

OFFICE OF  
RAMSEY COUNTY ENGR.

CONSTRUCTION NOTES

ANOKA CUT-OFF

CO. PROJ. NO 26-62

FILE NO 5

ENGINEERS

FIELD BOOK

No. 10403

DIV. <sup>12-29</sup> A

Office of Ramsey Co. Engineer

St. Paul, Minn.

10-10-27

5

# 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 1½ see inside of back cover.

Copyright, 1914, by Eugene Dietzgen Co.

"A" DIV.

911.4  
5.5  

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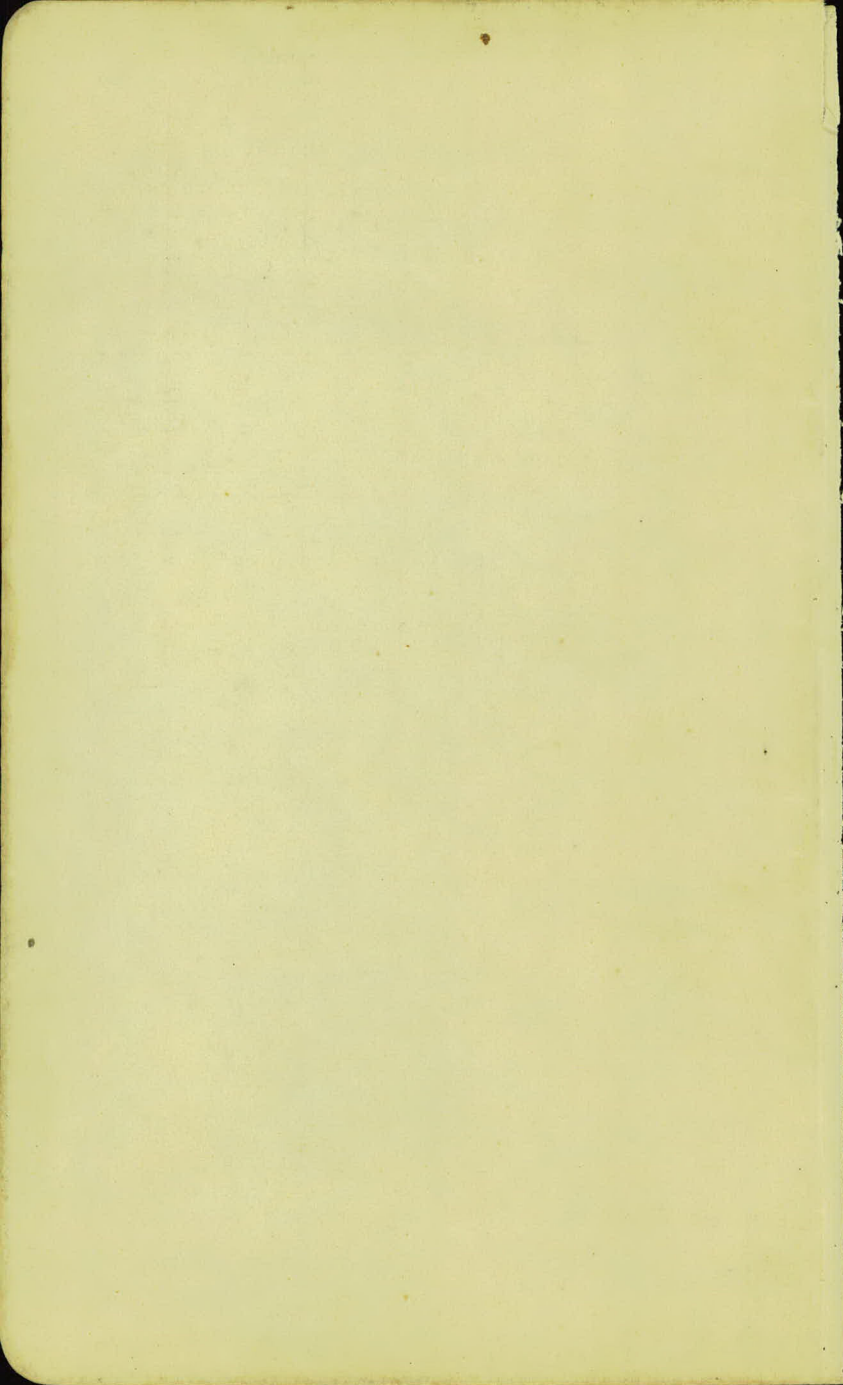
905.9

□

520-60  
9-12  

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870-74



# INDEX

Sta	Sta.	Description.	Page	Page
171+65	301+80	Alignment	1	6
170-	301+80	X-Sections	8	31
280	295	Grade change X-sections	33	35
271+65		" " "	38	39
		Bridge No. 4628		43
		" " 4627		44
		Bench Levels		45
		Ties to Montgomery Prop		7
		" " " "		78
280	28A+75	Side Ditch		46
		Bench Levels		47
	238+00	Cattle Pass		48
234+15	235+70	cont'd X-sec.		50
254+93	258+00	Add Orig X-sec.	51	
258	299+00	Line Revision	53	

570.

P.

Lt.

Rt.

PT 194+75.2 23°-25'

194+75.2 = P.T.

194+60 20°-48'

194+40 18°-18'

193+50 18°-48'

193+20 18°-18'

192+66.7 P.I.

440/10'

192+50 10°-48'

192+20 8°-18'

191+50 5°-48'

191+20 3°-18'

190+34.8 P.C.

190+50 0°-0'

PC 190+34.8 0°-0'

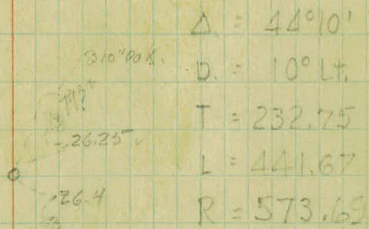
171-65.0 P.O.T.

Lt.

L

Rt.

C. W. Soudap  
June 1926



$$\Delta = 44^{\circ}10'$$

310'00 ft.

$$D = 10^{\circ} \text{ Lt.}$$

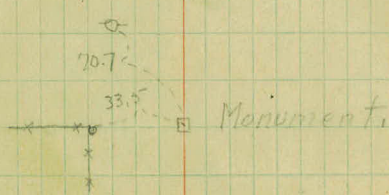
26.25'

$$T = 232.75$$

26.4'

$$L = 441.67$$

$$R = 573.65$$



70.7'

33.7'

Monument.

Sta.	P.	Lt.	Rt.
234+72 <sup>00</sup>	P.O.T.		231+74 <sup>1</sup> 7°02.5'
			231+00 8°33.6'
			+50 7°33.6'
			230+00 6°33.6'
231+24 <sup>1</sup>	P.T.		+50 5°33.6'
			229+00 4°33.6'
			+50 3°33.6'
229+00 <sup>00</sup>	P.T.	18°05'	228+00 2°33.6'
			+50 1°33.6'
			227+00 0°33.6'
226+72 <sup>00</sup>	P.C.		226+72 <sup>00</sup> 0°00'

216+44° Point on south end bridge.

208+19 <sup>2</sup>	P.T.	}	
203+49 <sup>2</sup>	P.I.		44°48'
198+24 <sup>22</sup>	P.C.		

Lt

♀

Rt

(scrapage 7 for land tie)  
204t

R stamp

G. W. Sealup



Δ = 200.0  
 D. 40.6t  
 T. 238.0  
 L. 41.3.1  
 R = 1432.69

- 208 + 19.87 - 22° 24' ✓
- 208 - 21° 57.7 ✓
- +50 - 20° 49.7 ✓
- 207 - 19° 42.2 ✓
- +50 - 18° 34.7 ✓
- 206 - 17° 27.2 ✓
- +50 - 16° 19.7 ✓
- 205 - 15° 12.2 ✓
- +50 - 14° 04.7 ✓
- 204 - 12° 57.2 ✓
- +50 - 11 49.7 ✓
- 203 - 10 42.2 ✓
- R.O. +50 - 9 34.7 ✓
- 202 +50 - 8 27.2 ✓
- 201 +50 - 7 19.7 ✓
- 200 +50 - 6 12.2 ✓
- 199 +50 - 5 04.7 ✓
- 198 +50 - 3 57.2 ✓
- 197 +50 - 2 49.7 ✓
- 196 +50 - 1 42.2 ✓
- 195 +50 - 0 34.7 ✓
- 194 +50 - 0 27.2 ✓



Δ = 44° 48'  
 D = 4230 R  
 T = 524.93  
 L = 297.77  
 995.56  
 R = 1273.57

Sta.

P.

Lt.

Rt.

256 + 80.8

Same as P.I. on Rd E. Conn

~~256 + 76.5~~

P.O.T. E of Co. Rd. "E"

~~244 + 61.2~~

P.O.T.

250 + 12.7

P.O.T.

243 + 50

P.O.T.

239 + 50

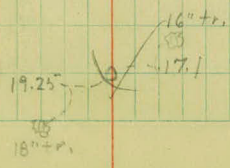
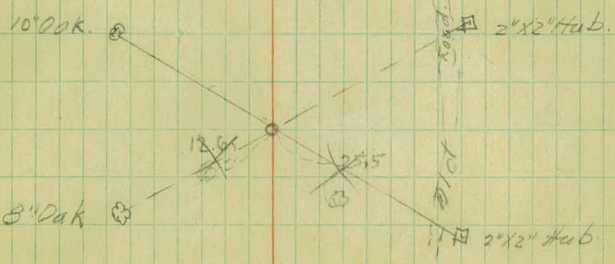
P.O.T.

LT

PT

PT

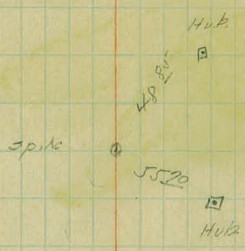
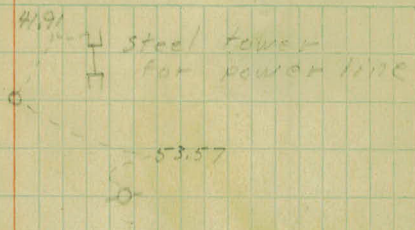
cW. Soukup



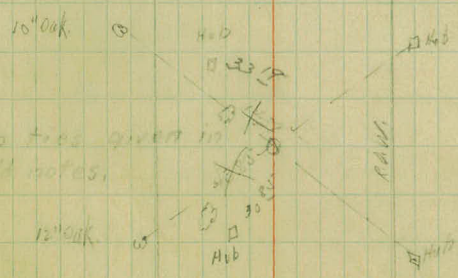
Sta	P.	Lt	Pt
278+17 <sup>22</sup>	P.A.T.		
			P.T. 277+90 <sup>22</sup> 19°40'
			+50 18°39.6'
277+90 <sup>23</sup>	P.T.		277+00 17°46'
			+50 16°09.6'
			276+00 14°54.6'
			+50 13°39.6'
274+13 <sup>25</sup>	P.T.	39°20'	275+00 12°24.6'
			+50 11°09.6'
			274+00 9°54.6'
			+50 8°39.6'
270+03 <sup>51</sup>	P.C.		273+00 7°24.6'
<del>270+01<sup>40</sup></del>			+50 6°09.6'
267+93 <sup>46</sup>	Q of 500 Track.		272+00 4°54.6'
262+86 <sup>32</sup>	P.T.	262+86 <sup>32</sup> 3°24'	+50 3°39.6'
		+50 3°22'	271+00 2°24.6'
		262+00 2°56'	+50 1°09.6'
		+50 2°22'	P.C. 270+03 <sup>51</sup> 0°-0'
261+00	P.T.	261+00 128.70 28'	
		+50 12°22'	
		260+00 02.56'	
		+50 02.06'	
259+13 <sup>04</sup>	P.C.	259+13 <sup>04</sup> 0°-0'	

LT      RT

c.w. Soukup <sup>4</sup>  
June 1976



$\Delta = 39^{\circ}20'$   
 $D_1 = 59.44$   
 $T_1 = 409.68$   
 $L_1 = 783.66$



$\Delta = 70^{\circ}28'$   
 $D_1 = 20.94$   
 $T_1 = 186.96$   
 $L_1 = 373.33$

S. No.	P.	Lt.	R.	
			297+00	29°-26'
			+50	28°-32'
			296+00	27°-17'
			+50	26°-02' ✓
			295+00	24°-47'
			+50	23°-32' ✓
			294+00	22°-17'
			+50	21°-02' ✓
			293+00	19°-47'
			+50	18°-32' ✓
			292+00	17°-17'
			+50	16°-02' ✓
			291+00	14°-47'
			+50	13°-32' ✓
		287-03	290+00	12°-17'
298+832'	P.T.		+50	11°-02' ✓
			289+00	9°-47'
			+50	8°-32' ✓
			288+00	7°-17'
292+922'	P.T.	68045'	+50	6°-02' ✓
			287+00	4°-47'
291+24 <sup>15</sup>	P.O.S.T.		+50	3°-32' ✓
			286+00	2°-17'
285+082'	P.C.		+50	1°-02'
			285+082'	0°-0'

Lit

E

Rt

5-

C.M. Book 43

June 1926

58

784.44

Hub  
E

4955

4955

E  
Hub

Cont Page 77.

Δ 680.451

D, 50.84

T, 784.14

L, 1375.00

old. PI.

303+36 $\frac{1}{2}$  P.O.T.

301+80 - End dit "A"

278+83 $\frac{1}{2}$  34°-22 $\frac{1}{2}$

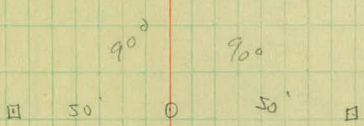
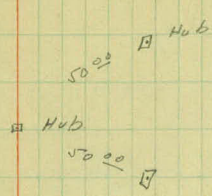
+50 33°-02 $\frac{1}{2}$

278+100 32°-17 $\frac{1}{2}$

290+50 31°-02 $\frac{1}{2}$

1679  
1872

6



Ties to Property Line

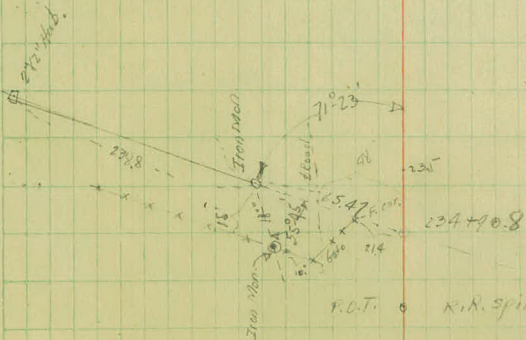
Station 234+90.8

234+93.5

W.H.C.  
A.L.P.  
W.A.  
R.R.

Sept 28, 1926

© P.O.T. 139/50



P.O.T. & R.R. spike ~~77~~ 70.1

For add ties 500  
page 78

-25A

Original

## Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	0.15	922.05			
170					
171				914.5	7.6
+65				15.1	7.0
172				15.5	6.6
B.M.	4.79	922.05	4.79		(917.26)
+56				16.1	6.0
173				16.5	5.6
174				17.5	4.6
T.P.	4.12	923.33	2.84		(919.21)
175				18.1	5.2
+50				18.1	5.2
176				18.0	5.3
+50				17.8	5.5
177				17.5	5.2
+50				17.3	6.0

Inst. W.H.C.  
 Rod. A.L.P.  
 Chain. E.H.F. & H.A.P.

June 5, 1926

8

Left

C L

Right

S.P.K. 113 16" 104 34' 11. Sta 172+11 El. 921.90

$\frac{8.1}{53}$   $\frac{8.5}{20}$   $\frac{7.7}{12}$   $\frac{7.4}{1}$   $\frac{7.7}{13}$   $\frac{8.7}{17}$   $\frac{8.6}{22}$   $\frac{9.1}{33}$

$\frac{18}{35}$   $\frac{26}{44}$   $\frac{23.2}{-1.6}$   $\frac{26}{19}$   $\frac{7.1}{12}$   $\frac{7.0}{0.0}$   $\frac{7.1}{10}$   $\frac{8.2}{-1.8}$   $\frac{8.6}{23.6}$   $\frac{9.2}{33}$

$\frac{7.1}{3.3}$   $\frac{20.8}{28.5}$   $\frac{2.0}{-1.1}$   $\frac{2.6}{2.0}$   $\frac{8.2}{18}$   $\frac{6.8}{11}$   $\frac{6.6}{0.0}$   $\frac{6.9}{10}$   $\frac{6.9}{15}$   $\frac{9.0}{22}$   $\frac{9.1}{-3.8}$   $\frac{8.3}{15.0}$   $\frac{7.1}{27}$   $\frac{7.1}{33}$

R.R. Spike Foot of 24" Oak 4. Sta -172+33

$\frac{33}{1.28}$   $\frac{3.2}{27}$   $\frac{3.5}{20}$   $\frac{6.0}{1.00}$   $\frac{7.0}{17}$   $\frac{6.0}{13}$   $\frac{5.6}{10.4}$   $\frac{5.8}{11}$   $\frac{5.9}{16}$   $\frac{7.2}{21}$   $\frac{7.8}{-1.8}$   $\frac{7.8}{23.6}$   $\frac{7.8}{26}$   $\frac{5.1}{29}$   $\frac{4.7}{11.3}$   $\frac{3.3}{33}$

$\frac{33}{1.28}$   $\frac{2.2}{1.24}$   $\frac{2.8}{20}$   $\frac{5.8}{16}$   $\frac{5.3}{11}$   $\frac{5.1}{10.5}$   $\frac{5.1}{14}$   $\frac{6.1}{20}$   $\frac{6.2}{-0.6}$   $\frac{6.2}{21.2}$   $\frac{6.2}{27}$   $\frac{4.4}{30}$   $\frac{3.9}{11.7}$   $\frac{3.9}{33}$

$\frac{38}{1.26}$   $\frac{2.0}{17}$   $\frac{4.3}{1.5}$   $\frac{4.4}{13}$   $\frac{3.7}{10}$   $\frac{3.3}{11.3}$   $\frac{3.6}{14}$   $\frac{4.4}{19}$   $\frac{4.3}{21}$   $\frac{3.4}{23}$   $\frac{2.0}{12.6}$   $\frac{3.3}{33}$

$\frac{33}{1.21}$   $\frac{3.1}{17}$   $\frac{3.2}{17}$   $\frac{5.2}{14}$   $\frac{5.2}{13}$   $\frac{8.7}{11}$   $\frac{4.3}{10.9}$   $\frac{4.6}{14}$   $\frac{4.3}{16}$   $\frac{4.7}{23}$   $\frac{3.5}{25}$   $\frac{2.7}{12.5}$   $\frac{2.7}{33}$

$\frac{33}{1.31}$   $\frac{2.1}{25}$   $\frac{2.4}{21}$   $\frac{4.5}{16}$   $\frac{4.7}{13}$   $\frac{5.9}{12}$   $\frac{5.9}{9}$   $\frac{5.5}{10.2}$   $\frac{5.1}{17}$   $\frac{5.5}{-0.3}$   $\frac{2.06}{23}$   $\frac{4.1}{26}$   $\frac{3.9}{11.3}$   $\frac{3.9}{33}$

$\frac{33}{1.13}$   $\frac{1.6}{19}$   $\frac{4.6}{13}$   $\frac{6.8}{11}$   $\frac{6.8}{9}$   $\frac{6.1}{-0.3}$   $\frac{5.6}{16}$   $\frac{5.8}{20}$   $\frac{6.0}{22}$   $\frac{6.9}{7.5}$   $\frac{6.8}{22.9}$   $\frac{2.7}{10.6}$   $\frac{2.7}{12.9}$   $\frac{6.4}{33}$

$\frac{6.2}{33}$   $\frac{2.4}{1.5}$   $\frac{4.5}{11.0}$   $\frac{6.9}{1.4}$   $\frac{7.0}{15}$   $\frac{7.2}{13}$   $\frac{6.3}{10}$   $\frac{6.2}{-0.7}$   $\frac{6.4}{17}$   $\frac{8.9}{23}$   $\frac{8.5}{-3.0}$   $\frac{8.5}{26.0}$   $\frac{8.7}{33}$

$\frac{7.5}{33}$   $\frac{2.1}{1.03}$   $\frac{2.5}{1.4}$   $\frac{7.2}{21}$   $\frac{7.5}{14}$   $\frac{7.7}{14}$   $\frac{6.8}{11}$   $\frac{6.6}{-0.8}$   $\frac{7.0}{16}$   $\frac{7.3}{20}$   $\frac{10.3}{-1.7}$   $\frac{10.6}{-4.8}$   $\frac{10.6}{29.6}$   $\frac{8.8}{33}$

$\frac{8.5}{33}$   $\frac{8.7}{2.7}$   $\frac{8.6}{21}$   $\frac{9.0}{22}$   $\frac{9.6}{16}$   $\frac{7.6}{10}$   $\frac{7.2}{-1.2}$   $\frac{7.4}{17}$   $\frac{10.7}{24}$   $\frac{11.1}{16}$   $\frac{11.1}{-5.1}$   $\frac{11.1}{30.2}$   $\frac{11.3}{33}$

Original

Cross Sections

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

923.33

T.P.

5.10

920.95

7.48

(915.25)

176				17.0	4.0
-----	--	--	--	------	-----

+50				16.8	4.2
-----	--	--	--	------	-----

179				16.4	4.6
-----	--	--	--	------	-----

T.P.

3.04

919.79

4.20

(916.75)

+50				16.0	3.8
-----	--	--	--	------	-----

180				15.5	4.3
-----	--	--	--	------	-----

+50				15.1	4.7
-----	--	--	--	------	-----

181				14.5	5.0
-----	--	--	--	------	-----

+60				13.7	6.1
-----	--	--	--	------	-----

182				13.2	6.6
-----	--	--	--	------	-----

183				12.1	7.7
-----	--	--	--	------	-----

+67				11.8	8.0
-----	--	--	--	------	-----

T.P.

