

Edgerton Street
3 23-04

ENGINEERS
FIELD BOOK
No. 10403

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and
SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

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

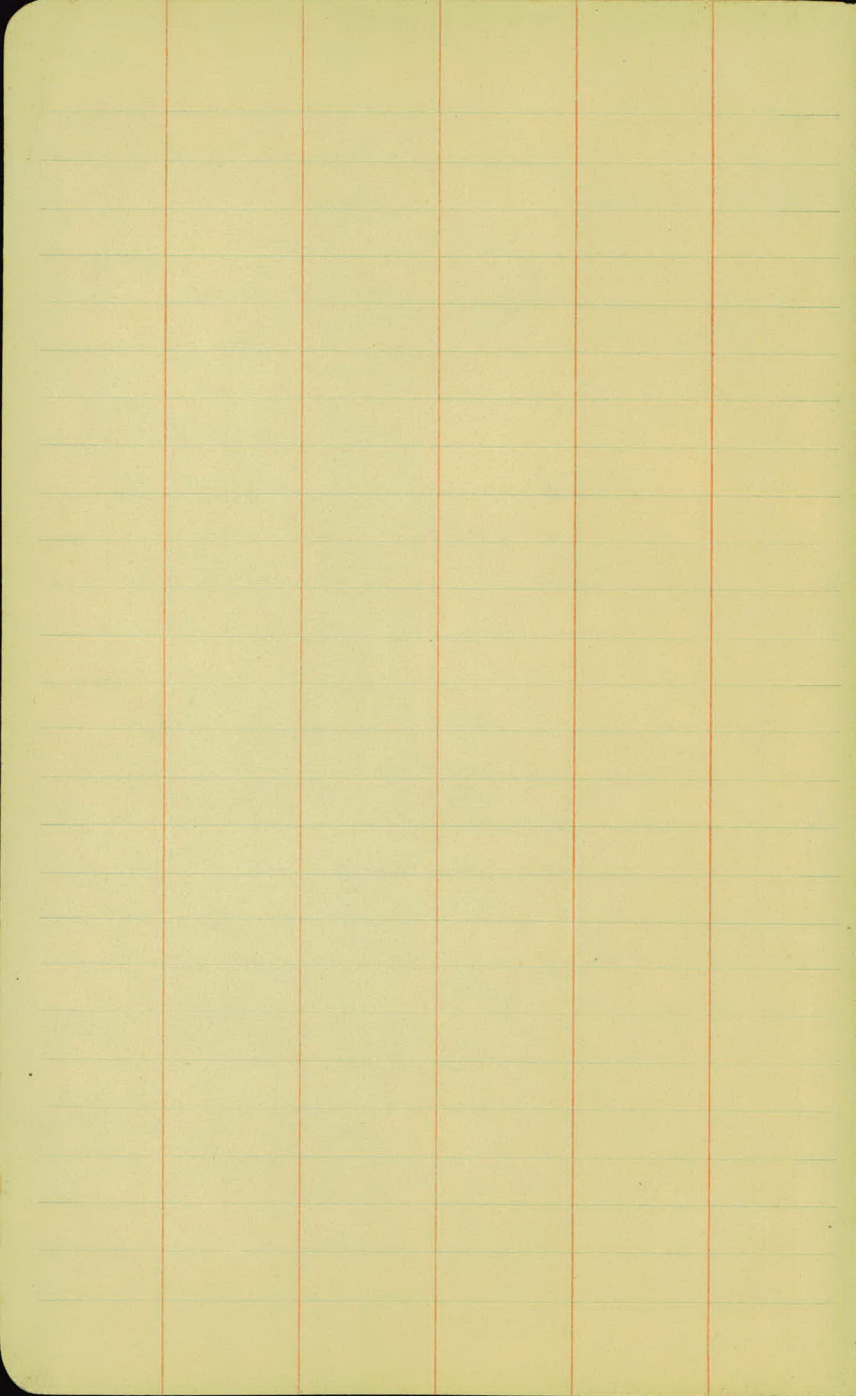
H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	II
0	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	0
1	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	1
2	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	2
3	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	3
4	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	4
5	13.0	13.1	13.2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

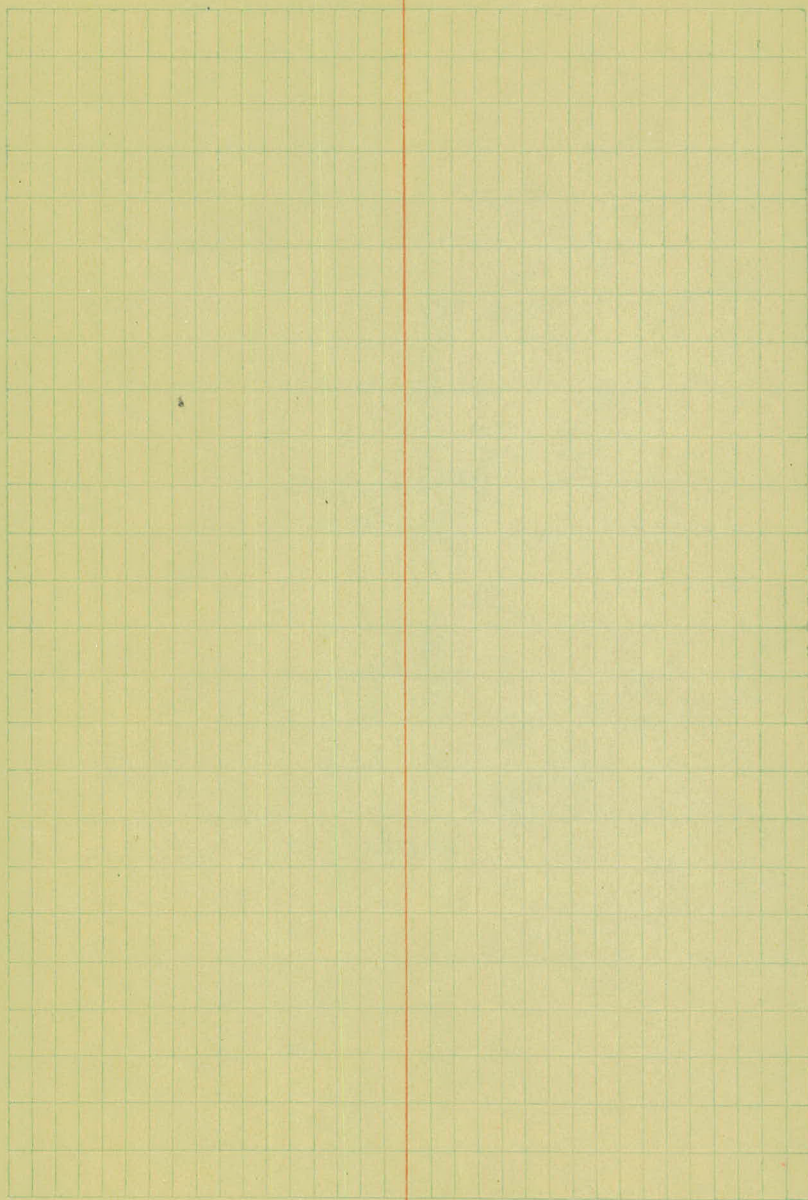
Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 30.6. For same slopes but other widths of roadbed, correct above figures by one-half difference in width of roadbed; thus in example above, for 20 ft. roadbed distance will be $30.6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

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Page	Description	Sta to Sta.	
5	Alignment	0	12
6	9 Cross Sections -	26	12
16	18 Slope Stakes	24	12
18	Cross Sections	24	26
19	21 " "	0	24





Location of P.O.T.s on

Proj #23-04

Sta.

+

H.I.

-

E.10

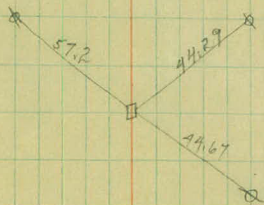
52+60.2 Monument County rd. B + Edgerton

37+16.2 P.O.T.

26+24.25 P.O.T.

0+00 Monument Carpenter + Edgerton

L R



7/16/23

Xsections of project 23-04
Sta 51+82 to sta.

Sta.	+	H.I.	-	Elev	Grade
BM ₁	4.32	218.91 [✓]			(214.59)
51+80			4.6	214.3 [✓]	213.7
50			4.8	14.1 [✓]	
+61			4.8	14.1 [✓]	
50			4.7	14.2 [✓]	
49			4.8	14.1 [✓]	
+50			4.8	14.1 [✓]	
TR	5.27	219.38 [✓]	4.80	214.11 [✓]	
48			5.1	14.3 [✓]	
47			5.0	14.4 [✓]	
+45			5.0	14.4 [✓]	
46			4.9	14.5 [✓]	
TR	4.94	219.52 [✓]	4.80	214.58 [✓]	
45			4.9	14.6	

Fair - Hat

L

♀

R

Carley - Transit 6
Persons - Level - Rod
Eck - Head-chain
B-199 - Rear-chain

Top of monument on ♀ County road B + Edgerstenstr.

$\frac{1.9}{33}$	$\frac{5.4}{25}$	$\frac{4.7}{11}$	$\frac{4.8}{10}$	$\frac{6.9}{21}$	$\frac{7.8}{33}$
------------------	------------------	------------------	------------------	------------------	------------------

$\frac{6.5}{33}$	$\frac{5.7}{24}$	$\frac{4.0}{16}$	$\frac{6.0}{20}$	$\frac{2.2}{33}$
------------------	------------------	------------------	------------------	------------------

$\frac{7.9}{33}$	$\frac{5.1}{17}$	$\frac{5.6}{15}$	$\frac{5.5}{21}$	$\frac{2.6}{28}$	$\frac{1.2}{33}$
------------------	------------------	------------------	------------------	------------------	------------------

$\frac{8.4}{33}$	$\frac{6.9}{21}$	$\frac{5.5}{19}$	$\frac{5.8}{15}$	$\frac{5.7}{18}$	$\frac{2.5}{27}$	$\frac{2.1}{33}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------

$\frac{10.0}{33}$	$\frac{8.7}{24}$	$\frac{5.3}{11}$	$\frac{5.3}{10}$	$\frac{6.0}{19}$	$\frac{4.1}{25}$	$\frac{4.4}{33}$
-------------------	------------------	------------------	------------------	------------------	------------------	------------------

$\frac{10.9}{33}$	$\frac{10.3}{21}$	$\frac{5.6}{13}$	$\frac{5.6}{10}$	$\frac{7.0}{21}$	$\frac{6.3}{28}$	$\frac{6.5}{33}$
-------------------	-------------------	------------------	------------------	------------------	------------------	------------------

$\frac{10.3}{33}$	$\frac{9.1}{23}$	$\frac{5.8}{10}$	$\frac{5.9}{11}$	$\frac{6.9}{20}$	$\frac{6.5}{26}$	$\frac{5.5}{33}$
-------------------	------------------	------------------	------------------	------------------	------------------	------------------

$\frac{2.9}{33}$	$\frac{3.4}{31}$	$\frac{6.8}{23}$	$\frac{7.4}{18}$	$\frac{5.6}{10}$	$\frac{5.7}{12}$	$\frac{7.4}{23}$	$\frac{3.0}{33}$
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$\frac{6.7}{33}$	$\frac{8.2}{24}$	$\frac{7.8}{18}$	$\frac{5.4}{10}$	$\frac{5.5}{12}$	$\frac{7.6}{17}$	$\frac{8.2}{25}$	$\frac{6.6}{30}$	$\frac{6.6}{33}$
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$\frac{10.0}{33}$	$\frac{10.0}{25}$	$\frac{8.4}{17}$	$\frac{6.2}{10}$	$\frac{5.8}{11}$	$\frac{8.2}{20}$	$\frac{9.0}{33}$
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$\frac{10.8}{33}$	$\frac{10.6}{29}$	$\frac{5.4}{12}$	$\frac{5.4}{10}$	$\frac{9.6}{21}$	$\frac{10.3}{33}$
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Continued

Sta	t	H.I.		Elev
	4.94	219.52		
44			3.9	15.6 ✓
432			2.5	16.7 ✓
43			2.3	17.2 ✓
T.P.	7.98	226.45 ✓	1.05	218.47 ✓
42.			6.6	19.9 ✓
41			3.8	22.7 ✓
B.M.	6.25	232.30 ✓	0.40	226.05 ✓

L & R

$\frac{7.6}{33}$	$\frac{6.7}{15}$	$\frac{4.3}{10}$	$\frac{4.6}{14}$	$\frac{10.3}{25}$	$\frac{11.1}{30}$	$\frac{11.5}{33}$
------------------	------------------	------------------	------------------	-------------------	-------------------	-------------------

$\frac{1.7}{33}$	$\frac{2.5}{25}$	$\frac{3.3}{14}$	$\frac{3.3}{13}$	$\frac{6.5}{21}$	$\frac{7.9}{33}$
------------------	------------------	------------------	------------------	------------------	------------------

$\frac{1.2}{33}$	$\frac{2.7}{30}$	$\frac{2.6}{16}$	$\frac{3.0}{14}$	$\frac{4.8}{26}$	$\frac{5.5}{33}$
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$\frac{3.1}{33}$	$\frac{5.6}{30}$	$\frac{7.5}{20}$	$\frac{7.4}{12}$	$\frac{7.1}{20}$	$\frac{11.6}{33}$
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271.95					
$+4.5$	0.5	4.4	4.7	5.6	9.7
$\frac{33}{33}$	$\frac{26}{26}$	$\frac{20}{20}$	$\frac{13}{13}$	$\frac{20}{20}$	$\frac{33}{33}$

Nail in tele pole L of sta 40 + 40

7/23/23
A.M.

Xsections on prop. # R3-04

Sta 40 to sta 26

Sta	F	H.I.	-	Elev	Grade
B.M.	6.25	232.30			(226.05)
40			7.1	25.2	✓
39 + 52			5.6	26.7	✓
39			4.1	28.2	✓
T.P.	5.08	234.76	2.62	229.68	✓
+60			5.7	29.1	✓
38			5.1	29.7	✓
37			5.1	29.7	✓
B.M.			4.60	230.16	(230.16)
36			5.7	29.1	✓
T.P.	3.75	232.45	6.06	228.70	✓
35			4.2	28.3	✓
+80			4.3	28.2	✓
34			5.2	27.3	✓
33			6.1	26.4	✓
T.P.	4.49	230.70	6.24	226.21	✓

cloudy - sultry

L

K

R

 Corley - Transit 8
 Parsons - Level - Rod
 Eck - Head - chain
 Briggs - Rear - chain

Nail in tele. pole Lt. of sta 40 + 40

$\frac{1.6}{33}$	$\frac{2.5}{30}$	$\frac{6.5}{23}$	$\frac{7.1}{20}$	$\frac{7.0}{18}$	$\frac{8.2}{12}$	$\frac{8.4}{22}$	$\frac{13.5}{33}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	-------------------

$\frac{1.6}{33}$	$\frac{5.0}{25}$	$\frac{5.1}{11}$	$\frac{6.6}{19}$	$\frac{8.3}{27}$	$\frac{10.3}{33}$
------------------	------------------	------------------	------------------	------------------	-------------------

233.3

$\frac{7.0}{33}$	$\frac{0.9}{33}$	$\frac{0.5}{28}$	$\frac{4.7}{20}$	$\frac{5.2}{12}$	$\frac{5.6}{20}$	$\frac{6.8}{23}$	$\frac{7.0}{30}$	$\frac{6.5}{33}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

$\frac{0.3}{33}$	$\frac{1.5}{31}$	$\frac{2.1}{28}$	$\frac{6.5}{18}$	$\frac{6.9}{19}$	$\frac{7.9}{22}$	$\frac{7.8}{28}$	$\frac{4.3}{33}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

236.5

$\frac{1.7}{33}$	$\frac{0.3}{31}$	$\frac{1.0}{28}$	$\frac{5.8}{16}$	$\frac{6.3}{19}$	$\frac{7.1}{25}$	$\frac{4.2}{32}$	$\frac{0.8}{33}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

$\frac{0.0}{33}$	$\frac{2.2}{29}$	$\frac{6.4}{21}$	$\frac{5.8}{13}$	$\frac{5.7}{17}$	$\frac{4.2}{25}$	$\frac{4.9}{30}$	$\frac{0.0}{33}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

Nail in tele. pole Lt. of sta 36 + 65

$\frac{0.2}{33}$	$\frac{2.6}{29}$	$\frac{6.7}{20}$	$\frac{6.7}{19}$	$\frac{6.2}{25}$	$\frac{1.8}{33}$
------------------	------------------	------------------	------------------	------------------	------------------

234.5

$\frac{2.0}{33}$	$\frac{0.4}{30}$	$\frac{2.9}{27}$	$\frac{5.0}{18}$	$\frac{5.4}{19}$	$\frac{4.3}{27}$	$\frac{0.0}{33}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------

G.W.

