OFFICE OF
RAMSEY COUNTY ENGINEER
CONSTRUCTION NOTES
BALD EAGLE AVENUE

CO. PROJ. 24-51

FILE No. 11

ENGINEERS'
FIELD BOOK
No. 10103

Sept. '24
'11'

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

Distances from Center of Roadway for Cross-Sectioning
Roadway 16 feet wide. Side Slopes 1 on 1.
For Single Track Embankment.

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

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

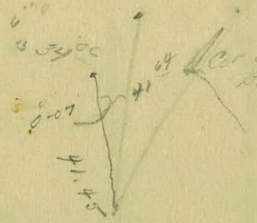
Law-23-03

6.26
4.64
1.62

9+42.03
50
8+92.03

22.63
1.62
228.01

228.08
6.26
234.34
9.83
224.51
4.66
229.17
4.74
224.43
3.91
228.34
2.18
226.16



Index

Cont. on next page

277+68 to 1161+39.1 – Alignment Notes Page 66 to 75

277+68 to 285+62
298+01.4 to 314+50 } Loose Leaf

Details – Loose Leaf

	+	H.I.	−	Check. Elev.	Plan. Elev.
B.M.	4.53	253.46		248.93	
T.P.	3.98	251.92	5.52	247.94	
B.M.				4.95	246.97
T.P.	4.93	253.37	3.48	248.44	
				2.68	
B.M.				250.69	250.64
T.P.	1.24	248.63	5.98	247.39	
				1.75	
B.M				241.88	241.77
T.P	1.66	238.10	12.19	236.44	
				4.18	
				4.48	
B.M				5.02	233.08
T.P	5.09	238.57	4.62	233.48	
B.M.	4.51	238.79	4.29	234.28	234.15
B.M.	4.46	238.35	4.90	233.89	233.78
T.P	6.25	240.57	4.03	234.32	
B.M.			3.68	236.89	236.74

By Austin

Old B.M. Proj 23-52 Approx Sta 274+00 Spk in Tree Rt.

Nail in Tree. 70' ht. Sta 282+35.0 Set 5/16/24

Spk in T.P. Ht Sta 287+35

Spk in T.P. 45' Rt. 291+80

Top. So Rail T.C. Rd
" No " " "

Spk. in Tree 65' R. Sta 299+20 Set 5/16/24

Nail in T.P. Ht. Sta 306+75

Spike in T.P. Rt. Sta 312+85

= 237.37 (Nail in T.P. 30' R. Sta. 2+16.0)

See Page 4-8
corrected B-Mod

Bench Levels

	+	H.I	−	Elev.	
B.M.	1.87	252.51		250.64	50.69
B.M.			5.60	246.91	46.97
T.P.	5.58	253.17	4.92	247.59	
B.M.			4.33	248.84	48.93
End of Pavement checking					
T.P.	5.43	[illegible]	5.87	247.30	
B.M. (as above)	1.35	251.99	2.09	250.64	50.6[illegible]
B.M.	0.95	242.77	10.17	241.82	[illegible]
T.P.	[illegible]	238.91	8.42	234.35	
B.M.			5.90	233.01	
T.P.	[illegible]	238.58	5.28	233.63	
B.M.	4.52	238.75	4.35	234.23	[illegible]
B.M.			3.95	234.80	
B.M.	4.75	238.60	4.90	233.85	33.78
T.P.	5.67	240.27	4.00	234.60	
B.M.			3.44	236.83	[illegible]
	5.24	242.61		237.37	
B.M.	2.91	244.40	1.12	241.49	
T.P.	5.85	247.80	2.45	241.95	
B.M.	0.89	245.10	3.59	244.21	44.19
B.M.			1.53	240.57	
T.P.	3.73	243.87	4.46	240.14	
T.P.	3.60	244.87	2.60	241.27	
T.P.	2.41	244.60	4.68	240.19	

58
+
87

W.H.C.
M.C.E.
M.A.G.
T.F.
} June 3-24

R.R. spike in T.P. Lt. 287+35

" tree to L 72+50

Old B.M. Proj 73-52 - Approx Sta 274+00 Spike in Tree Rt.

4.72 4.64 1.468

Lt. 287+35

R.R. spike Tel. Pole Rt. Sta. 291.80

R.R. spike in 6" Maple 65' R. Sta. 299.20

Nail in T.P. Lt Sta 306+75 (Will be moved)

R.R. spike in 4" Tree Rt. Sta. 310+40

Rt. " 312+85

Eq. { 237.39 / 236.74 Nail in T.R. 30' R. Sta 246

Top Fire Hyd. Rt. Sta. 7+35

Nail in T.P. Lt. 17+04

R.R. spike in 18" Ex Eld. Lt. Sta. 19+10

Top conc. at the step. Lt. sta. 27 S.E. Corner

Epoch Level 3

	+	H.I.	−	Elev.	
		244.60			
B.M.			3.27	241.33	241.4
B.M.	1.43	244.87	1.16	243.44	
T.P.	3.22	244.53	3.56	241.31	
B.M.			2.27	242.26	
T.P.	4.05	245.66	2.92	241.61	
B.M.	4.89	247.86	2.69	242.97	243.00
B.M.	3.86	247.03	4.67	243.17	
B.M.			3.95	243.10	
T.P.	4.51	248.01	3.55	243.50	
B.M.	0.73	244.41	4.33	243.68	243.70
T.P.	7.02	245.90	6.13	238.28	238.28
B.M.					238.23
T.P.	1.49	240.50	6.49	239.01	
T.P.	2.25	230.23	11.92	228.58	
B.M.	7.17	228.24	5.26	223.07	223.0
T.P.	1.95	227.40	2.79	225.45	
T.P.	9.33	236.51	0.22	227.18	
B.M.			8.40	228.11	228.2
T.P.	5.84	237.59	4.41	231.70	
B.M.	1.44	236.99	2.04	235.55	235.6
T.P.	6.10	235.87	7.17	229.87	
B.M.			5.70	230.67	
B.M.			6.24	229.63	

Nail in Elec. Lt. Pole Lt. 36+55 Dr. Good.

Top of Fire Hyd. N.W. Corner 4th & Bald Eagle Ave Sta. 36+50

Nail in 12" Maple. Lt. Sta. 46+70

Nail in E.P. Lt. 53+10

Nail in 12" Tree Rt. Sta. 58+80

R.R. spike in Elec. Pole - Lt. 59+35

Nail 24" Oak 50' R. Sta 71+68

Nail in Tree Lt. 75+45

Nail in 24" Oak 35' Rt. Sta. 80+25

Nail in W. Oak 30' Lt. 86+80

Nail in 16" Oak 40' Lt. Sta. 98+55

Nail in 16" Oak 60' Lt. 107+50

Nail in T.P. Rt. 114+20

R.R. spike 6" Pop. 60' Rt 114+50

24 - 51 Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M	7.94	236.02		228.08	
~~100+00~~		Revised		~~2.77~~	5.3
~~101+00~~		From Page 23		~~31.35~~	4.7
102+00				31.40	4.6
103+00				31.40	4.6
T.P.	5.33	236.63	4.72	231.30	
104+00				31.40	5.2
105+00				31.40	5.2
106+00				31.30	5.2
107+00				31.20	5.2
B.M.	0.53	236.03	1.13	235.50	
+50				31.14	4.7
108+00				31.07	4.8
109+00				30.70	5.1

Inst. Maloney
Rod Skeeglan
Chain Galvin

5-14-24

Left | C L | Right

Nail in 18" Oak 40' L. Sta. 98+55

~~4.5/33.0 3.9/21.0 ×4.0/16.3 4.1/15.5 5.6/12.0 5.5/10.5 | 5.3 | 5.3/11.0 5.0/12.5 4.4/14.5 ×4.3/15.9 4.3/20.0 3.3/33.0~~

~~5.8/33.0 5.5/27.0 5.2/20.0 ×5.6/16.4 5.0/11.0 | 4.5 | 4.5/8.0 4.5/11.0 5.0/14.0 ×4.8/15.2 4.7/20.5 4.0/33.0~~

31.6 ✓ 5.7/33.0 5.7/19.5 ×5.5/16.4 4.8/11.0 | 4.4 | 4.3/10.5 ×4.4/15.0 4.6/26.0 4.8/33.0

31.4 ✓ 5.5/33.0 5.4/21.0 ×5.2/15.9 5.1/12.0 4.8/10.5 | 4.6 | 4.8/10.5 ×4.9/15.5 4.6/17.5 4.5/23.0 4.7/27.0 4.5/33.0

31.6 ✓ 6.3/33.0 6.3/22.0 ×5.9/16.1 5.8/14.5 5.1/10.0 | 5.0 | 5.0/11.0 5.2/13.5 ×4.8/15.4 4.5/18.0 4.6/22.5 5.0/26.0 5.2/33.0

1.7 ✓ 2.7/33.0 2.4/27.0 4.3/20.5 ×5.0/15.2 5.2/14.0 5.1/10.5 | 4.9 | 5.0/10.0 5.0/14.5 ×3.9/16.3 3.7/24.0 4.5/27.0 5.0/33.0

1.7 ✓ 3.9/33.0 4.2/21.0 ×4.9/15.3 5.1/14.9 4.9/10.5 | 4.9 | 4.9/9.5 5.0/13.0 ×3.5/16.7 4.5/22.0 4.0/24.0 3.9/33.0

1.6 ✓ 5.5/33.0 5.2/22.0 ×5.3/15.2 5.0/14.0 5.2/10.5 | 5.0 | 5.5/12.0 6.1/13.5 ×5.3/15.2 4.4/20.0 4.4/27.0 0.2/31.0 0.0/33.0

Nail in 16" Oak 60' Lt Sta 107+50

1.4 ✓ 3.8/33.0 3.9/26.0 3.6/22.0 5.4/14.0 4.7/10.0 | 4.6 | 4.8/12.0 5.5/15.0 4.1/19.0 3.9/22.0 4.1/27.0 2.9/28.5 2.2/33.0

1.5 ✓ 5.1/33.0 5.3/23.0 ×5.3/15.8 5.1/11.0 4.7/10.0 | 4.5 | 4.7/11.0 5.1/14.0 ×6.3/17.3 4.5/20.0 4.5/25.0 4.0/27.0 3.9/33.0

0.9 ✓ 8.7/33.0 ×8.4/21.0 8.3/17.5 6.4/12.5 5.4/10.0 | 5.1 | 5.2/12.0 6.1/14.5 7.3/16.5 ×6.9/18.7 6.7/20.0 6.7/25.0 7.3/28.0 7.2/33.0

24-51 Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		236.03			
110+00				30.20	5.6
+11.3				30.16	
+22				30.13	
111+00				29.92	5.9
T.P.	5.73	235.85	5.91	230.12	
112+00				30.10	5.6
113+00				30.48	5.2
+60				30.68	5.0
114+00				30.86	4.8
B.M.				(5.21)	230.64
114+25				30.75	4.7
115+00				31.24	4.4
116+00				31.62	4.0
+39.1				31.77	3.8

Inst.
Rod.
Chain.

5-14-24

Left						C	L	Right						
8.4 / 33.0	7.4 / 23.0	× 7.7 / 19.2	7.6 / 16.0	6.9 / 11.0	5.7 / 9.0	5.5		5.6 / 11.0	6.8 / 13.5	7.9 / 16.0	× 7.8 / 19.3	7.0 / 20.0	7.7 / 26.0	9.7 / 28.0	7.3 / 33.0
8.8 / 33.0	10.5 / 30.0	12.1 / 25.0	12.3 / 14.0	(4" Mud) 5.2 / 14.0	5.2 / 13.0	6.3 / 13.0	5.9 / 10.0	5.7 / 11.0	6.2 / 12.5	6.0 / 14.0	Hd. Wall 5.3 / 14.0	5.3 / 15.0	12.2 / 15.0	12.4 / 33.0	
12.4 / 33.0	12.4 / 32.0	8.7 / 27.5	7.2 / 21.0	7.4 / 14.0	6.8 / 12.0	6.1 / 10.5	5.7	5.7 / 11.0	8.0 / 14.0	8.0 / 18.0	7.1 / 20.5	7.3 / 25.0	9.4 / 27.5	7.8 / 27.0	7.0 / 33.0
9.4 / 33.0	8.4 / 25.0	× 9.3 / 21.1	9.5 / 17.5	6.9 / 12.5	5.9 / 10.0	5.6		5.6 / 11.0	6.7 / 14.0	8.0 / 17.8	× 7.5 / 18.4	7.0 / 20.0	7.0 / 25.0	8.5 / 27.5	7.2 / 29.0	7.0 / 33.0
7.6 / 33.0	× 7.0 / 18.7	7.2 / 16.5	6.1 / 12.5	5.4 / 10.0		5.2		5.5 / 11.0	6.1 / 14.0	× 6.4 / 17.4	6.7 / 23.0	7.4 / 33.0			
6.2 / 33.0	× 5.9 / 20.3	6.0 / 14.5	5.8 / 11.0			4.7		5.2 / 11.0	6.1 / 13.5	7.2 / 16.3	× 6.5 / 18.0	6.4 / 23.5	7.6 / 26.0	6.9 / 29.0	7.1 / 33.0
5.8 / 33.0	5.8 / 27.0	× 5.9 / 20.1	5.8 / 14.0	5.3 / 10.5		5.0		5.3 / 9.5	5.8 / 13.5	6.2 / 16.0	6.2 / 17.8	6.2 / 23.0	6.2 / 33.0		
		5.4 / 33.0	5.2 / 23.0	4.9 / 12.0		4.8		4.8 / 11.5	5.0 / 19.0	5.6 / 33.0					
Nail in T.B. 1.4 S to 114+20															
		5.8 / 33.0	× 5.5 / 20.2	5.4 / 14.0	5.0 / 11.0	4.7		5.0 / 7.0	5.7 / 13.0	6.1 / 18.1	× 6.2 / 23.5	8.2 / 26.0	8.5 / 33.0		
8.0 / 33.0	8.0 / 26.0	× 7.7 / 21.0	7.0 / 16.5	5.8 / 13.0	5.0 / 11.0	4.7		4.6 / 11.0	5.6 / 13.5	6.1 / 17.0	× 6.1 / 18.7	5.9 / 25.0	6.8 / 25.0	7.0 / 33.0	
4.5 / 33.0	4.7 / 25.0	× 4.6 / 20.4	4.7 / 17.0	4.5 / 12.0		4.1		4.1 / 9.0	4.4 / 13.5	4.5 / 17.0	× 4.4 / 20.6	3.7 / 25.0	3.5 / 33.0		
		4.9 / 33.0	× 4.8 / 17.5	4.8 / 18.0	4.3 / 11.0	3.9		3.8 / 9.0	4.4 / 11.5	× 4.2 / 20.6	3.8 / 27.0	3.6 / 33.0			

End

Bench Levels.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	3.49	240.23		236.74	
T.P.	3.72	238.23	5.72	234.51	
			10.31	227.90	
			12.1	226.1	
T.P.	6.20	239.09	5.14	233.09	
B.M.			4.39	234.70	
T.P.	4.35	238.48	4.96	234.13	
B.M.	5.16	238.07	5.57	232.91	
T.P.	10.72	247.35	1.44	236.63	
B.M.			5.62	241.73	
T.P	6.42	252.68	1.09	246.26	
B.M.	2.08	252.62	2.14	250.54	
B.M.	5.60	252.41	5.81	246.81	
B.M.			3.98	248.43	
Top End of Pavement.		&	3.97	48.44	
		Left	4.04		
		Right	4.01		

Inst.
Rod.
Chain.

W.H.C.
M.C.E.
M.A.G.
J.C.F.

Left	C L	Right

Eq. $\frac{236.74-50}{237.37-No}$ } Nail in T.P. 30'R. - Sta. 2+16

Water at White Bear Lake. June 4, 1924

" " Goose Lake.

Nail in 14" tree Rt Sta 310+40

Nail in T.P. Lt - 306+75 Will be moved.

