OFFICE OF
RAMSEY COUNTY ENGINEER

CONSTRUCTION NOTES

COUNTY ROAD "E"

PROJ. NO. 26-07

FIELD NO. 5

ENGINEER'S
FIELD BOOK
No. 10403

11-18-26

"5"

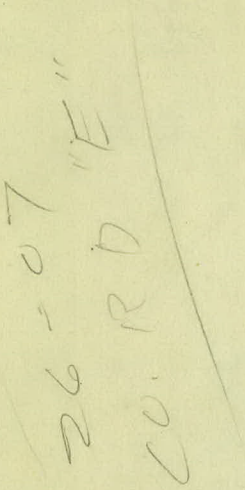
Distances from Center of Roadway for Cross-Sectioning

Roadway 16 feet wide. Side Slopes 1 on 1.
For Single Track Embankment.

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

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

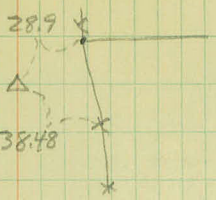
85-4
Ea

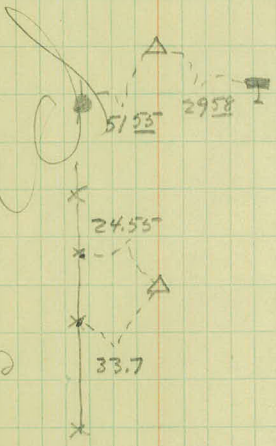


Index

Sta	P.	L.	R.
249+63	P.O.T.		
240+74	P.O.T.		
228+00	P.O.T.		
217+25	P.T.		
215+63	P.A.		89°50'
212+76	P.C.		

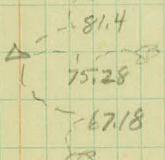
Lt ℄ Rt





Dropped 4-16

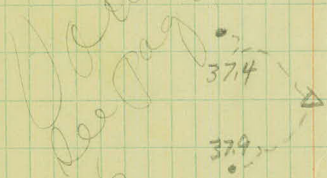
No. 1/4 Corner
Sec 34.



Δ 89°50'
D 20° Lt.
T 287.10
L 449.2

Sta	P.	L.	R.
259+03	P.C.C. "P.T"		End of proj
257+41.8	P.I.		
255+19.5	P.C.		

Lt ℄ Rt



Δ 71°29'
D. 18°38'R
T. 222.3
L 383.63

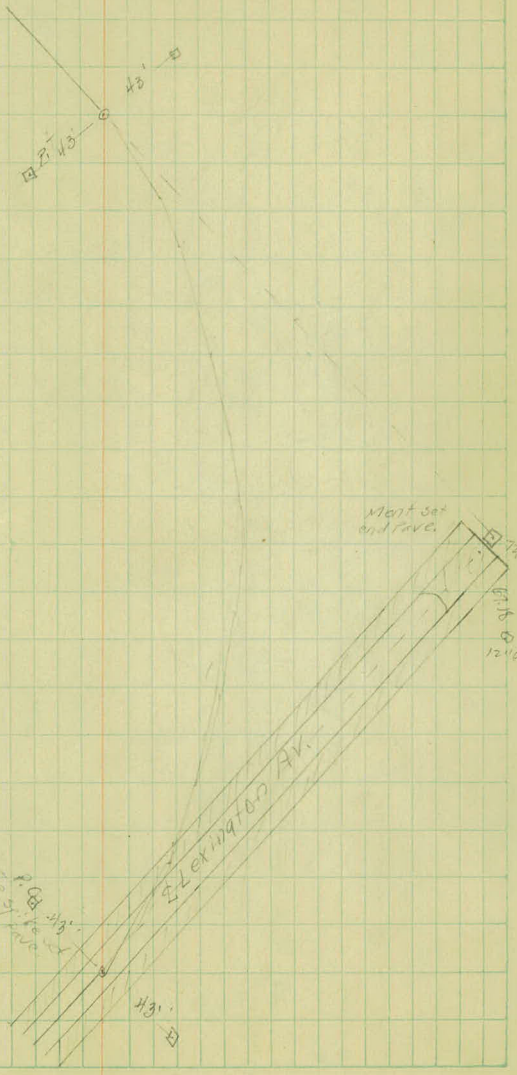
Station	Point	Lt.	Rt.
217+25.8	P.T.	44°-55'	
217		42°-20.4'	
+75		39°-50.4	
+50		37°-20.4	
+25		34°-50.4	+31 - 35°-26'
216		32°-20.4	20° C. Lt.
+75		29°-50.4	Δ 89°-50'
+50		27°-20.4	P.I. 215+63.1
+25		24-50.4	T. 287.10'
215		22°-20.4	L. 449.17'
+75		19°-50.4	R. 287.94
+50		17°-20.4	
+25		14°-50.4	+14 - 13°-44
214		12°-20.4'	+28 11°-08'
+75		9°-50.4	+78 - 10°-29'
+50		7°-20.4'	
+25		4°-50.4	
213		2°-20.4'	
212+76.6	P.C.	0°-00'	

25.12 50.19 50.19 25.12 49.51

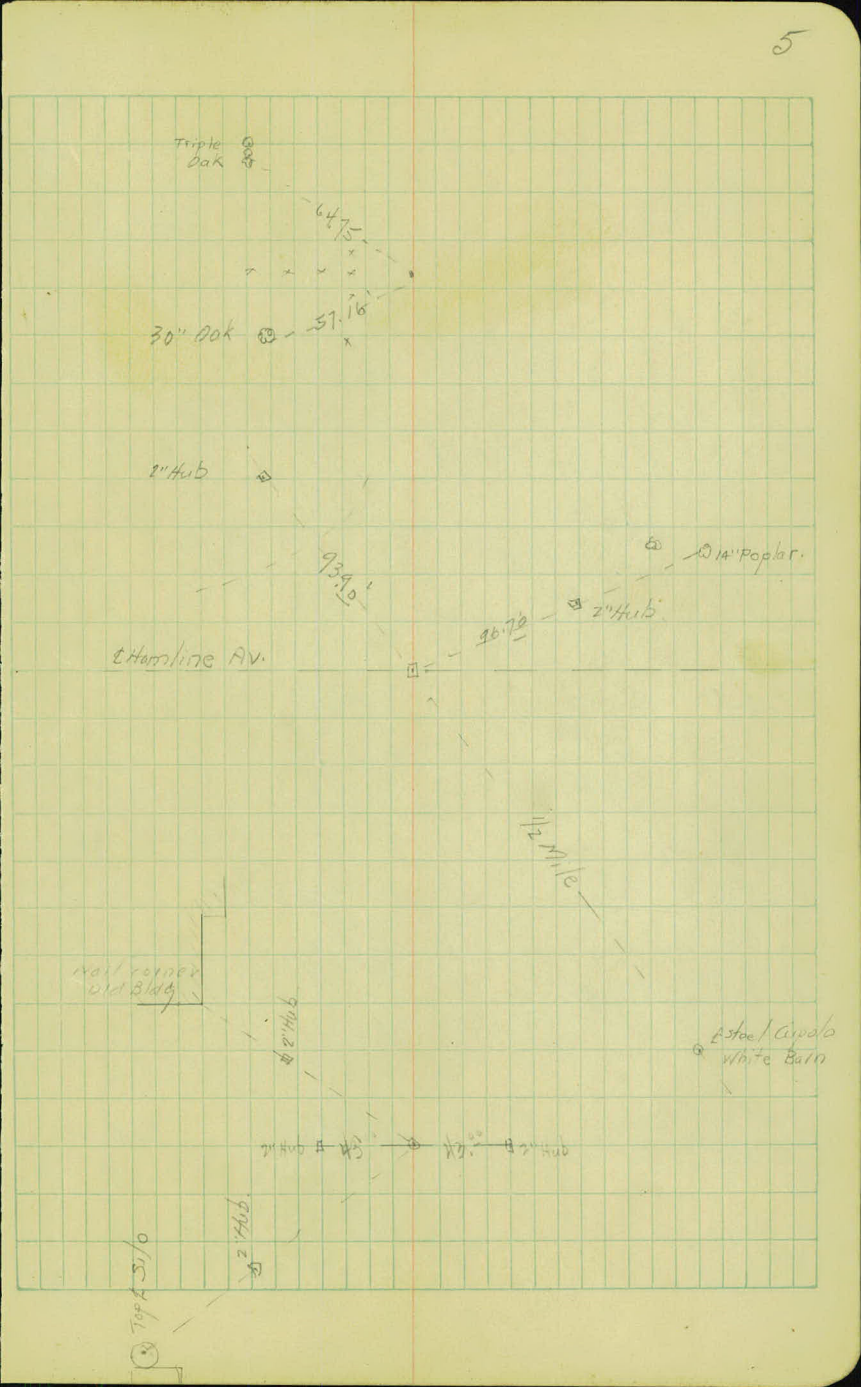
W.H.C.

June 29, 1974

A.L.P
E.F.
C.F.S.
H.T.P



Station	Point	Lt. & Rt.
249+45.3	P.O.T.	
240+74.10	P.O.T.	
230+00	P.O.T.	

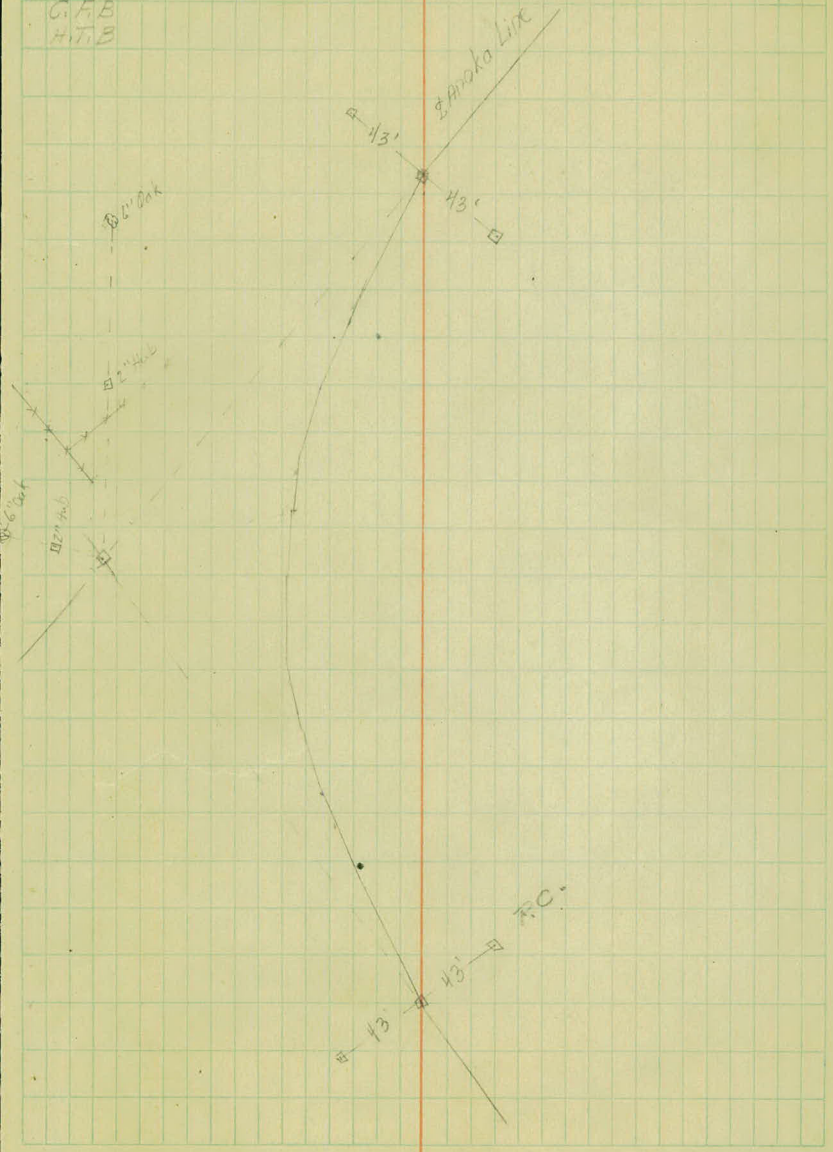

Triple Oak
64.75'
30" Oak
37.16'
8" Hub
93.70'
Dia Poplar.
2" Hub
36.72'
℄ Hamshire Av.
31.42'
Rail corner Old Bldg
2" Hub
Steel / Cupola White Barn
2" Hub
Top 35/0

Station	Point	Lt. Δ Rt.	
259+03.13	P.T.	35° 44.5'	
259		35° 27.0'	
+75	25' 30.16	33° 07.3'	
+50		30° 47.3'	
+25		28° 27.8'	
258		26° 08.3'	
+75		23° 48.3'	Δ 71° 29'
+50		21° 28.3'	18° 38' Rt.
+25		19° 08.8'	P.I. 257+41.8'
257		16° 49.9'	T. 222.30
+75		14° 29.3'	L. 383.43
+50		12° 09.5'	R. 308.85
+25		9° 41.8'	
256		7° 30.0'	
+75	30.14	5° 10.3'	
+50		2° 50.5'	
+25	25.10 30.11	0° 30.8'	
255+19.5	P.C.	0° 00.0'	

W.H.C.

June 28, 1926

E. F.
G. F. B
H. T. B



Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	1.89	954.20			952.31
212+40				49.43	4.8
212+66.6			950.1	49.48	4.72
212+76.6			50.1	49.46 949.5	4.7
213			50.0	49.43	4.8
+50			49.6	5.4 48.99	5.03
+78			48.4	6.1 48.4	5.5
+88			46.6	6.4 48.3	5.5 5.9
214			46.8	7.2 47.6	6.6

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

Aug 5, 1926 4

Left C L Right

R.R Spike 30" Oak 65' Rt. Sta 213+40

Edge Pavement

		6.6 / 4.2	6.2 / 2.9	7.1 / 2.7	7.1 / 2.2	4.8 / 1.6.5	4.37 / 13.5					
		7.6 / 4.3	7.7 / 2.9	27.0	7.7 / 3.0	7.5 / 2.3	4.4 / 1.7	4.50 / 13.5	4.40			
		7.7 / 4.3	7.8 / 3.9	26.8	7.6 / 2.9	7.3 / 2.2	4.3 / 1.6.5	4.22 / 13.5	4.12			
S	W.											
	21.7	7.7 / 4.3	9.0 / 2.6	7.4 / 2.6	7.6 / 2.6	7.3 / 2.5	4.4 / 1.6	4.31 / 12.6	4.17			
-0.17	13.5	5.5 / 4.3	4.3 / 2.9	5.8 / 4.3	4.1 / 1.8.5	4.2 / 1.4.5	7.4 / 1.2	7.3 / 4.5	4.7 / 4.5	4.68 / 4.5	4.61	
-0.3			6.5		5.8		5.40	4.7	7.5	7.4	5.2	5.2 5.08
+0.10	13.1		4.3	3.5	+0.3	22.7	1.1	1.9.5	7	3.5	0.0	1 4.12
-0.60				7.8		7.6	7.0	5.8	5.7	7.6	7.6	5.4 5.36
+0.40	24.8			4.3		3.4.1	+1.8	2.4	1	4	-1.7	4.6 5
-0.60			10.1		8.8	8.6	9.7	5.6	5.6	7.4	7.7	5.6 5.50
+0.50	24.0		4.3		3.9	1.0.6	2.1	6.0	7.5	-0.8	6	1 1 4.7

Original Cross Sections

Sta.	B. S.	H. I	H. S.	Grade	Gr. R.
		954.20			
214+14			48.3	947.2	7.8 7.4 7.0
750			44.3	40.9	3.5 6.3 7.3
T.P.	5.04	946.01	13.73		940.97
215			40.2	05.8	1.4 +0.4 0.2
750			38.1	44.1	3.5 3.3 1.3
216			38.6	43.6	4.7 3.4
731			38.7	42.9	3.1
750			41.4	42.5	3.5
217			41.0	41.4	4.6
705.8			40.7	40.9	5.1
760			40.4	40.1	5.9
218			40.1	39.3	6.7
750			39.4	38.5	7.5
T.P	4.70	944.16	6.55		939.46
219			38.6	37.4	6.3
719.750			37.6	37.6	6.6

Inst.
Rod:
Chain.

