ENGINEERS' FIELD-BOOK

No. 10-103

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.

Proj - 23-63

Property of Ramsey Co.
920 Guardian Life Bldg.
St. Paul.

INDEX

Sta to Sta	Page to Page	
0+00 - 46+50	2 - 6	Doetsche
46+00 - 77+00	6 - 11	Conner
77+00 99+00	13 - 16	Conner
99+00 - 107+97	12 - 12	Doetsche
0+00 99	17 - 32	Conner
55 108	77 - 77	Conner
0+00 107+97	52 - 52	Conner
0+00 42+50	38 - 47	
108+00 54+00	58 - 70	
54+00 108+00		

X sect. & Slope Stakes

" " " " "

" " " " "

" " " " "

ALIGNMENT

B.M.s Reset 8/14/23

Chaining Equations.

X Sections for fine grading.

X sections for fine grading.

(23-63) X-sec. & Slope Stakes

Sta.	+S	H.I.	-S	Rail Grade	Fin. Rod.
B.M.	634	238.30		231.96	
0+00				232.4	5.9
0+50				32.55	5.75
1+00				32.70	5.6
+50				32.85	5.45
2+00				33.00	5.3
+50				33.15	5.15
3+00				33.30	5.0
T.P.	5.69	239.26	4.73	233.57	5.8
+50				33.45	5.9
4+00				33.60	5.7
+50				33.75	5.5
5+00				33.90	5.4
+50				34.05	5.2
6+00				34.20	5.1
+50				34.35	4.9
7+00				34.50	4.8
T.P.	3.59	239.98	2.87	236.39	
B.M.			8.63	231.35	231.35
B.M.	8.45	239.76		231.31	
8+00				34.5	5.3
+50				34.3	5.5
9+00				34.0	5.8
+50				33.6	6.2

Party { Deutsche T. / Weber Ch. / Mahoney " / Franke Rod.

7-13-23

L ℄ R

Nail 12" Oak S.W. Cor. Roads

(C1.3/26.3) 4.6/33 4.4/23.5 6.1/22 6.7/19.5 5.7/16 C0.6/0 5.5/10 5.4/16.5 4.6/22 4.7/33 (C1.3/26.3)

(C1.4/26.4) 4.3/33 4.2/25 6.1/21 6.0/16 C0.5/0 5.6/13.5 4.8/18.5 5.1/33 (C0.6/25.6)

(C2.0/27.0) 3.9/33 3.9/23 5.4/22 6.1/19 5.0/16 C0.6/0 5.2/14.5 6.0/18 4.1/21 4.3/33 (C1.3/26.3)

(C1.9/26.9) 3.9/33 3.3/29.5 4.3/22.5 6.2/19.5 6.2/18 5.2/15 C0.45/0 5.1/14.5 6.1/18 4.7/21 4.4/33 (C0.5/25.5)

(C1.5/26.5) 3.7/33 4.2/23.5 5.4/20 5.4/16.5 C0.3/0 4.9/14 6.4/18 4.6/21.5 4.7/33 (C1.2/26.2)

(DC2.0/25.8) (F1.9/18.8) 4.8/33 5.1/23 7.1/19.5 5.3/15 C0.1/0 5.9/14.5 7.1/19.0 5.5/22 5.5/33 (DC1.7/24.7)

(DC1.3/24.3) 6.3/33 5.4/25 6.7/19.5 5.0/15 C0.1/0 5.4/14.5 7.0/19 6.0/23 6.1/33 (DC1.1/24.1)

Nail in Oak 23'R Sta. 3+00.

(F1.7/18.5) 7.2/33 7.1/26.5 7.8/24 7.9/19.5 6.2/16 C0.1/0 6.3/14 7.0/17 7.0/19.5 7.1/33 (F1.3/18)

(F1.2/17.8) 6.0/33 6.8/27 7.6/24 7.6/18 5.7/15 C0.2/0 5.8/13.5 7.3/18.5 7.4/26 7.5/33 (F1.7/18.5)

(F1.7/18.5) 6.3/33 7.3/27 6.9/17.5 5.4/14.5 C0.4/0 5.6/14.5 6.7/19 6.7/33 (DC0.9/23.9)

(F1.4/18.1) 5.8/33 6.3/28 7.0/25.5 7.1/19.5 5.6/16.5 C0.4/0 5.6/15 7.1/20 7.3/33 (DC0.1/23.1)

(DC0.5/23.5) 5.2/33 5.4/25.5 6.5/24 6.6/19.5 4.8/15.5 C0.6/0 5.3/13.5 6.4/18 5.0/22 4.6/33 (D.C.2.5/25.5)

(C1.1/26.1) 3.7/33 4.0/25 5.9/22.5 6.0/18.5 4.9/16 C0.6/0 4.9/15 6.2/18 6.2/22.5 4.9/23 5.3/33 (C0.2/25.2)

(C1.3/26.3) 3.1/33 3.7/24 5.6/21.5 5.6/18 4.4/14.5 C0.8/0 4.4/16 5.9/20 4.4/23 4.4/33 (C0.5/25.5)

(C0.6/25.6) 3.9/33 4.2/25 5.4/22.5 5.6/18.5 4.5/16 C0.7/0 4.6/15.5 5.9/20 4.9/23 4.9/33 (DC1.8/24.8)

Top. stk 25½ L Sta. 6+50

Nail 14" Oak 25'R Sta. 9+90 End. 7-13-23

" " " " " " " " " Start 7-14-23

(DC1.1/24.1) 5.0/33 5.8/25.5 6.4/23 6.2/17.5 4.8/15 C0.8/0 4.8/16 6.1/18 6.1/22.5 5.3/24.5 5.3/33 (D.C.2.0/25.0)

5.2/33 5.7/24.5 6.2/22.5 6.0/18 5.1/16 4.6/0 5.0/16.5 6.1/19 6.3/23 5.8/24.5 6.0/33

(D.C.2.3/25.3) 5.4/33 5.5/25.0 6.8/22.5 6.9/18.5 5.7/16 C0.5/0 5.7/15 7.5/19 7.4/23 7.7/33 (D.C.0.4/23.4)

6.4/33 6.8/25 7.7/23 7.9/18 6.7/16 5.9/0 6.3/15.5 7.8/18.5 8.3/23 9.0/33

Margin notes:

No clg. only light grubbing

Wooded area. Clg. trees 8"-14" Oak. Light grubbing 20'-33' Right

No clg. or grbbing Cultiv. Land

Cultiv. Land

Wooded 8"-16" Oak

(23-63) X-Sec. & Slope Stakes

Sta.	+S	H.I.	-S	Profile Grade	Gr Rod.
	Cont'd from prev. page	239.76			
10+00				233.2	6.6
+50				32.8	7.0
11+00				32.4	7.4
+50				32.0	7.8
12+00				31.6	8.2
T.P.	4.71	236.11	8.36	231.40	
+50				31.2	4.9
13+00				31.00	5.1
+50				30.8	5.3
+60				30.8	5.3
+71				30.7	5.4
14+00				30.7	5.4
+50				30.7	5.4
15+00				30.6	5.5
+50				30.6	5.5
16+00				30.5	5.6
+50				30.4	5.7
17+00				30.3	5.8
B.M.			7.10	229.01	(229.02)
B.M.	6.34	235.36		229.02	
17+50				30.2	5.2
18+00				30.1	5.3
+50				29.9	5.5
19+00				29.8	5.6

Party { Deutsche π, Weber Ch., Mahoney n, Franke Rod. }

7-14-23

L ℄ R

Cultiv. field 1 26' L to 7+00 ∧

(DC 2.1/25.1) 6.1/33 6.5/25 8.1/21.5 8.2/17.5 6.9/14.5 C0.1/0 7.1/15 8.5/17.5 8.7/22.5 8.3/24.5 8.9/33 (F 2.3/19.2)

6.0/33 6.2/26.5 6.1/23 8.1/20.5 8.3/16.5 7.0/14 6.6/0 6.9/14.5 8.8/18.5 9.1/23 7.5/25 8.0/31 8.6/33

(C1.5/26.5) 5.4/33 6.0/26 5.7/23.5 8.2/20 8.3/17 7.1/15 C0.3 (7.1)/0 7.4/15 9.4/18.5 9.7/22.5 7.8/25 8.4/30 8.9/33 (F 2.0/18.7)

5.3/33 5.6/23.5 8.2/20.5 8.5/17 7.6/14 7.6/0 8.0/16.5 9.4/20 9.7/23.5 8.2/26 8.8/30.5 9.0/33

(C 1.9/26.9) 5.7/33 6.4/24.5 8.8/21.5 9.1/18 8.3/16 C0.1 (8.1)/0 8.8/15 10.8/18.5 10.4/22.5 9.3/24 10.2/28 10.6/33 (F 2.3/19.1)

Top rock 2' R Sta. 12+08

3.1/33 4.1/27 5.8/22.5 6.0/18 5.0/15 4.7/0 5.4/15 7.1/19 7.1/23 8.3/33

(DC 1.0/24.0) 4.9/33 5.5/27 6.5/23 6.7/18 5.4/14.5 C0.1 (5.0)/0 5.8/14.5 8.3/20 9.4/28 9.8/33 (F 3.8/21.2)

5.9/33 6.3/23.5 6.9/21 6.9/18 5.7/14 5.2/0 6.3/17 8.0/23 8.8/33

6.0/33 6.0/15.5 5.2/0 6.4/18 7.6/24.5 8.2/33 South Edge priv. entr. L & R

5.7/33 5.7/22.5 6.3/19 6.4/16 5.7/13.5 5.3/0 6.1/14 7.2/23 7.9/33 North " " " L & R

Land. Alfalfa. & wheat.

(DC 1.9/24.9) 5.5/33 5.5/23. 6.8/20.5 6.7/16.5 5.6/15 C0.1/0 6.1/16.5 8.2/19.5 8.2/24 7.0/26 7.3/33 (F 3.3/20.5)

4.7/33 5.1/22.5 6.5/19.5 6.6/16.5 5.6/14 5.3/0 6.1/17 7.8/20 7.7/23.5 6.2/26.5 6.0/33

(C 0.7/25.7) 4.4/33 5.5/22 6.9/20 6.9/16 5.7/13 C0.3/0 5.6/16.5 7.5/21 7.6/23.5 5.8/26.5 5.6/33 (F 0.1/16.2)

4.8/33 5.4/23 7.2/19.5 7.3/16 5.6/13 5.3/0 5.9/16 8.0/20 7.9/23.5 6.7/26.5 6.7/33

Cultiv.

(F 2.4/19.3) 6.6/33 7.1/23.5 7.8/21 7.7/17.5 6.1/13.5 C0.1/0 6.1/16 8.2/21 8.2/24 7.3/25.5 7.0/33 (F 0.4/16.6)

9.1/33 8.2/17 6.1/13 5.7/0 6.3/17 7.9/20 8.1/24 6.5/26 5.4/33

(F 2.3/19.1) 6.9/33 6.6/23.5 7.9/21.5 7.7/16.5 6.4/14 C0.1/0 6.1/17 7.9/20.5 7.8/24 5.4/27.5 5.3/33 (DC 0.8/17)

Nail 20" Oak L Sta. 18+75 End 7-14-23

" " " " " " "

5.8/33 5.5/25 7.0/22 7.2/16.5 5.6/13.5 4.9/0 5.3/16.5 6.7/19 6.9/23 4.6/27 4.3/33

(F 2.0/18.7) 7.7/33 7.5/18.5 5.4/14.5 C0.3/0 5.6/17 7.5/20.5 7.4/25 5.8/27 5.1/33 (F 0.1/16.2)

8.1/33 8.0/17.5 6.1/13.5 5.3/0 5.7/17.5 7.3/21 7.1/25.5 6.3/33

(F 2.4/19.3) 8.2/33 7.7/18.5 6.2/14.5 C0.2/0 5.7/18 7.7/22 7.7/33 (DC 1.0/17) ∨

Wooded area ∨ Grubbing & cl. 8"-14" Oak

(23-63) Slope Stakes & X-Sec.

Sta.	+ S	H.I.	- S	Profile Grade	Grade Cut
		Contd fr. prec. page 235.36			
19+50				229.7	5.7
20+00				229.5	5.9
+50				29.4	6.0
T.P.	3.76	232.74	6.38	228.98	
21+00				229.2	3.5
+50				29.1	3.6
22+00				229.1	3.6
+50				29.3	3.4
23+00				29.5	3.2
T.P.	5.63	236.41	1.96	30.78	
B.M.			4.70	231.71	231.73
B.M.	4.85	236.58		231.73	
23+50				29.8	6.8
24+00				230.1	6.5
+50				30.3	6.3
25+00				30.6	6.0
+50				30.7	5.9
26+00				30.8	5.8
+50	Note: Equation New 26+63 = Old 26+65.14			30.8	5.8
27+00	26+00 to 27+00 = Short Sta = 97.76			30.9	5.7
+50				30.95	5.76
28+00				31.0	5.6
B.M.			4.87	231.71	231.73
New B.M.			6.18	230.40	230.40

Party { Demeny T. / Weber / Mahoney / Frank }

L ℄ Right

16 cl. or ... (left margin) — Woods (right margin)

4.5/36 8.3/26 8.2/18 5.9/14 5.5/0 5.4/18 6.7/21 7.4/33

(F3.2/20.3) 2.4/37 9.0/23.5 8.3/17 6.1/14 C0.4/0 5.4/18 7.9/21.5 3.6/34 D.C.0.5/23.5

5.4/34 8.2/28 9.0/22 8.3/16 6.1/13 5.6/0 5.7/18 8.6/21.5 7.7/26.5 7.1/29 4.0/35

Nail Top stump 25'L Sta. 20+85

(F5.1/21.9) 16' shldr 10.7/33 10.0/27 7.7/20 3.7/13.5 0.0/0 3.4/17 5.5/21 4.8/28 1.1/35 (D.C.0.0/23)

Toe → Slope 17.7/33 10.5/21 4.7/14 3.6/0 3.5/18 6.0/22.5 1.0/29 5.2/33

(F20.1/45.4) 18' Shldr 20.7/39.1 19.0/33 4.5/13.5 F0.1/0 3.7/19 6.1/23.5 8.3/36 (F0.1/16.2)

17.5/33 17.5/32.5 4.3/12.5 3.6/0 3.6/18 6.0/21.5 8.0/33

(F3.7/21.1) 16' shldr 6.7/33 6.6/19 3.6/13.5 0.0/0 3.1/17.5 6.5/23 6.6/31.5 4.1/35 (F0.2/16.3)

Top stk 15'R Sta. 24+58

Sp. Tel. pl. L sta. 27+85 End to run line to 41+13.5 P.O.T.

" " " " " " +85

5.1/33 5.2/27.5 9.2/19.5 8.8/16.5 7.1/12 6.7/0 6.7/16.5 9.1/22 9.7/30.5 8.8/33

(C2.1/27.1) 3.5/33 3.5/29 8.8/19 6.7/13 C0.2/0 6.6/16 8.3/20.5 8.5/25.5 7.8/28.5 7.8/34 (D.C.0.0/23.0)

(C0.7/25.7) 4.0/33 4.2/28.5 8.2/20 7.6/15.5 6.5/13 C0.3/0 6.3/17 7.3/20 7.0/23 2.2/27 2.1/33 (C4.1/29.1)

(C2.7/27.7) 3.4/33 2.2/27.5 7.9/21 7.9/18 5.8/12.5 C0.4/0 6.1/17 6.8/19 6.7/23 1.8/26.5 2.0/33 (C4.2/29.2)

3.2/33 3.2/27.5 7.8/20.5 7.3/17 5.8/13 5.6/0 6.0/17.5 6.6/19 6.4/23 2.3/25 2.5/33

(C1.7/26.7) 3.7/33 3.7/27.5 7.7/20.5 7.0/16.5 5.6/12.5 C0.4/0 5.4/17 7.0/20 6.5/23.5 3.7/25 3.9/33 (C2.1/27.1)

4.7/33 4.7/25.5 7.3/19.5 6.4/14.5 5.2/12 5.3/0 6.6/17.5 7.4/22 5.1/24.5 5.2/33

(D.C.1.6/24.6) 6.0/33 6.3/19.5 5.5/15.5 C0.3/0 5.9/16 7.7/28 7.8/33 (D.C.0.4/26.4)

(DC1.6/24.6) 6.4/33 6.3/27 5.4/19.5 C0.1/0 6.2/17 6.9/18.5 7.6/33 (DC0.4/26.4)

DC0.7/23.7 6.9/33 6.5/27.5 7.3/21 5.3/14 C0.5/0 5.5/14 6.8/19 6.0/25 7.0/33 (DC1.4/27.4)

Sp. Tel pl. L Sta. 27+85 (Will be moved.)

Sp. Tel. pl. 41'R Sta. 27+55 Set 7-16-23 ←

End. 7-16-23

(23-63) Slope Stakes & X-Sec.

Sta.	+S	H.I.	-S	Profile Grade	Grade Rod.
BM.	4.40	236.13		231.73	
28+50				31.05	5.1
29+00				31.1	5.0
+50				31.15	4.9
30+00				31.2	4.9
+50				31.25	4.8
31+00				31.3	4.8
+50				31.3	4.8
32+00				31.4	4.7
+50				31.4	4.7
33+00				31.4	4.7
T.P.	4.52	236.32	4.33	231.80	
+50				31.4	4.9
34+00				31.4	4.9
+50				31.4	4.9
35+00				31.4	4.9
+50				31.4	4.9
36+00				31.4	4.9
+50				31.4	4.9
37+00				31.4	4.9
+50				31.4	4.9
38+00				31.4	4.9
+50				31.4	4.9
39+00				31.4	4.9
T.P.	4.64	236.94	4.02	232.30	
BM.			4.79	232.15	(232.17)

Deutsche ⊼
Weber Ch.
Mahoney "
Franke Rod.

7-19-23 Hot Fair

L ℄ R

Sp. Tel. pl. L Sta. 27+85 (Not moved) See prec. page.

15' shldr (DC 1.1/24.1) 5.7/33 6.0/22.5 5.8/15.5 5.1/13 C0.1/0 5.0/16.5 6.1/19.5 6.4/24 4.8/26.5 4.3/33 (C 0.3/27.3) 17' shldr

15' shldr (DC 1.9/24.9) 5.0/33 5.0/25.5 5.8/22 5.8/16.5 4.8/13.5 C0.1/0 4.8/15.5 6.3/20 6.2/23.5 4.8/26.5 5.1/33 (D.C. 0.8/23.8) 15' "

5.4/33 5.2/25.5 5.8/23 5.9/17.5 4.8/13.5 4.9/0 4.8/15.5 6.2/20.5 6.0/24 4.8/26.5 5.1/33

(DC. 1.2/24.2) 5.6/33 5.3/26 6.2/22.5 6.1/18 4.8/14 0.0/0 4.8/16 6.2/20 5.8/23 4.3/26.5 5.6/33 (DC. 1.6/24.6)

4.8/33 4.8/27 6.4/23 6.2/18.5 4.6/14 4.8/0 5.1/16 6.1/19.5 6.0/23.5 4.6/25 5.4/33

(DC. 1.4/24.4) 4.9/33 4.8/28 6.0/23 6.1/18.5 4.9/15 0.0/0 4.8/15.5 6.2/18.5 6.1/21.5 4.9/24.5 5.8/33 (DC 1.9/24.9)

5.4/33 5.3/29 6.3/25 6.2/19 5.2/15.5 4.9/0 5.2/15 6.4/18.5 6.3/24 6.1/33

(DC. 0.3/23.3) 5.7/33 6.2/25 6.3/19.5 5.3/16 F0.2/0 5.0/15 6.3/18.5 6.0/24.5 6.1/33 (DC 0.7/23.7)

(F 1.0/17.3) 5.4/33 5.6/27.5 6.4/25 6.4/20 5.1/16 F0.2/0 5.4/15.5 6.8/18.5 6.6/23 6.3/27 6.7/33 (F 2.4/19.3)

(DC 0.7/23.7) 5.1/33 5.3/26 6.3/23 6.2/20.5 5.3/16.5 F0.3/0 5.2/14.5 7.4/18.5 6.8/24 6.7/33 (DC 0.0/23.0)

Top stk 14' R Sta. 33+00

(F 0.4/16.6) 5.6/33 5.8/28.5 6.6/23.5 6.7/20.5 5.4/16 F0.4/0 5.4/14.5 6.4/18 6.5/20.5 5.6/23 5.8/27.5 6.2/33 (DC 1.4/24.4)

(DC 1.1/24.1) 5.4/33 5.5/25.5 6.3/23 6.3/19.5 5.2/16 F0.3/0 5.3/15.5 6.3/17.5 6.3/21 5.8/23 6.4/33 (DC 1.1/24.1)

5.8/33 5.3/26 6.1/23.5 5.8/21 5.2/17.5 5.2/0 5.2/13.5 6.5/16.5 6.5/19.5 6.4/33

(DC. 1.1/24.1) 5.8/33 5.4/25.5 6.2/23.5 6.3/20.5 5.2/16.5 F0.3/0 4.9/14.5 5.8/16.5 5.8/20 4.7/23 5.3/27.5 5.5/33 (0.0/25)

6.0/33 5.6/27 6.1/24 5.9/21 5.2/17 5.0/0 4.7/14 5.6/16 5.5/19.5 4.5/22 4.9/25 4.7/33

(DC 0.8/23.8) 5.6/33 4.7/27.5 6.1/24 6.2/21.5 4.8/18.5 F0.1/0 4.6/14 5.6/16.5 5.4/19 4.1/21.5 4.1/33 (C 0.7/25.7)

5.9/33 4.5/26 6.0/22 5.3/19 4.9/0 4.6/14 5.5/16 5.5/18.5 3.8/22 4.0/28.5 4.4/33

(DC 0.7/23.7) 5.8/33 5.4/26 6.2/23.5 6.3/21.5 5.2/17.5 0.0/0 4.8/14 5.6/16 5.9/20 4.7/22.5 4.7/33 (C 0.3/25.3)

6.4/33 6.0/29.5 6.8/25.5 6.4/21 4.6/18 4.9/0 4.9/14 6.0/16.5 6.1/19.5 5.1/23 4.7/33

(P.C. 0.1/17) 7.7/33 7.2/26.0 6.8/21.5 6.0/18.5 F0.2/0 5.2/13.5 6.4/16 6.4/18.5 5.8/21.5 5.8/33 (DC 1.0/24.0)

8.8/33 8.6/26.5 6.9/19 5.4/16 5.2/0 5.3/14.5 6.7/18.5 7.2/23 7.7/34

(F 0.4/16.6) 9.3/33 8.4/27 7.3/20.5 5.2/15.5 F0.2/0 5.2/14.5 6.7/18 7.0/20.5 6.2/22.5 7.1/28 7.4/33 (DC 0.7/23.7)

Top stk 12' R Sta 39+35

Sp. Tel. pl. L. Sta. 39+50

Cultiv. Land Grain
No clg or grubbing

No clg or grubbing - pasture & corn etc

Cont'd on next page

(23-63) Slope Stakes & X-Sec.