$\frac{0.2}{33}$	$\frac{0.6}{31}$	$\frac{4.9}{30}$	$\frac{4.2}{23}$	$\frac{5.1}{17}$	$\frac{5.7}{32}$	$\frac{1.0}{30}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------

G.W.

$\frac{0.6}{33}$	$\frac{1.1}{32}$	$\frac{4.9}{30}$	$\frac{5.9}{19}$	$\frac{7.0}{23}$	$\frac{1.8}{33}$
------------------	------------------	------------------	------------------	------------------	------------------

$\frac{1.0}{33}$	$\frac{1.7}{34}$	$\frac{4.8}{30}$	$\frac{6.0}{20}$	$\frac{6.7}{16}$	$\frac{7.5}{24}$	$\frac{4.9}{32}$	$\frac{3.8}{33}$
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continued

Sta	+	H.I.	-	Elev
	4.49	230.70		
+67			4.7	26.0 ✓
32			5.1	25.6 ✓
T.P.	5.02	230.11 ✓	5.61	225.09 ✓
31			5.1	25.0 ✓
T.P.	5.00	229.84 ✓	5.27	224.84 ✓
30			5.2	24.6 ✓
T.P.	4.84	228.73 ✓	5.95	223.89 ✓
29			5.3	23.4 ✓
T.P.	3.81	225.76 ✓	6.78	221.95 ✓
28			4.2	21.6 ✓
27			7.7	18.1
+46			10.0	15.8
26			12.1	13.7
B.M.			11.51	214.25 ✓

21427

L & R

$\frac{3.7}{33}$ $\frac{3.8}{32}$ $\frac{4.8}{22}$ $\frac{5.1}{19}$ $\frac{4.4}{28}$ $\frac{3.0}{33}$

231.9

$\frac{4.2}{33}$ $\frac{0.0}{32}$ $\frac{1.6}{29}$ $\frac{6.3}{19}$ $\frac{5.7}{19}$ $\frac{5.7}{24}$ $\frac{2.6}{33}$

$\frac{0.1}{33}$ $\frac{1.2}{29}$ $\frac{6.3}{20}$ $\frac{6.2}{21}$ $\frac{3.5}{31}$ $\frac{2.2}{33}$

$\frac{0.1}{33}$ $\frac{1.3}{31}$ $\frac{7.0}{20}$ $\frac{6.5}{13}$ $\frac{5.9}{15}$ $\frac{6.6}{21}$ $\frac{4.9}{29}$ $\frac{2.5}{33}$

230.2

$\frac{0.5}{33}$ $\frac{6.7}{21}$ $\frac{6.0}{13}$ $\frac{5.5}{19}$ $\frac{6.5}{18}$ $\frac{0.0}{31}$ $\frac{+1.5}{33}$

227.3

$\frac{+1.5}{33}$ $\frac{0.0}{31}$ $\frac{5.4}{22}$ $\frac{5.2}{28}$ $\frac{4.5}{13}$ $\frac{4.0}{19}$ $\frac{0.0}{28}$ $\frac{229.3}{+3.0}$

$\frac{3.5}{33}$ $\frac{7.1}{28}$ $\frac{7.7}{25}$ $\frac{9.8}{20}$ $\frac{9.2}{17}$ $\frac{8.3}{14}$ $\frac{9.4}{18}$ $\frac{6.1}{26}$ $\frac{1.6}{33}$

$\frac{7.6}{33}$ $\frac{9.5}{28}$ $\frac{10.8}{19}$ $\frac{10.6}{16}$ $\frac{10.8}{20}$ $\frac{9.1}{25}$ $\frac{7.1}{33}$

13.3

$\frac{8.7}{33}$ $\frac{13.2}{26}$ $\frac{9.5}{13}$ $\frac{12.1}{15}$ $\frac{13.4}{20}$ $\frac{12.3}{28}$ $\frac{8.7}{33}$

Nail in tele pole Lt. of sta 26+09

sta

+

M.I.

-

Elev

Grade

The image shows a page of graph paper with a grid of 20 columns and 25 rows. A vertical red margin line is positioned on the left side, approximately one-fifth of the way across the page. The grid is composed of light green lines. The page is otherwise blank, with no text or markings within the grid.

	+	H.I	-	E/cv	Grade
B.M.	3.21	202.17			198.96
B.M.			0.70		201.47
B.M.	3.00	177.52			174.52
B.M.			6.14	171.38	
B.M.	6.64	220.91			214.27
BM			3.66	217.25	
B.M.	3.71	233.87			230.16
B.M.			2.72	231.15	

Bench-marks moved to permanent locations

14

7/31/23

M.W. Corley

Top of monument \pm 0+00

Moved to nail in tele pole 33' R of 00-25

spike in tele pole Lt. of sta 16+60

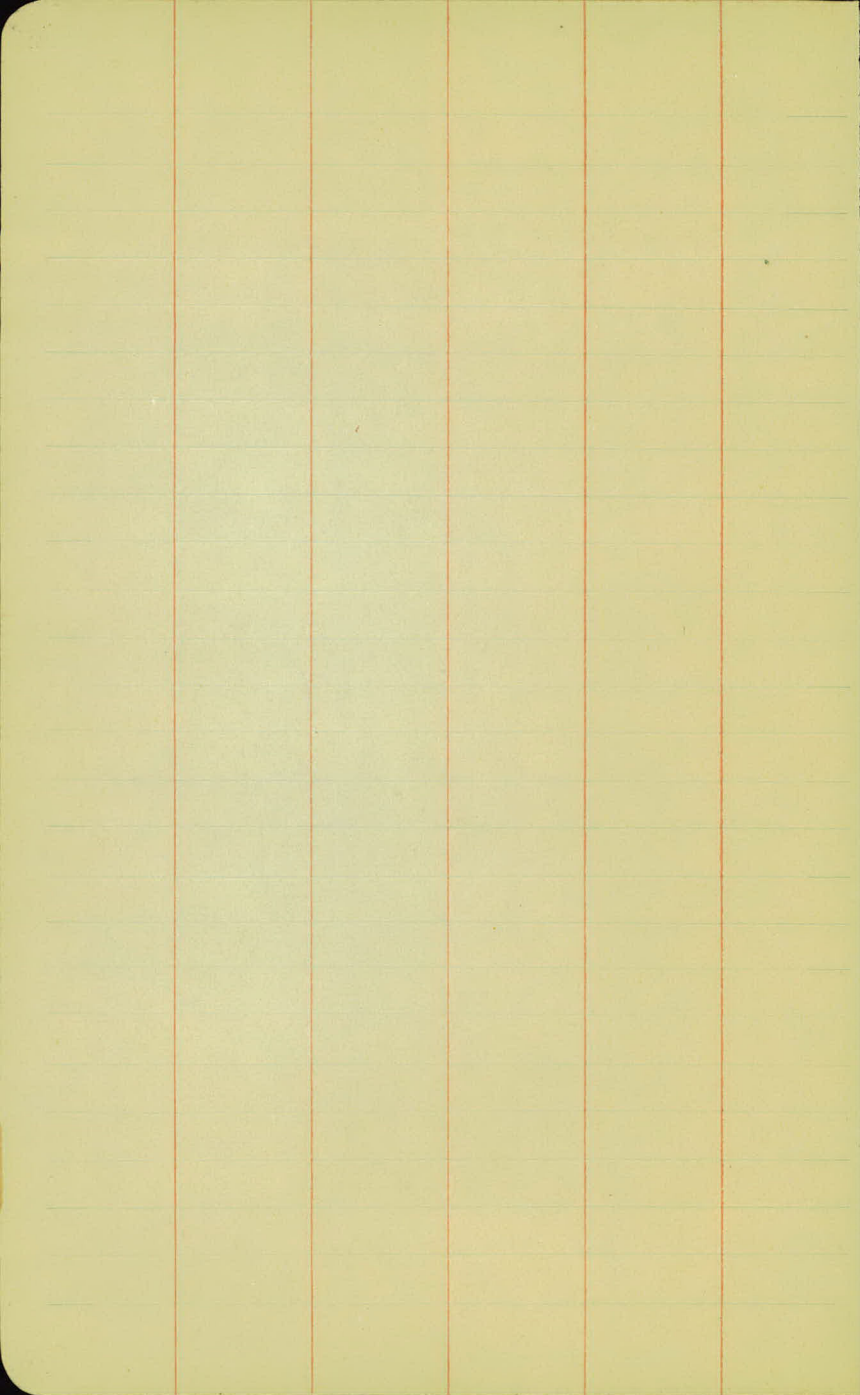
Moved to tele pole Rt of sta 18+00

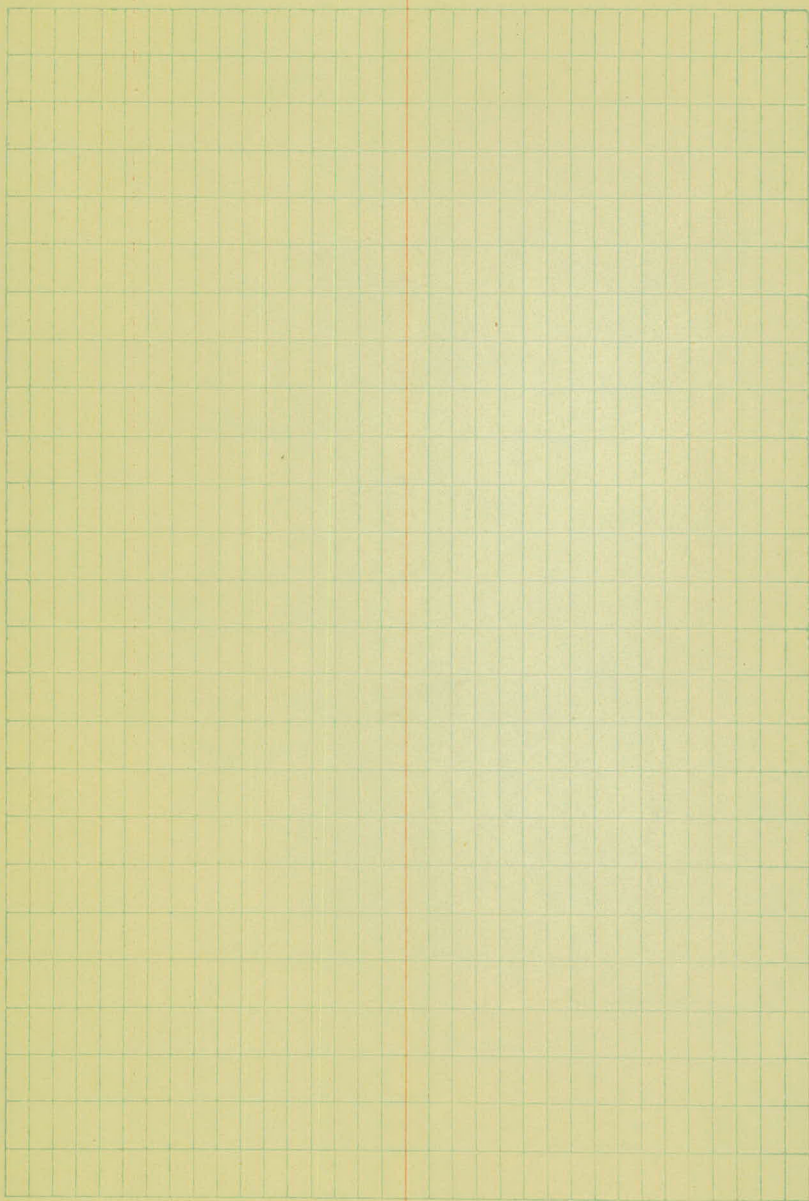
Nail in tele pole Lt sta 26+09

spike in tele pole R of sta 26+06

Nail in tele pole Lt of sta 37+

Moved to tele pole R of sta 36+22





7/23/23

slope stakes on proj 28004
sta 51+80 to sta.