Aug 5, 1926 8

		Left			C L			Right		
-0.8 / +0.6	24.0	13.1 / 43	39.7 / -7.6	8.0 / 14	5.9 / +1.1	5.8 / 5	7.8 / 8	7.7 / 14	5.8 / 19	5.1 / 22.0
+1.0 / -1.0	24.0	5.9 / 43	38.0 / -7.0	13.0 / 14	7.9 / -7.6	6.0 / +0.3	5.4 / 3.0	8.1 / 19	8.3 / 35	6.7 / 37
-1.0 / +1.0	24.0	9.8 / 43	40.0 / -8.0	9.4 / 18	7.7 / -8.6	7.6 / 15	10.1 / -7.6	8.2 / 52		6.2 / 43
+1.0 / -1.0	24.0	10.9 / 43	40.2 / -8.1	10.6 / 15	9.7 / -8.6	7.9 / 15	6.1 / -7.5	4.8 / -4.5	2.90	3.8 / 43
20.3	24	10.8 / 43	39.6 / -7.8	10.5 / 15	7.0 / -5.0	7.4 / 12	6.7 / 18	4.2 / 22	3.5 / 25	3.0 / 28
	24	10.5 / 43		10.5 / 43	8.9 / 14	7.3 / -5.2	4.1 / 9	3.6 / 22	1.2 / 35	2.0 / 39
	24	10.2 / 43	39.0 / -6.8	10.0 / 25	8.5 / 9	4.6 / -1.1	4.0 / 14	4.4 / 24.5	4.4 / -0.9	3.4 / 34.8
	23.3	10.1 / 43	33.5 / -5.1	9.9 / 18	9.0 / 12	5.3 / 9	5.2 / -0.4	5.4 / 14.5	6.0 / 16	5.5 / -0.9
	22.0	9.4 / 43	30.6 / -4.3	9.4 / 19	8.3 / 14	6.4 / 11	5.7 / -2.2	5.6 / 13	5.6 / -0.5	4.3 / 12.9
	21.0	8.6 / 43	28.9	7.9 / 20	7.4 / 20	7.3 / 15	6.1 / 10	5.6 / 10.3	5.7 / 12	6.3 / 17
	20.0	5.7 / 43	32.1 / +1.1	5.6 / 19	7.1 / 16	7.1 / 18	6.5 / 12	5.9 / 19.8	6.2 / 12	7.0 / 15
		5.3 / 43	37.3 / +4.7	5.3 / 22	6.9 / 17	7.1 / 12	6.6 / +0.1	7.1 / 13	7.5 / 14	7.5 / 15
		3.0 / 43	36.1 / +3.4	2.9 / 21	2.4 / 16	6.2 / 14	6.5 / 10	6.0 / +0.7	5.6 / 13	6.5 / 14
		5.1 / 43	33.4 / +1.6	5.0 / 19	4.6 / 15	7.3 / 13	7.5 / 12	7.0 / 00	6.6 / 12	6.9 / 10

		Left			C L			Right		
						5.4 / 16	5.4 / 19	5.2 / +1.2	5.8 / 32.8	5.0 / 43
		3.3 / 43	37.3 / +4.7	3.3 / 22	3.3 / 17	6.6 / 12	7.1 / 13	7.5 / 14	7.5 / 15	3.9 / 21
		5.7 / 43	32.1 / +1.1	5.6 / 19	7.1 / 16	7.1 / 18	6.5 / 12	5.9 / 19.8	6.2 / 12	7.0 / 15
	21.0	8.6 / 43	28.9	7.9 / 20	7.4 / 20	7.3 / 15	6.1 / 10	5.6 / 10.3	5.7 / 12	6.3 / 17
	22.0	9.4 / 43	30.6 / -4.3	9.4 / 19	8.3 / 14	6.4 / 11	5.7 / -2.2	5.6 / 13	5.6 / -0.5	4.3 / 12.9
	23.3	10.1 / 43	33.5 / -5.1	9.9 / 18	9.0 / 12	5.3 / 9	5.2 / -0.4	5.4 / 14.5	6.0 / 16	5.5 / -0.9
	24	10.2 / 43	39.0 / -6.8	10.0 / 25	8.5 / 9	4.6 / -1.1	4.0 / 14	4.4 / 24.5	4.4 / -0.9	3.4 / 34.8
	24	10.5 / 43		10.5 / 43	8.9 / 14	7.3 / -5.2	4.1 / 9	3.6 / 22	1.2 / 35	2.0 / 39
20.3	24	10.8 / 43	39.6 / -7.8	10.5 / 15	7.0 / -5.0	7.4 / 12	6.7 / 18	4.2 / 22	3.5 / 22	3.0 / 28
+1.0 / -1.0	24.0	10.9 / 43	40.2 / -8.1	10.6 / 15	9.7 / -8.6	7.9 / 15	6.1 / -7.5	4.8 / -4.5	2.90	3.8 / 43
-1.0 / +1.0	24.0	9.8 / 43	40.0 / -8.0	9.4 / 18	7.7 / -8.6	7.6 / 15	10.1 / -7.6	8.2 / 52		6.2 / 43
+1.0 / -1.0	24.0	5.9 / 43	38.0 / -7.0	13.0 / 14	7.9 / -7.6	6.0 / +0.3	5.4 / 3.0	8.1 / 19	8.3 / 35	6.7 / 37
-0.8 / +0.6	24.0	13.1 / 43	39.7 / -7.6	8.0 / 14	5.9 / +1.1	5.8 / 5	7.8 / 8	7.7 / 14	5.8 / 19	5.1 / 22.0

original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		944.16.			
219+75				37.3	937.5 6.7
220				36.9	37.4 6.8
+50				36.5	37.5 6.7
221			37 37	36.4	37.6 6.6
+50				37.0	37.8 6.4
222				37.4	37.9 6.3
T.P.	6.08	943.76.	6.48		
+50				38.1	38.1 5.7
223				38.9	38.2 5.6
+50				39.3	38.4 5.4
224				39.5	38.5 5.3
+50				39.3	38.6 5.2
225				38.6	38.6 5.2
+50				38.0	38.6 5.2

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

July 23 1926

9

Left							C L						Right					
6.7 / 43	31.7	4.6 / +0.1	20.0	6.7 / 0.0	6.6 / 1.8	7.1 / 1.6	7.8 / 1.4	7.3 / 1.0	6.9 / -0.2	7.3 / 1.3	7.1 / 1.5	7.9 / 1.7	7.0 / 1.8	7.3 / -0.6	4.2	7.5 / +1.3	20.0	7.4 / 43
8.1 / 43	29.1	8.1 / +0.7	32.6	8.1 / -1.3	8.1 / 1.9	8.0 / 1.0	8.6 / 1.5	7.5 / 1.0	7.3 / -0.5	7.6 / 1.2	8.0 / 1.6	9.6 / 2.0	9.3 / -2.5	25.9		8.8 / 43		
9.6 / 43	27.6	10.5 / -3.8		10.7 / 1.9	8.3 / 1.5	8.1 / 0.9	7.1 / -1.0	8.1 / 1.1	8.6 / 1.7	10.9 / 2.1	11.5 / -4.8	27.6				11.2 / 43		
10.8 / 43	29.8	11.5 / -4.9		11.5 / 2.0	8.9 / 1.5	8.1 / 1.0	7.8 / -1.2	8.2 / 1.2	8.8 / 1.7	11.4 / 2.2	11.2 / -4.6	27.2				11.2 / 43		
11.8 / 43	30.7	11.5 / -5.1		11.4 / 2.1	8.2 / 1.3	7.6 / 1.0	7.2 / -0.8	7.3 / 1.1	8.0 / 1.5	9.6 / 2.0	7.7 / 3.3	26.6				9.3 / 43		
10.2 / 43	27.9	9.8 / -3.5		9.3 / 1.8	7.6 / 1.4	7.3 / 1.0	6.8 / -0.5	7.0 / 1.1	8.0 / 1.6	7.1 / 1.9	7.3 / -1.0	22.0	7.3 / 2.3	30.2	P.C.	6.9 / 43		
937.68 - Top Stake Lt. 2 2 4 + 25																		
8.0 / 43	29.2	6.9 / -3.8	22.9	6.7 / -1.0	7.1.0 / 1.6	6.5 / 1.4	6.1 / 1.1	5.7 / 0.0	5.9 / 1.2	6.7 / 1.6	6.6 / 1.8	5.8 / 1.9	5.7 / 0.0	20.1	4.8 / +0.1	92.9	4.8 / 43	
6.6 / 43	31.1	5.6 / 2.0		4.9 / 1.9	6.1 / 1.7	6.2 / 1.5	5.8 / 1.4	5.3 / 1.0	4.9 / +0.1	5.4 / 1.2	6.0 / 1.7	4.8 / 1.9	3.1 / +2.5	33.8			2.8 / 43	
5.8 / 43	32.5	4.4 / 1.0		3.6 / 2.1	5.2 / 1.6	5.1 / 1.4	4.9 / 1.1	4.5 / +0.9	4.7 / 1.2	5.0 / 1.8	3.3 / 2.1	2.1 / 2.7	1.6 / +3.8	36.7			1.7 / 43	
2.3 / 43	36.4	4.7 / +3.6		5.9 / 2.2	5.2 / 1.4	4.8 / 1.3	4.6 / 1.0	4.3 / +1.0	4.1 / 1.2	4.7 / 1.9	2.6 / 2.1	1.8 / 2.5	0.8 / +4.5	37.8			1.1 / 43	
1.2 / 43	36.9	1.3 / +3.9		2.0 / 2.0	5.1 / 1.6	5.7 / 1.4	5.0 / 1.2	4.5 / +0.7	4.9 / 1.2	5.5 / 1.7	3.4 / 2.0	3.0 / +1.9	38.9				3.8 / 43	
P.C. 5.1 / 43	29.1	6.7 / +1.0	32.0	6.3 / 1.5	7.2 / 2.2	6.8 / 1.9	5.3 / 1.5	5.5 / 1.0	5.2 / 0.0	5.0 / 1.1	6.1 / 1.6	6.05 / 1.7	6.6 / -1.4	22.8	6.7 / +0.9	28.8	6.6 / 43	
	30.1	7.7 / 8.4		8.6 / 2.4	9.0 / 2.1	6.3 / 1.5	6.2 / 1.0	5.8 / 0.6	6.0 / 1.1	6.2 / 1.7	6.2 / 1.0	22.9	6.2 / +1.0	29.5	P.C.	5.9 / 43		

Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		943.76			
226				37.6	938.6 5.2
+50				37.8	38.5 5.3
227				37.9	38.4 5.4
+50				38.0	38.3 5.5
+60				38.0	38.3 5.5
228+00				38.2	38.2 5.6
T.P.	4.64	942.92	5.48		
+50				38.4	38.1 4.8
229				38.2	37.9 5.0
+50				37.9	37.6 5.3
230+00				37.2	37.2 5.7
+50				36.8	36.8 6.1
B.M.	8.40	944.73	6.59		
231				36.4	36.4 8.3
+40				36.0	36.1 8.6
+70				35.8	35.8 8.9
232				35.4	35.6 9.1
+30				35.3	35.3 9.4
+65				35.2	34.8 9.9
233				34.5	34.3 10.4
T.P.	7.05	938.38	8.40		
+50				32.7	33.3 5.1

Inst. W.H.C.
Rod. A.L. Parker
Chain E.H.S.

July 7-8 1926

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Left							C L	Right						
9.0 / 43	28.4	9.2 / 9.4 / -4.0	10.1 / 10.1 / -2.4	9.5 / 23.2	6.9 / 14	6.4 / 15	6.2 / 10	6.4 / 12	6.6 / 16	7.5 / -2.0	6.7 / 7.2	7.0 / 23.6	6.7 / +0.5	6.2 / 43
		9.2 / -4.1	9.4 / 28.8 / -4.1	7.5 / 20	7.6 / 16	6.3 / 10	6.0 / -3.7	6.2 / 11	7.0 / 16	8.5 / 19	8.6 / -3.3	23.6		8.3 / 43
8.1 / 43	26.8	8.8 / 3.4	9.1 / 23	9.7 / 20	7.4 / 16	6.3 / 11	5.9 / -0.5	6.1 / 11	6.7 / 15	8.0 / 17	7.4 / -2.3	7.7 / -2.5	23.0	7.8 / 43
		10.4 / -4.9	11.0.4 / 24.8 / -4.9	9.4 / -2.1	7.1 / 14	6.2 / 11	5.8 / -0.3	6.1 / 11	6.6 / 13	6.0 / 16	6.1 / -0.5	7.2 / 21.9	5.8 / +1.7	5.4 / 30.6 / 43
7.0 / 43	26.6 / 24.4	6.6 / -2.1	22.2 / 6.6 / -2.1	6.6 / 17	7.1 / 14	6.2 / 11	5.8 / -0.3	6.1 / 11	6.6 / 12	6.0 / 20		5.8 / 31		5.4 / 43
	4.0 / 43	23.3 / 4.1	5.2 / 4.1 / -1.5	6.3 / 17	6.0 / 16	5.6 / 12	5.7 / 0.0	5.5 / 11	4.4 / 22	4.1 / 21.2	32.8			4.1 / 43
9.3	8.28													
	4.0 / 43	31.8 / 4.3	4.9 / -0.5	5.6 / 17	5.6 / 16	5.0 / 11	4.5 / +0.3	4.9 / 11	4.2 / 19	3.4 / +1.4	33.1		3.7 / 43	
6.6 / 43	26.6 / 19.5	6.0 / 21.0	20.8 / 5.4 / -0.4	5.3 / 17	5.2 / 16	5.8 / 15	5.12 / 11	4.7 / +0.3	4.9 / 12	4.1 / 18	2.5 / +2.5	34.8		2.1 / 43
6.3 / 43	26.0 / 3.8	5.8 / +1.8	20.4 / 5.5 / -0.2	5.5 / 18	5.8 / 17	6.0 / 14	5.3 / 8	5.0 / +0.3	5.3 / 12	5.5 / 14	4.7 / 19	3.2 / +2.1	34.2	3.0 / 43
	5.7 / 43	26.8 / 24.8	26.8 / 6.7 / -1.0	21.8 / 6.6 / -0.9	6.7 / 14	5.9 / 7	5.7 / 0.0	5.7 / 7	6.2 / 14	5.7 / 00	20.0	5.2 / +0.5	31.8	5.4 / 43
	7.3 / 43	29.0 / 24.4	7.3 / +1.8	22.2 / 7.2 / -1.1	6.9 / 13	6.3 / 7	6.1 / 00	6.2 / 11	6.7 / 14	6.7 / 15	6.2 / -0.1	20.2	5.8 / +0.3	31.5	6.0 / 43
936.33		Spike, Stump 40 Lt.						2.30 + 85						
	7.3 / 43	26.8 / 24.8	7.1 / +1.2	21.0 / 7.8 / -0.5		7.8 / 11	8.3 / 00	8.7 / 12	9.3 / 14	9.3 / 15	8.0 / 18	7.4 / +0.9	32.4	7.1 / 43
	12.2 / 43		26.0	11.6 / -8.0	10.5 / 19	9.2 / 11	8.7 / -0.1	9.1 / 12	9.6 / 12	9.1 / 15	9.3 / 17	-0.7	31.4	9.1 / +1.8	30.3	8.7 / 43
	14.4 / 43		26.0	13.9 / -5.0	12.9 / 16	9.7 / 11	8.9 / -0.1	9.3 / 11	9.8 / 15	9.8 / 16	9.5 / 17	9.5 / -0.6	31.2	9.3 / +1.6	30.9	9.0 / 43
		14.6 / 43	28.2	13.2 / -4.1	11.4 / 16	9.9 / 11	9.3 / -0.2	9.6 / 11	10.3 / 15	10.1 / 16	9.1 / 18	9.1 / 00	32.0	8.1 / +1.0	32.8	7.3 / 43
	11.6 / 43	26.0 / 29.1	10.7	10.1 / 24	9.0 / 18	10.3 / 14	9.9 / 11	9.4 / -0.1	9.7 / 12	10.4 / 15	5.4 / 2.1	4.4 / +5.0	38.5	4.4 / 11.0	
	6.2 / 43	26.9	6.0 / +3.9	5.9 / 23	11.0 / 14	10.2 / 11	9.5 / +0.4	9.9 / 12	10.8 / 16	3.7 / 28		2.7 / +7.7	42.6	2.2 / 43	
	5.5 / 43	38.4	5.5 / +1.9	5.3 / 15	11.4 / 14	10.8 / 12	10.3 / 6	10.2 / 11	10.3 / 12	10.7 / 15	11.4 / 15	6.5 / +4.9	37.0	6.4 / 43	
936.53															
48 / 33	38.6	11.7 / +4.4	20.9	5.1 / 00	5.4 / 18	6.7 / 16	6.7 / 14	6.7 / 12	5.1 / 1	6.0 / 10.6	6.5 / 12	6.5 / 11.5	5.4 / 16	5.3 / 18	20.4	5.1 / 00	5.3 / 31 / 43