Sta	+S	H.I.	-S	Profile Grade	Gr. Rod.
B.M.	+4.79	236.96		232.17	
39+50				231.4	5.56
40+00				31.3	5.7
+50				31.0	6.0
+62				30.9	6.1
+77				30.8	6.2
41+00				30.5	6.5
B.M.	4.77	236.94		232.17	
+50				29.9	7.0
42+00				29.0	7.9
+50				28.0	8.9
43+00				26.7	10.2
+50				25.3	11.6
T.P.	1.58	228.82	9.70	227.24	
44+00				23.7	5.1
+50				21.9	6.9
45+00				220.0	8.8
+50				18.1	10.7
T.P.	1.78	219.84	10.76	218.06	
46+00				216.2	3.6 (4.2)
46+50				14.3	5.5 (6.0)
47+00				212.3	7.5 (8.0)

Party { Deutsche, Weber, Mahoney, Franke }

7-19-23 Hot Fair

L ℄ R

Sp. Tel. pl. L Sta. 39+50

7.6/33 7.2/28.5 7.9/26 7.1/20.5 5.6/17 5.6/0 5.4/15.5 7.5/20 7.5/23 6.3/25.5 6.4/31 6.7/33

(DC 0.6/23.6) 6.1/33 5.4/27.5 7.0/24 6.8/20.5 5.4/18 Fo.1/0 5.7/15 7.0/18 7.0/23.5 4.7/27.5 4.5/33 (DC 0.9/23.9)

4.4/33 6.7/30 6.9/20 5.7/17.5 5.9/0 5.7/15 6.5/17.5 6.4/24 3.4/28.5 3.9/33

South Edge Pavement. 6.0/0 6.0/18 6.2/21 5.7/25 5.2/35

North " " " 6.1/0 5.9/12.5 6.6/26.5 3.6/32 4.1/34

(DC 0.6/23.6) 2.9/34 7.5/27 7.6/21 6.1/18 Co.1/0 6.3/15 7.3/17 7.4/24.5 2.6/27.5 2.9/33 (C 0.1/15)

Sp. Tel. pl. L Sta. 39+50

Start 7-23-23 3:00 P.M.

Top → 2.3 / bk 34.2 5.4/31 8.4/27 8.6/21 7.0/17 7.1/0 6.8/14.8 8.1/19 7.5/24.5 5.5/28.2 2.8/30.6 2.8/33

(DC 0.3/23.3) 4.5/33 9.1/26.9 8.4/21.4 7.5/17.4 Fo.1/0 7.5/15 8.8/18.5 8.9/22.6 7.4/26.2 2.6/30.5 2.6/33 (DC 1.5/24.5)

4.1/35.7 6.5/33 10.0/27.8 10.2/22.3 8.4/18.9 9.1/0 9.3/17 9.8/18 9.6/22.6 5.8/27.5 5.3/33

(DC 1.0/24.0) 6.9/35 10.0/29.6 10.7/26.8 11.0/21 7.4/18.2 Co.3/0 9.9/15 11.5/19.5 11.4/23.7 8.0/28.4 8.0/35.5 (DC 0.8/23.8)

7.5/35 12.6/26.4 12.8/21.8 11.7/18 11.7/0 11.2/16.2 12.7/19.4 12.8/24.6 9.5/29.3 9.7/37.3

Sp. Tel. pl. 30' R Sta. 43+35

(DC 0.5/23.5) 0.8/34.8 6.5/26 6.4/21.3 4.5/17.4 Fo.1/0 5.0/16.5 6.6/21 6.4/26.7 2.8/31.5 2.8/33 (DC 0.4/23.4)

4.6/33.4 8.4/27.6 8.5/21.2 7.1/17.4 7.2/0 7.1/17.4 8.6/21.2 8.5/28.2 6.3/31.3 6.5/33

(DC 0.4/23.4) 8.3/33 8.5/28 10.5/25.2 10.5/19.9 8.7/16.6 Fo.3/0 9.6/18 10.8/21.2 10.7/25.6 10.2/28.1 10.0/33 (DC 0.0/23.0)

11.4/33 10.6/28 12.2/25 12.6/21 10.9/16.6 11.1/0 11.2/16.3 12.4/18 13.4/33

Sp. Tel. pl. 29' R Sta. 45+50

7-24-23

(5.0/16.0) 3.6/00 3.9/26.5 5.2/22.6 5.0/19.5 3.6/16.3 3.6/11.0 3.9/08 4.4/00 4.3/07 7.0/11.7 4.1/15.7 5.1/16.6 6.1/18.7 6.5/20.5 6.7/22.7 7.0/27 7.0/33 {F 3.0/20.5}

5.7/33 4.6/30 6.2/27 6.7/23 6.3/19 5.4/17.2 5.5/11 6.0/00 6.1/08 6.0/15 6.7/16.5 7.3/18 8.3/20 8.8/25 8.9/29 9.5/33

(5.0/16) 6.8/33 7.0/[illegible] 8.3/26.8 9.8/19.5 7.5/17.2 7.9/16 8.0/00 8.1/07 7.8/13 7.6/16.5 8.6/18 9.3/23 9.0/26.8 10.1/30 10.1/33 (Fo.1/16.2)

	+	H.I.	−	Profile Grades Elev	CH. Rod
		219.84			8.3
+20				211.5	(8.7)
+40				10.8	9.0
+50				10.3	9.5
48+00		21984		208.4	11.4
	1.40	209.70	11.54	208.30	
48+50				206.4	3.3
49+00				204.5	5.2
+50				03.0	6.7
50+00				201.7	8.0
T.P.	2.06	203.11	8.65	201.05	
50+50				200.7	2.4
50+50 T.P.	4.08	205.13	2.06	201.05	4.4
51+00				199.3	5.2
+50				99.5	5.6
52+00				199.2	5.9
+50				98.9	6.2
53+00				198.6	6.5

+87.4 PI
+86.1 Chained

L C R

	+	H.I.	−	Elev.	GR. & d
		205.13 ✓			
+50				198.3	6.8
T.P.	3.18	201.04 ✓ ✓	7.27	197.86 ✓ ✓	
54+00				198.0	3± ✓
~~+20~~					
~~+30~~					
+50				97.8	3.2
~~+70~~					
~~+80~~					
55+00				197.7 ✓	3± ✓
B.M.	4.41	201.77 ✓ ✓	+.42	197.36 ✓	
+50				97.9	3.4
~~+10~~					
~~+30~~					
~~+70~~					
~~54+00~~				198.2	3± ✓
+50				98.6	2.7
57+00				199.3	2± ✓
+50				200.1	1.2 ✓
T.P.	8.27	207.37 ✓ ✓	1.72	199.10 ✓	
58+00				204.1	6± ✓
+50				02.2	5.6
59+00				203.5	4± ✓

Party { Wilshusen / Rattenberg / McManus } 7-24-33 Hot - Fair

L ℄ R

9.4/33 5.6/30.4 6.7/17.6 7.0/09 7.1/00 7.4/20.5 8.0/27.7 9.0/33

(0.0/18.2) 5.3/33 1.8/20.8 2.9/17.7 3.3/00 3.5/18.4 6.0/24.8 4.9/28 7.0/33 (0.0/16)

5.3/33 5.1/27.7 3.2/17.7 3.2/10 3.4/10 3.6/00 3.9/11 4.1/21 6.1/23 6.7/24.3 7.0/26.5 7.0/33

(F 0.7/17.0) 6.4/33 6.2/27.3 3.8/17.5 4.0/08 4.1/00 4.4/08 4.7/18.6 6.3/21.7 7.3/27.3 7.5/33 (F 0.8/17.2)

~~Elev. of B.M. 196.66 Error 0.04~~ 5/a 56+16

7.2/33 4.1/28 5.2/11 5.0/00 5.7/10.5 4.9/20 C 2.4/33

(F 5.2/22.5) 7.4/33 7.0/19.8 5.6/16.1 5.6/00 5.9/08 5.7/15.4 7.7/17.5 7.3/33 (F 5.0/22.1)

7.6/33 7.6/20.5 5.6/17.3 5.5/00 5.9/15.3 7.6/18.5 7.5/33

(F 6.7/24.7) 7.7/33 7.7/20.3 4.9/16.4 5.0/00 5.3/15.3 6.6/17.7 7.4/19.8 7.4/33 (F 6.5/24.4)

7.5/33 7.5/23 6.9/20 3.1/15 3.4/00 3.6/14.6 6.3/20 7.6/21 7.7/33

(F 7.6/26.0) 13.2/33 13.2/24 8.2/16.2 8.2/00 8.2/15.1 13.7/23 13.7/33

14.0/33 13.0/25.3 6.5/15.3 6.4/00 6.2/14.5 13.8/23 13.8/33

(F 9.5/28.9) 13.4/33 13.4/21 4.3/16.2 4.5/00 4.5/14.8 11.3/21 13.8/33 (F 10.2/30.0)

	+	H.I.	−	Elev.	
		207.82			
+50				205.1	2.7
T.P	7.90	215.70	0.52	207.30	
60				206.7	8.5
+50				08.5	6.7
61				210.2	5.0
T.P.	11.05	219.82	5.33	209.87	
+50				212.00	7.3
62				213.7	6.2
T.P.	9.87	224.29	5.40	214.42	
+50				215.3	9.1
63				217.0	7.4
		Corrected on B.M.	3.95	220.34	
+50				12.5	5.9
64				219.9	4.5
T.P.	11.28	229.07	2.55	221.84	
+50				221.2	7.8
65				222.6	6.4

Party 7/25/23 { Wilshusen, Ruttenberg, McManus }

7-24-23 Hot - Fair

10.9/33 10.3/30.0 2.3/15.5 2.7/0.0 2.2/13.5 11.1/24 11.1/33

(0.0/17.9) 13.5/33 13.4/24.5 8.0/16.9 7.9/0.0 7.7/14.2 15.5/25 15.8/33 (F 8.3/27.3)

6.3/33 6.5/30.6 8.0/26.7 8.2/20.0 5.9/16.8 6.2/08 6.2/0.0 5.9/08 5.7/13.5 9.3/18.7 10.0/21.8 10.6/33

Started here 7-25-23

(0.0/19.3) +0.7/66.5 5.7/26.6 5.6/21.7 4.1/17.1 4.6/07 4.3/0.0 3.9/13.5 4.9/18.7 5.0/19.2 3.0/22.5 2.6/29 2.7/33 (0.0) (C-2.6/27.6)

nail on T. P. Lt. of Sta. 61+60

8.1/27.0 8.0/21.0 8.1/18 7.3/0.0 6.9/13.8 7.9/16 7.9/19.1 0.0/28.6 +1.2/33 (22.4 +1.9 3.7/43.7)

(0.0/18.7) 6.9/33 7.4/28 7.2/21 5.4/17.3 5.4/0.0 5.0/13.8 6.0/18.5 6.0/19 (1.0/16) (22.4 +2.9 C-9.9/34.9)

8.5/39.5 8.7/27.3 8.2/16 7.2/0.0 7.8/14.2 8.9/16.3 9.0/19.6 1.1/33 1.2/38

(0.0/17.7) 11.5/33 12.0/27.7 6.4/16 6.4/0.0 5.9/14.5 5.8/17.6 4.6/20.6 3.2/33 (C 3.9/28.9)

13 M 63+10 spike in 14" Oak Lt. 220.36

12.8/33 11.5/28.8 4.8/16.6 4.7/0.0 4.0/13.6 6.5/18 1.4/22.8 5.1/33

(F 8.4/27.3) 2.0/33 11.9/27 3.2/17 2.9/0.0 2.4/13.7 8.9/20.8 7.5/33 (F 0.0/23.0)

17.5/33 17.0/27.3 6.4/16.4 6.4/0.0 5.5/13.3 9.0/19 10.6/25 11.4/33

See page 48 for high readings

(0.0/18) 3.4/33 7.6/26.6 9.3/19.6 5.1/16 5.2/0.0 5.0/15 1.2/16.7 1.4/23.1 1.8/26 1.3/31 1.0/33 0.9/34 (0.0/19)

See page 48 for high readings

	+	π	−	Elev.	Rod
+15		229.02	0.41	228.55	
+50				24.0	5.0
66				225.1	3.9
+50				25.9	3.1
Pot 66+63					
Pot 66+60 chained					
	2.61	231.16		228.55	
67				226.2	5.0
+50				26.2	5.0
68				225.7	5.5
+50				24.9	6.3
T.P.	1.10	224.94	7.32	223.84	
69				23.8	1.1
70				221.7	3.7
+50				20.4	4.5
71				220.3	4.6

page 48 for high Readings

Party { H. H. Logan / [illegible] / W. [illegible]

7-25-23

Hot Cloudy

Cont. on page 48. 66+00 to 68 high readings

B.M. Spike on T.P. Lt of Sta 65+15

5.6/27.3 6.5/33.7 6.6/17.9 4.3/16.4 4.3/0.0 3.9/14.4 5.7/18.2 6.0/23.9 5.4/29.3

(0.0/17.2) 4.8/28.5 5.4/26.4 5.9/20.3 3.7/16.3 3.5/9.4 3.3/0.0 3.3/15.1 4.6/18 4.5/21.4 4.3/25.2 (0.0/16.6)

See page 48 for high readings

3.9/27.2 4.7/27.9 4.6/22.1 2.0/15.4 2.6/9.6 2.6/0.0 2.7/9.6 2.5/13.3 4.5/16.2 6.8/18 3.4/24.5

(0.0/16) 5.2/24.4 5.9/17.6 4.9/15.1 4.8/0.0 4.1/16 5.4/19 5.3/23.1 (0.0/18)

4.6/20.1 5.2/17.1 4.8/14.8 4.6/7.7 4.7/0.0 4.7/10.2 4.3/13.2 4.9/16.2 4.5/22.7

(0.0/17.2) 5.1/21.8 6.5/17.3 4.8/16 5.2/8.6 5.2/0.0 5.0/15.7 5.9/17.5 5.7/19.8 5.3/23.8 (0.0/16.7)

7.0/23.5 7.4/18 6.4/16 6.2/0.0 5.8/16.7 7.1/18 6.8/22.6

(0.0/16.0) 1.0/26.4 2.2/25 2.5/22 2.6/18.7 [illegible]/16 [illegible]/0.0 1.0/15 3.5/18.8 5.6/22 7.6/27.6 (0.0/16) 10.0/33 F 3.4/31

4.1/33 4.0/38.1 4.5/27.5 4.7/21.2 2.6/17.3 2.6/0.0 2.8/13.6 11.2/22.8 11.3/33

(F 2.5/19.7) 10.7/33 10.3/30.5 6.1/23.5 5.8/20 3.7/16 4.0/0.0 3.8/13 11.0/22 12.8/33 (F 10.7/30.7)

11.5/33 10.7/16 4.4/15.6 4.8/0.0 4.8/14 12.8/22 15.4/33

F 4.8/23.2 11.0/33 9.7/24.7 4.8/16.4 5.1/0.0 5.2/13.5 12.4/24.5 13.5/33 F 9.8/29.3

	+	H.I	−	Elev	Grad
		224.94			
+50				220.1	4.8
T.P.	0.05	225.53	5.46	219.48	
72				220±	5.3
+50				20.5	5.0
B.M.			3.16	222.37	
73	3.67	226.04		220±	
73				220±	5.2
+50				21.0	5.0
74				221±	4.9
				221±	4.9
+50				21.1	4.9
75				221.0	5.0
+50				20.7	5.3
T.P.	0.06	225.40	0.70	219.34	
76				220±	5.3
+50				19.4	6.0
+73±				218±	
77				218±	7.1

Cont. on page 139

Party { Wilshusen / Ruttenberg / McManus }

7-25-33 - Hot Cloudy 11

L ℄ R

10.3/33 10.7/31.1 4.9/17 5.5/00 5.6/13.6 12.5/24.6 12.6/33

(F 7.7/25.3) 11.1/33 11.6/26 5.8/17.5 5.6/00 5.5/14 13.5/25 14.0/33 F. 8.6/27.5

10.7/33 10.1/24.8 4.4/14.4 4.5/00 4.7/14 13.4/27.4 13.5/33

nail on tel. pole Lt. of Sta. 74+05

(0.0/18) 6.4/33 6.8/30 7.5/26.5 5.4/21 4.9/00 4.9/15.5 12.5/28 13.0/33 (F 8.2/27.2)

7/28/33

2.2/33 2.3/29 5.5/22 5.7/19 4.9/17 5.0/00 4.6/15 7.2/26 7.6/33

(0.0/17) 5.1/23 5.0/18 4.4/17 4.6/00 4.7/18 5.7/20 5.7/27 2.5/32 2.5/35 (D.C. 11/24.1)

5.2/23 5.3/18 4.6/15 4.9/00 4.8/17 6.0/20 6.0/27 2.4/32 2.4/35

(C-3.9/27.9) 0.9/33 1.0/40 5.0/24 5.4/18 4.6/17 5.1/00 5.4/17 6.8/19 7.4/27 7.7/33 (0.0/16) (F 1.7/18.5)

6.7/33 3.3/29 5.9/24 5.9/19 4.8/17 5.1/00 5.3/16 6.2/20 6.1/21 6.5/32 6.5/35

See page 28 for high readings

(D1.6/24.6) 1.5/34 1.8/30 5.1/26 5.9/19 4.8/16 4.8/00 4.5/16 5.4/19 5.5/26 3.4/28 3.7/33 (DC-1.7/24.7)

(4.1 / 23.2 5.9 / C-10.8 / 7.2 / 35.2) (23.2 5.9 / 7.5 / 34)

5.8/25 4.5/19 5.1/16 5.5/00 5.7/16 6.1/18 6.4/25 4.5/28 5.7/33

(0.0/18.5) 4.7/25 4.6/30 6.3/16 6.9/00 6.1/15 7.7/18 7.9/26 5.3/28 5.6/33 (DC 1.3/24.3)

BM Spike in 8" oak Lt. Sta 180+00 El. 207.51

(Z3-63)	X-Sec & Slope			Profile Grade	Grade Rod
Sta.	+S	H.I.	-S		
BM	5.65	229.80		224.15	
107+97				222.9	6.9
+50				23.3	6.5
107				23.8	6.0
+50				24.3	5.5
106				24.8	5.0
+50				25.3	4.5
105				25.8	4.0
+50				26.3	3.5
104				26.7	3.1
+50				27.0	2.8
103				27.4	2.4
T.P	4.97	233.13	1.64	228.16	
+50				27.7	5.4
102				28.0	5.1
+50				28.2	4.9
101				28.5	4.6
+50				28.7	4.4
100+00				29.0	4.1
Equation 99+00 = 99+01 Short Sta. = 99.0'					
+50				29.1	4.0
99+00				229.1	4.0
T.P	1.31	229.47	4.97	228.16	
BM.			5.34	224.13	224.15

Party { Deutsche, Weber, Connelly, Franke }

7-23-23 — Hot Fair — 12

L — ℄ — R

Spike Tel. pl. S.E. Cor. St. Vitts - Cleveland & 6th Sts

(C0.3/21.3) 6.4/21.8 Edge side walk 6.4/17.7 6.6/13 7.5/10.5 F0.2/0 7.4/12.8 7.4/17.7 5.5/26.5 3.7/32.4 (C0.1/21.1)

6.3/22 6.8/18.1 6.2/13.4 6.9/11.4 6.9/7.5 6.3/0 6.9/7.4 6.7/10.9 5.9/13.0 4.7/18.8 4.1/21.7 1.5/26.1 1.5/33

(C0.4/21.4) 5.6/22.1 5.5/18.5 5.7/12.4 6.6/8.8 0.0/0 6.6/6.9 6.3/11 5.6/12.4 4.0/20.3 3.6/33 (C2.5/23.5)

3.5/33 3.5/31 4.5/28.3 5.1/23 5.2/19. 5.2/12.2 6.1/8.5 5.5/0 6.3/9 5.7/13.2 5.8/21.9 6.4/26.9 6.9/33