3.02

915.40

7.4

(912.89)

184				11.7	3.9
-----	--	--	--	------	-----

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

June 8, 1926 9

Left

C L

Right

$\begin{array}{r} 7.2 \\ 33 \end{array} \times \begin{array}{r} 26 \\ 36 \end{array} / \begin{array}{r} 29 \\ 22 \end{array} \begin{array}{r} 29 \\ 15 \end{array} \begin{array}{r} 54 \\ 11 \end{array} \begin{array}{r} 50 \\ -10 \end{array} \begin{array}{r} 53 \\ 18 \end{array} \begin{array}{r} 82 \\ 73 \end{array} \begin{array}{r} 84 \\ 44 \end{array} / \begin{array}{r} 288 \\ 33 \end{array} \begin{array}{r} 84 \\ 33 \end{array}$

$\begin{array}{r} 7.2 \\ 33 \end{array} \times \begin{array}{r} 20 \\ 28 \end{array} / \begin{array}{r} 66 \\ 15 \end{array} \begin{array}{r} 56 \\ 11 \end{array} \begin{array}{r} 53 \\ -10 \end{array} \begin{array}{r} 54 \\ 20 \end{array} \begin{array}{r} 72 \\ -80 \end{array} / \begin{array}{r} 260 \\ 29 \end{array} \begin{array}{r} 72 \\ 29 \end{array} \begin{array}{r} 56 \\ 33 \end{array}$

$\begin{array}{r} 77 \\ 33 \end{array} \times \begin{array}{r} 62 \\ 76 \end{array} / \begin{array}{r} 55 \\ 15 \end{array} \begin{array}{r} 60 \\ 12 \end{array} \begin{array}{r} 53 \\ 7 \end{array} \begin{array}{r} 50 \\ -04 \end{array} \begin{array}{r} 52 \\ 19 \end{array} \begin{array}{r} 66 \\ -20 \end{array} / \begin{array}{r} 240 \\ 28 \end{array} \begin{array}{r} 63 \\ 28 \end{array} \begin{array}{r} 40 \\ 38 \end{array}$

Nail in T.P. RJ Sta. 179 + 30

$\begin{array}{r} 26 \\ 33 \end{array} \begin{array}{r} 26 \\ 13 \end{array} / \begin{array}{r} 32 \\ 25 \end{array} \begin{array}{r} 24 \\ 16 \end{array} \begin{array}{r} 43 \\ 14 \end{array} \begin{array}{r} 43 \\ 13 \end{array} \begin{array}{r} 36 \\ 10 \end{array} \begin{array}{r} 34 \\ +04 \end{array} \begin{array}{r} 37 \\ 19 \end{array} \begin{array}{r} 37 \\ 22 \end{array} \begin{array}{r} 3.8 \\ 00 \end{array} / \begin{array}{r} 31 \\ 33 \end{array} \begin{array}{r} 3.5 \\ 33 \end{array}$

$\begin{array}{r} 41 \\ 33 \end{array} \times \begin{array}{r} 41 \\ 40 \end{array} / \begin{array}{r} 33 \\ 20 \end{array} \begin{array}{r} 36 \\ 17 \end{array} \begin{array}{r} 43 \\ 14 \end{array} \begin{array}{r} 43 \\ 12 \end{array} \begin{array}{r} 38 \\ 10 \end{array} \begin{array}{r} 34 \\ +09 \end{array} \begin{array}{r} 33 \\ 10 \end{array} \begin{array}{r} 37 \\ 20 \end{array} \begin{array}{r} 39 \\ 22 \end{array} \begin{array}{r} 48 \\ 25 \end{array} \begin{array}{r} 45 \\ 28 \end{array} \begin{array}{r} 07 \\ 78 \end{array} / \begin{array}{r} 33 \\ 43.6 \end{array}$

$\begin{array}{r} 72 \\ 38 \end{array} \begin{array}{r} 09 \\ 28 \end{array} \begin{array}{r} 69 \\ 02 \end{array} / \begin{array}{r} 60 \\ 22 \end{array} \begin{array}{r} 58 \\ 11 \end{array} \begin{array}{r} 52 \\ 12 \end{array} \begin{array}{r} 42 \\ 10 \end{array} \begin{array}{r} 42 \\ 6 \end{array} \begin{array}{r} 41 \\ +06 \end{array} \begin{array}{r} 40 \\ 11 \end{array} \begin{array}{r} 44 \\ 20 \end{array} \begin{array}{r} 55 \\ 25 \end{array} \begin{array}{r} 54 \\ 28 \end{array} \begin{array}{r} 28 \\ 32 \end{array} \begin{array}{r} 2.2 \\ +05 \end{array} / \begin{array}{r} 33 \\ 45 \end{array}$

$\begin{array}{r} 80 \\ 33 \end{array} \times \begin{array}{r} 13 \\ 20 \end{array} / \begin{array}{r} 61 \\ 10 \end{array} \begin{array}{r} 54 \\ 8 \end{array} \begin{array}{r} 50 \\ +03 \end{array} \begin{array}{r} 46 \\ 10 \end{array} \begin{array}{r} 48 \\ 20 \end{array} \begin{array}{r} 6.7 \\ 78 \end{array} \begin{array}{r} 69 \\ +04 \end{array} / \begin{array}{r} 200 \\ 286 \end{array} \begin{array}{r} 6.0 \\ 33 \end{array}$

$\begin{array}{r} 34 \\ 33 \end{array} \begin{array}{r} 24 \\ 27 \end{array} / \begin{array}{r} 27 \\ 22 \end{array} \begin{array}{r} 24 \\ 10 \end{array} \begin{array}{r} 60 \\ 7 \end{array} \begin{array}{r} 56 \\ +05 \end{array} \begin{array}{r} 54 \\ 10 \end{array} \begin{array}{r} 5.7 \\ 20 \end{array} \begin{array}{r} 6.0 \\ 73 \end{array} \begin{array}{r} 79 \\ 27 \end{array} \begin{array}{r} 81 \\ 00 \end{array} / \begin{array}{r} 00 \\ 220 \end{array} \begin{array}{r} 77 \\ 37 \end{array} \begin{array}{r} 69 \\ 33 \end{array}$

$\begin{array}{r} 105 \\ 33 \end{array} \times \begin{array}{r} 104 \\ 38 \end{array} / \begin{array}{r} 102 \\ 23 \end{array} \begin{array}{r} 90 \\ 10 \end{array} \begin{array}{r} 67 \\ 5 \end{array} \begin{array}{r} 63 \\ +03 \end{array} \begin{array}{r} 6.0 \\ 11 \end{array} \begin{array}{r} 62 \\ 20 \end{array} \begin{array}{r} 65 \\ 23 \end{array} \begin{array}{r} 83 \\ 27 \end{array} \begin{array}{r} 86 \\ 00 \end{array} / \begin{array}{r} 00 \\ 258 \end{array} \begin{array}{r} 85 \\ 33 \end{array}$

$\begin{array}{r} 127 \\ 33 \end{array} \times \begin{array}{r} 127 \\ 50 \end{array} / \begin{array}{r} 123 \\ 21 \end{array} \begin{array}{r} 115 \\ 12 \end{array} \begin{array}{r} 78 \\ 3 \end{array} \begin{array}{r} 73 \\ +04 \end{array} \begin{array}{r} 69 \\ 12 \end{array} \begin{array}{r} 75 \\ 23 \end{array} \begin{array}{r} 87 \\ 00 \end{array} / \begin{array}{r} 00 \\ 28 \end{array} \begin{array}{r} 98 \\ 3.3 \end{array}$

$\begin{array}{r} 148 \\ 33 \end{array} \times \begin{array}{r} 120 \\ 42 \end{array} / \begin{array}{r} 121 \\ 13 \end{array} \begin{array}{r} 85 \\ 4 \end{array} \begin{array}{r} 78 \\ +02 \end{array} \begin{array}{r} 7.5 \\ 11 \end{array} \begin{array}{r} 80 \\ 00 \end{array} / \begin{array}{r} 20 \\ 20 \end{array} \begin{array}{r} 82 \\ 23 \end{array} \begin{array}{r} 78 \\ +01 \end{array} / \begin{array}{r} 00 \\ 223 \end{array} \begin{array}{r} 103 \\ 33 \end{array}$

$\begin{array}{r} 65 \\ 33 \end{array} \times \begin{array}{r} 65 \\ 28 \end{array} / \begin{array}{r} 61 \\ 16 \end{array} \begin{array}{r} 68 \\ 12 \end{array} \begin{array}{r} 39 \\ 4 \end{array} \begin{array}{r} 37 \\ 00 \end{array} \begin{array}{r} 31 \\ 13 \end{array} \begin{array}{r} 3.6 \\ 23 \end{array} \begin{array}{r} 47 \\ 00 \end{array} / \begin{array}{r} 00 \\ 28 \end{array} \begin{array}{r} 83 \\ 3 \end{array}$

Original

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		915.40			
+50				11.7	3.7
185				11.6	3.8
+70				11.5	3.9
186				11.5	3.9
+30				11.5	3.9
+52				11.5	3.9
187				11.4	4.0
+40				11.4	4.0
B.M.	463	915.40	4.63		910.77
188				11.4	4.0
+50				11.5	3.9
189				11.5	3.9
T.P.	6.20	918.66	2.94		(912.46) 24 69
+50				11.6	7.1
190				11.7	27 64 70
+50				11.8	81 59 69
+60				11.8	69

change Sec.



Original Cross Sections

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

918.66

191					11.9.	83 86 68
+71					12.0.	82 55 6.7
+50					11.9.	83 56 68
T.P.	412	918.25.	4.53			(914.12) 81 59
192					11.7.	81 59 6.6
+50					11.4.	84 57 6.9
193					10.9.	89 67 7.4
+50					10.3.	95 68 80
194					09.7.	10.1 74 86
+50					09.1.	100 8.1 9.2
195					08.5.	106 9.1 98
T.P.	1.98	909.66.	10.57			(907.68) 21 15
195+50					07.9.	24 23 18
196					07.4.	23
+50					07.2.	2.5
197					06.9.	2.8

Change Sec.

No widening % R.O.W.  
10° Curve Lt.

Inst. ....  
 Rec. ....  
 Chain. ....

July 9, 1926

11

Left C L Right

+1.24 x 2.0 1.8 2.6 1.4 4.8 4.4 4.9 x 4.8  
 -1.52 33.9 / 163 17 7 12.4 5 17 107 / 286 33

+1.24 2.6 2.6 3.3 4.8 4.8 5.1  
 -1.52 33.9 / 106 18 13.4 6 20 33

+1.24 x 4.2 4.1 4.0 5.2 4.8 5.0  
 -1.52 33.9 / 4.1 15 12.8 11 2.9 33

+1.24 86 x 86 21.0 x 86 8.5 8.1 7.4 5.2 4.5 5.4  
 -1.52 33.9 / 405 10.5 16 11.5 12 17 32 5.4  
 60' Pt Sta. 193 +0.0 50

+1.24 x 5.9 5.8 5.8 5.8 6.5 5.4 4.4 4.7  
 -1.52 33.9 / 2.3 + 2.5 20 11 10 12 18 33 50

+1.24 x 2.4 2.9 3.2 6.1 5.7 4.9 5.4  
 -1.52 33.9 / 165 16 14.2 5 10 33 48

+1.24 33.9 / 2.3 2.4 3.1 4.7 7.0 6.4 5.9 6.4  
 -1.52 17.2 5.4 8 4 11.0 3 2.2 3.9

+1.24 33.9 / 3.6 3.9 4.3 7.4 7.8 7.4 7.0 6.7 7.4 2.7 7.8 10.0 7.2  
 -1.52 16.5 15 14 10 7 5 11.6 7.6 2.6 2.8 14.6 / 30.4 33

+1.06 x 6.0 7.1 7.1 7.1 8.3 7.7 8.2 9.4 9.4 7.4 6.6 6.6  
 -1.52 33.9 / 13.9 18 16 15 13 11.5 17 20 21 25 28 14.5 / 33

+0.70 x 2.3 3.2 10.3 10.3 9.5 8.8 9.5 11.3 11.3 9.8 7.4 9.5  
 -0.84 33.9 / 4.3 2.4 2.2 2.1 1.8 11.0 10 14 15 19 41.7 / 30.6 33

+0.3 x 2.8 2.8 2.1 2.2 2.5 6.6 7.3 8.0 x  
 -0.3 33.9 / 11.3 2.8 20.0 / 0.0 0.4 4 12 20 6.5 / 33.1

+0.0 4.9 3.4 2.6 3.2 3.7 11.4 12.8 12.8  
 -0.1 33.9 / 30 21.6 2.8 14 14 14 19.5 33.0  
 1.5 40 2.8 1.4 3.8 11.7 15 12.5 14.7  
 3.3 2.4 1.4 1.6 1.4 15 26 17.2 / 33  
 6.1 5.1 4.3 4.6 5.0 5.3 13.2 14.7  
 3.0 3.0 2.0 1.7 2.0 2.0 20 11.2 / 33

Original Cross Sections

Sta.	B.S.	I.S.	P.S.	Grade	G.P.
197+50		909.66		06.9	2.8 23 3.1
198				07.0	2.7 1.8 2.5
+50				07.3	2.4 1.1 2.9
199				07.7	2.0 0.7 2.5
+50				08.1	1.6
T.P.	10.54	917.90	2.30		(907.36)
200				08.4	2.5 87 103
200+50				08.4	2.5 87 103
201				08.4	2.5 87 103
+60				08.2	2.7
B.M.	1.39	914.9 <sup>7</sup> <sub>6</sub>	4.32		913.5 <sup>8</sup> <sub>7</sub>
202				07.8	2.1 6.25 2.1 7.2
+50				07.2	2.7 6.9 8.7 7.8
203				06.5	2.5 7.6 9.6 8.5
+50				05.7	2.3 24 10.2 9.7 11.5
204				04.4	2.6 10.8 11.6
+50				03.3	1.7 10.8 11.6
205				02.0	1.3 12.1 10.9 13.0
T.P.	0.45	909.68 <sup>9</sup>	5.73		(909.2 <sup>4</sup> )
+50				906.5	1.2 8.3 10.1



Original

## Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
206		909.68		899.1	9.7 11.5 10.6
+50				97.8	11.0 12.8 11.9
T.P.	0.22	900.08	9.88		899.88
207				96.4	2.7 4.7 03.6
+50				95.2	3.9 5.7 4.8
+75				90.4	4.7 6.5 5.6
208				93.7	5.5 7.1 6.3
+19.2				97.8	6.6 7.9 7.2
209				91.2	8.7 8.9 8.8
+30				90.4	9.6
+50				90.1	9.9
+65				89.6	10.4
210				89.2	10.8
T.P.	0.66	900.19	0.49		899.58
+90				88.0	11.6
+70				88.0	12.7
B.M.	1.10	900.19	1.10		899.09
211				87.6	12.6

W.H.C.  
 in R.L.O.  
 Chain. E.H.F.  
 H.T.P.

July 13, 1926 <sup>13</sup>

Left C L Right

2.0 +0.88 2.5 39.3 4.2 24 80 10.6 12.4 12.8 12.2 9.4 9.2 9.4 x  
 -0.88 50 155 23 20 9 -1.8 8 10 21 36 50 +23/36.2

2.0 +0.88 6.2 35.2 7.8 20.9 11.0 12.3 14.5 14.8 13.0 10.4 9.7 10.1 x  
 -0.88 50 13.2 20.9 0.9 15 -2.6 18 -0.2 22.4 29 50 58 +2.4/37.2

2.0 +0.88 4.6 26.4 5.9 6.7 6.2 6.0 5.2 1.0 0.4 0.5 x  
 -0.88 50 3.2 3.2 -3.1 -2.0 24.0 28 34 42 50 67

2.0 +0.88 9.0 3.4 13.1 19.3 9.4 9.7 9.4 9.0 7.5 6.6 5.2 4.4 0.9 x  
 -0.88 50 6.2 15 6 4 -4.6 2 16 -0.9 33.8 37 41 50

1.8 +0.68 11 3.8 11.1 11.0 10.7 9.2 7.8 7.0 2.3 5.0 0.9 x  
 -0.68 50 3.8 6.4 17 -5.1 9 10.6 23.4 20 55

1.6 +0.76 12.9 1.3 2.6 11.8 11.8 11.7 11.4 10.3 7.5 3.0 x  
 -0.76 50 4.1 6.7 21 -5.6 13 -3.2 28.0 43 50

1.0 +0.62 13.2 2.9 12.6 12.2 12.3 12.0 12.3 10.3 9.7 x  
 -0.62 50 6.0 18 -5.1 18 -4.2 29.8 45 50

+0.06 9.2 9.8 25.4 11.4 11.6 12.4 14.7 11.1 8.8 x  
 -0.16 50 4.7 27 21 -2.6 -2.8 25.6 37 50

6.4 8.8 20.9 2.6 10.2 10.9 10.6 10.6 9.6 8.8 x  
 50 3.8 11.2 0.0 17 -1.3 22.6 11.0 29.5 43 50

4.0 5.4 7.8 8.0 8.5 8.1 8.2 x  
 50 38.5 19 11.5 21 2.7 38.6 50

0.4 12 4.3 6.5 7.0 7.0 7.0 7.0 x  
 50 4.7 4.6 21 14.3 21 19.8 36.7 50

Top slope stake Lt. Sta 210+00  
 +0.6 47.0 3.1 4.7 5.6 5.6 5.3 5.4 6.3 6.4 x  
 50 21.2 18 10.9 15 22 24 30 11.3 39.0 50

0.3 4.8 2.4 4.4 4.7 5.7 5.7 5.5 6.1 6.4 6.8 7.2 x  
 50 11.5 3.0 8 3 16.5 4 14 17 34 15.6 39.4 50

10.0 F.R. 70 Rt. Sta 210+60  
 2.0 2.4 4.3 4.8 6.3 6.0 7.0 8.5 4.0 4.0 4.0 x  
 50 11.4 11.4 19 19 6 13.6 11 13.4 50

Original

Cross Sections

Sta.	B. S.	H. I. <sup>20</sup>	F. S.	Grade	Gr. R.
+22		900 <del>X</del>			87.3 119
+50					87.0 132
T.P.	0.75	889.4 <sup>1</sup>	11.98		888.7 <sup>2</sup>
211+80					86.7 28
212+00					86.5 30
+50		891.56			86.11 34
		2.36			
		889.20			
213					85.8 37
+50					85.6 39
214					85.7 38
+15					85.7 38
T.P.	12.03	894.7 <sup>5</sup>	6.75		882.7 <sup>2</sup>
+50					85.8 39
+80					85.9 38
215					86.0 37
+50					86.1 34
+78					86.2 37
B.M.	1.56	890.76	5.56		889.20 <sup>14</sup>

~~85.8~~  
~~86.0~~  
~~86.1~~  
~~86.2~~  
~~86.3~~  
~~86.4~~  
~~86.5~~  
~~86.6~~  
~~86.7~~  
~~86.8~~  
~~86.9~~  
~~87.0~~

Inst. W.H.C.  
 Rod. A.L.P.  
 Chain. H.T.P.  
W.P.

Aug 3<sup>rd</sup> 1926 14

Left

C L

Right

$\frac{32}{50}$	$\frac{44}{50}$	$\frac{52}{50}$	$\frac{65}{50}$	$\frac{62}{50}$	$\frac{72}{50}$	$\frac{89}{50}$	$\frac{118}{50}$	$\frac{189}{50}$	$\frac{131}{50}$
$\frac{58}{50}$	$\frac{48}{50}$	$\frac{38}{50}$	$\frac{34}{50}$	$\frac{22}{50}$	$\frac{17}{50}$	$\frac{140}{50}$	$\frac{26}{50}$	$\frac{109}{50}$	$\frac{32.5}{50}$
$\frac{67}{50}$	$\frac{408}{50}$	$\frac{67}{50}$	$\frac{31}{50}$	$\frac{21}{50}$	$\frac{126}{50}$	$\frac{126}{50}$	$\frac{126}{50}$	$\frac{129}{50}$	$\frac{159}{50}$
		$\frac{67}{50}$	$\frac{31}{50}$	$\frac{21}{50}$	$\frac{126}{50}$	$\frac{126}{50}$	$\frac{126}{50}$	$\frac{129}{50}$	$\frac{159}{50}$

Top to stake 211/50

$\frac{97}{50}$	$\frac{724}{50}$	$\frac{40}{50}$	$\frac{54}{50}$	$\frac{62}{50}$	$\frac{7.8}{50}$	$\frac{27}{50}$
$\frac{316}{50}$	$\frac{104}{50}$	$\frac{72}{50}$	$\frac{15}{50}$	$\frac{34}{50}$	$\frac{300}{50}$	$\frac{50}{50}$
$\frac{16}{50}$	$\frac{46}{50}$	$\frac{260}{50}$	$\frac{54}{50}$	$\frac{83}{50}$	$\frac{93}{50}$	$\frac{9.3}{50}$
$\frac{51}{50}$	$\frac{37}{50}$	$\frac{20}{50}$	$\frac{17}{50}$	$\frac{33}{50}$	$\frac{100}{50}$	$\frac{10.0}{50}$
		$\frac{319}{50}$	$\frac{82}{50}$	$\frac{101}{50}$	$\frac{100}{50}$	$\frac{10.0}{50}$
			$\frac{67}{50}$	$\frac{67}{50}$	$\frac{33.2}{50}$	$\frac{50}{50}$

$\frac{68}{50}$	$\frac{310}{50}$	$\frac{99}{50}$	$\frac{102}{50}$	$\frac{103}{50}$
	$\frac{5.5}{50}$	$\frac{6.7}{50}$	$\frac{33.0}{50}$	$\frac{33.0}{50}$

$\frac{63}{50}$	$\frac{300}{50}$	$\frac{99}{50}$	$\frac{103}{50}$	$\frac{103}{50}$
	$\frac{89}{50}$	$\frac{6.0}{50}$	$\frac{32.8}{50}$	$\frac{50}{50}$

$\frac{25}{50}$	$\frac{39}{50}$	$\frac{256}{50}$	$\frac{66}{50}$	$\frac{75}{50}$	$\frac{73}{50}$	$\frac{9.8}{50}$	$\frac{101}{50}$
	$\frac{46}{50}$	$\frac{20}{50}$	$\frac{28}{50}$	$\frac{20}{50}$	$\frac{51.5}{50}$	$\frac{32.0}{50}$	$\frac{50}{50}$
$\frac{90}{50}$	$\frac{44}{50}$	$\frac{200}{50}$	$\frac{59}{50}$	$\frac{38}{50}$	$\frac{38}{50}$	$\frac{9.8}{50}$	$\frac{101}{50}$
$\frac{44}{50}$	$\frac{54}{50}$	$\frac{209}{50}$	$\frac{21}{50}$	$\frac{51}{50}$	$\frac{51}{50}$	$\frac{32.0}{50}$	$\frac{50}{50}$

$\frac{113}{50}$	$\frac{110}{50}$	$\frac{3.0}{50}$	$\frac{10.4}{50}$	$\frac{12.5}{50}$	$\frac{13.7}{50}$	$\frac{13.5}{50}$
$\frac{2960}{50}$	$\frac{14.9}{50}$	$\frac{28}{50}$	$\frac{16}{50}$	$\frac{36}{50}$	$\frac{10}{50}$	$\frac{50}{50}$
$\frac{114}{50}$	$\frac{123}{50}$	$\frac{99}{50}$	$\frac{4.0}{50}$	$\frac{7.6}{50}$	$\frac{10.0}{50}$	$\frac{13.7}{50}$
$\frac{93}{50}$	$\frac{69.0}{50}$	$\frac{17}{50}$	$\frac{14}{50}$	$\frac{2}{50}$	$\frac{21}{50}$	$\frac{21}{50}$
	$\frac{110.1}{50}$					$\frac{14.4}{50}$

$\frac{23}{50}$	$\frac{109}{50}$	$\frac{80}{50}$	$\frac{38}{50}$	$\frac{90}{50}$	$\frac{75}{50}$	$\frac{13.7}{50}$	$\frac{14.4}{50}$	$\frac{14.6}{50}$
$\frac{871.9}{50}$	$\frac{109}{50}$	$\frac{28}{50}$	$\frac{15}{50}$	$\frac{3}{50}$	$\frac{68}{50}$	$\frac{23}{50}$	$\frac{30.8}{50}$	$\frac{50}{50}$

$\frac{96}{50}$	$\frac{42.7}{50}$	$\frac{14}{50}$	$\frac{6.4}{50}$	$\frac{90}{50}$	$\frac{12.0}{50}$	$\frac{13.4}{50}$	$\frac{15.0}{50}$
	$\frac{78}{50}$	$\frac{30}{50}$	$\frac{4}{50}$	$\frac{66}{50}$	$\frac{15}{50}$	$\frac{71}{50}$	$\frac{50}{50}$

$\frac{53}{50}$	$\frac{94.6}{50}$	$\frac{64}{50}$	$\frac{90}{50}$	$\frac{110}{50}$	$\frac{13.5}{50}$	$\frac{14.5}{50}$	$\frac{15.0}{50}$
	$\frac{24}{50}$	$\frac{27}{50}$	$\frac{12}{50}$	$\frac{38}{50}$	$\frac{19}{50}$	$\frac{34.6}{50}$	$\frac{50}{50}$

Spoke 24" Oak 60 Rt. 21707

original

Cross Sections

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

890.76

216 86.4 86.7 4.4

+34 86.7 87.1 4.1

+60 87.3 87.4 3.8

+80 87.3 87.7 3.5

217 87.6 88.0 3.7

+30 88.1 88.4 2.7

T.P. 10.65 897.83. 3.58 887.18.

+65 88.7 89.0 9.1

218 89.4 89.7 8.4

+40 90.3 90.5 7.5

+72 91.0 91.2 6.9

219 91.5 91.7 6.0

+50 93.2 4.6

Grade change V.C. changed to 500' N.E. 1.875

Inst. W. H. C.  
 Rod. A. L. D.  
 Chain. H. T. P.  
W. A.

Aug 12, 1926

15-

Left

C L

Right

$\frac{59}{50}$	$\begin{array}{r} \times \\ 260 \overline{) 74} \\ \underline{-30} \end{array}$	$\frac{79}{21}$	$\frac{88}{-44}$	$\frac{97}{12}$	$\frac{106}{-62}$	$\frac{112}{50}$	
$\frac{89}{50}$	$\begin{array}{r} \times \\ 316 \overline{) 27} \\ \underline{-5.8} \end{array}$	$\frac{102}{18}$	$\frac{109}{-58}$	$\frac{110}{19}$	$\frac{109}{-5.8}$	$\frac{111}{50}$	
$\frac{100}{50}$	$\begin{array}{r} \times \\ 348 \overline{) 112} \\ \underline{-74} \end{array}$	$\frac{107}{14}$	$\frac{99}{-6.1}$	$\frac{87}{11}$	$\frac{95}{-5.7}$	$\frac{102}{50}$	
$\frac{101}{50}$	$\begin{array}{r} \times \\ 379 \overline{) 77} \\ \underline{-62} \end{array}$	$\frac{82}{17}$	$\frac{74}{-39}$	$\frac{72}{12}$	$\frac{5.8}{78}$	$\frac{64}{-2.9}$	$\frac{20}{50}$
$\frac{106}{50}$	$\begin{array}{r} \times \\ 342 \overline{) 103} \\ \underline{-7.1} \end{array}$	$\frac{82}{14}$	$\frac{63}{-3.1}$	$\frac{45}{12}$	$\frac{32}{20}$	$\frac{20}{+1.2}$	$\frac{38}{50}$
$\frac{107}{50}$	$\begin{array}{r} \times \\ 346 \overline{) 10.0} \\ \underline{-7.3} \end{array}$	$\frac{85}{17}$	$\frac{61}{-3.4}$		$\frac{3.1}{20}$	$\frac{0.2}{+2.5}$	$\frac{42.3}{873.1}$
$\frac{146}{50}$	$\begin{array}{r} \times \\ 302 \overline{) 142} \\ \underline{-5.1} \end{array}$	$\frac{13.1}{13}$	$\frac{11.4}{-2.3}$		$\frac{84}{21}$	$\frac{66}{+2.8}$	$\frac{41}{50}$
$\frac{9.3}{50}$	$\begin{array}{r} \times \\ 307 \overline{) 86} \\ \underline{-48} \end{array}$	$\frac{88}{-0.4}$	$\frac{84}{20}$		$\frac{7.2}{78}$	$\frac{60}{31}$	$\frac{39}{50}$
$\frac{3.5}{50}$	$\begin{array}{r} \times \\ 375 \overline{) 32} \\ \underline{-43} \end{array}$	$\frac{34}{15}$	$\frac{40}{+3.5}$		$\frac{3.7}{21}$	$\frac{3.3}{+4.2}$	$\frac{34}{50}$
$\frac{17}{50}$	$\begin{array}{r} \times \\ 357 \overline{) 3.7} \\ \underline{-4.1} \end{array}$	$\frac{24}{19}$	$\frac{25}{+4.3}$		$\frac{3.7}{21}$	$\frac{4.5}{+2.6}$	$\frac{54}{50}$
$\frac{61}{50}$	$\begin{array}{r} \times \\ 316 \overline{) 5.6} \\ \underline{-4.4} \end{array}$	$\frac{5.1}{23}$	$\frac{4.8}{+1.2}$		$\frac{5.7}{20}$	$\frac{6.7}{+1.3}$	$\frac{8.9}{50}$
$\frac{6.1}{50}$	$\begin{array}{r} \times \\ 75.0 \overline{) 7.1} \\ \underline{-7.5} \end{array}$		$\frac{86}{-2.0}$		$\frac{91}{20}$	$\frac{94}{-4.8}$	$\frac{106}{50}$

Original Cross Sections

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

897.83.