Sta		H.I.		Elev	Grade
BM	4.45	219.04			214.59
51+77.9			4.9	14.1	13.7
51			4.9	14.1	13.8
50			4.8	14.2	13.9
49			4.9	14.1	14.0
48			4.6	14.4	14.1
47			4.4	14.6	14.2
	T.P.	4.77	219.18	4.63	214.41
46			4.7	14.5	14.3
	T.P.	4.77	219.42	4.53	214.65
45			4.8	14.6	14.5
44			3.7	15.7	15.3
43			2.1	17.3	17.2
	T.P.	9.66	227.48	1.60	217.82
42			7.5	20.0	19.8
	BM		1.40	226.08	226.05
41			4.6	22.7	22.4

cloudy - sunny L & R

Carley-Transit 16
Pawson - Rod
Eck - Head-chain
B1995 - Rear-chain

Top of measurement & of Corrd. A + Edgerton str.

cl.9 $\frac{3.4}{26.9}$ c 0.4 $\frac{7.2}{23.1}$ F1.9

F0.6 $\frac{5.8}{24.4}$ c 0.3 $\frac{3.5}{26.7}$ c1.7

F1.9 $\frac{7.0}{23.1}$ c 0.3 $\frac{2.8}{27.2}$ c2.3

F3.4 $\frac{8.4}{21.1}$ c 0.1 $\frac{4.5}{25.5}$ c0.5

F3.6 $\frac{8.5}{21.4}$ c 0.3 $\frac{5.0}{24.9}$ F0.1

F1.4 $\frac{6.2}{23.6}$ c 0.4 $\frac{6.8}{19.0}$ F2.0

F5.0 $\frac{9.9}{24.5}$ c 0.2 $\frac{8.3}{21.1}$ F3.6

F5.2 $\frac{10.1}{24.8}$ c 0.1 $\frac{10.9}{26.0}$ F6.0

F2.8 $\frac{6.7}{19.9}$ c 0.4 $\frac{10.1}{26.0}$ F6.0

F0.4 $\frac{2.6}{27.6}$ c 0.1 $\frac{4.0}{23.2}$ F1.8

c 0.3 $\frac{7.4}{25.3}$ c 0.2 $\frac{F0.4}{16}$

Nail in tele pole L⁴, sta 40+40
grade 16 grade 17

Continued

Sta	T	H.I.		Flev	Grade	
	TRM	5.62	231.67		226.05	
40				6.4	25.3	24.9
39				3.4	27.3	26.4
	T.P.	6.35	234.51	3.51	228.16	
38				4.9	29.6	28.4
37				4.9	29.6	28.2
36				5.6	28.9	28.7
35				6.3	28.2	27.9
34				7.3	27.2	27.1
33				8.2	26.3	26.3
		4.15	230.38	8.28	226.23	
32				4.9	25.5	25.5
	T.P.	4.96	230.02	5.32	225.06	
31				5.0	25.0	24.8
	T.P.	4.94	229.62	5.34	224.68	
30				5.0	24.6	24.1
	T.P.	4.73	228.35	6.00	223.62	
29				4.8	23.6	23.4
	T.P.	4.41	225.95	6.81	221.54	

L & P

$\frac{4}{Ditch}$		
$c4.7 \frac{7.1}{23.0}$	c0.4	$\frac{7.4}{17.9} F0.6$

$\frac{c5.7}{30.7}$	c0.9	$\frac{6.0}{44.3} F0.7$
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236.4		
$c8.0 \frac{+1.9}{33}$	c1.2	$\frac{6.9}{24.2} F0.8$

$c4.5 \frac{1.8}{24.5}$	c1.4	$\frac{4.2}{27.1} C2.1$
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$c4.0 \frac{1.8}{27.0}$	c0.2	$\frac{5.8}{25} 0.0$
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$c3.0 \frac{3.6}{28.0}$	c0.3	$\frac{6.6}{25.0} 0.0$
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$c0.3 \frac{7.1}{25.3}$	c0.1	$\frac{9.1}{23.3} F1.7$
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$c0.3 \frac{7.9}{25.3}$	0.0	$\frac{9.4}{23.8} F1.2$
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$c4.5 \frac{0.4}{29.5}$	0.0	$\frac{5.6}{24.3} F0.7$
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$\frac{2.9}{27.3}$	c0.2	$\frac{5.5}{24.7} F0.3$
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$c2.0 \frac{3.5}{27.0}$	c0.6	$\frac{5.5}{25.0} 0.0$
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$c1.2 \frac{3.8}{26.2}$	c0.2	$\frac{1.8}{28.4} C3.4$
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Continued

Sta	+	H.I.	-	Elev	Grade
	4.41	225.95			
28			4.4	21.6	221.6
27			8.0	18.0	17.7
26			12.3	12.7	12.7
B.M.	4.45	218.72	11.79	214.20	214.27
25 + 50			7.7	12.0	11.0
T.P.	4.11	214.36	8.47	210.25	
25			5.6	08.8	07.7
+50			8.5	05.9	
T.P.	2.98	208.77	8.57	205.79	
24			5.4	03.4	02.7
+29			8.8	200.0	
B.M.			9.54	199.23	
					97.7
					92.7

L † R

$$c0.5 \frac{3.9}{25.5}$$

0.0

$$\frac{0.0}{2.94} \quad c4.4$$

$$c1.0 \frac{7.3}{26.0} \quad c0.3$$

$$\frac{5.6}{2.77} \quad c2.7$$

$$c2.5 \frac{10.8}{27.5} \quad c1.0$$

$$\frac{13.8}{2.45} \quad F0.5$$

$$\frac{4.2}{33} \quad \frac{5.1}{31} \quad \frac{9.0}{25} \quad \frac{9.5}{17} \quad \frac{8.3}{20} \quad \frac{8.4}{15} \quad \frac{10.0}{18} \quad \frac{9.9}{23} \quad \frac{4.4}{33}$$

$$F0.1 \left(\frac{6.8}{24.9} \right) - \frac{6.0}{33} \quad \frac{7.3}{23} \quad \frac{7.5}{16} \quad \frac{6.3}{13} \quad \frac{6.0}{11} \quad \frac{8.3}{19} \quad \frac{2.6}{33} \quad \left(\frac{7.1}{24.6} \right) F0.4$$

$$\frac{3.1}{33} \quad \frac{9.5}{22} \quad \frac{10.0}{17} \quad \frac{9.4}{14} \quad \frac{8.6}{11} \quad \frac{10.3}{18} \quad \frac{8.2}{24} \quad \frac{4.0}{32} \quad \frac{3.5}{33}$$

$$c3.5 \left(\frac{2.6}{28.5} \right) \quad 209.5 \quad \frac{70.7}{33} \quad \frac{2.8}{28} \quad \frac{8.4}{17} \quad \frac{6.3}{13} \quad \frac{6.2}{14} \quad \frac{7.5}{17} \quad \frac{5.8}{26} \quad \frac{1.3}{33} \quad \left(\frac{5.7}{25.4} \right) c0.4$$

$$\frac{4.6}{28} \quad \frac{4.6}{28} \quad \frac{11.4}{15} \quad \frac{9.6}{11} \quad \frac{9.5}{14} \quad \frac{10.7}{20} \quad \frac{6.5}{30} \quad \frac{4.3}{33}$$

Nail in take pole Lt of sta 23+12.

7/30/23

Xsections + slopes 10-23 to 10

Sta	T	H.I.		Elev	Grade
	B.M.	3.25	202.48 ✓		199.23
23			4.1	98.4 ✓	97.7
+40			6.9	95.8 ✓	
	T.P.	4.94	199.15 ✓	8.27	194.21 ✓
22			5.6	93.6 ✓	92.7
	T.P.	3.40	194.52 ✓	8.03	191.12 ✓
+50			3.4	91.1 ✓	
21			5.8	88.7 ✓	187.7
	T.P.	0.0	186.49	8.03	186.49 ✓
+55			0.0	86.5 ✓	
20			3.0	83.5 ✓	82.7
	T.P.	2.05	179.76 ✓	8.78	177.71 ✓
19			0.7	79.1 ✓	78.1
	T.P.	2.74	177.10 ✓	5.40	174.36 ✓
18			1.8	75.3 ✓	74.5
	B.M.	2.77	177.29 ✓	2.58	174.52 ✓
17			3.8	73.5 ✓	72.9
16			4.6	72.7 ✓	72.3

Fair-Worm

L ± R

Carley - Transit
Parsons - Level-Rod
Eck - Head-scheit
Briggs - Rear-chain.

19

Nail in tele pole Lt. of sta 23+12

039	$\frac{5.9}{28.9}$	$\frac{1.0}{33}$	$\frac{0.7}{26}$	$\frac{7.4}{15}$	$\frac{5.0}{10}$	$\frac{4.9}{16}$	$\frac{7.1}{20}$	$\frac{6.2}{23}$	$\frac{1.0}{33}$	$\frac{6.6}{23.2}$ F18
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	$\frac{4.2}{33}$	$\frac{5.6}{28}$	$\frac{10.8}{19}$	$\frac{7.3}{11}$	$\frac{7.8}{17}$	$\frac{12.6}{25}$	$\frac{12.6}{29}$	$\frac{7.6}{33}$
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CR5	$\frac{4.0}{27.5}$	199.7 $\frac{10.5}{33}$	$\frac{3.9}{28}$	$\frac{11.3}{18}$	$\frac{6.2}{8}$	$\frac{6.1}{13}$	$\frac{6.2}{17}$	$\frac{11.5}{25}$	$\frac{12.0}{33}$	$\frac{5.7}{15}$ COB
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	$\frac{6.7}{33}$	$\frac{9.8}{29}$	$\frac{10.2}{19}$	$\frac{4.7}{15}$	$\frac{3.1}{12}$	$\frac{4.1}{9}$	$\frac{3.6}{12}$	$\frac{3.4}{16}$	$\frac{10.0}{27}$	$\frac{10.1}{33}$
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F18	$\frac{8.2}{17}$	$\frac{11.6}{33}$	$\frac{11.6}{30}$	$\frac{14.8}{27}$	$\frac{6.3}{7}$	$\frac{6.1}{11}$	$\frac{12.2}{25}$	$\frac{12.3}{30}$	$\frac{12.3}{33}$	$\frac{12.8}{26.0}$ F60
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	$\frac{10.9}{33}$	$\frac{10.9}{28}$	$\frac{1.3}{16}$	$\frac{0.4}{10}$	$\frac{0.4}{15}$	$\frac{6.5}{26}$	$\frac{7.0}{33}$
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F10.0	$\frac{13.7}{33}$	$\frac{13.7}{27}$	$\frac{10.2}{23}$	$\frac{7.1}{19}$	$\frac{3.1}{13}$	$\frac{3.6}{12}$	$\frac{9.0}{25}$	$\frac{9.5}{33}$	$\frac{8.8}{24.8}$ F50
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F12.8	$\frac{14.5}{37.2}$		$\frac{14.5}{33}$	$\frac{1.2}{14}$	$\frac{0.5}{16}$	$\frac{5.4}{24}$	$\frac{8.0}{33}$	$\frac{6.7}{24.5}$ F50
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F11.8	$\frac{14.1}{34.2}$	$\frac{14.0}{33}$	$\frac{11.1}{26}$	$\frac{3.0}{13}$	$\frac{1.8}{16}$	$\frac{10.4}{28}$	$\frac{10.8}{33}$	$\frac{10.3}{29.0}$ F8.0
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F16.8	$\frac{16.2}{35.7}$		$\frac{16.2}{33}$	$\frac{4.6}{14}$	$\frac{4.3}{15}$	$\frac{14.8}{33}$	$\frac{14.8}{33.6}$ F10.4
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F11.0	$\frac{15.4}{33.6}$	$\frac{15.4}{33}$	$\frac{5.5}{17}$	$\frac{5.5}{17}$	$\frac{14.0}{30}$	$\frac{14.3}{33}$	$\frac{14.4}{31.1}$ F9.9
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7/31/23

X-sections + 5 stakes

Proj. 23-04

Sta	+	H.I.	-	Elev	Grade
	277	177.29		73.5	
15			3.8	72.5 ✓	173.1
+82			3.9	73.4	
				72.4 ✓	
+55			3.6	73.7	
				72.7 ✓	
14			2.1	75.2 ✓	75.2
T.P.	4.05	179.48 ✓	1.86	175.43 ✓	
+83			3.9	75.6 ✓	
T.P.	4.25	182.02 ✓	1.71	177.77 ✓	
13			4.1	77.9 ✓	77.7
12			1.4	80.6	80.2
T.P.	6.33	188.27 ✓	0.08	181.94 ✓	
11			5.7	82.6 ✓	82.5
10			4.7	83.6 ✓	83.1
+73			4.4	83.9 ✓	
+43			4.2	84.1 ✓	

Carley - Transit 20
 Persons - Level - Rod
 Eck - Hood - chain
 Brigg - Rear - chain

Fair - Water L & R

F10.8 $\frac{15.0}{34.2}$ $\frac{15.0}{33}$ $\frac{10.0}{23}$ $\frac{4.7}{16}$ $\frac{4.3}{17}$ $\frac{10.4}{28}$ $\frac{10.8}{33}$ $\frac{4.3}{17}$ F0.1

$\frac{11.7}{33}$ $\frac{11.0}{26}$ $\frac{4.2}{14}$ $\frac{4.0}{14}$ $\frac{4.8}{19}$ $\frac{5.0}{29}$ $\frac{7.3}{33}$

$\frac{8.0}{33}$ $\frac{8.3}{24}$ $\frac{3.4}{12}$ $\frac{4.0}{19}$ $\frac{3.6}{29}$ $\frac{3.7}{33}$
 S.W. S.W.
 S.W. S.W.

F3.2 $\frac{5.3}{20.8}$ $\frac{4.8}{33}$ $\frac{5.4}{28}$ $\frac{5.2}{20}$ $\frac{3.5}{16}$ $\frac{2.6}{6}$ $\frac{2.7}{19}$ $\frac{5.1}{29}$ $\frac{5.1}{33}$ $\frac{2.8}{17.1}$ F0.7

$\frac{8.8}{33}$ $\frac{8.2}{29}$ $\frac{7.5}{22}$ $\frac{4.6}{13}$ $\frac{4.3}{6}$ $\frac{4.3}{19}$ $\frac{4.7}{33}$

F11.4 $\frac{15.7}{35.1}$ $\frac{15.6}{33}$ $\frac{13.2}{23}$ $\frac{10.2}{18}$ $\frac{4.8}{10}$ $\frac{4.5}{10}$ $\frac{4.9}{19}$ $\frac{4.4}{20}$ $\frac{4.9}{29}$ $\frac{4.9}{33}$ $\frac{4.3}{20.5}$ 0.0

C1.6 $\frac{0.2}{22.1}$ $\frac{0.0}{33}$ $\frac{0.0}{28}$ $\frac{0.5}{20}$ $\frac{1.6}{19}$ $\frac{1.7}{8}$ $\frac{1.7}{8}$ $\frac{1.9}{14}$ $\frac{2.6}{18}$ $\frac{4.1}{33}$ $\frac{2.5}{17.1}$ F0.7

0.0 $\frac{5.8}{20.5}$ $\frac{7.3}{33}$ $\frac{5.6}{21}$ $\frac{6.5}{18}$ $\frac{6.2}{8}$ $\frac{5.7}{9}$ $\frac{5.4}{20}$ $\frac{3.8}{29}$ $\frac{3.8}{33}$ $\frac{4.4}{21.9}$ C1.4

F2.2 $\frac{7.4}{19.3}$ $\frac{8.9}{33}$ $\frac{7.8}{21}$ $\frac{5.3}{13}$ $\frac{5.3}{6}$ $\frac{4.8}{15}$ $\frac{4.2}{29}$ $\frac{4.0}{33}$ $\frac{4.3}{21.4}$ C0.9

$\frac{8.9}{31}$ $\frac{8.8}{31}$ $\frac{5.7}{22}$ $\frac{4.8}{12}$ $\frac{5.1}{33}$

$\frac{4.8}{33}$ $\frac{4.7}{30}$ $\frac{4.8}{20}$ $\frac{6.2}{15}$ $\frac{4.2}{8}$ $\frac{4.4}{10}$ $\frac{4.5}{22}$ $\frac{4.8}{33}$