(C0.3/21.3) 2.0/33 4.0/26.7 4.5/23.1 4.7/18.7 4.8/12.3 5.7/9.5 F0.1/0 5.9/8.6 5.9/11.5 5.3/14.4 6.3/20.7 6.7/24.3 7.4/26 8.7/27.9 9.0/33 (F0.6/16.9)

0.8/33 3.1/27.1 3.8/23.1 4.0/18.9 4.5/12.5 5.1/9.3 4.7/0 5.3/11.3 4.3/16.3 5.2/24.6 5.6/28 6.9/33

(Not set 4/crd) 2.6/33 3.0/28.4 3.3/18.4 4.0/7.8 F0.1/0 4.3/10 5.3/18.8 6.2/30 6.5/33 (Not set 4/c read)

0.4/33 1.0/25.8 2.9/22.6 3.4/10.9 4.0/7.8 3.5/0 4.2/9 4.3/12.8 4.6/17 5.3/20.5 5.6/24 6.7/33

(0.0/21.0) 1.5/33 1.8/25 3.0/22.2 3.3/10.4 3.7/8.1 F0.2/0 4.2/9.2 4.3/13.3 4.4/17.1 5.3/19.6 6.4/33 (F1.7/18.4)

2.6/33 3.2/10.9 3.6/8.3 3.0/0 4.0/10.5 4.6/16.6 4.5/21.8 5.1/33

(0.0/21) 1.5/33 1.8/24.5 2.4/22 2.6/10.9 3.3/7.7 F0.2/0 3.4/9.7 3.5/16.5 4.4/29.2 4.7/33 (F1.1/17.6)

Sp. Oak 22'L Sta. 103+30

4.3/33 4.8/25.4 5.4/22.2 5.6/11 6.2/9.0 5.6/0 6.3/9 6.3/15.7 6.9/24. 7.6/33

(C0.1/21.1) 4.6/33 4.7/25.7 5.1/19.2 5.7/16.3 5.9/8.6 F0.1/0 6.1/9.2 6.0/14.9 6.7/18.7 8.3/33 (F1.2/17.8)

4.8/33 5.0/17.8 4.6/12.8 5.6/7.2 5.0/0 5.8/9.2 5.5/13 5.5/24.2 6.1/27.7 7.2/33

(DC 0.3/20.3) 5.4/33 5.2/20.8 5.6/16.2 5.0/12.4 5.5/7.7 F0.1/0 5.4/9 5.5/13.1 5.8/23.5 6.4/26.3 7.4/33 (F1.6/18.2)

5.7/33 5.5/21.8 5.2/17.1 5.0/12.5 5.2/8.5 4.4/0 5.2/9 5.0/14.3 5.8/18.2 6.5/26 7.1/27.5 7.8/33

(DC 0.8/20.8) 4.8/33 4.3/21 4.0/17.7 4.5/13 5.0/8 0.0/0 4.7/9 5.0/13 4.5/16.6 4.5/21.8 5.3/24.2 6.7/33 (DC-0.9/20.9)

(4.0/33 3.5/27 2.6/22 2.2/19.7 3.5/12 4.5/11 4.7/8.4 3.8/0 4.4/9.5 4.1/13.9 3.5/21.2 4.0/27.4 4.6/33)

(C2.5/25.5) 2.5/41 1.5/26 1.7/22.4 1.9/18.8 3.8/13 4.6/11.4 C0.4/0 4.1/9.6 4.3/12.9 3.8/14.9 2.7/21.7 2.0/24.6 3.0/26.6 3.8/33 (C1.4/22.4)

Nail tree Oak 22'L Sta. 103+30

Sp. Tel. pl. S.E. Cor. of Intersection Cleveland & 6th St.

Cont. from page 11

	+	+1.	-	Elev.	Grade
77		✓✓5.40	15		
+23.1		✓✓5.40			
+50				217.1	8.3
+73.1					
78		✓✓5.01	15 (9.39)	15.6	9.8 ✓ ✓14.01
+23.1	6.00 B.C.				
+50				13.9	8.1
79	✓.53	✓14.97	12 9.57	12.0 ✓ ✓12.44	10.0
+23.1					
+50				10.0	5.0
80			07.9	07.9	7.1

Party { Witshusen ⊼ / Rottenberg Rod / McManus-chain

7/28/23
Hot. Fair

{ Note for stakes set on curve
See page 20

3.1/33	[illegible]	9.1/23	8.8/19	7.7/15	8.1/00	8.0/16	9.1/18	8.6/24	6.0/27	6.3/33

7.4/32	10.5/28	10.6/21	9.7/20	9.7/00	9.4/16	11.8/19	10.7/23	8.8/26	8.9/33

6.9/33	7.6/26	7.2/22	7.1/00	7.1/15	10.0/21	10.6/26	10.7/33

15.5/35	9.0/21	8.2/00	8.2/15	10.9/23	14.0/33

18.6/33	19.6/29	11.7/18	10.2/00	9.8/19	10.2/22	10.7/26	11.8/33

17.4/33	14.1/30	6.3/21	5.4/00	4.8/18	6.1/20	6.9/23

9.0/33	7.2/29	8.4/16	8.0/23	7.4/00	6.7/16	9.2/20	9.0/33

(for Slope Stakes
See page 20)

	+	H.I.	Profile Grade −	Grade El.	
80		214.97		207.9	
+30.9					
+50				05.9	9.1
80.9					
81			03.8	03.8	11.2
+30.9 E.C. (chained 81+33±)				02.5	12.5
+50	1.82	214.97 / 207.34	9.47 / 8.36	05.50 / 198.96 / 207.57 / 01.7	13.3
B.M.	0.80	208.31			
+80.9					
82			200.0	8.3	8.3
T.P.R.			12.56 / 198.6	195.75	
+50			12.03		9.7
T.P.L			12.03	196.28	
83			197.9	10.4	10.4
T.P.	8.53	206.13 (.19)	10.65	197.66	
+50			197.7		8.5
84			198.0	9.1	8.2

7/27/23 Party { Connors, Wishusen, Ruttenberg, McManus

BM 80+00 8" oak Lt. Elev 207.51

9.4/33 9.0/31 10.4/30 9.7/21 9.2/00 8.6/20 10.0/24 10.4/33

11.0/33 11.9/31 12.8/29 12.3/25 11.4/00 12.0/22 13.2/25 13.2/33

16.2/33 15.8/27 13.2/22 12.8/00 13.5/33

19.5/33 18.5/27 13.7/17 13.5/00 13.7/19 17.6/28 19.0/33

Lt of STA 80+00

8.7/15.1 8.7/00 9.2/13.1

See page 25

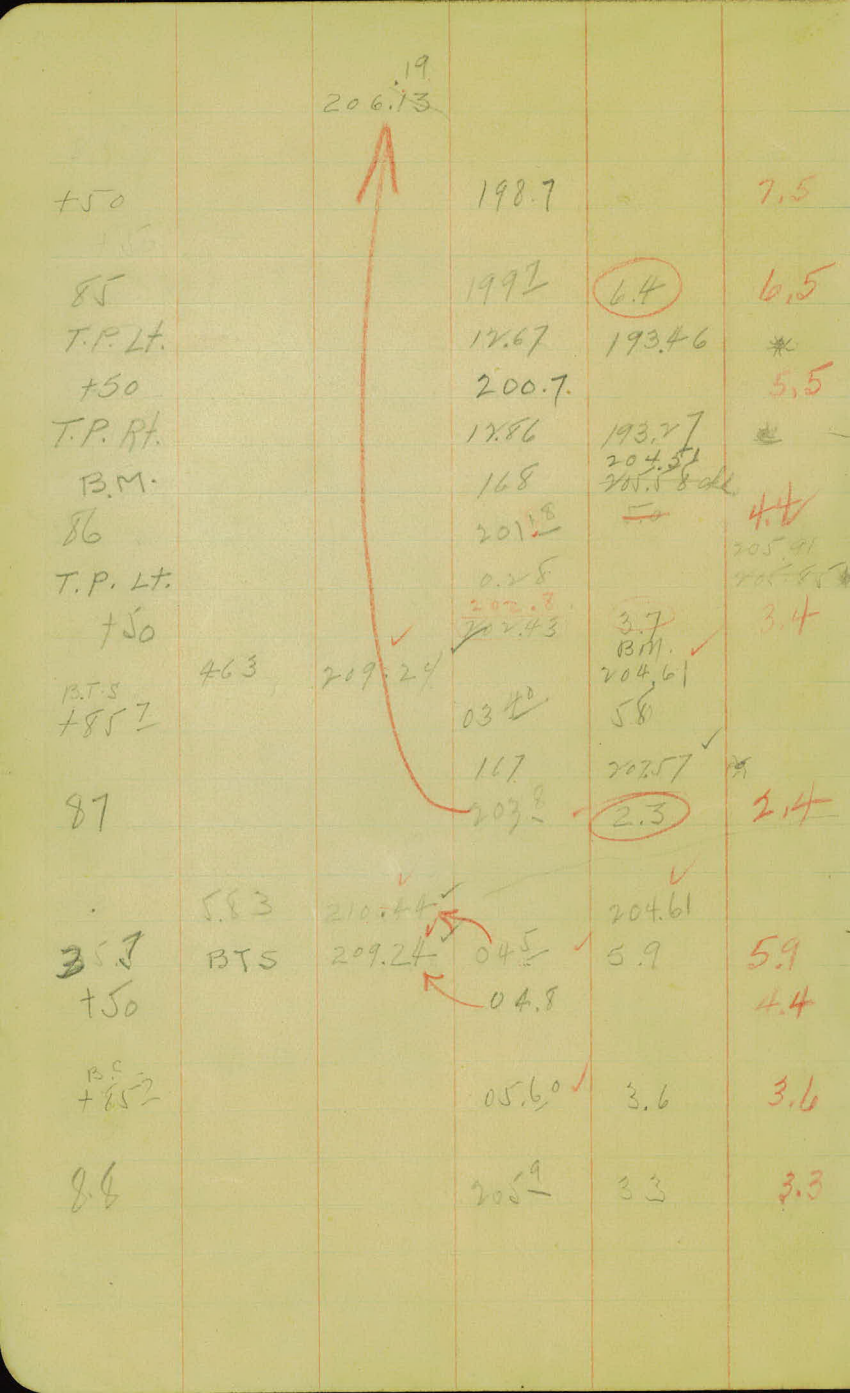
9.9/15.2 9.9/00 10.0/15.1

See page 26

10.7/15.8 10.1/00 10.7/14.1

9.5/15.4 8.5/00 8.7/13.9

8.8/14.9 8.4/00 8.7/16.1


206.13
+50
198.7
7.5
85
199.2
6.4
6.5
T.P. Lt.
197.67
193.46
+50
200.7
5.5
T.P. Rt.
197.86
193.27
B.M.
168
204.57
86
201.18
4.4
T.P. Lt.
0.28
+50
202.43
3.7
3.4
B.M.
204.61
463
209.24
B.T.S
+85.7
03.40
58
167
202.57
87
203.8
2.3
2.4
583
210.44
204.61
B.T.S
209.24
04.5
5.9
5.9
+50
04.8
4.4
+85.2
05.60
3.6
3.6
88
205.9
3.3
3.3

7-27-23
Rain-Cloudy

Party } T.C. Conners, Wilshusen, Ruttenberg, & 2 Marlow

7.3/15 7.5/00 7.3/15

6.4/14 6.5/00 6.6/14

See page 26

7.8/3.3 7.5/18 5.7/15 5.5/00 5.6/16.1 11.8/26.3 13.1/3.3

See page 25

BM 85+75 Lt 10" oak Elev. 204.61

1.0/26.0 (0.0/16.8) 3.3/26.4 4.3/24.5 5.5/22.7 5.7/17.8 4.3/15.6 4.4/00 4.3/15.3 5.8/18.7 5.8/23.1 2.3/28.9 2.3/3.3 (0.0/16.9) (C-1.8/26.8)

See page 27

(0.0/16.9) 1.0/23.9 4.1/20.9 3.3/17.8 3.0/16.1 3.3/00 3.5/15.0 4.5/18.0 4.3/23.5 1.1/28.1 0.5/3.3 (0.0/16.3) (0.0/25.0)

BM Lt 85+75

(0.0/16.9) (0.0/16.4)

See page 27

(1.1/20.8 1.0/25.5) (0.0/15) 2.8/20.8 3.1/17.9 2.4/15.7 2.3/00 2.1/15.8 3.2/18 2.9/21.8 +1.6/25.4 +2.0/3.3 (0.0/16) (C-4.0/29.0)

(BM Lt 85+75)

(0.0/15) 3.9/23 6.5/20.4 6.5/16.8 5.7/15 5.7/00 5.5/16.2 6.5/18.6 6.4/21.6 (C-0.5/15)

1.6/32.8 4.9/20.7 5.0/16.8 4.1/15 4.0/00 3.8/16.5 4.7/18.1 4.9/21 0.0/25.4

(4.7/29.7) (0.0/15) 2.8/22.7 4.3/18.1 3.5/15.2 3.6/00 3.1/15.5 3.9/17.3 3.8/20.7 0.0/25.1 0.0/16.8 (C-10.0/32.8)

2.8/3.8 4.4/21.1 4.4/18.8 3.5/17 3.3/00 3.2/15 3.8/16.5 3.5/20 1.4/21.4

+	H.I	-	Elev.	
	209.94			
E.W. +35.7		206.60		3.4
+50		06.9		2.3
+85.7		0760		
	218.21			
89		207.9		10.3
+35.7		208.40		9.8
+50		08.9		9.3
75.7		209.40	88	
T.P				
90		210.2		~~8.2~~ 4.8
	214.76			
+35.7		210.5		
+50		211.0		3.8
	216.62			
+75.7		211.7		
91		12.2		4.4
+35.7		12.9		
+50		13.5		3.1

continued Page 23

Corridors
Wilshusen
Ruttenbrey
McManus

7-31-23

F 1.3/15.0   C - 2.3/18.7

+9.4/33   1.2/.6   3.4/.4   2.5/4.4   2.2/7.6   2.5/0.0   2.5/8.7   3.1/9.6   2.6/16.8   C

(0.5/3.5/23.0) (0.0/15)   (C - 6.0/34.7)

H I from page 27

11.0/33   10.2/17   11.1/0.0   10.9/11.7   9.9/15.5   6.7/26   6.5/40

(0.5/0.6/23.5) (0.0/15)   (C - 2.2/30.7)

15.0/30   11.1/2.4   9.7/17.5   9.2/10   9.9/0.0   10.3/12   9.7/13.8   8.6/32.8   8.2/40

F 8.4/28.6 (F 1.4/16.0)   0.0/18.7 (4.0/28.7)

(See page 79)   13.9/33   12.6/2.5   10.4/20.5   5.9/14   4.6/0.5   4.5/0.0   5.4/10   5.7/15   4.9/17   5.0/21   4.1/31   3.3/35

H.I. Transferred from page 79

F 9.1/(29.6)   F 0.3/0.0   C - 0.2/27.0

13.5/0.0   11.5/2.1   9.3/21   5.2/14   3.7/0.5   3.5/0.0   3.7/0.7   4.6/13   4.6/16   2.7/33

H.I. Transferred from page 79

(F. 9.1/39.6)   (D - C 1.1/34.1)

13.1   11.1/3.8   10.9/3.3   5.8/16   5.4/10   4.7/0.0   5.3/10   6.0/13   6.3/17   6.0/33   5.1/33

F. 6.4/24.5   F 0.3/0.0   (F. 2.0/1.7/4.0/33)

9.3/3.3   7.3/2.1   5.1/16   4.0/10   3.5/0.0   3.7/0.9   4.7/16   5.1/40   4.4/24

28+38.17 E.C.

27+53.4 P.I.

BC 24+45.7 = 24+05.14

Alignment Notes Continued
on page (31)

24+00 P.O.T

10+00 P.O.T.

0+00

51.51

Tel pole

Edge of power frame
Closest to E.F.
5' Above Ground

51.25

51.4 Power pole

47.12 12" oak

38.52 14" Oak

14" oak

67.10

77.80

14" oak

38.6 14" oak

63.19

14" oak

Center present pavement.

Sta	Point	Lt. △ Rt.	Super	Add Width
+50		32-54 ✓		
80		25-39 ✓		
+56		18-24 ✓		
79		11-09 ✓		
+18		7-15		
+50		3-54 ✓		
+26				
78+23.1	BC	0 0		
78+22.1	New chainage			
66+63	POT			
66+60.8	chained	New		
53+87.4	PI	0°-35		
53+86	chained			
41+13	Back Sight			

PI = 80+20.2
△ = 89°-16'
D = 29°-00' Lt.
T = 197.1
LC = 307.8

Conner
Wilshusen
Rottenberger
Mc Manus

7/24/23

		Lt ◇ Rt		Super	Add. width
+25⁷	ETS			+00 -00	
91				+00 -.03	
+75⁷	BW			+.12 -.15	00
+50				+.29 -.30	0.2
+25⁷	EC		24-00	+0.39 -0.44	1.84
90			21-26	+.50 -.68	3.30
+75⁷	EW			+.66 -.79	3.72
+50			16-26	+0.82 -1.04	
+25⁷	BTS		14-00	+.93 -1.18	
89			11-26	+.93 -1.18	
+85⁷	ETS			+.93 -1.18	
+50			6-26	+.72 -.91	
+35⁷	EW			+.66 -.79	3.72
88			1-26	+.50 -.59	2.85
87+85⁷	EC		00	+0.39 -0.44	1.84
+50				+0.18 -0.18	0.14
+35⁷	BW			+0.12 -0.15	00
87				+.00 -.04	
86+85⁷	BTS			+0.0 -0.0	
+30⁹ +33¹	EC Chained	44-38			
81		40-09			

chained 90+26 ±

PI = 89+13.9
Δ = 48°-00'
D = 20°-00'
T = 128 ±
LC = 240 ±

chained 87+85 ±

Note When restaking this curve use notes on page 37 at each end transition is staked 50 ft to far on curve.

Sta	Point	Super.	Widening	Grade.	
77+23.1	B.T.S.	+.00 -.00		17.8	4.4
+73.1	B.W.	+.12 -.15	.00	16.5	5.5
78+23.1	B.C.	+.39 -.44	1.84	14.9	7.1
78+73.1	E.W.	+.66 -.79	3.72	13.1	8.9
79+23.1	E.T.S.	+.93 -1.18	3.72	11.1	3.9
79+50		+.93 -1.18	3.72	09.91	2.4
80		+.93 -1.18	3.72	07.92	4.43
+30.9	B.T.S.	+.93 -1.18	3.72	06.63	5.7
+80.9	E.W.	+.66 -.79	3.72	04.58	7.1
81+30.9	E.C.	+.39 -.44	1.84	02.53	9.8
+80.9	B.W.	+.12 -.15	0.0	00.48	4.W
82+30.9	E.T.S.	+.00 -.00		99.35	5.3

Party { Connors, Wilkinson, Rosenberg, McMartus — ℄ R.

8-14-23
Fair - Cool

216.01 BM. - Page 77
+ 6.00
222.01 HI

(0.0 / 18.6)	+0.1 / 0.0	(0.0 / 15)	(0.0 / 25)
(0.0 / 25)	+0.1 / 0.0	(0.0 / 15)	
(0.0 / 17.8)	0.0 / 0.0	(F 3.4 / 21.1)	
(0.0 / 19.7)	-0.1 / 0.0	(0.0 / 16)	
(F 7.8 / 31.4)	F 0.5	(0.0 / 16)	

+.1
214.97

216.01 BM - 78+15 Page 77
+ .77
216.78 HI
- 7.91
208.87 TP
+ 3.46
212.33 HI

(0.0 / 19.7)	F 0.3 / 0.0	(F 0.8 / 17.2)
(0.0 / 19.7)	F 0.4 / 0.0	(F 3.4 / 21.1)
(0.0 / 28.7)	F 0.1 / 0.0	(F 1.1 / 17.7)
(0.0 / 18.7)	F 0.9 / 0.0	(0.0 / 16)
(0.0 / 17.8)	F 0.4 / 0.0	(F 1.0 / 17.5)
(0.0 / 16)	F 0.3 / 0.0	(0.0 / 16)
(0.0 / 16)	F 0.5 / 0.0	(0.0 / 16)

212.33 HI
- 9.39
202.94 TP
+ 1.74
204.68 HI

B.M. 216.01

R.R. Spike off-set-10 ft.