220 94.7 3.1

+50 96.2 1.6

221 97.7 0.1

+35 98.8 (+1.0)

+65 99.6 (+1.8)

T.P. 12.28 906.54 3.57 894.26.

222 900.7 5.8

+30 01.6 4.9

+65 02.7 3.8

223 03.7 2.8

T.P. 8.53 914.92 0.15 906.39.

+66 05.7 4.2

224 06.7 8.2

+50 08.2 6.7

115 09.0 5.7

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

.....

Left

C L

Right

$$\begin{array}{r} 69 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 79 \\ 286 \overline{) 43} \end{array}$$

$$\begin{array}{r} 87 \\ \hline -58 \end{array}$$

$$\begin{array}{r} 70 \\ \hline 24 \end{array}$$

$$\begin{array}{r} \times 88 \\ 57 \overline{) 14} \end{array}$$

$$\begin{array}{r} 93 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 79 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 84 \\ 236 \overline{) 68} \end{array}$$

$$\begin{array}{r} 74 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 72 \\ \hline -56 \end{array}$$

$$\begin{array}{r} 75 \\ \hline 21 \end{array}$$

$$\begin{array}{r} \times 77 \\ -61 \overline{) 32} \end{array}$$

$$\begin{array}{r} 89 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 102 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 97 \\ 397 \overline{) 96} \end{array}$$

$$\begin{array}{r} 86 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 63 \\ \hline -62 \end{array}$$

$$\begin{array}{r} 50 \\ \hline 18 \end{array}$$

$$\begin{array}{r} \times 50 \\ -47 \overline{) 298} \end{array}$$

$$\begin{array}{r} 75 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 86 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 82 \\ 284 \overline{) 72} \end{array}$$

$$\begin{array}{r} 68 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 60 \\ \hline -70 \end{array}$$

$$\begin{array}{r} 61 \\ \hline 23 \end{array}$$

$$\begin{array}{r} \times 69 \\ -79 \overline{) 58} \end{array}$$

$$\begin{array}{r} 87 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 46 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 38 \\ 312 \overline{) 56} \end{array}$$

$$\begin{array}{r} 40 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 44 \\ \hline -62 \end{array}$$

$$\begin{array}{r} 56 \\ \hline 23 \end{array}$$

$$\begin{array}{r} \times 60 \\ -78 \overline{) 56} \end{array}$$

$$\begin{array}{r} 74 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 80 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 78 \\ 240 \overline{) 20} \end{array}$$

$$\begin{array}{r} 85 \\ \hline -27 \end{array}$$

$$\begin{array}{r} 100 \\ \hline 23 \end{array}$$

$$\begin{array}{r} \times 74 \\ -56 \overline{) 312} \end{array}$$

$$\begin{array}{r} 131 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 20 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 52 \\ 306 \overline{) 17} \end{array}$$

$$\begin{array}{r} \times 54 \\ 210 \overline{) 05} \end{array}$$

$$\begin{array}{r} 49 \\ \hline -20 \end{array}$$

$$\begin{array}{r} 84 \\ \hline 20 \end{array}$$

$$\begin{array}{r} \times 88 \\ -39 \overline{) 278} \end{array}$$

$$\begin{array}{r} 107 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 18 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 37 \\ 312 \overline{) 101} \end{array}$$

$$\begin{array}{r} \times 46 \\ 216 \overline{) 08} \end{array}$$

$$\begin{array}{r} 75 \\ \hline -27 \end{array}$$

$$\begin{array}{r} 95 \\ \hline 20 \end{array}$$

$$\begin{array}{r} \times 70 \\ -65 \overline{) 330} \end{array}$$

$$\begin{array}{r} 118 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 21 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 48 \\ 325 \overline{) 710} \end{array}$$

$$\begin{array}{r} \times 33 \\ 210 \overline{) 05} \end{array}$$

$$\begin{array}{r} 93 \\ \hline -35 \end{array}$$

$$\begin{array}{r} 94 \\ \hline 21 \end{array}$$

$$\begin{array}{r} \times 78 \\ -85 \overline{) 370} \end{array}$$

$$\begin{array}{r} 130 \\ \hline 50 \end{array}$$

Nail in F.P. 50' Lt. Sta 222 + 95

$$\begin{array}{r} 59 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 77 \\ 327 \overline{) 718} \end{array}$$

$$\begin{array}{r} \times 86 \\ 20 \overline{) 16} \end{array}$$

$$\begin{array}{r} 108 \\ \hline -16 \end{array}$$

$$\begin{array}{r} 136 \\ \hline 19 \end{array}$$

$$\begin{array}{r} \times 163 \\ -71 \overline{) 542} \end{array}$$

$$\begin{array}{r} 186 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 55 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 92 \\ 20 \overline{) 110} \end{array}$$

$$\begin{array}{r} \times 102 \\ 240 \overline{) 20} \end{array}$$

$$\begin{array}{r} 123 \\ \hline -41 \end{array}$$

$$\begin{array}{r} 141 \\ \hline 25 \end{array}$$

$$\begin{array}{r} \times 146 \\ -64 \overline{) 328} \end{array}$$

$$\begin{array}{r} 149 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 36 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times 67 \\ 310 \overline{) 00} \end{array}$$

$$\begin{array}{r} \times 23 \\ 220 \overline{) 11} \end{array}$$

$$\begin{array}{r} 96 \\ \hline -29 \end{array}$$

$$\begin{array}{r} \times 104 \\ -37 \overline{) 274} \end{array}$$

$$\begin{array}{r} 95 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 73 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 47 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 65 \\ \hline -06 \end{array}$$

$$\begin{array}{r} \times 72 \\ -13 \overline{) 226} \end{array}$$

$$\begin{array}{r} \times 25 \\ +04 \overline{) 286} \end{array}$$

$$\begin{array}{r} 64 \\ \hline 50 \end{array}$$

Original

Cross Sec

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

914.92.

225 909.7. 52

+39 10.9 40

T.P. 12.31 926.63. 0.60 914.32

+60 11.4 15.2

T.P. 8.42 933.21. 1.24 925.39.

226 12.3 21.5

+33 ~~11.9~~ 22.1 21.7  
~~12.9~~ 21.9

+72 13.4. 20.8 20.0  
20.4

227 13.6 20.9 19.5  
20.2

T.B.M. 1.27 929.71. 5.37 928.44.

+50 13.9 16.5 15.1  
15.8

228 13.8 16.6 15.8  
15.9

+50 13.5 16.9 15.5  
16.2

+75 13.2 17.2 15.8  
16.5

229 12.8 17.0 16.2  
16.9

T.P. 0.37 918.59. 11.49 918.22.

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

17

Left C L Right

	$\frac{11}{50}$	$\frac{2.2}{100}$	$\frac{43}{109}$		$\frac{50}{102}$	$\frac{44}{50}$
	$\frac{407}{136}$	$\frac{112}{92.0}$	$\frac{14}{12.6}$	$\frac{3.3}{20}$	$\frac{40}{00}$	$\frac{41}{50}$
	$\frac{49}{50}$	$\frac{57}{110.1}$	$\frac{6.0}{27}$	$\frac{74}{158}$	$\frac{133}{20}$	$\frac{144}{108}$
	$\frac{6.0}{50}$	$\frac{67}{115.7}$	$\frac{71}{23}$	$\frac{72}{173}$	$\frac{13.8}{28}$	$\frac{15.6}{40}$
-0.02 -0.16						$\frac{15.6}{50}$
	$\frac{44}{50}$	$\frac{3.5}{16.7}$	$\frac{3.8}{14}$	$\frac{50}{169}$	$\frac{25}{27}$	$\frac{117}{107}$
0.05 -0.2						$\frac{113}{50}$
	$\frac{51}{50}$	$\frac{5.5}{17.3}$	$\frac{3.3}{20}$	$\frac{37}{116.7}$	$\frac{6.5}{27}$	$\frac{9.1}{109}$
1.0 -0.44						$\frac{9.3}{50}$
	$\frac{57}{50}$	$\frac{57}{115.2}$	$\frac{51}{22}$	$\frac{45}{115.7}$	$\frac{54}{22}$	$\frac{85}{110}$
1.85 -0.70						$\frac{85}{50}$
Kallio 12" Bat Jump 49' Lt. Sta. 727						
	$\frac{37}{50}$	$\frac{30}{47}$	$\frac{59}{24}$	$\frac{32}{112.5}$	$\frac{2.1}{28}$	$\frac{2.3}{128}$
2.0 -0.7						$\frac{1}{50}$
	$\frac{45}{50}$	$\frac{37}{46}$	$\frac{88}{182}$	$\frac{10.0}{20}$	$\frac{98}{105}$	$\frac{2.7}{24}$
2.0 -0.7						$\frac{2.1}{48.1}$
	$\frac{117}{50}$	$\frac{12.2}{119}$	$\frac{68}{111}$	$\frac{5.6}{12}$	$\frac{56}{106}$	$\frac{93}{27}$
2.0 -0.7						$\frac{12.7}{50}$
	$\frac{110}{50}$	$\frac{10.6}{110}$	$\frac{59}{58}$	$\frac{5.0}{15}$	$\frac{59}{110}$	$\frac{107}{23}$
2.0 -0.7						$\frac{13.5}{12.3}$
	$\frac{113}{50}$	$\frac{10.3}{113}$	$\frac{7.5}{56}$	$\frac{93}{17.0}$		$\frac{16.8}{50}$
2.0 -0.7						$\frac{16.8}{50}$
	$\frac{141}{50}$	$\frac{14.3}{141}$	$\frac{8.0}{56}$	$\frac{7.5}{19}$		$\frac{12.3}{50}$
2.0 -0.7						$\frac{12.3}{50}$

Original

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		912.59			
+32				12.2	7.1 5.7 6.0
+70				11.5	7.8 6.6 7.1
T.P.	0.52	907.26	11.25		906.74 (73.0) 4.13
230				11.0	(73.7)
B.M.	1.58	902.46	6.38	900.88	✓ (73) (87)
+30				10.5	8.0
+50				10.1	6.9 8.3 15.0
+73				09.7	6.7 8.0 (73)
231				09.2	6.0 8.0 (6.7)
+24				08.8	(5.9) 6.7 (6.3)
+65				08.0	(5.3) 5.7 5.7
T.P.	2.07	908.99	0.74	901.92	1.4 1.2
232				07.4	1.4
+14				07.7	1.1
T.P.	9.50	912.28	1.01	907.98	
+42				06.6	10.7

Inst. W.C.C.  
 Rod. H.L.P.  
 Chain. A.T.P. + W.A.

Aug 13, 1926

18

	Left	C L	Right
2.0	+0.7 $\frac{50}{50}$ $\frac{30}{40}$ $\frac{65}{70}$ $\frac{5.0}{4.1}$ 1.8 1.7 3.0 5.1	1.8 1.7 3.0 5.1	x 4.6/31 1.96 5.0
2.0	-0.7 $\frac{50}{50}$ $\frac{40}{30}$ $\frac{70}{60}$ $\frac{4.1}{5.0}$ 3.4 2.7 4.4 7.0	3.4 2.7 4.4 7.0	1.6/35.6 1.22 7.8
2.0	+0.7 1.9 3.4 2.1 1.0 1.2 2.6 6.6	1.0 1.2 2.6 6.6	x 1.39/50
2.0	-0.7 5.0 3.3 3.1 3.6 3.3 1.3 -6.3 2.4	3.3 1.3 -6.3 2.4	-18.2/50
R.R. Spike, 18" Oak 50' Lt. 230120			
2.0	+0.7 $\frac{50}{50}$ $\frac{0.1}{4.0}$ $\frac{0.1}{3.8}$ $\frac{0.1}{-7.4}$ 1.8 1.9 4.3 5.7 8.1 10.9 15.0	1.8 1.9 4.3 5.7 8.1 10.9 15.0	1.50/50
2.0	-0.7 $\frac{50}{50}$ $\frac{4.0}{3.8}$ $\frac{3.8}{-7.4}$ 7.4 1.9 -1.3 1.0 2.1 3.4 -2.7	7.4 1.9 -1.3 1.0 2.1 3.4 -2.7	1.50/50
2.0	+0.7 $\frac{50}{50}$ $\frac{3.8}{2.0}$ $\frac{1.2}{1.2}$ $\frac{2.5}{1.5}$ $\frac{9.2}{-1.0}$ 11.2 1.4 1.6	11.2 1.4 1.6	2.43/50
2.0	-0.7 $\frac{50}{50}$ $\frac{3.8}{2.0}$ $\frac{1.2}{1.2}$ $\frac{2.5}{1.5}$ $\frac{9.2}{-1.0}$ 11.2 1.4 1.6	11.2 1.4 1.6	2.43/50
2.0	+0.7 $\frac{50}{50}$ $\frac{2.9}{1.46}$ $\frac{2.9}{2.5}$ $\frac{1.9}{2.0}$ $\frac{1.6}{-1.99}$ 1.3 1.4 1.6	1.3 1.4 1.6	2.40/50
2.0	-0.7 $\frac{50}{50}$ $\frac{2.9}{1.46}$ $\frac{2.9}{2.5}$ $\frac{1.9}{2.0}$ $\frac{1.6}{-1.99}$ 1.3 1.4 1.6	1.3 1.4 1.6	2.40/50
2.0	+0.7 $\frac{50}{50}$ $\frac{1.10}{-1.70}$ $\frac{2.0}{3.6}$ $\frac{5.6}{2.3}$ $\frac{3.5}{2.4}$ $\frac{3.0}{1.4}$ $\frac{4.2}{8}$ $\frac{9.6}{-1.3}$ 11.3 1.4 1.6	11.3 1.4 1.6	1.52/50
2.0	-0.7 $\frac{50}{50}$ $\frac{1.10}{-1.70}$ $\frac{2.0}{3.6}$ $\frac{5.6}{2.3}$ $\frac{3.5}{2.4}$ $\frac{3.0}{1.4}$ $\frac{4.2}{8}$ $\frac{9.6}{-1.3}$ 11.3 1.4 1.6	11.3 1.4 1.6	2.26/50
2.0	+0.44 $\frac{50}{50}$ $\frac{1.8}{1.77}$ $\frac{9.5}{2.9}$ $\frac{4.0}{2.0}$ $\frac{3.6}{7}$ $\frac{4.6}{-1.09}$ 10.4 11.4 11.9	10.4 11.4 11.9	1.86/50
2.0	-0.44 $\frac{50}{50}$ $\frac{1.8}{1.77}$ $\frac{9.5}{2.9}$ $\frac{4.0}{2.0}$ $\frac{3.6}{7}$ $\frac{4.6}{-1.09}$ 10.4 11.4 11.9	10.4 11.4 11.9	1.86/50
2.0	+0.2 $\frac{50}{50}$ $\frac{1.3}{1.66}$ $\frac{7.5}{3.6}$ $\frac{7.7}{1.4}$ $\frac{3.5}{5}$ $\frac{5.0}{-8.5}$ 2.8 3.9 2.7	2.8 3.9 2.7	1.7/50
2.0	-0.2 $\frac{50}{50}$ $\frac{1.3}{1.66}$ $\frac{7.5}{3.6}$ $\frac{7.7}{1.4}$ $\frac{3.5}{5}$ $\frac{5.0}{-8.5}$ 2.8 3.9 2.7	2.8 3.9 2.7	1.7/50
2.0	-0.04 $\frac{14.3}{50}$ $\frac{1.44}{-1.30}$ $\frac{1.6}{7.3}$ $\frac{9.2}{9}$ $\frac{7.0}{3}$ $\frac{6.8}{-5.2}$ 6.0 5.7 7.0 3.0 3.0 3.7	6.0 5.7 7.0 3.0 3.0 3.7	3.0/50
2.0	-0.16 $\frac{14.3}{50}$ $\frac{1.44}{-1.30}$ $\frac{1.6}{7.3}$ $\frac{9.2}{9}$ $\frac{7.0}{3}$ $\frac{6.8}{-5.2}$ 6.0 5.7 7.0 3.0 3.0 3.7	6.0 5.7 7.0 3.0 3.0 3.7	3.0/50
2.0	$\frac{12.3}{50}$ $\frac{4.50}{10.0}$ $\frac{1.14}{1.9}$ $\frac{7.6}{5}$ $\frac{7.0}{5}$ $\frac{6.2}{5.1}$ 4.5 5.0 2.8 4.9 2.0 3.7	4.5 5.0 2.8 4.9 2.0 3.7	2.7/50
2.0	$\frac{16.1}{50}$ $\frac{1.45}{3.9}$ $\frac{1.25}{2.8}$ $\frac{2.0}{1.0}$ $\frac{1.07}{1.5}$ $\frac{9.5}{+2.4}$ $\frac{8.3}{4}$ 8.9 12.4 10.9 11.4 11.9 10.8	8.9 12.4 10.9 11.4 11.9 10.8	1.16/50

Original Cross Sec. A.S. 2401  
1008  
4000

Sta.	B. S.	H. I.	E. S.	Grade	Gr. R.
-		917.28			
+75				06.0	11.3
233				05.6	11.7
+38				04.9	12.4
+75				04.2	13.1
234				03.8	13.5
+25				03.4	13.9
+72				02.9	14.4
235				03.9	14.4
+34				02.7	14.6
+48				02.7	14.6
T.P.	2.37	908.92	10.93	906.55	
+70				02.8	5.9
TP	4.37	901.26	11.83	896.89	
236 TP	5.74	897.91	9.09	892.17	
236+00				03.1	+5.2

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

Left

C L

Right

$\frac{107}{50}$   $\frac{36 \frac{9}{80}}{33}$   $\frac{48}{18}$   $\frac{48}{+0.5}$   $\frac{9.5}{10}$   $\frac{9.6}{11}$   $\frac{9.3}{31}$   $\frac{8.6}{32}$   $\frac{8.6}{+27}$   $\frac{8.6}{91.0}$   $\frac{89}{50}$

$\frac{5.5}{50}$   $\frac{31 \frac{1}{6.0}}{5.7}$   $\frac{2.9}{32}$   $\frac{2.7}{7}$   $\frac{6.5}{+5.3}$   $\frac{8.0}{6}$   $\frac{7.2}{10}$   $\frac{7.8}{23}$   $\frac{6.4}{2.5}$   $\frac{7.6}{+41}$   $\frac{37.2}{5.1}$

$\frac{7.8}{50}$   $\frac{1.0}{+6.7}$   $\frac{3.2}{30}$   $\frac{1.7}{16}$   $\frac{6.0}{7}$   $\frac{6.0}{+6.4}$   $\frac{6.2}{10}$   $\frac{4.8}{14}$   $\frac{5.2}{2.4}$   $\frac{6.4}{+6.0}$   $\frac{6.7}{40.}$   $\frac{6.7}{50}$

$\frac{11.5}{50}$   $\frac{38 \frac{3}{82}}{49}$   $\frac{4.7}{21}$   $\frac{5.6}{18}$   $\frac{5.1}{11}$   $\frac{5.1}{+8.0}$   $\frac{6.8}{12}$   $\frac{9.5}{28}$   $\frac{10.5}{+26}$   $\frac{13.9}{14.2}$   $\frac{14.2}{50}$

$\frac{13.5}{50}$   $\frac{36 \frac{1}{9.7}}{3.6}$   $\frac{9.0}{32}$   $\frac{5.9}{21}$   $\frac{5.5}{13}$   $\frac{7.9}{+5.6}$   $\frac{11.3}{16}$   $\frac{18.5}{+25}$   $\frac{15.6}{33}$   $\frac{22.6}{50}$

$\frac{9.7}{50}$   $\frac{39 \frac{1}{8.4}}{5.5}$   $\frac{5.9}{23}$   $\frac{6.3}{16}$   $\frac{7.5}{+4.4}$   $\frac{11.2}{6}$

$\frac{1.4}{50}$   $\frac{4.4}{28}$   $\frac{3 \frac{1}{6.2}}{+8.2}$   $\frac{6.0}{30}$   $\frac{6.4}{20}$   $\frac{10.1}{+4.3}$

$\frac{6.5}{50}$   $\frac{43 \frac{1}{6.0}}{+8.4}$   $\frac{5.9}{38}$   $\frac{7.7}{20}$   $\frac{10.3}{+4.1}$

$\frac{6.1}{50}$   $\frac{42 \frac{9}{6.7}}{3.9}$   $\frac{5.5}{40}$   $\frac{6.0}{27}$   $\frac{7.5}{13}$   $\frac{11.2}{+3.4}$

$\frac{6.9}{50}$   $\frac{6.6}{48}$   $\frac{1 \frac{6}{5.5}}{+9.1}$   $\frac{7.2}{26}$   $\frac{7.4}{15}$   $\frac{13.8}{+10.8}$

$\frac{0.0}{50}$   $\frac{2 \frac{1}{2.2}}{+3.7}$   $\frac{5.0}{25}$

Cont on page 50

$\frac{+3.5}{50}$   $\frac{0.0}{44}$   $\frac{34 \frac{1}{2.0}}{+7.2}$   $\frac{3.2}{30}$   $\frac{4.8}{23}$   $\frac{6.5}{-11.7}$

Water Lake

Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
+50				3.8	+5.9
T.P.	8.80	903.62	3.09	894.82	-
			0.67	902.95	902.9
237				04.7	+6.8
T.B.M.	2.71	905.67			902.96
+50				06.2	+0.5
+75				07.0	+1.3
238				08.2	+2.5
T.B.M.	11.52	916.86	0.33		905.34
+50				10.2	6.7
+74				11.2	5.7
T.P.	11.06	927.10	0.82		916.04
239				12.2	14.9
+32				13.5	13.6
+70				15.0	12.1
240				16.2	10.9
+30				17.4	9.7

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

Oct 13, 1926

Left

C L

Right

$$\begin{array}{r} 2.0 \\ \hline 50 \end{array} \quad 4 \times \frac{45.2}{11.1} \quad \frac{6.7}{34}$$

lake water

$$\frac{1.8}{50} \quad 4 \frac{1.8}{10.9} \quad \frac{6.0}{34}$$

lake water

$$\begin{array}{r} 5.2 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 78 \\ 366 \\ \hline -80 \end{array} \quad \frac{9.7}{26} \quad \frac{7.1}{12.6} \quad \frac{12.8}{20} \quad \begin{array}{r} 14.1 \\ \times \\ \hline -146 \\ 497 \end{array} \quad \frac{14.2}{50}$$

$$\begin{array}{r} 4.2 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 48 \\ 322 \\ \hline -61 \end{array} \quad \frac{5.1}{20} \quad \frac{7.3}{8.6} \quad \frac{8.7}{22} \quad \begin{array}{r} 11.0 \\ \times \\ \hline -12.3 \\ 42.6 \end{array} \quad \frac{11.4}{50}$$

$$\begin{array}{r} 2.8 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 27 \\ 301 \\ \hline -52 \end{array} \quad \frac{2.5}{20} \quad \frac{3.2}{4.7} \quad \frac{3.7}{20} \quad \begin{array}{r} 4.8 \\ \times \\ \hline -7.3 \\ 4.6 \end{array} \quad \frac{6.0}{50}$$

$$\begin{array}{r} 9.6 \\ \hline 50 \end{array} \quad \begin{array}{r} 91 \\ 30 \end{array} \quad \begin{array}{r} \times 9.5 \\ 286 \\ \hline -78 \end{array} \quad \frac{9.5}{24} \quad \frac{8.5}{20} \quad \frac{8.0}{1.3} \quad \frac{9.0}{9} \quad \begin{array}{r} 10.1 \\ \times \\ \hline -3.4 \\ 26.8 \end{array} \quad \frac{10.2}{50}$$

$$\begin{array}{r} 4.6 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 47 \\ 375 \\ \hline +10 \end{array} \quad \frac{4.3}{8} \quad \frac{6.2}{-0.5} \quad \frac{5.0}{14} \quad \frac{5.7}{20} \quad \begin{array}{r} 6.0 \\ \times \\ \hline 11.7 \\ 206 \end{array} \quad \frac{7.4}{50}$$

Nail in 24" str. 55" str. 232 + 85

$$\begin{array}{r} 16.2 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 102 \\ 384 \\ \hline +1.7 \end{array} \quad \frac{10.2}{20} \quad \frac{10.5}{14.4} \quad \frac{10.7}{14} \quad \frac{11.2}{20} \quad \frac{13.1}{29} \quad \begin{array}{r} 13.3 \\ \times \\ \hline +1.6 \\ 39.4 \end{array} \quad \frac{14.0}{38} \quad \frac{12.1}{39} \quad \frac{12.7}{50}$$

$$\begin{array}{r} 4.1 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 44 \\ 44.6 \\ \hline +1.2 \end{array} \quad \frac{4.3}{20} \quad \frac{5.1}{8.5} \quad \frac{7.5}{24} \quad \frac{12.0}{32} \quad \begin{array}{r} 11.7 \\ \times \\ \hline +1.9 \\ 33.9 \end{array} \quad \frac{11.4}{40} \quad \frac{12.1}{46} \quad \frac{11.2}{50}$$

$$\begin{array}{r} 50.0 \\ \hline 121 \end{array} \quad \frac{3.3}{20} \quad \frac{5.1}{7.0} \quad \frac{6.4}{20} \quad \frac{7.2}{32} \quad \begin{array}{r} 7.8 \\ \times \\ \hline +2.3 \\ 29.5 \end{array} \quad \frac{11.1}{38} \quad \frac{10.6}{44} \quad \frac{11.0}{50}$$

$$\begin{array}{r} 73.1 \\ \hline 920.2 \\ +14.0 \end{array} \quad \frac{6.5}{16} \quad \frac{3.2}{11.7} \quad \frac{6.5}{17} \quad \frac{8.8}{30} \quad \begin{array}{r} 10.5 \\ \times \\ \hline +0.4 \\ 31.6 \end{array} \quad \frac{10.7}{35} \quad \frac{10.1}{43} \quad \frac{11.2}{50}$$

$$\begin{array}{r} 73.7 \\ \hline 130.8 \\ +13.4 \end{array} \quad \frac{0.5}{2.4} \quad \frac{3.8}{15.9} \quad \frac{6.1}{14} \quad \frac{8.1}{24} \quad \begin{array}{r} 10.2 \\ \times \\ \hline +1.6 \\ 30.9 \end{array} \quad \frac{7.9}{38} \quad \frac{11.0}{50}$$

Original

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		927.16.			
+75				19.2	79.
241				20.2	6.9.
T.P.	10.40	933.65.	3.85		923.75.
+78				21.3	12.4.
+54				22.4	11.3.
242				24.2	4.5.
B.M.	8.21	933.68.	8.18		925.47.
+23				25.1	2.6.
+50				26.1	7.6.
+75				27.0	6.7.
243				27.8	5.9.
T.P.	10.40	943.51.	0.57		933.11.
+42				28.9	14.6.
244				30.7	12.8.
+27				31.4	12.1.
+70				32.3	11.7.
T.P.	5.23	938.95.	9.79		933.72.