Original Cross Sections

Sta.	B. S.	H.I.	H.S.	Fill	Gr. R.
33+10			32.2	93x.7	5.7
34			31.7	32.0	6.4
+50			30.6	30.6	7.8
+70			30.0	30.0	8.4
35			28.8	29.3	9.2
+25			27.5	28.5	9.9
T.P.	2.07	928.91	11.54		926.84
+50			26.8	27.8	1.1
36			25.4	26.5	2.41
+50			24.5	25.5	3.4
37			24.2	24.9	4.0
+50			24.2	24.7	4.2
38			24.3	24.9	4.0
+50			24.6	25.5	3.4
39			25.4	26.4	2.5
T.P.	9.19	935.64	2.46		926.45
+50			26.4	27.4	8.2
+80			27.3	28.0	7.9

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

Aug 6. 1926

Left							C L	Right							
6.2 / 43	30.4	6.1 / +1.6	24	6.0 / -0.7	6.5 / 18	7.2 / 17	7.2 / 15	6.6 / 7	6.2 / -0.6	6.5 / 11	7.1 / 14.5	7.1 / 14.5	6.7 / 19	6.5 / -0.3	6.8 / 21.6 / +0.9	DC / 29.4	7.0 / 43
5.3 / 43	32.8	5.4 / +1.0		5.9 / 19	7.8 / 16	7.8 / 15	7.3 / 13	6.7 / -0.2	7.2 / 13	7.9 / 15	7.9 / 17	7.4 / 19.5	7.4 / -1.0	6.7 / 22.9	DC / +1.7 30.6		6.8 / 43
3.7 / 43	27.6	3.4 / +0.4		4.9 / 22	7.3 / 16	7.6 / 12	7.2 / 0.0		8.9 / 12	7.1 / 17	4.3 / 7.3			4.0 / +3.8	29.7		4.0 / 43
5.0 / 43	36.9	4.5 / +2.9		4.8 / 23	10.2 / 16	9.4 / 12	8.9 / 0.0		9.4 / 14	9.7 / 16	3.2 / 2.5			2.6 / +5.8	39.1		2.5 / 41.3
13.6 / 43	31.6	8.8 / +0.4		13 / 20	11.3 / 17	10.6 / 15	9.6 / -0.0		10.3 / 16	10.9 / 18	4.2 / 2.6		2.2 / +6.0	40.0			3.2 / 43
14.7 / 43			27.0	13.4 / -2.8	13.2 / 17.5	11.4 / 11	10.9 / -1.0		11.2 / 19		9.3 / 2.2	8.5 / +1.4		33.1			7.7 / 43
7.9 / 43	33.0	7.6 / -0.5		7.0 / 27	7.8 / 20	7.7 / 12	7.1 / -1.1		7.5 / 16	7.5 / 18	3.0 / -1.9		2.7 / 23.8	DC / +0.4	28.6		1.2 / 43
13.6 / 43	35.7	10.0 / +7.6		10.0 / 29	11.9 / 19	11.2 / 12	10.5 / -1.1		9.8 / 12	11.1 / 19	5.8 / 2.4	5.4 / -2.0		26.0			5.0 / 43
11.0 / 43	25.2	11.0 / -7.6		10.0 / 27	9.7 / 18.5	9.9 / 13	9.4 / -1.0		9.8 / 14	5.2 / 2.1	6.8 / 2.5	6.6 / -3.2		26.4			6.1 / 43
9.7 / 43	36.8	9.9 / -5.9		11.0 / 29	8.9 / 21	7.6 / 18	8.7 / -0.7		9.8 / 11	5.5 / 2.0	7.5 / 2.5	7.4 / -3.4		26.8			7.3 / 43
7.8 / 43	28.4	7.9 / -4.2		8.9 / 27	8.0 / 21	8.0 / 11	8.7 / -0.5		8.0 / 12	8.4 / 22	6.7 / -2.5			25.0			6.6 / 43
7.9 / 43	29.3	7.6 / -4.6		8.4 / 27	8.5 / 19	8.8 / 12	8.6 / -0.6		8.0 / 12	8.4 / 21	7.6 / 2.5	7.4 / -2.4		26.8			7.3 / 43
8.0 / 43	31.6	7.2 / -5.8		9.0 / 27	8.4 / 18	8.6 / 11	8.3 / -0.7		8.7 / 13.5	8.8 / 21	8.5 / 2.8	10.0 / -1.6		31.2			10.4 / 43
8.4 / 50	31.1	8.0 / -5.5		8.0 / 25	8.0 / 19	8.1 / 12	7.9 / -1.0		8.8 / 13	8.8 / 19	8.7 / 2.9	8.7 / -6.2		32.9			8.6 / 43
10.6 / 43	40.3	10.6 / 40		13.4 / -1.7	10.1 / 20	10.5 / 14	9.9 / -0.9		9.7 / 12.5	10.5 / 16	10.5 / 18	9.2 / -0.9		27.8	27.0 / +0.1	29.7	9.4 / 43
8.1 / 43	38.8	7.1 / +0.6		7.0 / 30	7.1 / 18	9.5 / 16	9.8 / 14	8.4 / -0.6	8.8 / 14	9.5 / 15.5	9.5 / 17.5	8.7 / 2.1	6.2 / +15.2	32.3			6.5 / 43

Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		935.64			
240			28.0	28.4	7.2
B.M.	3.88	935.64	3.88	931.76	
+50			29.8	29.2	6.4
+74		℄ Hamline Av.	30.6	29.6	6.0
241			31.4	30.0	5.6
+08			31.6	30.1	5.5
+42			32.2	30.5	5.1
T.P.	5.77	936.93	4.48		931.16
+75			32.6	30.9	6.0
242			32.6	31.2	5.7
+50			32.3	31.6	5.3
243			31.9	32.0	4.9
+50			31.2	32.2	4.7
244			31.0	32.5	4.4
+50			31.4	33.0	3.9
245			32.2	33.6	3.3

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

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Left | C L | Right

7.2		6.1	6.6	8.6	8.6	8.0	7.4	8.1	8.8	8.9	6.2	6.6		7.3
43	32.8	41.2	20.5	18	16	13	-0.3	12	16	18	21	+0.7	32.1	43

P 31.76 - R.R. Sta. 1 + 17.8 +00 Rt. Sta. 240+94

6.6		6.5		2.5	6.1	5.8	6.2	7.2	7.2	5.7	6.3		7.2
43	31.9	0.0	20	0.0	5	+0.7	15	17	19	22	+0.7	31.3	43

5.0		5.0		5.0		5.0				4.8	
43		20		+1.1		20				43	

5.8		4.7		4.2		4.6			5.0		4.8	
43		20		+1.4		20			31		43	

4.1	4.5	5.8	5.8	5.2	4.6	4.0		4.5			5.9	6.0	5.8	
43	39.6	38	34	31	19	+1.5		16			31	34	43	

3.9		3.9	3.7	4.9		5.1	5.0	4.3	3.4		3.9	4.7	4.9	3.6	2.5		2.0	1.6
43	33.9	+1.9	35.5	21	20.0	0.0	18.5	15	+1.7		14	16	18	21	+2.6	34.9	41	43

Top Stake 20' Lt. Sta. 241 + 42

2.0		3.0	4.2	5.6	5.7	4.8	1.3	4.5	5.4	5.0	4.3	3.3	0.9	0.4		0.4
43	35.5	+3.0	21	19	16	13	+1.7	12	15	18	19	25	34	45.6	39	43

2.8		2.5	4.0	5.3	5.5	4.6	4.3	1.9	4.9	4.7	1.8		2.1
43	35.8	+3.2	21	19	17	13	+1.9	11	17	27	+3.9	36.7	43

3.5		3.6	3.6	5.7	5.1	5.0	4.6	5.0	6.0	6.0	3.8	4.0		4.6
43	33.9	+1.7	24	17	15	12	+0.7	11	15	16	19	+1.3	32.9	43

4.0		4.5	4.0	6.2	6.2	5.4	5.0	5.5	6.9	6.9	5.1		4.9		4.9
43	31.6	+0.4	20	18	17	12	-0.1	10	14	16	-0.2	30.9	0.0	31.0	43

6.5	8.2	6.7		4.6	6.4	7.3	6.0	5.7	6.0	7.2	6.9	4.6	3.6	3.7		3.2
43	26.0	0.0	33.8	-1.9	21	19	13	-2.0	11	13	15	17	28	+4.0	32.5	43

9.4		10.2	9.9	7.0	6.3	5.9	6.2	7.3	9.2				8.5
43	31.6	-5.8	24	19	12	-1.5	10	16	-4.8	29.6			43

12.6		11.6	12.1	6.2	5.8	5.5	6.0	6.2	12.4	12.9			13.0
43	37.4	-8.7	27	18	12	-1.6	10	15	24	-9.0	38.0		43

13.0		13.9	13.0	5.7	4.8	4.9	5.1	5.7	11.2	11.2			11.2
43	39.7	-9.6	35	16	14	-1.9	10	16	28	-7.9	35.8		43

Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		936.93.			
245+65			33.9	934.8	2.1
246			34.8	35.5	1.4
T.P.	10.85	947.50	0.28		936.65
+50			36.7	36.7	10.8
247			38.7	38.0	9.6
+50			40.1	38.9	8.6
248			41.5	39.7	7.8
+50			43.0	40.3	7.2
249			43.1	40.8	6.7
+50			43.2	41.0	6.5
250			42.7	41.0	6.5
B.M.	5.84	945.12	8.22		
+50			41.7	40.9	4.2
251			40.5	40.5	4.6
+50			39.6	40.0	5.1
252			39.0	39.3	5.8
+50			38.5	38.7	6.1
253			38.0	38.1	7.2

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

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Aug 6, 1926

Left C L Right

Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		945.12			
253+36			37.5	937.6	8.1
+75			36.5	36.1	9.0
254			35.5	35.3	9.3
T.P.	6.67	939.05	12.74		932.38
+61			32.9	33.1	6.0
255			31.5	31.6 31.5	7.5
254+A5			30.8	30.8	8.3
+50			29.5	29.7	9.9
256			27.1	26.7	12.4
T.P.	4.31	933.64	9.72		929.33
+32			27.9	25.1	8.5
+50			27.9	25.7	9.4 9.4
257			21.6	21.7	11.4 11 12A 7
T.P.	0.61	924.66	9.59		924.05
+50			14.7	19.3	5.4 5.0
258			12.9	17.4	7.5
+50			13.5	15.5	9.9
			1.96		

Inst. W.H.C.

Rod. A.L. [illegible]

Chain: H.T.R. W.F.

Aug 7, 1926

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Left C L Right

Original Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
259			142	914.1	
703.1					

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

15

Left C L Right

See Onaka Line
X-Sections.

330

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	9.68	927.08			
Pt. 259+03.13					
259+00				914.0	13.08
+50				15.5	11.58
258				17.2	9.88
+50				19.3	7.78
257				21.7	5.38
T.P.	9.72	934.94	1.86		
+50				24.2	10.72
+32				25.1	9.84
256				26.7	8.24
+50				29.2	5.74
T.P.	7.95	942.88	0.01		
Pt. 255+19.5				30.8	12.08

Inst. W.H.C.
Rod. R.R.
Chain. C.L.

NOV. 4, 1926

16

Left	C L	Right
917.40 - R.R. Spike	10" Scrub Oak 60' Rt. Sta. 258+50 -	

(0.0 Fill)

Ver. Slope Shldr. 9.8 10.1 13.5 11.5
Rocks = 2 25 31 x x = Slope 43

Slope = x 12.5/5 7.4 8.6/5 9.4/24 10.5/28.5 x 9.3/43

(257+30 - 0.0 Ditch Rt.)

Shldr. Rock 5.0/55 5.0/29 4.7 4.1/27.5 5.7/34.5 2.2/40 x 3.0/43

925.22

x 9.7/25 10.5 10.3/25 11.2/36 5.3/42 x 5.3/43

x 8.9/17 7.5 9.3/24 9.8/31 3.7/43 x

x 7.8/4 7.8 7.9/23.5 8.9/36 1.5/43

(255+80 = 0.0 Ditch Lt.)

4.7/43 x 1.7/37 6.4/30 6.2/24.5 5.4/21.5 5.4 5.1/22 6.7/31 10.3 935.2/43 x

934.93 Top 2" 4x6 43' Lt. Sta. 255+19.5

x 8.4/38 8.7/36 9.2/25 13.0/30 13.0/24 11.3/10.5 11.74/13.5 11.61 Pav. End 11.71/15.35 11.8/20.6 13.7/26 13.7/24.5 9.0/37 8.5/38.5 x 8.1/43

S R R S

Final Cross Sections

Sta.	B. S.	H. I. 942.88	F. S.	Grade	Gr. R.
255+00				931.6	11.28
+61				33.1	9.78
254				35.3	7.58
+75				36.1	6.78
+36				37.0	5.88
253+00				37.9	4.98
+50				38.7	4.18
252+00				39.3	3.58
+50				40.0	2.88
B.M.	6.73	945.97	3.64		
251+00				40.5	5.47
250+50				40.9	5.07
250+00				41.0	4.97

Inst. W.H.C.
Rod. A.S.R.
Chain. C. L.