See page 13 for X sections

Note

Note Re X sect-ioned 8/18/23 and transition slabs corrected for Supers See page 35

Sta	Point	Super	Widening	Grade	Grade Rod.
95+61 4		+0.0 -0.0		24 7	5.4
96+11 4		+0.12 -0.15	0.0	25 9	4.1
96+61 4	BC	+0.39 -0.44	1.84	26 8	3.3
97+11 4		+0.66 -0.79	3.72	27 6	2.5
T.P. 97+61 4		+0.93 -1.18	3.72	28 3	5.9
98+00 3		+0.93 -1.18	3.72	28 6	5.5
98+50 3		+0.66 -0.79	3.72	28 9	5.2
99+00 3 99+01 3	EC	+0.39 -0.44	1.84	29 1	5.0
99+51 3		+0.12 -0.15	0.0	29 1	
100+01 3		+0.0 -0.0		29 0	

8-16-23

L	℄	R
HI 730.17 from page (23)		
(C-1.3 / 22.3)	(C-1.0 / 0.0)	(C-0.9 / 21.9)
(F 1.0 / 22.0)	(F 0.2 / 0.0)	F 0.5 / 16.8
(C-1.4 / 24.2)	(F 0.1 / 0.0)	(F 0.4 / 16.6)
(C-1.3 / 26)	(F 0.1 / 0.0)	(F 0.8 / 17.2)
HI 734.07 from page (23)		
(C-1.0 / 25.7)	(C 0.3 / 0.0)	(0.0 / 16)
C-2.5 / 26.5	(C 0.5 / 0.0)	(0.0 / 16)
(C-3.0 / 25.8)	(C 0.5 / 0.0)	(0.0 / 16)

for X sections see pages 23 & 24

(see page (12)

Transition slabs corrected for supers and re staked 8/18/23 see page (36)

Sta	Point	Lt △ Rt.	
(chained 96+62.7			PI = 97+88.9
96+61.4)	BC	0.0	△ = 47-46
			D = 20° Lt
97		3-51½	T = 127.3
			LC = 238.9
+50		8-51½	
98		13-51½	
+50		18-51½	
Equation (99+00.3		23-53 ✓	
99+01.3)	EC		
Chained 99+01.3			

Sta 100+00.7 chained =
nail set by Dutsche Sta 100+00

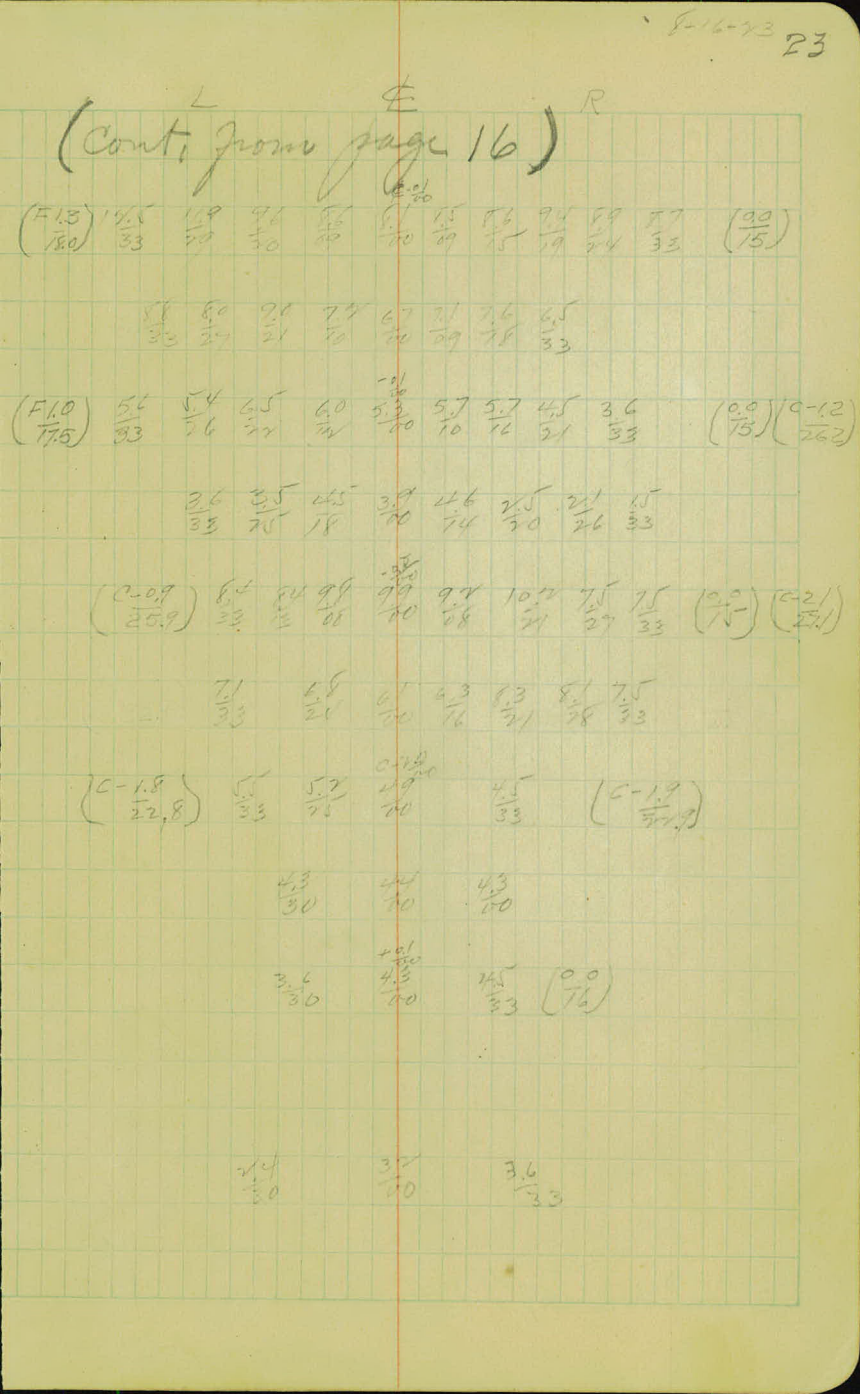
for X sections
see pages 23-24

for slope stakes
see pages 31-36

	+	H.I.	−	E/eV	
		216.62			
	8.74	222.97	2.39	214.23	
92				14.8	5.2
+50				16.2	6.8
93				17.6	5.4
+50				19.0	4.0
T.P.	10.22	230.17	3.07	219.90	
94				20.±	9.7
+50				21.8	8.3
95				23.±	6.9
+50				24.5	5.6
96				25.7	4.4
+50		230.17		26.6	3.5
	584	234.07	1.89	228.23	

L ℄ R

(Cont. from page 16)



		234.07		431	229.76
97				27^{5}	6.6
+50				28.1	6.1
98				28^{6}	5.5
+50				28.9	5.2
99	See page 12			29^{1}	

L ℄ R

6.3/33 6.5/00 6.6/33

6.3/33 6.3/00 5.5/30 6.0/33

4.6/33 4.5/00 5.6/06 5.4/71 4.8/17 4.7/24 6.0/31 6.2/33

3.6/33 3.1/38 2.3/15 4.0/57 4.5/00 4.5/04 4.5/10 5.1/16 4.1/24 2.5/33

For slope stakes
Sta 91+61 ℄ 98 x 50.9
See page 21

	+	+.1	-	Elev
T.P. Rt.				195.75
	0.86	196.61		/
82			2.14	-3.4
	1.97	196.24	12.34	-184.27
+50			198.6	
83			197.2	-11.7
+50			97.7	
84			198.0	-11.8
+50			98.7	
			199.2	
85				-13.5
T.P.	13.02	197.77	1.49	184.75
T.P.			4.42	
+50				
86	See page 14		2.18	

7-29-23

Connors
Wishusen
Ruttenburg

L ℄ R

* Carried forward from page - 14

L	R
200. / 189.7 / 10.3	6.9/30 9.4/36 (F 13.7 / 34.7)
198.6 / 182.9 / 15.7	3.3/37 4.7/50
197.9 / 182.2 / 15.7 / 2.6 / 18.3	4.0/35.5 6.6/43.4 (F. 19.7 / 42.5)
197.7 / 180.0 / 17.7	6.2/37 7.4/50
198.0 / 179.8 / 18.2	6.4/44 (F 19.7 / 42.5)
198.7 / 180.4 / 18.3	5.8/40 7.4/50
199.7 / 183.3 / 16.4	2.9/36 4.3/43 4.8/50 F. 19.6 / 42.7

See page 20

See pages 14-15

	+	H.I	-	Elev
T.P. Lt.	0.29	196.57		196.28
82			7.00	-3.4
T.P.	3.52	189.39	10.70	185.87
+50			98.6	
83			97.2	-8.5
+50			97.7	
84		189.39	98.0	-8.6
T.P.	14.63	193.37	8.65	180.74
+50			98.7	
85			99.2	-6.3
T.P.	11.45	204.31	0.51	194.86
+50			10.78	
86	see page 15			

7-27-23

26

L E R.

* Carried forward from page 14

(F. 14.0/35.2) 7.9/32

198.6
184.1
14.5

6.8/45 5.3/36

197.9
183.9
14.0

(F 15.5/37.1) 6.8/50 5.5/35

197.7
184.3
13.4

6.0/40 5.1/33

198.0
182.9
15.1

(F 18.0/40.6) 6.5/36

198.7
183.7
15.0

11.5/50 9.2/39

(F 12.9/33.7) 4.7/31

See pages 14-15

See page 25

T.P. Lt.	1.93	218.78		205.85
86			2.01	17.6
T.P.	7.65	210.30	3.19	215.59
+50			0.43	20.9
87			2.03	19.5
+35.5			2.04	14.3
+35.5				18.8
B.M.			6.95	216.39
87	3.77	220.06		216.29
+35.5				
+50			04.8	15.3
88			05.9	14.2
+35.7				
	10.64	218.21		207.57
+50			06.9	11.3

L C R

Carried forward from page 15

nail on dead oak Lt of Stg. 87+85

	+	H.I	−	Elev	Grad.
	979	235.13		226.34	
74			2 21 1/2		14.0
+50			21 1/2		14.0

Party { Wilshusen
Ruttenberg
McManus }

7-28-23
Hot-2011

L | ℄ | R

Carried forward from page 11
High readings

(C 7.8/32.8) 4.5/36 6.3/32

3.7/43 3.0/57

29+38±

28+88±

28+38± EC 12°-58½'

28+13± 11°-16'

27+88± 9-13½

27+69.4 7°-38'

27+50 6-22

27+32.55 5°-04'

27+15± 3-45

26+90± 1°-52.5

26+65± BC 00

26+15±

25+65±

PI = 27+53.4

Δ = 25°-57' Rt

T = 88.3

LC = 173.2

D = 15°00'

7°30'

3°45'

1°52.5'

30°02'

30°01'

30°

Sta	Point	Super	Widening	Elev	Grade %
29+88 ℄		+0.0 −0.0		31.19	4.9
29+38 ℄		+0.12 −0.15		31.14	4.9
28+88 ℄		+0.39 −0.44	0.0	31.09	5.0
28+63 ℄					
28+38 ℄	EC	+0.66 −0.79	1.84	31.04	5.0
28+13 ℄			2.78		
27+88 ℄		+0.93 −1.18	3.72	30.99	5.1
27+69.1			3.72		
27+50		+0.93 −1.18	3.72	30.94	5.1
27+10 ℄		+0.93 −1.18	3.72	30.91	5.2
26+90 ℄			2.78		
26+65 ℄	BC	+0.66 −0.79	1.84	30.86	5.2
26+40 ℄					
26+15 ℄		0.39 0.44	0.0	30.81	5.3
25+65 ℄		+0.12 −0.15		30.76	5.3
25+15 ℄		+0.0 −0.0		30.90	5.2

Party { Compares(?) [illegible] - Level / Rottenberg - Rod / McNamee(?) } 8-17-72

+	H.I.	−	L	℄	R
669	736.09	Spike on tel pole Rt. of Sta - 27+75			
			0.0 / 15	C 0.2 / 00	0.0 / 15
			0.0 / 15		0.0 / 15
			0.0 / 15		0.0 / 15
			0.0 / 15		0.0 / 16.5
			0.0 / 15		0.0 / 18.7
			0.0 / 15		0.0 / 18.7
			0.0 / 15		0.0 / 18.7
			0.0 / 15		0.0 / 16.8
			0.0 / 15		0.0 / 15
			0.0 / 15	C 0.3 / 00	0.0 / 15
			0.0 / 15	0.0 / 15	0.0 / 15

Notes for grade stakes

8/16 - 23

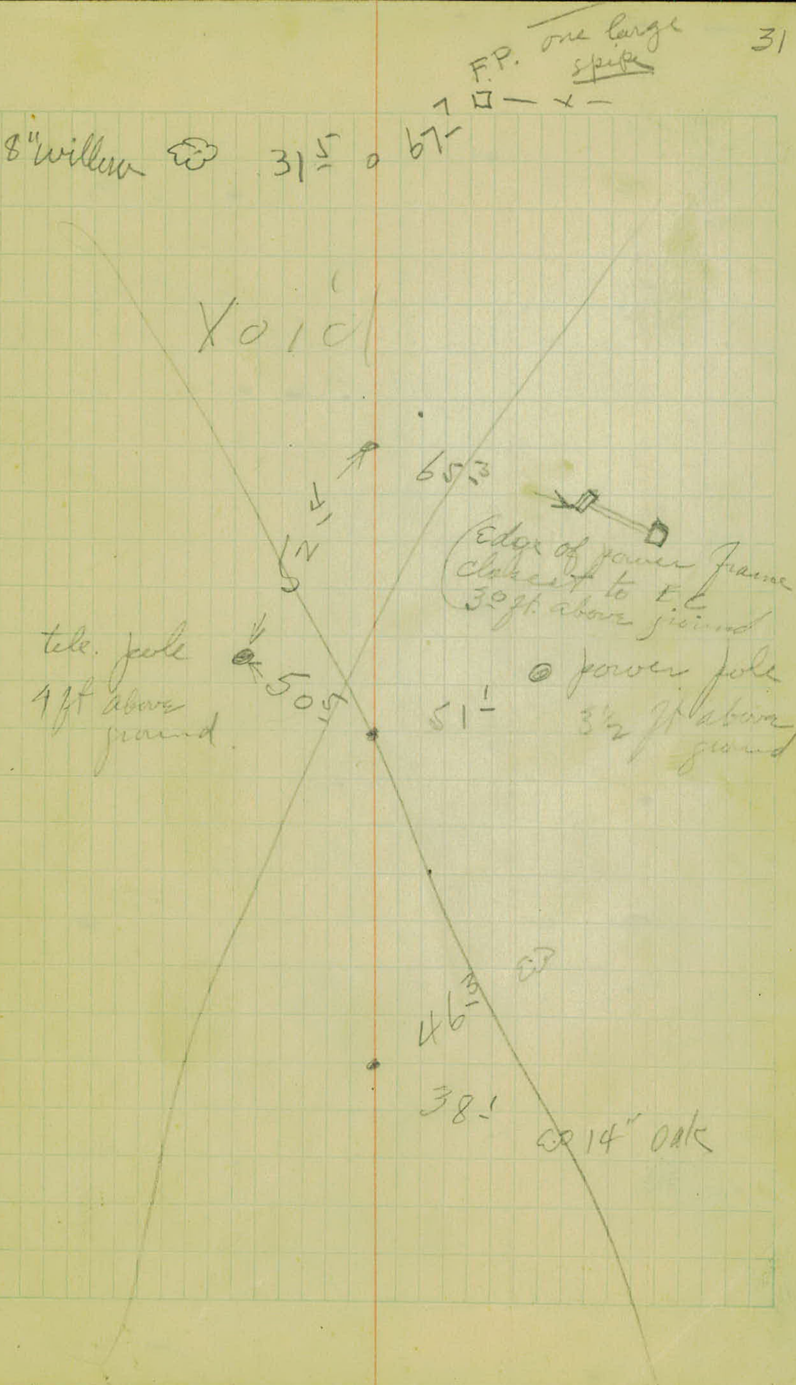
53+87± PI

28+38± EC

27+53± PI

26+65± BC

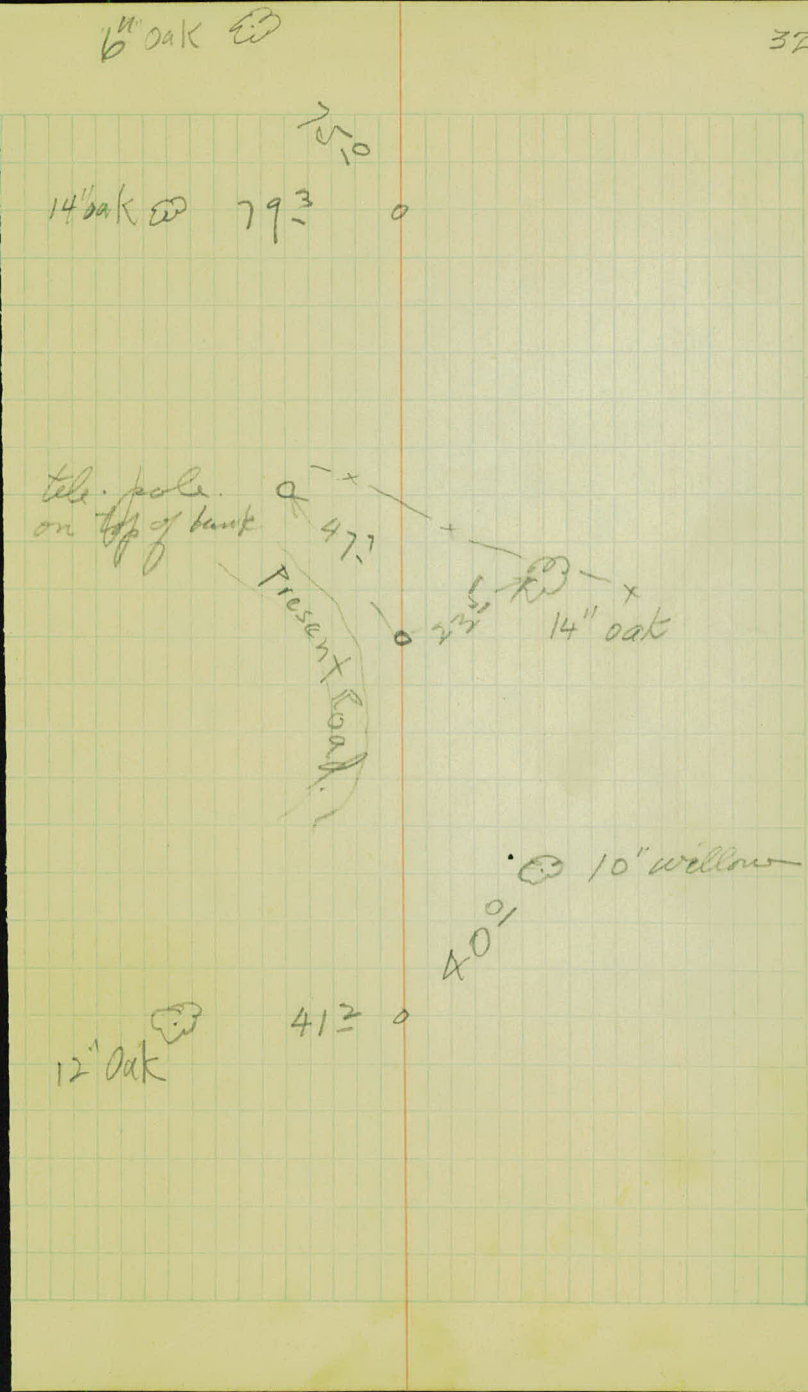
Alignment Notes Cont.
from page 17.