Instr. ....

Rod. ....

Chain. ....

Left

C L

Right

$\frac{107}{927.8}$	$\frac{11.2}{45.69289}$	$\frac{07}{50}$	$\frac{34}{16}$	$\frac{62}{117}$	$\frac{9.1}{17}$	$\frac{9.0}{1.1}$	$\frac{26}{28}$	$\frac{2.8}{297}$	$\frac{104}{40}$	$\frac{12.1}{50}$
---------------------	-------------------------	-----------------	-----------------	------------------	------------------	-------------------	-----------------	-------------------	------------------	-------------------

$\frac{00}{50}$	$\frac{01}{16.8}$	$\frac{00}{36}$	$\frac{15}{20}$	$\frac{48}{12.1}$	$\frac{6.0}{4}$	$\frac{7.2}{10}$	$\frac{7.1}{-0.2}$	$\frac{8.1}{29}$	$\frac{11.3}{36}$	$\frac{13.7}{50}$
-----------------	-------------------	-----------------	-----------------	-------------------	-----------------	------------------	--------------------	------------------	-------------------	-------------------

$\frac{99}{50}$	$\frac{9.2}{35.8}$	$\frac{8.1}{17}$	$\frac{11.0}{11}$	$\frac{108}{11.6}$	$\frac{12.3}{13}$	$\frac{11.3}{18}$	$\frac{13.8}{10.6}$	$\frac{16.0}{28.9}$	$\frac{16.0}{50}$
-----------------	--------------------	------------------	-------------------	--------------------	-------------------	-------------------	---------------------	---------------------	-------------------

$\frac{92}{50}$	$\frac{6.4}{35.6}$	$\frac{93}{74}$	$\frac{104}{7}$	$\frac{86}{12.7}$	$\frac{102}{25}$	$\frac{11.8}{11.5}$	$\frac{12.0}{30.3}$	$\frac{10.0}{50}$
-----------------	--------------------	-----------------	-----------------	-------------------	------------------	---------------------	---------------------	-------------------

$\frac{83}{50}$	$\frac{17.7}{33}$	$\frac{79}{33}$	$\frac{10.1}{24}$	$\frac{103}{21.6}$	$\frac{114}{-1.9}$	$\frac{120}{28}$	$\frac{123}{51}$	$\frac{13.6}{50}$
-----------------	-------------------	-----------------	-------------------	--------------------	--------------------	------------------	------------------	-------------------

R.R. 10' Oak 50' Lt 242' 100

$\frac{65}{50}$	$\frac{7.7}{45}$	$\frac{13}{30}$	$\frac{11.8}{26.4}$	$\frac{132}{3.2}$	$\frac{132}{-4.6}$	$\frac{142}{56}$	$\frac{151}{31.2}$	$\frac{15.1}{50}$
-----------------	------------------	-----------------	---------------------	-------------------	--------------------	------------------	--------------------	-------------------

$\frac{42}{50}$	$\frac{13}{48}$	$\frac{82}{38}$	$\frac{102}{20.2}$	$\frac{19}{-9.3}$	$\frac{192}{-7.6}$	$\frac{192}{35.2}$	$\frac{19.8}{50}$
-----------------	-----------------	-----------------	--------------------	-------------------	--------------------	--------------------	-------------------

$\frac{24}{50}$	$\frac{40}{35.1}$	$\frac{120}{27}$	$\frac{52}{11.0}$	$\frac{74}{-0.7}$	$\frac{107}{-7.0}$	$\frac{126}{28.0}$	$\frac{12.6}{50}$
-----------------	-------------------	------------------	-------------------	-------------------	--------------------	--------------------	-------------------

$\frac{06}{50}$	$\frac{07}{48}$	$\frac{129}{129}$	$\frac{925.7}{30}$	$\frac{19}{14.0}$	$\frac{52}{28}$	$\frac{5.6}{19.2}$	$\frac{7.6}{31.6}$	$\frac{7.6}{50}$
-----------------	-----------------	-------------------	--------------------	-------------------	-----------------	--------------------	--------------------	------------------

$\frac{85}{50}$	$\frac{90}{45}$	$\frac{17.4}{41.2}$	$\frac{40}{36}$	$\frac{46}{110.0}$	$\frac{64}{30}$	$\frac{7.3}{7.2}$	$\frac{8.2}{41.0}$	$\frac{8.2}{50}$
-----------------	-----------------	---------------------	-----------------	--------------------	-----------------	-------------------	--------------------	------------------

$\frac{77}{50}$	$\frac{83}{44}$	$\frac{7.0}{39.7}$	$\frac{6.7}{29}$	$\frac{43}{+8.5}$	$\frac{3.5}{20}$	$\frac{3.2}{19.0}$	$\frac{3.7}{44.5}$	$\frac{3.7}{50}$
-----------------	-----------------	--------------------	------------------	-------------------	------------------	--------------------	--------------------	------------------

$\frac{84}{50}$	$\frac{89}{55}$	$\frac{7.4}{38.1}$	$\frac{6.7}{20}$	$\frac{6.1}{16.0}$	$\frac{5.1}{29}$	$\frac{5.1}{17.0}$	$\frac{5.1}{41.5}$	$\frac{5.1}{50}$
-----------------	-----------------	--------------------	------------------	--------------------	------------------	--------------------	--------------------	------------------

$\frac{100}{50}$	$\frac{11.0}{31.0}$	$\frac{11.8}{21.7}$	$\frac{11.7}{-0.6}$	$\frac{11.7}{-0.5}$	$\frac{13.9}{-1.7}$	$\frac{13.9}{23.4}$	$\frac{13.5}{50}$
------------------	---------------------	---------------------	---------------------	---------------------	---------------------	---------------------	-------------------



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

Left

C L

Right

$$\frac{9.1}{50}$$

$$27.2 \overset{9.8}{\underset{3.6}{|}}$$

$$\frac{9.7}{50}$$

$$\frac{9.7}{3.5} / 27.0$$

$$\frac{4.7}{50}$$

$$\frac{7.7}{50}$$

$$29.4 \overset{9.5}{\underset{4.7}{|}}$$

$$\frac{9.8}{50}$$

$$\frac{9.8}{50} / 30.0$$

$$\frac{9.7}{50}$$

$$\frac{4.7}{50}$$

$$20.9 \overset{9.1}{\underset{10.7}{|}}$$

$$\frac{7.1}{17}$$

$$\frac{9.1}{4.3}$$

$$\frac{9.8}{50} / 30.0$$

$$\frac{9.8}{50}$$

$$\frac{4.3}{50}$$

$$30.9 \overset{4.2}{\underset{4.6}{|}}$$

$$\frac{5.9}{2.1}$$

$$\frac{7.4}{2.3} \overset{8.0}{\underset{4.2}{|}}$$

$$\frac{9.3}{50}$$

$$\frac{4.8}{50}$$

$$28.9 \overset{4.8}{\underset{4.6}{|}}$$

$$\frac{3.8}{0.4}$$

$$\frac{4.3}{9} \overset{5.5}{\underset{1.4}{|}}$$

$$\frac{6.2}{50}$$

$$\frac{6.0}{50}$$

$$28.6 \overset{4.7}{\underset{10.4}{|}}$$

$$\frac{4.1}{1.0}$$

$$\frac{3.0}{1.0} \overset{2.5}{\underset{1.6}{|}}$$

$$\frac{3.1}{50}$$

$$\frac{1.6}{50}$$

$$29.2 \overset{13.2}{\underset{10.8}{|}}$$

$$\frac{1.5}{10.5}$$

$$\frac{10.7}{20} \overset{9.2}{\underset{4.8}{|}}$$

$$\frac{8.5}{50}$$

$$\frac{1.70}{50}$$

$$1.92 \overset{11.7}{\underset{3.1}{|}}$$

$$\frac{9.7}{1.8}$$

$$\frac{7.5}{20} \overset{6.0}{\underset{1.5}{|}}$$

$$\frac{7.1}{50}$$

$$\frac{1.7}{50}$$

$$31.3 \overset{10.8}{\underset{10.2}{|}}$$

$$\frac{7.0}{1.0}$$

$$\frac{6.5}{20} \overset{6.2}{\underset{4.8}{|}}$$

$$\frac{5.6}{50}$$

R.R. spike 18" oak 55 lb 249+05

$$\frac{1.7}{50}$$

$$34.3 \overset{8.4}{\underset{12.2}{|}}$$

$$\frac{3.1}{1.9}$$

$$\frac{2.9}{20} \overset{3.0}{\underset{2.7}{|}}$$

$$\frac{4.1}{1.65} \overset{4.9}{\underset{4.8}{|}}$$

~~spike 20" white oak 52 lb 242+43~~

$$\frac{1.34}{50}$$

$$31.5 \overset{10.1}{\underset{10.3}{|}}$$

$$\frac{5.6}{4.3}$$

$$\frac{4.6}{20} \overset{4.9}{\underset{3.4}{|}}$$

$$\frac{5.2}{1.2} \overset{4.9}{\underset{3.8}{|}}$$

lt. 249+06

$$\frac{1.60}{50}$$

$$22.0 \overset{11.4}{\underset{1.0}{|}}$$

$$\frac{7.6}{1.8}$$

$$\frac{5.7}{20}$$

$$\frac{6.0}{1.4} \overset{4.9}{\underset{3.7}{|}}$$

$$\frac{4.0}{50}$$

Original

CROSS

Sta.	B. S.	H. I.	F. S.	Grade	Gr. E.
		948.20			
251				937.6	106.
	T. P.	5.47	944.02	9.65	738.55
	+50			37.3	6.7.
252				37.0	7.0.
	+50			36.6	7.4.
253				35.8	8.2.
	+30			35.3	8.7.
	+60			34.6	9.4.
254				33.6	10.4.
	+50			<del>37.5</del> 35.5	11.5.
255				30.2	13.8.
	T. P.	0.88	932.85	12.05	931.97.
	+50			28.1	4.8.
256				25.8	7.1.



*Original* Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. H.
		932.85			
+30				24.3	8.6
+51				22.3	9.6
T.P.	3.84	925.84	10.85		922.00
+76				22.1	3.7
+93				21.3	4.5
257				20.1	4.7
+14				20.6	5.2
+50				19.1	6.7
258				17.3	8.5
B.M.	4.45	921.83	8.46	917.38	
+50				15.7	6.1
259				14.2	7.5 7.7 2.6
+50				12.9	3.6 3.9 4.2
T.P.	10.43	914.4	3.12	913.91	17.0 17.6
260				11.8	17.3

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

42.5

24

207

SMALLER BORE - 1/2" DIA. - 1/4" WALL

Left

C L

Right

$\frac{112}{50}$      $\begin{matrix} \times \\ 23.4 \\ \hline 103 \\ -17 \end{matrix}$      $\frac{98}{112}$      $\frac{96}{10} / 24$      $\frac{94}{11.2} / 110$      $\frac{83}{50}$

$\frac{131}{50}$      $\frac{127}{50}$      $\frac{480}{217}$      $\frac{28}{15}$      $\frac{100}{30}$      $\frac{24}{50}$

$\frac{62}{50}$      $\frac{52}{25}$      $\frac{38}{50}$      $\frac{3.0}{20}$      $\frac{2.3}{50}$

5

$\frac{58}{50}$      $\frac{50}{50}$      $\frac{6.8}{13}$      $\frac{2.5}{22}$      $\frac{2.6}{50}$

$\frac{59}{50}$      $\frac{59}{16}$      $\frac{7.9}{8}$      $\frac{25}{38}$      $\frac{68}{18}$      $\frac{42}{29}$      $\frac{3.2}{50}$

$\frac{73}{50}$      $\begin{matrix} \times \\ 10.9 \\ \hline 37 \\ 9.0 \\ -5.2 \end{matrix}$      $\frac{98}{46}$      $\frac{84}{3.2} / 26.4$      $\frac{21}{40}$      $\frac{3.5}{47}$      $\frac{3.3}{50}$

$\frac{133}{50}$      $\begin{matrix} \times \\ 33.7 \\ \hline 13.0 \\ -1.6 \end{matrix}$      $\frac{127}{58}$      $\frac{113}{26} / 29.2$      $\frac{110}{33}$      $\frac{5.7}{43}$      $\frac{5.8}{50}$

$\frac{134}{50}$      $\frac{128}{43}$      $130$      $0.119$

RR Spike to scrubbank 60 ft 3/4 208450 (from P. 45)

$\frac{68}{50}$      $\begin{matrix} \times \\ 29.0 \\ \hline 20 \end{matrix}$      $\frac{8.5}{1.9}$      $\frac{78}{1.9} / 23.4$      $\frac{6.6}{50}$

$\begin{matrix} +0.14 \\ -0.16 \end{matrix}$      $\frac{27}{50}$      $\begin{matrix} \times \\ 26.1 \\ \hline 28.9 \\ 106 \end{matrix}$      $\begin{matrix} \times \\ 22.0 \\ \hline 25 \\ -10 \end{matrix}$      $\frac{73}{100}$      $\frac{70}{20}$      $\frac{6.7}{11.0} / 32.5$      $\frac{5.8}{50}$

$\begin{matrix} +0.34 \\ -0.34 \end{matrix}$      $\frac{19.7}{50}$      $\begin{matrix} \times \\ 31.0 \\ \hline 26 \\ 0.0 \end{matrix}$      $\frac{7.6}{26}$      $\frac{70}{20}$      $\frac{53}{23.6}$      $\frac{4.1}{15.1} / 38.7$      $\frac{5.8}{50}$

$\begin{matrix} +0.34 \\ -0.34 \end{matrix}$      $\frac{19.0}{50}$      $\begin{matrix} \times \\ 37.5 \\ \hline 15.0 \\ 11.0 \end{matrix}$      $\frac{14.7}{27}$      $\frac{15.1}{16.4}$      $\frac{9.9}{18}$      $\frac{7.3}{10.3} / 46.5$      $\frac{6.7}{50}$

Original Cross Sections

Sta.	B. S.	H. L.	F. S.	Grade.	Gr. P.
		929.14.			12.0
150				10.8	18.3
					18.5
175				10.3	18.8
					19.0
261				09.8	19.3
T.P.	2.07	922.71.	2.50	920.64.	
					10.7
160				08.7	24.0
					14.6
262				07.8	14.9
T.P.	1.99	913.24	11.46	911.25	
					6.1
150				06.8	6.4
					7.3
163				05.8	7.4
T.P.	0.25	912.39.	1.10	912.14.	
					6.1
145				04.8	7.6
					7.3
264				03.8	8.6
					7.3
136				03.1	09.3
					7.3
169				02.4	10.0
T.P.	2.62	903.53.	11.48	900.91.	
					7.3
265				01.8	1.7

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

25

.....

Left

C L

Right

+0.34	179	<sup>x</sup> 139	113	75	38		<sup>x</sup> 0.6		
-0.34	50	37.4	73	118	28		118.0	50.0	
+0.34	172	<sup>x</sup> 141	105	57	29		111		
-0.34	50	37.4	21	113.1	21		0.0	930.2	
							40	1202	
+0.34	176	<sup>x</sup> 153	117	67	30	10	114		
-0.34	50	36.6	21	1126	20	33	730.5	50	
							121.0		
+0.34	132	<sup>x</sup> 102	81	33	11	0.0	12.7		
-0.34	50	36.3	26	1107	20	33	925.4	50.0	
							1170		
+0.34	158	<sup>x</sup> 128	110	70	24	0.0	12.2		
-0.34	50	33.7	22	119	23	37	924.9	50.0	
							1114		
+0.34	176	<sup>x</sup> 169	94	25	00		170		
-0.34	50	29.8	22	139	16		920.2	50.0	
							1137		
+0.14	185	<sup>x</sup> 170	110	74	51		120		
-0.16	50	40.0	19	60	22		160	40.0	
							772.7	50	
railed 20' white oak 50ft-263+55									
220	50	48.0	126	98	62		37	14	
		126	12	-22	20		139	50	
220	50	45.1	126	86	51		06	110	
		12.3	14	60	20		180	113.4	
		12.7					430	5.0	
293	50	36.0	133	93	60		20	04	
		17.3	24	00	20		173	50	
		80					420		
253	50	41.0	163	151	93		38	6.9	
		240	19	-21	20		11.2	50	
		170					343		
50.9	50	13.2	171	127	61		44	2.4	
		165	15	7	20		27	50	
				109			254		
				-21			31		

Original

Cross Section

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

903.53

+20

901.4

2.1

T.P.

3.35

894.<sup>02</sup>12

12.86

890.77<sup>67</sup>

+56

00.7

+6.6

266

899.8

+5.1

+75

985

+44

267

97.8

+3.7

+25

97.3

+3.2

T.P.

11.65

902.26<sup>16</sup>

3.51

890.61<sup>51</sup>

+37

T.P.

6.63

908.71<sup>01</sup>

0.18

97.1<sup>52</sup>  
902.08

NA. 1174

T.P.

10.50

919.11

0.10

908.61

901.98

267+66

01

51

+174.00 R. 1000 No. 101

+894 L. 1000 No. 101

+91.70

268

95.8

B.M.

0.82

892.23

891.41

T.P.

8.30

896.69

3.86

888.37

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

Left

C L

Right

$$\begin{array}{r} 174 \\ \underline{17} \\ 157 \end{array}$$

$$\begin{array}{r} 157 \\ \underline{-136} \\ 21 \end{array}$$

$$\begin{array}{r} 103 \\ \underline{20} \\ 83 \end{array}$$

$$\begin{array}{r} 26 \\ \underline{55} \\ 31.0 \end{array}$$

$$\begin{array}{r} 45 \\ \underline{50} \\ 5 \end{array}$$

Use Original  
 X-500 acet  
 Lake

$$\begin{array}{r} 13 \\ \underline{12} \\ 1 \end{array}$$

$$\begin{array}{r} 78 \\ \underline{23} \\ 55 \end{array}$$

$$\begin{array}{r} 40 \\ \underline{-70} \\ -30 \end{array}$$

$$\begin{array}{r} 41.2 \\ \underline{50} \\ 9.2 \end{array}$$

$$\begin{array}{r} 23 \\ \underline{50} \\ 27 \end{array}$$

$$\begin{array}{r} 84 \\ \underline{28} \\ 56 \end{array}$$

$$\begin{array}{r} 74 \\ \underline{40} \\ 34 \end{array}$$

$$\begin{array}{r} 62 \\ \underline{-11.9} \\ 50.1 \end{array}$$

$$\begin{array}{r} 40 \\ \underline{50} \\ 10 \end{array}$$

$$\begin{array}{r} 87 \\ \underline{24} \\ 63 \end{array}$$

$$\begin{array}{r} 75 \\ \underline{34} \\ 41 \end{array}$$

$$\begin{array}{r} 6.0 \\ \underline{-10.9} \\ -4.9 \end{array}$$

$$\begin{array}{r} 408 \\ \underline{50} \\ 358 \end{array}$$

$$\begin{array}{r} 44 \\ \underline{50} \\ 6 \end{array}$$

$$\begin{array}{r} 80 \\ \underline{-17.9} \\ 62.1 \end{array}$$

$$\begin{array}{r} 77 \\ \underline{13} \\ 64 \end{array}$$

$$\begin{array}{r} 5.0 \\ \underline{-9.1} \\ -4.1 \end{array}$$

$$\begin{array}{r} 40 \\ \underline{50} \\ 10 \end{array}$$

$$\begin{array}{r} 45 \\ \underline{50} \\ 5 \end{array}$$

$$\begin{array}{r} 34.0 \\ \underline{39} \\ 7.0 \end{array}$$

$$\begin{array}{r} 41 \\ \underline{7.0} \\ 34 \end{array}$$

$$\begin{array}{r} 3.0 \\ \underline{-6.2} \\ -3.2 \end{array}$$

$$\begin{array}{r} 17 \\ \underline{50} \\ 33 \end{array}$$

$$\begin{array}{r} 50 \\ \underline{50} \\ 0 \end{array}$$

$$\begin{array}{r} 50 \\ \underline{20} \\ 30 \end{array}$$

$$\begin{array}{r} 52 \\ \underline{00} \\ 52 \end{array}$$

$$\begin{array}{r} 52 \\ \underline{50} \\ 20 \end{array}$$

$$\begin{array}{r} 52 \\ \underline{60} \\ -8 \end{array}$$

St. Sta. 7677 37

$$\begin{array}{r} 21 \\ \underline{10} \\ 11 \end{array}$$

Shift ←

$$\begin{array}{r} 27 \\ \underline{27} \\ 0 \end{array}$$

+ of R.R. Road Bed

$$\begin{array}{r} 21 \\ \underline{50} \\ 29 \end{array}$$

check top full (3)

$$\begin{array}{r} 27 \\ \underline{27} \\ 0 \end{array}$$

$$\begin{array}{r} 28 \\ \underline{28} \\ 0 \end{array}$$

$$\begin{array}{r} 24 \\ \underline{50} \\ 26 \end{array}$$

shoulder of

$$\begin{array}{r} 24 \\ \underline{24} \\ 0 \end{array}$$

R.R. Road Bed

$$\begin{array}{r} 24 \\ \underline{50} \\ 26 \end{array}$$

Original

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
268+23		896.67		95.4	1.4
+35				95.1	1.6
+50				94.8	1.9
269				93.8	2.9 <sup>2.8</sup>
+50				92.8	3.9 <sup>3.2</sup>
270				91.8	4.9 <sup>4.5</sup>
+50				90.8	5.9 <sup>5.0</sup>
271				89.8	6.9 <sup>6.0</sup>
+79				89.2	7.5 <sup>6.6</sup>
+65				88.7	8.0 <sup>7.1</sup>
272				88.2	8.5 <sup>7.6</sup>
+15				88.0	8.7 <sup>7.8</sup>
T.P.	7.47	904.04	-0.10	896.57	
+56				87.7	16.3 <sup>15.4</sup>
273				87.4	16.6 <sup>15.7</sup>
+38				87.3	16.7 <sup>15.8</sup>

Grady  
Change

See page 38

Inst. W.H.C.  
 Rod. R.L.P.  
 Chain. H.T.P. W.A.