Sta		H.I.		Elev	Grade	
		188.27				
9			3.9	84.4 ✓	83.2	
	T.P.	6.83	192.00 ✓	3.10	185.17 ✓	
8			6.6	85.4 ✓	84.1	
7			5.4	86.6	85.1	
6			4.9	87.1 ✓	86.1	
5			4.1	87.9 ✓	87.1	
4			3.3	88.7 ✓	88.1	
	T.P.	8.57	197.24 ✓	3.33	188.67 ✓	
3			7.0	90.2 ✓	89.6	
2			4.8	92.4 ✓	92.1	
1			1.9	95.3 ✓	95.1	
	T.P.	6.92	202.30 ✓	1.86	195.38 ✓	
0			3.2	99.1 ✓	98.3	
	B.M.		3.26	199.04 ✓	198.96	

$$F3.2 \quad \left(\frac{8.3}{20.8} \right) \quad \frac{9.2}{33} \quad \frac{8.4}{18} \quad \frac{4.2}{8} \quad \frac{4.1}{11} \quad \frac{4.5}{20} \quad \frac{4.1}{33} \quad \left(\frac{4.7}{21.4} \right) \text{CO.4}$$

$$F0.9 \quad \left(\frac{8.8}{20.1} \right) \quad \frac{7.4}{33} \quad \frac{9.0}{15} \quad \frac{6.8}{9} \quad \frac{6.7}{14} \quad \frac{6.7}{33} \quad \left(\frac{6.8}{22.0} \right) \text{C1.0}$$

$$F0.5 \quad \left(\frac{7.4}{20.5} \right) \quad \frac{6.9}{33} \quad \frac{7.5}{25} \quad \frac{7.3}{17} \quad \frac{6.0}{6} \quad \frac{5.4}{14} \quad \frac{4.9}{33} \quad \left(\frac{5.1}{22.8} \right) \text{C1.8}$$

$$\text{CO.3} \quad \left(\frac{5.6}{21.3} \right) \quad \frac{5.5}{33} \quad \frac{5.6}{21} \quad \frac{5.4}{7} \quad \frac{5.0}{8} \quad \frac{5.1}{23} \quad \frac{6.8}{33} \quad \left(\frac{5.1}{21.8} \right) \text{CO.8}$$

$$F0.7 \quad \left(\frac{5.6}{20.3} \right) \quad \frac{6.5}{33} \quad \frac{5.5}{18} \quad \frac{4.6}{7} \quad \frac{4.4}{12} \quad \frac{5.2}{19} \quad \frac{4.8}{33} \quad \left(\frac{5.3}{20.6} \right) \text{F0.4}$$

$$F0.1 \quad \left(\frac{4.6}{20.3} \right) \quad \frac{8.0}{33} \quad \frac{5.0}{26} \quad \frac{4.6}{15} \quad \frac{3.6}{9} \quad \frac{3.4}{13} \quad \frac{4.3}{21} \quad \frac{3.9}{33} \quad \left(\frac{4.3}{20.6} \right) \text{F0.4}$$

$$F1.6 \quad \left(\frac{9.2}{18.4} \right) \quad \frac{12.0}{33} \quad \frac{9.4}{26} \quad \frac{9.1}{17} \quad \frac{7.4}{11} \quad \frac{7.1}{11} \quad \frac{8.2}{17} \quad \frac{9.4}{23} \quad \left(\frac{8.5}{20.1} \right) \text{F0.9}$$

$$F2.1 \quad \left(\frac{7.5}{19.6} \right) \quad \frac{10.3}{33} \quad \frac{7.6}{19} \quad \frac{5.3}{11} \quad \frac{4.9}{10} \quad \frac{6.2}{10} \quad \frac{7.3}{33} \quad \left(\frac{6.5}{18.1} \right) \text{F1.4}$$

$$F1.6 \quad \left(\frac{3.7}{18.4} \right) \quad \frac{6.8}{33} \quad \frac{4.1}{27} \quad \frac{3.7}{16} \quad \frac{2.1}{11} \quad \frac{2.2}{11} \quad \frac{3.0}{22} \quad \frac{2.4}{33} \quad \left(\frac{2.8}{20.3} \right) \text{F0.7}$$

$$F0.3 \quad \frac{4.3}{20.1} \quad \frac{3.6}{33} \quad \frac{4.3}{22} \quad \frac{4.1}{13} \quad \frac{3.7}{14} \quad \frac{3.6}{20} \quad \frac{3.2}{33} \quad \left(\frac{3.6}{20.6} \right) \text{F0.4}$$

Top of monument of Karp & Edgerton

Pavement - stakes

Sta	+	H.I.	-	Elev	Sub. Grade
B.M.	4.17	218.76		214.59	
52					
	+50				213.75
51					213.80
	+50				213.85
50					213.90
	+50				213.95
49					214.00
	+50				214.05
48					214.10
	+50				214.15
47					214.20
K.P.	4.15	219.13	3.78	214.98	

4.M. 7/14/23 - Fair - cool

Part 1
Carley
Persons
R-1995
Eck

Paving Grade
Grade Red.

Top of monument on E side 32+60.9

LT 10' E RT 10'

24.375	4.39 ✓	5.1	4.9	5.1	↑ Grading & setting forms to firm stakes. ↓
17.425	4.34 ✓	5.1	4.9	5.1	
17.475	4.29 ✓	5.1	4.8	5.0	
14.525	4.24 ✓	4.92	4.75	4.90	
14.575	4.19 ✓	5.25	4.89	4.83	
14.625	4.14 ✓	4.81	4.90	4.80	
14.675	4.09 ✓	5.00	4.87	4.80	
14.725	4.04 ✓	5.01	4.70	4.89	
14.775	3.99 ✓	5.60	4.62	4.83	
14.825	3.94 ✓	4.98	4.60	4.78	

		H.I		Flux	Sub. Grade
579	+	219.13			
46	+50				214.25
46					214.30
	+50				214.35
	+25				214.37
45					214.592
	+75				214.55
	+50				214.601
	+25				214.830
44					215.343
	+75				215.710
	+50				216.00
	+25				216.57
TP	10.30	227.49	1.94	217.19	
43					217.230
	+75				217.810
B.M.	0.16	226.21	1.39	226.10	226.05

Reading Sod.	Grade Sod.	L.S. 10'	±	R.L. 10'
14.875	4.26 ✓	5.02	5.05	4.30
14.925	4.21 ✓	4.88	4.85	4.89
14.975	4.16 ✓	5.15	4.97	4.84
14.995	4.14 ✓	4.78	4.90	4.68
15.127	4.01 ✓	4.96	4.70	4.67
15.175	3.96 ✓	5.11	4.75	4.75
15.224	3.91 ✓	4.69	4.50	4.61
15.355	3.78 ✓	3.85	4.16	4.30
15.938	3.20 ✓	3.12	3.74	3.90
16.335	2.80 ✓	3.20	3.23	3.41
16.625	2.51 ✓	2.00	2.85	3.11
17.175	1.74 ✓	1.90	2.60	2.71
17.855	7.64	10.25	10.45	10.83
18.435	9.06	9.42	9.78	10.11

Grading & setting corners to form stakes

Nail in tele pole 1 ft. of sta 40+40

Checks

Sta	+	H.I.	-	Elv.	Sub. Grade
		226.21			17.8'
42+50					218.46
42					219.77
+50					221.09
41					222.40
		227.42			
+50					223.71
B.M.	1.37	227.42	0.16	226.05	<u>226.05</u>
+25					224.38
40					225.02
+75					225.60
+50	2.22	233.97	0.67	224.75	226.14
+25					224.63
39					227.07
+75					227.47
+50					227.82
+25					228.12
38					228.37

Paving Grade	Grade Rod	$\frac{L_i}{10}$	$\frac{R_i}{10}$	$\frac{R_i}{10}$
19.085	7.13 ✓	7.85	7.95	5.38
20.395	5.82 ✓	6.90	6.60	7.05
21.715	4.50 ✓	5.36	5.31	5.62
23.025	3.19 ✓	4.07	3.86	4.23
24.335	1.88	$\frac{3.6}{10}$	3.7	$\frac{4.9}{10}$

Grinding & setting corners to stakes

Neilsen T. P. Lt 40740

225.005				
225.645	1.78	$\frac{2.9}{10}$	2.9	$\frac{3.1}{10}$
226.225	1.20	$\frac{1.7}{10}$	2.0	$\frac{2.7}{10}$
226.965	0.64	$\frac{1.1}{10}$	1.4	$\frac{1.8}{10}$
227.255	0.72	$\frac{2.2}{10}$	2.4	$\frac{2.8}{10}$
227.695	0.18	$\frac{6.7}{10}$	6.8	$\frac{7.1}{10}$
228.095	5.88	$\frac{6.1}{10}$	6.4	$\frac{6.6}{10}$
228.445	5.50	$\frac{5.6}{10}$	6.0	$\frac{6.0}{10}$
228.745	5.20	$\frac{5.5}{10}$	5.7	$\frac{5.6}{10}$
228.995	4.98	$\frac{5.3}{10}$	5.6	$\frac{5.6}{10}$

Pavement stakes

23-04

Sta	+	H.I.		Elev	Sub. Grade
30		133.99			
37	+75				228.58
	+50				228.73
	+25				228.89
37	+0				228.90
	+75				228.92
	+50				228.89
	+25				228.80
34	+0				228.68
	+75				228.50
T.P.	1.59	131.03	4.53	229.44	
	+50				228.30
	+25				228.10
35	+0				227.90
	+75				227.70
	+50				227.50
	+25				227.30
34	+0				227.10
	+75				226.90
	+50				226.70
	+25				226.50
33	+0				226.30

9/17/23 cloudy-wet

25

Party: Carley
 Parsons

Pavement
 Grades: Briggs Lt.
 East

Rt.

		<u>5.4</u>		<u>5.4</u>
229.205	4.77	<u>10</u>	5.5	<u>10</u>
		<u>5.5</u>		<u>5.4</u>
229.355	4.62	<u>10</u>	5.4	<u>10</u>
		<u>5.3</u>		<u>5.3</u>
229.465	4.51	<u>10</u>	5.3	<u>10</u>
		<u>5.4</u>		<u>5.4</u>
229.525	4.45	<u>10</u>	5.4	<u>10</u>
		<u>5.4</u>		<u>5.5</u>
229.545	4.43	<u>10</u>	5.5	<u>10</u>
		<u>5.5</u>		<u>5.6</u>
229.515	4.46	<u>10</u>	5.7	<u>10</u>
		<u>5.7</u>		<u>5.4</u>
229.425	4.55	<u>10</u>	5.4	<u>10</u>
		<u>5.8</u>		<u>5.4</u>
229.305	4.67	<u>10</u>	5.6	<u>10</u>
		<u>5.7</u>		<u>5.6</u>
229.125	4.85	<u>10</u>	5.3	<u>10</u>
		<u>3.8</u>		<u>3.0</u>
228.725	2.11	<u>10</u>	2.4	<u>10</u>
		<u>2.9</u>		<u>3.0</u>
228.725		<u>10</u>	2.7	<u>10</u>
		<u>3.1</u>		<u>3.2</u>
228.525	2.51	<u>10</u>	2.9	<u>10</u>
		<u>3.0</u>		<u>3.5</u>
228.325		<u>10</u>	3.2	<u>10</u>
		<u>3.9</u>		<u>3.7</u>
228.125	2.71	<u>10</u>	3.5	<u>10</u>
		<u>4.2</u>		<u>3.8</u>
227.925		<u>10</u>	3.8	<u>10</u>
		<u>4.6</u>		<u>4.4</u>
227.725	3.31	<u>10</u>	4.0	<u>10</u>
		<u>4.6</u>		<u>4.7</u>
227.515		<u>10</u>	4.1	<u>10</u>
		<u>4.8</u>		<u>4.8</u>
227.325	3.71	<u>10</u>	4.4	<u>10</u>
		<u>4.8</u>		<u>5.1</u>
227.125		<u>10</u>	4.7	<u>10</u>
		<u>4.6</u>		<u>5.2</u>
226.925	4.11	<u>10</u>	<u>5.0</u> 7	<u>10</u>
			4.9	

S. No	+	H.I.	-	F/RV	Sub. Grade
		231.03			
	+75				224.10
	+50				225.91
	+25				225.91
32					225.52
	+75				225.34
	+50				225.12
	+25				224.98
31					224.800
P.M.	1.11	231.27	0.27	130.16	
	+75				224.625
	+50				224.450
	+25				224.275
30					224.100
	+75				223.925
	+50				223.750
	+25				223.575
29					223.40
T.P.	0.74	224.76	7.25	214.02	
	+75				223.14
	+50				222.79
	+25				222.28
28					221.64

Proving
Grade

LT

RT

226,725	4.31	$\frac{9.8}{10}$	5.1	$\frac{5.3}{10}$
226,535	7.50	$\frac{5.7}{10}$	5.4	$\frac{5.7}{10}$
226,335	4.70	$\frac{5.7}{10}$	5.4	$\frac{5.9}{8} \frac{5.7}{10}$
226,145	4.87	$\frac{6.1}{10}$	5.7	$\frac{5.7}{2} \frac{6.0}{10}$
225,965	5.07	$\frac{6.7}{10}$	$\frac{5.9}{4} 5.9$	$\frac{6.2}{8} \frac{6.0}{10}$
226,785	5.25	$\frac{6.4}{10}$	$\frac{6.1}{4} 6.1$	$\frac{6.3}{8} \frac{6.2}{10}$
225,605	5.43	$\frac{6.0}{10}$	$\frac{6.2}{4} 6.1$	$\frac{6.1}{6} \frac{6.3}{10}$
225,425	5.61	$\frac{6.7}{10}$	$\frac{6.2}{4} 6.2$	$\frac{6.6}{10}$
Nail in Tol pole				
225,250		$\frac{6.6}{10}$	6.5	$\frac{6.5}{10}$
225,075	4.20	$\frac{6.8}{10}$	6.8	$\frac{6.6}{10}$
224,900		$\frac{7.0}{10}$	7.1	$\frac{6.9}{10}$
224,725	6.55	$\frac{7.1}{10}$	7.2	$\frac{7.2}{10}$
224,550		$\frac{7.4}{10}$	7.2	$\frac{7.0}{10}$
224,375	6.70	$\frac{7.7}{10}$	7.9	$\frac{7.4}{10}$
224,200		$\frac{8.1}{10}$	7.9	$\frac{8.0}{10}$
224,025	7.25	$\frac{8.2}{10}$	8.3	$\frac{8.1}{10}$
223,785	0.98	$\frac{2.0}{10}$	2.0	$\frac{2.0}{10}$
223,415	1.35	$\frac{2.7}{10}$	2.4	$\frac{2.6}{10}$
222,905	1.86	$\frac{3.2}{10}$	3.1	$\frac{3.1}{10}$
222,265	2.50	3.9	3.5	$\frac{3.5}{10}$

Sta.	+	H.I.	-	Elev	Sub Grade
		224.74			
	+75				220.84
	+50				219.95
	+25				218.90
27					217.72
	+75				
	+50				215.20
	+25				
24					212.70
B.M.	0.13	217.38	7.54	217.22	217.25
	+75				
	+50				210.20
	+25				
25					207.70
	+75				
	+50				205.20
T.P.	+25	0.72	206.52	11.58	205.80
24					202.70
	+75				
	+50				200.20
	+25				
23					197.70

Tau 103
Grade

L1 R

221.485	3.28	$\frac{7.6}{10}$	4.1	$\frac{7.4}{10}$
220.575	4.19	$\frac{5.5}{10}$	5.2	$\frac{5.7}{10}$
219.525	5.24	$\frac{6.3}{10}$	6.3	$\frac{6.3}{10}$
218.345	6.42	$\frac{7.5}{10}$	7.5	$\frac{7.3}{10}$

		$\frac{8.3}{10}$	8.5	$\frac{8.3}{10}$
215.825	8.77	$\frac{9.2}{10}$	9.2	$\frac{9.7}{10}$
		$\frac{10.2}{10}$	10.0	$\frac{10.0}{10}$
213.325	11.47	$\frac{11.4}{10}$	11.3	$\frac{11.4}{10}$

SPK in Tol. pole R. of Sta. 20+06.