F.P. one large spike
8" willow
31 5
67 7
65 3
N
tele. pole
4 ft above ground
50 5
Edge of power frame
closest to F.C
30 ft. above ground
power pole
3½ ft above ground
51 1
46 3
38 1
14" oak

81+30.9 EC

80+20.2 PI

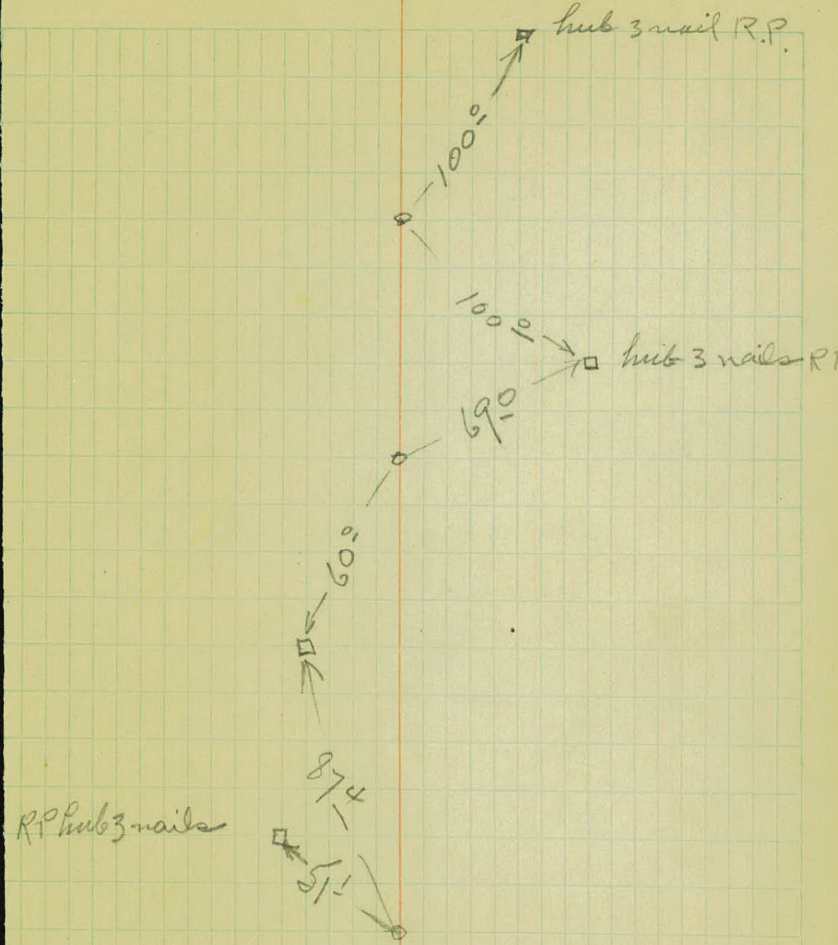
78+23.1 BC


6" oak
75.0
14" oak
79.3
tele. pole on top of bank
47.1
Present Road
14" oak
10" willow
40.0
41.2
12" Oak

90+25.7 EC

89+13.9 PJ

87+35.7 BC

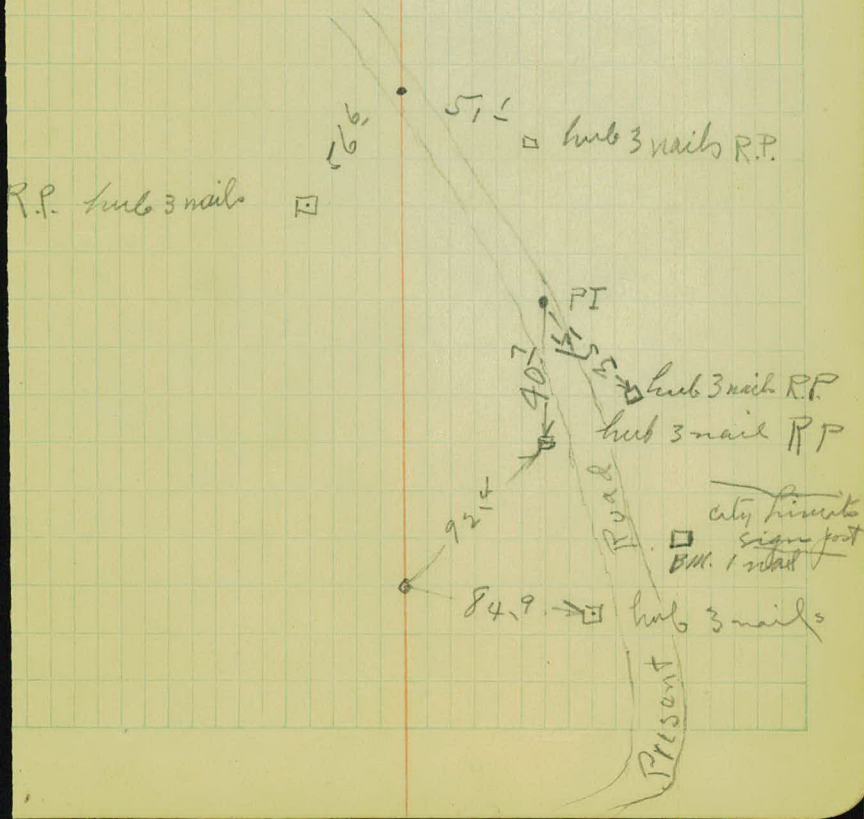

hub 3 nail R.P.
100'
100'
hub 3 nails RP
69'
60'
87 1/4'
RP hub 3 nails
51'

chained

99+00
99+01.3 EC

97+88 PI

96+61 BC


97.1
51.1
hub 3 nails R.P.
R.P. hub 3 nails
PI
40.7
hub 3 nails R.P.
hub 3 nails R.P.
92.4
Road
city limits
sign post
BM. 1 inch
84.9
hub 3 nails
Prison

Transitión Slabs corrected for. Supers

	+	H.I.	−	Elev	
	620	222.21			210.01
76+73.1		+0 0	−0 0	1820	3.5
77+23.1		+0.12 −0	−0.15	1780	4.4
77+73.1		+.39	−0.44	1650	5.7
78+23.1		+.66	0.79	1490	7.3
78+73.1 B.C.		+.93	−1.18	1310	9.1
T.P.	0.70	210.93	11.98	210.23	
80+80.9		+.93	−1.18	0458	6.3
81+30.9 E.C.		+ +.66	−.79	0253	8.4
81+80.9		+.39	−.44	0048	10.5
82+30.9		+.12	−.15	9935	11.6
82+80.9		+00	−00	9820	12.7
8					

Hot-Fair party { Conners, Wickhusen, McManus, Ruttenberg }

8-16-23

Spike on 14" oak Lt. of Sta. 78+15

L	℄	R
(0.0 / 16)		(0.0 / 21)
(0.0 / 18.7)		(0.0 / 15) (0.0 / –)
		(0.0 / 21)
(0.0 / 17.8)		(F 3.8 / 21.7)
(0.0 / 19.7)		(0.0 / 15)
(0.0 / 19.7)		(0.0 / 16)
0.0 / 17.8		(F 1.3 / 18.0) RR Spike
0.0 / 17.8		(0.0 / 16)
0.0 / 16		(0.0 / 16)
0.0 / 16		0.0 / 16

for stakes set on curve see page (20)

Transition Slabs corrected for Supers

	3.72	733.49		77977
95+11.4	+.00	-.00	2350	10.0
95+61.4	+.12	-.15	2422	8.8
96+11.4	+.39	+.44	2590	7.6
96+61.4	+.66 BC	-.79	2680	6.7
97+11.4	+.93	-1.18	2760	5.9
98+50.3	+.93	-1.18	2829	4.6
99+00.3	EC	see page 12		

Conners
Wilsh..son
Ruttanbur Spike on city limits sign Post.
M.S. Mann

8-18-73

L	℄	R
C-1.7 / 22.1	C 2.2 / 20	C-2.0 / 23
C-1.4 / 22.4	F 1.1 / 20	C-1.0 / 22
C-1.4 / 22.4	0 / 20	F 0.8 / 17.2
		F 0.6 / 16.9
F 0.9 / 17.4		C-1.6 / 26.1
C-3.4 / 28.1		0.0 / 16

for stakes set on curve see page (21)

Transition Slabs corrected for Supers.

Sta.	Point widening	Lt Super.	Δ Rt. Def	
91+75		+0.0 -0.0		
91+25		+0.12 -0.15		
90+75	0.0	+0.39 -0.44		
90+25	EC 1.84	+0.66 -0.79	24-00	PI = 89+13
				Δ = 48-00
89+75	3.72	+0.93 -1.18	19-00	D = 20°-00' Rt
				T = 128
89+25	3.72	+0.93 -1.18	14-00	LC = 240.0
88+85	3.72	+0.93 -1.18	10-00	
88+35	3.72	+0.93 -1.18	5-00	
87+85	BC 1.84	+0.66 -0.79	0.0	
87+35	0.0	+0.39 -0.44		
86+85		+0.12 -0.15		
86+35		+0.0 -0.0		

Use these notes when setting finishing stakes for grading

Grade

214.20

212.90

211.70

210.50

209.40

208.40

207.60

206.60

205.60

204.50

203.40

202.40

< correct Supers > < stakes set O.K. > correct Supers

for slope stakes on curve see page 16

8/21/73

Pavement stakes 0 to 5
23-63

Sta.	+	H.I.	−	Elev	Sub. Grade
B.M.	5.89	237.85		231.96	
0					232.40
T.R. +25'	4.42	237.73	4.54	233.31	232.475
+50					232.550
+75'					232.625
1					232.70
+25'					232.775
+50					232.850
+75'					232.925
2					233.000
+25'					233.075
+50					233.150
+75'					233.225
3	4.29	238.14	3.88	233.85	233.300
+25'					233.375
+50					233.450
+75'					233.525
4					233.600
+25'					233.675
+50					233.750
+75'					233.825
5					233.900

Carley
Parsons
Eck
Briggs

Pavement Grade

		L+	℄	R+
Nail in 12" oak S.W. Cor of road's				
233.025				
233.100	Grade Rod	10'	℄	10'
233.175	4.56	5.53	5.43	5.44
233.250	4.48	5.20	5.26	5.26
233.325	4.41	4.90	5.05	5.38
233.400	4.33	4.88	4.98	5.13
233.475	4.26	4.66	4.91	5.02
233.550	4.18	4.71	4.71	4.99
233.625	4.11	4.74	4.68	4.90
233.700	4.03	4.78	4.69	4.79
233.775	3.96	4.80	4.65	4.93
233.850	3.88	4.69	4.60	5.02
233.925	4.22	5.18	4.99	5.25
234.000	4.14	5.18	5.00	5.20
234.075	4.07	5.02	4.97	5.09
234.150	3.99	5.02	4.82	5.08
234.225	3.92	4.89	4.68	4.68
234.300	3.84	4.62	4.47	4.43
234.375	3.77	4.46	4.38	4.30
234.450	3.69	4.30	4.25	4.34
234.525	3.62	4.30	4.19	4.33

Pavement stakes

8/22/23

Sta	+	H.I.	−	Elev	Sub. Grade
B.M.	7.84	239.15			231.31
5 + 25					33.975
+50					34.050
+75					34.125
6					34.20
+25					34.275
+50					34.350
+75					34.425
7					34.500
+25					34.551
+50					34.570
+75					34.530
8					34.50
+25					34.300
+50					34.240
+75					34.101
9					34.0
+25					33.80
+50					33.60
+75					33.40

Paving Grade

	Grade Rod	Lt 10'	℄	Rt 10'
Spike in 14" oak 25' Rt of sta 9+90				
34.600	4.85 L	5.30	5.22	5.28
34.675	4.48 L	5.13	5.13	5.13
34.750	4.40 L	5.12	5.17	5.25
34.825	4.33 L	5.39	5.09	5.40
34.700	4.45 L	5.20	5.09	5.36
34.975	4.18 L	5.18	5.00	5.20
35.150	4.00 L	4.92	4.73	4.78
35.125	4.03 L	4.78	4.72	4.76
35.176	3.98 L	4.61	4.72	4.89
35.195	3.96 L	4.76	4.70	4.85
35.155	4.00 L	4.86	4.85	4.95
35.125	4.03 L	4.95	4.82	4.96
34.975	4.23 L	4.82	4.72	4.80
34.865	4.29 L	5.13	4.80	4.96
34.726	4.43 L	5.35	5.09	5.31
34.625	4.53 L	5.60	5.21	5.39
34.425	4.73 L	5.58	5.56	5.65
34.225	4.93 L	5.90	5.79	5.82
34.025	5.13 L	6.08	5.82	6.06

Sta	+	H.I.	−	Elev	Sub. Grade
	7.84	239.15			
10					33.20
+25					33.00
+50					32.80
+75					32.60
T.P.	2.57	234.42	6.30	232.85	
11					32.40
+25					32.20
+50					32.00
+75					31.80
12					31.60
+25					31.317
+50					31.106
+75					31.040
13					31.001
+25					30.890
+50					30.750
+75					30.720
14					30.70
+25					30.675
+50					30 650
+75					30.625
15					30.60

Paving Grade	Grade Rod	Lt 10'	℄	Rt 10'	
33.825	5.33 L	6.35	6.09	6.35	
33.625	5.53 L	6.40	6.12	6.33	
33.425	5.73 L	6.43	6.48	6.48	
33.225	5.93 L	6.56	6.51	6.60	
33.025	2.40 L	3.05	3.10	3.38	
32.825	2.60 L	3.10	3.41	3.47	
32.625	2.80 L	3.33	3.42	3.53	
32.425	3.00 L	3.70	3.61	3.89	
32.225	3.20 L	3.95	3.80	4.10	
31.942	3.48 L	4.30	4.10	4.20	
31.731	3.69 L	4.30	4.15	4.38	
31.665	3.76 L	4.52	4.39	4.55	
31.626	3.80 L	4.58	4.42	4.90	
31.515	3.91 L	4.63	4.63	5.05	
31.415	4.01 L	4.70	4.78	5.00	
31.345	4.08 L	4.75	4.77	5.06	
31.325	4.10 L	4.76	4.72	4.96	
31.300	4.12 L	4.68	4.76	4.91	After setting sta. 157+00
31.275	4.15 L	4.61	4.61	4.82	shot back to B.M. 9+90
31.250	4.17 L	4.64	4.81	4.78	Error = 0.02
31.225	4.20 L	4.71	4.82	4.87	

8/27/23 Pavement stakes.

Sta	+	H.I.	Elev	Elev	Sub Grade
BM.	4.16	235.47			231.31
16					230.50
+25					230.44
+50					230.38
+75					230.32
17					230.30
+25					230.26
+50					230.19
+75					230.14
T.P.	3.64	334.41	4.70	230.77	
18					230.10
+25					230.025
+50					229.950
+75					229.875
19					229.800
+25					229.725
+50					229.650
+75					229.575
20					229.500
+25					229.425

Paving Grade	LT 10'		RT 10'	Conley Parsons Briggs Eck
Spike in 12" oak				
231.125	4.35	5.30	5.09	5.12
231.074	4.40	5.40	5.30	5.35
230.963	4.51	5.45	5.40	5.30
230.967	4.51	5.25	5.30	5.32
230.925	4.55	5.35	5.22	5.30
230.885	4.59	5.40	5.23	5.17
230.815	4.66	5.25	5.20	5.26
230.765	4.71	5.25	5.30	5.45
230.725	3.69	4.40	4.42	4.50
230.650	3.76	4.55	4.52	4.62
230.575	3.84	4.80	4.40	4.55
230.500	3.91	4.85	4.50	4.60
230.425	3.99	5.00	4.70	4.70
230.350	4.06	5.00	4.87	4.66
230.275	4.14	4.95	5.00	4.82
230.200	4.21	4.85	4.95	4.90
230.125	4.29	4.75	4.92	4.95
230.050	4.36	4.86	4.90	5.00

Sta	+	H.I.	−	Elev	Sub Grade
	3.64	334.41			
20+50					229.350
+75					229.275
21					229.200
+25					229.190
+50					229.150
+75					229.112
22					229.100
+25					229.220
+50					229.319
+75					229.430
23					229.50
+25					229.65
+50					229.80
+75					229.95
TP1	4.32	335.01	3.72	330.69	
24 BM1			4.65	Error .04 230.36	230.1
+25	Cont'd on page 44				230.24
+50					230.37
+75					230.48
25					230.60

Paving Grade		Lt 10'	℄	Rt 10'
229.975	4.44	5.00	5.60	5.00
229.900	4.51	5.30	5.15	5.10
229.825	4.59	5.55	5.30	5.33
229.815	4.60	5.50	5.22	5.20
229.775	4.64	5.39	5.35	5.40
229.737	4.68	5.50	5.32	5.46
229.725	4.69	4.95	4.90	4.71
229.845	4.57	5.50	5.50	5.30
229.944	4.47	5.50	5.35	5.40
230.055	4.36	5.20	5.10	5.50
230.125	4.29	5.08	4.90	5.20
230.275	4.14	4.95	4.70	4.81
230.425	3.99	4.93	4.65	4.72
230.575	3.84	4.70	4.54	4.61
230.725	3.69	4.32	4.32	4.45
230.845				
230.995				
231.105				
231.225				

Sta.			℄ Sub Grade	℄ Pavement Grade	I. R. Super Elev.
25 +15.1	P.S.T.		230.64	231.245	0.0
+40.1			230.70	231.325	-0.08
+65.1			230.75	231.375	-0.08
+90.1			230.79	231.415	-0.17
26					
+15.1	P.W.T.		230.815	231.440	-0.26
+40.1			230.840	231.465	-0.34
+65.1	B.C.		230.865	231.490	-0.51
+90.1		1°-52½'	230.890	231.515	-0.67
27					
+15.1	E.T.C.	3°-45'	230.915	231.540	-0.81
+40.1		5°-37½'	230.940	231.565	-0.81
+65.1		7°-30'	230.965	231.590	-0.81
+88.2 (23')	E.T.C.	9°-13½'	230.985	231.610	-0.71
28					
+13.2		11°-06'	231.010	231.635	-0.67
+38.2	F.C.	12°-58½'	231.035	231.660	-0.51
+63.2			231.060	231.685	-0.36
+88.2	P.W.T.		231.085	231.710	-0.26
29					
+13.2			231.110	231.735	-0.17
+38.2			231.135	231.760	-0.08
+63.2			231.160	231.785	-0.08
+88.2	P.S.T.		231.185	231.810	0.0
30			231.20[illegible]	231.[illegible]	

O L Super Elev.	Extra Widen.		I. R Pavement Grade	O L Pavement Grade
00			231.265	231.265
-.01			231.245	231.315
+0.08			231.295	231.455
+0.17			231.245	231.585
+0.26	00		231.180	231.700
+0.35	0.35		231.105	231.815
+0.45	1.49		230.980	231.940
+0.53	2.64		230.895	232.045
+0.62	3.00		230.730	232.160
+0.62	3.00		230.755	232.185
+0.62	3.00		230.780	232.210
+0.62	3.00		230.800	232.230
+0.53	2.64		230.965	232.125
+0.47	1.49		231.150	232.110
+0.35	0.35		231.325	232.035
+0.26	00		231.450	231.970
+0.17			231.565	231.905
+0.08			231.680	231.840
-0.01			231.715	231.775
0.0			231.810	231.810
			231.825	231.855

Sta.	+	H.I.	−	Elev.	I Rt. Pavement Grade
B.M.	7.69	238.09		230.40	
24+25					230.56
+50					230.77
+75					231.05
25+					231.23
+15.1	P.S.T.				231.26
+40.1					231.24
+65.1					231.27
+90.1					231.24
26+15.1	P.W.T.				231.18
+40.1					231.10
+65.1	B.C.				230.98
+90.1					230.84
27+15.1	E.T.C.				230.73
+40.1					230.75
+65.1					230.77
+88.2	E.T.C.				230.80
28+13.2					230.96
+35.2	E.C.				231.15
T.P. +432	3.83	235.93	5.99	232.10	231.34
+88.2	P.W.T.				231.45

O Lt. Pavement Grade	L.			R.
Spk in Tel. pole 41' R. sta. 27+55				
—		7.9 / 10	7.8	7.6 / 10
—		7.7 / 10	7.7	7.7 / 10
—		7.6 / 10	7.6	7.6 / 10
—		7.5 / 10	7.5	7.5 / 10
31.265		7.4 / 10	7.5	7.5 / 10
31.315		7.3 / 10	7.6	7.6 / 10
31.455		7.2 / 10	7.4	7.5 / 10
31.585		7.1 / 10	7.2	7.6 / 10
31.700	7.4 / 10	7.3 / 5	7.6	7.7 / 10
31.816		7.2 / 10	7.2	7.9 / 10
31.940	7.1 / 10		7.4	8.0 / 10
32.045		7.1 / 10	7.7	7.9 / 10
32.160		6.9 / 10	7.5	8.0 / 10
32.185		6.7 / 10	7.5	7.8 / 10
32.210		6.7 / 10	7.3	7.9 / 10
32.230		6.8 / 10	7.3	7.9 / 10
32.165		6.7 / 10	7.3	7.6 / 10
32.110	4.9 / 10	7.8 / 4	7.3	7.4 / 10
32.035		4.6 / 10	5.0	5.1 / 10
31.970		4.9 / 10	5.1	5.0 / 10

Sta.	+	H.I. 236.93	−	Elev.	I.S. Pavement Grade
29+13.2					231.545
+32.2					231.680
+42.2					231.766
+88.2	P.S.T.				231.810
B.M.	6.14	236.54	5.52	230.41	230.40 Sub Grade
30					231.20
+25					231.225
+50					231.250
+75					231.275
31					231.30
+25					231.32
+50					231.34
+75					231.36
32					231.37
+25					231.386
+50					231.39
+75					231.395
33					231.40
T.P. +25	5.02	231.04	4.52	232.02	"
+50					"

0
2
Pavement Grade

	L		R
231.905	4.8/10	4.8	5.0/10
231.840	4.7/10	4.8	5.1/10
231.775	4.7/10	4.8	5.0/10
231.510	5.0/10	4.8	4.8/10

Spk in tel. pole 41 R sta 27+55

Pavement Grade

231.825	5.5/10	5.3	5.3/10
231.850	5.2/10	5.3	5.3/10
231.875	5.3/10	5.3	5.4/10
231.900	5.3/10	5.3	5.4/10
231.925	5.4/10	5.3	5.4/10
231.949	5.4/10	5.2	5.4/10
231.969	5.4/10	5.2	5.4/10
231.986	5.5/10	5.2	5.4/10
232.001	5.4/10	5.2	5.3/10
232.011	5.5/10	5.4	5.4/10
232.018	5.5/10	5.4	5.4/10
232.024	5.5/10	5.3	5.5/10
232.025	5.4/10	5.2	5.1/10
"	5.7/10	5.8	5.8/10
"	5.7/10	5.7	5.9/10

Sta.	+	H.I.	−	Elev.	Sub Grade
		239.04			
+75					231.40
34					
+25					
+50					
+75					
35					
+25					
+50					
+75					
36					
+25					
+50					
+75					
37					
+25					
+50					
+75					
38					
+25					231.40

Pavement Grade

	L.		R.
	5.7		5.9
32.025	10	5.4	10
	5.7		6.4
	10	5.7	10
	5.7		5.7
	10	5.8	10
	5.9		5.7
	10	5.8	10
	5.7		5.5
	10	5.7	10
	5.6 5.9		5.4
	10 4	5.7	10
	5.7		5.5
	10	5.4	10
	5.6 5.7		5.5
	10 4	5.4	10
	5.6		5.7
	10	5.9	10
	5.5 5.7		5.6
	10 10	5.4	10
	5.6		5.6
	10	5.6	10
	5.6		5.6
	10	5.6	10
	5.5		5.6
	10	5.4	10
	5.6		5.5
	10	5.4	10
	5.6		5.5
	10	5.4	10
	5.6		5.7
	10	5.4	10
	5.5		5.7
	10	5.4	10
	5.7		5.5
	10	5.4	10
37.925	5.7		5.7
	10	5.7	10

Sta.	+	H.I.	−	Elev.	Sub Grade
		237.04			
+50					231.40
+75					
39					
+25					
+50					231.4
B.M.	4.47	235.19	6.32	230.72	
T.P.			7.91	227.28	227.24
B.M.	4.79	235.51		230.72	
39 +75					231.37
40					231.30
+25					231.19
+50					231.02
+75					230.81
41					230.54
+25					230.24
+50					229.88
+75					229.48
T.P.	6.50	233.78	8.23	227.28	
42					229.02
+25					228.53
+50					227.98