Aug 2, 1924 27

	Left		CL		Right
	$\frac{12}{50} \ 31$	$\frac{10}{00}$	$\frac{14}{00}$	$\frac{14}{00}$	$\frac{09}{50}$
	$\frac{29}{50}$	$314$	$\frac{23}{5.7}$	$\frac{89}{7.3}$	$\frac{67}{50}$
	$\frac{111}{50}$	$40$	$\frac{17}{100}$	$\frac{124}{105}$	$\frac{109}{50}$
-0.1	$\frac{110}{50}$	$378$	$\frac{17}{89}$	$\frac{137}{108}$	$\frac{133}{50}$
-0.16	$\frac{110}{50}$	$378$	$\frac{17}{89}$	$\frac{137}{108}$	$\frac{133}{50}$
+0.26	$\frac{75}{50}$	$308$	$\frac{26}{54}$	$\frac{102}{73}$	$\frac{139}{50}$
-0.26	$\frac{75}{50}$	$308$	$\frac{26}{54}$	$\frac{102}{73}$	$\frac{139}{50}$
+0.58	$\frac{11}{50}$	$\frac{10}{313}$	$\frac{65}{267}$	$\frac{107}{58}$	$\frac{140}{50}$
-0.58	$\frac{11}{50}$	$\frac{10}{313}$	$\frac{65}{267}$	$\frac{107}{58}$	$\frac{140}{50}$
+0.88	$\frac{27}{50}$	$368$	$\frac{15}{43}$	$\frac{63}{0.0}$	$\frac{133}{50}$
-0.88	$\frac{27}{50}$	$368$	$\frac{15}{43}$	$\frac{63}{0.0}$	$\frac{133}{50}$
+0.88	$\frac{14}{50}$	$\frac{0.0}{306}$	$\frac{1.4}{50}$	$\frac{109}{11}$	$\frac{132}{22}$
-0.88	$\frac{14}{50}$	$\frac{0.0}{306}$	$\frac{1.4}{50}$	$\frac{109}{11}$	$\frac{132}{22}$
+0.88	$\frac{7.2}{50}$	$280$	$\frac{114}{30}$	$\frac{121}{7}$	$\frac{147}{8.1}$
-0.88	$\frac{7.2}{50}$	$280$	$\frac{114}{30}$	$\frac{121}{7}$	$\frac{147}{8.1}$
+0.88	$\frac{24}{50}$	$364$	$\frac{110}{43}$	$\frac{126}{46}$	$\frac{147}{9}$
-0.88	$\frac{24}{50}$	$364$	$\frac{110}{43}$	$\frac{126}{46}$	$\frac{147}{9}$
+0.88	$\frac{42}{50}$	$390$	$\frac{51}{40}$	$\frac{8.2}{27}$	$\frac{120}{19}$
-0.88	$\frac{42}{50}$	$390$	$\frac{51}{40}$	$\frac{8.2}{27}$	$\frac{120}{19}$
+0.88	$\frac{51}{50}$	$459$	$\frac{40}{386}$	$\frac{41}{50}$	$\frac{78}{00/20}$
-0.88	$\frac{51}{50}$	$459$	$\frac{40}{386}$	$\frac{41}{50}$	$\frac{78}{00/20}$
+0.88	$\frac{22}{50}$	$104$	$\frac{61}{22}$	$\frac{70}{170}$	$\frac{139}{15}$
-0.88	$\frac{22}{50}$	$104$	$\frac{61}{22}$	$\frac{70}{170}$	$\frac{139}{15}$
+0.88	$\frac{16}{50}$	$133$	$\frac{65}{75}$	$\frac{76}{170}$	$\frac{135}{12.2}$
-0.88	$\frac{16}{50}$	$133$	$\frac{65}{75}$	$\frac{76}{170}$	$\frac{135}{12.2}$
+0.88	$\frac{51}{50.9}$	$1128$	$\frac{70}{21}$	$\frac{109}{154}$	$\frac{121}{13.7}$
-0.88	$\frac{51}{50.9}$	$1128$	$\frac{70}{21}$	$\frac{109}{154}$	$\frac{121}{13.7}$

Original Cross Sections

Sta.	B. S.	H. I. 904.04	F. S.	Grade	Gr. R.
+75				87.1	17.8 16 16.9
274				87.0	17.9 16 17.0
T.P.	0.19	892.04	12.19		291.85
+50				86.8	61 43 52
275				86.6	6.3 4.0 5.4
+50				86.4	6.5 4.7 5.6
276				86.2	6.7 4.9 5.8
+50				86.0	6.9 5.1 6.0
277				85.8	7.1 5.3 6.7
+50				85.6	7.3 5.5 6.4
T.P.	10.86	902.17	0.73		291.31
278				85.4	17.4 16 16.8
B.M.	7.58	902.17	7.58		(294.59)
+40				85.2	17.3 16.7 17.0
+70				85.1	17.3 16.8 17.1
279				85.0	17.3 17.1 17.2
T.P.	2.82	892.70	12.29		289.88

Grade Change  
 See Page 38-39

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

Aug 2, 1926

28

	Left	C L	Right
2.6	$\frac{102}{\sqrt{5}}$	$\frac{67}{\sqrt{2}}$	$\frac{100}{\sqrt{5}}$
2.0	$\frac{118}{\sqrt{5}}$	$\frac{78}{\sqrt{2}}$	$\frac{98}{\sqrt{5}}$
2.0	$\frac{65}{\sqrt{5}}$	$\frac{57}{\sqrt{2}}$	$\frac{30.6}{\sqrt{5}}$
2.0	$\frac{105}{\sqrt{5}}$	$\frac{109}{\sqrt{2}}$	$\frac{103}{\sqrt{5}}$
2.0	$\frac{130}{\sqrt{5}}$	$\frac{130}{\sqrt{2}}$	$\frac{127}{\sqrt{5}}$
2.0	$\frac{109}{\sqrt{5}}$	$\frac{129}{\sqrt{2}}$	$\frac{133}{\sqrt{5}}$
2.0	$\frac{103}{\sqrt{5}}$	$\frac{103}{\sqrt{2}}$	$\frac{12.2}{\sqrt{5}}$
2.0	$\frac{69}{\sqrt{5}}$	$\frac{64}{\sqrt{2}}$	$\frac{7.8}{\sqrt{5}}$
1.95	$\frac{16}{\sqrt{5}}$	$\frac{06}{\sqrt{2}}$	$\frac{47}{\sqrt{5}}$
0.65	$\frac{199}{\sqrt{5}}$	$\frac{60}{\sqrt{2}}$	$\frac{82}{\sqrt{5}}$
1.028	$\frac{50.9}{\sqrt{5}}$	$\frac{58}{\sqrt{2}}$	$\frac{61}{\sqrt{5}}$
1.017	$\frac{50}{\sqrt{5}}$	$\frac{38}{\sqrt{2}}$	$\frac{27}{\sqrt{5}}$
0.14	$\frac{87}{\sqrt{5}}$	$\frac{118}{\sqrt{2}}$	$\frac{138}{\sqrt{5}}$
0.16	$\frac{50}{\sqrt{5}}$	$\frac{24}{\sqrt{2}}$	$\frac{36.0}{\sqrt{5}}$

Na. in P. S. at Sta 278+6

original Cross Sections

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

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
156		892.70			84.8    7.9
280					84.6    8.1
T.P.	4.27	884.59		12.38	880.32
+50					84.4    0.7
281					84.2    0.1
+50					84.0    0.6
B.M.	2.14	884.59		2.14	882.45
282					83.8    0.8
+50					83.6    1.0
283					83.4    1.2
284					83.0    1.4 <sup>17</sup> 1.6
285					82.6    1.4 <sup>26</sup> 2.0
T.P.	1.30	884.01		6.88	877.71
+50					82.4    0.7 <sup>2.5</sup> 1.6
286					82.2    0.9 <sup>2.7</sup> 1.8
+50					82.0    1.1 <sup>2.9</sup> 2.0
287					81.8    1.3 <sup>3.1</sup> 2.2
+50					81.6    1.5 <sup>3.3</sup> 2.4
288					81.4    1.7 <sup>3.5</sup> 2.6

*Grade changed  
24 P. 30*

*Sta. 279+50 - 30+80  
Grade changed  
see pages 33 to 37*

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

Aug 2, 1926

29

Left

C.I.

Right

~~65  
 50  
 30.6  
 112  
 117  
 219  
 104  
 105  
 28  
 19~~

~~100  
 25  
 250  
 114  
 50~~

~~87  
 50  
 27.2  
 117  
 56  
 150  
 19  
 13.6  
 5.5  
 310  
 137  
 50~~

~~34  
 50  
 3.2  
 50  
 2.0  
 50  
 294  
 147  
 287  
 4.1  
 269  
 3.0  
 65  
 58  
 60  
 56  
 54  
 78  
 21  
 69  
 20  
 66  
 6.7  
 6.1  
 338  
 332  
 322  
 71  
 50  
 7.3  
 50  
 7.2  
 50~~

R.R. spike 38 Lt. Sta. 281 + 21

~~2.0  
 50  
 2.0  
 50  
 3.3  
 50  
 34  
 26  
 42  
 32  
 48  
 36  
 26  
 26  
 34  
 26  
 49  
 41  
 55  
 48  
 62  
 50  
 62  
 57  
 6.8  
 58  
 75  
 63  
 308  
 316  
 326  
 69  
 50  
 7.3  
 50  
 7.2  
 50~~

W 5'

~~-0.06  
 -0.16  
 6.1  
 50  
 30.6  
 67  
 53  
 80  
 24  
 88  
 71  
 342  
 84  
 50~~

~~+0.52  
 -0.56  
 0.9  
 86  
 50  
 35  
 89  
 75  
 88  
 68  
 84  
 58  
 32.5  
 84  
 50~~

Top R.W. Stake 50 Lt. Sta 285

~~+0.88  
 -0.88  
 2.0  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 76  
 50  
 34  
 28  
 71  
 17  
 61  
 29  
 54  
 32.8  
 77  
 50~~

~~+0.88  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 80  
 50  
 33  
 26  
 27  
 26  
 65  
 73  
 56  
 69  
 49  
 40  
 56  
 25  
 67  
 41  
 56  
 25  
 30.2  
 30.2  
 28.0  
 68  
 50  
 61  
 50  
 50  
 50  
 56  
 50~~

~~2.0  
 +0.88  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 2.0  
 +0.88  
 -0.88  
 80  
 50  
 33  
 26  
 27  
 26  
 65  
 73  
 56  
 69  
 49  
 40  
 56  
 25  
 67  
 41  
 56  
 25  
 30.2  
 30.2  
 28.0  
 68  
 50  
 61  
 50  
 50  
 50  
 56  
 50~~

Original

Cross Section

Jan 1904

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		884.01			
+50				81.2	1.9 3.7 2.8
289				81.0	2.1 3.8 3.0
T.P.	7.10	888.76	2.35		881.66
+50				80.8	7.1 8.9 8.0
+75				80.7	7.2 8.1 9.0
290				80.6	7.3 9.1 8.2
+50				80.4	7.5 9.3 8.4
291				80.3	7.6 9.4 2.5
+50				80.3	7.4 9.1 8.5
292				80.3	7.6 9.4
+50				80.4	7.5 9.3 8.4
293				80.4	7.5 9.3
+50				80.5	7.4 9.2 7.3
294				80.5	7.4 9.2 8.3
T.P.	5.98	885.75	8.79		879.97
+50				80.5	4.6 6.4 5.5
295				80.6	4.5 6.3 5.4
B.M.			3.28		882.67
+15				80.6	

Grade change



original CROSS

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

155

80.7

296

80.7

145

80.7

297

80.8

135

80.8

298

80.9

150

80.9

299

81.0

300

81.1

301

81.2

150

81.3

180

81.3

Grade changed See page 33-37

End Div "A"





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

.....

Left

C L

Right

Original

Cross Sections

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

(cont'd from P. 39)

Grade change

Sta. 279+50 - to 301+80

B.M.	1.75	884.20			882.45
280				84.6	+0.4
+50				84.6	+0.4
281				84.6	+0.4
+50				84.8	+0.6
282				85.0	+0.8
+50				85.2	+1.0
283				85.4	+1.2
284+00				85.6	+1.4
285				85.6	+1.4
+50				85.6	+1.4

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

Aug 4 1926

33

Left

C L

Right

S. W.

R.R. Spike Twin Oak 38' 1/4 Sta. 281+21

$\frac{1.2}{50}$	$\frac{27.4 \times 3.2}{3.7}$	$\frac{45}{-50}$	$\frac{5.2}{-5.7} / 31.4$	$\frac{50}{50}$		
$\frac{3.1}{50}$	$\frac{27.6 \times 4.0}{4.8}$	$\frac{5.6}{-6.0}$	$\frac{6.7}{-7.1} / 34.2$	$\frac{71}{50}$		
$\frac{2.8}{50}$	$\frac{29.4 \times 4.2}{4.7}$	$\frac{5.6}{-6.1}$	$\frac{6.7}{-7.2} / 34.4$	$\frac{7.0}{50}$		
$\frac{1.6}{50}$	$\frac{27.2 \times 3.0}{3.6}$	$\frac{5.0}{-5.6}$	$\frac{6.3}{-6.9} / 33.8$	$\frac{6.8}{50}$		
$\frac{1.6}{50}$	$\frac{27.6 \times 3.0}{3.8}$	$\frac{4.6}{-5.4}$	$\frac{5.8}{-6.5} / 33.2$	$\frac{6.6}{50}$		
$\frac{1.7}{50}$	$\frac{29.6 \times 3.8}{4.8}$	$\frac{5.1}{-6.1}$	$\frac{6.4}{-7.4} / 34.8$	$\frac{6.8}{50}$		
$\frac{2.9}{50}$	$\frac{30.6 \times 4.1}{5.3}$	$\frac{5.9}{-7.1}$	$\frac{7.2}{-8.4} / 36.8$	$\frac{7.2}{50}$		
$\frac{5.7}{50}$	$\frac{35.0 \times 6.3}{7.5}$	$\frac{7.6}{-9.0}$	$\frac{9.0}{-9.2} / 38.4$	$\frac{8.0}{50}$	0.06	0
$\frac{8.1}{50}$	$\frac{40.4 \times 8.3}{10.2}$	$\frac{8.5}{-9.9}$	$\frac{8.0}{-8.9} / 38.8$	$\frac{8.0}{50}$	0.06	1.0
$\frac{8.0}{50}$	$\frac{40.6 \times 8.0}{10.3}$	$\frac{7.9}{-9.3}$	$\frac{7.9}{-8.4} / 38.8$	$\frac{7.9}{50}$	0.08	2.0

Grade Change

Original

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		88420			
286				85.5	2.2 4.0 1.3
T.R.	10.90	987.64	7.46		876.74 1.5
+50				85.3	2.4
287				84.8	1.9 3.0 2.8
+50				84.6	2.4 4.5 3.3
288				83.8	3.0 4.0 3.9
+50				83.2	3.6 5.0 4.5
289				82.7	4.1 5.0 5.0
+50				82.3	4.5 6.0 5.4
+75				82.2	4.6 6.0 5.5
290				82.1	4.7 6.0 5.6
+50				82.0	4.8 6.0 5.7
291				82.0	4.8 6.0 5.7



Grade Change

Original

Cross Sections

Sta.	B.S.	H. I.	F.S.	Grade	Gr. R.
		987.64			
291+50				82.0	4.8 5.7
292				82.0	4.8 5.7
+50				82.0	4.8 5.7
T.P.	8.30	885.82	10.12		977.54
293				82.0	2.9 3.8
+50				82.0	2.9 3.8
294				82.0	2.9 3.8
+50				82.0	2.9 3.8
295				82.0	2.9 3.8
B.M.			3.17		882.67

Continued on P. 40

Inst. ....

Rod. ....

Chain. ....

Aug 4, 1926

35-

Left

C L

Right

S W

$$\begin{array}{r} 93 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 79 \\ 302 \phantom{0} \\ \hline 51 \end{array}$$

$$\begin{array}{r} 100 \\ \hline 43 \end{array}$$

$$\begin{array}{r} 103 \phantom{0} \times 107 \\ -37 \phantom{0} / 294 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 109 \\ -09 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 102 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 100 \\ 304 \phantom{0} \\ \hline 52 \end{array}$$

$$\begin{array}{r} 104 \\ -47 \\ \hline \end{array}$$

$$\begin{array}{r} 110 \phantom{0} \times 111 \\ -44 \phantom{0} / 308 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 109 \\ -09 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 102 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 105 \\ 314 \phantom{0} \\ \hline 57 \end{array}$$

$$\begin{array}{r} 108 \\ -51 \\ \hline \end{array}$$

$$\begin{array}{r} 112 \phantom{0} \times 112 \\ -46 \phantom{0} / 312 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 109 \\ -09 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 86 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 89 \\ 320 \phantom{0} \\ \hline 60 \end{array}$$

$$\begin{array}{r} 90 \\ -52 \\ \hline \end{array}$$

$$\begin{array}{r} 93 \phantom{0} \times 93 \\ -46 \phantom{0} / 312 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 109 \\ -09 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 84 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 81 \\ 316 \phantom{0} \\ \hline 58 \end{array}$$

$$\begin{array}{r} 91 \\ -53 \\ \hline \end{array}$$

$$\begin{array}{r} 94 \phantom{0} \times 94 \\ -47 \phantom{0} / 314 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 109 \\ -09 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 75 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 80 \\ 302 \phantom{0} \\ \hline 51 \end{array}$$

$$\begin{array}{r} 85 \\ -47 \\ \hline \end{array}$$

$$\begin{array}{r} 92 \phantom{0} \times 94 \\ -45 \phantom{0} / 310 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 109 \\ -09 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 48 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 54 \\ 260 \phantom{0} \\ \hline 26 \end{array}$$

$$\begin{array}{r} 66 \\ -28 \\ \hline \end{array}$$

$$\begin{array}{r} 29 \phantom{0} \times 91 \\ -41 \phantom{0} / 302 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 100 \\ -09 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 0.4 \\ \hline 50 \end{array} \quad \begin{array}{r} \times 16 \\ 320 \phantom{0} \\ \hline 4.3 \end{array}$$

$$\begin{array}{r} 30 \\ \hline 00 \end{array}$$

$$\begin{array}{r} 5.0 \phantom{0} \times 60 \\ -0.3 \phantom{0} / 228 \\ \hline 40.7 \phantom{0} \times 31 \\ \hline 12.6 \phantom{0} \times 07 \\ \hline 0.9 \phantom{0} \times 20 \end{array}$$

# Grade Change

## Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		896.67			
271+65				88.6	7.0 8.1
272				88.1	7.5 8.6
+75				87.7	9.9 9.0
T.P.	7.47	904.04	0.10		896.5 17.5
+56				87.4	14.6
273				86.9	18.0 17.1
+38				86.6	18.3 17.4
+75				86.5	12.4 17.5
274				86.4	18.5 17.6
T.P.	0.19	892.04	12.19		891.85
+50				86.2	6.7 5.8
275				86.1	6.8 5.9
+50				85.9	7.0 6.1
276				85.8	7.1 6.2

Inst. ....  
Pod. ....  
Chain. ....

Left

C L

Right

*Void*

Grade change <sup>Original</sup> Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	1.68	893.09.		891.41	
T.P.	11.06	895.30.	8.85		984.24 76
271+65				88.6	6.7
272				88.1	8.1 7.2
+75				87.7	8.5 7.6
T.P.	15.2	903.30.	0.52		894.78 168
+56				87.4	159
273				86.9	173 164
+38				86.6	176 167
+75				86.5	177 168
274				86.4	178 168
T.P.	4.50	892.07.	11.73		891.57 6.8
+50				86.2	5.9
275				86.1	6.9 6.0
+50				85.9	7.1 6.2

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

Left

C L

Right

11.41							
	Top Stake £	271+50					
-0.9	$\sqrt{0.9} \overline{) 2.8}$	$\begin{array}{r} 26.4 \\ \times 9.8 \\ \hline 27.2 \end{array}$	$\begin{array}{r} 11.2 \\ -2.5 \\ \hline \end{array}$	$\begin{array}{r} 12.2 \\ \hline 10 \end{array}$	$\begin{array}{r} 13.1 \\ -7.3 \\ \hline 34.6 \end{array}$	$\begin{array}{r} 13.2 \\ \hline 50 \end{array}$	
+0.9	$\sqrt{0.9} \overline{) 10.3}$						
	$\sqrt{0.9} \overline{) 10.8}$	$\begin{array}{r} 6.5 \\ \hline 24 \end{array}$	$\begin{array}{r} 8.7 \\ -1.6 \\ \hline \end{array}$	$\begin{array}{r} 10.6 \\ -7.3 \\ \hline 28.6 \end{array}$		$\begin{array}{r} 11.3 \\ \hline 50 \end{array}$	
	$\sqrt{0.9} \overline{) 19.8}$	$\begin{array}{r} 1.9 \\ \hline 29 \end{array}$	$\begin{array}{r} 4.8 \\ \hline 12.8 \end{array}$	$\begin{array}{r} 7.4 \\ \hline 30 \end{array}$	$\begin{array}{r} 8.1 \\ \hline 38.0 \end{array}$	$\begin{array}{r} 7.9 \\ \hline 50 \end{array}$	
	Top Stake £	272+50					
	$\sqrt{0.9} \overline{) 11.0}$	$\begin{array}{r} 5.3 \\ \hline 20 \end{array}$	$\begin{array}{r} 8.6 \\ \hline 17.3 \end{array}$	$\begin{array}{r} 12.6 \\ \hline 6.5 \end{array}$		$\begin{array}{r} 15.3 \\ \hline 11.7 \\ \hline 50 \end{array}$	
	$\sqrt{0.9} \overline{) 16.5}$	$\begin{array}{r} 1.7 \\ \hline 37 \end{array}$	$\begin{array}{r} 4.8 \\ \hline 20 \end{array}$	$\begin{array}{r} 2.1 \\ \hline 17.5 \end{array}$	$\begin{array}{r} 12.0 \\ \hline 2.1 \end{array}$	$\begin{array}{r} 13.0 \\ \hline 12.9 \\ \hline 50 \end{array}$	
	$\sqrt{0.9} \overline{) 13.3}$	$\begin{array}{r} 1.9 \\ \hline 31 \end{array}$	$\begin{array}{r} 9.5 \\ \hline 17.2 \end{array}$	$\begin{array}{r} 11.6 \\ \hline 2.4 \end{array}$		$\begin{array}{r} 10.6 \\ \hline 15.3 \\ \hline 50 \end{array}$	
	$\sqrt{0.9} \overline{) 10.9}$	$\begin{array}{r} 1.4 \\ \hline 25 \end{array}$	$\begin{array}{r} 7.0 \\ \hline 19.8 \end{array}$	$\begin{array}{r} 10.0 \\ \hline 7.8 \end{array}$		$\begin{array}{r} 9.0 \\ \hline 16.9 \\ \hline 50 \end{array}$	
	$\sqrt{0.9} \overline{) 16.8}$	$\begin{array}{r} 9.8 \\ \hline 2.8 \end{array}$	$\begin{array}{r} 1.0 \\ \hline 17.9 \end{array}$	$\begin{array}{r} 10.2 \\ \hline 7.6 \end{array}$		$\begin{array}{r} 9.0 \\ \hline 16.8 \\ \hline 50 \end{array}$	
	$\sqrt{0.9} \overline{) 10.4}$	$\begin{array}{r} 1.1 \\ \hline 22 \end{array}$	$\begin{array}{r} 5.3 \\ \hline 10.6 \end{array}$	$\begin{array}{r} 5.7 \\ \hline 2.1 \end{array}$		$\begin{array}{r} 3.7 \\ \hline 11.3 \\ \hline 50 \end{array}$	
	$\sqrt{0.9} \overline{) 30.41}$	$\begin{array}{r} 11.0 \\ \hline 30.41 \end{array}$	$\begin{array}{r} 19.9 \\ -7.9 \\ \hline \end{array}$	$\begin{array}{r} 10.5 \\ -5.4 \\ \hline 30.8 \end{array}$		$\begin{array}{r} 10.4 \\ \hline 50 \end{array}$	
	$\sqrt{0.9} \overline{) 34.0}$	$\begin{array}{r} 13.1 \\ \hline 34.0 \end{array}$	$\begin{array}{r} 18.2 \\ \hline 7.0 \end{array}$	$\begin{array}{r} 12.4 \\ -7.6 \\ \hline 35.2 \end{array}$		$\begin{array}{r} 12.8 \\ \hline 50 \end{array}$	

## Grade Change

Original

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
276		892.07		85.8	7.2 63
+50				85.6	7.4 65
277				85.5	7.5 66
+50				85.3	7.7 68
T.P.	11.56	903.56	0.07		892.00
278				85.2	19.0 180
+40				85.2	18.7 189
+70				84.9	18.9 187
T.P.	4.46	896.44	11.58		891.98
279				84.9	11.2 115
+50				84.7	11.7
B.M.			1.85		894.59

