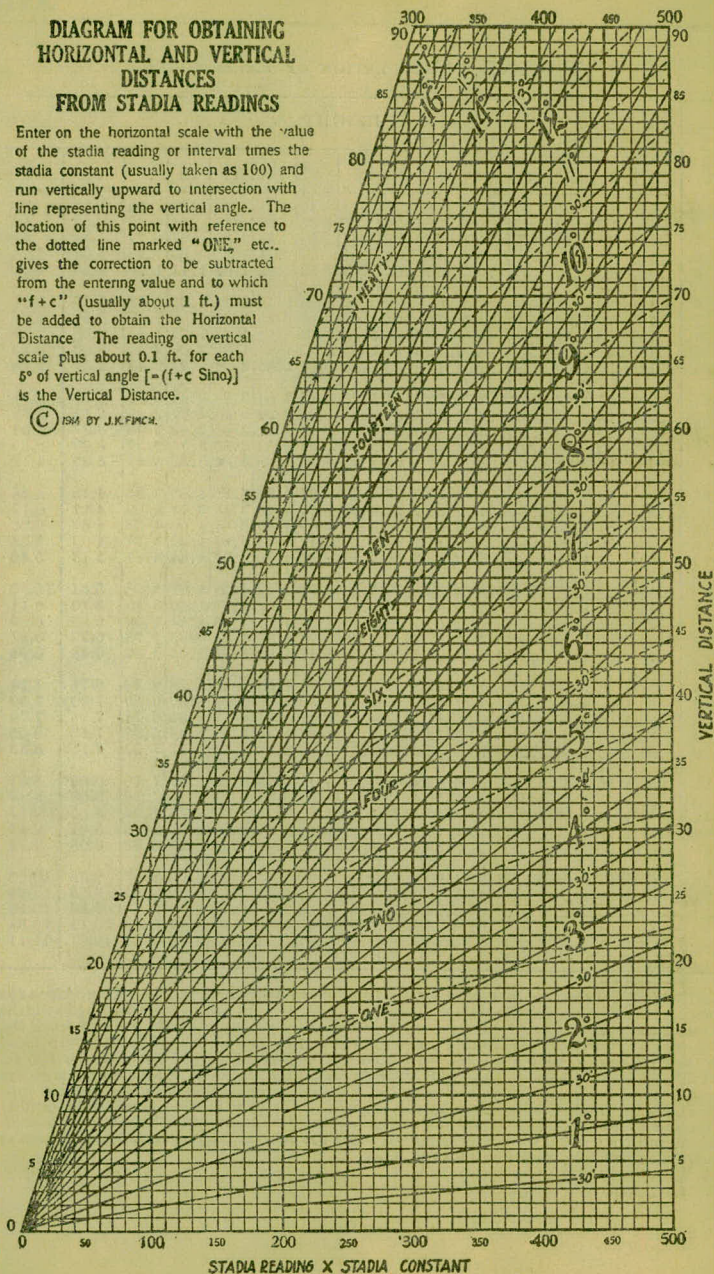
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	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	6.93	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	9.73
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