		$\frac{5.3}{10}$	5.2	$\frac{5.5}{10}$
210.825	6.54	$\frac{6.5}{10}$	6.7	$\frac{6.9}{10}$
		$\frac{7.7}{10}$	8.0	$\frac{7.9}{10}$
208.325	7.09	$\frac{9.0}{10}$	7.1	$\frac{9.1}{10}$

		$\frac{10.6}{10}$	10.5	$\frac{10.8}{10}$
205.825	11.54	$\frac{11.9}{10}$	11.8	$\frac{12.0}{10}$
		$\frac{2.1}{10}$	2.2	$\frac{2.2}{10}$
213.325	3.20	$\frac{3.7}{10}$	3.4	$\frac{3.7}{10}$

		$\frac{4.8}{10}$	4.7	$\frac{4.8}{10}$
200.825	5.70	$\frac{5.9}{10}$	5.9	$\frac{4.1}{10}$
		$\frac{7.3}{10}$	7.1	$\frac{7.3}{10}$
198.325	8.20	$\frac{8.4}{10}$	8.3	$\frac{8.5}{10}$

Sta.	+	H.I.	-	Elev.	Sub Grade
		206.52			
	+75				
	+50				195.20
T.P.	+25	0.05	195.89	10.66	195.84
22					192.90
	+75				
	+50				190.20
	+25				
21					187.70
	+75				
	+50				185.20
	+25				
20					182.70
T.P.		0.47	183.77	12.59	183.30
	+75				181.47
P.M.		11.51	182.89	12.40	171.37
	+50				180.28
	+25				177.17
19					178.10
	+75				177.14
	+50				176.28
	+25				175.44

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L

R

		$\frac{9.8}{10}$		$\frac{9.7}{10}$
			9.7	
		$\frac{11.1}{10}$		$\frac{11.0}{10}$
195.525	10.70		10.9	
		$\frac{1.8}{10}$		$\frac{1.6}{10}$
			1.5	
		$\frac{3.0}{10}$		$\frac{2.7}{10}$
193.325	2.57		2.4	
		$\frac{4.7}{10}$		$\frac{3.8}{10}$
			3.4	
		$\frac{5.3}{10}$		$\frac{4.8}{10}$
190.825	5.07		4.9	
		$\frac{6.8}{10}$		$\frac{6.3}{10}$
			6.2	
		$\frac{7.8}{10}$		$\frac{7.6}{10}$
188.325	7.57		7.5	
		$\frac{9.3}{10}$		$\frac{9.0}{10}$
			8.9	
		$\frac{10.3}{10}$		$\frac{10.3}{10}$
185.525	10.07		10.0	
		$\frac{11.9}{10}$		$\frac{11.7}{10}$
			11.5	
		$\frac{13.0}{10}$		$\frac{13.0}{10}$
183.325	12.57		12.5	
		$\frac{2.1}{10}$		$\frac{1.9}{10}$
			1.7	
182.095	1.68			
Nail in Tolipale Rt Sta. 18+00				
		$\frac{2.3}{10}$		$\frac{2.0}{10}$
			2.0	
180.905	1.99	$\frac{3.7}{10}$		$\frac{3.0}{10}$
			3.1	
177.765	3.13	$\frac{4.6}{10}$		$\frac{4.0}{10}$
			4.2	
178.725	4.17	$\frac{5.5}{10}$		$\frac{4.8}{10}$
			5.3	
177.765	5.13	$\frac{6.2}{10}$		$\frac{5.7}{10}$
			6.0	
176.905	5.99	$\frac{7.0}{10}$		$\frac{6.7}{10}$
			6.7	
176.115	6.78	$\frac{7.0}{10}$		$\frac{6.7}{10}$
			6.7	

		H.I		Elev	sup Grade
579					
		182.89			
18					174.80
	+75				174.18
	+50				173.64
	+25				173.22
17					172.90
	+75				172.59
	+50				172.40
	+25				172.33
16					172.30
	+75				172.36
	+50				172.52
	+25				172.76
15					173.10
			9.50		
	P.M.		11.51	171.38	
	+75				173.50
	+50				173.99
	+25				174.51
	B.M.	6.50	177.88	171.38	
14					175.20
	+50				176.45
13					177.70
	J.P.	9.35	186.98	0.20	177.63

Boring
Grade

L

R

175,425 7.47

$\frac{7.9}{10}$ 7.8

$\frac{7.6}{10}$

174,805 8.09

$\frac{8.5}{10}$ 8.4

$\frac{8.5}{10}$

174,285 8.61

$\frac{9.0}{10}$ 8.9

$\frac{9.2}{10}$

173,845 9.05

$\frac{9.2}{10}$ 9.3

$\frac{9.6}{10}$

173,525 9.37

$\frac{10.0}{10}$ 9.5

$\frac{9.7}{10}$

173,215 9.68

$\frac{10.0}{10}$ 9.7

$\frac{10.1}{10}$

173,025 9.87

$\frac{10.0}{10}$ 10.0

$\frac{10.1}{10}$

172,955 9.94

$\frac{10.4}{10}$ 10.3

$\frac{10.3}{10}$

172,925 9.97

$\frac{10.6}{10}$ 10.4

$\frac{10.4}{10}$

172,985 9.71

$\frac{10.5}{10}$ 10.4

$\frac{10.5}{10}$

173,145 9.75

$\frac{10.3}{10}$ 10.1

$\frac{10.4}{10}$

173,325 9.51

$\frac{9.8}{10}$ 9.4

$\frac{10.0}{10}$

173,725 9.17

$\frac{9.7}{10}$ 9.5

$\frac{9.7}{10}$

174.125

174.615

175.135

Sp. Kc tele pole Lt 18+00

2.78

1.53

0.28

Paving - stakes

Sta		H.I.		Elev	Profile Grade
		186.98			
12+50					178.95
12					180.20
	+50				181.45
	+34.8				181.85
11					182.50
	+54.8				182.80
	+34.8				183.10
10	T.P.	5.95	188.95	3.98	183.00
	+50				183.10
9					183.20
	+50				183.60
8					184.10
	+50				184.60
7					185.10
	+50				185.60
6					186.10
	+50				186.60
5	T.P.	10.90	197.85	2.00	186.95
	+50				187.10
					187.60
4					188.10
V.C.	+80				188.40

Fair - Warm

Grade
Red,
oil for
crown

Party { Carley
Perseris
Briggs
Eck

Lt
10' ♀

Rt. 10'

8.13 ✓

6.88 ✓

5.63 ✓

5.23 ✓

4.58 ✓

4.28 ✓

3.98 ✓

3.98 ✓

5.95 ✓

5.85 ✓

5.45 ✓

4.95 ✓

4.45 ✓

3.95 ✓

3.45 ✓

2.95 ✓

2.45 ✓

1.95 ✓

10.35 ✓

9.85 ✓

9.55 ✓

Sta	+	H.I.	-	Elev	Profile Grade
		197.85			
3+50					188.65
3					187.60
	+50				190.50
2					192.10
	+80				192.43
	+50				193.48
1					195.10
TP	+60				196.72
0		6.58	203.90	0.53	197.32
					198.34
	B.M.		4.96	198.94	198.96

Grade
rod,
+ all for
CROWIN

10.11

±

Party

Conley

Parsons

Briggs

Eck

10 ft

9.30 L

8.35 ✓

7.45 ✓

5.85 ✓

5.52 ✓

4.47 ✓

2.85 ✓

1.23 ✓

5.66 ✓

Top of monument ± 0+00

23-64

Xsect 10775 for first 14 str.

Sta

+

H.I.

-

Elev

177.88

14

+75

+50

+25

13

+75

186.98

+50

+25

12

+75

+50

+34~~8~~

11

+84~~8~~

+50

+34~~8~~

10

+75

188.95

+50

+25

9

+75

+50

+25

10-15-23
Fair - Warsaw

Carley
Perkins
3-19-93
Eck

X

10' Lt	±	10' Rt.
3.2	3.1	2.9
2.6	2.5	2.5
2.0	1.8	1.7
1.3	1.1	1.1

X

0.4	0.5	0.4
8.6	8.8	8.9
8.0	8.4	8.4
7.2	7.4	7.5
7.0	7.0	6.9
6.4	6.3	6.2
5.8	5.7	5.6
5.6	5.4	5.4
5.0	4.9	4.8
5.0	4.6	4.5
4.9	4.4	4.4
4.5	4.1	4.4
4.5	4.2	4.1

Rail road

X

5.9	6.0	5.8
5.7	6.0	5.7
5.6	5.7	5.4
5.3	5.3	5.2
5.0	5.1	5.0
5.0	5.0	5.0

Sta

H.I

8

+75

+50

+25

7

+75

+50

+25

6

+75

+50

+25

5

+75

197.85

+50

+25

4

+80

+50

+25

3

+75

+50

+25

<u>10' H</u>	<u>♀</u>	<u>10' H</u>
5.0	4.8	4.7
4.9	4.7	4.5
4.8	4.5	4.5
4.6	4.2	4.1
4.0	4.1	3.8
4.0	3.6	3.4
3.6	3.3	3.2
3.1	3.1	3.0
2.9	2.9	2.6
2.6	2.4	2.2
2.2	2.2	1.9
2.0	2.1	1.8
1.7	1.8	1.8
10.3	10.3	10.3
10.2	10.0	10.1
10.0	9.8	9.8
9.6	9.7	9.4
9.4	9.5	9.3
9.1	9.0	8.9
8.9	8.6	8.4
8.1	8.7	7.9
7.7	7.4	7.2
7.1	7.0	6.8
6.6	6.5	6.4

X

Sta

Elev

197.85

2, +00

1 +80

1 +50

1 +25

1 +00

0 +75

0 +50

0 +25

0 +00

10' L

f

10' R

6.1

5.9

5.9

5.5

5.4

5.3

4.5

4.4

4.4

3.8

3.7

3.8

2.9

2.9

3.0

2.2

2.1

2.1

1.3

1.2

1.2

0.4

0.3

0.2

5.8

5.5

5.4

23-04 Final sections

Sta	+	H.I	-	Elev
B.M.	4.91	219.50 ✓		214.59
51+80			5.1	14.4
51			5.0	14.5
+61			5.0	14.5
50			4.9	14.6
49.			4.9	14.6
.				
+50			4.8	14.7
48			4.8	14.7
47			4.6	14.9
+45			4.6	14.9
46			4.5	15.0
T.T.	5.21	220.61 ✓	4.10	215.40 ✓
45			5.3	15.3
44			4.6	16.0

11-8-23

Fall - Warrin.

LT

≠

RTParty { Carley
Persons
Briggs
Eck

Top of monuments on Co. rd. B & Edger to 17

$$\frac{7.6}{23} \quad \frac{7.2}{19} \quad \frac{5.3}{15} \quad \frac{5.2}{10} \quad \frac{5.2}{10} \quad \frac{5.4}{15} \quad \frac{7.0}{19}$$

$$\frac{6.2}{24} \quad \frac{7.4}{23} \quad \frac{7.4}{17} \quad \frac{5.3}{14} \quad \frac{5.1}{10} \quad \frac{5.1}{10} \quad \frac{5.2}{14} \quad \frac{6.6}{18} \quad \frac{6.3}{29} \quad \frac{6.6}{30}$$

$$\frac{5.8}{16} \quad \frac{5.1}{15} \quad \frac{5.1}{10} \quad \frac{5.1}{10} \quad \frac{5.4}{15} \quad \frac{6.7}{18} \quad \frac{6.7}{26} \quad \frac{1.9}{32}$$

$$\frac{7.3}{21} \quad \frac{5.4}{15} \quad \frac{5.0}{10} \quad \frac{5.0}{10} \quad \frac{5.2}{14} \quad \frac{6.6}{18} \quad \frac{6.3}{26} \quad \frac{2.9}{31}$$

$$\frac{8.1}{21} \quad \frac{5.2}{15} \quad \frac{5.0}{10} \quad \frac{5.0}{10} \quad \frac{5.0}{14} \quad \frac{6.8}{18} \quad \frac{7.0}{29} \quad \frac{4.9}{32}$$

$$\frac{10.2}{22} \quad \frac{5.3}{15} \quad \frac{4.9}{10} \quad \frac{4.9}{10} \quad \frac{5.1}{15} \quad \frac{7.4}{20} \quad \frac{7.5}{31} \quad \frac{7.1}{32}$$

$$\frac{9.1}{23} \quad \frac{4.9}{15} \quad \frac{4.9}{10} \quad \frac{4.9}{10} \quad \frac{5.3}{14} \quad \frac{7.2}{18} \quad \frac{7.2}{27} \quad \frac{6.0}{32}$$

$$\frac{7.0}{22} \quad \frac{5.0}{16} \quad \frac{4.7}{10} \quad \frac{4.7}{10} \quad \frac{4.9}{15} \quad \frac{7.4}{19} \quad \frac{7.7}{25} \quad \frac{3.1}{32}$$

$$\frac{7.5}{21} \quad \frac{4.8}{14} \quad \frac{4.7}{10} \quad \frac{4.7}{10} \quad \frac{4.7}{15} \quad \frac{8.0}{21} \quad \frac{8.3}{39} \quad \frac{6.7}{31}$$

$$\frac{9.0}{22} \quad \frac{4.7}{15} \quad \frac{4.6}{10} \quad \frac{4.6}{10} \quad \frac{4.4}{16} \quad \frac{8.1}{21} \quad \frac{9.7}{36} \quad \frac{9.4}{30} \quad \frac{9.0}{31}$$

$$\frac{10.8}{22} \quad \frac{5.4}{14} \quad \frac{5.4}{10} \quad \frac{5.4}{10} \quad \frac{5.6}{16} \quad \frac{12.1}{26}$$

$$\frac{7.7}{19} \quad \frac{4.9}{14} \quad \frac{4.7}{10} \quad \frac{4.7}{10} \quad \frac{4.6}{15} \quad \frac{10.3}{24} \quad \frac{11.4}{27}$$

Sta	+	H.I	-	Elev
	5.21	220.61		
+32			3.4	17.2
T.P.	7.63	226.17 ✓	2.07	218.54 ✓
43			8.1	18.1
42			5.6	20.6
41			3.0	23.2
B.M.	6.35	232.40 ✓	0.08	226.09 ✓ 226.05 ✓
40			6.7	25.7
+52			5.6	26.8
39			4.6	27.8
+60			4.0	28.4
38			3.4	29.0
T.P.	3.30	233.25 ✓	2.45	229.95 ✓
37			3.7	29.6
36			3.9	29.4
35			4.7	28.6