Cont'd on page 33

Left

C L

Right

0  
 +0.9  
 -0.9

<sup>x</sup>  
 127  
 50  
 336  
 130  
 58

129  
 -46

<sup>x</sup>  
 134  
 80  
 360

<sup>x</sup>  
 133  
 50

<sup>x</sup>  
 104  
 50  
 331  
 104  
 30

<sup>x</sup>  
 110  
 45

<sup>x</sup>  
 119  
 63  
 526

<sup>x</sup>  
 122  
 50

0  
 +0.9  
 -0.9

<sup>x</sup>  
 49  
 50  
 70.6

<sup>x</sup>  
 63  
 50

<sup>x</sup>  
 64  
 70.2

<sup>x</sup>  
 80  
 23  
 24.6

<sup>x</sup>  
 79  
 50

0  
 +0.9  
 -0.9

<sup>x</sup>  
 14  
 50  
 76.3

<sup>x</sup>  
 07  
 31

<sup>x</sup>  
 07  
 76.1

<sup>x</sup>  
 2.8  
 31

<sup>x</sup>  
 47  
 71.2  
 50

1  
 +0.6  
 -0.6

<sup>x</sup>  
 2.5  
 50.9  
 17.5

<sup>x</sup>  
 20  
 30

<sup>x</sup>  
 79  
 110.5

<sup>x</sup>  
 85  
 24

<sup>x</sup>  
 103  
 47.5  
 50

0  
 +0.3  
 -0.3

<sup>x</sup>  
 47  
 50.1  
 44.0

<sup>x</sup>  
 64  
 26

<sup>x</sup>  
 68  
 111.6

<sup>x</sup>  
 7.4  
 27

<sup>x</sup>  
 103  
 72.5  
 50

+0.3  
 -0.3

<sup>x</sup>  
 11.5  
 50  
 113.4

<sup>x</sup>  
 84  
 28

<sup>x</sup>  
 96  
 77.1

<sup>x</sup>  
 9.9  
 2.1

<sup>x</sup>  
 117  
 76.8  
 50

+0.1  
 -0.1

<sup>x</sup>  
 3.0  
 50.9  
 78.6

<sup>x</sup>  
 57  
 28

<sup>x</sup>  
 20  
 4.5

<sup>x</sup>  
 7.2  
 2.4

<sup>x</sup>  
 7.4  
 72.0  
 50

<sup>x</sup>  
 0.102  
 50  
 41.4

<sup>x</sup>  
 21.2  
 12.2  
 0.5

<sup>x</sup>  
 13.1  
 17

<sup>x</sup>  
 14.2  
 25  
 25.0

<sup>x</sup>  
 11.2  
 50

Again in 2.5 RT 54 278416

X-See cont'd on P 33

Cross Sections

Sta.	B.S.	H. I.	F.S.	Grade	Gr. N.
Continued from P. 35					
B.M.	13.02	895.67			882.6
295+10				82.0	13.7
295+40				✓	✓
295+55				✓	✓
T.P.	3.13	898.54	226		895.4
295+60				82.0	16.6
295+55				82.0	
296+00				82.0	15.7 16.6
296+50				82.0	15.7 16.6
297+00				82.0	15.7 16.6
T.P.	1.40	898.70	11.26		887.30
+25				82.0	5.8 6.7
298+00				82.0	5.8 6.7
298+50				82.0	5.8 6.7

Left

C L

Right

$50^\circ \frac{6.5}{+63}$	$\frac{10}{73}$	$\frac{12.2}{+15}$	$\frac{13.5}{20}$	$\frac{18.8}{+0.8/50}$	$\frac{10.9}{-0.9}$	20
cont'd below	$\frac{5.6}{+21}$	$\frac{11.0}{21}$	$\frac{14.8}{+1.8/50}$			
		$\frac{10}{+12.7}$	$\frac{4.7}{73}$	$\frac{11.5}{32}$	$\frac{14.0}{+0.6/50}$	
$50^\circ \frac{2.0}{+13.7}$	$\frac{5.6}{17}$				$\frac{10.9}{-0.9}$	20
$50^\circ \frac{1.9}{+13.8}$	$\frac{2.8}{23}$					
$50^\circ \frac{3.0}{+12.2}$	$\frac{3.9}{29}$	$\frac{3.8}{+12.8}$	$\frac{4.3}{20}$	$\frac{6.8}{28}$	$\frac{15.0}{+2.5/50}$	
$50^\circ \frac{5.0}{+10.7}$	$\frac{5.1}{27}$	$\frac{5.3}{+11.3}$	$\frac{6.3}{29}$	$\frac{7.5}{34}$	$\frac{11.4}{+6.1/50}$	
$50^\circ \frac{6.0}{+7.7}$	$\frac{7.0}{26}$	$\frac{10.2}{+6.4}$	$\frac{11.4}{27}$		$\frac{12.2}{+2.0/50}$	
$50^\circ \frac{10.5}{81.3/6.4}$	$\frac{1.2}{26}$	$\frac{2.9}{+3.8}$	$\frac{1.2}{24}$		$\frac{5.8}{+1.3/50}$	
$50^\circ \frac{2.5}{+33}$	$\frac{3.2}{28}$	$\frac{5.0}{+1.7}$	$\frac{6.7}{22}$		$\frac{8.1}{+1.0/50}$	$\frac{10.9}{-0.9}$ 20
$50^\circ \frac{5.3}{+0.7}$	$22^\circ \frac{6.8}{1.0}$	$\frac{6.9}{-0.2}$	$\frac{7.4}{-0.8/22.2}$		$\frac{9.8}{50/50}$	$\frac{10.9}{-0.9}$ 11

Sta.	+	H.I 898.70 <sup>68</sup>	-	Grade	Gr. Rd.
299+00				82.0	6.7 <sup>6.2</sup>
+50				82.0	6.7
300				82.0	6.7
+45				82.0	6.7
301				82.0	6.7
+50				82.0	6.7
+80				82.0	6.7
T.B.M.			11.09		877.59

L

L

Rl.

S-W.

$$\begin{array}{r} 26 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times \\ 264 \overline{) 92} \\ \underline{-33} \end{array}$$

$$\begin{array}{r} 97 \\ \hline 30 \end{array}$$

$$\begin{array}{r} \times \\ 107 \overline{) 274} \\ \underline{-55} \end{array}$$

$$\begin{array}{r} 119 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 105 \\ \hline 95 \end{array} \quad 0.4$$

$$\begin{array}{r} 103 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times \\ 276 \overline{) 105} \\ \underline{-58} \end{array}$$

$$\begin{array}{r} 110 \\ \hline 48 \end{array}$$

$$\begin{array}{r} \times \\ 119 \overline{) 304} \\ \underline{-52} \end{array}$$

$$\begin{array}{r} 119 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 109 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times \\ 283 \overline{) 111} \\ \underline{-44} \end{array}$$

$$\begin{array}{r} 112 \\ \hline 46 \end{array}$$

$$\begin{array}{r} \times \\ 122 \overline{) 110} \\ \underline{-58} \end{array}$$

$$\begin{array}{r} 122 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 113 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times \\ 288 \overline{) 111} \\ \underline{-44} \end{array}$$

$$\begin{array}{r} 109 \\ \hline 42 \end{array}$$

$$\begin{array}{r} \times \\ 123 \overline{) 112} \\ \underline{-56} \end{array}$$

$$\begin{array}{r} 123 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 94 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times \\ 256 \overline{) 95} \\ \underline{-38} \end{array}$$

$$\begin{array}{r} 102 \\ \hline 35 \end{array}$$

$$\begin{array}{r} \times \\ 115 \overline{) 296} \\ \underline{-43} \end{array}$$

$$\begin{array}{r} 122 \\ \hline 50 \end{array}$$

$$\begin{array}{r} \times \\ 400 \overline{) 41} \\ \underline{-26} \end{array}$$

$$\begin{array}{r} 57 \\ \hline 27 \end{array}$$

$$\begin{array}{r} 63 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 80 \\ \hline 13 \end{array}$$

$$\begin{array}{r} \times \\ 105 \overline{) 276} \\ \underline{-38} \end{array}$$

$$\begin{array}{r} 115 \\ \hline 50 \end{array}$$

$$\begin{array}{r} 50 \\ \times \\ 157 \\ \hline 944 \\ \hline 1124 \end{array}$$

$$\begin{array}{r} 157 \\ \times \\ 944 \\ \hline 30 \end{array}$$

$$\begin{array}{r} 90 \\ \hline 145 \end{array}$$

$$\begin{array}{r} 51 \\ \hline 116 \end{array}$$

$$\begin{array}{r} 84 \\ \hline 15 \end{array}$$

$$\begin{array}{r} \times \\ 93 \overline{) 252} \\ \underline{-26} \end{array}$$

$$\begin{array}{r} 113 \\ \hline 50 \end{array}$$

Top Herb 50' Rt. Sta. 30x100

Bridge No. 4628

20 Ft. Span, 34' Roadway

Sta. 285+05

B.M.	1.67	884.12	882.45	e. of W. Oak 32' Lt. 281+2
		El. Sub Grade	85.60	
			+ 1.15	
		Top Curb Elev.	86.75	
		Grade Rod		(+ 2.63)
		Blue Top on Rt.		6.87
		" " " Lt.		7.37

X-Sections.

0+31

1+20.5

0+00 = 285+05

0+20.5

0+31

~~Void  
moved to 284+85~~



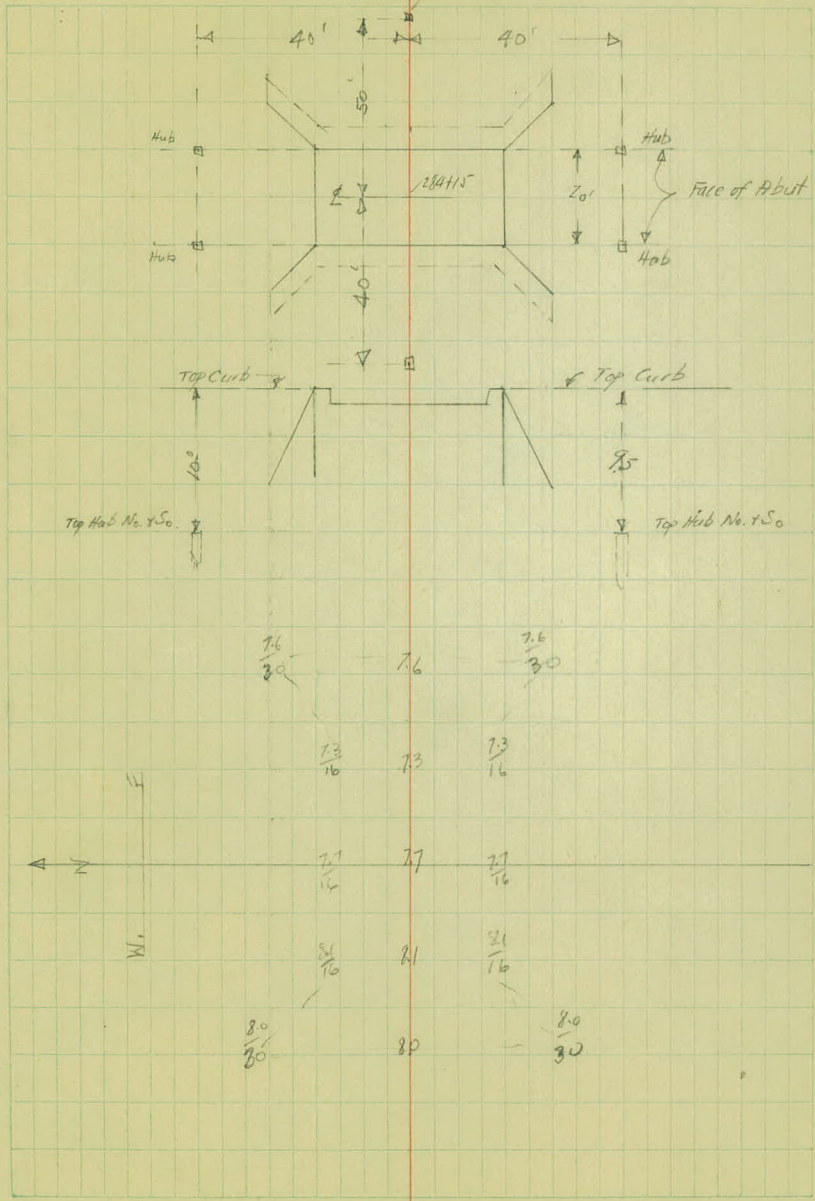


W.H.C.  
A.Lit.  
W.A.  
R.

Sept 27, 1926

43  
17

Staking Plan



Bridge No. 4627

20 Ft. Spd - 34 Ft. Roadway

Sta. 216+55<sup>0</sup>

B.M.

0.94

890.14

889.20

sp. Riv. + 4' or k  
to Rt. 277 to J

El. Subgrade  
7 1/2' Pipe Slab  
6 - 5/8" Crown to Top Curb =

87.00

41.15

to Top of Curb

Top Curb Elev.

88.15

1.99

X-sections

0+50

0+31

0+20.5

0+00 = 216+55<sup>0</sup>

Water Surface

-10.84

879.20

0+20.5

0+31

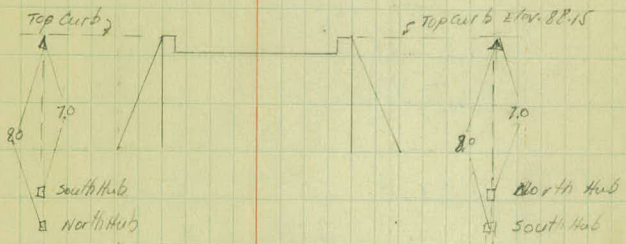
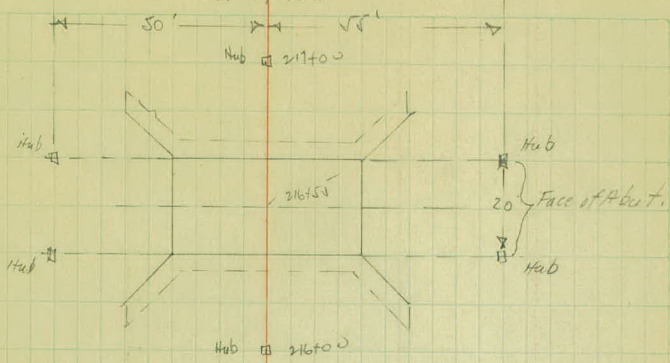
0+50

W.H.C.  
A.L.P.  
W.A.  
R.

Sept 27, 1926

44

Staking Plan



7.0	8.9	9.1	9.8	11.4	11.7	10.2	15.4
5.0	1.0		8	11	16	20	3.0
5.9	7.9	9.4	9.6	11.8	11.8	9.1	10.1
3.0	1.6	1.0	1.2	7	9	10	16
							3.0

10.2	6.9	7.8	9.0	10.3	10.5	10.5	10.1
1.6	1.0	1.4		3	5	8	16

1.9	9.4	10.5	10.5	13.7	9.7	9.1	10.2
1.6	1.0	3.5	7.5	7	3	10	7.4

8.6	9.3	10.3	10.3	9.3	9.4	9.6	9.8
1.6	1.0	7	6	4	3	10	16

9.0	10.1	12.1	12.1	10.0	10.0	8.6
3.0	11	9	6	8	10	3.0
9.4	9.3	10.2	10.2	9.3	9.5	6.8
3.0	13	11.5	9	7	10	3.0



Level Levels.

Stal	+	H.I	-	Elev.
B.M.	10.04	935.51		925.47
T.P.	3.55	932.52	0.54	934.97
✓	9.62	947.63	0.51	938.61
B.M.	3.20	947.63	3.20	944.43
T.P.	1.99	942.77	6.15	940.78
✓	1.45	931.24	12.98	929.79
BP.	0.99	921.77	10.46	920.78
B.M.			4.39	917.38

Going South

B.M.	5.39	930.86		925.47
T.P.	0.04	918.42	12.48	918.38
T.P.	0.33	905.67	13.08	905.34
T.B.M			2.71	902.96

W.H.C.

Oct 5, 1926

A.L.P.

R.R.

W.A. R.R. Spike 14 20" Oak 50' Lt. 247+00

R.R. Spike 20" White Oak 58' Rt. 247+43

R.R. Spike 10" scrub oak 60' Rt. Sta. 258+50 (Same as Co. Rd E)

R.R. 20" Oak 50' Lt. 247+00

R.R. Spike 20" Oak 50' Lt. Sta. 287+58

# Side Ditch on Left.

Sta. 280 to 284+75

B.M.			Grade of Ditch	G. R.
B.M.	3.68	826.13	822.45	
284+75	-face of foot		75.4	10.7
284			76.6	9.5
+50			77.4	8.7
283			78.2	7.9
+50			79.0	7.1
282			79.8	6.3
+50			80.0	5.1
281			80.2	5.9
+50			80.4	5.7
280			80.6	5.5

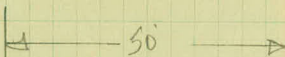
-1.6%

+0.4%

W.H.C.

Oct. 1926

A.L.P.  
W.A.  
R.R.



$\frac{9.7}{46}$        $\frac{27}{45}$        $\frac{10.3}{35}$



$\frac{8.0}{46.5}$        $\frac{8.0}{45}$        $\frac{8.2}{35}$

$\frac{6.0}{47.7}$        $\frac{6.2}{45}$        $\frac{6.6}{35}$

$\frac{5.0}{47.9}$        $\frac{5.4}{45}$        $\frac{6.0}{35}$

P.O.W. Line A

$\frac{3.6}{47.5}$        $\frac{3.8}{45}$        $\frac{4.8}{35}$

$\frac{3.5}{47.8}$        $\frac{3.9}{45}$        $\frac{4.6}{35}$

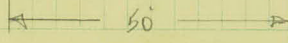
$\frac{3.7}{47.4}$        $\frac{3.9}{45}$        $\frac{4.2}{35}$

$\frac{5.0}{45.9}$        $\frac{5.0}{45}$        $\frac{6.0}{35}$

$\frac{5.0}{45.4}$        $\frac{5.3}{45}$        $\frac{6.1}{35}$

$\frac{8.0}{48.5}$        $\frac{3.9}{45}$        $\frac{4.5}{35}$

2 of Anoka Road.



Bench Levels,

B.M.	3.68	886.13	882.45
B.M. (New)			882.34

R.R. Sp. in 10' Oak 215' H. Sta 284175

Cattle Pass

Standard 4x6' Cattle Pass

Station 238+00

238+00 E Cattle Pass

T.B.M.

2.71

905.67

902.96

P.O. Spike  
20' oak  
53' Lt. 237+59

0+33

900.34

5.36

0+20

900.42

5.25

0+00

E Cattle Pass

900.52

5.15

0+20

900.62

5.05

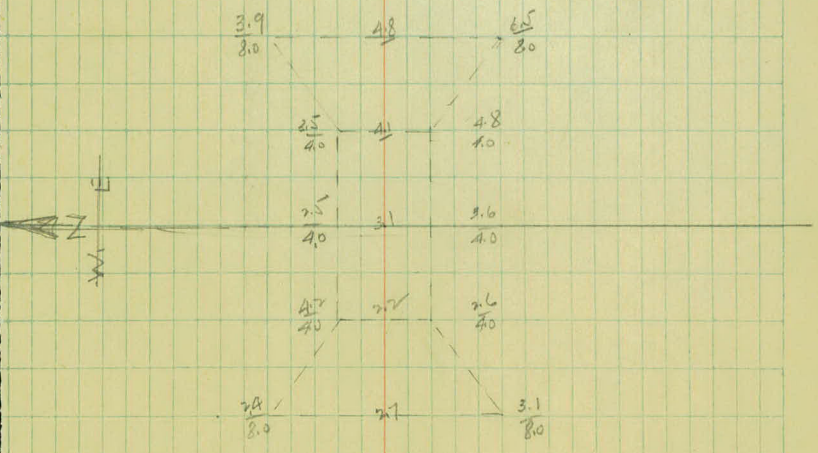
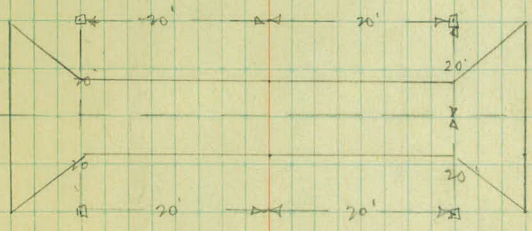
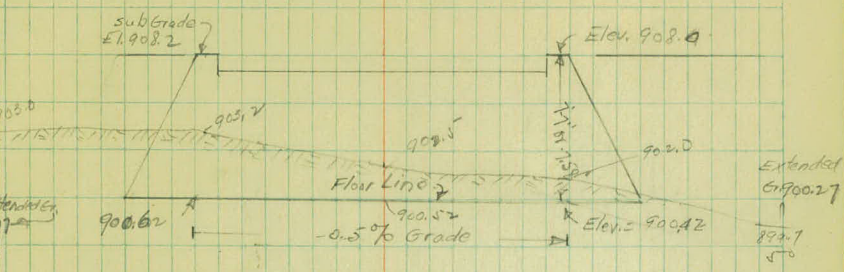
0+33

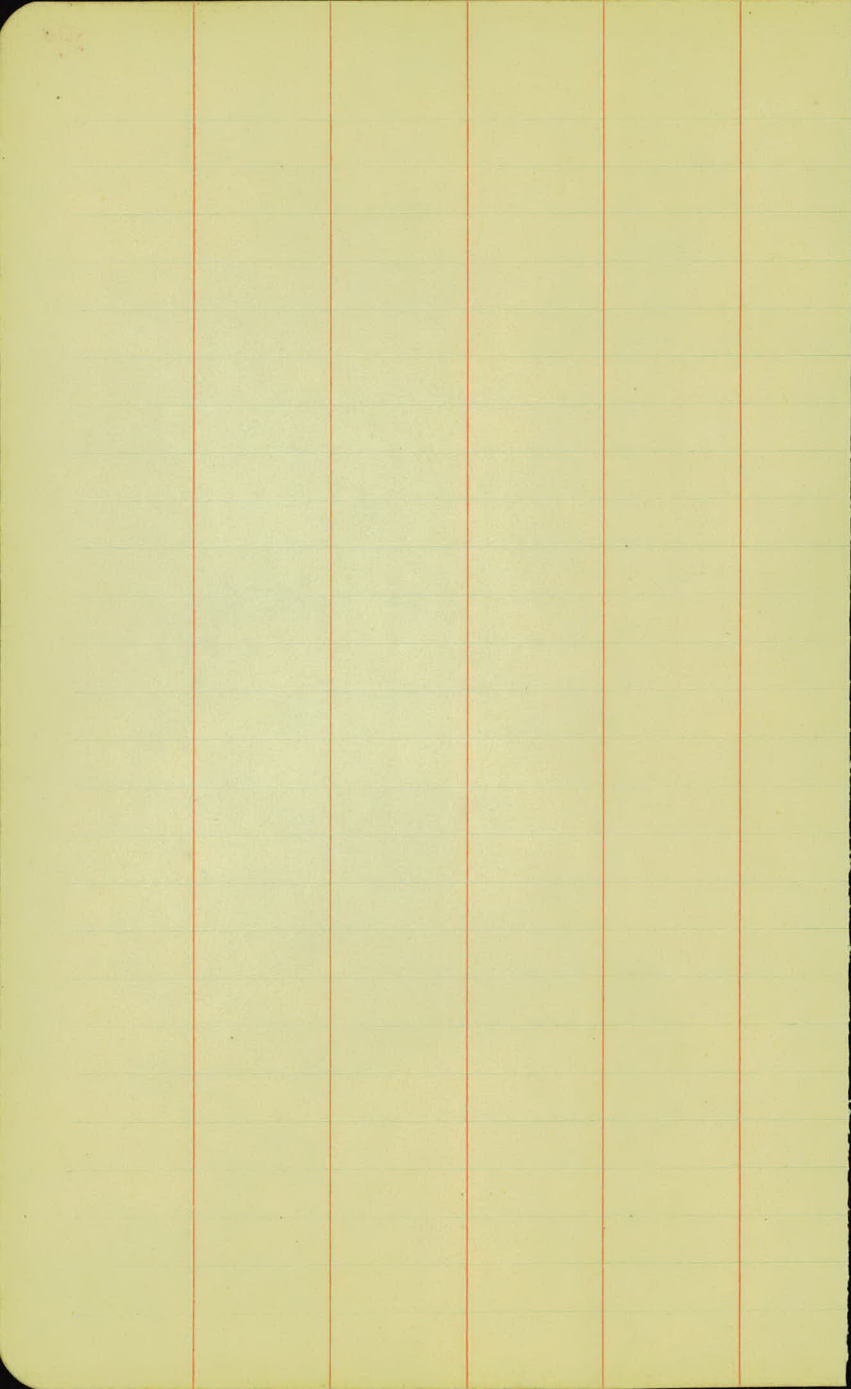
900.72

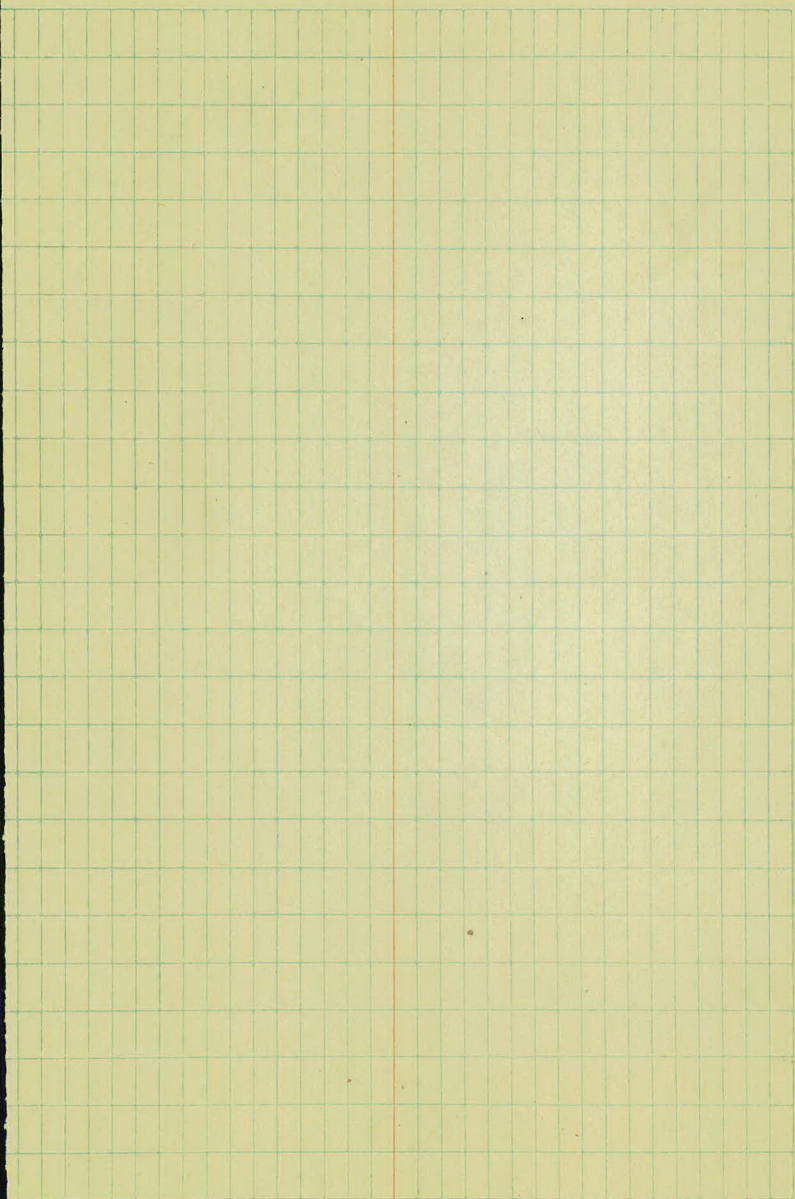
4.95

Oct. 13/1926

W.H.C.  
A.L.P.  
R.S.  
T.T.