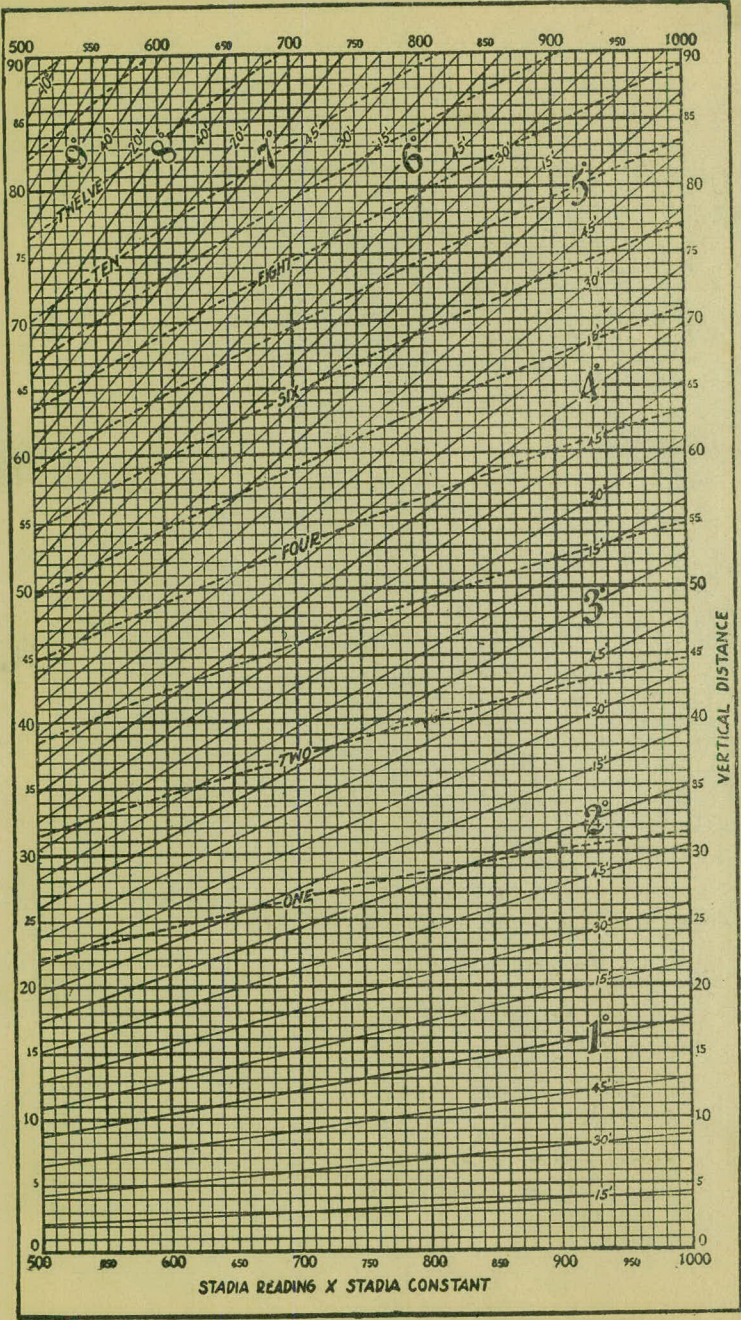
Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering 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 $\frac{1}{2}$ 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 [$= (f+c \text{ Sino})$] is the Vertical Distance.

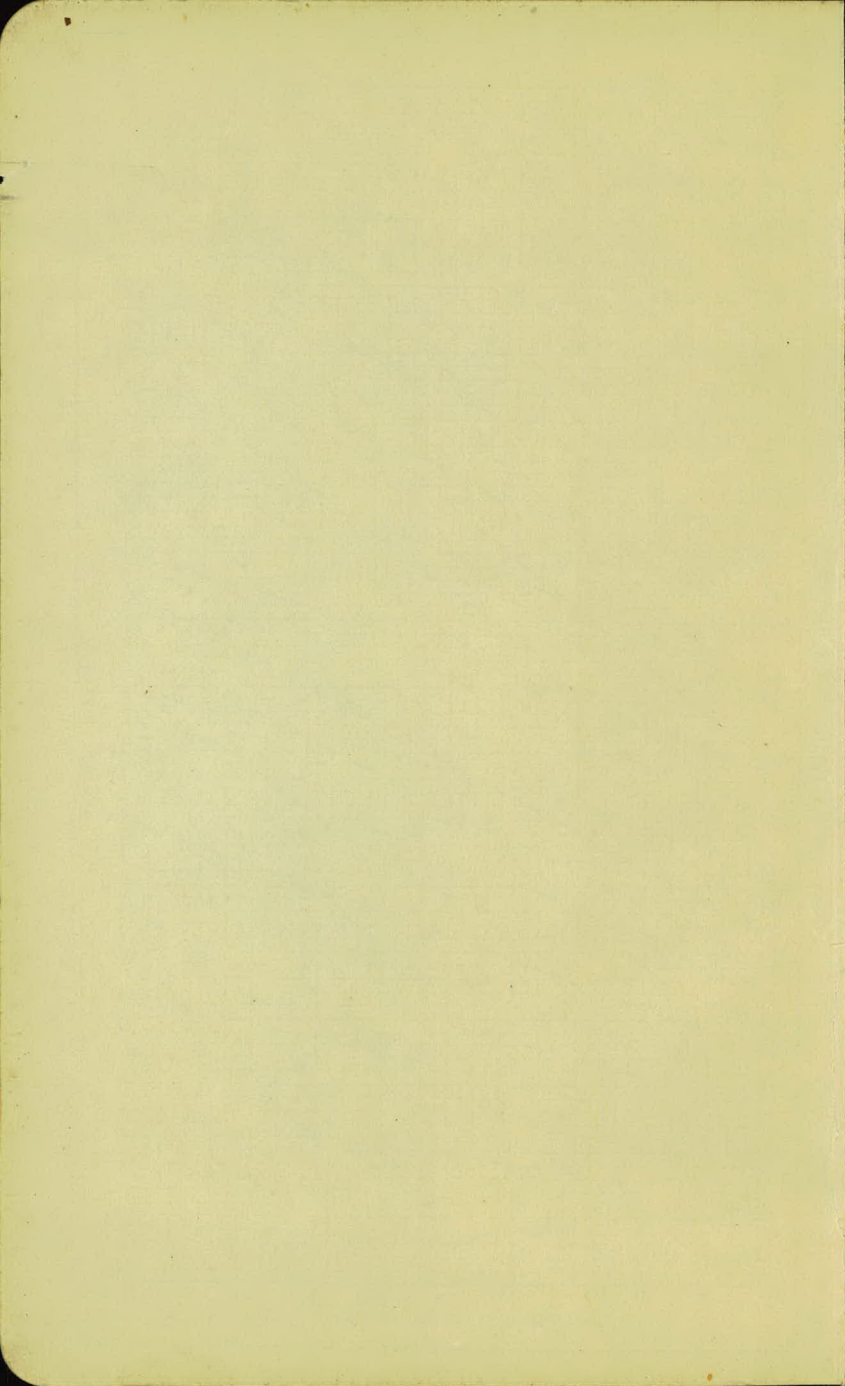
© 1914 BY J.K. FIMCH.