Contd on page 55

Pavement Grade	L.		R
32.025	5.7/10	5.8	5.7/10
	5.8/10	5.7	5.6/10
	5.8/10	5.7	5.8/10
	5.8/10	5.7	5.6/10
32.025	5.7/10	5.6	5.5/10

Spk in Tel. pole L. Sta 39+40

Spk in Tel pole 30' R. Sta 43+35

Spk in Tel. pole L. Sta 39+40

31.975	4.0/10	4.2	4.3/10
31.925	4.3/10	4.2	4.3/10
31.815	4.3/10	4.3	4.3/10
31.645	4.6/10	4.4	4.7/10
31.430	4.7/10	4.6	4.5/10
31.145	5.0/10	5.0	5.0/10
30.865	5.3/10	5.4	5.4/10
30.505	5.7/10	5.7	5.8/10
30.105	6.0/10	6.2	6.1/10

Spk in Tel. pole 30' R. Sta. 43+35

29.445	4.7/10	4.8	4.7/10
29.155	5.2/10	5.3	5.3/10
28.005	5.7/10	5.9	5.9/10

	+	+!	-	Ea.	
	1310	241.65		1568.55	
66				25.2	16.5
+50				25.9	15.7
67				26.2	15.4
+50				26.2	15.4
68				25.7	15.9
+50				24.9	16.7
	261	731.16	26	1585.5	
65				22.6	8.6
66				25.1	6.1

7-24-23
Hot - Fair

Party { Wilshosen T
Ruttenberg - Rod
McMarus chain

Carried forward from page - 9 - and - 10
high readings

7.3 / 37.5	4.7 / 41
8.0 / 40 6.2 / 36	8.0 / 34.5 5.9 / 36.0 5.4 / 39.2 3.8 / 41.7
(C-11.2 / 36.2) 4.2 / 37	C-13.4 / 38.4 2.1 / 39
3.5 / 35	1.4 / 31.0
(C-11.7 / 36.1) 4.2 / 33.7	(C 11.3 / 36.3) 4.4 / 34.5
6.8 / 35.6	12.1 / 25.5
D-C 2.6 / 25.5	D-C .08 / 23.8
D-C 0.3 / 23.3	D.C. 1.5 / 24.5

Sta		+	H.I.	−	Elev	Grade
T.P.		3.00	234.57			231.57
41						30.5
42						29.0
43						26.7
44						23.7
45	T.P.	1.94	225.61	10.90	223.67	20.0
46	T.P.	1.64	217.86	9.39	216.22	16.2
47						12.3
48	T.P.	0.25	208.63	9.48	208.38	08.4
49						04.5
50						01.7
51						99.9
52						99.2
53						98.6

Checked old B.M. Lt 45+50 Error = .02

17.86
4.66
13.20

213.04
4.62
217.66

5.4

199.35

	+	I	-	Elev	
BM	1.45	219.51		218.06	
	0.87	208.40	11.98	207.53	
	2.40	202.30	8.50	199.90	
			4.49	197.81	197.86
			2.95	199.35	
BM					

B.M.'s

Spike on tel. pole Rt. of Sta 48+50-29' Rt.
carried from page 6

Top of P.O.T. Spike at Sta 53+87-3' Rt. Page 8
Spike on 3rd bent Lt. of Sta 55+50

08.63
09.31
17.94

08.63
17.86
10.77

Chaining Equations

310.0

BC (78+23¹) −0.8
78+22^I Connor

159.1

P.O.T. (66+63⁶) −2.8
66+60³·⁸ Conner.

1260.8

12.6

P.I. (53+87⁴) −0.7
53+86⁷ Conner

2721.5.6

B.C. (26+65¹⁴) −2.4
26+63⁰ Dutsche

2663.0

P.O.T. (0+00)
0+00 Dutsche

(107+97⁰) +0.7
107+97^I Dutsche & Conner

897.4

EC (99+00³) (99+01³) +1.0
99+01³ Conner

239.9

BC (96+61⁴) (+0.9) +1.1
96+62⁵ Conner

636.8

EC (90+25⁷) +0.8
90+26⁵ Conner

240.8

BC (87+85⁷) −0.2
87+85⁵ Conner

654.6

EC (81+30⁹) +2.2
81+33¹ Conner

Note Sta. in parenthesis are profile stations.

At P.O.T.'s, B.C.'s, & E.C.'s Stationing was corrected to profile Stationing.

+	−
2.2	2.14
0.8	0.7
0.9	2.8
1.0	0.4
0.7	0.2
5.6	−6.24
5.8	+5.60
	−0.64

Therefore the total project chainage is 0.64 ft. less than shown on profile

Comm

8/21/23

Grade on ℄ Line 23 - 63

Sta	+	H.I.	−	Elev	Sub-Grade
18+00	5.76	236.16			230.40
29					31.1
30					31.2
31					31.3
32					31.35
33					31.4
34					31.4
35 TP1	5.07	236.45	4.78	231.38	31.4
36					31.4
37					31.4
38					31.4
39					31.4
40					31.3
41					31.5
BM1					232.17
TP1			4.88	231.57	

Corley
Persons
Eck
Briggs.

Cloudy - Rainy.

Spike in tele pole Rt. of s to 27+53

Spike in tele pole Lt. of s to 39+50 Moved

Stg.	+	H.I. 233.78	−	Elev.	Sub Grade
42+75					227.39
43					226.74
+25					226.44
+50					225.32
+75					224.54
44					223.70
+25					222.83
+50					221.90
T.P. +75	1.27	223.79	11.24	222.52	220.95
45					220.00
+25					219.05
+50					218.10
+75					217.15
46					216.20
+25					215.25
+50					214.29
+75					213.32
47					212.35
+25					211.37

Pavement Grade

	L			R	
228.015	6.7 / 10	6.7		6.5 / 10	
227.525	6.9 / 10	7.1		7.0 / 10	
224.025	7.5 / 10	7.4		7.7 / 10	
225.725	8.4 / 10	8.5		8.6 / 10	
225.165	8.2 / 10	8.3		8.3 / 10	
224.225	10.0 / 10	10.2		10.1 / 10	
223.750	11.0 / 10	11.0		11.0 / 10	
222.525	11.9 / 10	12.1		12.1 / 10	
221.525	2.3 / 10	2.4 / 7	2.9	2.9 / 10	
220.625	3.4 / 10	3.7 / 7	3.5	3.8 / 10	
219.675	4.4 / 10	5.0 / 7	4.7	5.0 / 10	
218.725	5.7 / 10	6.2 / 7	6.0	5.7 / 10	
217.775	6.9 / 10	6.9 / 7	7.0	6.9 / 10	
216.825	7.1 / 10	7.7 / 4	8.0 / 1	7.8	7.8 / 10
215.875	8.5 / 10	8.7 / 6		8.0	8.0 / 10
214.925	9.0 / 10	9.7 / 6		7.9	7.7 / 10
213.975	10.3 / 10	10.6 / 7		10.7	10.7 / 10
212.975	11.0 / 10	11.8 / 6		11.8	11.5 / 10
211.975		12.4 / 10		12.4	12.6 / 10

Sta.	+	H.I. 223.79	−	Elev.	Sub Grade
T.P.	0.60	213.81	10.58	213.21	
+50					210.39
+75					209.40
48					208.40
+25					207.40
+50					206.40
+75					205.43
49					204.54
+25					203.72
+50					202.97
+75					202.28
T.P.	2.03	204.94	10.90	202.91	
50					201.47
+25					201.13
+50					200.67
+75					200.27
51					199.90
+25					199.68
+50					199.50
+75					199.35
52					199.20

Pavement Grade	L		R
Nail [illegible]			
211.015	3.5/10	3.7	3.7/10
210.325	4.5/10	4.7	4.8/10
209.025	5.4/10	5.5	5.7/10
208.025	6.5/10	6.4	6.8/10
207.025	7.8/10	7.5	7.8/10
206.055	8.8/10	8.5	8.6/10
205.145	9.3/10	9.3	9.4/10
204.345	10.3/10	10.1	9.9/10
203.595	10.8/10	10.8	10.9/10
201.905	11.5/10	11.4	11.6/10
202.295	3.1/10	3.1	3.3/10
201.755	3.8/10	3.9	3.7/10
201.295	4.3/10	4.2	4.1/10
200.895	4.7/10	4.4	4.6/10
200.525	5.2/10	5.0	5.0/10
200.305	5.2/10	5.2	5.4/10
200.125	5.6/10	5.5	5.5/10
199.975	5.4/10	5.7	5.6/10
199.525	5.4/10	5.7	5.7/10

Sta.	+	H.I. 204.94	−	Elev.	Sub Grade
+25					199.05
+50					198.90
+75					198.75
53					198.60
+25					198.45
+50					198.30
+75					198.15
T.P.			7.97	196.97	
54					198.00
+25					197.87
+50					197.78
+75					197.74
55					197.70
+25					197.78
+50					197.87
+75					198.00
56					198.20

Pavement Grade	L.		R.
199.475	5.5 / 10	5.7	6.1 / 10
199.525	5.9 / 10	6.0	6.4 / 10
199.375	6.0 / 10	6.2	6.5 / 10
199.225	6.2 / 10	6.4	6.6 / 10
199.075	6.4 / 10	6.5	6.9 / 10
198.925	6.5 / 10	6.8	7.1 / 10
198.775	6.7 / 10	7.0	7.2 / 10

spk in tel pole rt. of sta. 54+75

198.625

198.495

198.405

198.365

198.325

198.405

198.495

198.625

198.825

Pavement Stakes and X Sections for fine grading from End of project to Sta. 54

Sta.	+	H.I.	−	Elev.	Sub Grade
B.M.	5.69	227.84		224.15	
108					222.90
107+97					222.93
+75					223.125
+50					223.350
+25					223.575
107					223.800
+75					224.05
+50					224.30
+25					224.55
106					224.80
+75					225.05
+50					225.30
+20					225.60
105					225.80
+75					226.03
+50					226.24
+25					226.47
104					226.70

	L.		R.
Pavement Grade.			
Spk. in Tel. pole S.E. Cor. of St. Intersection			
223.555	7.2 / 10	7.0	6.9 / 10
223.750	6.7 / 10	6.7	6.8 / 10
223.975	6.4 / 10	6.2	6.2 / 10
224.200	6.7 / 10	6.1	6.1 / 10
224.425	6.1 / 10	6.0	6.0 / 10
224.675	5.9 / 10	5.7	6.1 / 10
224.925	5.5 / 10	5.5	5.9 / 10
225.175	5.2 / 10	5.3	5.4 / 10
225.425	5.2 / 10	5.1	5.3 / 10
225.675	5.1 / 10	4.9	5.0 / 10
225.925	4.7 / 10	4.7	5.1 / 10
226.225	4.3 / 10	4.4	5.1 / 10
226.425	4.0 / 10	4.1	4.4 / 10
224.655	3.5 / 10	3.8	3.8 / 10
224.885	3.5 / 10	3.5	3.6 / 10
227.105	3.4 / 10	3.2	3.3 / 10
227.325	3.2 / 10	3.1	3.0 / 10

Sta.	+	H.I.	−	Elev.	
		229.84			
+75					224.88
+50					227.08
+25					227.25
103					227.40
+75					227.58
+50					227.73
+25					227.87
102					228.00
T.P.	4.94	233.93	0.85	228.99	
+75					228.125
+50					228.250
+25					228.375
101					228.50
100 +75					228.625

Cont'd on page 61

Pavement Grade	L.		R.
	2.7		3.1
227.525	10	3.1	10
	2.9		3.9
227.725	10	3.1	10
	2.7		3.0
227.875	10	2.9	10
	2.6		3.8
228.025	10	2.6	10
	2.3		2.6
228.205	10	2.4	10
	2.1		2.9
228.355	10	2.2	10
	1.8		2.2
228.495	10	2.1	10
	1.8		2.0
228.625	10	1.8	10
Nail in Tree = L. 57+ 10.2 + 1.2			
	5.5		5.7
228.750	10	5.9	10
	5.2		5.6
228.875	10	5.7	10
	5.2		5.5
229.000	10	5.5	10
	5.3		5.5
229.125	10	5.5	10
	5.3		5.4
229.250	10	5.3	10

			℄ Sub Grade	℄ Pavement Grade	L I
95+11.4	P.S.T.		223.50	224.125	00
+25			223.70	224.325	-.08
+50			224.52	225.145	-.08
+75			225.12	225.745	-.12
96			225.70	226.325	-.22
+11.4	P.W.T.		225.90	226.525	-.26
+25			226.19	226.815	-.30
+50			226.44	227.285	-.44
+61.4	B.C.		226.80	227.425	-.53
+75		1°-21½'	227.10	227.725	-.60
97		3°-51½'	227.50	228.125	-.70
+11.4	E.S.T.	5°-00'	227.60	228.225	-.85
+25		6°-21½'	227.84	228.465	-.85
+50		8°-51½'	228.15	228.775	-.85
+75		11°-21½'	228.42	229.045	-.85
98		13°-51½'	228.60	229.225	-.85
+25		16°-21½'	228.84	229.465	-.85
+50.3	E.S.T.	18°-51½'	228.98	229.605	-.85
+75		21°-21½'	229.09	229.715	-.71
99+00.3	E.C.	23°-53'	229.10	229.725	-.53
+25			229.13	229.805	-.34
+50.3	P.W.T.		229.14	229.765	-.24
+75			229.10	229.725	-.14
100			229.00	229.625	-.08
+25			228.87	229.495	-.08
+50.3	P.S.T.		228.75	229.325	00

R. O	Extra Width	Lt I Pavement Grade −	Rt O Pavement Grade +
00		224.125	224.12
−.03		224.24	224.29
+.05		225.00	225.19
+.12		225.62	225.86
+.22		226.10	226.54
+.26	00	226.26	226.78
+.29	.11	226.51	227.10
+.40	.98	226.84	227.68
+.45	1.84	226.87	227.87
+.48	2.69	227.12	228.20
+.58	3.64	227.34	228.70
+.62	3.72	227.37	228.84
+.62	3.72	227.61	229.08
+.62	3.72	227.92	229.39
+.62	3.72	228.19	229.66
+.62	3.72	228.37	229.84
+.62	3.72	228.61	230.08
+.62	3.72	228.75	230.22
+.53	3.30	229.00	230.24
+.45	1.84	229.19	230.17
+.35	.40	229.44	230.15
+.24	00	229.52	230.04
+.14		229.56	229.88
+.08		229.54	229.70
−.01		229.41	229.48
00		229.37	229.37

Sta.	+	H.I. 233.93	−	Elev.	I Pavement Grade
100	+50.3	P.S.T.			229.37
	+25				229.41
100					229.54
T.P.	+75	3.43	233.51	4.05	229.88	229.54
	+50.3	P.W.T.			229.52
	+25				229.44
99	+00.3	E.C.			229.19
	+75				229.00
	+50.3	E.T.C.			228.75
	+25				228.61
98					228.37
	+75				228.17
	+50				227.92
	+25				227.61
	+11.7	E.T.C.			227.37
97					227.34
	+75				227.12
	+61.4	B.C.			226.89
	+50				226.84
	+25				226.51
96	+11.4	P.W.T.			226.26

Rt
O
Pavement
Grade

	L.		R.	
227.37	5.2 / 10	5.2	5.3 / 10	
227.48	5.1 / 10	5.0	5.0 / 10	
227.70	4.9 / 10	4.9	4.8 / 10	
227.88	4.9 / 10	4.9	4.9 / 10	
228.04	4.6 / 10	4.5	4.2 / 10	
230.15	4.7 / 10	4.3	4.1 / 10	
230.17	4.7 / 14	4.4	4.1 / 10	
230.24	4.8 5.0 / 14 8	4.4	4.0 / 10	
230.22	5.1 / 14	4.5	4.4 3.9 3.8 / 3 6 10	
230.08	5.2 5.3 / 14 10	4.7	3.7 / 10	
229.84	5.8 / 14	4.8	4.2 / 10	
227.44	6.1 / 14	5.1	4.2 / 10	
227.37	6.4 / 14	5.7	4.8 / 10	
227.08	6.6 / 14	5.8	5.4 / 10	
228.84	6.6 / 14	6.0	5.4 / 10	
228.70	6.9 / 14	6.2	5.4 / 10	
228.20	7.1 / 14	6.5	5.7 /	
227.89	7.3 / 12	6.7	6.0 / 10	
227.68	7.4 / 12	6.8	6.6 / 10	
227.10	7.7 / 12	7.3	7.1 / 10	
226.78	7.7 / 10	7.7	7.4 / 10	

Sta.	+	H.I.	—	Elev	Lt. I Pavement Grade
		233.51			
94					224.40
	+75				225.65
	+50				225.04
	+25				224.24
95	+11.4	P.S.I.			224.12
B.M.	2.70	232.41	3.78	229.73	229.71 sub Grade
95					223.20
	+75				222.50
	+50				221.80
	+25				221.10
94					220.40
T.P.	0.60	221.63	11.38	221.03	
	+75				219.70
	+50				219.00
	+25				218.30
93					217.60
	+75				214.90
	+50				214.20
	+25				215.50
92					214.80

Pavement Grade

	L.		R.
226.54	8.1 / 10	7.9	9.7 / 10
226.04	8.5 / 10	8.5	5.1 / 10
225.17	8.7 / 10	7.0	8.7 / 10
224.29	9.7 / 10	9.4	9.5 / 10
224.12	10.1 / 10	10.0	10.0 / 10

Spk. on City limits sign post.

Pavement Grade

222.825	9.1 / 10	9.1	9.0 / 10
223.125	9.5 / 10	9.7	9.6 / 10
222.425	10.0 / 10	10.2	9.8 / 10
221.725	10.9 / 10	10.5	10.9 / 10
221.625	11.8 / 10	12.0	11.8 / 10
220.325	1.7 / 10	1.8	1.7 / 8 — 1.8 / 10
219.625	2.7 / 10	2.5	2.7 / 6 — 2.0 / 8 — 2.6 / 10
218.925	3.3 / 10	3.3	3.6 / 6 — 3.2 / 8 — 3.7 / 10
218.225	3.9 / 10 — 4.2 / 8	4.0	4.1 / 6 — 3.6 / 8 — 4.9 / 10
217.525	4.7 / 10 — 5.0 / 8	4.6	4.8 / 6 — 4.2 / 9 — 4.5 / 10
216.825	5.2 / 10 — 5.6 / 6	5.4	5.6 / 6 — 5.3 / 10
216.125	5.7 / 10 — 6.3 / 4	6.0	6.2 / 7 — 5.8 / 10
215.425	6.5 / 10 — 6.7 / 8 — 7.0 / 4	6.7	6.4 / 5 — 6.9 / 10

STA.	+	H. I.	−	ELEV.	∠ Pavement Grade
		221.63			
91+75.7	P.S.T.				217.77
+50.7					214.97
+25.7					213.55
91+00.7					213.24
T.P.	4.25	213.95	8.75	212.70	
+75.7	P.W.T.				212.53
+50.7					212.04
+25.7	E.C.				211.59
90+00.7					211.12
+75.7	E.S.T.				210.70
+60.7					210.40
+35.7					209.89
89+10.7					209.38
+85.7					208.87
+60.7					208.34
+35.7	E.S.T.				207.85
88+10.7					207.25
+85.7	B.C.				206.65
+60.7					206.05
87+35.7	P.W.T.				205.45

R

Pavement Grade	L.					R.			
214.77		7.1/10	7.3/8	7.6/4	7.4	7.6/4		7.1/10	
214.02		7.0/10	7.6/9	8.3/5	8.4	8.4/3	8.1/8		8.2/10
213.39			8.3/10	9.1/5	9.1	9.1/3		8.7/7	9.1/10
212.79			8.7/10	9.6/4	9.7			9.3/8	9.6/10
212.01		1.4/10		2.3/4	2.5			2.2/4	2.4/10
211.33	1.4/10		2.2/7	3.1/4	3.0				3.0/10
210.63			2.9/10	3.6/4	3.7	3.8/5	3.5/9		3.7/12
209.81		3.0/10		4.0/5	4.1		4.2/4		4.7/14 5
209.23				3.4/10	4.7		5.0/3		5.0/14
208.93				3.9/10	5.0		5.4/3		5.5/14
208.42				4.9/10	5.6				6.1/14
207.91				5.7/10	6.2		6.4/3		6.5/14
207.40				5.5/10	6.5		6.7/5		7.0/14
206.89			5.3/10	6.7/3	6.9	7.1/3	7.1/8		7.6/14
206.38			5.7/10	6.4/8	7.3				7.9/14
206.01			7.3/10		7.9				8.3/14
205.69		4.7/10	8.0/8		8.4				8.9/14
205.34		8.5/10			8.9		9.1/10		
204.93			9.0/10		9.5				9.7/10

Sta.	+	H.I. 213.95	−	Elev.	to Pavement Sub Grade
87+10.7					204.80
+85.7					207.25
+60.7					203.05
86 +35.7	P.S.I.				203.15
P.M.	0.75	205.36	9.32	204.63	204.63
+25					202.27
86					201.74
+75					201.25
+50					200.74
+25					200.23
85					199.70
+75					199.21
+50					198.70
+25					198.25
84					197.93
+75					197.73
+50					197.64
83 +25					197.72