Cont from Page

901.26

234+25

3.4

+2.1

+72

2.9

+1.6

235+00

2.9

+1.6

+34

2.7

+1.4

+48

2.7

+1.4

+70

2.8

+1.5

RT

$$\frac{9.7}{50} \quad 39.6 / \frac{7.7}{-9.8} \quad \frac{5.2}{32} \quad \frac{2.2}{24}$$

$$\frac{9.8}{50} \quad 39.8 / \frac{8.3}{-9.9} \quad \frac{8.0}{38} \quad \frac{1.8}{22}$$

$$\frac{9.7}{50} \quad 38.4 / \frac{7.7}{-9.3} \quad \frac{6.5}{34} \quad \frac{1.0}{23}$$

$$\frac{9.7}{50} \quad 40.4 / \frac{8.8}{-10.2} \quad \frac{5.5}{25} \quad \frac{2.0}{19}$$

$$\frac{10.3}{50} \quad 40.8 / \frac{10.0}{-11.4} \quad \frac{9.3}{36} \quad \frac{6.2}{15}$$

$$\frac{10.7}{50} \quad 43.8 / \frac{10.4}{+11.9} \quad \frac{10.1}{35} \quad \frac{8.5}{18}$$

Cont from Page 19.

Additional X-sec. to care for  
Widening @ Co. Road "E" Intersection

B.M.

6.40

917.38

256+93

257

+14

+50

258

W.H.C.

R.R.

C.L.

M.

Z

RT.

Nov. 4, 1926

57

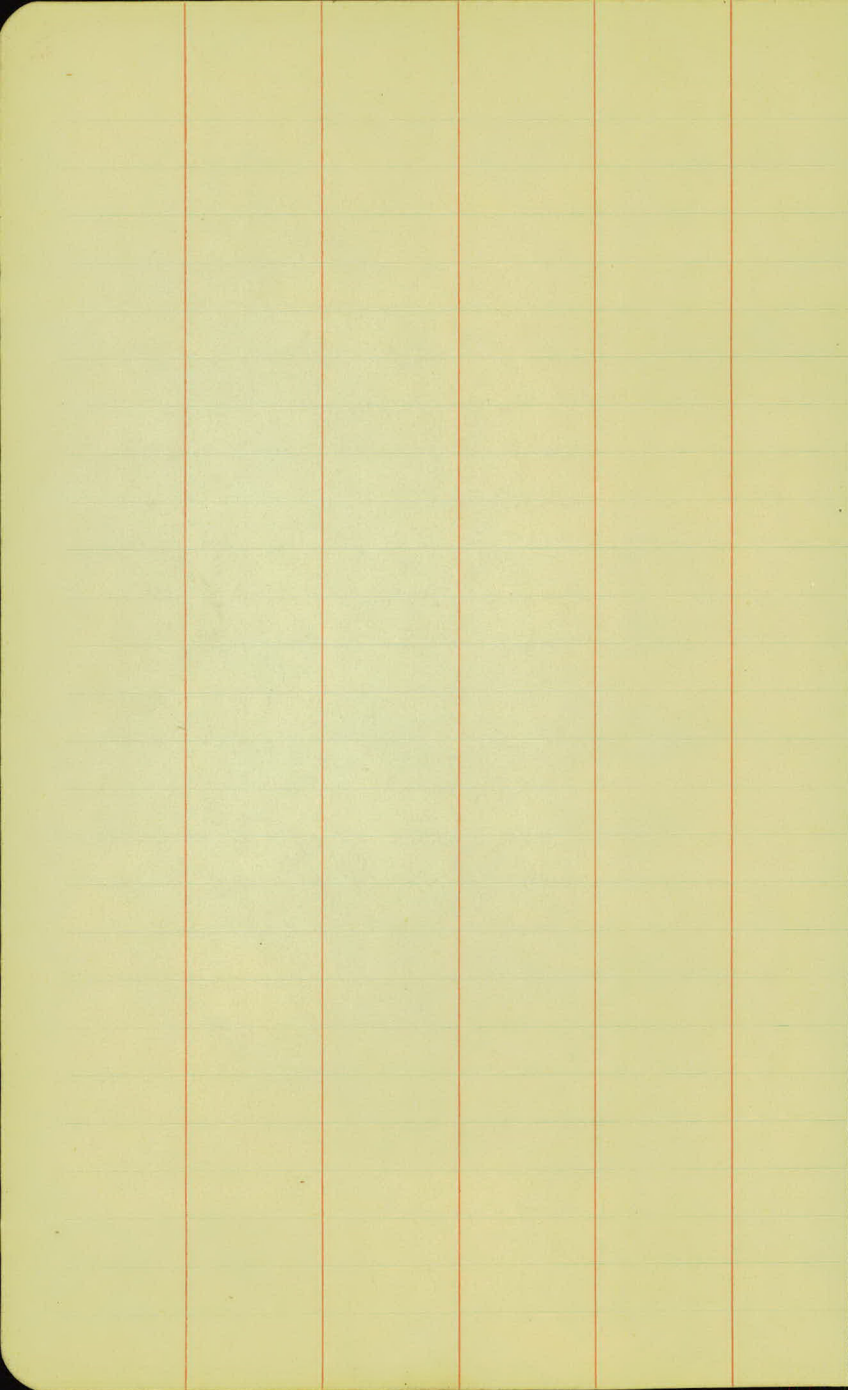
$\frac{10}{50}$	$\frac{00}{100}$
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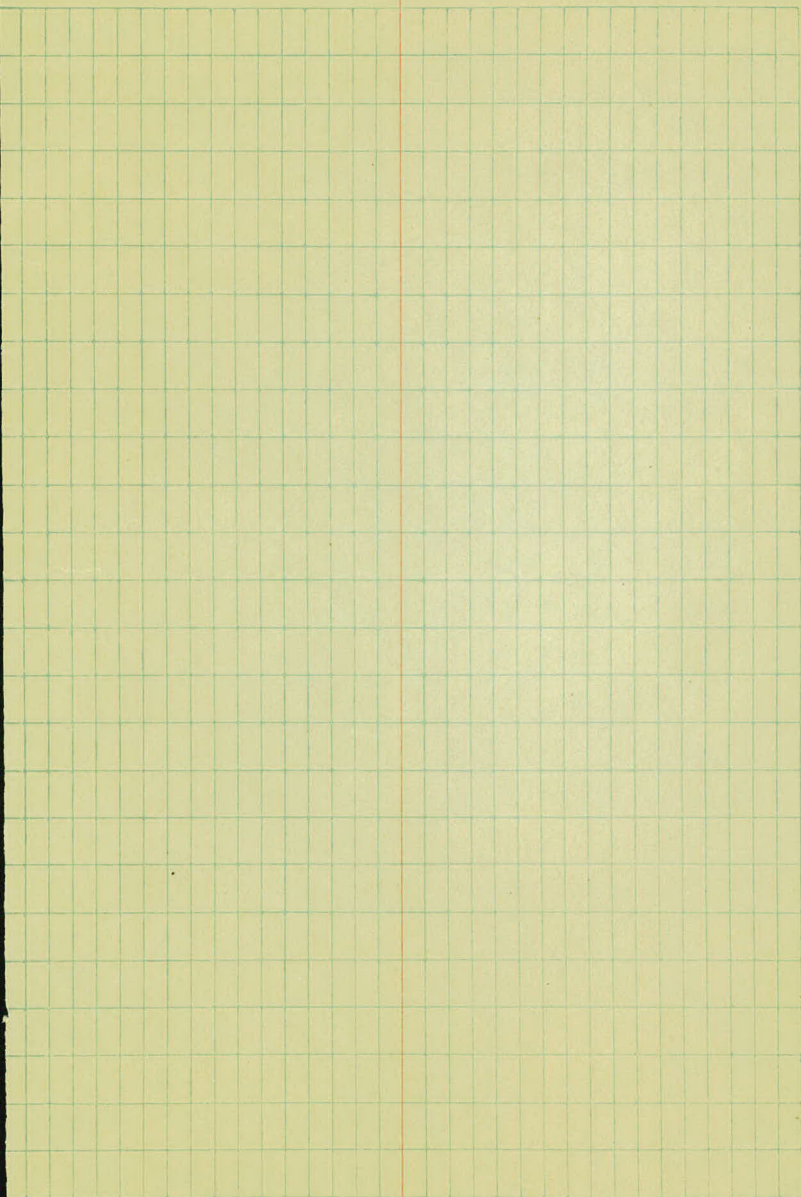
$\frac{13}{50}$	$\frac{00}{100}$
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$\frac{900}{50}$	$\frac{20}{50}$	$\frac{04}{95}$
------------------	-----------------	-----------------

$\frac{46}{20}$	$\frac{82}{29}$	$\frac{88}{32}$	$\frac{39}{42}$	$\frac{32}{50}$	$\frac{30}{72}$
-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

$\frac{64}{20}$	$\frac{68}{45}$	$\frac{92}{50}$	$\frac{76}{65}$
-----------------	-----------------	-----------------	-----------------





# Line Revision

Sta	+	H.I.	-	Elev.	
B.M.	1.66	884.00		882.34	
285	+50			885.6	+1.6
286				85.6	+1.6
	+50			85.5	+1.5
287				85.4	+1.4
	+50			85.2	+1.2
	+86			85.0	+1.0
288				85.0	+1.2 +0.8 +1.0
	+28			84.8	+1.5 +0.8 +0.8
289				84.4	+1.3 +0.4
T.P.	9.23	890.65	2.58	881.42	5.4 8.1 -6.6
	+50			84.1	
290				83.8	5.7 8.1 -6.9
	+50			83.5	4.0 8.1 -1.2

$$\frac{73}{50} \quad \frac{80}{71} \quad \frac{74}{-90} \quad \frac{76}{37} \quad \frac{89}{36} \quad \frac{78}{30} \quad \frac{69}{26} \quad \frac{72}{20} \quad -\frac{74}{70} \quad \frac{73}{17} \quad \frac{74}{-90} \quad \frac{80}{380} \quad \frac{75}{50}$$

$$\frac{75}{50} \quad \frac{80}{71} \quad \frac{72}{93} \quad \frac{75}{16} \quad \frac{73}{-89} \quad \frac{72}{18} \quad \frac{67}{-83} \quad \frac{366}{366} \quad \frac{67}{50}$$

$$\frac{77}{50} \quad \frac{80}{71} \quad \frac{78}{93} \quad \frac{75}{20} \quad \frac{71}{+96} \quad \frac{64}{16} \quad \frac{66}{-81} \quad \frac{362}{362} \quad \frac{65}{50}$$

$$\frac{78}{50} \quad \frac{80}{71} \quad \frac{79}{93} \quad \frac{73}{16} \quad \frac{60}{-78} \quad \frac{57}{16} \quad \frac{55}{31} \quad \frac{56}{-70} \quad \frac{340}{340} \quad \frac{55}{27} \quad \frac{57}{50}$$

$$\frac{75}{50} \quad \frac{80}{71} \quad \frac{78}{-86} \quad \frac{78}{13} \quad \frac{58}{8} \quad \frac{55}{-67} \quad \frac{48}{21} \quad \frac{53}{-65} \quad \frac{330}{330} \quad \frac{53}{50}$$

$$\frac{75}{50} \quad \frac{77}{21} \quad \frac{77}{2} \quad \frac{57}{15} \quad \frac{54}{37} \quad \frac{54}{50}$$

$$\frac{78}{50} \quad \frac{80}{71} \quad \frac{76}{-88} \quad \frac{75}{14} \quad \frac{74}{-84} \quad \frac{54}{5} \quad \frac{55}{20} \quad \frac{53}{-61} \quad \frac{32}{32} \quad \frac{50}{22} \quad \frac{57}{24} \quad \frac{57}{50}$$

$$\frac{76}{50} \quad \frac{75}{29} \quad \frac{75}{15} \quad \frac{73}{7} \quad \frac{63}{13} \quad \frac{55}{28} \quad \frac{55}{50}$$

$$\frac{46}{50} \quad \frac{80}{71} \quad \frac{85}{-57} \quad \frac{29}{13} \quad \frac{32}{-36} \quad \frac{33}{16} \quad \frac{47}{17} \quad \frac{45}{-38} \quad \frac{39}{38} \quad \frac{24}{50}$$

$$\frac{81}{50} \quad \frac{10}{25} \quad \frac{39}{-22} \quad \frac{68}{20} \quad \frac{62}{32} \quad \frac{59}{37} \quad \frac{93}{+0.8} \quad \frac{100}{50}$$

$$\frac{50}{0.5} \quad \frac{52}{36} \quad \frac{53}{27} \quad \frac{53}{+16} \quad \frac{54}{15} \quad \frac{46}{29} \quad \frac{43}{44} \quad \frac{89}{+1.5} \quad \frac{100}{50}$$

$$\frac{50}{+2.8} \quad \frac{40}{29} \quad \frac{40}{17} \quad \frac{84}{+38} \quad \frac{33}{17} \quad \frac{47}{35} \quad \frac{71}{+1.6} \quad \frac{50}{50}$$

Sta	+	H.I	-	Elev		
		890.65				
291				83.2	6.3	7.5
417				83.1		-7.5
T.P.	5.37	888.60	7.42	883.23	4.5	7.2
+50				82.9		5.7
292				82.6	4.8	6.0
+50				82.2	5.1	6.3
293				82.0	5.4	6.6
B.M	4.67	887.31	5.76	882.64 =	882.67	
+50				81.8	4.3	5.5
294				81.7	4.4	5.6
+50				81.6	4.5	5.7
295				81.5	4.6	5.8
+50				81.65	4.6	5.8
T.F	12.43	898.28	1.46	885.85	15.8	
+75				81.6		16.7

124

124 154 50 / +20 +19 +11 10 20 60 85  
 +83 35 20 5 -55 23 +65/50

" " +35 +21 +03 20 25 43 66 74 82 88  
 50 31 21 11 8 43 15 27 38 50

" " 50 / 19 37 52 60 66 69 81 95  
 +26 32 16 -03 19 32 09/50

" " 20 76 26 79 77 83 87 95 97 101  
 50 44 31 21 6 -27 15 -22/26.7 50

" " 10.0 304 103 105 108 110 108 107  
 50 -5.2 18 -4.5 22 -30/28.3 50

" " 11.2 316 112 112 109 109 108 107  
 50 -5.8 15 -4.3 23 -27/27.9 50

Spoke in 8" cut at 294, +95, old line  
 98 30 97 97 94 97 92 10.8 96 95  
 50 30/54 22 -3.9 22 -27/27 30 39 50

" " 98 310 99 99 95 93 92 96  
 50 -5.5 20 3.9 15 -23/26.9 50

" " 89 311 91 91 90 93 93 94  
 50 -4.6 15 -3.6 16 -21/26.5 50

+ 60 65 54 22 79 82 94 87 95  
 152 50 37 2 -2.6 19 -31 16 -11/2.5 40.6 50

+ 50 142 00 11 37 51 56 60 62 67  
 106 50 33 30 16 +0.6 16 25 35 +04/50

99 109 50 16 23 45 67 10.6 136 148 156 167 95  
 -14.2 40 26 22 10 +3.7 14 30 +11/50

Sta	+	HI	-	Elev
		898.28		
296				81.6    16.0 16.7
+21				81.6    16.1 16.7
+50				81.6    16.2 16.7
297				81.7    16.6
+50				81.75    16.5
298				81.8    16.5
+25				81.8    16.5
T.P.	3.45	898.77	10.96	887.32
299				81.9    8.9
+50				81.95    8.8
299 + 79.09 = 298 + 83.21				82.0    8.8
B.M.			13.18	877.59
299				82.0
+50				82.05

$$50 \begin{array}{r} 11 \\ +14.9 \\ \hline \end{array} \quad \frac{1.3}{32} \quad \frac{2.0}{17} \quad \frac{4.2}{10.8} \quad \frac{5.9}{13} \quad \frac{7.7}{16} \quad \frac{9.9}{32} \quad \frac{11.3}{32} \quad \frac{13.8}{+38} / 50$$

$$50 \begin{array}{r} 1.0 \\ +15.7 \\ \hline \end{array} \quad \frac{0.8}{40} \quad \frac{1.1}{29} \quad \frac{1.5}{8} \quad \frac{1.5}{+15.2} \quad \frac{1.9}{7} \quad \frac{4.5}{16} \quad \frac{5.7}{14} \quad \frac{8.5}{32} \quad \frac{11.6}{+5.8} / 50$$

$$50 \begin{array}{r} 1.5 \\ +14.9 \\ \hline \end{array} \quad \frac{0.9}{38} \quad \frac{1.2}{24} \quad \frac{1.8}{10} \quad \frac{1.9}{14.8} \quad \frac{2.4}{19} \quad \frac{4.2}{32} \quad \frac{7.6}{+9.5} / 50$$

$$50 \begin{array}{r} 3.4 \\ +13.2 \\ \hline \end{array} \quad \frac{3.4}{33} \quad \frac{3.5}{15} \quad \frac{3.6}{13.0} \quad \frac{3.6}{19} \quad \frac{3.6}{32} \quad \frac{3.8}{+3.8} / 50$$

$$50 \begin{array}{r} 4.8 \\ +11.7 \\ \hline \end{array} \quad \frac{4.9}{35} \quad \frac{5.1}{18} \quad \frac{5.2}{+11.3} \quad \frac{5.1}{18} \quad \frac{5.0}{30} \quad \frac{5.8}{+10.7} / 50$$

$$50 \begin{array}{r} 2.6 \\ +18.9 \\ \hline \end{array} \quad \frac{8.2}{34} \quad \frac{8.7}{21} \quad \frac{9.6}{+5.7} \quad \frac{10.5}{17} \quad \frac{10.8}{32} \quad \frac{11.8}{+4.7} / 50$$

$$50 \begin{array}{r} 8.8 \\ +2.7 \\ \hline \end{array} \quad \frac{9.6}{31} \quad \frac{10.7}{16} \quad \frac{11.7}{+4.8} \quad \frac{12.6}{19} \quad \frac{13.0}{32} \quad \frac{14.4}{+2.1} / 50$$

$$50 \begin{array}{r} 4.5 \\ +4.4 \\ \hline \end{array} \quad \frac{5.5}{30} \quad \frac{6.2}{14} \quad \frac{6.8}{+2.1} \quad \frac{8.1}{12} \quad \frac{8.8}{24} \quad \frac{9.1}{43} \quad \frac{9.9}{+1.0} / DC / 50$$

$$50 \begin{array}{r} 7.1 \\ +1.0 \\ \hline \end{array} \quad \frac{8.4}{34} \quad \frac{9.3}{-0.5} \quad \frac{9.3}{16} \quad \frac{9.3}{-0.5} \quad \frac{10.0}{15} \quad \frac{10.8}{30} \quad \frac{11.4}{24.0} \quad \frac{12.0}{31} \quad \frac{12.0}{50}$$

$$DC \begin{array}{r} 9.8 \\ +1.0 \\ \hline \end{array} \quad \frac{10.3}{34} \quad \frac{10.4}{-1.6} \quad \frac{9.9}{21} \quad \frac{10.2}{-1.4} \quad \frac{10.6}{20} \quad \frac{11.2}{24} \quad \frac{12.6}{-3.8} \quad \frac{13.4}{27.6} \quad \frac{13.4}{50}$$

Top Hub 50' at 25.9 20+86

Sta + HI - Elev

300 82.1

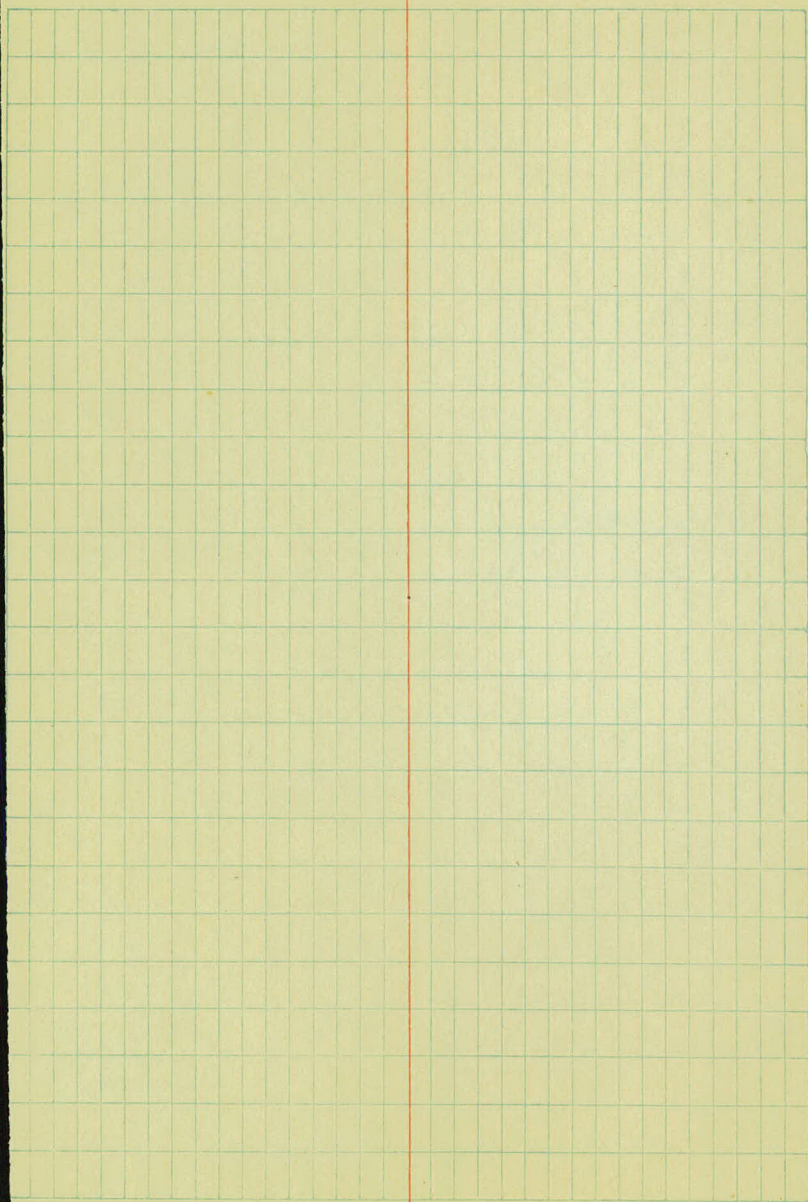
+45 82.5

301 82.2

+50 82.3

+80 82.3

302 82.3



392.45  
 345.15  
 47.30

295 + 87.40

54° - 12.5

+50

32° - 30 ✓

295

30° - 00 ✓

068° - 45

+50

27° - 30 ✓

D. 10° RT

294

25° - 00

T. 392.45

+50

22° - 30

L. 687.50

293

20° - 00

+50

17° - 30

292

15° - 00

+50

12° - 30

291

10° - 00

+50

7° - 30

290

5° - 00

+50

2° - 30

289

0° - 00

788 + 999

PC

0 + 00

Hok.  
□

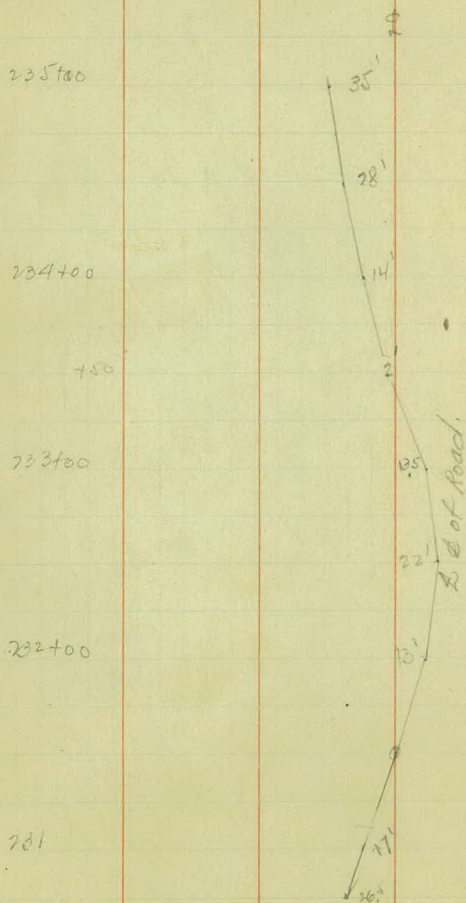
44 □

Hok.  
□

49 □

• sp. ko.