STADIA READING X STADIA CONSTANT

VERTICAL DISTANCE



41
27

74235
280
945.15

74628
240
948.68

112 + 215
17497
13495.57

112 + 21.5
84.63
13613

10000
764
23.6

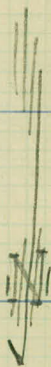
74628
13
947.58

21 + 27.2
1 + 25.4
7.80

U2466

Line Change

See Page 39 for
Original & Slope State.



986.95

988.38

994.86

Sta.	+	H.I.	-	Roof	F104
B.M.	4.30	98695		982.65	
173				4.7	982.3 ✓
+50				5.0	82.0 ✓
174				5.1	81.9 ✓
+50				6.0	81.0 ✓
175				5.2	81.8 ✓
+52				3.2	83.8 ✓
176				1.4	85.6 ✓
T.P.	10.08	994.03	2.38	984.57	✓
176+54 = 176+1300				2.4	88.3 ✓
177				2.5	92.2 ✓

$$\begin{array}{r} 6.5 \\ \hline 6.3 \\ 86.8 \end{array}$$

$$\begin{array}{r} 4.8 \\ 9.4 \\ \hline 1.6 \\ 9.1 \\ 1.8 \\ 1.5 \\ \hline 9.0 \end{array}$$

$$\begin{array}{r} 7.2 \\ 8 \\ \hline 9.1 \end{array}$$

$$\begin{array}{r} 9.1 \\ 9.8 \\ \hline 1.8 \\ 8.0 \\ 8.0 \end{array}$$

$$\begin{array}{r} 5.1 \\ 4.1 \\ \hline 1.0 \end{array}$$

$$\begin{array}{r} 1.6 \\ 5.0 \\ \hline 6.6 \end{array}$$

$$\begin{array}{r} 1.2 \\ 1.2 \\ \hline 2.4 \end{array}$$

$$\begin{array}{r} 1.8 \\ 1.3 \\ \hline 3.1 \end{array}$$

$$\begin{array}{r} 1.1 \\ 9.0 \\ \hline 10.1 \end{array}$$

$$\begin{array}{r} 5.4 \\ 6.3 \\ \hline 11.7 \end{array}$$

$$\begin{array}{r} 12.5 \\ 6.2 \\ \hline 18.7 \end{array}$$

$$\begin{array}{r} 4.3 \\ 7.5 \\ \hline 11.8 \end{array}$$

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1 $\frac{1}{2}$.

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 $41.9 + (20 - 16) \div 2$ or 2 ft. added to 41.9 = 43.9. For slopes of 1 on 1 see inside of front cover.