LT ✗ RT

2.6 3.3 3.5 3.5 3.5 10.2 9.8 8.2
35 17 10 10 15 24 32 33

9.0

32 87 109 11.0 8.0 8.2 8.2 8.3 11.1 12.1
42 34 26 21 15 18 10 16 23 34

10.3

5.6 8.3 8.1 5.7 5.7 5.7 6.0 9.5 9.8 11.0
31 27 18 15 10 10 15 21 27 28

3.5

6.0 4.7 4.8 3.2 3.1 3.1 3.2 5.8 7.2
28 24 18 15 10 10 14 20 28

Spike intake pole LT ST 40+40

3.8 5.2 8.2 6.3 6.7 6.8 7.2 9.0 9.3 8.7
26 23 18 14 10 10 14 18 23 33

7.1

4.8 5.1 5.6 5.7 5.9 8.1 7.5
26 18 10 10 14 20 23

5.1

4.9 5.5 5.6 4.8 4.7 4.7 5.0 7.0 7.4 7.0
20 19 17 15 10 10 15 20 24 27

4.2

4.0 4.6 4.6 4.0 4.1 4.1 4.2 5.9 6.3 5.3
20 19 17 15 10 10 15 19 24 26

3.3

3.0 3.7 4.1 3.4 3.4 3.4 3.6 5.7 5.3 4.3
19 19 17 15 10 10 14 18 24 25

2.7

0.6 5.1 5.5 3.8 3.7 3.8 4.0 5.8 5.3 3.5
29 23 18 15 10 10 14 20 24 27

3.6

1.1 5.9 6.1 4.0 4.0 4.0 4.3 6.5 6.4 4.1
29 24 19 15 10 10 14 18 23 25

4.2

2.2 6.4 6.2 4.9 4.8 4.8 5.0 7.7 7.3 5.3
31 25 20 15 10 10 15 20 24 25

5.0

Sta	+	H.I.	-	Elev
	3.30	233.25		
+80			4.9	28.4
34			5.6	27.7
33			6.4	26.9
+67			6.5	26.8
32			7.0	26.3
31			7.8	25.5
T.P.	2.62	228.22 ✓	7.65	225.60 ✓
30			3.5	24.7
29			4.2	24.0
28			6.1	22.1
27			10.0	18.2
T.P.	1.40	219.86 ✓	9.76	218.46 ✓
+46			4.4	15.5
26			6.6	13.3
B.M.			5.66	214.20 ✓ 214.27 ✓

LT

♀

PT

5.3 6.7 6.5 5.2 5.0 5.0 5.3 7.8 7.7 6.0
 27 23 18 14 10 10 15 19 23 26

5.9 7.4 7.2 6.0 5.7 5.7 5.9 8.4 8.8 6.8
 27 25 17 15 10 10 15 20 24 26

6.6 6.9 6.1 6.4 6.5 6.6 7.6 9.0 7.3
 29 26 17 10 10 15 16 26 28

6.9 6.6 6.6 6.6 6.7 7.9 8.8 6.8
 25 18 10 10 15 18 25 28

4.5 8.6 9.0 7.2 7.1 7.1 7.1 9.0 9.5 7.1
 29 24 19 15 10 10 15 18 26 28

5.4 9.3 9.4 8.1 7.9 7.8 7.9 9.8 10.0 7.5
 30 25 18 15 10 10 14 18 26 28

2.2 4.0 5.2 5.2 3.4 3.5 3.6 3.8 5.6 5.7 3.6
 28 27 22 18 14 10 10 15 21 25 27

2.2 6.5 6.3 4.5 4.3 4.3 4.4 6.4 6.2 3.8
 30 24 18 14 10 10 14 18 22 24

1.2 5.7 8.4 8.5 6.4 6.2 6.2 6.5 8.5 8.2 4.0
 33 30 25 20 15 10 10 14 19 23 26

10.0 12.0 12.1 10.1 10.0 10.1 10.3 12.3 12.2 8.9
 23 21 19 15 10 10 15 19 23 26

3.3 6.0 6.1 4.3 4.5 4.4 4.6 5.8 6.0 3.6
 26 23 21 17 10 10 19 22 23 25

5.4 8.0 7.8 6.5 6.6 6.7 6.2 7.5 7.6 6.1
 28 25 22 17 10 10 18 22 25 28

Spike in T.R. LT 5 to 26 + 09

23-04

	+	H.I	-	Elev
	B.M.	1.24	215.51 ✓	214.27
25	+50		4.8	10.7
	TP		7.3	08.2
	+50		9.5	05.7
24	TP	0.89	204.69 ✓	203.80 ✓
			1.4	03.3
	+29		5.0	997
	B.M.	5.43	204.66 ✓	199.26 ✓
23			5.43	199.23 ✓
			6.4	98.3
	+40		9.4	95.3
	TP	0.67	193.99 ✓	193.32 ✓
22			11.34	93.2
			0.8	93.2
	+50		3.2	90.8
21			5.7	88.3
	T.P.	1.05	186.43 ⁸⁸ ✓	185.83 ✓
	+55		8.16	86.0
			0.9	86.0
20			3.6	83.3
	TP	0.21	179.46 ⁴¹ ✓	179.25 ✓
			7.68	179.25 ✓

11-9-23

Felt-worm Lt

±

Rt

same-party

(4.5)

$\frac{5.0}{25}$	$\frac{5.8}{23}$	$\frac{5.7}{20}$	$\frac{5.1}{17}$	$\frac{4.9}{10}$	$\frac{4.9}{10}$	$\frac{5.1}{17}$	$\frac{6.5}{22}$	$\frac{6.4}{25}$	$\frac{5.5}{26}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

(6.7)

$\frac{6.6}{27}$	$\frac{8.0}{24}$	$\frac{8.5}{21}$	$\frac{7.4}{17}$	$\frac{7.5}{10}$	$\frac{7.4}{10}$	$\frac{7.7}{16}$	$\frac{9.1}{21}$	$\frac{8.9}{24}$	$\frac{8.1}{25}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

$\frac{9.2}{28}$	$\frac{10.1}{24}$	$\frac{10.3}{20}$	$\frac{9.8}{17}$	$\frac{9.9}{18}$	$\frac{9.9}{10}$	$\frac{10.3}{15}$	$\frac{10.8}{28}$	$\frac{10.2}{24}$
------------------	-------------------	-------------------	------------------	------------------	------------------	-------------------	-------------------	-------------------

(1.3)

$\frac{1.0}{23}$	$\frac{1.7}{22}$	$\frac{2.4}{19}$	$\frac{1.3}{15}$	$\frac{1.5}{10}$	$\frac{1.5}{10}$	$\frac{1.7}{16}$	$\frac{2.8}{23}$	$\frac{2.1}{25}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

(4.1)

$\frac{4.6}{27}$	$\frac{5.6}{21}$	$\frac{5.6}{17}$	$\frac{4.9}{15}$	$\frac{5.1}{10}$	$\frac{5.1}{10}$	$\frac{5.0}{16}$	$\frac{6.0}{22}$	$\frac{5.8}{24}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

Nail in tele pole Lt of sta 23+12

(6.3)

$\frac{2.9}{27}$	$\frac{7.6}{22}$	$\frac{7.3}{15}$	$\frac{6.5}{15}$	$\frac{6.7}{10}$	$\frac{6.5}{10}$	$\frac{6.6}{10}$	$\frac{7.5}{20}$	$\frac{7.6}{25}$	$\frac{6.0}{27}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

(9.1)

$\frac{9.6}{24}$	$\frac{11.3}{23}$	$\frac{11.2}{20}$	$\frac{9.6}{15}$	$\frac{9.5}{10}$	$\frac{9.5}{10}$	$\frac{10.1}{16}$	$\frac{15.0}{27}$
------------------	-------------------	-------------------	------------------	------------------	------------------	-------------------	-------------------

(0.4)

$\frac{2.0}{23}$	$\frac{3.6}{22}$	$\frac{3.6}{20}$	$\frac{0.9}{16}$	$\frac{0.9}{10}$	$\frac{0.9}{10}$	$\frac{1.2}{16}$	$\frac{1.7}{20}$	$\frac{6.3}{28}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

(2.9)

$\frac{8.7}{28}$	$\frac{8.3}{23}$	$\frac{3.3}{15}$	$\frac{3.4}{10}$	$\frac{3.4}{10}$	$\frac{3.6}{17}$	$\frac{4.0}{20}$	$\frac{9.0}{27}$
------------------	------------------	------------------	------------------	------------------	------------------	------------------	------------------

(5.3)

$\frac{14.1}{28}$	$\frac{5.9}{16}$	$\frac{5.8}{10}$	$\frac{5.8}{10}$	$\frac{6.3}{17}$	$\frac{11.6}{26}$
-------------------	------------------	------------------	------------------	------------------	-------------------

(0.4)

$\frac{11.3}{32}$	$\frac{1.0}{17}$	$\frac{0.9}{10}$	$\frac{0.9}{10}$	$\frac{1.2}{14}$	$\frac{2.1}{18}$	$\frac{6.7}{25}$
-------------------	------------------	------------------	------------------	------------------	------------------	------------------

(3.3)

$\frac{14.9}{33}$	$\frac{4.1}{16}$	$\frac{3.6}{10}$	$\frac{3.7}{9.4}$	$\frac{3.7}{9.5}$	$\frac{3.6}{10}$	$\frac{3.7}{14}$	$\frac{4.6}{18}$	$\frac{10.4}{25}$
-------------------	------------------	------------------	-------------------	-------------------	------------------	------------------	------------------	-------------------

Sta	+ 0.21	H.I. 177.41 ⁴	- 0.7	Elelev 78.7	
19			0.7	78.8	
				75.4	
18			4.0	75.5	
	B.M.		8.10	271.31 271.36	171.38
17			6.0	73.5	73.4
				73.0	
16			6.4	73.1	
				73.7	
15			5.7	73.8	
	+82		5.4	74.0 74.1	
	+55		4.9	74.5 74.6	
	T.P.	7.42	4.45	182.38 182.43	175.01
14			6.6	75.8	174.96
	+83		6.2	76.2	
13			4.1	78.3	
			1.5	80.7	
12			1.02	188.91 188.96	181.56
	T.P.	7.55		181.41	
11			5.8	83.2	83.1
				83.7	
10			5.0	84.0	

$$\begin{array}{r} 121 \\ 32 \end{array} \quad \begin{array}{r} 0.9 \\ 16 \end{array} \quad \begin{array}{r} 0.6 \\ 10 \end{array} \quad \begin{array}{r} 0.8 \\ 9.5 \end{array} \quad \begin{array}{r} 0.3 \\ 0.8 \\ 9.5 \end{array} \quad \begin{array}{r} 0.6 \\ 10 \end{array} \quad \begin{array}{r} 0.6 \\ 16 \end{array} \quad \begin{array}{r} 6.2 \\ 24 \end{array}$$

$$\begin{array}{r} 15.7 \\ 31 \end{array} \quad \begin{array}{r} 4.4 \\ 16 \end{array} \quad \begin{array}{r} 4.0 \\ 10 \end{array} \quad \begin{array}{r} 4.1 \\ 9.5 \end{array} \quad \begin{array}{r} 4.1 \\ 9.5 \end{array} \quad \begin{array}{r} 4.0 \\ 10 \end{array} \quad \begin{array}{r} 4.4 \\ 17 \end{array} \quad \begin{array}{r} 11.4 \\ 28 \end{array}$$

Tele pole Lt 187 $\begin{array}{r} 5.9 \\ 6.1 \end{array}$ see page 14

$$\begin{array}{r} 11.2 \\ 22 \end{array} \quad \begin{array}{r} 6.3 \\ 16 \end{array} \quad \begin{array}{r} 5.9 \\ 10 \end{array} \quad \begin{array}{r} 6.0 \\ 9.3 \end{array} \quad \begin{array}{r} 6.1 \\ 9.5 \end{array} \quad \begin{array}{r} 5.1 \\ 10 \end{array} \quad \begin{array}{r} 6.1 \\ 14 \end{array} \quad \begin{array}{r} 8.5 \\ 20 \end{array}$$

$$\begin{array}{r} 262.0 \\ 33 \end{array} \quad \begin{array}{r} 6.7 \\ 16 \end{array} \quad \begin{array}{r} 6.5 \\ 10 \end{array} \quad \begin{array}{r} 6.6 \\ 9.5 \end{array} \quad \begin{array}{r} 6.1 \\ 9.5 \end{array} \quad \begin{array}{r} 6.3 \\ 10 \end{array} \quad \begin{array}{r} 6.7 \\ 15 \end{array} \quad \begin{array}{r} 15.7 \\ 29 \end{array}$$

$$\begin{array}{r} 11.1 \\ 22 \end{array} \quad \begin{array}{r} 5.9 \\ 16 \end{array} \quad \begin{array}{r} 5.8 \\ 10 \end{array} \quad \begin{array}{r} 5.8 \\ 10 \end{array} \quad \begin{array}{r} 5.7 \\ 16 \end{array} \quad \begin{array}{r} 9.7 \\ 21 \end{array}$$

$$\begin{array}{r} 12.5 \\ 22 \end{array} \quad \begin{array}{r} 5.7 \\ 15 \end{array} \quad \begin{array}{r} 5.5 \\ 10 \end{array} \quad \begin{array}{r} 5.5 \\ 10 \end{array} \quad \begin{array}{r} 5.6 \\ 16 \end{array} \quad \begin{array}{r} 7.1 \\ 17 \end{array} \quad \begin{array}{r} 6.9 \\ 20 \end{array}$$

$$\begin{array}{r} 10.3 \\ 23 \end{array} \quad \begin{array}{r} 5.2 \\ 15 \end{array} \quad \begin{array}{r} 4.7 \\ 10 \end{array} \quad \begin{array}{r} 5.0 \\ 10 \end{array} \quad \begin{array}{r} 5.2 \\ 15 \end{array} \quad \begin{array}{r} 6.2 \\ 17 \end{array} \quad \begin{array}{r} 6.1 \\ 19 \end{array}$$

$$\begin{array}{r} 10.6 \\ 26 \end{array} \quad \begin{array}{r} 10.2 \\ 21 \end{array} \quad \begin{array}{r} 6.7 \\ 14 \end{array} \quad \begin{array}{r} 6.7 \\ 10 \end{array} \quad \begin{array}{r} 6.7 \\ 10 \end{array} \quad \begin{array}{r} 6.9 \\ 14 \end{array} \quad \begin{array}{r} 8.5 \\ 19 \end{array} \quad \begin{array}{r} 8.2 \\ 20 \end{array} \quad \begin{array}{r} 7.5 \\ 20 \end{array}$$

$$\begin{array}{r} 11.0 \\ 28 \end{array} \quad \begin{array}{r} 10.7 \\ 25 \end{array} \quad \begin{array}{r} 6.5 \\ 15 \end{array} \quad \begin{array}{r} 6.3 \\ 10 \end{array} \quad \begin{array}{r} 6.3 \\ 10 \end{array} \quad \begin{array}{r} 6.6 \\ 18 \end{array} \quad \begin{array}{r} 7.4 \\ 27 \end{array}$$

$$\begin{array}{r} 15.2 \\ 33 \end{array} \quad \begin{array}{r} 4.6 \\ 16 \end{array} \quad \begin{array}{r} 4.1 \\ 10 \end{array} \quad \begin{array}{r} 4.1 \\ 10 \end{array} \quad \begin{array}{r} 4.3 \\ 15 \end{array} \quad \begin{array}{r} 5.5 \\ 20 \end{array} \quad \begin{array}{r} 4.9 \\ 20 \end{array}$$

$$\begin{array}{r} 7.0 \\ 29 \end{array} \quad \begin{array}{r} 5.0 \\ 28 \end{array} \quad \begin{array}{r} 4.5 \\ 22 \end{array} \quad \begin{array}{r} 2.1 \\ 17 \end{array} \quad \begin{array}{r} 1.5 \\ 10 \end{array} \quad \begin{array}{r} 1.6 \\ 10 \end{array} \quad \begin{array}{r} 1.8 \\ 16 \end{array} \quad \begin{array}{r} 2.2 \\ 18 \end{array} \quad \begin{array}{r} 2.0 \\ 20 \end{array} \quad \begin{array}{r} 1.1 \\ 20 \end{array}$$

$$\begin{array}{r} 7.4 \\ 29 \end{array} \quad \begin{array}{r} 8.6 \\ 28 \end{array} \quad \begin{array}{r} 8.4 \\ 20 \end{array} \quad \begin{array}{r} 6.1 \\ 15 \end{array} \quad \begin{array}{r} 5.8 \\ 10 \end{array} \quad \begin{array}{r} 5.9 \\ 10 \end{array} \quad \begin{array}{r} 5.7 \\ 16 \end{array} \quad \begin{array}{r} 6.4 \\ 18 \end{array} \quad \begin{array}{r} 6.1 \\ 21 \end{array} \quad \begin{array}{r} 5.3 \\ 21 \end{array}$$

$$\begin{array}{r} 9.3 \\ 30 \end{array} \quad \begin{array}{r} 7.5 \\ 24 \end{array} \quad \begin{array}{r} 6.6 \\ 18 \end{array} \quad \begin{array}{r} 5.1 \\ 15 \end{array} \quad \begin{array}{r} 5.1 \\ 10 \end{array} \quad \begin{array}{r} 5.1 \\ 10 \end{array} \quad \begin{array}{r} 5.2 \\ 20 \end{array}$$