Ties to Road along the  
Montgomery Property.

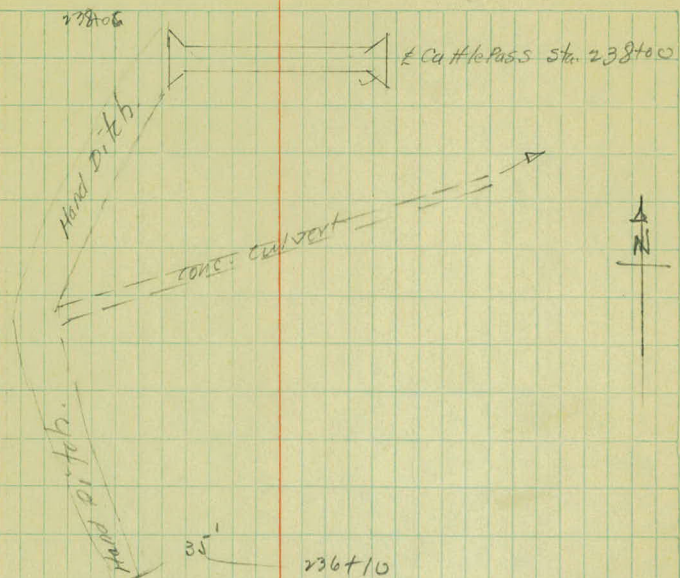




# Hand Ditch

Left sta. 236+10 to 238+05

Sta.	Area.	Cu Yds
238+10	0.0	1.4
238+06	19.0	4.2
238+00	19.0	37.0
237+50	21.0	40.5
237+05	27.7	25.4
236+70	11.5	14.3
236+20	4.0	0.7
236+10	0.0	<u>118.5</u>



$$\frac{00}{15} \quad \frac{+1.0}{10} \quad \frac{+.25}{1} \quad \frac{00}{0}$$

$$\frac{00}{15} \quad \frac{+1.0}{10} \quad \frac{+.25}{1} \quad \frac{00}{0}$$

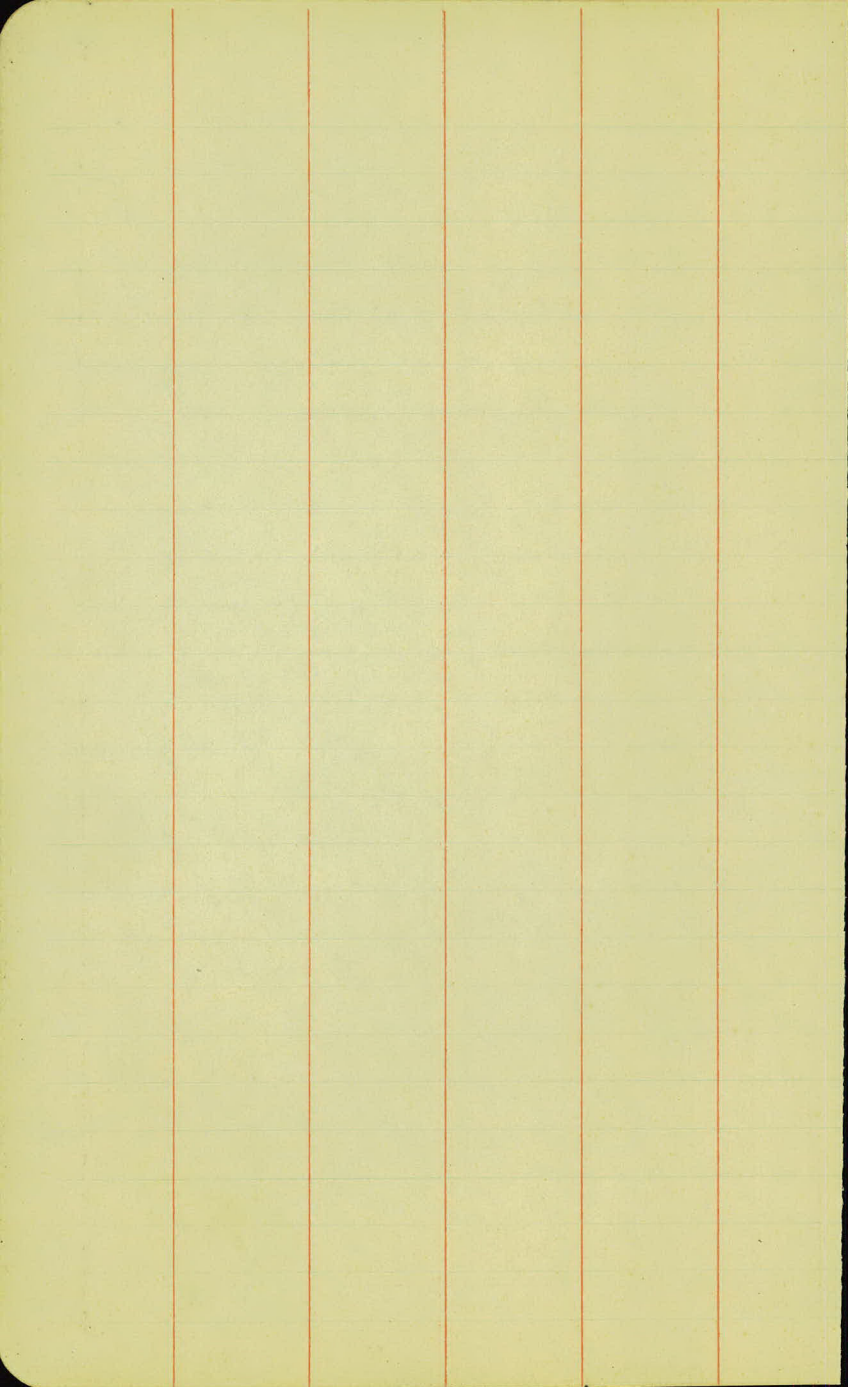
$$\frac{00}{11} \quad \frac{+.30}{9} \quad \frac{+.20}{3} \quad \frac{00}{0}$$

$$\frac{00}{14} \quad \frac{+.50}{7} \quad \frac{+.25}{5} \quad \frac{00}{0}$$

$$\frac{00}{9} \quad \frac{+.20}{7} \quad \frac{+.10}{1} \quad \frac{00}{0}$$

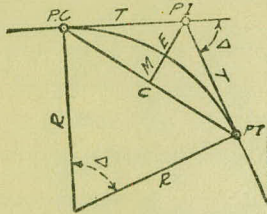
$$\frac{00}{7} \quad \frac{+.10}{6} \quad \frac{+.05}{2} \quad \frac{00}{0}$$

0.0 Ditch.



# DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

Copyright, 1914, by Eugene Dietzgen Co., New York City



## CURVE FORMULAS

Radius= $R = \frac{50}{\sin. \frac{D}{2}}$  (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  $1^\circ$  curve  $T=3454.1$  and  $\div 8\frac{1}{2}=414.49$  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)<sup>2</sup>=2.16 ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus (54.50)<sup>2</sup> $\div$ (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 $\times 54.5 \times 8\frac{1}{2}=136.2'$  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  $1^\circ$  curve  $E=960.6$  for  $8^\circ 20'=960.6 \div 8\frac{1}{2}=91.27$  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	¼	3-16	¼	5-16	¾	½	⅝	¾	⅞
.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
					30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65					
20	2455.70	.509	2.036	0.70	10	573.69	2.183	8.716	3.00
30	2292.01	.545	2.181	0.75	30	546.44	2.292	9.150	3.15
40	2148.79	.582	2.327	0.80	11	521.67	2.402	9.585	3.30
50	2022.41	.618	2.472	0.85	30	499.06	2.511	10.02	3.45
					12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15					
					15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.04	1.273	5.088	1.75					
					25	231.01	5.476	21.64	7.50
6	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
10	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
20	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
30	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
40	859.92	1.455	5.814	2.00	30	193.18	6.583	25.88	9.00

Note. Chord Deflection=2 times tangent deflection.

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

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

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
<b>31°</b>	1589.0	216.3	<b>41°</b>	2142.2	387.4	<b>51°</b>	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
<b>32</b>	1643.0	230.9	<b>42</b>	2199.4	407.6	<b>52</b>	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
<b>33</b>	1697.2	246.1	<b>43</b>	2257.0	428.5	<b>53</b>	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
<b>34</b>	1751.7	261.8	<b>44</b>	2314.9	450.0	<b>54</b>	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
<b>35</b>	1806.6	278.1	<b>45</b>	2373.3	472.1	<b>55</b>	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
<b>36</b>	1861.7	294.9	<b>46</b>	2432.1	494.8	<b>56</b>	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
<b>37</b>	1917.1	312.2	<b>47</b>	2491.3	518.2	<b>57</b>	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
<b>38</b>	1972.9	330.2	<b>48</b>	2551.0	542.2	<b>58</b>	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
<b>39</b>	2029.0	348.6	<b>49</b>	2611.2	566.9	<b>59</b>	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
<b>40</b>	2085.4	367.7	<b>50</b>	2671.8	592.3	<b>60</b>	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	.103	.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	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.885	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.33	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	.03	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.03	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	1.45	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	.390	.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

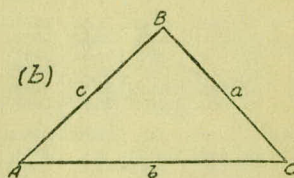
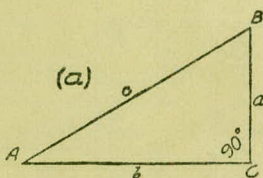
## SLOPE REDUCTIONS.

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).
$A, B, a$	$b$	$b = \frac{a \sin. B}{\sin. A}$
$A, a, b$	$B$	$\sin. B = \frac{b \sin. A}{a}$
$a, b, C$	$A - B$	$\tan. \frac{1}{2}(A - B) = \frac{(a - b) \tan. \frac{1}{2}(A + B)}{a + b}$
$a, b, c$	$A$	$\left\{ \begin{aligned} & \text{If } s = \frac{1}{2}(a + b + c), \sin. \frac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{bc}} \\ & \cos. \frac{1}{2} A = \sqrt{\frac{s(s - a)}{bc}}, \tan. \frac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{s(s - a)}} \\ & \sin. A = \frac{2\sqrt{s(s - a)(s - b)(s - c)}}{bc} \end{aligned} \right.$
$A, B, C, a$	area	$\text{area} = \frac{a^2 \sin. B \sin. C}{2 \sin. A}$
$A, b, c$	area	$\text{area} = \frac{1}{2} b c \sin. A$
$a, b, c$	area	$s = \frac{1}{2}(a + b + c), \text{area} = \sqrt{s(s - a)(s - b)(s - c)}$

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

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

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
or						or					
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.	
or						or					
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
						20	.6338	.8195	1.220	.77347	40
33	.5446	.6494	1.540	.83867	57	30	.6361	.8243	1.213	.77162	30
10	.5471	.6536	1.530	.83708	50	40	.6383	.8292	1.206	.76977	20
20	.5495	.6577	1.520	.83549	40	50	.6406	.8342	1.199	.76791	10
30	.5519	.6619	1.511	.83389	30						
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
						20	.6472	.8491	1.178	.76229	40
34	.5592	.6745	1.483	.82904	56	30	.6494	.8541	1.171	.76041	30
10	.5616	.6787	1.473	.82741	50	40	.6517	.8591	1.164	.75851	20
20	.5640	.6830	1.464	.82577	40	50	.6539	.8642	1.157	.75661	10
30	.5664	.6873	1.455	.82413	30						
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
						20	.6604	.8796	1.137	.75088	40
35	.5736	.7002	1.428	.81915	55	30	.6626	.8847	1.130	.74896	30
10	.5760	.7046	1.419	.81748	50	40	.6648	.8899	1.124	.74703	20
20	.5783	.7089	1.411	.81580	40	50	.6670	.8952	1.117	.74509	10
30	.5807	.7133	1.402	.81412	30						
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
						20	.6734	.9110	1.098	.73924	40
36	.5878	.7265	1.376	.80902	54	30	.6756	.9163	1.091	.73728	30
10	.5901	.7310	1.368	.80730	50	40	.6777	.9217	1.085	.73531	20
20	.5925	.7355	1.360	.80558	40	50	.6799	.9271	1.079	.73333	10
30	.5948	.7400	1.351	.80386	30						
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
						20	.6862	.9435	1.060	.72737	40
37	.6018	.7536	1.327	.79864	53	30	.6884	.9490	1.054	.72537	30
10	.6041	.7581	1.319	.79688	50	40	.6905	.9545	1.048	.72337	20
20	.6065	.7627	1.311	.79512	40	50	.6926	.9601	1.042	.72136	10
30	.6088	.7673	1.303	.79335	30						
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
						20	.6988	.9770	1.024	.71529	40
38	.6157	.7813	1.280	.78801	52	30	.7009	.9827	1.018	.71325	30
10	.6180	.7860	1.272	.78622	50	40	.7030	.9884	1.012	.71121	20
20	.6202	.7907	1.265	.78442	40	50	.7050	.9942	1.006	.70916	10
							.7071	1.	1.	.70711	45
											or
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE IX.—CALCULATION OF EARTHWORK.

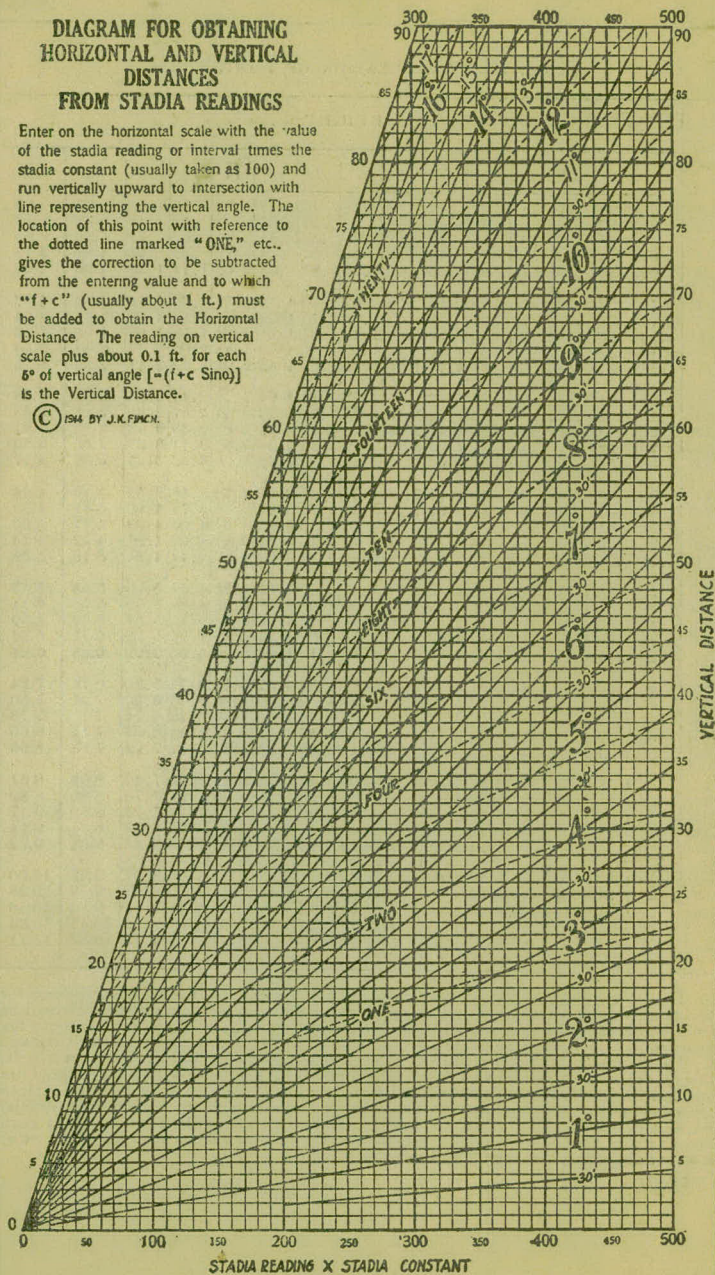
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	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	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.11	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.15	8.89	9.63	10.37	11.11

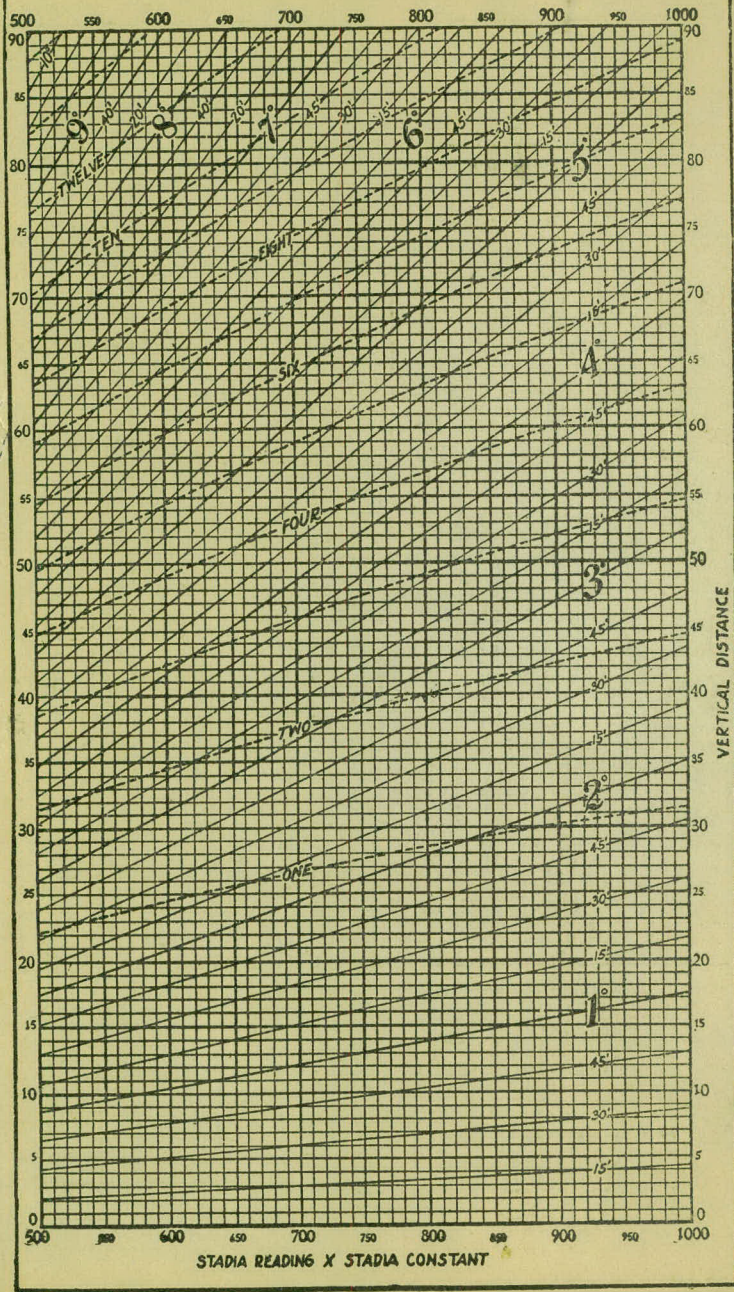
Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering the heights from 1 to 9 as tenths. Thus if  $w=16.2$  and  $h=5.3$ , cu. yds.  $=1.48+.028+.089=1.597$  cu. yds. or practically 160 cu. yds. per 100 ft. If  $w$  exceeds 40 ft., use one half and multiply result by 2, if both  $w$  and  $h$  are large use one half of each and multiply result by 4. Any cross-section may be divided into triangles by the following rule. To the triangle of the sum of the outside cuts (or fills)  $=h$ , and  $\frac{1}{2}$  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

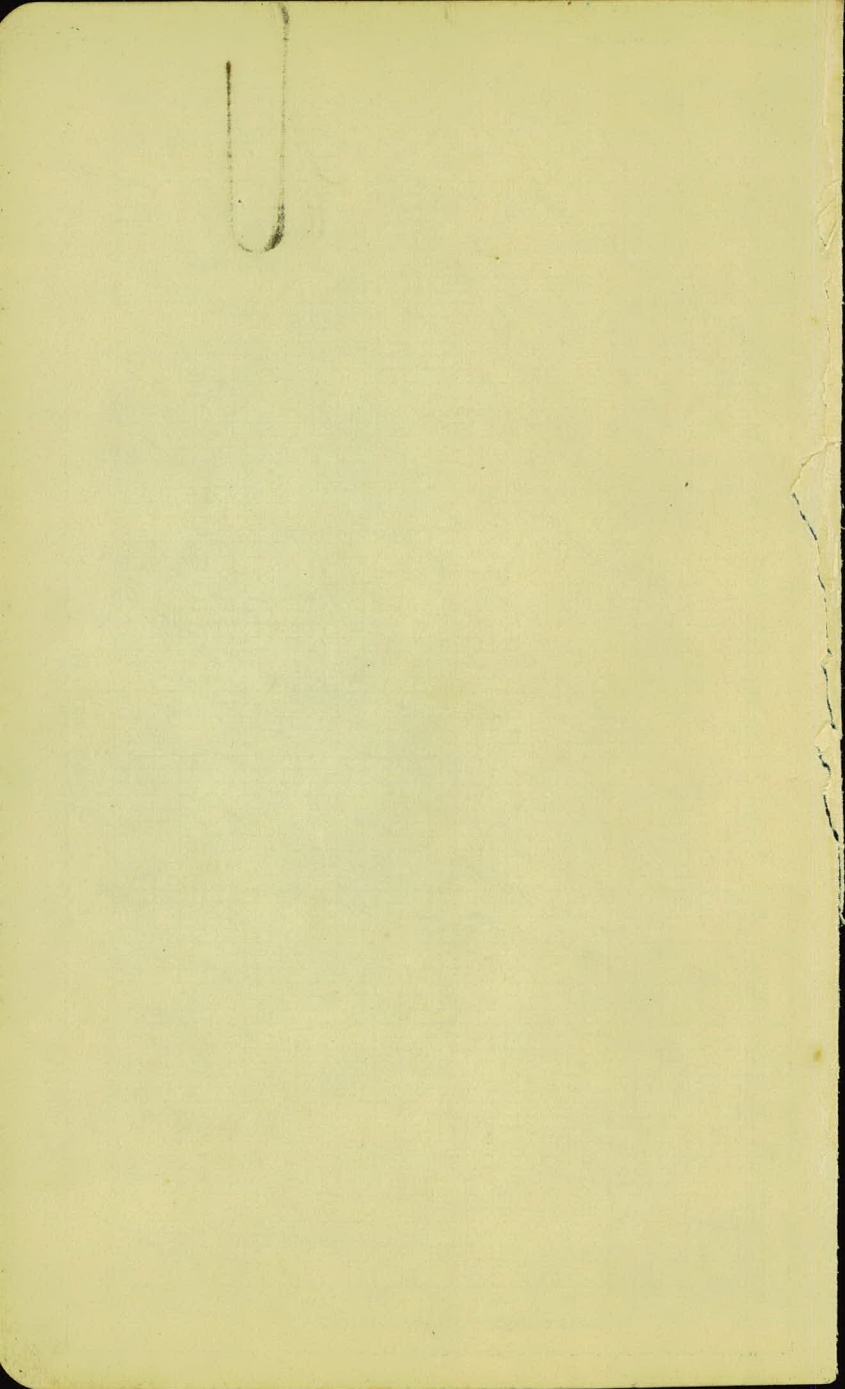
Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the 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.

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STADIA READING X STADIA CONSTANT



7<sup>e</sup> 28

80.9  
4.25  

---

76.65

925.47  

---

10.95  
936.40  
31.5  

---

55

892.45  

---

107.75  
224.75

20  

---

31

292 + 92.05  

---

291 + 24.65  
1-6770

31  

---

12  

---

25  

---

43

897.88  

---

841  
889.47

925.81  

---

915.03  
9.78

910.77  

---

4.26  
915.03  

---

90.35  
968

90  
915.03



234721  
218

DISTANCES FROM CENTER OF ROADWAY FOR  
CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1 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  $41.9 + (20 - 16) \times 2$  or 2 ft. added to 41.9 = 43.9. For slopes of 1 on 1 see inside of front cover.