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NOV 5 1926

Pave
C L

Left

		8.5	8.9	12.6	12.5	10.7	10.91		10.78		10.88	10.8	12.9	12.9	9.6	9.4	
	×	38.5	35.5	30	23.5	18.5	13.5		A		14.0	19.5	22.5	27.5	37.5	38 ×	43
6.7		6.9	7.7	10.7	10.8	8.9	9.30		9.22		8.31	9.1	11.5	11.6	8.8	8.6	
43	×	39	35.5	31	24.5	18.5	13.5				13.5	18.6	23	28.9	32	35 ×	43
		+11	+0.9														
	×	34.8	43.6	8.8	8.6	7.0	7.18		7.02		7.07	7.0	8.3	8.6	3.4	3.7	
43			41.5	29	23.5	19.0	13.5				13.5	18.5	23	28	38	41 ×	43
		+0.3															
		43.0	0.0	7.8	7.6	6.1	6.38		6.26		6.34	6.0	7.6	7.9	1.8	1.7	1.7
43			42	29	24.	19.5	13.5				13.5	18.5	22.5	28	38.5	42 ×	43
3.8		4.2	6.6	6.4	4.9	5.28			5.24		5.33	5.2	7.0	6.9	5.7	4.5	4.3
43	×	34.5	33	24	19	13.5					13.5	19.5	22.5	28.4	36	37 ×	43
(253+85= 0.0 Ditch Lt.)											(253+85= 0.0 Ditch Rt.)						
		5.4		6.6	4.4	4.56			4.48		4.56	4.6	7.3		6.8		
	×	43		26.5	18	13.5					13.5	19.5	26.0	×	40		
		6.7		7.0	3.6	3.78			3.67		3.77	3.8	8.1			8.2	
	×	43		27.0	18.5	13.5					13.5	19	28.5	×		43	
		7.2		7.2	3.3	3.13			3.00		3.11	3.2	7.5			7.1	
	×	43		27	19	13.5					13.5	18.5	28.5	×		43	
		6.5		6.6	2.5	2.48			2.36		2.46	2.6	6.2		7.0	7.0	
	×	43		27.5	18.5	13.5					13.5	18	24		28 ×	43	
939.24 - R.R. Spike in 18" oak 50' Lt Sta. 250+85																	
		7.4		8.4	4.9	4.94			4.86		5.00	5.1	6.0		8.1	8.1	
	×	43		26.5	18.5	13.5					13.5	18	20.5	×	33	43	
250+85 = 0.0 Ditch Lt. & Rt.																	
6.7		6.0	7.4	6.1	4.8	4.64			4.53		4.62	4.4	6.5	7.9	4.6	4.5	
43	(	34	27.5	24	17	13.5					13.5	20	26	29.5	33	43	
4.1		3.5	3.7	6.7	5.2	4.7	4.50		4.38		4.47	4.3	6.4	6.5	7.0	1.2	1.2
43	×	35.5	37.5	29	22.5	18	13.5				13.5	19	25	29.5	36	40 ×	43

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		945.97			
249+50				41.0	4.97
249+00				40.8	5.17
248+50				40.3	5.67
248+00				39.7	6.27
+50				38.9	7.07
247				37.9	8.07
+50				36.7	9.27
246				35.5	10.47
T.P.	2.31	937.62	10.66		
+65				34.8	2.82
245				33.6	4.02
+50				33.0	4.62
244+00				32.5	5.12

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

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← Pave →

Left C L Right

2.3/43 x 24/36.5 2.7/34 5.1/28 5.5/32 4.3/15 4.47/13.5 4.40 4.51/13.5 4.6/18.5 6.7/24.5 6.7/29.5 2.2/36 1.7/37 x 1.5/43

2.7/43 x 2.8/37.5 3.2/34.5 6.2/29.5 6.0/24 4.6/18 4.75/13.5 4.66 4.75/13.5 4.8/18.5 7.5/24.5 7.5/29.5 1.8/37 1.0/40.5 x 1.0/43

3.5/43 x 3.3/37.5 3.8/33.5 6.8/28.5 6.4/22.5 4.9/18.5 5.14/13.5 5.1 5.18/13.5 5.2/18.5 7.2/23 7.6/29 1.5/37.5 0.8/41 x 0.9/43

5.3/43 x 5.0/35.5 5.4/32 8.4/28 8.0/22.5 5.8/18 5.83/13.5 5.73 5.79/13.5 6.0/18.5 8.5/23.5 8.7/29.5 3.0/36.5 2.1/40.0 x 2.0/43

6.2/43 x 6.0/36 6.2/31.5 8.8/28 8.8/23 6.6/18.5 6.59/15.5 6.50 6.59/13.5 6.4/18 9.3/23 9.1/29 3.1/37.5 2.3/40.5 x 2.1/43

6.2/43 x 6.2/36.5 6.5/33 10.4/28 10.3/23 7.6/18.0 7.61/13.5 7.58 7.78/13.5 7.5/18.5 10.4/23.5 10.2/29.5 3.4/38 2.6/41 x 2.4/43

7.4/43 x 7.6/37 2.4/33.5 11.5/24.5 11.0/23 8.8/18 8.78/13.5 8.75 8.81/13.5 8.6/18.5 11.0/22 11.1/28.5 5.0/36.5 4.3/39.5 x 4.4/43

Curb Pav. P. Pav Curb

1/3 12.1/35.5 x 13.0/34.5 13.2/31 12.9/24.5 9.9/18.5 9.76/13.5 10.2/12.3 9.93 10.0/12.5 9.72/13.5 9.7/18.5 12.0/22 12.3/27.5 10.1/31 9.7/33.5 x 10.1/37 10.0/43

935.31

C. P. P. C.

7.1/43 x 7.6/32.5 2.1/18.5 2.13/13.5 2.41/12.5 2.31 2.42/12.3 2.14/13.5 2.2/18.5 7.0/30.0 x 6.2/43

(266+75 = 0.0 Ditch Lt.) (246+70 = 0.0 Ditch Rt)

13.5/43 x 13.5/40 6.5/28 3.2/18.5 3.25/13.5 3.52/12.5 3.46 3.54/12.3 3.24/18.5 3.3/18.5 11.7/39 x 11.9/43

13.0/43 x 13.0/40.5 3.6/19 3.85/13.5 4.15/12.5 4.10 4.18/12.5 3.84/13.5 3.9/18.5 12.7/39.5 x 13.4/43

10.0/43 x 10.5/35 4.2/18.5 4.37/13.5 4.65/12.5 4.57 4.65/12.5 4.37/13.5 4.4/19 9.5/35.0 x 9.9/43

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		937.62			
243+50				32.2	5.42
243+00				32.0	5.62
T.P.	5.01	937.20	5.43		
242+50				31.6	5.60
242+00				31.2	6.00
+75				30.9	6.30
+42				30.5	6.70
+08				30.1	7.10
241+00				30.0	7.20
B.M.	0.73	932.49	5.47		
+74				29.6	2.89
+50				29.2	3.29
240+00				28.4	4.09
239+80				28.0	4.49

Inst. .....
Rod. .....
Chain. (243+55 = 0.0 Ditch 4) (243+92 = 0.0 Ditch 4A)

Left				C. P.	C. L.	R.						C. Right
7.1 / 43	7.9 / 32	7.2 / 27.5	4.8 / 18.5	4.71 / 13.5	4.86 / 12.5	4.87	4.91 / 12.5	4.60 / 12.5	4.6 / 18	7.2 / 23.5	7.0 / 28.5	4.74 / 32	4.1 / 35	3.6 / 43
4.5 / 43	4.9 / 32	5.2 / 29	7.6 / 27	7.4 / 23	5.1 / 18.5	5.20 / 13.5	5.10	5.17 / 13.5	4.9 / 18.5	7.4 / 23.5	7.5 / 28.5	6.0 / 31	5.6 / 33	5.5 / 43
93+19 Typ. Rdg. 243+50														
4.0 / 33	3.8 / 36.5	4.4 / 33	7.6 / 29.5	7.5 / 23	5.1 / 18.5	5.11 / 13.5	5.01	5.07 / 13.5	5.2 / 18.5	7.7 / 23	7.8 / 28	5.0 / 31.5	4.3 / 35	4.9 / 43
				P.				P.						
3.1 / 48	3.1 / 38	3.6 / 35	7.6 / 30	7.4 / 23.5	5.5 / 18.5	5.57 / 13.5	5.42	5.51 / 13.5	5.5 / 18.5	7.7 / 23.5	7.6 / 29.5	7.7 / 35.5	7.2 / 39	7.4 / 43
3.3 / 43	3.7 / 40	3.6 / 35	7.7 / 30.5	7.4 / 23	5.9 / 18.5	5.80 / 13.5	5.72	5.81 / 13.5	5.6 / 19	7.6 / 23	7.9 / 29	7.6 / 38	7.1 / 40.5	7.3 / 43
4.5 / 43	4.7 / 37	5.4 / 33	8.0 / 29.5	8.0 / 22	6.2 / 18	6.18 / 13.5	6.11	6.15 / 13.5	6.1 / 19	8.1 / 24	8.1 / 30	7.9 / 35	3.17 / 38	7.9 / 43
6.2 / 49	8.1 / 41	7.6 / 31	6.7 / 26	6.5 / 19.5	6.37 / 13.5	6.54	6.62 / 13.5	6.5 / 22		7.9 / 25	5.0 / 29	7.8 / 31		7.5 / 43
			6.5 / 20		6.72 / 13.5	6.62	6.71 / 13.5	6.6 / 21					6.6 / 43	
931.73 / 931.76 correct – R.R. Spike in T.P. 100' Rt. Sta. 240+94														
	2.0 / 43		2.0 / 32	2.1 / 19	3.35 / 13.5	2.28	2.34 / 13.5	2.3 / 18.5	2.1 / 30			1.7 / 43		
(240+57 = 0.0 Ditch 4 Rt)														
3.4 / 43	3.0 / 34.5	3.2 / 31.5	3.0 / 29	2.7 / 23	2.28 / 19.5	2.79 / 13.5	2.65	2.74 / 13.5	2.8 / 18.5	3.4 / 23	3.4 / 29	3.9 / 31		4.0 / 43
4.0 / 43	3.4 / 36.5	3.6 / 32.5	4.2 / 28	3.8 / 23.5	3.7 / 18.5	3.61 / 13.5	3.58	3.64 / 13.5	3.6 / 18.5	4.1 / 23	4.0 / 29	3.7 / 31.5	3.4 / 34.5	4.2 / 43
4.8 / 43	4.0 / 36	4.2 / 32	4.6 / 28.5	4.3 / 23.5	4.04 / 18	4.00 / 13.5	3.92	3.98 / 13.5	3.9 / 18.5	4.3 / 23.5	4.5 / 29.5	3.6 / 33.5	3.4 / 36	3.4 / 43

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		932.49 ✓			
239+50				27.4	5.09
239+00				26.4	6.09
+50				25.5	6.99
238				24.9	7.59
+50				24.7	7.79
237				24.9	7.59
+50				25.5	6.99
236				26.5	5.99
+50				27.8	4.69
T.P.	8.68	937.83 ✓	3.34		
+25				28.5	9.33
235				29.2	8.63
334+70				30.0	7.83

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

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Left				C.	P.	C L	P	C.	Right				
7.1	6.9 7.2 8.0 7.8	4.4	4.38	4.56	4.49		4.57	4.76	4.2	7.7	7.7	6.2	6.5
43	36 32 30 24	18	13.5	12.5			12.5	12.5	18	24	29	32	43
(2.39+3.5=0.0 Ditch Lt.)							(7.39+3.5=0.0 Ditch Rt.)						
11.7	11.5	9.5	5.5	5.38	5.63	5.48	5.57	5.27	5.2	8.9	12.1		12.3
43	34	27	12.5	13.5	12.5		12.5	13.5	13.5	27	33		43
12.4	12.5	6.5	6.24	6.50	6.39		6.51	6.27	6.2		13.60		14.0
43	33	18	13.5	12.5			12.5	13.5	18.5		31.5		43
11.8	12.0	6.7	6.79	7.07	7.00		7.08	6.82	6.7		10.4		10.6
43	32	18.5	13.5	12.5			12.5	13.5	18.5		30		43
11.2	11.4	6.9	7.08	7.32	7.22		7.30	7.03	7.1		9.2		10.2
43	34	18.5	13.5	12.5			12.5	13.5	18.5		28		43
12.8	13.1	6.7	6.83	7.13	7.03		7.12	6.82	6.6		10.7		10.7
43	35	18.5	13.5	12.5			12.5	13.5	18.5		30		43
14.6	10.4	6.3	6.22	6.57	6.44		6.52	6.24	6.1		10.0		9.8
43	26	18	13.5	12.5			12.5	13.5	19		31		43
12.4	13.3	5.4	5.21	5.48	5.42		5.54	5.23	5.1		7.7		8.7
43	37	18.5	13.5	12.5			12.5	13.5	18.5		30		43
								(6.35+6.0=0.0 Ditch Rt.)					
11.5	11.4	4.0	3.87	4.20	4.06		4.13	3.82	3.8	6.1	4.6	6.2	5.5
43	36	18	13.5	12.5			12.5	13.5	13.5	24	28	30	43
9.29.15													
13.9	13.1	8.7	8.52	8.83	8.68		8.77	7.96	8.4	10.7	10.5	7.6	6.7
43	31	18	13.5	12.5			12.5	13.5	18	24	28	33	43
(3.35+1.8=0.0 Ditch Lt.)							P.	C.					
10.9	8.5	10.3	7.9	7.84	8.18	8.08	8.22	7.92	7.3	9.8	9.8	9.5	2.8	2.6
43	31	28	24	18	12.5	12.5	12.5	13.5	18.5	23	29	38	41	43
				R			P.							
11.0	4.5	4.5	9.5	9.7	7.2	7.28	7.16	7.23	7.0	9.1	9.1	2.7	2.1	2.0
43	40	35.5	28	24.5	18.5	12.5		13.5	13.5	23	29	32.5	41.5	43

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		937.83			
234+50				30.6	7.23
234				32.0	5.83
+70				32.7	5.13
+50				33.3	4.53
T.P	7.36	942.30	2.89		
233				343	8.00
+65				348	7.50
+30				35.3	7.00
232				35.6	6.70
+70				35.8	6.50
+40				36.1	6.20
231				36.4	5.90
B.M.	7.01	944.36	5.95		
230+50				36.8	6.56

Inst. W.H.C.
Rod. A.L.B.
Chain. R.R.

NOV. 10, 1926

Left							G L		Right						
3.2	3.0	3.5	9.2	9.3	8.9	6.71	6.64	6.74	9.9	8.1	8.5	3.8	3.2	×	3.3
43	40.5	36	27.5	24	18.5	13.5		13.5	18.5	23	29.5	36	29		43
4.6	4.5	4.9	7.6	7.8	5.3	5.91	5.24	5.30	5.2	7.6	7.7	6.5	6.0	×	6.0
43	35.5	32	28	23	18	13.5		13.5	19	24	28.5	30.5	33		43
5.3	5.8	5.7	7.1	7.0	4.5	4.56	4.48	4.58	4.4	6.2	6.8		6.1		6.4
43	32	29.5	28.42	18.5	13.5			13.5	19	23	29		32	×	43
9.4	9.2	4.5	6.7	6.6	9.0	4.04	3.96	4.02	3.9	6.9	6.5	5.0	4.6		4.7
43	5.2	3.1	2.9	2.3	1.8.5	13.5		13.5	18.5	23	28	31.5	34.5	×	43
9 3 4.94															
3.0	3.0	3.4	9.6	9.5	7.3	7.46	7.36	7.44	7.2	9.2	8.9	4.5	4.0		4.0
43	41.5	38	28	23	18.5	13.5		13.5	18.5	23	28	36	39.5	×	43
4.2	3.7	4.0	9.2	9.2	6.8	6.91	6.22	6.98	6.7	8.4	8.9	6.9	40.2		9 4 2.83
43	4.0	2.5	2.8	2.2	18.5	13.5		13.5	18.5	22	28.5	41.5			43
8.9	8.2	9.4	9.1	6.5	6.50	6.40	6.50	6.3	8.4	8.6			21.8	29	
43	29.5	28	23.5	18.5	13.5		13.5	18.5	22	28			37.8		43
12.9	13.2	10.3	6.1	6.16	6.06	6.15	6.1	8.2	8.0	6.9	5.3				4.7
43	5.4	2.7	18.5	13.5		13.5	19	23	29	32	35.5	×			43
(231+95=0.00 Ditch Lt.)															
12.2	11.5	6.0	5.96	5.87	5.96	5.9	8.0	8.3	6.9						6.6
43	28	18.5	13.5		13.5	18.5	23	31	33	×					43
(231+50= 0.0 Ditch Lt.)															
9.9	9.6	10.2	9.8	5.7	5.71	5.64	5.5	5.6	8.0	8.0	6.7				6.5
43	3.5	2.2	2.8	18	13.5		13.5	19	23	31	33	×			43
7.0	6.7	8.0	7.9	5.2	5.90	5.29	5.36	5.1	6.9	6.8	5.0				4.7
43	2.5	29.5	25	18	13.5		13.5	19	23.5	31	34	×			43
936.35															
R.R. Spike in Stump 40' Lt. 230+85															
7.7	7.7	8.7	8.3	6.1	6.09	5.98	6.07	6.0	7.1	7.7	6.2				6.4
43	3.2	3.0	2.4	19	13.5		19.5	19.5	23	32	34	×			43

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		943.36			
230+00				37.2	6.16
+50				37.6	5.76
229				37.9	5.46
+50				38.1	5.26
228				38.2	5.16
+60				38.3	5.06
+50				38.3	5.06
227				38.4	4.96
T.P.	4.56	943.73	4.19		
+50				38.5	5.23
226				38.6	5.13
+50				38.6	5.13
225				38.6	5.13

Inst. W. H. S.
Rod. R.L.P.
Chain. R.P.