R.R. spike 6" maple 65'R. Sta 299+20

R.R. spike in Po. P. Rt. 291+80

R.R. spike in T.P. Lt. 287+35

R.R. spike in Tree 70'L. Sta. 282+35

" " " Rt. Sta 278+35

41.84
1.32
41.82

Also B.M. page No. 5

Cross Sections

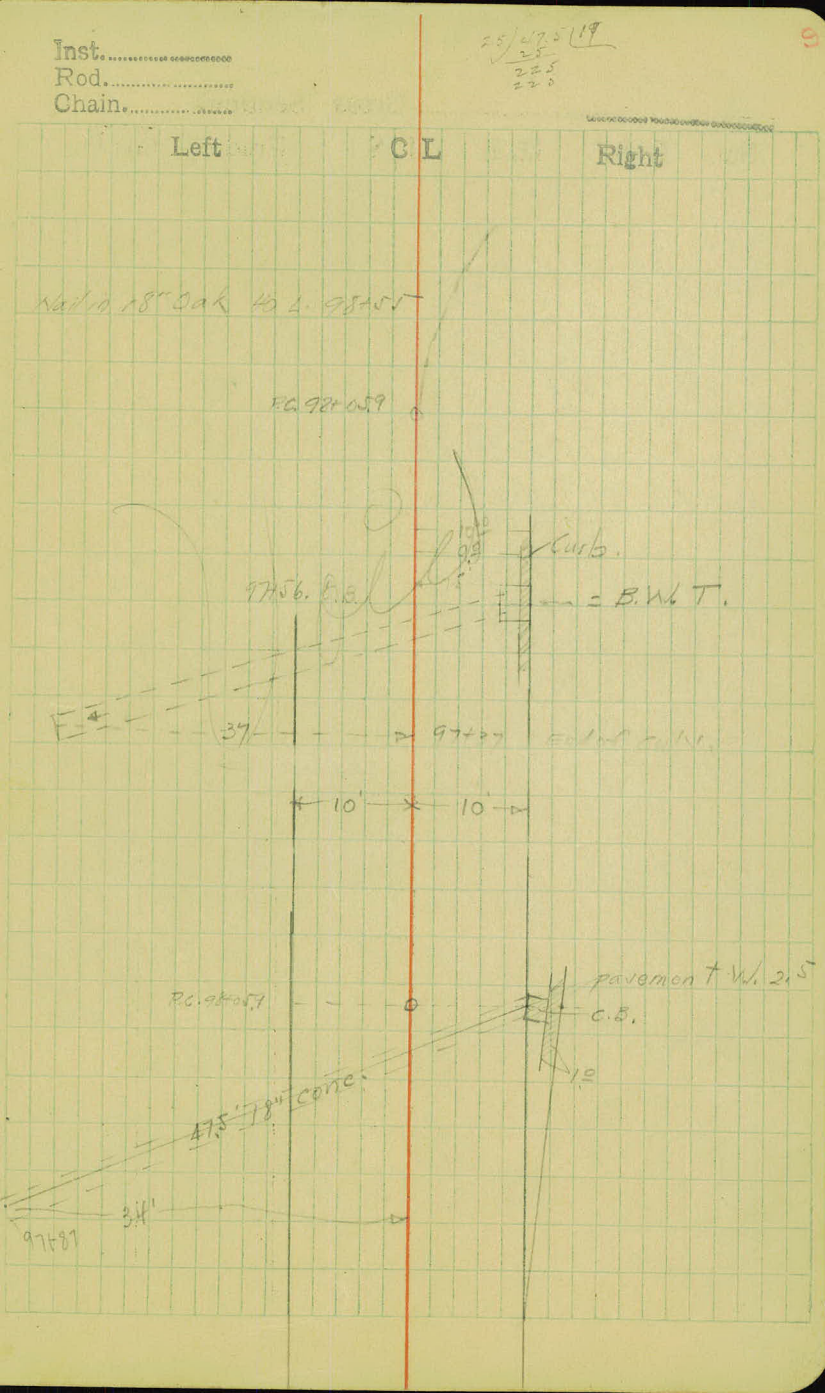
Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
	Culvert @ Sta 97+56		18" Conc.		
B.M.	5.68	233.79		228.11	
			Sub Grade	226.4	7.4
			Ground	226.6	7.6
			Invert	223.9	9.9
			Outlet	223.4	10.4
			½ Way	223.65	10.15
	Culvert @	98+05.9	18" Conc.		
	4.46	232.57		228.11	
			Sub Grade	227.81	5.3
			Invert	224.7	7.9
			Outlet	224.2	8.4
			½ Way		8.15

Moved See below

Void

Inst.
Rod.
Chain.

Left C L Right



Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
	Culvert @ Sta. 86+56			18" Conc.	
B.M.	3.04	228.51		225.47	
			Sub Grade	24.28	4.2
			Invert.	21.8	6.7
			Outlet.	21.3	7.2
Flow Line of Culvert to Lake			9.5	219.8	

Inst. ....

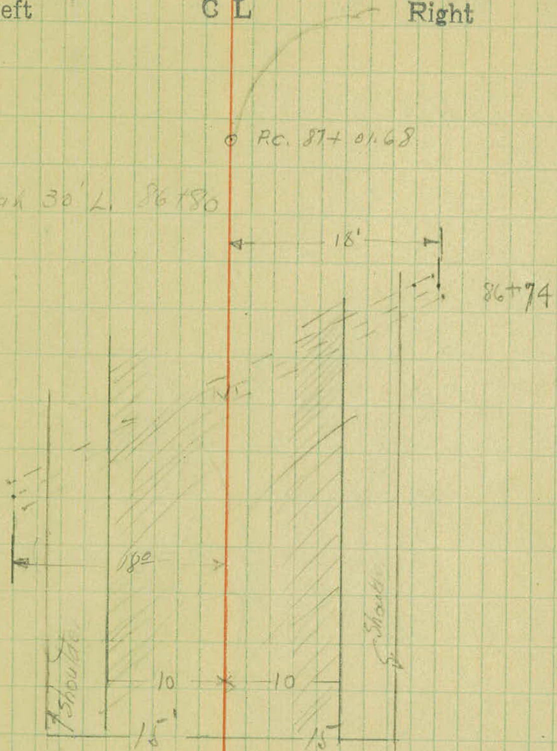
Rod. ....

Chain. ....

Left | C L | Right

Nail in W. Oak 30' L. 86+80

86+56

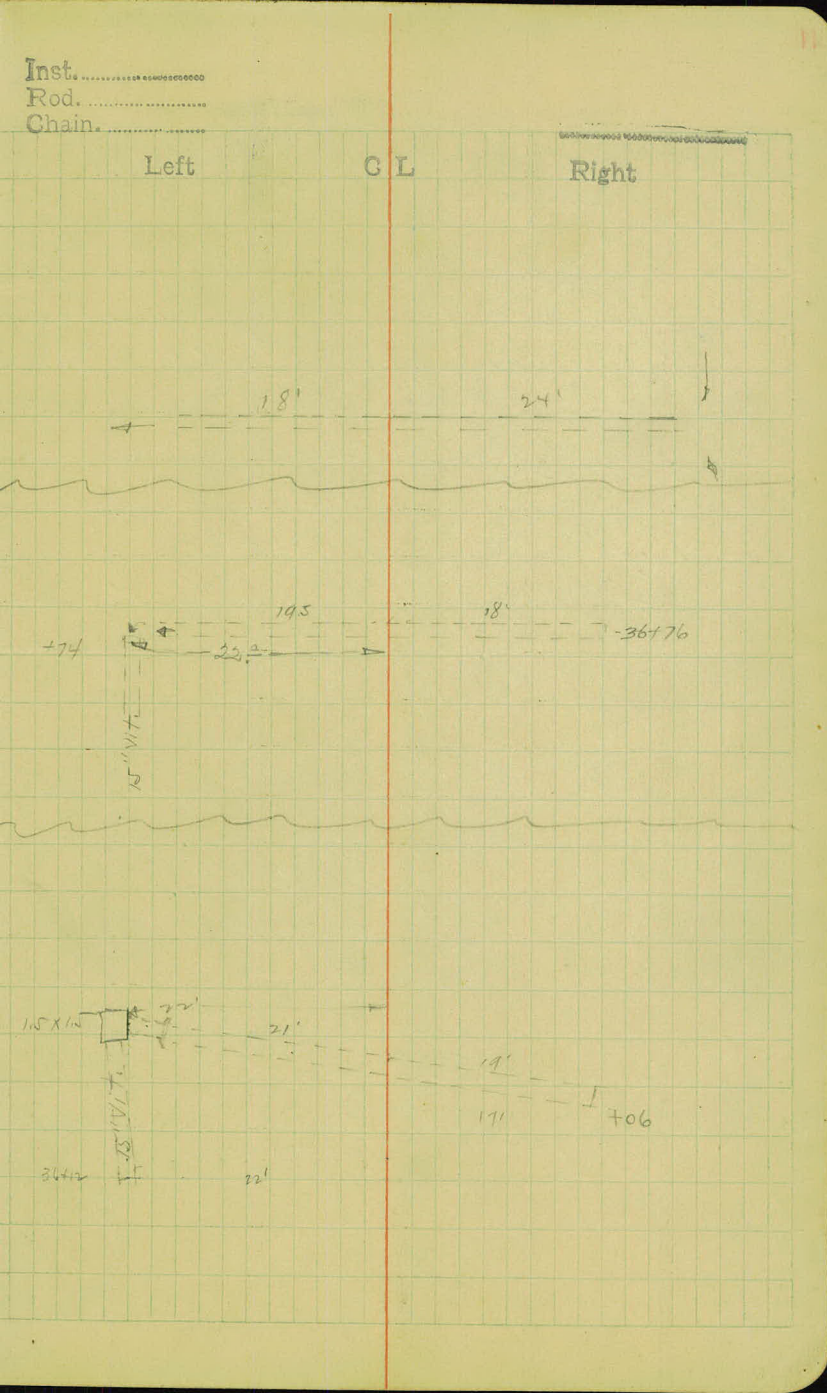


Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
			18' Lt. 24' R.		
	Culvert @ 303+00		24" X 42' P.3		
	4.86	237.77		232.91	
			Invert	230.5	7.3
			Outlet	229.6	8.2
			18' Rt + 19.5 Lt Drains Lt		
	Culvert @ 36+76		18" X 37.5		
	3.09	244.42		241.33	
	Inv. Vit. culv.		6.64	37.78	
	Inv. culv Right		7.0	37.4	
	Outlet " Left		7.1	37.3	
		244.42			
	Culvert @ 36+14		40" - 21' Lt & 19' Rt Drains Lt		
	Inv. C. Basin		7.27	237.15	
	Inv. Culvert Rt.		7.07	237.35	

Inst.
Rod.
Chain.

Left | C L | Right



Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R
	culvert @ Sta. 284+15			24" x 42'	
B.M.	5.21	252.02		246.81	
			Subgrade	47.94	4.08
			Invert	45.02	7.00
			Outlet	44.02	8.00

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

	Left	C L	Right

70' Lt. 2 8 2 + 3 5

..... Cross Sections

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

Inst.
Rod.
Chain.

Left	C L	Right

Cross Sections

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

Inst.
Rod.
Chain.

Left	C L	Right

From Page 31

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M	1.89	246.08		244.19	
17 +00				43.95	2.1
18 +00				42.54	3.5
19 +00				40.92	5.2
20 +00				40.03	6.1
21 +00				39.29	6.8
T.P.	3.12	244.83	4.37	241.71	
22 +00				38.90	5.9
23 +00				39.20	5.6
24 +00				39.39	5.4
25 +00				39.25	5.6
+36				39.20	
26 +00				39.11	5.7
B.M	3.35	244.69	3.55	241.25	

Inst. Maloney
Rod. Skoglund
Chain. Golvin

5-20-24

Left	C L	Right

Nail in T.P. 21' h Sta 17+04

0 4.2/33.0 4.3/28.0 3.9/21.0 ×3.2/16.7 2.8/11.0 2.4/5.5 | 2.1 | 1.8/6.0 2.0/14.0 ×2.0/17.1 2.1/33.0

5 5.3/33.0 5.5/24.0 ×5.3/17.7 4.6/8.5 4.1/5.5 | 3.6 | 3.7/7.0 ×4.1/16.4 4.0/19.5 3.4/23.0 3.7/26.0 2.0/33.0

6.1/33.0 6.7/28.0 6.9/21.0 6.4/19.0 ×6.2/16.5 5.4/11.5 4.9/6.0 | 4.4 | 4.5/6.5 4.9/12.0 ×5.4/16.8 5.4/20.0 4.9/24.0 4.9/31.0 6.1/33.0

3 5.9/33.3 6.7/24.0 6.1/20.0 ×6.3/16.8 6.0/13.0 5.5/7.0 | 4.8 | 4.9/7.0 5.1/12.0 5.5/17.0 ×5.5/17.6 6.0/20.0 5.4/24.0 5.1/33.0

7 6.5/33.0 7.6/26.0 6.9/19.5 ×6.7/17.1 6.6/13.5 6.1/6.0 | 5.4 | 5.6/7.0 6.0/15.0 ×6.4/17.4 6.8/19.5 6.0/23.5 6.3/33.0

7 6.8/33.0 6.6/23.0 ×6.3/16.6 5.1/12.5 4.7/7.0 | 4.1 | 4.5/10.0 5.2/16.0 ×5.5/17.4 5.9/19.0 5.2/25.0 5.3/33.0

.4 6.6/33.0 6.6/21.0 ×6.0/16.6 5.3/12.5 4.8/9.5 | 4.4 | 4.9/11.0 5.6/16.0 ×5.8/16.8 6.2/19.5 6.1/22.0 5.5/25.0 5.5/33.0

3 5.7/33.0 6.1/30.0 6.1/22.0 ×5.9/16.5 5.9/14.0 5.2/8.5 | 4.5 | 4.4/4.0 5.0/13.0 ×5.7/16.7 6.1/18.0 5.9/21.0 5.5/25.5 5.5/33.0

.4 5.9/33.0 6.2/23.0 ×5.8/16.8 5.4/12.0 4.9/6.0 | 4.4 | 4.4/4.5 4.6/10.0 ×5.3/17.3 5.2/26.0 5.2/33.0

.4 5.4/33.0 6.7/29.0 6.3/19.0 5.2/15.0 5.0/7.0 | 4.4 | 4.4/6.0 4.7/12.0 5.2/21.5 5.3/33.0

.5 5.0/33.0 5.1/27.0 ×5.3/17.4 5.3/14.5 4.7/7.5 | 4.3 | 4.9/9.0 5.2/14.0 ×5.5/17.2 5.2/26.0 5.1/33.0

Nail in T.P. 20' h Sta 26+40 set 5/20

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		244.63			
27 + 00				39.14	5.5
+ 08					
28 + 00				39.4	40.3 5.2
29 + 00				39.4	40.4 5.2
T.P.	4.24	244.94	3.93	240.70	
30 + 00				39.46	40.4 5.5
31 + 00				3956	40.4 5.4
32 + 00				3966	40.4 5.3
+ 60					40.3
33 + 00				39.66	40.3 5.3
34 + 00				39.60	40.5 5.3
35 + 00				39.53	40.5 5.4
B.M.			3.63	241.31	

Inst.
Rod.
Chain.

5-20-24

Left					CL	Right				
4.4 / 33.0	4.2 / 18.3	4.2 / 14.0	4.2 / 4.0		4.1	4.2 / 5.0	4.4 / 10.0	4.6 / 17.9	4.8 / 27.0	4.7 / 33.0
4.6 / 25.0	4.4 / 21.0	4.5 / 19.0	5.4 / 16.6	5.2 / 16.0	4.7 / 14.0	4.4 / 5.0	4.3	4.5 / 5.5	4.5 / 11.0	4.6 / 17.6	4.8 / 25.0	4.7 / 33.0
4.2 / 33.0	4.2 / 28.0	4.8 / 25.0	4.1 / 21.0	4.0 / 17.0	5.5 / 16.7	4.7 / 14.0	4.5 / 8.0	4.2	4.4 / 6.5	4.7 / 15.5	4.8 / 17.4	4.9 / 22.0	4.4 / 28.0	4.6 / 33.0
4.3 / 33.0														
4.4 / 28.0	5.1 / 24.0	4.4 / 20.5	4.5 / 17.5	5.9 / 16.6	5.2 / 15.0	5.0 / 8.5	4.5	4.9 / 7.0	5.0 / 14.0	-1.4 / 17.1	6.8 / 19.0	4.6 / 20.0	4.5 / 33.0	
4.3 / 28.0	4.4 / 25.0	4.7 / 23.5	4.4 / 21.5	5.6 / 20.0	4.8 / 16.8	4.9 / 15.5	8.0	4.5	4.7 / 8.0	4.9 / 12.5	6.7 / 15.9	6.7 / 17.0	4.6 / 19.0	4.4 / 23.0	4.5 / 33.0
4.6 / 33.0	4.7 / 28.0	4.2 / 23.0	4.1 / 20.5	5.8 / 16.5	5.0 / 13.5	4.9 / 8.0	4.5	4.8 / 7.0	5.2 / 13.0	7.0 / 16.0	7.1 / 17.7	5.4 / 19.0	5.3 / 23.0	4.7 / 26.0	4.6 / 33.0
			5.1 / 33.0	5.1 / 23.5	5.2 / 16.0	4.9 / 7.5	4.6	4.8 / 7.0	4.8 / 14.0	5.1 / 22.0	4.9 / 33.0				
4.7 / 33.0	4.7 / 28.0	4.7 / 23.0	8.0 / 21.5	6.3 / 16.5	5.2 / 14.0	4.9 / 8.5	4.6	4.9 / 6.5	5.1 / 12.0	5.4 / 14.5	7.1 / 16.6	7.1 / 17.7	6.1 / 19.0	5.8 / 23.0	4.6 / 27.0	4.8 / 33.0
4.7 / 33.0	4.7 / 27.5	6.3 / 23.5	5.8 / 21.0	5.4 / 16.9	4.9 / 14.5	4.7 / 9.0	4.4	4.4 / 7.0	4.9 / 13.5	5.2 / 17.1	4.8 / 22.0	4.4 / 27.0	4.4 / 33.0			
4.9 / 33.0	4.6 / 26.0	5.7 / 23.0	5.9 / 17.1	5.3 / 15.5	4.9 / 12.0		4.4	4.8 / 6.5	5.2 / 14.0	6.7 / 17.0	6.7 / 19.0	5.5 / 23.0	5.0 / 25.0	4.6 / 33.0		

Nail in T.P. 20' Lt Sta 36+55

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	3.61	244.95		241.34	
36+00				39.47	40.1 5.5
+40	℄ 47				40.3
37+00				39.50	40.3 5.5
38+00				39.62	40.5 5.3
39+00				39.73	40.5 5.2
40+00				39.85	40.5 5.1
T.P.	1.33	245.02	1.26	243.69	
40+30.					40.5
41+00				39.96	40.5 5.1
42+00				40.08	40.9 4.9
43+00				40.19	41.1 4.8
44+00				40.31	41.2 4.7

Inst.
Rod.
Chain.