	L		R	
Pavement Grade				
204.51	7.7/10	10.0	10.3/10	
204.09	10.7/10	10.6	10.7/10	
203.58	10.8/10	11.1	11.1/10	
203.19	11.4/10	11.7	11.6/10	
Pavement Grade				
202.895	3.0/10	3.2	3.4/8	3.1/10
202.385	3.6/10	3.7		3.6/10
201.875	4.1/10	4.2		4.2/10
201.365	4.3 4.8/10 9	4.7		4.8/10
200.855	5.2/10	5.1		5.3/10
200.325	5.6/10	5.6		5.6/10
199.835	6.0/10	6.2		6.3/10
199.325	4.3/10	6.7		6.6/10
198.875	7.1/10	7.3	7.0/4	7.1/10
198.555	7.7/10	7.7	7.3/4	7.4/10
198.355	7.6/10	7.8		7.7/10
198.285	7.7/10	7.7		7.8/10
198.345	7.6/10	7.7		7.7/10

Sta.	+	H.I.	−	Elev	Sub Grade
		205.30			
83					197.91
T.P.	11.27	210.49	6.14	199.22	
					½ Pavement Grade
+80.9	P.S.T.				198.82
+50					199.22
+25					199.77
82					200.39
+80.9	P.W.T.				200.84
+50					201.98
+30.9	E.C.				202.60
81					203.61
+80.9	E.W.T.				204.27
+50					205.54
+25					206.57
80					207.59
+75					208.62
T.P. +50	10.41	219.04	1.86	208.63	209.64
+25					210.67
79					211.69
+73.1	E.W.T.				212.79

Pavement Space

	L		R	
198.535	7.6/10	7.4	7.8/10	
A pavement space				
198.82	12.5/10	12.5	12.7/10	
199.30	11.9/10	12.1	11.9/10	
199.97	11.3/10	11.4	11.3/10	
200.77	10.6/10	10.7	10.7/10	
201.34	10.0/10	10.2	10.0/10	
202.73	9.2/11	9.1	9.0/10	
203.59	8.5/13	8.3	8.4/4 6.9/10	
204.97	7.6/15	6.9	6.9/5 6.9/10	
205.82	7.0/15	6.0	5.7/4 5.0/10	
207.09	5.5/15 5.7/8 4.8/4	7.7	7.6/3 7.7/10	
208.12	4.8/15	3.7	3.6/4 2.1/10	
209.14	3.8/15	2.9	2.8/2 1.7/10	
210.17	2.7/15 1.6/12 1.1/10	1.7	1.7/2 0.1/10	
211.19	9.0/15 10.0/12	9.4	8.7/7 7.9/10	
212.22	8.3/15 9.1/13 9.0/6	8.7	7.6/10	
213.24	7.7/15	7.2	6.3/8 5.7/10	
214.34	5.9/15 4.4/10	5.8	5.7/4 4.9/10	

Sta.	+	H.I.	−	Elev	− Pavement Subgrade
		219.04			
78 +50					213.77
+23.1	B.C.				214.97
78					215.88
+73.1	P.W.T.				216.86
+50					217.56
+25					218.29
T.P. 77	4.04	222.33	0.75	218.29	218.89
76 +73.1	P.S.T.				219.32 Sub Grade
+50					219.36
+25					219.78
76					220.14
B.M.	9.54	225.34	6.35	215.98	
+75					220.44
+50					220.68
+25					220.89
75					221.00
+75					221.08
+50					221.14
+25					221.14
74					221.15

R. Pavement Grade	L.			R.	
215.10	5.6/18	5.4/4	4.9	4.8/10	4.2/10
215.94		4.5/13	3.9	3.6/6	3.2/10
216.62	3.7/11	3.7/6	3.2	3.6/8	2.6/10
217.38		2.7/10	2.4		2.2/10
217.90		1.8/10	1.8		1.6/10
218.47		1.2/10	1.2		1.3/10
218.96		4.0/10	4.2		4.0/10
219.32		3.5/10	3.4		3.7/10
Pavement Grade					
219.985		2.9/10	2.9		2.8/10
220.405		2.7/10	2.5		2.7/10
220.765		2.4/10	2.4	2.4/10	2.2/3

Spk in 12 Oak Lt of Sta 78+15

	L.		R.
221.065	5.1/10	4.9	5.4/10
221.305	4.9/10	4.8	5.0/10
221.495	4.7/10	4.7	5.0/10
221.625	4.6/10	4.6	4.8/10
221.705	4.2/10	4.5	4.6/10
221.765	4.3/10	4.5	4.3/10
221.785	4.2/10	4.3	4.2/10
221.775	4.3/10	4.2	4.3/10

Sta	+	H.I.	−	Elev	Grade
		225.34			
+75					221.11
+50					221.04
+25					220.93
73					220.80
T.P.	4.64	220.07	3.71	221.43	
+75					220.65
+50					220.60
+25					220.35
72					220.20
+75					220.09
+50					220.07
+25					220.13
71					220.30
+75					220.50
+50					220.82
+25					221.22
70					221.70
+75					222.225
+50					222.750
+25					223.275
69					223.80

Pavement Grade

	Lt.		Rt
	4.2/10		4.3/10
221.735		4.3	
	4.7/10		4.7/10
221.635		4.5	
	4.6/10		4.5/10
221.535		4.5	
	4.5/10		4.5/10
221.435		4.6	
	5.7/10		5.7/10
221.235		5.5	
	5.9/10		5.7/10
221.135		5.7	
	5.9/10		5.8/10
221.035		5.7	
	5.6/10		6.0/10
220.935		5.8	
	6.0/10		6.0/10
220.835		5.9	
	5.9/10		6.1/10
220.735		6.0	
	5.9/10		5.8/10
220.635		5.8	
	5.9/10		5.8/8 5.1/10
220.535		5.7	
	5.6/10		5.4/8 4.8/10
221.135		5.5	
	5.3/10		5.2/8 4.6/10
221.435		5.3	
	5.9/10		4.9/10
221.835		5.0	
	4.5/10		4.5/10
222.335		4.7	
	4.1/10		3.9/10
222.850		4.0	
	3.7/10		3.5/10
223.375		3.6	
	2.9/10		2.8/11
223.900		2.7	
	2.5/10		2.2/8 1.8/10
224.425		2.2	

Sta	+	H.I.	-	Elev	Sub Grade
		226.09			
T.P.	5.68	230.15	1.62	224.47	
+75					224.375
+50					224.90
+25					225.37
48					225.75
+75					226.02
+50					226.20
+25					226.27
47					226.25
+75					226.12
+50					225.90
+25					225.57
46					225.15
+75					224.62
+50					224.00
+25					223.27
45					222.60
+75					221.92
+50					221.25
+25					220.57
44					219.90

Pavement Breaks

	L		R
Nail in Tel pole L = Sta. 69+60			
225.000	6.0/10	6.0	6.0/10
225.525	5.1/10	5.4	5.6/10
225.795	5.1/10	5.1	5.4/10
226.375	4.7/10	4.7	4.7/10
226.675	4.3/10	4.4	4.3/10
226.825	4.1/10	4.3	4.3/10
226.895	4.3/10	4.2	3.8/10
226.875	4.1/10	4.2	4.2/10
226.745	4.1/10	4.3	4.4/10
226.525	4.3/10	4.8	4.6/10
224.195	4.8/10	5.0	5.0/10
223.775	5.2/10	5.3	5.1/10
225.245	5.9/10	5.7	5.7/10
224.625	6.5/10	6.4	6.2/10
223.895	7.1/10	7.0	7.0/10
223.225	7.8/10	7.8	7.9/10
222.545	8.6/10	8.4	8.3/10
221.875	9.0/10	7.2	9.1/10
221.195	9.6/10	9.7	10.0/10
220.525	10.4/10	10.7	10.5/10

Sta.	+	H.I.	−	Elev.	Sub Grade
		230.15			
T.P.	3.98	222.26	11.87	218.28	
+75					217.21
+50					216.50
+25					215.74
63					215.00
+75					214.21
+50					213.40
+25					212.56
62					211.80
B.M. +75			8.37	213.89	212.825
+50					211.95
+25					211.075
61					210.200
+75	1.21	212.02	11.45	210.81	209.325
+50					208.450
+25					207.575
60					206.70
+75					205.85
+50					205.03
+25					204.27
59					203.50
+75					202.84
+50					202.22
+25					201.62

Pavement Grade	L.		R.	
219.535	3.3/10	3.3	3.1/10	
219.125	4.0/10	4.0	4.1/10	
218.385	4.7/10	4.7	4.7/10	
217.625	5.2/12	5.3	5.3/12	
216.835	5.8/12	6.1	5.9/12	
216.025	6.8/12	7.0	6.7/12	
215.185	7.8/12	7.9	7.7/12	
214.325	8.8/12	8.8	8.6/12	
213.450	9.9/12	9.7	9.6/12	Tel. pole L Sta. 62+15
212.575	10.5/12	10.3	10.4/12	
211.700	11.3/12	11.1	11.3/12	
210.825	12.1/12	12.1	12.0/12	
209.950	2.6/12	2.5	2.6/12	
209.075	3.5/12	3.5	3.4/12	
208.200	4.5/12	4.5	4.5/12	
207.325	5.6/12	5.6	5.3/12	
206.475	6.6/12	6.2	6.3/12	
205.655	7.4/12	7.3	7.2/12	
204.895	8.0/12	7.9	8.0/12	
204.125	9.2/12	8.9	8.9/12	
203.485	9.7/12	9.7	9.6/12	
202.845	10.1/12	10.2	10.3/12	
202.245	10.9/12	11.0	10.8/12	

Sta.	+	H.I.	—	Elev.	Sub Grade
		212.02			
58					201.10
+75					200.55
+50					200.08
T.P. +25	5.87	205.44	12.45	199.57	199.04
57					199.30
+75					198.73
+50					198.64
+25					198.35
56					198.20
T.P. +25	5.44	202.32	8.56	196.88	198.00
+50					197.22
+25					197.28
55					197.70
+75					197.74
+50					197.78
+25					197.87
54					198.00
T.P.			5.37	196.95	

Pavement Recycle

	L.		R.	
	14.2		11.2	
201.725	10	11.4	10	
	11.8		11.7	
201.175	10	12.1	10	
	12.4		12.3	
200.705	10	12.6	10	
	6.4		6.3	
200.285	10	6.5	10	Nail in Tel. P. L. Sta. 54+05
	6.9		7.0	
199.925	10	7.0	10	
	7.5		6.9	
199.555	10	7.5	10	
	8.1		8.1	
199.265	10	8.2	10	
	8.2		8.0	
199.005	10	8.3	10	
	8.9		7.6	
198.825	100	9.4	10	
	4.7		4.3	
198.625	10	9.5	10	Nail in Tel. P. L. Sta. 54+25
	4.6		4.7	
198.495	10	4.8	10	
	4.7		4.7	
198.405	10	4.7	10	
	4.2		4.9	
198.325	10	4.7	10	
	4.2		4.7	
198.365	10	4.5	10	
	4.7		5.0	
198.435	10	4.8	10	
	4.5		4.7	
198.495	10	4.8	10	
	4.2		4.2	
198.625	10	4.4	10	

Spk. in Tel. pole L.A. Sta. 54+75.

			℄ Sub. Grade	℄ Pavement Grade	LT I
76+73.1	P.S.T.		218.70	219.325	.00
77			218.35	218.975	-.08
+25			217.74	218.385	-.07
+50			217.11	217.735	-.17
+73.1	P.W.T.		216.50	217.125	-.26
78			215.64	216.265	-.38
+23.1	B.C.		214.90	215.525	-.55
+50		3°-54'	213.94	214.565	-.79
+73.1	E.W.T.	7°-15'	213.10	213.725	-.93
79		11°-09'	212.80	212.425	-.93
+25		14°-46½'	210.975	211.600	-.93
+50		18°-24'	209.750	210.375	-.93
+75		22°-01½'	208.925	209.550	-.93
80		25°-39'	207.90	208.525	-.93
+25		29°-16½'	206.875	207.500	-.93
+50		32°-54'	205.850	206.475	-.93
+84.7	E.W.T.	37°-23'	204.58	205.205	-.93
81		40°-09'	203.80	204.425	-.81
+30.9	E.C.	47°-38'	202.53	203.155	-.55
+50			201.75	202.375	-.39
+80.9	P.W.T.		200.48	201.105	-.26
82			199.94	200.585	-.19
+25			199.25	199.875	-.10
+50			198.68	199.305	-.08
+80.9	P.S.T.		198.20	198.825	.00

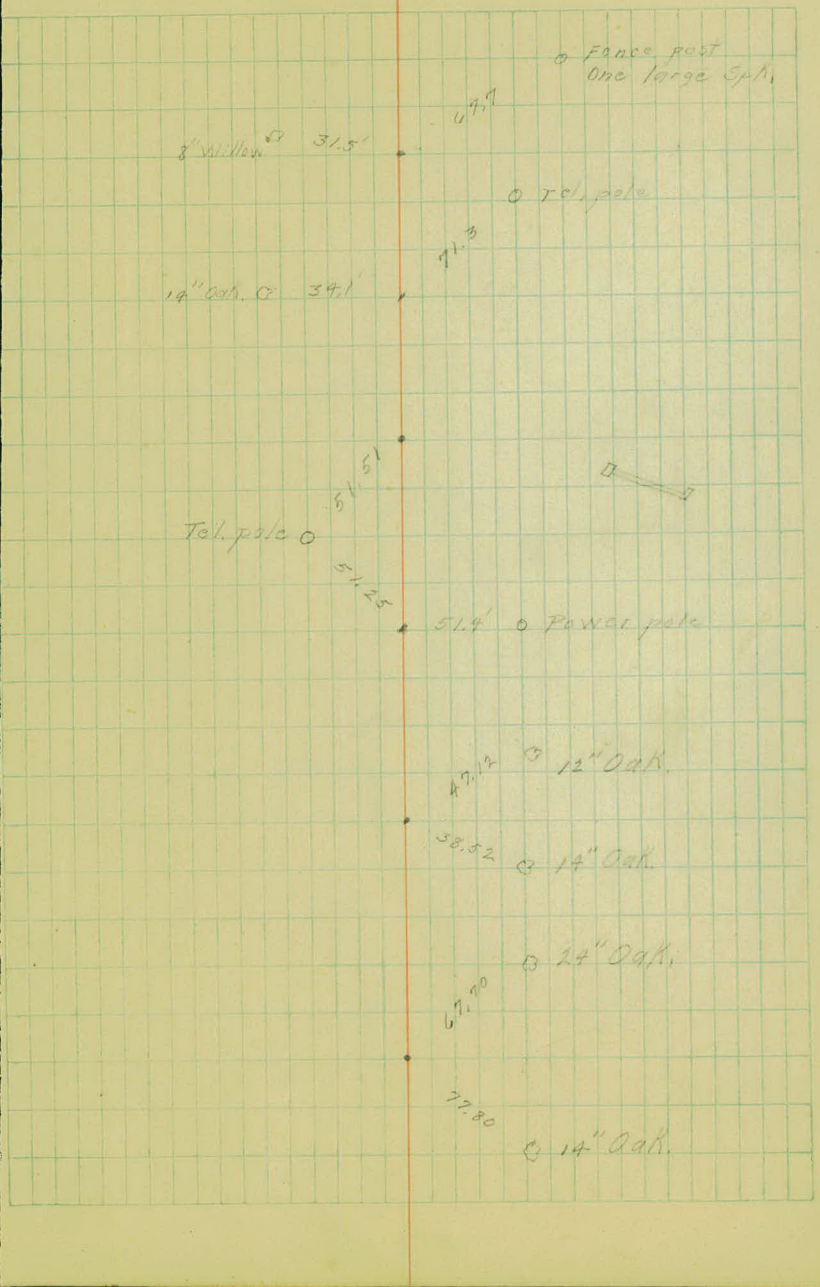
R. O	Extra Widening	Lt I Pavement Grade	Rt O Pavement Grade
00		219.325	219.32
-01		218.89	218.96
+.09		218.27	218.47
+.17		217.56	217.90
+.24	00	216.86	217.38
+.36	0.59	215.88	216.62
+.44	2.48	214.97	215.96
+.54	4.58	213.77	215.10
+.62	5.00	212.79	214.34
+.62	5.00	211.69	213.24
+.62	5.00	210.69	212.22
+.62	5.00	209.64	211.19
+.62	5.00	208.62	210.17
+.62	5.00	207.59	209.14
+.62	5.00	206.57	208.12
+.62	5.00	205.54	207.09
+.62	5.00	204.27	205.82
+.55	4.74	203.61	204.97
+.44	2.48	202.60	203.59
+.36	0.80	201.98	202.73
+.24	00	200.84	201.36
+.17		200.39	200.77
+.10		199.77	199.97
		199.22	199.30
		198.82	198.82

			℄ Sub Grade	℄ Pavement Grade	L. O
86+35.7	P.C.,T.		202.53	203.135	00
86+60.7			203.04	203.645	-.01
86+85.7			203.55	204.175	+.06
87+10.7			204.06	204.685	+.17
87+35.7	P.W.T.		204.57	205.195	+.26
87+60.7			205.08	205.705	+.35
87+85.7	B.C.		205.59	206.215	+.44
88+10.7		2°-30'	206.10	206.725	+.53
88+35.7	E.S.T.	5°-00'	206.61	207.235	+.62
88+60.7		7-30'	207.12	207.745	+.62
88+85.7		10°-00'	207.63	208.255	+.62
89+10.7		12°-30'	208.14	208.765	+.62
89+35.7		15°-00'	208.65	209.275	+.62
89+60.7		17°-30'	209.16	209.785	+.62
89+75.7	E.S.T.	19°-00'	209.46	210.085	+.62
90+00.7		21°-30'	209.97	210.595	+.53
90+25.7	E.C.	24°-00'	210.53	211.155	+.44
90+50.7			211.07	211.695	+.35
90+75.7	P.W.T.		211.65	212.275	+.26
91+00.7			212.25	212.875	+.17
91+25.7			212.85	213.475	+.08
91+50.7			213.48	214.105	-.01
91+75.7	P.S.T.		214.15	214.775	.00

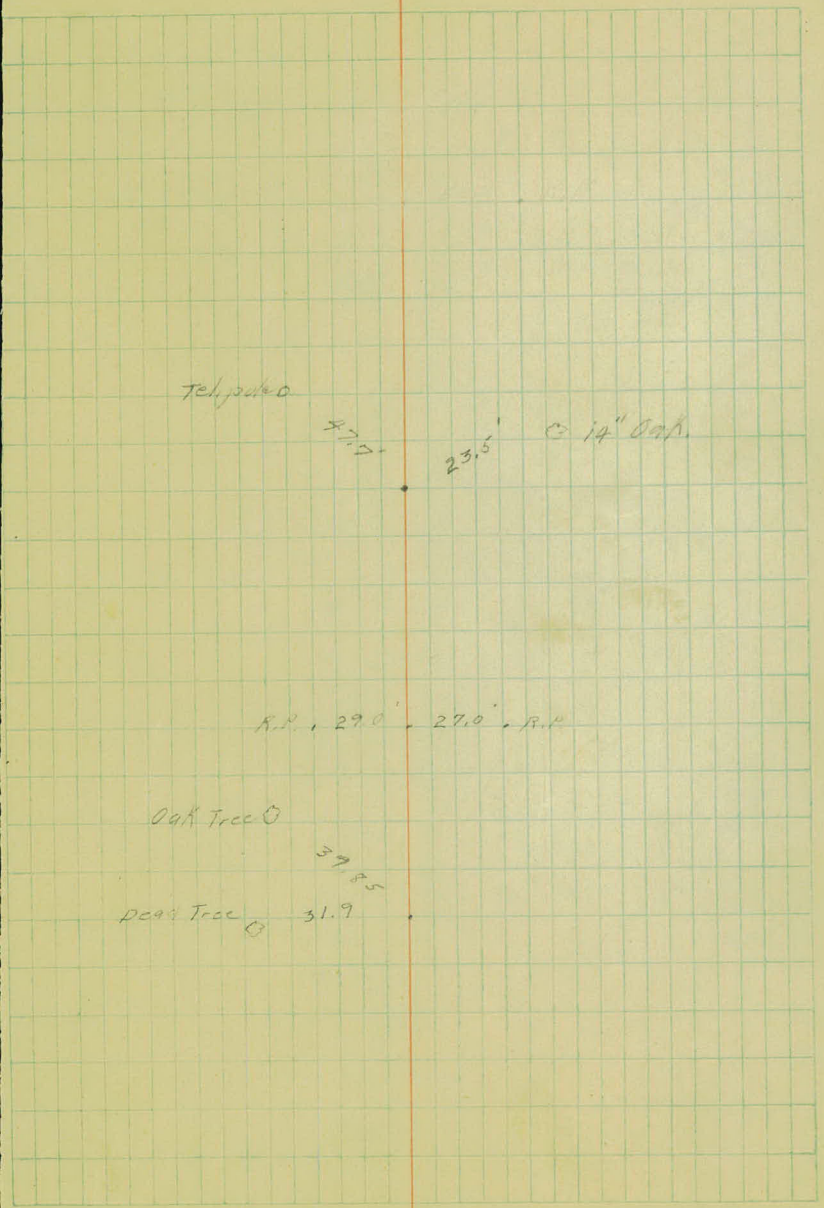
R	Extra	Pavement Grade	R Pavement Grade
00		203.15	203.15
+.08		203.65	203.58
+.08		204.25	204.09
+.17		204.86	204.51
+.30	00	205.45	204.93
+.36	0.40	206.05	205.34
+.52	1.84	206.65	205.69
+.71	3.30	207.25	206.01
+.80	3.72	207.85	206.38
+.83	3.72	208.34	206.87
+.85	3.72	208.87	207.40
+.85	3.72	209.38	207.91
+.85	3.72	209.89	208.42
+.85	3.72	210.40	208.93
+.85	3.72	210.90	209.23
+.71	3.30	211.12	209.81
+.52	1.84	211.59	210.63
+.36	0.40	212.04	211.33
+.26	00	212.53	212.01
+.17		213.04	212.70
+.08		213.55	213.39
+.08		214.09	214.02
00		214.77	214.77

Alignment from sta 24+00 to Sta.