NOV. 12, 1926

Left | C L | Right

7.1		7.1	7.1	7.4	5.7	5.69	5.61	5.69	5.5	7.1	7.0	5.7	5.9		
4.3	x	3.3	3.1	3.5	1.8	1.35		1.35	1.9	2.3	3.15	3.4	4.3		
6.6		6.2	7.0	7.0	5.2	5.29	5.20	5.30	5.0	6.6	6.2	3.9		3.9	
4.3	x	3.3	3.1	2.45	1.9	1.35		1.35	1.85	2.3	3.25	3.50	x	4.3	
7.9		6.5	7.0	6.8	4.3	4.95	4.87	5.00	5.0	6.6	6.0	3.4	2.8	2.7	
4.3	x	3.25	3.1	2.35	1.9	1.35		1.35	1.85	2.4	3.1	3.4	3.9	x 4.3	
4.7	4.5	5.0	6.8	6.8	4.7	4.80	4.70	4.78	4.7	6.4	6.5	4.6	3.8	x 3.7	
4.3	2.45	3.25	3.0	2.35	1.85	1.35		1.35	1.85	2.15	2.95	3.1	3.6	4.3	
3.6	3.7	4.1	4.4	6.3	4.4	4.57	4.56	4.69	4.6	6.3	6.7	4.6	4.2	4.0	
4.3	3.6	3.3	2.95	2.35	1.85	1.35		1.35	1.85	2.2	2.95	3.2	3.45	4.3	
6.3	6.2	7.3	7.1	4.4	4.54		4.44	4.58	4.4	5.9	5.8	5.1	x	4.8	
4.3	x 3.2	3.05	2.35	1.9	1.35			1.35	1.85	2.2	2.95	3.1		4.3	
(4+74.50 = 0.0 Ditch Lt.)															
2.5		2.4	7.6	4.7	4.55		4.45	4.61	4.5	6.2	6.1	5.9	x	5.2	
4.3		3.05	2.5	1.9	1.35			1.35	1.85	2.2	2.9	3.2		4.3	
(2+27+40 = 0.0 Ditch Rt.)															
7.7			7.9	4.3	4.36		4.20	4.44	4.3	6.2	7.4	7.3		7.3	
4.3		x	2.9	1.8	1.35			1.35	1.85	2.4	2.9	3.5		4.3	
5.39.17															
9.2			8.9	4.5	4.65		11.56	4.64	4.5	8.0	x			7.8	
4.3		x	3.7	1.85	1.35			1.35	1.9	3.1				4.3	
(7+264+0 = 0.0 Ditch Rt.)															
8.0		x	8.0	4.5	4.58		4.50	4.63	4.5	7.1	7.0	6.6	x	6.2	
4.3			3.1	1.85	1.35			1.35	1.85	2.75	3.15	3.4		4.2	
7.9		x	8.0	4.6	4.59		4.48	4.57	4.5	7.0	7.5	6.1	x	5.7	
4.3			3.0	1.85	1.35			1.35	1.85	2.75	3.1	3.2		4.3	
(2+75+20 = 0.0 Ditch Lt.)															
(3+257+30 = 0.0 Ditch Rt.)															
5.1	6.1	7.6	7.4	4.6	4.57		4.45	4.57	4.4	6.7	x			6.4	
4.3	x 3.1	2.8	2.45	1.85	1.35			1.35	1.85	2.3				4.3	

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		943.73			
224+50				38.6	5.13
224				38.5	5.23
+50				38.4	5.33
223				38.2	5.53
+50				38.1	5.63
222				37.9	5.83
+50				37.8	5.93
221				37.6	6.13
+50				37.5	6.23
220				37.4	6.33
T.P	9.10	947.19	5.64		
+75				37.5	9.69
219+50				37.6	9.59

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

NOV. 12, 1926 23

Left Pav. C L Pav. Right (224+30 = 0.0 Ditch Rt.)

1.3/43 x 1.4/38 2.0/34 7.1/27 7.1/23 4.9/18.5 4.65/13.5 4.56 4.63/13.5 4.5/18 6.5/22 6.5/29 4.0/33 3.6/38 x 3.8/43

7.1/43 x 1.7/39 7.1/36 6.7/28 6.8/23.5 4.6/18.5 4.73/13.5 4.68 4.76/13.5 4.7/18 6.6/23 6.8/28.5 1.6/36 0.7/41 x 1.0/43

5.6/43 1.0/36 5.8/33.5 7.4/29 7.1/23.5 5.0/19 4.85/13.5 4.79 4.88/13.5 4.8/18 7.0/22.5 7.0/29 7.0/36 1.5/39.5 x 1.3/43

4.5/43 x 5.9/33 7.4/30 7.1/22.5 4.9/18.5 5.01/13.5 4.93 5.02/13.5 5.0/18.5 6.8/22 7.0/28 3.6/35 2.8/36 x 2.1/43

7.8/43 x 7.6/34 8.2/32 8.0/24 5.1/18.5 5.17/13.5 5.06 5.16/13.5 5.1/18.5 6.6/23 6.6/30 4.9/32.5 x 4.9/43

(222+15 = 0.0 Ditch Lt.)

9.5/43 x 9.3/30 5.2/18.5 5.35/13.5 5.26 5.35/13.5 5.3/18 7.3/24 7.2/31 6.6/32 x 6.6/43

221+90 = 0.0 Ditch Rt

11.2/43 x 10.9/33 5.3/18.5 5.42/13.5 5.35 5.43/13.5 5.5/18 8.9/30 x 9.0/43

10.2/43 x 10.3/33 5.4/19 5.56/13.5 5.47 5.55/13.5 5.5/18.5 10.7/31.5 x 10.8/43

9.3/43 8.5/30 5.5/19.5 5.7/13.5 5.62 5.74/13.5 5.8/19 10.5/34 x 10.7/43

(220+10 = 0.0 Ditch Lt.)

7.5/43 x 7.1/30 8.6/28 8.6/22.5 6.1/18.5 SA/13.5 5.74/12.5 5.63 5.72/13.5 5.6/19 8.5/28 x 8.3/43

938.09 ✓

Curb Pav. Pav. (219+90 0.0 Ditch Rt.)

9.8/43 8.6/34 9.9/31 12.1/28 12.1/23 8.1/18 8.90/13.5 9.19/12.5 9.10 9.18/13.5 9.0/18.5 10.9/21 11.0/28 10.2/30 x 1.04/43

8.0/43 x 8.0/26.5 8.5/30.5 12.0/28 12.0/23 8.8/18 8.83/13.5 9.10/12.5 9.00 9.06/13.5 9.0/18.5 10.5/22.5 10.5/28.5 8.7/32 8.5/35 x 8.4/43

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		947.19			
219+00				37.9	9.79
+50				38.5	8.69
218				39.3	7.89
+60				40.1	7.09
+25.8				40.9	6.29
217				41.4	5.79
+50				42.5	4.69
+31				42.9	4.29
216				43.6	3.59
+50				44.7	2.49
T.P.	1.67	954.10	0.76		
215				45.8	8.30
214+50				46.9	7.20

Inst. W.H.C.
Rod. D.L.B.
Chain. A.R.

NOV. 12, 1926

24

Left						Cub Pav.	C L	Pav.	Right						
6.0	5.8	6.6	10.7	10.9	8.4	8.45	8.72	8.45	8.70	8.6	10.7	10.7	6.3	5.6	5.0
43	38	34	27	23	18	13.5	13.5		13.5	18.5	22.5	29	36	39	43
4.5	4.6	5.1	10.1	8.6	7.8	7.95	8.12	8.04	8.13	7.7	7.5	9.5	6.3	5.2	5.7
43	39	35	27	21.5	18.5	13.5	13.5		13.5	19	23	29	35	38	43
7.0	6.8	7.3	9.0	9.2	7.0	7.14	7.40	7.30	7.36	7.2	8.9	9.2	6.7	6.3	5.8
43	36	32	27	22	18	13.5	13.5		13.5	18.5	23	30	38.5	36	43

(2.17 + 7.0 = 0.0 Diff. 6.7.)

C. P.

7.5	9.3	6.4	6.30	6.58	6.52	6.57	6.5	7.1	8.0	6.9	5.9
43	20.5	14	14.2	13.0		13.5	19	23	30	32.5	43
10.2	10.8	5.4	5.81	5.85	5.77	5.80	5.8	7.2	7.5	5.6	5.3	4.7
43	35	20.5	15.4	14.4		13.5	19.5	23	29.5	32	34	43

P.

11.2	10.8	4.8	5.01	5.28	5.19	5.21	5.2	7.0	6.8	5.0	4.7	4.3
43	36	21.5	16.3	15.4		15.0	20	24.5	31	33	35	43

R

11.4	11.3	4.3	4.06	4.31	4.21	4.03	4.0	5.1	5.2	2.6
43	40	23.5	17.2	16.0		24.6	29.5	33	37	43

P.

11.6	11.5	4.1	3.71	4.00	3.95	3.55	3.3	4.6	4.0	3.2
43	41.5	24	17.2	16.0		34.1	36.5	40	45	48
11.7	11.0	3.3	3.16	3.42	3.16	3.01	3.1	3.7	4.3	4.8	5.3
43	41.5	23	17.2	16.0		13.5	32	45	43	45	46

(2.15 + 9.0 = 0.0 Diff. 6.8)

	11.5	3.3	2.34	2.57	1.98	1.46	1.4	5.6	5.7
	42	22	17.2	16.0		13.5	19.0	31	43

(2.15 + 1.5 = 0.0 Diff. 6.7)

9.46 43

	17.7	8.2	8.14	8.35	7.67	7.23	7.1	9.9	9.3	7.8
	42.5	20.5	17.2	16.2		13.5	18.5	24.5	37	41
15.5	14.4	7.0	6.94	7.16	6.64	6.25	5.8	7.7	7.6	3.1
43	38	21.5	17.2	16.2		13.5	19	22	28	33

Final Cross Sections

Sta.	B. S.	H. I. 954.10	F. S.	Grade	Gr. R.
214+14				47.2	6.90
214				47.6	6.50
+88				48.3	5.80
+78				48.4	5.70
+50				48.97	5.13
213				49.43	4.67
+76.6				49.46	4.64
212+66.6				49.48	4.62
212+40					
B.M.			1.78		

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

Nov. 12, 1926

25

			Left				C L			Right	
11.8 / 43	×	10.2 / 31	6.2 / 22	5.77 / 17.2	6.07 / 16.2		5.89		5.64 / 13.5	5.70 / 27.0	
10.0 / 43	×	8.8 / 27.5	5.5 / 21	5.64 / 17.2	5.90 / 16.2		5.58		5.25 / 13.5	5.37 / 14.2	
(21400=O.O. Ditch H.)											
80 / 43	×	70 / 34.5	84 / 32.5	82 / 28	5.3 / 22.	5.35 / 17.2	5.61 / 16.2		5.21	5.15 / 8	
					C.	P.					
6.4 / 43	×	5.9 / 37	8.0 / 33	7.4 / 26	5.0 / 22	5.10 / 17.2	5.34 / 16.2		5.00	4.97 / 4.2	
					C.	P.					
4.4 / 43	×	4.1 / 40	7.4 / 33	7.1 / 27	4.2 / 21.5	4.50 / 17.2	4.77 / 16.2	4.57 / 11.5	4.50		
(21+10=Ditch) 4.4.											
					C.	P.					
7.2 / 43	×		5.7 / 20	4.1 / 20.5	3.94 / 15.3	4.20 / 14.3	4.18 / 12.6		4.07		
					C.	P.					
7.5 / 43	×		7.1 / 20	4.0 / 19.5	3.80 / 14.7	4.11 / 13.5			4.01		
					C.	P.					
7.17 / 43	×	6.7 / 32	4.9 / 24	3.9 / 18.7	3.85 / 14.5	4.09 / 13.5			4.00		

Samoa Cr'k

Note:- Dotted line indicates West edge of Lex. Ave. Pavement.

9527.32 R.R. Spike 30" oak 65' Rt. Sta. 213+40

Notes For Staking Pavement

Station	+	H.I	−	Top ℄ Pave Grade	
B.M.	3.42	942.70			939.28
255+19.5				931.89	
255+00				32.17	
+75				33.12	
+69.5					
+50				34.20	
+25				35.11	
254+00				35.93	
+75				36.69	
+50				37.35	
+25				37.95	
253+00				38.47	
+75				38.91	
+50				39.27	
+25				39.60	
252+00				39.92	
+75				40.25	
+50				40.57	
+25				40.88	
251+00				41.12	
250+75				41.33	

Lt.				℄			Rt.		
Remarks	Width	Gr. Rod	+ or −	Gr. Rod.	+ or −	Gr. Rod	Width	Remarks
							W.H.C. A.C.A. R.B. W.H. Oct 8, 1926	
	13.5	11.53	-0.12	11.41	-0.12	11.53	15.3	P.C.
	✓	10.65	-0.12	10.53	✓	10.65	14.0	
	✓	9.70	-0.12	9.58	✓	9.70	13.6	
							15.5	B.W.T.
	✓	8.62	✓	8.50	✓	8.62	13.5	
	✓	7.71	✓	7.59	✓	7.71	✓	
	✓	6.89	✓	6.77	✓	6.89	✓	
	-	6.13	✓	6.01	✓	6.13	✓	
	✓	5.47	✓	5.35	✓	5.47	✓	
	✓	4.87	✓	4.75	✓	4.87	✓	
	✓	4.35	✓	4.23	✓	4.35	✓	
	✓	3.91	✓	3.79	✓	3.91	✓	
	✓	3.55	✓	3.43	✓	3.55	✓	
	✓	3.22	✓	3.10	✓	3.22	✓	
	✓	2.90	✓	2.78	✓	2.90	✓	
	✓	2.57	✓	2.45	✓	2.57	✓	
	✓	2.25	✓	2.13	✓	2.25	✓	
	✓	1.94	✓	1.82	✓	1.94	✓	
	✓	1.70	✓	1.58	✓	1.70	✓	
	13.5	1.49	-0.12	1.37	-0.12	1.49	13.5	

Station	+	H.I	—	Top ℄ Pave Grade	
		942.70			
250+50				941.48	
+25				41.59	
250+00				41.64	
+25				41.66	
249+50				41.62	
B.M.	6.25	945.53	3.42		939.28
249+25				41.52	
249+00				41.38	
+75				41.20	
+50				40.96	
+25				40.68	
248+00				40.34	
+75				39.96	
+50				39.53	
+25				39.05	
247+00				38.52	
+75				37.95	
+50				37.32	
+25				36.69	
246+00				36.11	
T.P.	0.70	936.69	9.54		935.99
+75				35.58	
245 +50				35.04	