5-20-24

Left	C L	Right
Nail in T.P. 20' Lt. Sta 36+55		
4.6/33.0 4.8/27.5 7.0/23.5 6.9/19.5 ×6.1/16.4 5.7/14.0 5.2/9.5	4.9	5.2/8.0 5.4/14.0 ×6.1/16.4 6.2/18.0 5.1/21.0 5.0/33.0
4.8/33.0 On Pav. 4.8/10.0 5.0/5.5	4.7	4.7/9.0 4.9/20.0 4.9/33.0
4.8/33.0 4.6/28.0 6.2/25.0 6.6/22.0 ×6.2/16.3 5.6/15.0 5.0/10.0	4.7	4.9/8.0 5.3/14.5 6.6/16.3 ×6.7/16.8 6.0/19.0 4.5/22.0 4.3/33.0
4.5/33.0 4.5/28.0 5.5/24.5 5.9/20.0 ×5.4/16.9 5.3/16.0 4.9/9.5	4.5	4.9/8.0 5.1/13.0 6.8/15.5 6.8/16.7 ×6.6/17.0 5.6/23.0 4.7/26.0 4.6/33.0
4.5/33.0 4.5/26.0 5.6/21.0 6.7/19.0 ×5.5/16.7 4.9/9.0	4.5	4.7/7.5 4.8/13.0 6.6/15.0 6.6/16.6 ×6.3/16.7 5.6/18.0 5.4/22.5 4.5/25.0 [illegible]/33.0 } 5.9/33.0 }
4.5/33.0 4.3/28.0 5.9/24.0 6.5/19.0 ×5.8/16.8 5.2/14.0 4.8/9.5	4.5	4.9/6.0 5.1/12.0 6.6/15.0 6.6/16.6 ×6.4/17.0 5.2/19.5 5.2/23.0 4.4/25.5 4.3/30
Top Hyd. Rt. Sta 40+50		
4.5/33.0 4.4/28.0 6.0/25.0 6.2/16.0 5.3/14.0 4.8/9.0	4.5	4.7/6.0 4.8/16.0 5.0/33.0
[illegible] 4.4/28.0 5.3/26.0 5.9/23.0 ×5.9/16.2 5.3/15.0 4.9/9.0	4.5	4.7/7.0 5.5/14.0 ×5.0/17.1 4.5/26.0 4.2/33.0
4.1/33.0 4.3/28.0 4.8/23.0 5.6/19.0 ×5.2/16.7 5.0/15.7 4.5/9.0	4.1	4.4/8.0 4.7/13.0 5.0/15.5 ×4.4/17.5 4.2/26.0 3.7/33.0
4.2/33.0 4.2/28.0 ×4.9/16.9 4.3/8.0	3.9	4.3/7.5 4.8/15.0 ×4.2/17.6 3.8/26.0 3.7/33.0
4.2/33.0 4.2/23.0 ×4.5/17.2 4.6/16.0 4.1/8.0	3.8	4.0/7.0 4.5/16.0 ×4.5/17.2 4.0/25.0 3.6/33.0

Cross Sections

Sta.	B. S.	H. I.	F S	C	Gr. R.
		245.02			
45+00				240.47	41.1 4.6
46+00				40.54	41.1 4.5
T.P.	4.34	245.92	3.43	241.59	
47+00				40.65	41.4 5.3
48+00				40.76	41.4 5.2
49+00				40.87	41.4 5.1
B.M			2.93	242.98	

Inst. Maloney
Rod. Skoglan
Chain Galvin
} Austin Rec.

5-20-24

Left							C L						
4.5 / 33.0	4.6 / 26.0	5.4 / 21.0	X 4.8 / 16.8	4.6 / 16.0	4.2 / 9.0	3.9		4.1 / 8.0	X 4.7 / 16.9	4.8 / 23.0	4.0 / 26.0	4.2 / 33.0	
4.7 / 33.0	5.0 / 24.0	5.3 / 20.0	X 4.6 / 16.9	4.6 / 16.5	4.1 / 9.0	3.9		4.3 / 10.0	X 4.7 / 16.7	4.6 / 20.0	3.9 / 27.0	3.9 / 33.0	

Sp. in T.P. 25' Lt of Sta 464+15. Do. Side of Pole

5.1 / 38.0	5.4 / 25.5	6.0 / 20.0	X 5.6 / 16.7	5.5 / 16.0	5.0 / 10.5	4.5		4.6 / 7.0	5.1 / 13.5	5.7 / 14.6	X 5.1 / 17.2	4.7 / 23.0	5.0 / 27.0	4.5 / 33.0	4.5
	5.8 / 33.0	5.8 / 24.0	X 5.5 / 16.7	4.8 / 9.5	4.5			4.8 / 7.0	5.7 / 12.5	6.2 / 14.5	X 5.6 / 16.6	5.3 / 24.5	4.5 / 27.0	4.7 / 33.0	
5.1 / 33.0	6.0 / 24.0	5.2 / 24.0	X 5.4 / 16.7	5.0 / 10.0	4.5			4.8 / 6.5	5.0 / 12.0	5.4 / 14.0	X 0.0 / 17.0	5.0 / 22.0	4.4 / 27.0	4.5 / 33.0	

Nail in T.P. 30' Rt Sta 53+10

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M	2.81	245.80		242.99	
50+00				240.98	41.7 4.8
51+00				41.08	41.8 4.7
52+00				41.18	41.2 4.6
53+00				41.28	41.3 4.5
B.M	5.01	248.00	2.81	242.99	
+45				41.38	42.6 6.6
54+00				41.60	42.9 6.4
55+00				42.00	43.3 6.0
+60				42.15	43.3 5.9
56+00				42.25	43.6 5.7
57+00				42.50	43.6 5.5
+50				42.54	43.6 5.5
58+00				42.58	43.4 5.4

Rec. Austin.
Inst. Maloney
Rod Skaggs/Lin
Chain Galvin

14.5
3.5
18.0

5-19-24

19

Left | C L | Right

Nail in T.P 30' N Sta 53+10 (53+40)

4.8	4.7	5.6	5.0	4.9	4.4	(5.8)	4.4	4.8	4.5	4.5	4.0	4.0	17
33.0	30.0	27.0	20.5	16.9	7.0	4.1	6.0	13.0	17.3	25.0	27.0	33.0	
				×					×				
4.7	4.6	5.7	5.3	4.9	4.4	(4.7)	4.2	4.8	4.7	4.7	4.0	3.9	
39.0	29.0	25.0	22.0	16.8	7.0	4.0	8.0	14.0	17.0	25.0	27.0	33.0	
				×		(4.6)			×				
4.4	4.4	5.3	4.8	4.7	4.3		3.8	4.0	3.7	3.7	3.7		
33.0	26.5	24.0	21.0	16.9	7.0	3.7	8.0	17.6	22.0	27.0	33.0		
				×		(4.5)			×				
4.0	4.3	4.9	4.6	4.4	3.8		3.6	4.0	3.9	3.7	3.5	3.4	
33.0	27.0	24.0	21.5	17.1	8.5	3.4	6.5	14.5	17.6	24.0	27.0	33.0	

Nail in T.P 30' N Sta 53+10

		6.8	6.2	5.7		(6.0)	5.6	6.1	6.5	6.4			
		33.0	18.0	8.0	5.4		6.0	13.0	18.0	33.0			
			×			(6.4)		×					
	5.8	5.8	5.9	5.4			5.4	6.2	6.3	5.8			
	33.0	22.0	17.5	9.0	5.1		7.0	17.2	24.0	33.0			
			×			(6.0)			×				
	4.9	5.3	5.3	5.2			4.9	5.0	3.4	3.5	3.8	3.2	
	33.0	24.5	17.7	9.0	4.7		7.0	14.0	18.0	19.5	25.0	33.0	
	4.4	4.7	5.2	5.0		(5.8)	4.7	5.0	4.5	2.6	2.9	2.4	
	33.0	26.0	17.0	8.0	4.7		7.0	13.0	16.0	18.0	24.0	33.0	
		×				(5.7)				×			
4.6	4.7	5.2	4.9	5.0			4.4	4.2	3.8	2.0	2.2	2.4	1.8
33.0	26.0	22.0	17.1	9.5	4.2		6.0	11.0	14.5	17.4	20.5	27.0	33.0
			×			(5.9)			×				
	4.8	4.9	4.6	4.6			4.4	4.4	3.8	3.3	3.2	2.9	
	33.0	26.0	17.7	7.0	4.4		7.0	13.0	18.5	19.2	26.5	33.0	
		×				(5.5)			×				
5.1	5.9	5.7	5.0	4.9	4.7		4.3	4.4	4.8	4.5	4.1		19
33.0	27.0	23.0	19.5	14.0	9.5	4.4	7.0	13.0	19.7	26.0	33.0		
		×				(5.4)			×				
5.5	5.7	6.0	5.7	5.7	5.0		4.7	5.0	5.4	5.0	5.0	4.7	21
33.0	28.0	24.5	20.7	17.0	9.5	4.6	7.0	12.0	16.0	21.4	27.0	33.0	

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		248.00			
59 +00				242.66	43.1 5.3
B.M.	4.26	247.37	4.89	243.11	43.0
60 +00				242.74	4.6
61 +00				242.82	43.0 4.6
62 +00				242.90	43.4 4.5
63 +00				243.10	43.7 4.3
T.P	4.16	248.06	3.47	243.90	
64 +00				243.3	43.8 4.8
65 +00				243.5	44.1 4.6
66 +00				243.7	44.2 4.4
T.P	8.65	247.55	4.16	243.90	
+50				243.75	44.2
67 +00				243.7	44.0 3.8
68 +00				243.50	43.5 4.1
69 +00				242.95	43.3 4.6 42.9
+40					
70 +00				242.1	42.4 5.0

Rec. Austin.
Inst. Maloney
Rod. Hoogland
Chain Gal. Iron.

5-19-24

Left					C L	Right				
5.6 / 33.5	5.7 / 26.0	5.7 / 20.6	5.6 / 15.5	5.4 / 9.5	4.9	5.2 / 7.5	5.6 / 12.5	6.3 / 15.0	6.1 / 20.2	6.0 / 27.0	5.8 / 32.0

Sp. in T.P. 25 ft. Sta 59+35 (Set 5/19)

5.6 / 33.0	5.0 / 27.0	5.4 / 24.0	5.2 / 20.4	5.0 / 9.0	4.4	4.6 / 6.0	4.9 / 12.0	5.2 / 16.0	5.3 / 20.3	5.1 / 33.0
	4.9 / 33.0		4.9 / 20.7	4.9 / 11.0	4.4	4.7 / 13.0	4.8 / 20.8	4.7 / 33.0		
4.5 / 33.0	4.5 / 27.0	4.9 / 24.0	4.7 / 20.8	4.6 / 9.0	4.0	4.5 / 10.0	4.9 / 16.0	4.0 / 21.5	3.9 / 33.0	
	4.2 / 33.0	4.6 / 27.6	4.8 / 20.8	4.2 / 9.0	3.7	4.1 / 13.0	3.9 / 21.4	3.5 / 33.0		
4.9 / 33.0	5.3 / 26.5	5.4 / 25.0	5.3 / 20.5	4.8 / 17.5	4.6 / 9.0	4.3	4.6 / 10.0	4.9 / 16.0	4.8 / 21.0	4.6 / 33.0
5.5 / 33.0	5.5 / 25.0	5.2 / 20.4	4.8 / 18.0	4.5 / 10.0	4.0	4.0 / 11.0	3.9 / 16.0	2.6 / 21.4	2.8 / 22.8	2.4 / 33.0
5.2 / 33.0	5.2 / 26.0	4.8 / 20.6	4.8 / 20.0	4.3 / 10.5	3.9	4.4 / 11.0	4.6 / 16.0	3.5 / 18.0	3.4 / 22.0	3.0 / 33.0
5.0 / 33.0	5.2 / 26.0	5.0 / 19.0	3.9 / 10.0		3.4	4.0 / 10.0	4.6 / 14.0	5.8 / 15.0	4.0 / 18.0	3.4 / 33.0
5.2 / 33.0	5.8 / 30.0	5.9 / 22.0	5.5 / 18.4	4.8 / 15.0	4.1 / 10.5	3.6	4.0 / 10.0	4.3 / 18.0	4.4 / 17.0	6.0 / 17.2	4.8 / 23.0	4.7 / 33.0
5.6 / 33.0	5.4 / 30.0	5.3 / 21.5	5.8 / 18.6	5.1 / 15.0	4.6 / 10.5	4.1	4.7 / 6.5	4.8 / 12.0	6.0 / 16.0	6.0 / 18.9	4.9 / 23.5	4.8 / 33.0
4.9 / 33.0	4.6 / 23.5	5.1 / 20.5	5.7 / 19.0	5.1 / 15.0	4.7 / 9.0	4.3	5.0 / 12.0	6.5 / 16.0	6.0 / 18.1	4.9 / 20.0	4.2 / 33.0
	4.8 / 33.0	4.9 / 22.0	6.2 / 17.0	5.6 / 14.5	5.1 / 8.5	4.7	5.2 / 9.0	5.6 / 13.0	6.7 / 15.5	6.8 / 18.5	4.6 / 22.0	4.3 / 33.0
	4.4 / 33.0	4.4 / 22.0	6.5 / 17.5	6.0 / 15.0	5.6 / 10.2	5.2	5.8 / 11.5	6.4 / 17.0	4.5 / 17.0	4.0 / 22.5	4.2 / 33.0

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		247.55			
T.P.	3.13	245.59	5.09	242.46	41.5
71+00				41.1	4.5
+43					41.3
+70					40.8
72+00				40.2	40.4
T.P.	5.68	241.32	9.95	235.64	3.2
73+00				39.9	39.0
					2.1
74+00				39.70	38.4
					1.46
+38				39.5	38.7
					2.0
+65				39.1	39.3
T.P.			3.04	238.28	

See Page #24

Inst. Maloney
Rod Skeaglun
Chain Galvin

5-23-24

Left	C L	Right
1.5/33.0 2.1/26.0 ×5.0/20.5 5.2/19.0 4.6/15.0 4.5/9.0	4.1	4.5/11.0 5.3/14.0 5.0/19.5 2.2/22.8 ×2.0/23.5 2.2/33.0
2.6/33.0 3.0/26.0 5.2/21.5 5.1/16.0 4.8/9.0	4.3	4.9/12.0 6.1/16.0 5.9/18.5 5.1/21.0 2.7/23.0 2.6/33.0
3.6/35.0 5.6/27.0 5.5/18.0 5.1/10.0	4.8	5.2/8.0 6.0/15.0 6.6/22.0 6.4/33.0 5.0/35.0 4.0/39.0
5.1/33.0 5.5/25.0 ×6.5/20.0 5.8/15.0 5.4/9.0	(5.5) 5.2	5.5/7.5 5.9/15.0 ×6.0/16.5 6.5/22.5 6.9/33.0
5.7/33.0 4.2/25.5 ×3.5/18.1 3.2/16.5 2.8/12.0	2.3	2.8/5.5 3.0/8.0 5.9/13.5 8.0/18.0 ×7.6/27.4 9.8/33.0
10.4/33.0 9.7/27.0 ×5.6/21.1 3.7/14.5 3.3/9.0	2.9	3.3/9.0 5.9/13.5 9.1/20.0 ×(2.4) 9.4/27.7 10.5/33.0
5.7/33.0 7.0/26.0 ×6.4/22.0 5.7/16.5 3.2/14.0 2.9/10.0	2.6	3.1/9.0 5.3/14.0 9.4/20.5 ✓10.3/27.9 10.2/33.0
2.5/33.0 2.5/20.0 2.1/10.0	2.0	2.1/10.0 3.2/17.5 5.6/25.0 7.7/33.0

Nail in Tree 30' Rt Sta 75 +50

To Page 24

From Page 25

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	1.55	226.97		225.42	
87+01.66	R.C.			223.63	2.5 +3 -2 3.1 3.3 3.6
B.M.	2.37	227.77	1.55	225.42	
+41.82				223.20	4.9 +3 -2 4.4 4.6 4.8
+61.79	R.T			222.93	2.5 +3 -2 4.7 4.9 5.1
88+31.79				222.80	00 4.8 5.0 5.2
89+00				23.0	4.8
T.P	4.81	229.40	3.20	224.59	
90+00				23.6	5.8
91+00				24.15	5.2
92+00				24.35	5.0
93+00				24.15	5.2
+36					(23.7)
94+00				23.60	5.8
T.P.	7.51	230.92	5.99	223.41	
95+00				23.15	(23.15) 7.8

Rec. Austin
Inst. Austin + Maloney
Rod Skooglun
Chain Odlain

5-21-21

Sta.	Left	C L	Right
Nail in Oak 30' h Sta 86+80			
(23.8) ✓	3.5/33.0, 3.4/22.5, x 3.1/15.0, 2.9/10.0	3.2	3.6/9.0, 3.9/14.0, 4.7/18.0, x 4.7/19.2, 4.1/22.0, x 4.1/23.0, 4.4/33.0
(3.4) ✓	6.3/33.0, 5.7/24.5, x 5.0/16.9, 4.4/8.5	4.4	5.0/13.2, 4.2/16.0, x 4.5/20.4, x 4.5/26.5, 4.9/29.0, 5.2/33.0
(3.2) ✓	5.1/33.0, 5.1/31.5, 6.0/23.0, x 5.8/17.7, 4.8/11.5	4.6	4.8/13.0, 4.2/15.5, x 4.4/18.3, x 4.5/24.2, 4.4/33.0
.3 ✓	4.9/33.0, 6.2/24.5, x 5.7/17.4, 4.6/13.0	4.5	4.5/13.0, 3.6/16.5, x 3.7/22.6, 4.2/33.0
.4 ✓	4.1/33.0, 5.5/27.5, 5.9/23.0, x 5.0/16.3, 4.7/10.5	4.4	4.4/16.0, 4.7/18.5, x 2.5/23.3, 1.9/25.0, 1.5/33.0
.9 ✓	7.7/33.0, x 6.9/17.5, 5.9/7.5	5.5	5.3/15.0, 5.7/19.5, 4.5/21.0, x 4.5/22.3, 4.5/33.0
3 ✓	6.6/33.0, 6.1/21.0, x 5.4/16.3, 5.5/13.0	5.1	5.2/13.5, 5.3/17.0, x 5.1/21.1, 4.6/33.0
6 ✓	6.0/33.0, 5.6/25.0, x 5.4/16.6, 5.4/14.6, 5.1/10.0	4.8	4.9/9.0, 5.1/13.0, 4.5/14.0, x 4.5/17.5, 1.7/23.0, 1.6/33.0
2 ✓	6.1/33.0, 5.5/21.0, x 4.9/15.3, 5.6/12.0, 5.4/8.0	5.2	5.5/8.5, 5.8/12.5, 5.4/13.5, x 5.0/17.2, 4.2/20.5, 3.9/33.0
0 ✓	3.4/33.0, 2.5/27.0, 2.5/22.0, 5.8/15.0, 6.0/12.0, 5.7/10.0	5.4	5.7/9.0, 6.1/10.0, 6.2/23.0, 5.9/33.0
	6.4/33.0, 6.1/26.0, 5.8/21.0, x 6.5/17.1, 7.2/15.5, 6.5/11.0, 5.9/8.5	5.7	5.9/9.5, 6.7/14.0, x 7.0/17.8, 7.0/22.0, 7.4/33.0
	8.3/28.0, 7.2/25.0, 7.3/20.5, x 8.6/17.2, 8.6/14.0, 7.9/11.0	7.4	7.6/12.0, 8.4/14.0, x 8.6/17.2, 8.7/21.0, 9.8/24.0, 10.0/33.0