Sta	+	H.I	-	Elev
	7.55	188.76		83.9
+73		188.91	5.0	84.0
				83.9
+43			5.0	84.0
				83.9
9			5.0	84.0
				84.7
8			4.2	84.8
				85.7
7			3.2	85.8
				86.7
6		195.70	2.2	86.8
TP	898	195.75	2.19	186.77
				186.72
5			8.0	87.8
				88.8
4			6.9	88.9
				90.3
3			5.5	90.3
				92.5
2			3.2	92.6
				95.7
1		202.21	0.0	95.8
J.B	7.04	202.26	0.53	195.27
				195.17
0			3.2	198.97
				199.0
B.M.			3.24	199.02
				198.96

L

±

R

$$\frac{8.8}{26} \quad \frac{7.1}{18} \quad \frac{5.0}{15} \quad \frac{5.1}{10} \quad \frac{5.0}{10} \quad \frac{5.1}{19}$$

R

L

$$\frac{5.2}{15} \quad \frac{5.1}{10} \quad \frac{5.0}{10} \quad \frac{5.2}{25} \quad \frac{5.6}{32} \quad \frac{5.2}{33}$$

$$\frac{9.0}{23} \quad \frac{4.9}{15} \quad \frac{5.1}{10} \quad \frac{4.9}{10} \quad \frac{4.9}{14} \quad \frac{5.8}{17} \quad \frac{5.6}{20} \quad \frac{5.3}{22}$$

$$\frac{5.5}{25} \quad \frac{5.2}{19} \quad \frac{4.5}{16} \quad \frac{4.3}{10} \quad \frac{4.2}{10} \quad \frac{4.2}{15} \quad \frac{5.0}{17} \quad \frac{5.0}{20} \quad \frac{4.0}{22}$$

$$\frac{4.2}{20} \quad \frac{3.5}{17} \quad \frac{3.4}{10} \quad \frac{3.3}{10} \quad \frac{3.1}{14} \quad \frac{4.2}{17} \quad \frac{3.8}{21} \quad \frac{1.9}{24}$$

$$\frac{2.7}{22} \quad \frac{2.3}{10} \quad \frac{2.3}{10} \quad \frac{2.0}{15} \quad \frac{2.7}{17} \quad \frac{2.8}{20} \quad \frac{2.1}{21}$$

$$\frac{9.1}{19} \quad \frac{8.2}{16} \quad \frac{8.1}{10} \quad \frac{8.1}{10} \quad \frac{8.3}{14} \quad \frac{9.5}{18} \quad \frac{9.7}{21} \quad \frac{9.1}{23}$$

$$\frac{8.5}{24} \quad \frac{8.1}{17} \quad \frac{7.1}{15} \quad \frac{7.0}{10} \quad \frac{7.0}{10} \quad \frac{6.8}{15} \quad \frac{8.3}{20} \quad \frac{8.1}{23}$$

$$\frac{7.8}{24} \quad \frac{7.5}{19} \quad \frac{6.0}{14} \quad \frac{5.7}{10} \quad \frac{5.5}{10} \quad \frac{5.6}{14} \quad \frac{6.7}{18} \quad \frac{7.0}{26}$$

$$\frac{5.9}{22} \quad \frac{6.2}{20} \quad \frac{3.7}{15} \quad \frac{3.3}{10} \quad \frac{3.3}{10} \quad \frac{3.2}{14} \quad \frac{4.9}{18} \quad \frac{5.0}{24}$$

$$\frac{3.9}{28} \quad \frac{3.8}{20} \quad \frac{0.3}{14} \quad \frac{0.1}{10} \quad \frac{0.1}{10} \quad \frac{0.2}{15} \quad \frac{1.8}{19} \quad \frac{1.8}{22} \quad \frac{1.5}{23}$$

$$\frac{4.0}{27} \quad \frac{3.5}{20} \quad \frac{3.3}{10} \quad \frac{3.2}{10} \quad \frac{3.4}{19} \quad \frac{3.2}{26}$$

Top of measurement

23-04

Final Topography

5+0

7

6

5

4

3

2

1

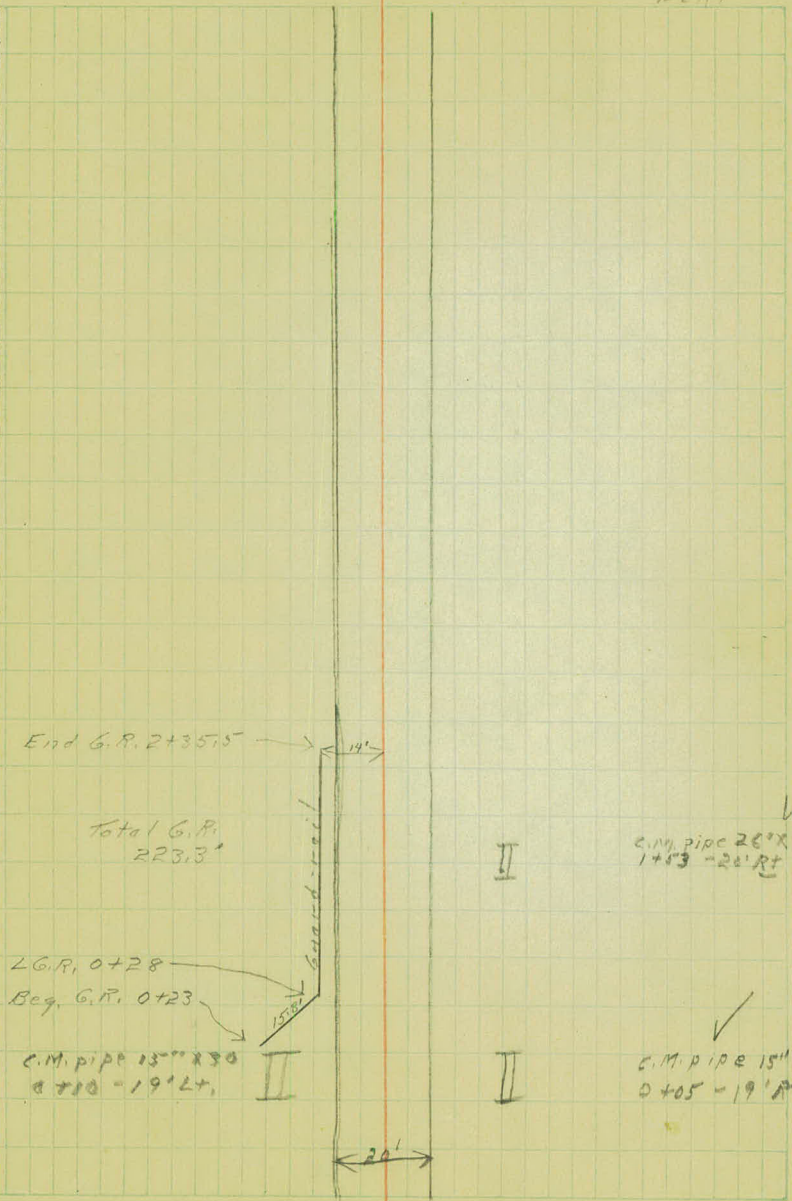
0+00

11-9-23
Fair-Warning, Carley
Persons
Br 1993
Eck

L+

E

R+



End G.R. 2+35.15 → 14'

Total G.R.
223.3'

2 G.R. 0+28
Beg. G.R. 0+23
15'

C.M. pipe 15" x 30'
0+10 - 19' L+ II

C.M. pipe 26" x 12"
1+53 - 20' R+ II

C.M. pipe 15" x 30'
0+05 - 19' R+ II

← 20' →

5th

15

14

13

12

11

10

9

8

17 Feb
Beg. of curb 15+00

L.G.R. 14+29.5

L.G.R. 14+08.5

Beg. G.R. 11+85
14' ~~RT~~

End G.R. 9+32

Beg. G.R. 8+52

Guard-rail

Guard-rail

G.R. 11'

G. Rail

Beg. of curb 15+00

Beg. of Guard-rail 14+76

C.M. pipe 12" X 28.4'
13+84 - 18' RT

C.M. pipe 26.5' X 12"
10+81 - 18' RT

Beg. paving 9+68.4

End paving 9+57.9



570

24

23

22

21

20

19

18

17

16

L+

±

R+

End G.R. 22+89

End G.R. 22+42

End curb 20+50



End curb 20+50

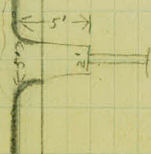


Guard-rail 14' LT

Guard-rail

← Guard-rail 14' RT

C.M. pipe 12" X 16'
catch basin 16' x 00



C.M. pipe 12" X 16'
catch basin 16' x 00

5th

36

35

34

33

32

31

30

29

28

27

26

25

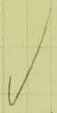
L+

±

R+

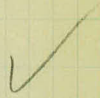


II C.M. pipe 26.5" X 12"
36+20 23' RT



C.M. pipe 50" X 12"
32+85 - 23' LT

II



II

C.M. pipe 29" X 12"
29+69 - 23' RT
old pipe



C.M. pipe 36" X 18"
26+24.7 - 19' LT

Frost
Line



C.M. pipe 36" X 18"
26+24.7 - 19' RT

These Culverts
are ~~not~~ for
Frost ~~line~~ on Edgerton

570

51

50

49

48

47

46

45

44

43

42

41

40

39

38

37

L1

+

R+

End of project

End. G.R. 49+31

Beq. G.R. 47+71

End G. Rail 46+61

End G.R. 47+18

✓
L G.R. 43+41

C.M. pipe 26' x 12"
43+27 - 27' 6"



L G.R. 43+03

8'

8'

L G.R. 42+88

Beq. G.R. 40+58

✓
C.M. pipe 26' x 12"
39+63 - 20' 6"

II

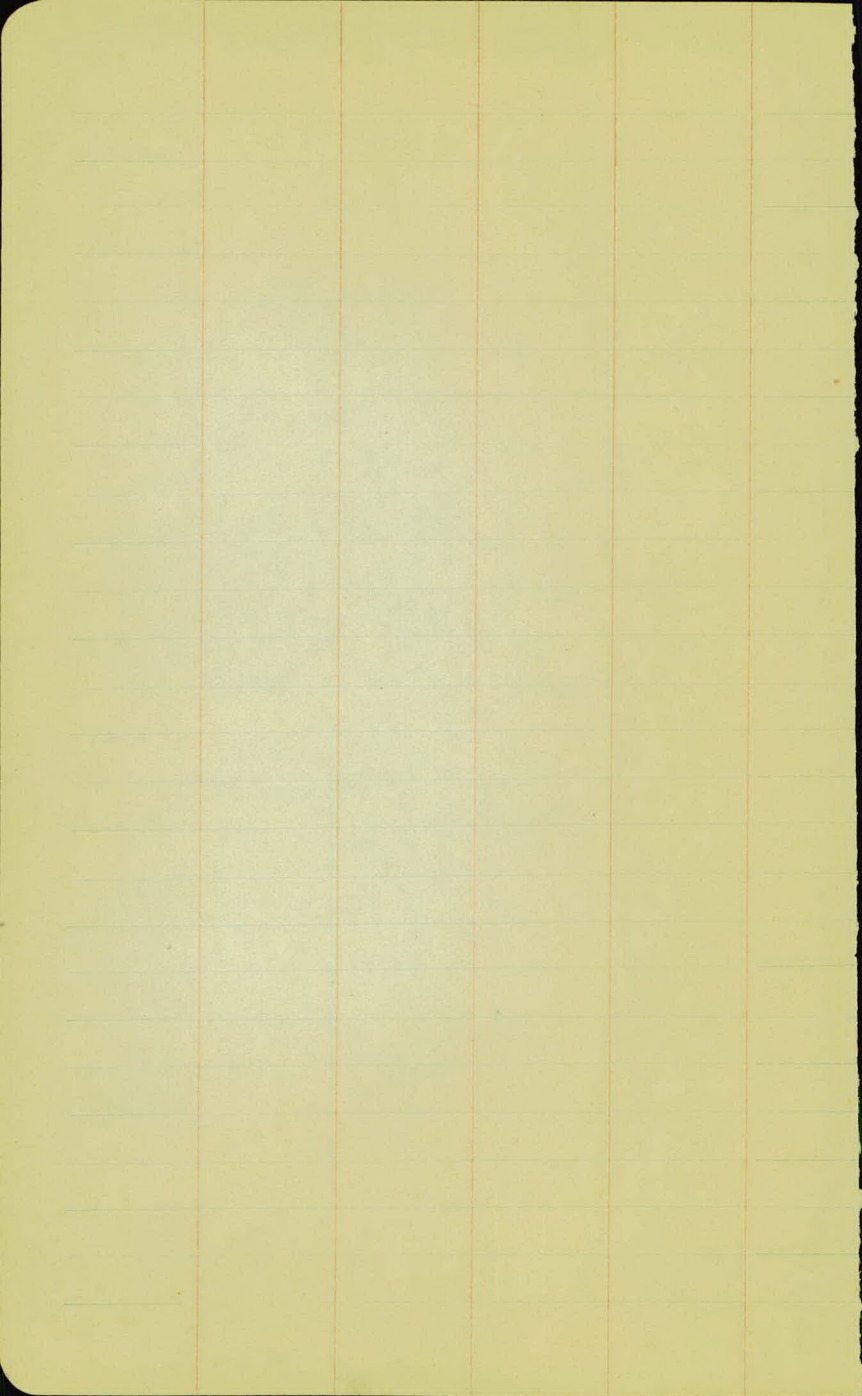


TABLE I.—MINUTES IN DECIMALS OF A DEGREE.

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

TABLE II.—INCHES IN DECIMALS OF A FOOT.

1-16	3-32	¼	3-16	½	5-16	¾	½	¾	¾	⅞
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

TABLE III.—RADII, ORDINATES AND DEFLECTIONS.