Lt.				Ø		Rt.		
Remarks	Width	Gr. Rad	+ or −	Gr. Rad.	+ or −	Gr. Rd.	Width	Remarks
	13.5	1.34	-0.12	1.22	-0.12	1.34	13.5	
	✓	1.23	✓	1.11	✓	1.23	✓	
	✓	1.18	✓	1.06	✓	1.18	✓	
	✓	1.16	✓	1.04	✓	1.16	✓	
	13.5	1.20	-0.12	1.08	-0.12	1.20	13.5	
	13.5	4.13	-0.12	4.01	-0.12	4.13	13.5	
	✓	4.27	✓	4.15	✓	4.27	✓	
	✓	4.45	✓	4.33	✓	4.45	✓	
	✓	4.69	✓	4.57	✓	4.69	✓	
	✓	4.97	✓	4.85	✓	4.97	✓	
	✓	5.31	✓	5.19	✓	5.31	✓	
				5.57	✓	5.69	✓	
				6.00	✓	6.12	✓	
				6.48		6.60		
				7.01		7.13		
				7.58		7.70		
				8.21		8.33		
				8.84		8.96		
				9.42	-0.12	9.54	13.5	
Top Blue Top on Rt.								
				1.11	-0.12	1.23	13.5	
				1.60	✓	1.72	✓	

Station	+	H.I	−	Top ℄ Pave Grade
		936.69		
245+75				34.64
245+00				34.25
+75				33.89
+50				33.59
+25				33.33
244+00				33.11
+75				32.94
+50				32.82
+25				32.71
243+00				32.57
T.P.	3.65	93561	473	
+75				32.41
+50				32.22
+25				32.01
242+00				31.77
+75				31.51
+50				31.22
+25				30.91
241				30.57
+75				30.21
+50				29.82
240 +25				29.41

		Lt.			Lt.		Rt.	
	Width G.R.	+or −	Gr. Rad	+or −	G. R	Width		
			~~2.05~~	~~-0.12~~	~~2.17~~	~~13.5~~		
			2.05	-0.12	2.17			
			2.44	"	2.56			
			2.80		2.92			
			3.10		3.22			
			3.36		3.48			
			3.58		3.70			
			3.75		3.87			
			3.87		3.99			
			3.98		4.10			
			4.12	-0.12	4.24	13.5		
73+96	Top Hub 30' Rt.		Sta. 243+00					
			3.20	-0.12	3.32	13.5		
			3.39		3.51			
			3.60		3.72			
			3.84		3.96			
			4.10		4.22			
			4.39		4.51			
			4.70		4.82			
			5.04		5.16			
			5.40		5.52			
			5.79		5.91			
			6.20		6.32			

	+	H.I.		Top ℄ Pav. Grade
B.M.	0.65	932.41		
240+00				928.97
239+75				28.51
+50				28.02
+25				27.52
239				27.02
+75				26.52
+50				26.07
+25				25.72
238				25.47
+75				25.32
+50				25.27
+25				25.32
237+00				25.47
+75				25.72
+50				26.07
+25				26.52
236+00				27.07
T.P.	12.13	938.52	6.02	
+75				27.72
+50				28.42
+25				29.12
235				29.82
234+75				30.52

		Lt.				Rt.		
31.76	Width	G.R	+or−	Gr. Rod	+or−	G.R	Width	
	13.5	3.56	-0.12	3.44	-0.12	3.56	13.5	
				3.90		4.02		
				4.39		4.51		
				4.89		5.01		
				5.39		5.51		
				5.89		6.01		
				6.34		6.46		
				6.69		6.81		
				6.94		7.06		
				7.09		7.21		
35.6 1 2.1 3 144				7.14		7.26		
				7.09		7.21		Low Point in Rd. V.
32 4 6.1 6				6.94		7.06		
				6.69		6.81		
				6.34		6.46		
				5.89		6.01		
				5.34		5.46		
926.39								
				10.80		10.92		
				10.10		10.22		
				9.40		9.52		
				8.70		8.82		
				8.00		8.12		

Station	+	H.I		Top ℄ Pav. Grade	
		938.52			
234+50				931.22	
+25				31.92	
234				32.62	
+75				33.27	
+50				33.89	
+25				34.42	
233				34.92	
+75				35.34	
+50				35.69	
+25				35.99	
232				36.22	
+75				36.42	
+50				36.62	
+25				36.82	
231				37.02	
+75				37.22	
+50				37.42	
+25				37.62	
230+00				37.82	
B.M.	6.82	943.15	2.19		936.33
+75				38.01	
+50				38.16	
+25				38.34	

				G.P.L.	+or−	G.R	Width
13.5	7.30	-0.12		7.30	+0.12	7.42	13.5
				6.60	✓	6.72	
				5.40	✓	6.52	
				5.25	✓	5.37	
				4.63	✓	4.75	
				4.10	✓	4.22	
				3.60	✓	3.72	
				3.18	✓	3.30	
				2.83	✓	2.95	
				2.53	✓	2.65	
				2.30	✓	2.42	
				2.10	✓	2.22	
				1.90	✓	2.02	
				1.70	✓	1.82	
				1.50	✓	1.62	
				1.30	✓	1.42	
				1.10	✓	1.22	
				0.90	✓	1.02	
				0.70	✓	0.82	
Spike in Stump 40' LT - 7304.85							
				5.14	✓	5.26	
				4.99	✓	5.11	
				4.81	-0.12	4.95	

Sta.	+	H.I.		Top ℄ Prev. Grade	
		943.18			
229+00				938.47	
+75				38.59	
+50				38.66	
+25				38.76	
228				38.82	
+75				38.87	
+50				38.92	
+25				38.97	
227				39.02	
+75				39.07	
+50				39.12	
+25				39.16	
226				39.20	
+75				39.22	
+50				39.24	
+25				39.24	
225				39.23	
T.P.	3.61	942.73	403		939.12
+75				39.22	
+50				39.19	
+25				39.15	
224				39.10	
223 + 75				39.04	

Gr. Rod.	+or−	G.R.	Width
4.68	-0.12	4.80	
4.56	✓	4.68	
4.49		4.61	
4.39		4.51	
4.33		4.45	
4.28		4.40	
4.23		4.35	
4.18		4.30	
4.13		4.25	
4.08		4.20	
4.03		4.15	
3.99		4.11	
3.95		4.07	
3.93		4.05	
3.91		4.03	
3.91		4.03	
3.92		4.02	
3.57		3.63	
3.54		3.66	
3.58		3.70	
3.63		3.75	
3.69		3.81	

Station	+	H.I.		Top ℄ Pavement Grade	
		942.73			
223+50				938.97	
+25				38.90	
223				38.82	
+75				38.75	
+50				38.67	
+25				38.60	
222				38.52	
+75				38.45	
+50				38.37	
+25				38.30	
221				38.22	
+75				38.15	
+50				38.07	
+25				38.03	
220				37.97	
T.P.	7.44	945.34	4.83		937.90
+75				38.08	
+50				38.19	
+25				38.35	
219				38.56	
+75				38.82	
+50				39.14	
+25				39.50	

				E.R.	±	A.R	WIDTH
				3.76	-0.12	3.88	
				3.83		3.95	
				3.91		4.02	
				3.98		4.10	
				4.06		4.18	
				4.13		4.25	
				4.21		4.33	
				4.28		4.40	
				4.36		4.48	
				4.43		4.55	
				4.51		4.63	
				4.58		4.70	
				4.66		4.78	
				4.70		4.82	
				4.71		4.83	
13.5	7.38	-0.12		7.26	-0.12	7.38	13.5
✓	7.27	✓		7.15	✓	7.27	✓
✓	7.11	✓		6.99	✓	7.11	✓
✓	6.90	✓		6.78	✓	6.90	✓
✓	6.64	✓		6.52	✓	6.64	✓
✓	6.32	✓		6.20	✓	6.32	✓
13.5	5.96	✓		5.84	-0.12	5.96	13.5

Station	+	H.I.		Top ℄ Pav. Erode	
		945.34			
218+00				939.92	
217+75.8					
+75				40.40	
+50				40.92	
217+25.8				41.47	
T.P.	10.21	953.43	2.12		943.22
217+00				42.02	
216+75				42.57	
216+50				43.12	
216+25				43.67	
216+00.9				44.22	
216+00				44.22	
215+75				44.77	
215+50				45.32	
215+25				45.87	
215				46.42	
+75				46.97	
+50				47.52	
+25				48.07	
214				48.62	
+75					
+50					
+25					
213					

	Width	L. ±	± S	Q.R.	+/−	R. R.	Width
				L		RT	
	13.5	5.41	-0.12	5.42	-0.12	5.54	13.5
B.W.T.							
	13.5	5.06	✓	4.94	-0.12	5.06	✓
	14.5	4.54	✓	4.42	✓	4.54	✓
P.T.	15.5	3.99	✓	3.87	✓	3.99	13.5
	Top of RW 43' RT Ckl. 717 + 25.8						
	16.8	11.54	-0.13	11.41	-0.12	11.53	14.7
	17.2	11.01	-0.15	10.86	-0.12	10.99	18.9
	17.2	10.55	10.43 -0.12	10.31	-0.12	10.43	24.2
	17.2	10.16	9.88 -0.12	9.76	-0.12	9.88	33.2
	17.2		9.33 -0.12	9.21	-0.12	9.33	16413.8=3.24 Wide
							16403.7=13.5 = Wide
	✓	9.71	-0.50	9.21	-0.12	9.13	13.5
	✓	9.26	-0.60	8.66	+0.30	8.36	
	✓	8.91	-0.80	8.11	+0.40	7.71	
	✓	8.36	-0.80	7.56	+0.40	7.16	
	✓	7.81	-0.80	7.01	+0.40	6.61	
	✓	7.26	-0.80	6.46	+0.40	6.06	
	✓	6.41	-0.70	5.91	+0.30	5.61	
	✓	5.96	-0.60	5.36	+0.16	5.20	
	✓	5.31	-0.50	4.81	+0.09	4.72	13.5
	17.2	4.71	-0.40	4.31			3.4
	17.0	4.16	-0.30	3.86			
	16.0	3.85	-0.23	3.62			
	15.7	3.60	-0.17	3.43			

For Detail 5e P. 38

Sta.	+	H.I			
		953.43			
212+76.6					
212+66.6					
B.M.				1.12	952.31

P.C. 14.6 3.47 -0.10 3.36

3.45 -0.10 3.35

(R.R. Spike 30' Oak 65' Rt.)
213+46

℄ Conn.

℄ Eco Rte

164+13.8

216+38.8

135 135 135 +21.4

15.5

14.5

3.84

33.2

24.7 +25 +50

19.4 +75

14.7 +17

E

N

W

Staking Plan

135 15.5

13.5 14.5 +50

13.5 13.5

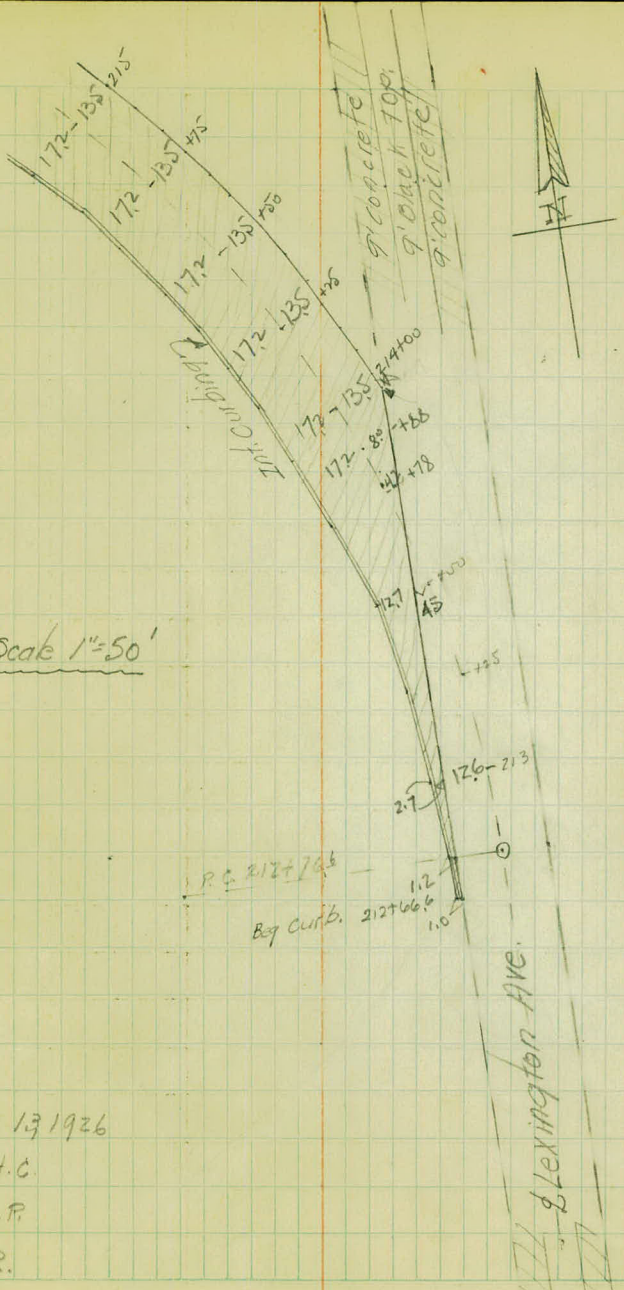
Rt 217+25.8

B.W.T. 217+75.8

Final Topography.

Final Topography.

Misc. Finals see pages 51, 52, 53.

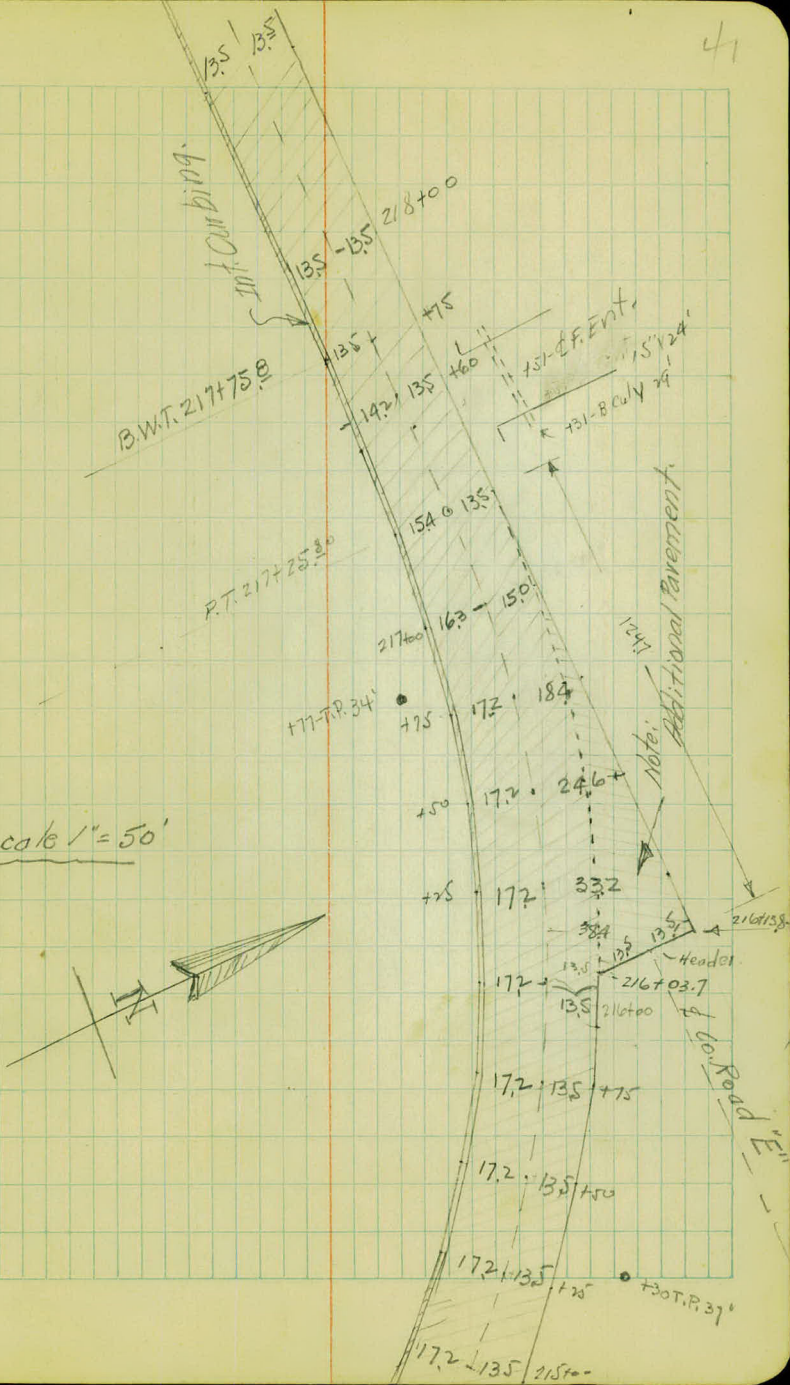


Nov. 13 1926

W.H.C.