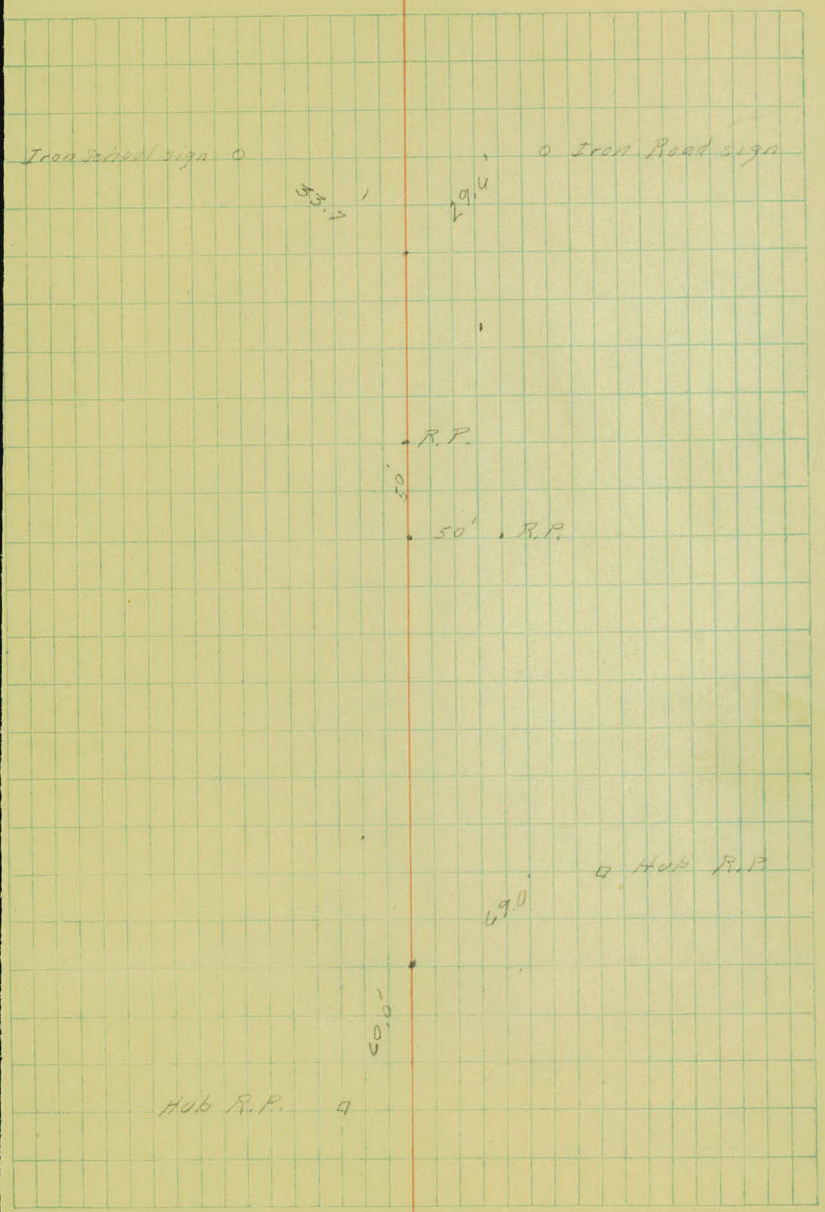
	Point	
53+87.4	P. I.	0°-35' L.
41+12.9	P.O.T. = 41+13.5	
28+32.17	E. C.	
27+53.4	P. I.	
26+45.7	B.C. = 26+45.14	
24+00	P.O.T.	


Fence post
One large Sph.
44.7
8" Willow
31.5'
Tel. pole
71.3
14" Oak.
34.1'
51
51
Tel. pole
51.25
51.4'
Power pole
47.17
12" Oak.
38.52
14" Oak.
24" Oak.
67.10
72.80
14" Oak.

Sta.	Point	
81+30.9	P.T.	Δ 89°-14′
		D 29° L.
80+20.2	P.I.	T. 197.1′
		L. 307.8′
78+23.1	P.C.	
66+14.9	P.O.T.	
69+15.4	P.O.T.	


Tel. pole
23.5'
14" Oak
R.P. 29.0' - 27.0' - R.P.
Oak Tree
37.85
Oak Tree
31.9

108+26.9	P.O.T.	
99+00.3	P.T.	
		Δ 47°-40'
97+88.9	P.I.	D. 20° L.
		T 127.49'
96+61.4	P.C.	L. 238.85
90+25.7	P.T.	
		Δ 48°-00'
89+13.9	P.I.	D 20° R.
		T 128.2'
87+85.7	P.C.	L. 240.0'


Iron School sign
Iron Road sign
53.7
91.4
R.P.
50'
50' R.P.
Hub R.P.
690'
50'
Hub R.P.

B.M.s Reset.

	+	H.I.	−	Elev.	
					199.35 ~~199.45~~
B.M.	4.96	204.41			
	9.38	212.53	1.26	203.15	
	10.78	222.37	.94	211.59	213.89. ~~213.99~~
B.M.				6.38	
	8.81	230.77	0.41	222.96	
	3.20	226.87	8.10	223.67	
	2.40	223.97	4.30	221.57	
	3.90	218.91	8.96	215.01	216.01 ~~216.11~~
B.M.				2.80	
	1.53	207.97	12.47	206.44	198.97 ~~199.07~~
	7.12	206.19	8.90	199.07	204.67 ~~204.77~~
B.M.			1.42		
	8.67	213.08	1.78	204.41	
	10.31	222.33	1.06	212.02 Stake	
	9.75	231.87	0.21	222.12	299.77 ~~299.87~~
B.M.			2.00		
	4.94	233.90	2.91	228.96	
B.M.	2.14	230.36 ~~230.46~~	5.58	228.22 ~~228.32~~	228.16
B.M.			6.15	224.21	224.15

B.M's

Check Levels Sta 55 to 108

8/14/13 { Conner.
Witshusen - Level
Ruttenberg - Rod.
McManus

RR Spike in 3rd bent Lt. of sta. 55+50
carried from page 50.

Spike on tel. pole 33' Lt of Sta 67+15

R.R. Spike on 12" oak Lt of Sta 78+15 - 33' Lt.

Temporary check

plug on the edge of shoulder

R.R. Spike on 8" oak Lt. of Sta 85+75

Spike on city Limits Sign Post

Nail in oak tree 22' Lt. Sta 103+30 (Page 12)

Spike on tel. pole S.E. Cor. [illegible]

error 0.06

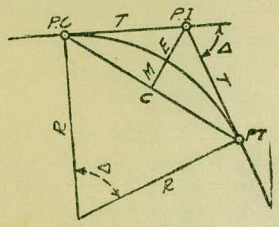
	+	⊼	-	Elev.	
BM	5.40	210.01		204.61	
TP	5.38	214.76	0.63	209.38	
TP			4.38	210.38	
	6.58	211.25			204.67
	6.22	216.62	0.85	210.40	

Carried forward from page 16 (85775)

R.R. Spike on 8" oak. L + 0° S + 85775

Super.		Widening	
	-.0089		
00	-.0089	00	0.00
20	-.0016	10	0.05
	-.008		
40	+.0048	20	0.22
	-.008		
60	+.0116	30	0.58
	-.0116		
80	+.0188	40	1.11
	-.0188		
100	+.026	50	1.84
	-.026		
	+.0332		
120	-.0332	60	2.57
	+.0404		
140	-.0404	70	3.12
	+.0476		
160	-.0476	80	3.48
	+.0548		
180	-.0548	90	3.67
	+.062		
200	-.062	100	3.72

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

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

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

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

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

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

EXPLANATION AND USE OF TABLES

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

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

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

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

Table I.—Minutes in Decimals of a Degree.

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

Table II.—Inches in Decimals of a Foot.

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

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

Table III.—Radii, Ordinates and Deflections.

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

Note. Chord Deflection=2 times tangent deflection.

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

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

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

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

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

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

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

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

TABLE V.—CORRECTIONS FOR TANGENTS AND EXTERNALS.

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

FOR TANGENTS ADD

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

FOR EXTERNALS ADD

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

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

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

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

Table VII.—Middle Ordinates for Rails in Feet.

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

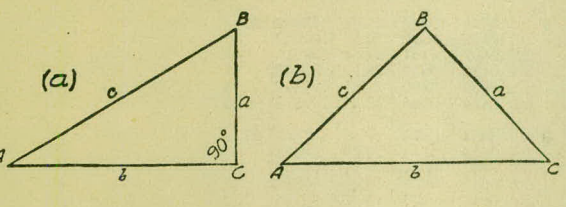
SLOPE REDUCTIONS.

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

TRIGONOMETRICAL FORMULAS.

See fig. (a).

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



Formula for Solving Triangles.

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

Table VIII.—Natural Trigonometrical Functions.

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

Table VIII.—Natural Trigonometrical Functions.

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

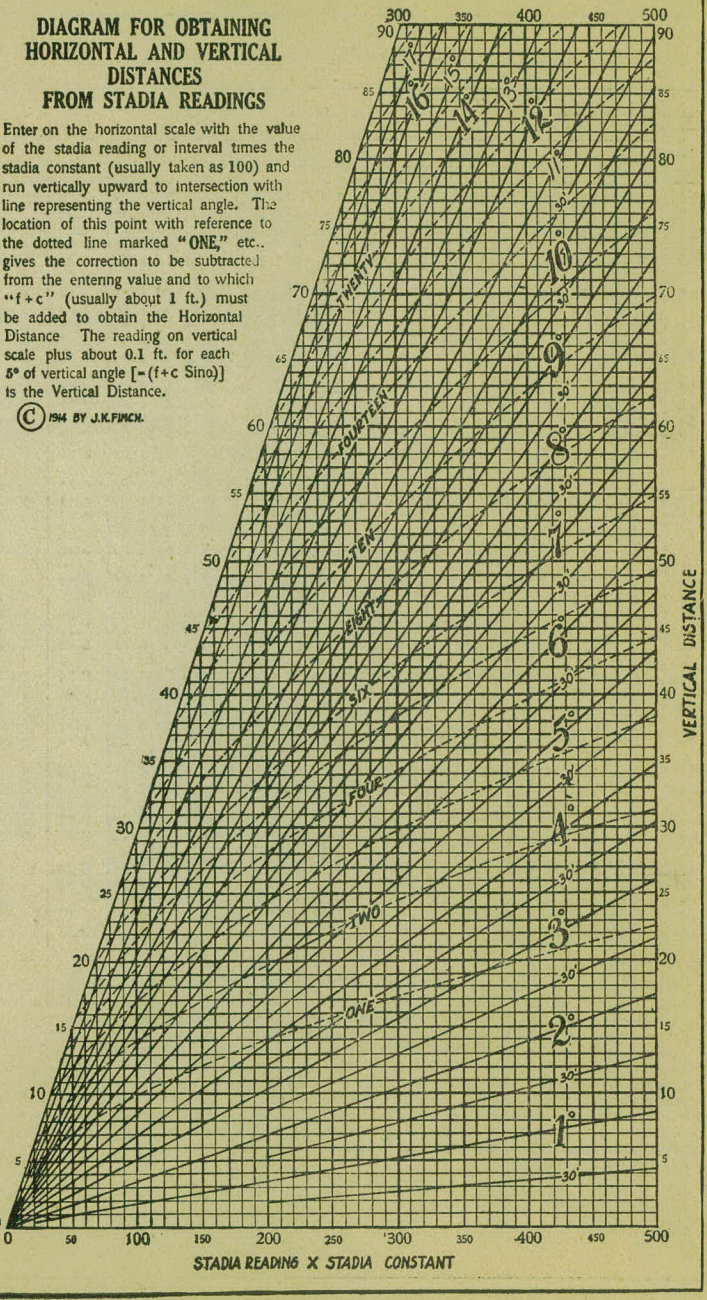
Table IX.—Calculation of Earthwork.

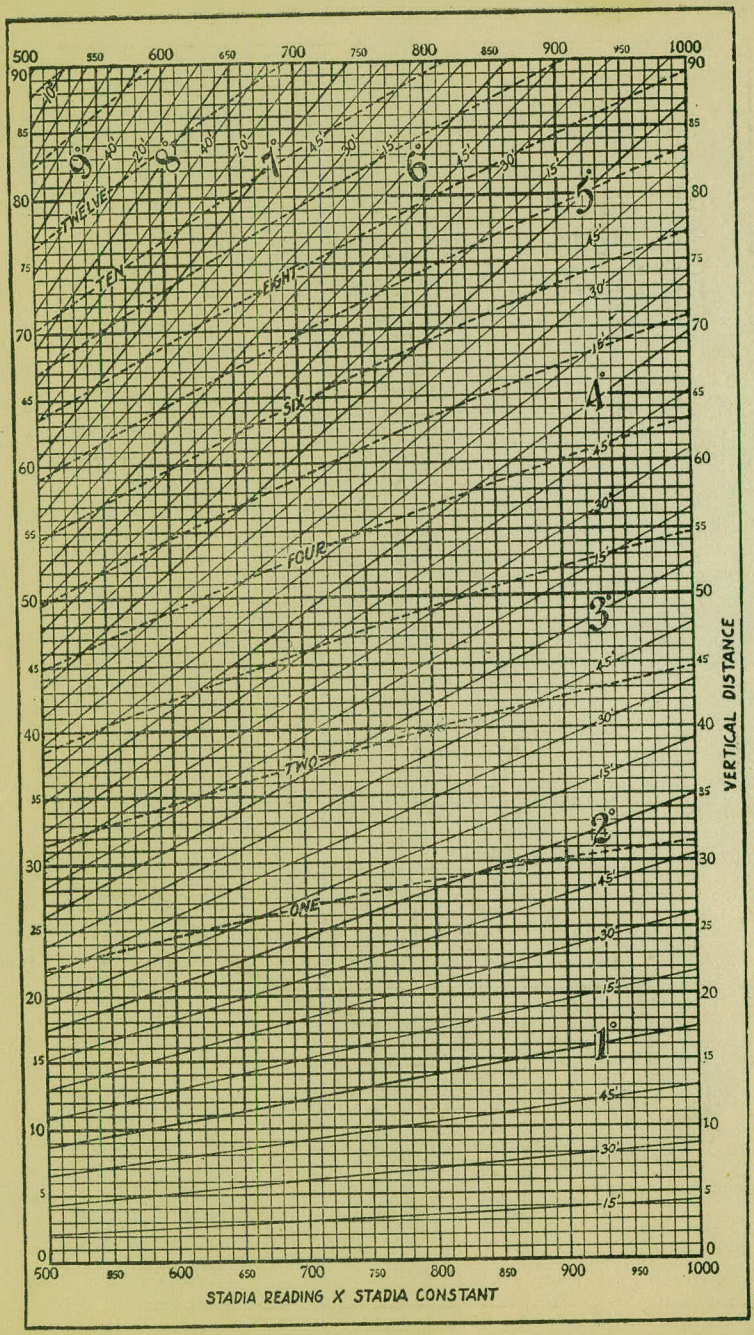
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.15	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.83
22	.41	.81	1.22	1.63	2.04	2.44	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11
23	.43	.85	1.28	1.70	2.13	2.56	2.98	3.41	3.83	4.26	4.68	5.11	5.54	5.96	6.39
24	.44	.89	1.33	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67
25	.46	.92	1.39	1.85	2.31	2.78	3.24	3.70	4.17	4.63	5.09	5.56	6.02	6.48	6.94
26	.48	.96	1.44	1.92	2.41	2.89	3.37	3.85	4.33	4.82	5.30	5.78	6.26	6.74	7.24
27	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
28	.52	1.04	1.55	2.07	2.59	3.11	3.63	4.15	4.67	5.18	5.70	6.22	6.74	7.26	7.78
29	.54	1.07	1.61	2.15	2.68	3.22	3.76	4.30	4.83	5.37	5.91	6.44	6.98	7.52	8.06
30	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	5.55	6.11	6.67	7.22	7.78	8.33
31	.57	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.32	6.89	7.46	8.04	8.61
32	.59	1.18	1.78	2.37	2.96	3.56	4.15	4.74	5.33	5.92	6.52	7.11	7.70	8.30	8.89
33	.61	1.22	1.83	2.44	3.05	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.17
34	.63	1.26	1.89	2.52	3.15	3.78	4.40	5.04	5.67	6.29	6.93	7.56	8.18	8.81	9.44
35	.65	1.30	1.94	2.59	3.24	3.89	4.53	5.18	5.83	6.48	7.13	7.78	8.42	9.08	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.11	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.15	8.89	9.63	10.37	11.11

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

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

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

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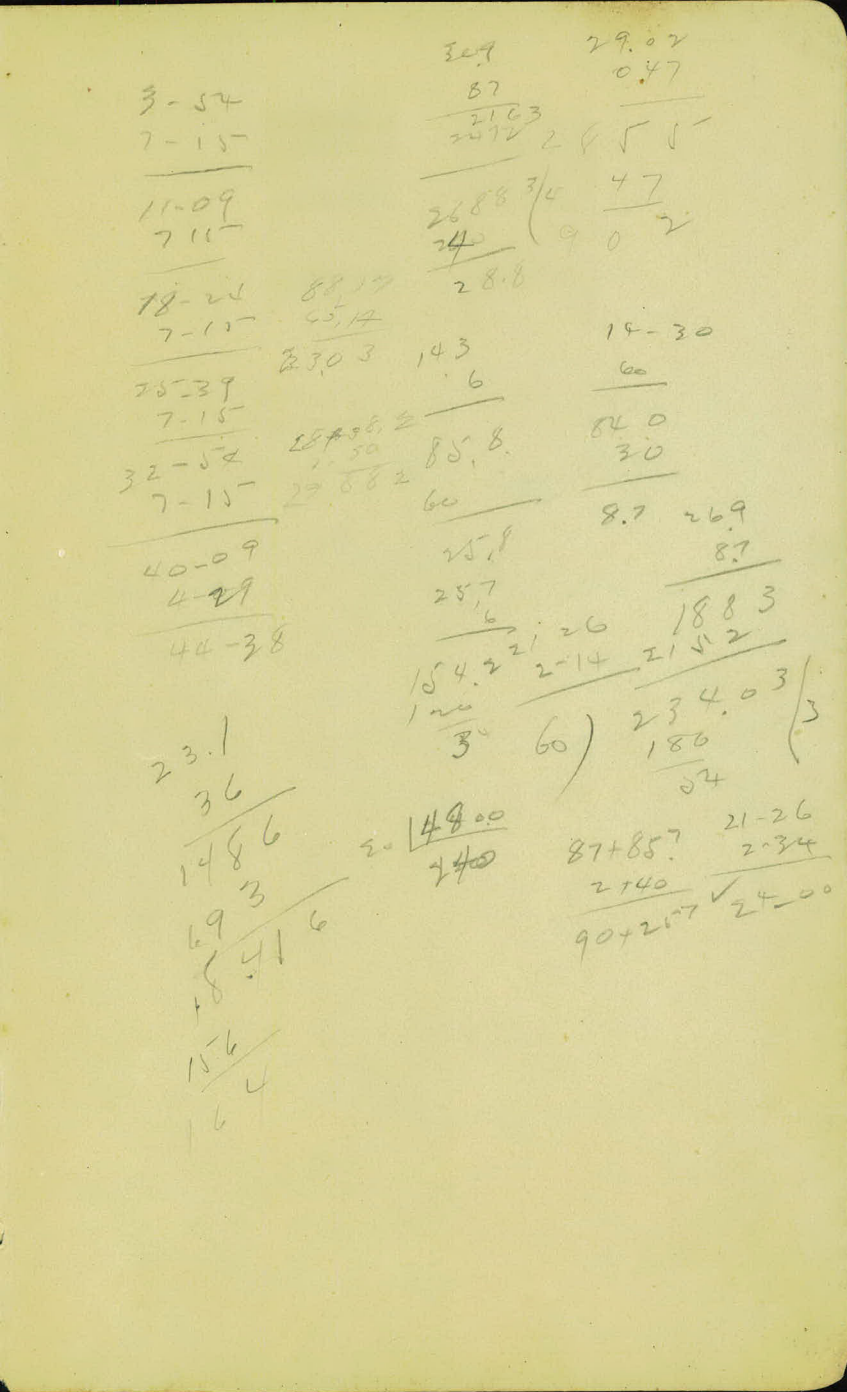
90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0
9° 40' 20'
8° 40' 20'
7° 45' 30' 15'
6° 45' 30' 15'
5° 45' 30' 15'
4° 45' 30' 15'
3° 45' 30' 15'
2° 45' 30' 15'
1° 45' 30' 15'
TWELVE
TEN
EIGHT
SIX
FOUR
TWO
ONE
VERTICAL DISTANCE
STADIA READING X STADIA CONSTANT



U-2456

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.

For Single Track Embankment.

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

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

Made in Germany.