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		230.92			
96+00				223.75	7.2
97+00				25.4	5.5
+55.9	B.W.T			26.4	4.2 4.5 4
98+00				27.2	3.3 3.7 4
+49.98	E.W.T			28.1	2.2 2.8 3.
T.P.	5.59	235.22	1.29	229.63	
99+00				28.9	5.9 6.3 6.
+22					
+28					
99+44.1	B.W.T			29.5	5.5 5.9 5.
100+00				30.18	5.0
101+00				31.0	4.2
+848 = 101+50				31.37	3.9
B.M			7.21	228.01	

See Page 6

Rec Rec. Austin
Inst Austin + Maloney
Rod Skoglun
Chain Galvin

5-21-24

	Left					C L	Right				
1 ✓	8.3 / 33.0	9.0 / 23.0	X 8.2 / 17.5	8.1 / 5.0	7.3 / 10.0	6.8	6.8 / 11.0	7.2 / 13.5	X 7.3 / 16.9	7.5 / 24.0	7.1 / 33.0
8 ✓	7.3 / 33.0	6.1 / 24.0	X 5.9 / 14.6	5.9 / 15.0	5.6 / 10.5	5.1	5.3 / 10.0	5.4 / 15.0	X 4.4 / 18.1	4.0 / 19.0	2.5 / 26.0	3.2 / 33.0
9 ✓	5.9 / 33.0	4.9 / 22.0	X 4.5 / 16.5	4.5 / 12.5	4.2 / 8.0	4.0	4.2 / 10.0	4.3 / 13.0	X 2.3 / 17.3	2.1 / 18.5	2.0 / 26.0	1.6 / 33.0
6 ✓	4.8 / 33.0	3.5 / 21.0	X 3.3 / 15.0	3.3 / 14.0	3.7 / 7.0	3.3	3.5 / 8.0	3.7 / 13.3	1.6 / 17.5	X 1.6 / 20.0	1.3 / 33.0	
✓	3.8 / 33.0	2.8 / 21.0	X 2.7 / 16.8	2.4 / 13.0	2.8 / 11.5	3.0 / 8.5	2.7	2.7 / 9.5	3.0 / 15.5	0.5 / 20.0	X 0.5 / 22.9	0.9 / 33.0	

Top Concrete Sta 20' R 98+15

3 ✓	7.3 / 33.0	6.8 / 25.0	4.8 / 16.5	5.9 / 11.0	5.9	5.9 / 9.0	5.2 / 13.0	X 4.7 / 19.5	4.5 / 23.2	4.4 / 33.0	
6 ✓	6.5 / 33.0	6.5 / 22.0	4.3 / 12.5	5.7 / 10.0	5.6	5.7 / 9.0	5.6 / 13.0	4.3 / 15.0	4.3 / 21.0	3.7 / 33.0	
6 ✓	6.6 / 33.0	6.4 / 26.0	4.4 / 13.0	5.9 / 17.0	5.7 / 14.0	5.6	5.7 / 10.0	5.2 / 13.0	4.2 / 15.5	4.0 / 23.0	3.7 / 33.0	
9 ✓	4.6 / 33.0	3.9 / 22.0	3.9 / 16.6	5.4 / 12.5	5.4 / 8.5	5.3	5.2 / 8.0	5.4 / 11.0	4.1 / 15.1	X 4.1 / 16.8	3.5 / 22.0	3.6 / 33.0	
4 ✓	3.9 / 33.0	3.1 / 16.9	3.2 / 15.16	5.0 / 12.0	4.8	5.0 / 12.5	3.6 / 14.5	X 3.7 / 16.3	3.3 / 22.0	2.5 / 33.0	
1 ✓	5.1 / 33.0	4.3 / 21.0	X 4.5 / 16.5	4.7 / 4.0	4.5 / 12.5	4.1	4.2 / 11.0	4.4 / 13.5	X 4.1 / 15.1	3.7 / 22.0	3.0 / 33.0	
5 ✓	5.3 / 25.0	5.1 / 22.0	X 4.8 / 16.4	4.1 / 10.0	3.7	3.9 / 11.0	X 4.1 / 15.3	3.1 / 23.0	4.2 / 33.0		

To Pag 6

From Page 21

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
T.P.	3.84	242.12		238.28	
74+80					
75+00				38.70	3.2
+08					
+60					
76+00				39.66	2.5
T.P.	10.44	248.72	3.84	238.28	
+55					
77+00				40.62	8.1
+40					
78+00				41.58	7.1
+50					
79+00.				42.15	6.6
T.P.	0.72	243.35	6.09	242.63	
+50					
80+00				41.47	1.9
+60					
81+00				39.89	3.5
+45					

Austin

Inst. Maloney
Rod. Skaglun
Chain Galvin

5-26-24

	Left						C L	Right					
Nail in Tree 30' Rt Sta. 75+50													
.2 ✓	6.9/33.0	3.5/19.5	3.2/14.5	3.4/9.5			2.9	3.5/8.0	3.5/15.5	3.7/33.0			
.0 ✓	10.3/33.0	8.7/27.3	6.8/18.0	4.0/13.0	3.6/10.0		3.1	3.6/8.0	3.7/16.8	3.9/23.0	4.1/33.0		
.0 ✓	9.2/33.0	9.1/26.0	6.9/19.0	3.7/13.0	3.5/10.0		3.1	3.7/8.0	4.0/10.5	6.0/15.5	7.7/20.5	9.1/33.0	
.7 ✓	4.0/33.0	4.0/22.0	2.8/13.5	2.8/8.5			2.4	2.8/7.5	3.0/11.0	4.5/17.0	5.3/23.0	4.0/33.0	
1 ✓	0.6/33.0	1.7/28.0	2.5/21.0	2.4/18.5	2.4/15.0	2.2/8.0	2.0	2.4/8.0	2.4/13.0	3.1/20.4	3.0/27.0	2.3/33.0	
Nail in Tree													
1 ✓	5.1/33.0	5.2/23.0	6.3/22.0	7.7/15.0	7.9/11.0		7.6	7.9/9.0	8.2/17.0	8.0/28.0	6.9/33.0		
5 ✓	5.2/33.0	5.1/24.0	5.7/20.5	7.0/15.5	7.4/10.5		7.2	7.6/8.5	7.8/16.0	7.4/21.7	7.5/25.5	5.6/31.0	5.6/33.0
7 ✓	5.5/33.0	5.4/27.0	5.6/20.0	6.5/14.0	7.1/8.0		7.0	7.3/9.5	7.6/17.5	6.7/23.0	4.6/29.0	4.4/33.0	
9 ✓	3.9/33.0	4.2/23.9	6.2/30.5	7.6/17.0	7.3/12.0	7.0/9.0	6.8	7.0/8.0	7.3/14.0	6.9/18.0	6.0/22.1	3.0/29.0	2.3/33.0
.0 ✓	2.9/33.0	4.1/26.0	5.7/22.0	7.5/17.5	7.0/10.0		6.7	6.7/9.0	6.9/16.0	5.4/21.5	2.6/28.0	2.5/33.0	
.1 ✓	5.4/33.0	5.3/26.0	6.2/21.4	6.8/17.0	6.7/8.0		6.6	6.6/9.0	6.5/17.0	6.0/21.6	4.8/25.0	4.6/33.0	
Nail in 24" Oak 35' R Sta 80+25													
.0 ✓	1.1/33.0	1.4/26.0	2.0/21.0	1.7/15.0	1.7/8.0		1.4	1.7/8.0	1.7/14.0	1.4/20.0	1.8/26.0	1.0/33.0	
.5 ✓	1.4/33.0	1.6/21.2	2.0/14.5	2.2/8.0			1.9	2.2/9.0	2.0/20.9	1.7/33.0			
.9 ✓	2.7/33.0	3.2/24.0	2.9/16.0	3.0/9.0			2.5	2.8/9.0	2.7/16.0	2.2/24.0	1.5/33.0		
.5 ✓	4.1/33.0	3.9/24.0	4.1/20.4	3.5/15.5	3.7/9.0		2.9	3.3/8.0	3.6/15.0	3.1/21.4	2.8/26.0	2.1/30.0	2.2/33.0
.6 ✓	6.0/33.0	5.2/28.0	4.5/26.0	5.2/14.0	4.7/8.0		3.8	4.2/9.0	4.5/13.0	4.3/15.0	4.6/25.0	4.6/33.0	

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		241.35 ✓			
82+00				237.3	6.1
+50					
83+00				34.2	9.2
+45					
T.P.	1.36	232.74 ✓	11.97	231.38 ✓	
84+00				31.1	1.6
85+00				28.0	4.7 28.10
86+00				25.36	7.4
+50					
B.M.			7.38	225.36 ✓	

See Page 72

Rec Austin.
Inst. Maloney
Rod. Skooglan
Chain. Godwin

5-27-24

Sta.	Left	C L	Right
7.8 ✓	5.8/33.0, ×5.9/21.2, 5.8/14.0, 6.0/6.5	5.6	5.7/7.0, 5.7/15.5, ×5.7/21.4, 5.6/33.0 } Stillwater Ave
.12 ✓	6.4/33.0, 6.7/25.0, 6.8/19.0, 7.9/16.0, 7.8/9.0	7.2	7.6/8.0, 7.8/14.0, 8.4/21.0, 8.2/33.0
.5 ✓	8.0/33.0, 8.4/26.0, ×8.4/21.8, 9.7/15.0, 9.4/9.5	8.9	9.2/9.0, 9.5/15.0, ×9.1/21.1, 8.8/25.5, 8.1/33.0
.0 ✓	11.0/33.0, 10.8/21.0, 11.6/16.0, 10.8/8.5	10.4	11.1/8.5, 11.4/14.0, 10.9/17.0, 10.7/20.5, 9.9/25.0, 9.8/33.0
.0 ✓	2.9/33.0, 2.8/22.0, ×3.1/18.3, 2.2/13.0, 2.1/8.0	1.7	2.0/7.0, 2.1/17.0, ×2.1/20.5, 2.3/33.0
.8	[illegible]/3.0, 5.6/25.5, 6.8/23.0, ×6.8/19.2, 6.5/15.0, 5.4/13.5, 5.0/9.5	4.7	5.4/7.5, 5.5/11.0, 7.1/15.0, ×8.1/21.1, 8.9/33.0
6 ✓	[illegible]/33.0, 8.2/28.0, 8.7/24.0, ×8.5/17.7, 7.9/14.0, 7.6/10.0	7.1	7.4/7.5, 7.5/12.5, 10.2/17.5, ×9.9/19.8, 9.5/23.0, 10.0/33.0
17 ✓	8.9/33.0, 8.8/27.0, 9.1/23.0, 8.6/15.0, 8.4/6.0	8.0	8.1/6.5, 8.6/13.5, 10.5/17.0, 9.2/21.0, 9.1/33.0

Nail in W. oak 30' ↑ Sta. 86+80

To Page 22

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	3.47	240.21			236.74
T.P.	3.71	238.35	5.57	234.64	
T.P.	4.42	238.51	4.26	234.09	
314+00				32.50	33.7
+50					33.9
+72.6	Top Rail				233.66
+95.75	" "				234.04
315.+00				233.39	34.0
+50				33.60	33.9
316+00				33.72	34.1
+50				33.90	34.3
317+00				234.05	34.5
+50				34.1	34.7
B.M.	4.67	238.90	4.28	234.23	
318+00				84.17	35.2

See page 32

Rec. Austin
Inst. Roessler
Rod. Berthiaume
Chain Schmidt

7-9-24

Left	C L	Right

Sp in T.P. 30' Rt Sta 2+16

From Page 5 of Last Leaf

5.5 / 30.0	5.3 / 22.5	Top Rail (4.80 / 17.35) (5.02 / 12.35)	5.0 / 10.0	4.9 / 0.5	4.8	4.8 / 5.0	5.2 / 11.5	5.3 / 17.0	5.5 / 24.0	Fence
4.9 / 29.5	4.5 / 14.0	Top Rail (4.51 / 9.85) (4.83 / 4.75)	5.0 / 3.3	4.7 / 2.7	4.6	4.7 / 6.0	4.9 / 10.5	5.5 / 13.0	5.7 / 22.5	Fence
					4.85					
					4.47					
5.4 / 26.0	4.9 / 23.5	5.0 / 21.0	5.3 / 20.2	4.6 / 16.0	4.3 / 9.0	4.5	Top Rail (4.47 / 1.0) (4.77 / 6.1)	4.6 / 11.0	5.0 / 13.0	5.8 / 25.0	Fence
4.3 / 30.0	4.4 / 33.0										
3.9 / 28.0	3.8 / 22.5	4.2 / 18.0	5.1 / 16.0	5.1 / 14.0	4.8 / 4.5	4.6	4.7 / 7.0	Top Rail. (4.38 / 12.2) (4.71 / 17.3)	5.0 / 22.5	5.7 / 34.5	Fence
5.0 / 33.0	5.0 / 27.5	4.8 / 18.0	5.3 / 15.5	4.7 / 11.0	4.3 / 3.5	4.4	4.4 / 7.5	4.7 / 14.5	Top Rail (4.16 / 18.65) (4.53 / 23.4)	5.1 / 33.0	
		5.0 / 33.0	5.3 / 16.0	4.7 / 8.0		4.2	4.2 / 6.0	4.8 / 14.0	4.5 / 19.0	4.9 / 29.0	5.1 / 33.0
4.8 / 33.0	4.8 / 26.0	5.0 / 14.0	4.7 / 12.0	4.3 / 7.5	4.1 / 5.5	4.0	4.1 / 7.0	4.6 / 13.5	4.3 / 17.0	4.7 / 27.5	4.9 / 33.0
5.1 / 33.0	5.1 / 26.5	4.9 / 19.5	5.0 / 17.5	4.6 / 13.0	4.1 / 11.0	3.9	4.1 / 7.5	4.6 / 11.5	4.7 / 14.5	4.6 / 25.0	5.2 / 28.0	5.4 / 33.0
4.0 Rt. Sta 3+7+06 Elec. Pole													
		5.0 / 33.0	5.0 / 27.0	4.5 / 13.5	4.1 / 11.0	3.7 / 4.0	3.7	4.0 / 5.0	4.4 / 9.5	4.6 / 12.5	4.3 / 14.0	5.3 / 28.5	4.8 / 33.0

To Page 32

Borrow for Division St.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	2.67	245.66			242.99
49+00				240.87	4.8
50+00				40.98	4.7
51+00				41.08	4.6
52+00				41.18	4.5
+55				41.24	4.4
+55				41.24	4.4
53+00				41.28	4.4
+45				41.38	4.3
54+00				41.60	4.1
T.P.	5.07	247.42	3.31	242.35	
55+00				42.00	5.4
+60				42.15	5.3

Rec. Austin
Inst. Maloney
Rod Skoglun
Chain Galvin

5-28-24

Nail in T.P. 20' Lt. sta 53+10

Sta.	Left						C L	Right						
(4.8)		4.7/33.0	5.6/25.0	5.0/20.0	5.0/14.0	5.0/8.5	4.6	4.8/6.0	4.6/12.0	5.2/14.0	4.7/16.5	4.2/26.0	4.2/33.0	
(4.7)		4.7/33.0	5.2/28.0	5.5/23.5	5.0/18.5	4.6/12.0	4.5	4.6/11.0	4.6/14.0	4.5/19.0	4.4/25.0	3.9/27.0	3.9/33.0	
(4.6)	4.5/33.0	4.5/29.0	5.5/25.5	4.7/18.0	4.4/11.0	4.6/6.0	4.7	4.7/8.5	4.6/14.5	4.7/22.0	4.5/26.0	3.9/27.5	3.8/33.0	
(4.5)	4.2/33.0	4.3/26.5	5.3/23.5	4.6/19.0	4.4/12.0	4.5/8.0	4.6	4.8/6.5	4.6/11.5	4.9/17.0	3.8/18.0	3.6/27.5	3.6/33.0	
(4.4)	4.1/33.0	4.3/27.0	5.0/24.0	4.7/21.5	4.1/14.0	4.3/10.0	4.3	4.3/6.5	4.3/13.0	4.3/17.0	3.8/18.0	3.3/27.0	3.3/33.0	
(4.4)	4.1/33.0	4.3/27.0	5.0/24.0	4.7/21.5	4.1/14.0	4.3/10.0	4.3	4.3/6.5	4.3/13.0	3.6/14.0	3.8/18.0	3.3/27.0	3.3/33.0	
(4.4)	3.9/33.0	4.1/27.0	4.6/24.0	4.5/20.5	4.2/15.0	4.4/9.0	4.4	4.5/9.0	3.8/11.0	3.7/21.0	3.3/26.5	3.3/33.0		
(4.3)		4.1/33.0	3.7/19.0	3.4/13.0	4.0/10.5	4.1/7.0	4.1	4.1/10.0	3.6/13.0	4.1/20.0	4.1/33.0			
(4.1)	2.4/33.0	3.5/27.0	3.6/17.5	3.3/13.0	3.8/11.0	3.9/7.0	3.9	4.0/7.0	3.9/9.0	3.4/11.0	3.8/18.0	3.7/25.0	3.3/33.0	
(5.4)		4.4/33.0	4.5/26.5	4.9/20.0	4.7/13.0	5.5/11.0	5.6	5.6/5.5	5.5/9.0	4.5/10.0	4.3/15.0	2.8/19.0	3.2/25.0	2.6/33.0
([illegible])		3.9/33.0	4.0/26.0	4.6/22.0	4.6/13.5	5.5/12.0	5.5	5.5/10.5	4.3/12.0	3.6/17.0	2.0/19.0	2.3/24.0	1.8/33.0	

Borrow for Division A.