A.L.P.

R.R.


Mt. Cumbing
B.W.T. 217+75.8
R.T. 217+25.8
218+00
217+00
216+03.8
216+03.7
216+00
215+00
+77 T.P. 34'
+30 T.P. 37'
Scale 1"=50'
Note: Additional Pavement
Road "E"
Headon
13.5
17.2
24.6+
33.2
38.4
18.4
15.0
16.3
14.3
15.4
12.4

223

222

221

+85 - E 18" x 56' P.3

220

219

218

135 135

+27-T.P.38

+93-T.P.38'

300 765

+49.5- E.Curbing.

+02.58.Curbing
+03-E.Spillway

+96.5-E.Curbing.

Scale 1" = 100'

+60-T.P.38'

Curbing.

+03-T.P.38'

228

227

+58 ℄ 18" x 56' P.3

226

225

224

223

135 135

+60 - T.P. 39'
+57 - A Cor. 43

280 285

+24 - T.P. 38

+90 - T.P. 38'

+59 - T.P. 38'

233

232

231

+22- ± FEET 24

230

229

228

F. 43'

135 135

NOV. 12, 1926

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

+29-T.P. 38'

+35-T.P. 58'

15"x 24' C.M.
+10-B.Cu.M-31

+10-T.P. 38

F. 44'

Cut Five feet.

+25-T.P. 38'

238

237

236

235

234

767 F.Ent Rt.

233

F. 43'

+56 - T. P. 37'

+47 - B. Curbing.
+44 - ℄ Spillway
+35 - E. Curbing.

+34 + T. P. 37'

+06 - T. P. 37'

+74.8 Beg Curbing

+85 - T. P. 37'

135 135

curbing

Curbing.

+46 - B. curbing.
+39.5 ℄ Spillway.
+34 - E. curbing

+73.5 - Beg Curbing.

15"x24" C.M.
+84 - B. Culv. 39'

243

242

241

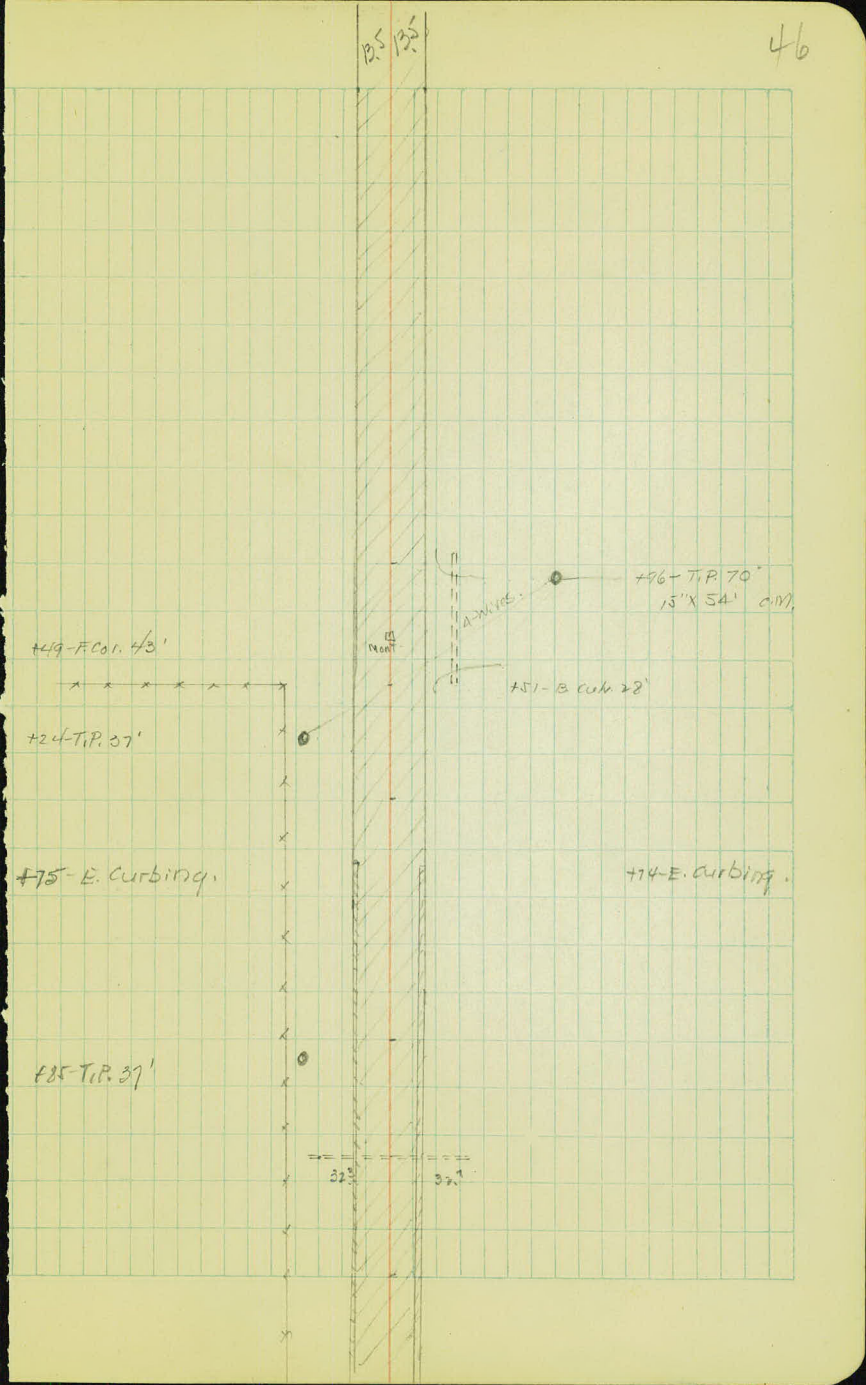
+74.1 ℄ Hamline Ave.

240

239

+50- ℄ 18"x 64' P.3

238


12.5'
13.5'
+49-F Col. 4/3'
FRONT
4-WIRE
+51-B Curb 28'
+96-T.P. 70'
15"X 54' C.M.
+24-T.P. 37'
+75-E. Curbing.
+74-E. curbing.
+85-T.P. 37'
32.3'
37.1'

248

247

+22- ℄ FENTH.

246

245

+73- ℄ 18"x 72' P3

244

243

135 135

+50-E. Curbing.

+50-B Curbing.

15"x24' C.M.
+10-B. Curv. 30'

Pasture.

Pasture.

37'

36

+88-B. curbing.
+00-℄ Spillway.

+95-E. Curbing

+83-B. curbing.
+75-℄ Spillway.
+70-E. Curbing.

+02.5-Beg Curbing.

+03.5-B. Curbing.

253

252

251

+42- E F. Ent Rt.

250

249

248

F-43'

120

138

Timber.

27' Dbe Course Concrete.

Cultivated.

152 24' C.M.

138-8 Cu.M. 80'

+99-F. Cor 43'

259

258

257

256

P.C.=+19.5 End of 1926 Pavement.

255

254

+22 - L.F.Ent Pt

253

W.H.C.

NOV. 5, 1926

R.R.

C.L.

F-42

F-43'

F-43'

(2" x 10" x 29' Fir Header)

F-44'

F-42'

13.5 15.36

14.0

13.5' + 6.95 = B.W.T.

Timber.

27' Vibe course concrete.

Timber.

139.0. F. 13

F-43'

15' x 27' C.M. + 10 = 0 Quiv. 37.5

Miscellaneous Finals

X-Drains, Side Drains, and F. Entrances.

Station	Descrip.	R.C. Culv. 18"	C.M. Culv. 15"	Lin. Ft. Curbing Left	Lin. Ft. Curbing Right.
253+22	F. Ent Rt		24'		
250+42	F. Ent Rt.		24'		
246+22	F. Ent Lt.		24'		
240+74	Culv. Rt. Hamline Rt.		54		
233+67	F. Ent. Rt.		24		
230+22	F. Ent. Lt.		24		
217+51	F. Ent Rt.		24		
244+73		72			
238+50		64			
226+58		56			
220+85		56			
Total		248	198		

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

Nov. 13, 1926

Embankment		Excavation.
1'x9'x22' = 7	cu.yds	
1'x9'x22' = 7	cu.yds	
2'x9'x22 = 14	cu.yds	
None		
1'x9'x22 = 7	cu yds	
1.5'x9'x22 = 10	cu.yds	
1'x9' x 22 = 7	Cu.yds	
52	Cu.yds	

Misc. Finals contd

Station	to Station	Lineal Feet curbing Lt	Rt.	
234+74.5	237+35.0	260.5		
234+73.5	237+34		259.0	
237+47.°	239+75.°	227.0		
237+46.°	239+74.°		228.5	
243+03.5	243+98.°		70.5	
243+02.5	243+70.°	67.0		
244+08.°	246+50.°		242.0	
243+83	246+50.°	266.0		
212+66.6	219+96.5	707.5		
220+08.5	220+49.5	41.0		
		1569.0	820.0	
Total Lineal feet curbing				2389

Headers

255+19.5	29'	
216+08	27'	
Lat+ Cord E.		
Bit Fill Jt.		135' Lin Ft.

W.H.C.

A.L.P.

R.R.

NOV. 13 1926

Misc. Final cont'd
Concrete Spillways.

737+39.5

737+41.0

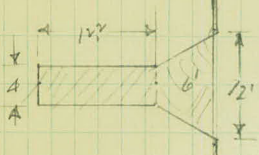
243+75

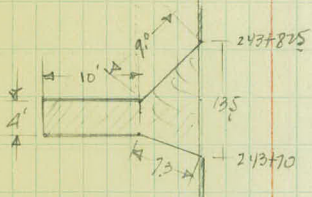
244+00

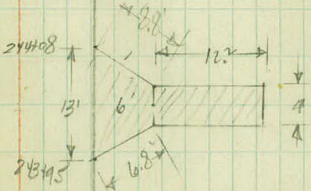
220+03

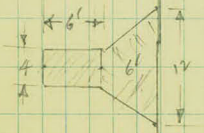
W.H.C.
A.L.P.
K.R.

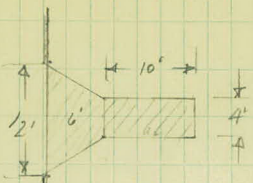
Lt. ℄ Rt. Nov. 13, 1926











Alignment for Borrow Pit

(Align same as Relocation of Co. Rd. "E.")

13+74.4 P.T.

1° C. Rt.

Δ 1°16'

Rt. 13+11.00

T. 63.3

L. 126.7

12+47.7 P.C.

0+00 Mont.

Aug 14, 1926

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

T.P. ○

52.55

42.60

T.P. ○

On Sec. Line
E. Co. Road E.

N

Mont Set in Pave.

℄ Lexington Ave.

℄ Anoka Cond.

P.T.

X-Sec. for Borrow Pit.

E. along Co. Road E. Beg. at Lexington Av.

Sta.	+	H.I	−	Elev.
B.M.	0.36	952.67		952.31
B.M.	4.40	951.81	5.26	947.41
0+00			5.50	46.31
0+20				46.2'
0+33				46.4'
0+66				46.8'
T.P.	8.18	955.52	4.46	947.34
1+00				47.2'
1+50				47.9'
2+00				48.7'
+30				48.7'
T.P.	6.56	955.29	6.80	948.73
+65				48.8'
3+00				48.7'
3+50				48.6'

H E RH 72

Aug-14-1926

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

Anoka Line

R.R. Spike 30" Oak 65' Rt. Sta. 213+40

16" Oak N.E. cor. Lex. & Co Rd E'

Top Mon & Lex. Av.

6.6 / 33	6.3 / 19	5.6	5.5 / 17	5.5 / 33							
6.9 / 33	6.2 / 19	5.7	5.6 / 20	6.3 / 25	6.0 / 29	4.5 / 30	4.3 / 33				
5.6 / 33	5.0 / 20	5.9 / 17	5.0	5.6 / 10	5.8 / 13	3.7 / 17		4.1 / 33			
6.3 / 33	6.1 / 23	8.0 / 20	9.2 / 17	8.6 / 13	8.3	8.8 / 10	9.1 / 14	7.8 / 17	2.7 / 25	3.0 / 33	
5.2 / 33	4.2 / 26	6.6 / 22	8.5 / 18	7.5 / 11	7.6	8.5 / 12	8.1 / 13	7.2 / 20	1.7 / 28	2.1 / 33	
8.5 / 33	7.9 / 24	8.6 / 21	8.1 / 17	7.1 / 10	6.8	7.3 / 7	8.0 / 10	8.5 / 15	7.9 / 22	3.9 / 30	3.4 / 33
10.0 / 33		9.5 / 23	7.5 / 17	6.8 / 11	6.8	7.5 / 8	8.6 / 12	8.4 / 19	7.1 / 25		6.4 / 33
12.6 / 33	11.6 / 25	8.2 / 20	7.3 / 17	6.6 / 10	6.5	7.1 / 6	8.6 / 10	8.9 / 12	6.3 / 18	6.8 / 28	5.9 / 33
12.8 / 33		10.9 / 23	7.6 / 19	6.7 / 12	6.6	6.9 / 5	7.6 / 8	7.8 / 11	6.4 / 12	5.4 / 28	4.2 / 33
9.7 / 33	8.9 / 26	7.1 / 19	6.6 / 13	6.7	7.4 / 6	9.0 / 12	7.6 / 16			1.9 / 33	

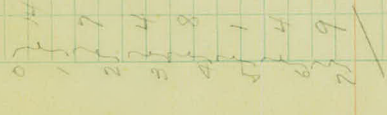
Sta.	+	H.I	−	Elev
		955.29		
4+00				48.2
+50				47.5
5+00				46.7
+50				45.6
6+00				44.7
T.P.	3.50	948.08 ✓	10.71	944.58 ✓
6+50				43.5
7+00				42.5
checking	6.41	953.77 ✓	0.72	947.36 ✓
			7.45	946.32

5.8	5.7	8.0	6.8	7.1	7.3	6.4	7.3	1.6	1.3
33	26	22	12		4	9	12	25	33
4.1	4.7	8.3	8.0	7.5	7.8	8.0	3.7	3.8	2.9
33	31	24	21	19		4	9	23	33
1.5	1.3	9.2	8.8	8.3	8.6	9.0	8.7	5.3	5.1	1.4
33	31	24	21	13		3	5	8	22	33
1.8		10.2	9.6	9.1	9.7		9.8	6.4	7.2	2.9
33		24	22	15			4	8	18	33
2.1	7.1	10.4	11.5	10.8	10.2	10.6	10.7	7.6	8.9	1.5
40	33	30	28	22	19		3	7	19	33
3.1	3.1	5.3	4.0	4.0	4.6	4.7	4.1	5.2	6.8
33	32	26	16	6		4	6	15	33
8.4	8.2	5.7	5.1	5.2	5.6	6.5	9.6	1.0.4
33	31	23	16	7		4	10	33

Top Mon X Lex.