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		247.42			
56+00				242.25	5.2
57+00				42.50	4.9
+50				42.54	4.9
58+00				42.58	4.8
B.M.			4.29	243.13	

Inst.
Rod.
Chain.

5-28-24

Left					C L	Right				
					(5.2)					
3.9 / 33.0	4.1 / 26.0	4.3 / 21.0	4.5 / 12.5	5.0 / 11.5	5.2	5.0 / 9.0	3.6 / 11.0	3.3 / 15.0	1.4 / 18.4	1.9 / 23.0	1.2 / 33.0
					(4.9)					
4.2 / 33.0	4.2 / 26.0	4.3 / 21.0	4.2 / 12.0	4.9 / 10.0	4.9	4.9 / 9.0	3.9 / 11.0	2.8 / 19.0	2.3 / 33.0		
					(4.9)					
4.6 / 33.0	5.3 / 26.0	4.5 / 19.5	4.3 / 10.0	4.7 / 9.0	4.8	4.9 / 10.0	3.9 / 11.0	4.1 / 17.0	4.3 / 24.0	2.3 / 33.0	
					(4.8)					
5.0 / 33.0	5.1 / 28.0	5.5 / 25.0	4.7 / 18.0	4.0 / 9.0	4.8 / 8.0	4.8	4.8 / 12.5	4.5 / 12.0	4.8 / 16.0	4.4 / 24.0	4.3 / 33.0

s/p in T.P 25' Rt. Sta 59+35

E levels for Grade Revision
Sta 100+00 to 116+00

Cross Sections

Sta.	B. S.	H. I.	F. S.	~~Grade~~ Rod.	~~Gr. R.~~ Elev.
B.M.	7.69	235.77			228.08
100+00				5.4	30.4
101+00				4.6	31.2
101+84.8 = 101+50				4.3	31.5
102+00				4.2	31.6
103+00				4.4	31.4
T.P.	5.17	236.64	4.30	231.47	
104+00				5.0	31.6
105+00				5.0	31.6
106+00				5.0	31.6
107+00				5.2	31.4
108+00				5.2	31.4
B.M.				1.13	235.51
T.P.	5.28	235.30	6.62	230.02	

Inst.
Rod.
Chain.

5-29-24

Left GL Right

Nail in 18" Oak 40 L

Nail in Oak 60' Rt. Sta 197+51

℄ here is for Grade Revision
Sta - 100+00 to 116+39.1

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		235.30			
109+00				4.3	231.0
110+00				4.8	30.5
111+00				4.8	30.5
112+00				4.6	30.7
113+00				4.4	30.9
114+00				4.3	31.0
B.M.	5.99	236.63	4.66	230.64	
115+00				5.4	31.2
116+00				4.8	31.8
+39.1				4.7	31.9

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

5-29-24

Left	C L	Right
Nail in T.P At Sta 114 + 70		

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	3.43	247.64 ✓			
15+50				242.80	4.8
15+27				242.5	5.1
15				242.3	5.3
14+50				242.0	5.6
14				241.87	5.7
13+50				241.66	6.0
13				241.44	6.2
12+839				241.37	6.2

Inst. V.V.H. 6-13-24
Rod. Eck
Chain Franker Golein

Left						C L				Right	

44+21 ✓ – ∠ rt. 17+04

To Page 15

3.25	(−0.2/15.3)	4.9/33	4.9/31	5.8/22	5.1/13	4.4/+0.4	4.6/15	4.4/24	5.0/33		
3.0	−0.2/15.3		6.0/33	6.0/20	4.3/10	4.6/	4.7/11	4.6/23	5.2/33		
2.7		6.0/33	5.9/24	4.8/18	4.6/13	5.0/5	4.8/+0.4	4.7/9	5.2/24	5.1/33	
2.9		6.0/33	5.7/30	4.8/26	5.0/13	4.7/+0.9	4.6/12	4.5/28	4.7/50	4.6/75	
3.0			5.0/33	4.7/24	4.8/9	4.6/+1.1	4.6/13	4.8/23			
2.5			4.6/33	4.9/15	5.4/11	5.1/+0.9					
2.		5.0/33	5.0/17	13/5.5/+0.7		(5.3)					
2.	5.1/33	5.1/25	5.1/16	14/5.2/+1.0		5.2					

From Page 34

From page 26

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R
		238.90			
318 + 50				234.23	35.4
319 + 00				34.29	35.6
+ 50				34.35	35.8
320 + 00				34.41	35.8
T.R.	5.06	239.86	4.10	234.80	
+ 50				34.47	35.6
321 + 00				34.53	35.8
+ 50				34.59	35.7
322 + 00				34.65	35.7
+ 50				34.71	35.9
B.M.	3.91	240.65	3.12	236.74	
+ 80				34.75	35.8
323 + 25				34.80	35.9

Rec. Austin
Inst. Skoeglun
Rod Berthiaume
Chain Schmidt

7-9-24

From Page 26

Left	C L	Right
4.7/33.0 4.6/21.5 4.4/18.5 4.2/15.0 4.1/12.0 3.7/10.0 3.5/5.0	3.5	3.7/6.0 4.3/12.0 4.0/14.0 4.9/26.5 5.9/30.5 6.0/33.0
4.0/33.0 4.0/20.0 3.7/18.0 4.0/12.5 3.8/10.0 3.5/8.5 3.3/4.5	3.3	3.5/5.5 3.8/9.5 4.1/12.5 3.9/15.0 4.7/26.0 5.3/31.0 6.0/33.0
4.3/26.0 4.3/33.0		
7/.0 3.7/20.0 3.5/17.5 3.4/12.5 3.7/10.0 3.4/8.0 3.2/5.5	3.1	3.3/5.5 3.6/7.5 4.0/13.0 3.8/15.0 5.4/31.5 5.7/33.0
3.5/33.0 3.5/18.0 3.2/15.5 3.8/11.5 3.4/9.0 3.2/5.5	3.1	3.3/5.0 3.7/9.0 4.1/12.0 3.8/14.0 4.8/23.0 5.1/27.5 6.4/33.0
4.5/33.0 4.3/26.0 4.2/21.0 4.4/14.0 4.6/12.0 4.4/10.0 4.2/4.5	4.3	4.5/5.5 5.0/12.0 4.9/14.5 6.2/29.0 7.6/33.0
5.1/33.0 5.1/27.0 4.4/21.0 4.1/14.5 4.6/11.0 4.5/9.0 4.2/4.5	4.1	4.2/5.0 4.4/9.0 4.9/12.0 4.7/15.5 5.7/25.5 7.4/33.0
5.1/33.0 5.1/26.0 4.4/21.0 4.5/18.5 4.2/14.5 5.0/12.0 4.4/5.5	4.2	4.2/5.5 4.4/10.0 4.9/13.0 4.6/14.0 5.6/27.0 6.5/32.0 7.0/33.0
4.6/33.5 4.6/19.0 4.6/16.5 5.0/14.0 5.1/12.0 4.7/10.0 4.3/6.0	4.2	4.3/6.5 4.6/11.0 4.5/15.0 5.2/25.0 5.4/26.0 5.8/30.5 6.0/33.0
5.6/37.5 5.7/33.0		
4.9/33.0 4.6/29.0 4.4/22.0 4.8/18.0 5.0/15.0 4.7/12.5 4.2/7.0	4.0	4.2/5.5 4.7/11.5 4.5/15.0 5.0/23.5 5.0/25.0 5.4/29.5 7.1/33.0

Nail in T.P. 3' Rt sta 2+16

Left	C L	Right
hittaker St.) 5.6/20.0 5.5/18.5 4.8/10.5	4.9	5.3/7.0 5.5/12.5 5.1/15.5 5.7/25.5 7.9/33.0
" ") 4.6/16.0	4.8	4.9/8.5 5.0/11.0 4.8/15.5 5.1/29.5 5.9/33.0

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. F
		240.65 ✓			
323+75				234.86	35.6
324+00				34.89	35.9
+50				34.95	36.3
+74.4	= 1+84.1			34.98	36.3
B.M.			3.91	236.74	= (237.37)
	Equation 324+74.4 = 1+81.4				
B.M.	4.64	242.01 ✓		237.37	= (236.74)
2+00				35.73	37.0
+50				36.13	37.3
3+00				36.49	37.1
4+00				36.60	37.3
B.M.	4.21	241.58 ✓	4.64	237.37 ✓	
5+00					37.3
6+00					37.1
+50					37.1

Rec. Austin.
Inst. Skoglund
Rod Berthiaume
Chain Schmidt

7-9-24

Left					G L	Right				
Whittaker St.	5.3 / 13.0	5.1 / 11.0			5.1	5.0 / 9.5	4.9 / 17.5	5.2 / 33.0		
	4.6 / 31.0	4.6 / 26.0	4.9 / 20.5	5.0 / 7.5	4.7 / 6.5	4.8	5.0 / 6.3	5.2 / 10.5	4.9 / 16.5	5.0 / 31.0	5.2 / 33.0
		4.3 / 26.0	4.3 / 17.0	4.1 / 15.0	4.2 / 7.5	4.4	5.2 / 15.5	5.0 / 18.0	4.9 / 33.0		
		3.9 / 26.0	4.1 / 19.0	4.0 / 13.5	4.2 / 7.0	4.4	4.6 / 3.5	5.2 / 16.0	4.9 / 19.0	4.9 / 31.5	5.2 / 33.0
Nail in T.R. Rt. Sta 2+16											
Nail in T.R. Rt. Sta 2+16											
	5.3 / 28.0	4.8 / 25.5	4.8 / 19.5	5.3 / 13.5	5.1 / 8.5	5.0	5.3 / 6.0	5.8 / 12.0	5.4 / 17.0	5.6 / 31.5	6.0 / 33.0
	4.2 / 33.0	4.4 / 27.0	4.6 / 20.0	4.9 / 12.0	4.7 / 9.0	4.7	4.8 / 5.0	5.1 / 15.0	5.6 / 18.0	5.1 / 21.5	5.2 / 31.
	5.0 / 33.0	4.6 / 27.0	4.7 / 26.0	4.8 / 22.0	4.6 / 15.0	4.5 / 7.5	4.7	5.1 / 5.0	5.7 / 13.0	5.1 / 20.5	5.3 / 30.5	6.5 / 32.0	6.7 / 33.0
	4.9 / 33.0	4.1 / 23.5	4.0 / 20.0	4.2 / 17.5	4.6 / 13.0	4.5 / 6.0	4.7	5.1 / 6.0	5.5 / 12.5	5.3 / 15.5	5.1 / 28.5	7.2 / 33.0	
Nail in T.R. Rt. Sta 2+16											
	4.8 / 33.0	3.6 / 27.5	3.8 / 22.0	3.8 / 16.5	4.3 / 7.0	4.2 / 8.0	4.3	5.0 / 15.0	4.6 / 17.5	4.6 / 28.5	6.5 / 33.0		
	4.2 / 33.0	4.0 / 26.5	3.9 / 22.5	3.7 / 19.2	4.1 / 14.0	4.3 / 6.5	4.5	4.6 / 5.5	5.3 / 12.5	4.8 / 17.0	4.4 / 21.0	4.4 / 29.5	7.6 / 31.5
	3.8 / 33.0	3.6 / 27.0	3.5 / 21.0	4.3 / 18.0	4.3 / 6.5	4.5	4.6 / 2.0	5.0 / 9.0	4.3 / 14.5	4.2 / 19.5	6.6 / 31.0	6.6 / 33.0	

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R
		241.58			
7+00					37.3
T.P.	4.17	241.54	4.21	237.37	
+38.4					37.5
+88.4					37.3
T.P.	4.72	242.33	3.93	237.61	
8+38.4					37.5
+88.4					38.3
9+40.7					38.8

Inst.
Rod.
Chain.

Left						C L						Right
5.1	3.5	3.5	3.7	4.5	4.2		4.2	4.3	5.3	5.4		
33.0	30.0	23.0	14.5	11.5	7.8	4.3	7.5	14.5	26.0	33.0		
	4.8	3.9	4.2	4.1			4.2	4.7	5.1	4.2	4.0	4.0
	33.0	21.5	17.0	7.5	4.0		7.0	14.0	20.5	23.0	27.0	33.0
4.5	4.3	4.6	3.8	4.9			4.4	4.3	4.6	4.1	4.1	4.0
33.0	29.0	23.0	10.5	6.0	4.2		10.0	14.0	15.0	27	33	33.0
4.8	4.2	4.4	4.5	4.6			4.9	5.1	5.2	4.8	4.7	
33.0	27.5	16.0	8.0	3.5	4.8		5.0	12.5	14.5	17.5	33.0	
4.0	4.1	4.0	4.1	4.2	4.1		4.0	4.5	4.5	4.5		
30.0	30.0	23.0	19	13.0	10.0	4.0	12.0	18.0	22.0	33.0		
2.6	2.8	3.5	3.2	3.6			3.5	3.8	4.2	3.9	3.9	
33.0	28.5	18.5	15.0	10.0	3.5		10.0	17.0	19.0	29.0	33.0	

To Page 31

..... Cross Sections

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

Inst.
Rod.
Chain.

Left	C L	Right

Whittaker Street.
X-Sections

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R
B.M	3.91	240.65		236.74	
T.P	4.12	240.23	4.54	236.11	
0+00				234.58	35.2
+25				34.60	34.8
+50				34.69	34.9
1+00				34.98	35.3
1+43.0 1+43.4				35.28	35.2
T.P	4.23	240.34	4.12	236.11	
1+75				35.44	35.4
1+96					35.4
T.P	4.61	240.72	4.23	236.11	
2+22				35.36	35.4
+50				35.09	35.7
+75				34.84	36.0
B.M			3.98	236.74	

Inst.
Rod.
Chain.

48.34
31.74
4.60

Left	C L	Right
Nail in T.P 30' Rt Sta 2+16		
9.8/27.0 5.5/19.0 5.0/16.5 5.24/12.0	5.0	5.32/12.0 6.2/22.0 5.9/22.5 5.1/23.5 4.1/28.0
9.2/27.0 5.1/18.0 4.9/6.5	5.2	5.2/7.0 5.6/16.0 6.2/20.0 5.9/24.5 4.9/25.0 4.6/27.0
8.0/27.0 5.7/21.0 5.2/16.5 5.3/6.0	5.3	5.6/5.0 6.0/7.5 6.3/19.0 6.6/22.0 6.4/24.5 4.7/25.0 4.3/27.0
5.5/30.0 5.5/20.5 6.0/17.5 5.0/7.5 5.2/6.5 4.9/2.5	4.9	5.2/5.0 5.8/9.5 6.1/15.0 6.0/21.5 5.6/23.5 4.7/24.0 4.2/25.5
Fence 5.4/22.0 5.5/18.5 5.8/12.0 5.5/9.0 5.6/7.5 5.3/5.0	5.0	5.2/7.5 5.5/10.0 5.7/11.0 5.4/14.0 5.7/20.5 5.1/22.5 4.2/23.5 4.3/[illegible]
Fence. 5.3/23.5 5.3/20.5 6.0/15.5 5.4/10.0 5.0/4.5	4.9	5.1/5.0 5.5/10.5 5.8/13.5 5.3/16.0 4.6/20.0 3.6/31.0 [illegible]
5.3/[illegible] 5.4/21.5 5.9/18.0 5.4/10.0 5.5/9.0 5.1/6.0	4.9	5.0/5.0 5.3/9.0 5.1/11.5 5.1/18.0 4.5/22.0 4.1/26.5 3.6/47.0 Gate Road
5.1/33.0 5.3/26.5 6.3/20.5 6.2/18.0 6.4/15.5 5.5/6.0	5.3	5.4/4.5 5.7/8.0 5.4/12.0 Road 4.8/29.0 4.9/33.0
6.0/33.7 6.2/30.5 6.0/23.5 5.5/8.5 5.3/6.5 5.2/3.5	5.0	4.9/4.5 5.3/18.0 5.5/21.0 5.2/27.0 5.1/33.0
5.3/[illegible] 5.4/50.0 5.3/41.0 5.4/33.0 5.2/26.0 5.0/19.0 4.7/12.5	4.7	4.8/7.5 5.0/20.0 5.2/29.0 5.4/32.0 5.7/43.0
Nail in T.P 30' Rt 2+16		

Whittaker Street

Final Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	4.46	241.20		236.74	
T.P	4.88	240.68	5.35	235.85	
0+00					
+25					
+50					
1+00					
1+43.0 } 1+43.2 }					
1+75					
T.P	5.03	240.87	4.83	235.85	
1+85					
2+22					
+50					
+75					
B.M			4.13	236.74	

Rec. Austin
Inst. Crane
Rod Beathstone
Chain. Mahoney

10-22-24

Left	C L	Right
Nail in T.P. Rt. Sta 2+16	(5.5)	
10.3/28.2 6.9/21.5 5.8/18.2 5.68/12.0	5.45	5.77/12.0 5.6/20.8 5.2/24.6 4.6/27.8 4.3/33.0
	(5.9)	
9.6/27.0 5.5/17.4 5.60/12.0 5.71/11.5	5.53	5.76/11.5 5.62/12.0 5.4/16.4 5.6/24.5 5.0/27.0
	(5.8)	
8.2/29.0 5.5/17.4 5.41/12.0 5.53/11.5	5.36	5.55/11.5 5.47/12.0 5.2/18.0 5.3/25.4 4.7/27.0
	(5.4)	
6.0/30.0 5.8/19.6 5.3/17.5 5.15/12.0 5.23/11.5	5.09	5.22/11.5 5.12/12.0 5.0/24.4 4.6/25.0
	(5.5)	
5.9/30.0 6.0/19.2 5.1/16.8 4.86/12.0 4.97/11.5	4.77	4.92/11.5 4.82/12.0 4.8/25.0
	(5.3)	
5.6/23.5 5.7/19.5 5.0/16.8 4.79/12.0	4.60	4.72/11.8 4.64/12.0 4.5/23.0 4.3/31.0
	(5.5)	
5.8/24.0 6.0/31.0 5.1/19.0 4.91/12.0	4.71	4.75/12.0 4.36/25.0 4.12/43.0 4.1/47.0
	(5.5)	
5.2/33.0 5.3/24.6 5.07/12.3	4.89	5.02/12.0 5.11/25.0 5.01/28.5 4.9/33.0
	(5.2)	
5.3/33.0 5.38/23.4 5.52/22.2 5.38/21.0	5.16	5.32/23.0 5.45/24.0 5.24/25.0 5.3/33.0
	(4.9)	
5.46/72.5 5.53/50.0 5.45/24.0	5.31	5.43/35.0 5.56/36.5 5.38/38.0 5.3/100

Nail in T.P. Rt Sta 2+16

..... Cross Sections

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

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

Left	G L	Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M.	6.41	253.22		246.81	

From Page 2 of Loose Leaf.

286+00				248.2	48.9 5.0
+50				48.3	48.8 4.1
+75					48.9
287+00				48.19	48.9 5.0
T.P	5.97	254.75	4.44	248.78	
+50				247.95	49.0 6.8
1906	B.S.T			247.64	48.9 7.1
288+28					48.8
+33					48.9
+40.64				47.17	48.8 7.7 7.3 7.5
1906	B.W.T			46.44	47.9 7.7 8.3 7.8
289+40.64	P.C.	1.54		45.40	47.0 10.0 9.2 9.6

Rec. Austin
Inst: Skooglun
Rod. Berthiaume
Chain. Schmidt

7-17-24

Left	C L	Right

R.R. Spike in Tree 70' Rt. Sta 28 + 435.0

3.6/33.0 — C.1.9 5.1/24.9 — 5.2/22.0 — 6.0/22.0 — 6.0/19.0 — 5.0/15.5 — 4.4/5.0 — C.0.7 4.3 — 4.4/4.5 — 4.7/12.0 — 5.3/14.5 — 4.7/20.5 — 5.1/24.0 — C.0.5 4.5/25.5 — 3.8/27.5 — 3.0/33.0

6.0/33.0 — C.1.6 5.3/24.6 — 5.1/21.0 — 4.6/18.5 — 4.5/15.5 — 5.0/13.5 — 4.7/10.0 — 4.5/5.0 — C.0.5 4.4 — 4.7/5.0 — 4.5/9.0 — 4.6/13.0 — 0.0 4.9/15.0 — 5.5/20.5 — C.2.0 4.9/25.0 — 2.0/28.5 — 1.0/33.0

7.5/33.0 — 5.9/20.5 — 4.8/17.5 — 4.6/15.5 — 5.0/13.5 — 4.8/11.0 — 4.4/4.5 — 4.3 — 4.6/9.5 — 4.9/14.5 — 5.4/17.0 — 5.4/21.5 — 4.7/26.0 — 2.6/29.0 — 1.2/29.5 — 0.8/33.5

6.9/33.0 — F.0.8 5.4/24.2 — 5.6/22.0 — 3.8/17.0 — 4.1/15.0 — 4.7/12.5 — 4.4/5.0 — C.0.7 4.3 — 4.6/10.0 — 4.8/13.0 — 0.0 3.0/15.0 — 5.6/20.5 — C.2.0 5.0/25.0 — 0.6/30.0 — 0.0/33.0

7 — C.1.2 5.6/26.2 — 5.4/24.5 — 4.7/17.0 — 5.1/15.5 — 6.3/13.0 — 6.0/8.0 — C.1.0 5.8 — 6.0/4.5 — 6.4/8.0 — 6.4/12.0 — C.0.1 6.7/15.0 — 6.8/17.0 — 6.0/20.0 — 3.5/24.0 — 2.1/29.7 — C.5.6 1.2/30.0

7.3/27.5 — C.0.2 7.4/25.2 — 6.9/20.5 — 5.6/16.5 — 6.4/14.0 — 6.3/9.5 — 6.0/4.0 — C.1.2 5.9 — 6.6/12.5 — 5.8/20.0 — 3.7/25.5 — C.4.7 2.4/29.7 — 1.9/33.0

7.2/33.0 — 7.1/24.5 — 6.9/19.0 — 5.8/21.5 — 5.9/17.0 — 6.4/15.0 — 6.4/8.0 — 6.1/5.0 — 6.0 — 6.3/12.0 — 6.7/14.0 — 6.1/22.0 — 2.0/30.0 — 1.8/33.0

6/0 — 6.6/26.5 — 5.9/21.5 — 5.9/17.0 — 6.3/16.0 — 6.6/13.5 — 6.4/10.5 — 6.1/5.0 — 5.9 — 6.2/11.0 — 5.6/17.0 — 4.7/33.0

6.6/25.0 — 5.8/22.5 — 6.2/19.0 — 5.7/16.5 — 6.3/15.0 — 6.6/13.5 — 6.4/10.0 — 6.1/5.0 — C.1.6 6.0 — 6.0/5.5 — 6.1/10.0 — 5.3/21.5 — C.2.7 4.5/27.7 — 4.5/33.0

7.4/33.0 — C.0.9 7.8/25.9 — 8.4/21.0 — 7.2/14.0 — 7.3/10.5 — 7.0/6.0 — C.1.4 6.9 — 7.0/8.0 — 7.3/15.0 — 4.7/21.0 — C.6.1 6.8/26.1 — 6.7/33.0

9.5/33.0 — C.0.5 9.3/27.3 — 9.7/22.5 — 8.4/15.5 — 8.0/7.0 — C.1.4 7.8 — 8.0/4.0 — 8.1/9.5 — 8.8/14.5 — 0.0 8.5/16.0 — 9.0/20.0 — C.1.5 9.0/24.5 — 9.3/33.0

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		254.75			46.7
289+90.64	E.W.T 3.32			44.60	11.2 10.2
T.P.	3.13	248.90	8.98	245.77	
290+50				43.30	44.3 6.5 5.5 4.
291+00				42.20	43.1 7.9 6.7 5.
+50				41.10	43.7 9.0 7.8 6.
+65					42.9
+75					41.2
292+00				40.00	41.0 10.1 8.9 8.
T.P.	3.91	243.28	9.53	239.37	
+42.3	E.W.T			39.07	39.4 5.2 4.2 3.
T.P.	1.01	240.98	3.91	239.37	
+67.3					38.4
+92.3	P.T. 180			37.97	37.9 3.8 3.0 2.
293+42.3	B.W.T			36.90	37.3 4.5 4.1 3.

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

7-17-24

Left C L Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
		240.98			
293+92.3				35.96	36.3 5.1 5.[illegible]
294+42.3				35.14	35.5 5.91
295+00				34.35	35.0 6.6[illegible]
+50				33.8	34.5 7.2
T.P.	4.58	238.87	6.69	234.29	
296+00				33.38	34.0 5.5
+50				33.07	33.6 5.[illegible]
297+00				32.9	33.2 6.0
+50				33.1	33.1 5.6 5.8 [illegible]
+77					
298+10					
T.P.	4.77	238.59	5.05	233.82	
B.M.			5.62	232.97	232.91

To Page 2 of Loose Leaf

Inst.
Rod.
Chain.

7-17-24

Left | C L | Right

F.3.6 — 9.4/33.0 8.6/24.3 7.5/19.0 7.2/7.3 6.4/7.0 4.9/3.5 C.0.3/4.7 4.5/5.0 4.9/13.8 F.0.7 5.6/16.1 6.0/21.5 O.0.09 6.0/23.9 5.2/33.0

F.2.1 — 9.4/33.0 9.1/28.0 8.0/24.0 8.0/19.2 7.4/11.5 6.9/7.3 5.6/6.5 C.0.4/5.5 5.8/11.0 6.7/13.0 7.0/15.5 F.1.7 7.6/16.6 9.7/23.0 8.8/33.0

F.1.8 — 10.6/33.0 9.0/25.5 8.4/18.7 8.0/13.0 7.2/10.0 6.0/7.5 C.0.6/6.0 6.2/9.5 6.8/11.0 7.7/15.0 F.1.3 7.9/18.0 9.6/24.0 10.3/33.0

F.2.3 — 11.1/33.0 10.7/27.0 9.5/19.5 9.5/15.0 8.9/12.5 6.8/8.0 C.0.7/6.5 6.6/9.5 7.4/13.5 9.0/15.5 9.8/16.0 F.2.6 9.8/19.3 9.3/33.0

F.2.6 — 10.1/33.0 9.3/26.0 9.3/24.0 8.1/19.4 8.7/14.5 5.0/7.0 C.0.6/4.9 4.9/10.5 6.6/16.0 7.6/17.8 F.3.5 8.7/21.3 9.5/26.5 6.2/33.0

F.2.8 — 0/0 9.5/28.0 9.0/23.0 8.6/20.2 8.3/14.0 7.3/10.0 5.4/5.5 C.0.5/5.3 5.4/12.0 6.0/13.0 F.1.1 6.9/17.7 7.6/21.5 8.4/33.0

F.2.8 — 9.8/33.0 8.8/20.2 7.9/4.5 5.7/6.5 C.0.3/5.7 5.8/11.0 0.0 5.9/16.0 6.1/21.0 D.C.1.3 6.7/24.3 7.3/33.0

F.2.3 — 9.7/33.0 8.3/20.5 8.0/18.0 7.8/13.0 7.4/11.0 6.2/9.5 5.8/7.5 0.0/5.8 5.6/10.5 6.0/12.0 C.0.6 5.4/15.5 5.0/17.0 4.8/25.0 4.8/33.0 Top

4.98/10' Rt Top Rail

Top Rail 5.14/12.0

¢ stake Twin City Ry. 297+90 Rt.

RR Spike 65' Rt. @ Sta 299+20.

X-Sections for Extra Material

Sta. 73+00 — 74+50

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R
B.M.	1.45	245.13		243.68	
73+00					
73+50					
73+75					
74+00					
+25					
+50					

Inst.
Rod.
Chain.

9-2-24

Left	C L	Right

Rev
4.82 4.9 5.7 13.7 13.4
10.0 14.0 17.2 28.0 33.0

Rev
4.91 5.2 10.0 13.2 14.9
10.0 13.6 20.4 25.0 33.0

Rev
5.00 7.1 13.6 14.2
10.0 14.0 27.0 33.0

5.00 5.4 6.1 6.3 14.6 14.2
10.0 10.0 12.0 15.4 26.0 33.0

Rev
5.17 5.6 11.5 13.6 13.9
10.0 10.0 19.5 28.5 33.0

5.3 5.6 6.8 8.3 12.8 13.9
10.0 10.0 16.0 18.5 25.5 33.0

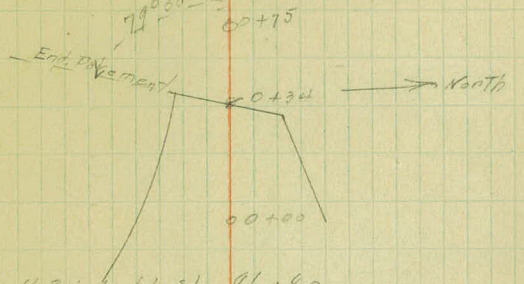
X-Sections for approach to Pavement
No. End Bald Eagle Ave

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
B.M	3.43	228.90		225.47	
0+00					
+15					
+34					
+46					
+75					

Inst.
Rod.
Chain.

Left C L Right



Nail in Woak 30' Left Sta 86+80

4.6	5.0	4.6	E.Pav 4.4	Pav	E.Pav 5.05	5.3	6.4	7.1	7.8	
37.0	40.0	42.5	42.5	4.41	20.9	20.9	23.0	25.5	33.0	
5.3	5.4	5.7	5.0	E.Pav +1.61		E.Pav 5.1a	5.5	6.1	6.6	7.3	7.4
30.0	37.0	31.0	29.4	29.4	4.92	17.6	17.6	18.5	23.5	25.0	33.0
5.2	5.5	5.2	E.Pav 5.0			5.5	6.1	7.0	6.7	7.0	
33.0	18.5	16.5	16.5	5.10		15.7	17.6	22.6	28.0	33.0	
5.7	5.5	5.8				6.6	6.6	6.8			
32.0	18.0	14.0	5.8			20.0	20.0	33.0			
5.1	5.5	6.1				6.7					
33.0	22.0	9.5	5.9			20.0	Building				

..... Cross Sections

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

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

Left	C L	Right

..... Cross Sections

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

Inst.
Rod.
Chain.

Left	C L	Right

..... Cross Sections

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

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

Left	C L	Right

Cross Sections

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

Inst.
Rod.
Chain.

Left	C L	Right

..... Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. 1

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

Left	C L	Right

Cross Sections

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

Inst.
Rod.
Chain.

Left	C L	Right

..... Cross Sections

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

Inst.
Rod.
Chain.

Left	C. L	Right

..... Cross Sections

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

Inst.
Rod.
Chain.

50

Left | C L | Right

Cross Sections

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

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

Left	C L	Right

Curve P.I. Sta 282+55.2

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R:
Station	Point	Defl.	Profile Grade	Super. Per 1ft.	Extra Widening
278+72.03	B.S.T.	0	247.73	-.008	
+97.03		25	247.70	-.008 +.000	
279+22.03		50	247.68	-.008 +.008	
+47.03		75	247.65	-.008 +.017	
+72.03	B.W.T.	100	247.63	-.017 +.026	
+97.03		125	247.60	-.026 +.035	0.0
280+22.03	P.C.	0°00'	247.58	-.035 +.044	0.4
+47.03		2°30'	247.55	-.044 +.053	1.84
+72.03	E.S.T. E.W.T.	5°00'	247.53	-.053 +.062	3.40
281+00		7°48'	247.50	-.062	3.72
+25			247.48		
+50		12°48'	247.45	"	"
+75			247.43		
282+00		17°48'	247.40	"	"
+25			247.39		
+50		22°48'	247.38	"	"
283+00		27°48'	247.40	"	"
+30		30°48'	247.42	"	"
+62.03	E.W.T. E.S.T.	34°00'	247.50	+.062 -.062	3.72
+87.03		36°30'	247.55	+.053 -.053	3.40
284+12.03	P.T.	39°00'	247.64	+.044 -.044	1.84
+37.03			247.71	+.035 -.035	0.4
+62.03	B.W.T.		247.79	+.026 -.026	0.0
+87.03			247.86	+.017 -.017	
285+12.03			247.94	+.008 -.008	
+37.03			248.01	+.000 -.008	
+62.03	B.S.T.		248.09	-.008 -.008	

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

Left	C L	Right		
10°	10.0	11.84	13.40	13.72
247.65	247.65			
247.70	247.62			
247.76	247.60			
247.82	247.48			
247.89	247.41			
247.95	247.24			
248.02		247.06		
248.08			246.84	
248.15				246.68
248.12				246.65
248.07				246.60
248.02				246.55
248.00				246.53
248.02				246.55
248.06				246.59
248.12				246.65
248.08			246.84	
248.08		247.12		
248.06	247.35			
248.05	247.53			
248.03	247.69			
248.02	247.86			
248.01	247.93			
248.01	248.01			

Curve P.I. Sta. 291+43.5

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
Station	Point	Defl.	Profile Grade	Super Per. ft.	Extra. Widening
287+9.64	B.S.T.		247.64	-.008	
288+15.64			247.40	+.000 -.008	
+40.64			247.11	+.008 -.008	
+65.64			46.80	+.017 -.017	
+90.64	B.W.T		46.44	+.026 -.026	0.0
289+15.64			46.04	+.035 -.035	0.4
+40.64	P.C.	0°00'	45.59	+.044 -.044	1.84
+65.64		2°30'	45.17	+.053 -.053	3.40
+90.64	E.S.T. E.W.T.	5°00'	44.60	+.062 -.062	3.72
290+20		7°56'	43.96	" "	" "
+50		10°56'	43.30	" "	" "
+72		13°26'	42.75		
291+00		15°56'	42.20	" "	" "
+25		18°26'	41.65		
+50		20°56'	41.10	" "	" "
+75		23°26'	40.55		
292+00		25°56'	40.00	" "	" "
+20	E.W.T.	27°56'	39.56	+.062	
+42.3	E.S.T.	30°10'	39.07	-.062	3.72
+67.3		32°40'	38.51	+.053 -.053	3.40
+92.3	P.T	35°10'	37.97	+.044 -.044	1.84
293+17.3			37.42	+.035 -.035	0.40
+42.3	B.W.T.		36.90	+.026 -.026	0.0
+67.3			36.47	+.017 -.017	
+92.3			35.96	+.008 -.008	
294+17.3			35.53	+.000 -.008	
+42.3	B.S.T		35.14	-.008	