For additional X Sec see Co. Road 15

Relocation Notes



Final X-Sec. of Borrow Pit

E. along Co Road E beg @ Lex. Ave.

Station	+	H.I.	−	Orig. & Elev.	Gr. Rod.
B.M.	139	953.70		946.31	
0+00					
0+20					
0+33					
0+66					
1+00					
1+50					
2+00					
+30					
+65					
3+00					
3+50					

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

Aug. 27, 1926 74

Top Σ Stone Morn.

7.39

7.5 (7.5)

8.6 33 | 8.1 17 | 7.4 17 | 7.4 33

8.8 33 | 7.5 14 | 7.3 (7.3) | 7.5 20 | 8.0 24 | 7.8 29 | 6.6 33

7.3 34 | 8.6 32 | 8.5 21 | 7.4 10 | 6.9 (6.9) | 7.2 7 | 7.9 19 | 8.1 29 | 6.0 33

4.5 33 | 7.7 30 | 7.7 20 | 6.6 11 | 6.4 (6.4) | 6.9 10 | 7.5 15 | 7.4 26 | 1.1 33

3.7 33 | 7.3 27 | 7.1 19 | 6.1 13 | 5.8 (5.8) | 6.0 8 | 7.3 15 | 6.8 24 | 0.2 33

6.9 33 | 6.1 15 | 5.4 10 | 5.1 (5.0) | 5.4 6 | 5.8 10 | 7.2 14 | 6.9 25 | 1.6 33

2+10= O.O. Cut LH

5.8 18 | 5.3 13 | 5.0 (5.0) | 5.3 6 | 5.8 8 | 6.9 12 | 6.7 27 | 4.4 31 | 4.6 33

No horizon here

5.6 17 | 5.2 10 | 5.0 (4.9) | 5.4 5 | 6.2 8 | 7.0 10 | 6.7 24 | 6.0 29 | 4.2 33

6.1 19 | 5.2 12 | 5.0 (5.0) | 5.3 5 | 5.9 8 | 6.6 10 | 6.6 24 | 5.8 28 | 2.5 33

5.4 19 | 5.0 13 | 5.2 (5.1) | 5.3 5 | 6.2 8 | X | 6.1 23 | | 0.7 33

Station	Final +	X-Sec. H.I	Borrow −	Pit (Cont'd) Original Elev.	Pit (Cont'd) Gr. Rod
		953.70 ✓			
4+00					
+50					
5+00					
+50					
6+00					
6+50					
7+00					
B.M.			7.39	46.31	

Lt ℄ Rt

5+95 = 0.0, Cut Lt.

4.2 / 36	6.8 / 32	6.5 / 22	5.7 / 18	5.8 / 13	5.4	5.6 / 6	6.2 / 9	6.5 / 23	4.09 54.1 / 33
3.5 / 35	6.8 / 30	6.8 / 22	6.3 / 19	5.9 / 14	6.0	6.3 / 5	6.7 / 7	6.8 / 23	13 / 33
2.9 / 37	8.0 / 31	8.0 / 23	7.2 / 22	6.7 / 14	7.0	7.1.0 / 4	7.8 / 6	7.1 / 23	39 / 33
3.0 / 39	8.4 / 33	8.5 / 22	7.8 / 20	7.5 / 14	7.9	8.0 / 3	9.0 / 5	9.1 / 27	64 / 33
5.8 / 39	9.6 / 35	9.7 / 23	8.9 / 21	8.6 / 15	9.0	9.1 / 2	10.0 / 5	10.6 / 31	9.0 / 33
4.8 / 37	9.9 / 35	10.3 / 23	9.8 / 21	9.6 / 14	10.0	10.3 / 4	11.7 / 12	7.2 / 19	09 / 22 × 12.5 / 33

(6+73 = 0.0 Cut Lt.)

(6+62 = 0.0. Cut Rt.)

Same as Original

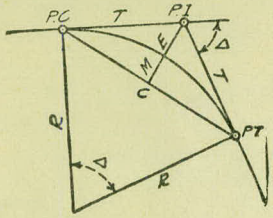
Top Stone Mon.

Compute Overhaul

All material placed bet.

Sta. 214+00 - to 217+25

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

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

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

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

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

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

EXPLANATION AND USE OF TABLES

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

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

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

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

Table I.—Minutes in Decimals of a Degree.

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

Table II.—Inches in Decimals of a Foot.

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

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

Table III.—Radii, Ordinates and Deflections.

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

Note. Chord Deflection=2 times tangent deflection.

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

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

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

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

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

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

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

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

Table V.—Corrections for Tangents and Externals.

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

For Tangents Add

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

For Externals Add

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

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

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

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

Table VII.—Middle Ordinates for Rails in Feet.

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

SLOPE REDUCTIONS.

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

TRIGONOMETRICAL FORMULAS.

See fig. (a).

sin. $A=\frac{a}{c}$

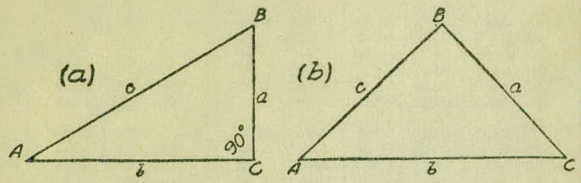
cos. $A=\frac{b}{c}$

tan. $A=\frac{a}{b}$

cot. $A=\frac{b}{a}$

sec. $A=\frac{c}{b}$

cosec. $A=\frac{c}{a}$



Formula for Solving Triangles.

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

Table VIII.—Natural Trigonometrical Functions.

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

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
°						°					
16	.2756	.2867	3.487	.96126	74	24	.4067	.4452	2.246	.91355	66
10	.2784	.2899	3.450	.96046	50	10	.4094	.4487	2.229	.91236	50
20	.2812	.2931	3.412	.95964	40	20	.4120	.4522	2.211	.91116	40
30	.2840	.2962	3.376	.95882	30	30	.4147	.4557	2.194	.90996	30
40	.2868	.2994	3.340	.95799	20	40	.4173	.4592	2.177	.90875	20
50	.2896	.3026	3.305	.95715	10	50	.4200	.4628	2.161	.90753	10
17	.2924	.3057	3.271	.95615	73	25	.4226	.4663	2.145	.90631	65
10	.2952	.3089	3.237	.95545	50	10	.4253	.4699	2.128	.90507	50
20	.2979	.3121	3.204	.95459	40	20	.4279	.4734	2.112	.90383	40
30	.3007	.3153	3.172	.95372	30	30	.4305	.4770	2.097	.90259	30
40	.3035	.3185	3.140	.95284	20	40	.4331	.4806	2.081	.90133	20
50	.3062	.3217	3.108	.95195	10	50	.4358	.4841	2.066	.90007	10
18	.3090	.3249	3.078	.95106	72	26	.4384	.4877	2.050	.89879	64
10	.3118	.3281	3.048	.95015	50	10	.4410	.4913	2.035	.89752	50
20	.3145	.3314	3.018	.94924	40	20	.4436	.4950	2.020	.89623	40
30	.3173	.3346	2.989	.94832	30	30	.4462	.4986	2.006	.89493	30
40	.3201	.3378	2.960	.94740	20	40	.4488	.5022	1.991	.89363	20
50	.3228	.3411	2.932	.94646	10	50	.4514	.5059	1.977	.89232	10
19	.3256	.3443	2.904	.94552	71	27	.4540	.5095	1.963	.89101	63
10	.3283	.3476	2.877	.94457	50	10	.4566	.5132	1.949	.88968	50
20	.3311	.3508	2.850	.94361	40	20	.4592	.5169	1.935	.88835	40
30	.3338	.3541	2.824	.94264	30	30	.4617	.5206	1.921	.88701	30
40	.3365	.3574	2.798	.94167	20	40	.4643	.5243	1.907	.88566	20
50	.3393	.3607	2.773	.94068	10	50	.4669	.5280	1.894	.88431	10
20	.3420	.3640	2.747	.93969	70	28	.4695	.5317	1.881	.88295	62
10	.3448	.3673	2.723	.93869	50	10	.4720	.5354	1.868	.88158	50
20	.3475	.3706	2.669	.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.	
° ′						° ′					
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	.6713	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**
											°
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

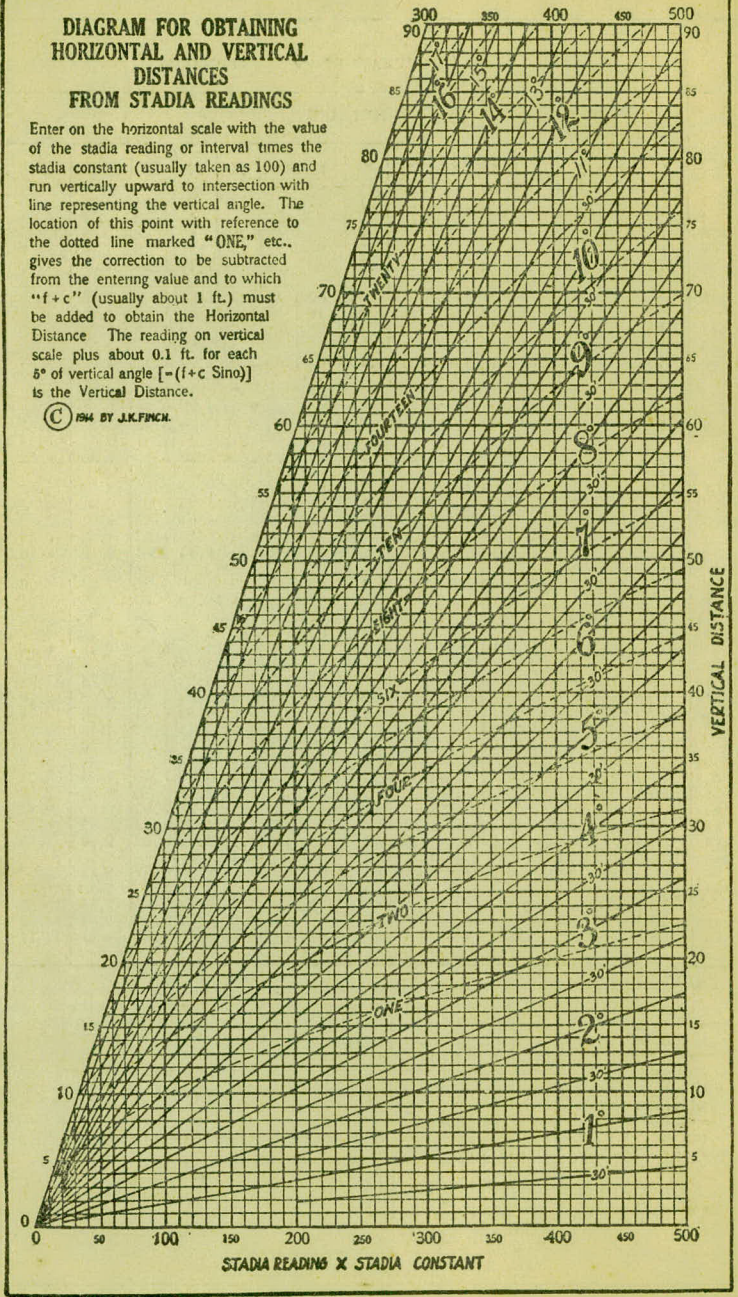
Table IX.—Calculation of Earthwork.

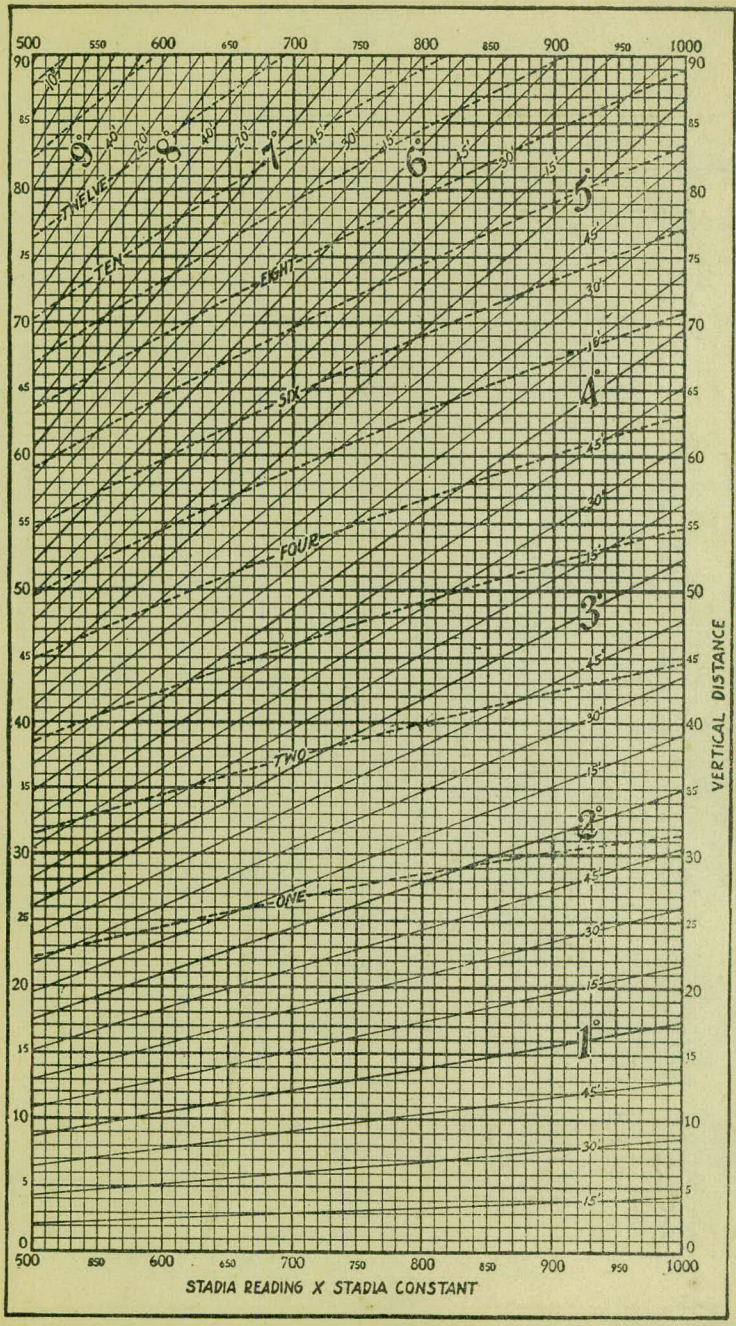
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	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 ½ the roadbed =w, add the triangles formed by taking the distance out to each break in turn (=w's) by the difference between the cuts (or fills) on each side of it (=h's) always subtracting the outer from the inner.

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

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

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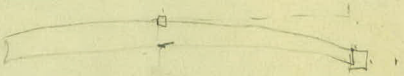
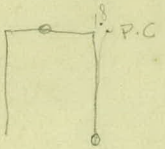
TWELVE
TEN
EIGHT
SIX
FOUR
TWO
ONE
VERTICAL DISTANCE
STADIA READING X STADIA CONSTANT





DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.

For Single Track Embankment.

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

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

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