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

Left	10 C	L 10	11.	Right 12	10.17
	247.56	247.56			
	247.32	247.40			
	247.03	247.19			
	246.63	246.97			
0.4	246.18	246.70			
0.0	245.68	246.39			
1.84	245.07	246.03			
3.40	244.41	245.65			
3.72	43.75	245.22			
	43.11	44.58			
	42.45	43.92			
	41.90	43.37			
	41.35	42.82			
	40.80	42.27			
	40.25	41.72			
	39.70	41.17			
	39.15	40.67			
	38.71	40.18			
3.72	38.22	39.69			
3.40	37.81	39.05			
1.84	37.45	38.41			
0.40	37.06	37.77			
0.0	36.74	37.16			
	36.25	36.59			
	35.88	36.04			
	35.45	35.53			
	35.06	35.06			

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
297+01.4	B.W.T		33.17		0.0
+26.4			33.17		0.3
297+51.4	T.C.	0° 00'	33.17	+006 −006 +000	1.13
+76.4		1° 15'	33.17	−008 +008	2.00
298+01.4	E.W.T	2° 30'		−008 +017	2.29
+25		3° 40'		−017 +026	"
+50		4° 55'	32.92	−026 +035	"
+75		6° 10'	32.90	−035 +044	
299+00		7° 25'	32.88	−044 +053	
+25		8° 40'	32.88	−053 +062	
+50		9° 55'	32.87	−062	
+75		11° 10'	32.88		
300+00		12° 25'	32.90		
+25		13° 40'	32.92		
+50		14° 55'	32.95		
+75		16° 10'	32.97		
301+00		17° 25'	33.00		
+20		18° 25'	33.02		
+36.4	E.W.T	19° 15'	33.04	+062 −062	2.79
+61.4		20° 30'	33.06	+053	3.05
+86.4	P.T	21° 45'	33.09	−044 +035	3.13
302+11.4			33.11	035	0.0
+36.4	B.W.T		33.14	+026 026	0.0
+61.4			33.16	+017 −017	
+86.4			33.19	+008 −008	

53

21 05
21 05
48° 30'

299+80.3
297+51.4
2428.9

Inst.
Rod
Chain

Left	C.L.	Right
33.09	33.09	
33.08	33.19	
33.07	33.19	33.66
33.07	33.25	32.28
		1.38
32.60	33.18	
32.47	33.25	
32.34	33.32	5.05
32.23	33.41	1.59
32.11	33.49	
32.12	33.50	
32.14	33.52	
32.16	33.54	
32.19	33.57	
32.21	33.59	
32.24	33.62	
32.26	33.64	
32.28	33.66	
32.41	33.59	
32.60	33.53	
32.76	33.45	
32.88	33.40	
32.99	33.33	
33.11	33.27	

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
303+04.2	P.C.	0°00'	33.20		
+50		00 14'	33.25		
304+00		00 29'	33.30		
+50		0°44'	33.35		
305+00		0°59'	33.40		
+50		1°14'	33.45		
306+00		1°29'	33.50		
+50		1°44'	33.55		
307+00		1°59	33.60		
+20.9	P.T	2°05'	33.62		

J-4

Inst.
Rod.
Chain.

Left	C L	Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
307+50				33.65	
308+00				33.70	
+30				33.73	
+55.3	B.W.T			33.75	0.0
+80.3				33.78	0.3
309+05.3	P.C.	0°00'		33.80	1.27
+30.3		1°30'		33.87	2.25
+55.3	E.W.T	3°00'		33.83	2.57
+75		4°11'		33.87	
310+00		5°41'		33.80	
+25		7°11'		33.77	
+50		8°41'		33.72	
+70.5	E.W.T	9°54½'		33.68	2.57
+95.5		11°24½'		33.61	
311+20.5	P.T.	12°54½'		33.5[illegible]	
311+39.8				[illegible]	
311+38.2					
+43.8				33.47	0.3
+68.8	T.S.W.T			33.40	0.0
12+00				33.30	
+20				33.24	
+50				33.16	
13+00				33.07	
+50				33.04	
14+00				33.06	33.9
+30				33.16	38.4
					33.9

Inst.
Rod.
Chain.

Left	C L	Right

Cross Sections

Sta.	B. S.	H. I.	F. S. Profile Grade:	Grade	Gr. R. Extra Wid
314+62.84	B.W.T		233.27 ✓		0.0
314+87.84			233.35 ✓		0.35
315+00			233.39		
315+12.84	P.C.	0°00'	233.43 ✓		1.56
+37.84		2°00' 30 12	233.52 ✓		2.77
+47.84					
+62.84	E.W.T	4°00' 2°34½	233.60 ✓		3.14
+70					
+80		5°22½'	233.65 ✓		✓✓
316+00		6°58½'	33.72 ✓		✓✓
+25		8°58½'	33.80 ✓		✓✓
+45.75	E.W.T	10°38'	33.87 ✓		3.14
+70.75		12°38'	33.95 ✓		2.77
+95.75 ✓	P.T.	14°38'	234.04 ✓		1.56
317+20.75			234.07 ✓		0.35
+45.75	B.W.T.		234.10 ✓		0.0
+68.0			234.13 ✓		

Inst.
Rod.
Chain.

Left

Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
317+88.9	P.C.	0°00'	34.16		
318+05		0°34'	34.18		
+25		1°16'	34.20		
+50		2°08½'	34.23		
+75		3°01'	34.26		
319+00		3°53½'	34.29		
+30		4°56½'	34.33		
+58.7	P.T.	5°56½'	34.36		
+78.7			34.38		
320+00			34.41		
+25			34.44		
+50			34.47		
+80			34.51		

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

57

Left	C L	Right

Cross Sections

Sta.	B. S.	H. I.	F. S. Finish Grade	Grade	Gr. F.
321+09	P.C.	0000'	34.54		
+30		0031'	34.56		
+50		1001'	34.59		
+75		1°38½'	34.62		
322+00		2016'	34.65		
+25		2°53½'	34.68		
+50		3°31'	34.71		
+56			34.72		
+75		4°08½'	34.74		
323+00		4°46'	34.77		
+25		5°23½'	34.80		
+50		6°01'	34.83		
+75		6°38½'	34.86		
+90		7°01'			
324+00		7°16'	34.89		
+25		7°53½'	34.92		
+50		8°31'	34.95		
+74.4	P.T.	9°07½'	34.98	Eq. 236.74 = 237.37	
=1784			35.61		
2+00			35.73		
+25			35.93		
+50			36.13		
+75			36.33		

Inst. ....

Rod. ....

Chain. ....

Left	C L	Right
17.1 × 1.5 = 855 / 171 / 25.65	16.5 × 1.5 = 825 / 165 / 24.75	17.5 × 1.5 = 875 / 26.25
4046 / 25.½ / 5011½	4046 / 26. / 3012	4046' / 24.77175 / 1075

56 × 5 = 280 / 56 / 840

1024 / 2016 / 3040.

Whittaker Street Co. Proj - 24-5

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
0+00				234.58	
0+02.1	P.C.	0000'			
+25	3°	3°27'		234.60	
+30		4°14'		234.61	
+50		7°20'		234.69	
+75		11°12'		234.81	
1+00		15°05'		234.98	
+25		18°57'		235.15	
1+43.0 1+43.4	P.T.	21°45'		235.28	
+75	End Curb left			235.44	
2+14.9	Beg. Rad. left			235.39	
+22.8	" " Right			235.36	Top. Pave 30'-At-235.
+25				235.32	
+50				235.19	
+75				234.84	

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

Left | C L | Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gs. R.
14+40	P.C.	0°00'			
+70		4°21'			
+75		5°04½			
15+00		8°42'			
+25		12°19½			
+33.8		13°36'			
9+88.4	P.C.	0°00			
9+00		10°10'			
+38.4		5°00'			
+88.4		10°00'			
9+40.7	P.T.	15°14'			

Inst.
Rod.
Chain.

Left - C L - Right

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
3+00				36.49	
+25				36.52	
3+40.8	P.C.	0°00'		36.54	
+58		0°05'		36+56	
+75		0°10'		36.58	
4+00		0°18'		36.60	
+25		0°25'		36.63	
+50		0°33'		36.65	
+75		0°41'		36.68	
5+00		0°48'		36.70	
+25		0°55'		36.73	
+50		1°03'		36.75	
+75		1°10'		36.78	
6+00		1°18'		36.80	
+25		1°25'		36.83	
+50		1°33'		36.85	
+75		1°40'		36.87	
7+00		1°48'		36.87	
+19		1°53'		36.87	

Inst.
Rod.
Chain.

Left	C L	Right

100' Super Transition

Station — Point — Det. — Profile Grade — Super. per Ft. — Cross Section

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
96+01.86	B.S.T.		225.3	-.017 -.017	
86+26.86			224.81	-.008 -.017	
+51.86	B.W.T.		224.37	-.000 -.017	0.0
+76.86			223.96	+.008 -.017	0.6
87+01.86	P.C.	0°00'	223.63	+.017 -.017	2.48
+21.84			223.39	-.017 +.017	4.24
+41.82	E.W.T.	17°32½'	223.20	-.017 +.017	4.94
+61.80			223.05	-.017 +.017	4.24
87+81.79	P.T. 45+	35°05'	222.93	-.017 +.017 +.008	2.48
88+06.79			222.84	-.017	0.6
+31.79	B.W.T.		222.80	-.000 -.017	0.0
+56.79			222.62	-.008 -.017	
+61.79	B S T		222.90	-.017	

Inst.
Rod.
Chain.

℄

Top. Pav.

Left	C L	Right
225.82	225.99	225.82
225.40	225.48	225.31
225.04	225.04	224.87
224.71	224.63	224.45
224.47	224.30	224.09
224.23	224.06	223.82
224.04	223.87	223.62
223.89	223.72	223.28
223.77	223.60	223.39
223.59	223.51	223.33
223.47	223.47	223.30
223.41	223.49	223.35
223.40	223.57	223.40

Cross Sections

Sta.	B. S.	H. I.	F. S.	Grade	Gr. R.
			Profile Grade	Super. per ft	Extra Width
~~97+12.13~~	~~B.S.T~~	Def		-.017	
97+17.13	B.S.T.		225.62	+.017	
20 +32.13			225.98	-.017	
97+55.86	B.W.T.		226.40	-.011	
				-.017	
70 +82.13			226.88	+.004	0.0
98+05.99	P.C.	0°00'	227.30	-.017	0.6
10 +32.13		2°22'	227.60	+.012	2.48
				-.017	
25 +37.13	E.S.T	4°33'	227.87	+.017	4.00
				-.024	
+50	E.W.T E.W.T	6°23½'	228.09	+.024	4.75
				-.024	
+62.79	E.S.T.	8°14'	228.31	+.024	4.75
10 98+77.79		10°25'	228.56	-.017	
98+90.04	P.T.	12°47'	228.81	+.017	4.00
				-.017	
70 99+17.79			229.16	+.012	2.48
99+44.04	B.W.T		229.51	-.017	
				-.004	0.6
					0.0
99+67.79			229.81	-.017	
10 99+87.79	B.S.T		230.04	-.011	
				-.017	
				-.017	

Inst.
Rod.
Chain.

Left	C L	Right
Top Par Elev.		
226.14	226.29	226.12
226.54	226.65	226.48
227.03	227.07	226.90
227.59	227.55	227.39
228.09	227.97	227.76
228.44	228.27	228.03
228.78	228.54	228.29
229.00	228.76	228.40
229.22	228.98	228.63
229.40	229.23	228.99
229.60	229.48	229.27
229.87	229.83	229.65
230.14	230.18	230.01
230.37	230.48	230.31
	230.71	

7a2

..... Cross Sections

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

Inst.
Rod.
Chain.

Left	C L	Right

..... Cross Sections

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

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

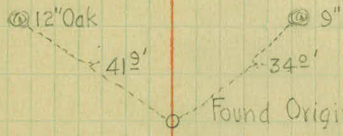
Left	℄ L	Right

Sta.	Point	Defl.-L.	Defl. R.	
284+12.03	P.T.		39°00'	
284			37°48'	
+50			32°48'	
283			27°48'	Δ. 78°00'
282+55.2	P.I.			D. 20°-R.
+50			22°48'	T. 233.17'
282			17°48'	L. 390.0'
+50			12°48'	
281			7°48'	
+50			2°48'	
280+22.03	P.C.			
277+68.0	Beginning of Proj. 24-51			
272+19.2	P.I.			

T - O.R. VanKrevelen
H.C. - O. Skooglund
R.C. - W. Maloney
Stake - M. Galvin

Clear - Cold
Very Windy

May - 5 - 1924.



End of Pavement - Proj. 23-52.

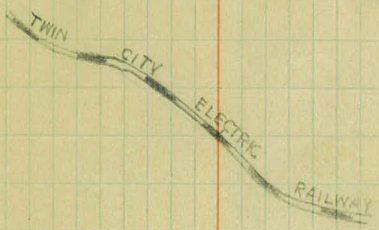
Mont. Center of Pavement.

Sta.	Point	Defl.-L.	Defl.-R.	
+50		15°05'		
300		12°35'		Δ. 41°02'
299+63.2	P.I.			D. 10°-L.
+50		10°05'		T. 214.67'
299		7°35'		L. 410.33'
+50		5°05'		
298		2°35'		
297+49.4	P.C. = 297+48.33 P.C.			
292+92.3	P.T.	35°10'		
+50		30°56'		
292		25°56'		
+50		20°56'		Δ. 70°20'
291+43.5	P.I.			D. 20°-L.
291		15°56'		T. 202.86'
+50		10°56'		L. 351.66'
290		5°56'		
+50		0°56'		
289+39.0	P.T. = 289+40.64 P.T.			

7+91+49.5
2+02.86
287+46.64

See Revision

Sta.	Point	Defl. L.	Defl. R.	
314+82.-				
311+38.12	P.T.	12°03'		
311		10°09'		
+50		7°39'		Δ. 24°06'
310+19.6	P.I.			D-10°-L.
310		5°09'		T. 122.48'
309 +50		2°39'		L. 241.0'
308+97.12	P.C.			
301+58.66	P.T.	20°31'		
+50		20°05'		
301		17°35'		



Sec. Revision

14" Tree
45 8/10'
Found original R.R. Spike
71 8/10'
18" Oak

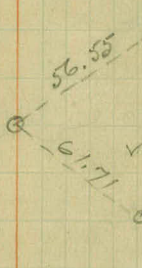
Sta.	Point	Defl. L.	Defl. R.	
319+58.7	P.T.		5°56½'	7° - Rt.
319 +00			3°53½'	Δ = 11°53
318+74.1	P.I			Rad = 819.02
+50			2°08½'	Tang = 85.23
318			0°23½'	Length = 169.76
317+88.9	P.C.		0°00'	
316+95.75	P.T.		14°38'	16° - Rt.
+50			10°58½'	Δ = 29°16'
316+06 64	P.I.			Rad = 359.27
316			6°58½'	Tang = 93.8
+50			2°58½'	Length = 182.91
315+12.84	P.C.		0°00'	

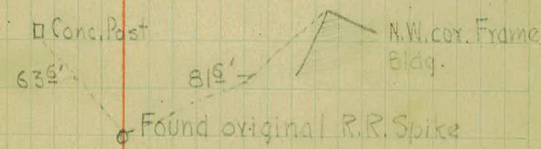
T-O.R.Van Krevelen
H.C.- O. Skaaglund
R.C.- W.Maloney
Stake- M. Galvin

Rain - Cold.
Very Windy.

69

May 6-1924





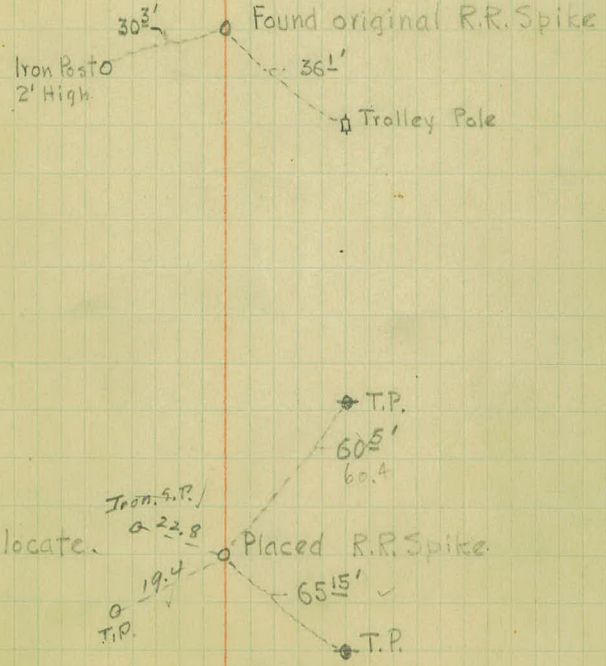
57 3/6

Sta.	Point	Defl. L.	Defl. R.	
7+19±	P.T.	1°53'		
7		1°48'		
6		1°18'		Δ. 3°47'
5+30±	P.I.			D. 1°-L.
5		0°48'		T. 189.2'
4		0°18'		L. 378.3'
3+40±	P.C.			

Equation 324+74.4 = 1+84±

324+74.4	P.T. ✓		9°07½'	5° Curve
324			7°16'	Δ = 18°15'
323			4°46'	Rad = 1146.28
322+93±	P.I.			Tang = 184.1 ✓
322			2°16'	Length = 365.0
321+09±	P.C. ✓		0°00'	

26± Error in location R.R.H.


30.3'
Found original R.R. Spike
Iron Post
2' High
36.1'
Trolley Pole
T.P.
60.5'
60.4
Iron S.P.
22.8
Unable to locate.
Placed R.R. Spike
19.4
65.15'
T.P.
T.P.

93.13
19.1
74.03

Sta.	Point	Defl. L.	Defl. R.	
$15+34^{5}$ = $15+33^{4}$ - EQUATION				
$15+33^{8}$	P.T.	13°36'		
15		8°42'		Δ. 27°12'
$14+88^{3}$	P.I.			D. 29°-L.
+70		4°21'		T. 48.3'
$14+40^{0}$	P.C.	0°0'		L. 93.8'
$12+33^{9}$		End of Exception		

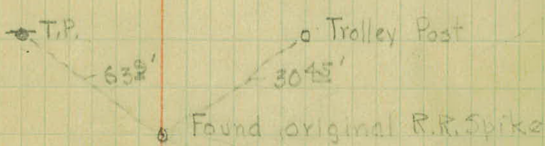
——— EXCEPTION ———

Sta.	Point	Defl. L.	Defl. R.	
$9+42^{03}$	P.T. = $18+09^{13}$ - State P.O.C.		14°53'	
9			10°41'	Δ. 29°47'
$8+69^{7}$	P.I.			D. 20°-R.
+50			5°41'	T. 76.57'
8			0°41'	L. 148.9'
$7+93^{13}$	P.C.			

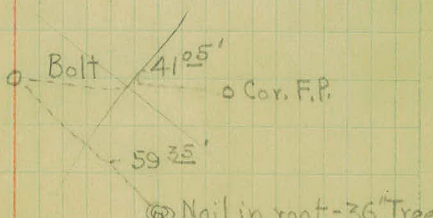
Ʌ-O. R. Van Krevelen
.C.- D. Skooglond
.C. - W. Moloney
Stake - M. Galvin

Cloudy - Cold

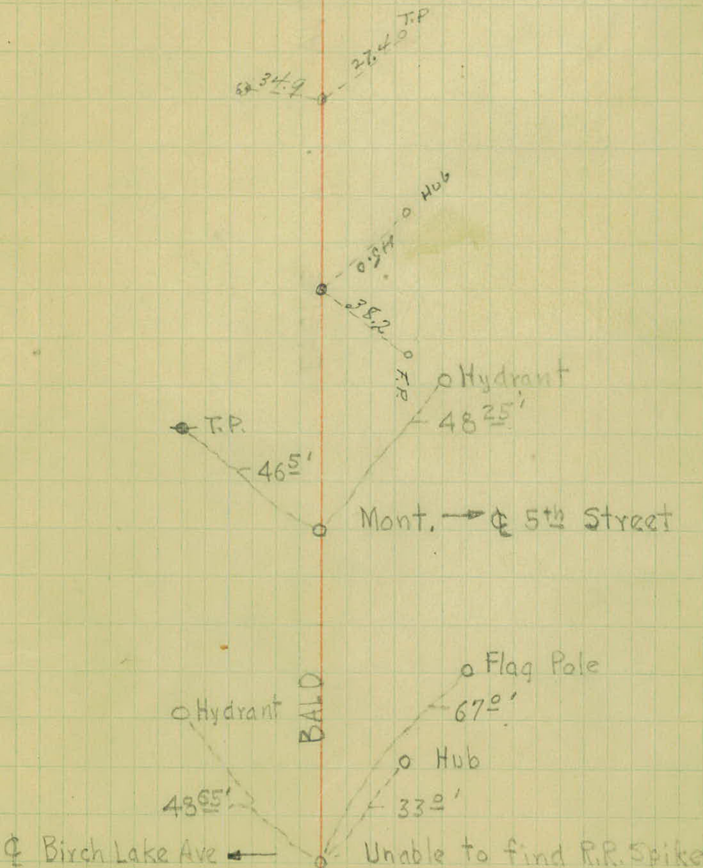
May 7 - 1924



Unable to locate old P.I.



Sta.	Point	Defl. L.	Defl. R.	
79+35.3	P.O.T.			
66+73.4	P.I. Mont			
40+29.4	P.I. = 40+30.82			Δ. 00°01'-L.
			40+29.40	
			27+07.45	
			13 21.95	
27+07.45	P.O.T.			



T.P
27.4
34.9
Hub
45.0
38.2
T.P
Hydrant
48.25'
T.P.
46.5'
Mont. → ℄ 5th Street
Flag Pole
67.0'
Hydrant
BALD
Hub
48.65'
33.0'
℄ Birch Lake Ave ←
Unable to find R.R. Spike

87+81.79
15.95
65.84

Sta.	Point	Defl. L.	Defl. R.
87+81.79	P.T		
87+47.7	P.I		70°10'
87+01.86	P.C.		

4 / 79.93 ∟ 19.98 65.27

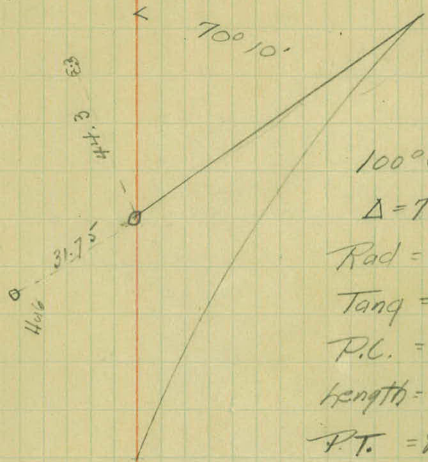
79.93
39.96

39.35
59.34
19.67

87+01.86
19.98
87+21.8[illegible]

179° 60'
70° 10'
109° 50
54° 55'

87+01.86
39.96
87+41.82
19.98
87+61.80



100° Curve Rt.

Δ = 70° 10'

Rad = 65.27

Tang = 45.84

P.C. = 87+01.86

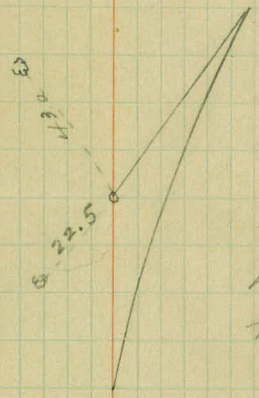
Length = 79.93 (Arc.)

P.T. = 87+81.79

Rad. Hub. Set

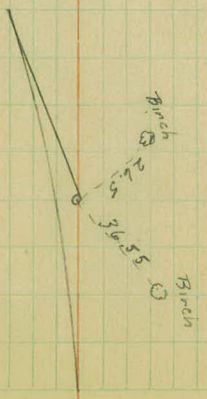
Sta.	Point	Def'l. L.	Def'l. R.
101+84.8 =	101+50		
98+94.04	P.T		
98+51.2	P.I		25°34'
98+05.88	P.C.		
93+98.5	P.T		
91+57.2	P.I	4°50'	
89+15.2	P.C.		

Sta	Def
98+05.9	0°00'
+50	6°23½
+94.1	12°47'



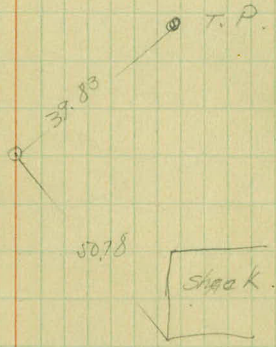
29° Curve Rt.
Δ = 25°34'
Rad = 199.70
Tang = 45.32
P.C = 98+05.9
Length = 88.16
P.T. = 98+94.1

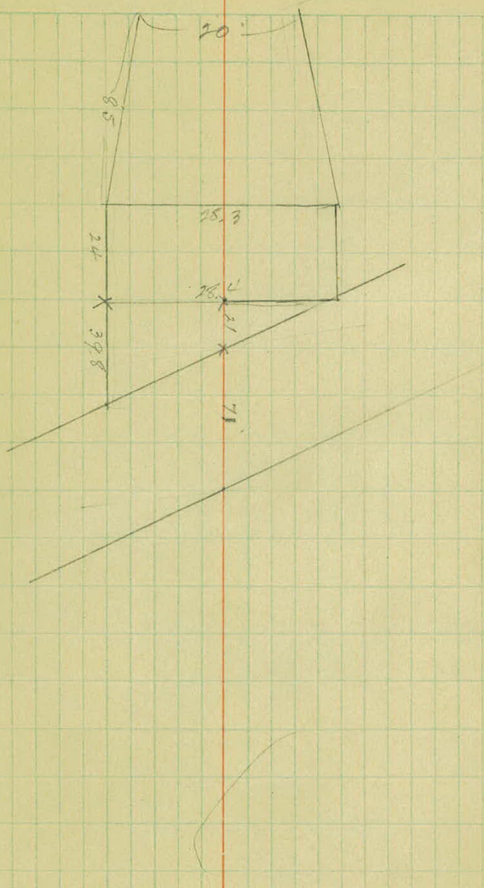
Sta	Def
89+15.2	0°00'
+50	0°10'
90+00	0°25'
+50	0°40'
91+00	0°55'
+50	1°10'
92+00	1°25'
+50	1°40'
93+00	1°55'
+50	2°10'
93+98.5	2°25'



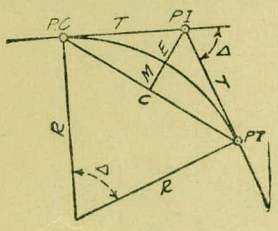
1° Curve Lt
Δ = 4°50'
Rad = 5729.65
Tang = 241.8
P.C = 89+15.2
Length = 483.3
P.T. = 93+98.5

Sta.	Point	Defl. L.	Defl. R.	
117+42.0	P.I			79° C.L. Δ 54°30' T. 102.85
116+39±	P.C. End of Project			


T. P.
37.83
50.78
Shack.


20
8.5
28.3
24
28.5
21
39.8
71

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

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

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

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

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

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

EXPLANATION AND USE OF TABLES

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

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

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

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

Table I.—Minutes in Decimals of a Degree.

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

Table II.—Inches in Decimals of a Foot.

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

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

Table III.—Radii, Ordinates and Deflections.

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

Note. Chord Deflection=2 times tangent deflection.

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

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

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

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

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
61°	3375.0	920.2	71°	4086.9	1308.2	81°	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	72	4162.8	1352.6	82	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	73	4239.7	1398.0	83	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	20	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	2444.0	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×$2\frac{1}{2}$ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

TRIGONOMETRICAL FORMULAS.

See fig. (a).

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

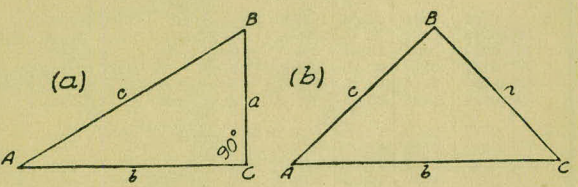
cos. $A=\frac{b}{c}$ $\frac{a}{c}$

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

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

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

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



Formula for Solving Triangles.

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

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
0′						8′					
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.

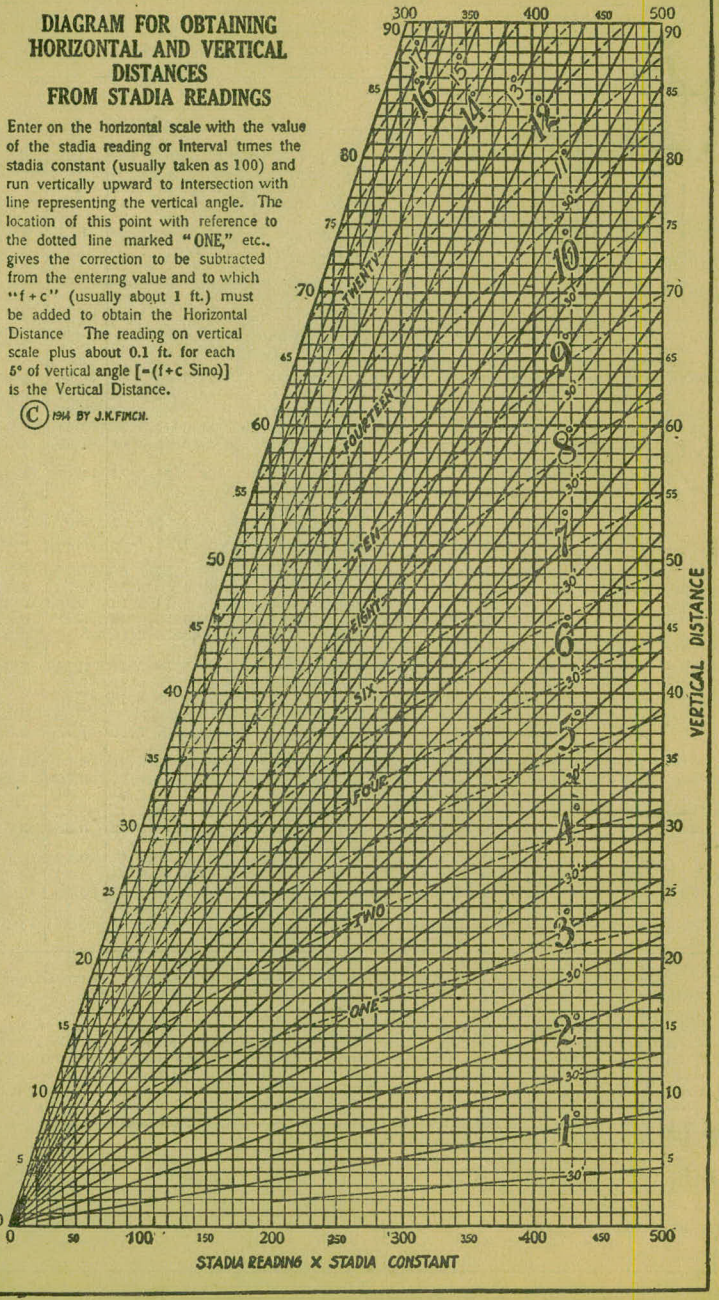
Table IX.—Calculation of Earthwork.

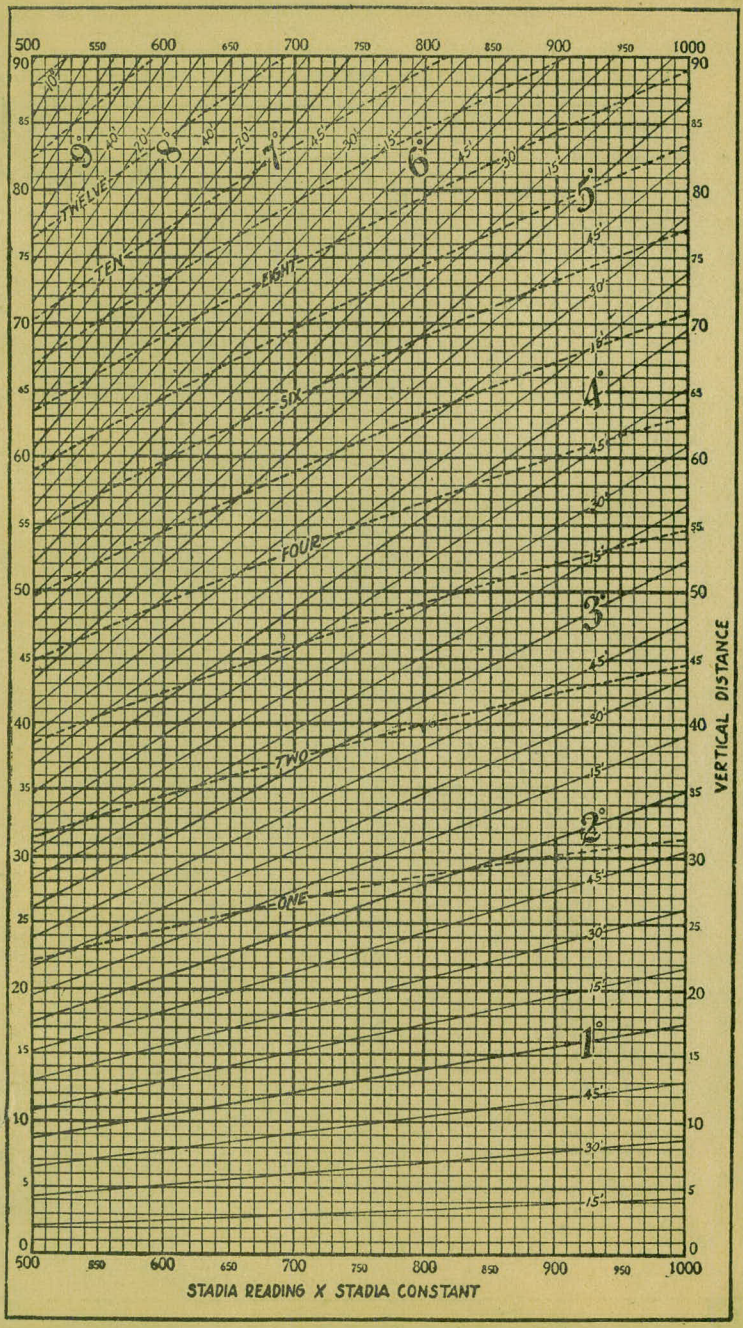
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96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




500
550
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700
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1000
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TWELVE
TEN
EIGHT
SIX
FOUR
TWO
ONE
VERTICAL DISTANCE
STADIA READING X STADIA CONSTANT

179 - 60
11 - 53

168 - 07

85.23
93.80
93.15

272.18

317+88.90
316+95.75

93.15

22.5

.75
3
.225

.0833
7
.5831

12/700000 (583
60
100

299+62
17.3
299+80.3

.0316
.225
1580
632
632
.07100
.06975
14065

16+68.4 — 0°00'

17+00. — 0°07'
+31 —
+32 — 0°14'

15+33.80
14+88.30
45.50

18+00 — 0°29 1/2'

+07.8 — 0°31'

48.30
45.50
2.80

15+33.80
14+88.30
45.50

.225
30
06750
0711
13860

.225
.31
225
675
.06975

Δ = 31°00'

Int = 17+80

15

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88888
66666
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17+00 .0711
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Evans
363 So Hamlin
St. Clair car
Hamlin

U 2365

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

40

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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