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot
0° 10'	34377.5	.036	.145	0.05'	7°	819.02	1.528	6.105	2.10'
20	17188.8	.073	.291	0.10	20'	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25					
1	5729.65	.218	.873	0.30	8	718.78	1.746	6.976	2.40
10	4911.15	.255	1.018	0.35	20	688.16	1.819	7.266	2.50
20	4297.28	.291	1.164	0.40	30	674.69	1.855	7.411	2.55
30	3819.83	.327	1.309	0.45	40	661.74	1.892	7.556	2.60
40	3437.87	.364	1.454	0.50	9	637.28	1.965	7.846	2.70
50	3125.36	.400	1.600	0.55	20	614.56	2.037	8.136	2.80
					30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65					
20	2455.70	.509	2.036	0.70	10	573.69	2.183	8.716	3.00
30	2292.01	.545	2.181	0.75	30	546.44	2.292	9.150	3.15
40	2148.79	.582	2.327	0.80	11	521.67	2.402	9.585	3.30
50	2022.41	.618	2.472	0.85	30	499.06	2.511	10.02	3.45
					12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15					
					15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.64	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	3310.2	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	.79	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.40	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34
110°	.51	1.03	1.56	2.08	2.61	3.14	3.67	4.21	4.76	5.31	5.86	6.43	7.01	7.60
120°	.62	1.25	1.93	2.52	3.16	3.81	4.45	5.11	5.77	6.44	7.12	7.80	8.50	9.22

FOR EXTERNALS ADD

Central Angle	DEGREE OF CURVE													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.701
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.771	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.266	.353	.440	.528	.617	.707	.797	.891	.977	1.07	1.18	1.29
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.885	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	.06	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.57
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.57
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

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

TABLE VII.--MIDDLE ORDINATES FOR RAILS IN FEET.

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

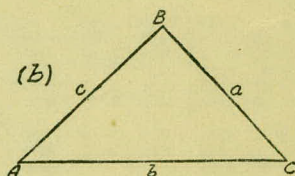
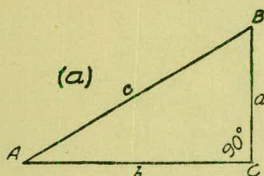
SLOPE REDUCTIONS.

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

See fig. (a).

TRIGONOMETRICAL FORMULAS.

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



FORMULA FOR SOLVING TRIANGLES.

Given	Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A = \frac{a}{c}, \cos. B = \frac{a}{c}, b = \sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan. A = \frac{a}{b}, \cot. B = \frac{a}{b}, c = \sqrt{a^2 + b^2}$
A, a	B, b, c	$B = 90^\circ - A, b = a \cot. A, c = \frac{a}{\sin. A}$
A, b	B, a, c	$B = 90^\circ - A, a = b \tan. A, c = \frac{b}{\cos. A}$
A, c	B, a, b	$B = 90^\circ - A, a = c \sin. A, b = c \cos. A$
Given	Sought.	Oblique triangles. See fig. (b).
A, B, a	b	$b = \frac{a \sin. B}{\sin. A}$
A, a, b	B	$\sin. B = \frac{b \sin. A}{a}$
a, b, C	$A - B$	$\tan. \frac{1}{2} (A - B) = \frac{(a - b) \tan. \frac{1}{2} (A + B)}{a + b}$
a, b, c	A	$\left\{ \begin{aligned} \text{If } s = \frac{1}{2} (a + b + c), \sin. \frac{1}{2} A &= \sqrt{\frac{(s-b)(s-c)}{bc}} \\ \cos. \frac{1}{2} A &= \sqrt{\frac{s(s-a)}{bc}}, \tan. \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}, \\ \sin. A &= \frac{2\sqrt{(s-a)(s-b)(s-c)} s}{bc} \end{aligned} \right.$
A, B, C, a	area	$\text{area} = \frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area} = \frac{1}{2} b c \sin. A$
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.	
^{o'} 0	0	0	∞	1	^{o'} 8	.1392	.1405	7.115	.99027	
10	.0029	.0029	343.8	I	10	.1421	.1435	6.968	.98986	
20	.0058	.0058	171.9	99998	20	.1449	.1465	6.827	.98944	
30	.0087	.0087	114.6	.99996	30	.1478	.1495	6.691	.98902	
40	.0116	.0116	85.94	.99993	40	.1507	.1524	6.561	.98858	
50	.0145	.0145	68.75	.99989	50	.1536	.1554	6.435	.98814	
1	.0175	.0175	57.29	.99985	89	.1564	.1584	6.314	.98769	
10	.0204	.0204	49.10	.99979	10	.1593	.1614	6.197	.98723	
20	.0233	.0233	42.96	.99973	20	.1622	.1644	6.084	.98676	
30	.0262	.0262	38.19	.99966	30	.1650	.1673	5.976	.98629	
40	.0291	.0291	34.37	.99958	40	.1679	.1703	5.871	.98580	
50	.0320	.0320	31.24	.99949	50	.1708	.1733	5.769	.98531	
2	.0349	.0349	28.64	.99939	88	.1736	.1763	5.671	.98481	
10	.0378	.0378	26.43	.99929	10	.1765	.1793	5.576	.98430	
20	.0407	.0407	24.54	.99917	20	.1794	.1823	5.485	.98378	
30	.0436	.0437	22.90	.99905	30	.1822	.1853	5.396	.98325	
40	.0465	.0466	21.47	.99892	40	.1851	.1883	5.309	.98272	
50	.0494	.0495	20.21	.99878	50	.1880	.1914	5.226	.98218	
3	.0523	.0524	19.08	.99863	87	.1908	.1944	5.145	.98163	
10	.0552	.0553	18.07	.99847	10	.1937	.1974	5.066	.98107	
20	.0581	.0582	17.17	.99831	20	.1965	.2004	4.989	.98050	
30	.0610	.0612	16.35	.99813	30	.1994	.2035	4.915	.97992	
40	.0640	.0641	15.60	.99795	40	.2022	.2065	4.843	.97934	
50	.0669	.0670	14.92	.99776	50	.2051	.2095	4.773	.97875	
4	.0698	.0699	14.30	.99756	86	.2079	.2126	4.705	.97815	
10	.0727	.0729	13.73	.99736	10	.2108	.2156	4.638	.97754	
20	.0756	.0758	13.20	.99714	20	.2136	.2186	4.574	.97692	
30	.0785	.0787	12.71	.99692	30	.2164	.2217	4.511	.97630	
40	.0814	.0816	12.25	.99668	40	.2193	.2247	4.449	.97566	
50	.0843	.0846	11.83	.99644	50	.2221	.2278	4.390	.97502	
5	.0872	.0875	11.43	.99619	85	.2250	.2309	4.331	.97437	
10	.0901	.0904	11.06	.99594	10	.2278	.2339	4.275	.97371	
20	.0929	.0934	10.71	.99567	20	.2306	.2370	4.219	.97304	
30	.0958	.0963	10.39	.99540	30	.2334	.2401	4.165	.97237	
40	.0987	.0992	10.08	.99511	40	.2363	.2432	4.113	.97169	
50	.1016	.1022	9.788	.99482	50	.2391	.2462	4.061	.97100	
6	.1045	.1051	9.514	.99452	84	.2419	.2493	4.011	.97030	
10	.1074	.1080	9.255	.99421	10	.2447	.2524	3.962	.96959	
20	.1103	.1110	9.010	.99390	20	.2476	.2555	3.914	.96887	
30	.1132	.1139	8.777	.99357	30	.2504	.2586	3.867	.96815	
40	.1161	.1169	8.556	.99324	40	.2532	.2617	3.821	.96742	
50	.1190	.1198	8.345	.99290	50	.2560	.2648	3.776	.96667	
7	.1219	.1228	8.144	.99255	83	.2588	.2679	3.732	.96593	
10	.1248	.1257	7.953	.99219	10	.2616	.2711	3.689	.96517	
20	.1276	.1287	7.770	.99182	20	.2644	.2742	3.647	.96440	
30	.1305	.1317	7.596	.99144	30	.2672	.2773	3.606	.96363	
40	.1334	.1346	7.429	.99106	40	.2700	.2805	3.566	.96285	
50	.1363	.1376	7.269	.99067	50	.2728	.2836	3.526	.96206	
				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.	
<i>o'</i>						<i>o'</i>					
16	.2756	.2867	3.487	.96126	74	24	.4067	.4452	2.246	.91355	66
10	.2784	.2899	3.450	.96046	50	10	.4094	.4487	2.229	.91236	50
20	.2812	.2931	3.412	.95964	40	20	.4120	.4522	2.211	.91116	40
30	.2840	.2962	3.376	.95882	30	30	.4147	.4557	2.194	.90996	30
40	.2868	.2994	3.340	.95799	20	40	.4173	.4592	2.177	.90875	20
50	.2896	.3026	3.305	.95715	10	50	.4200	.4628	2.161	.90753	10
17	.2924	.3057	3.271	.95615	73	25	.4226	.4663	2.145	.90631	65
10	.2952	.3089	3.237	.95545	50	10	.4253	.4699	2.128	.90507	50
20	.2979	.3121	3.204	.95459	40	20	.4279	.4734	2.112	.90383	40
30	.3007	.3153	3.172	.95372	30	30	.4305	.4770	2.097	.90259	30
40	.3035	.3185	3.140	.95284	20	40	.4331	.4806	2.081	.90133	20
50	.3062	.3217	3.108	.95195	10	50	.4358	.4841	2.066	.90007	10
18	.3090	.3249	3.078	.95106	72	26	.4384	.4877	2.050	.89879	64
10	.3118	.3281	3.048	.95015	50	10	.4410	.4913	2.035	.89752	50
20	.3145	.3314	3.018	.94924	40	20	.4436	.4950	2.020	.89623	40
30	.3173	.3346	2.989	.94832	30	30	.4462	.4986	2.006	.89493	30
40	.3201	.3378	2.960	.94740	20	40	.4488	.5022	1.991	.89363	20
50	.3228	.3411	2.932	.94646	10	50	.4514	.5059	1.977	.89232	10
19	.3256	.3443	2.904	.94552	71	27	.4540	.5095	1.963	.89101	63
10	.3283	.3476	2.877	.94457	50	10	.4566	.5132	1.949	.88968	50
20	.3311	.3508	2.850	.94361	40	20	.4592	.5169	1.935	.88835	40
30	.3338	.3541	2.824	.94264	30	30	.4617	.5206	1.921	.88701	30
40	.3365	.3574	2.798	.94167	20	40	.4643	.5243	1.907	.88566	20
50	.3393	.3607	2.773	.94068	10	50	.4669	.5280	1.894	.88431	10
20	.3420	.3640	2.747	.93969	70	28	.4695	.5317	1.881	.88295	62
10	.3448	.3673	2.723	.93869	50	10	.4720	.5354	1.868	.88158	50
20	.3475	.3706	2.699	.93769	40	20	.4746	.5392	1.855	.88020	40
30	.3502	.3739	2.675	.93667	30	30	.4772	.5430	1.842	.87882	30
40	.3529	.3772	2.651	.93565	20	40	.4797	.5467	1.829	.87743	20
50	.3557	.3805	2.628	.93462	10	50	.4823	.5505	1.816	.87603	10
21	.3584	.3839	2.605	.93358	69	29	.4848	.5543	1.804	.87462	61
10	.3611	.3872	2.583	.93253	50	10	.4874	.5581	1.792	.87321	50
20	.3638	.3906	2.560	.93148	40	20	.4899	.5619	1.780	.87178	40
30	.3665	.3939	2.539	.93042	30	30	.4924	.5658	1.767	.87036	30
40	.3692	.3973	2.517	.92935	20	40	.4950	.5696	1.756	.86892	20
50	.3719	.4006	2.496	.92827	10	50	.4975	.5735	1.744	.86748	10
22	.3746	.4040	2.475	.92718	68	30	.5000	.5774	1.732	.86603	60
10	.3773	.4074	2.455	.92609	50	10	.5025	.5812	1.720	.86457	50
20	.3800	.4108	2.434	.92499	40	20	.5050	.5851	1.709	.86310	40
30	.3827	.4142	2.414	.92388	30	30	.5075	.5890	1.698	.86163	30
40	.3854	.4176	2.394	.92276	20	40	.5100	.5930	1.686	.86015	20
50	.3881	.4210	2.375	.92164	10	50	.5125	.5969	1.675	.85866	10
23	.3907	.4245	2.356	.92050	67	31	.5150	.6009	1.664	.85717	59
10	.3934	.4279	2.337	.91936	50	10	.5175	.6048	1.653	.85567	50
20	.3961	.4314	2.318	.91822	40	20	.5200	.6088	1.643	.85416	40
30	.3987	.4348	2.300	.91706	30	30	.5225	.6128	1.632	.85264	30
40	.4014	.4383	2.282	.91590	20	40	.5250	.6168	1.621	.85112	20
50	.4041	.4417	2.264	.91472	10	50	.5275	.6208	1.611	.84959	10
					66						58
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

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

TABLE IX.—CALCULATION OF EARTHWORK.

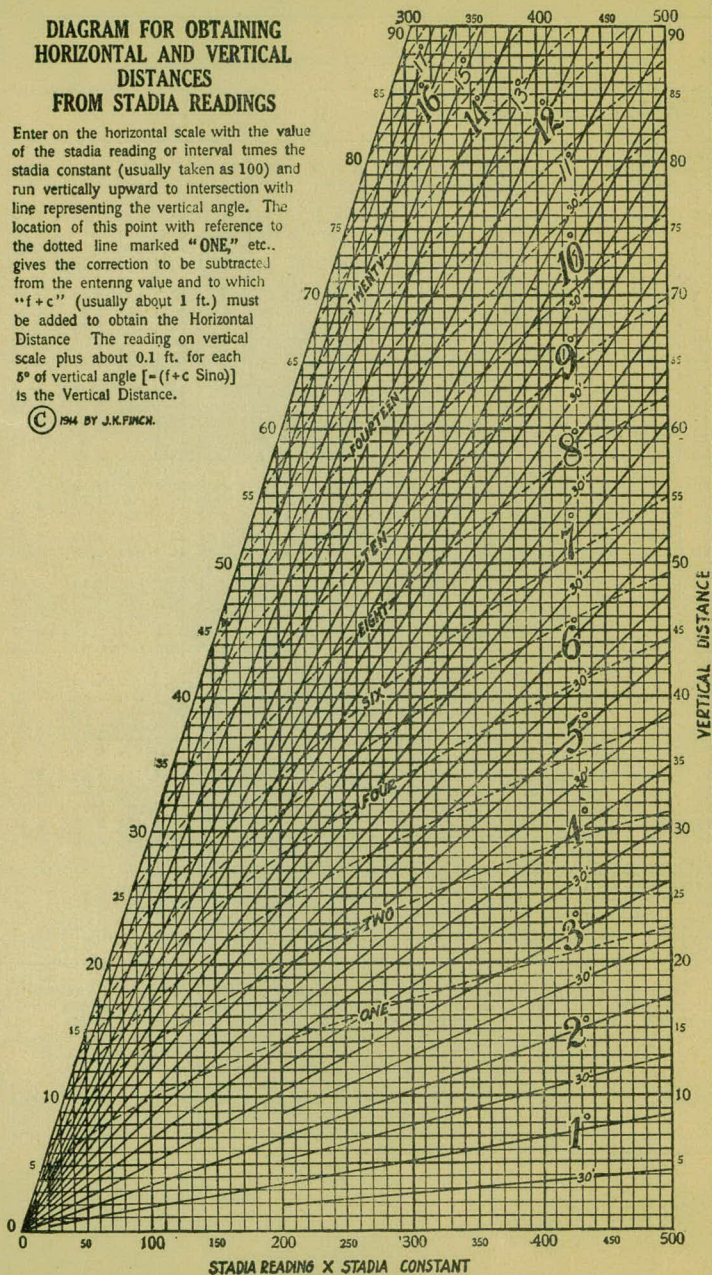
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96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

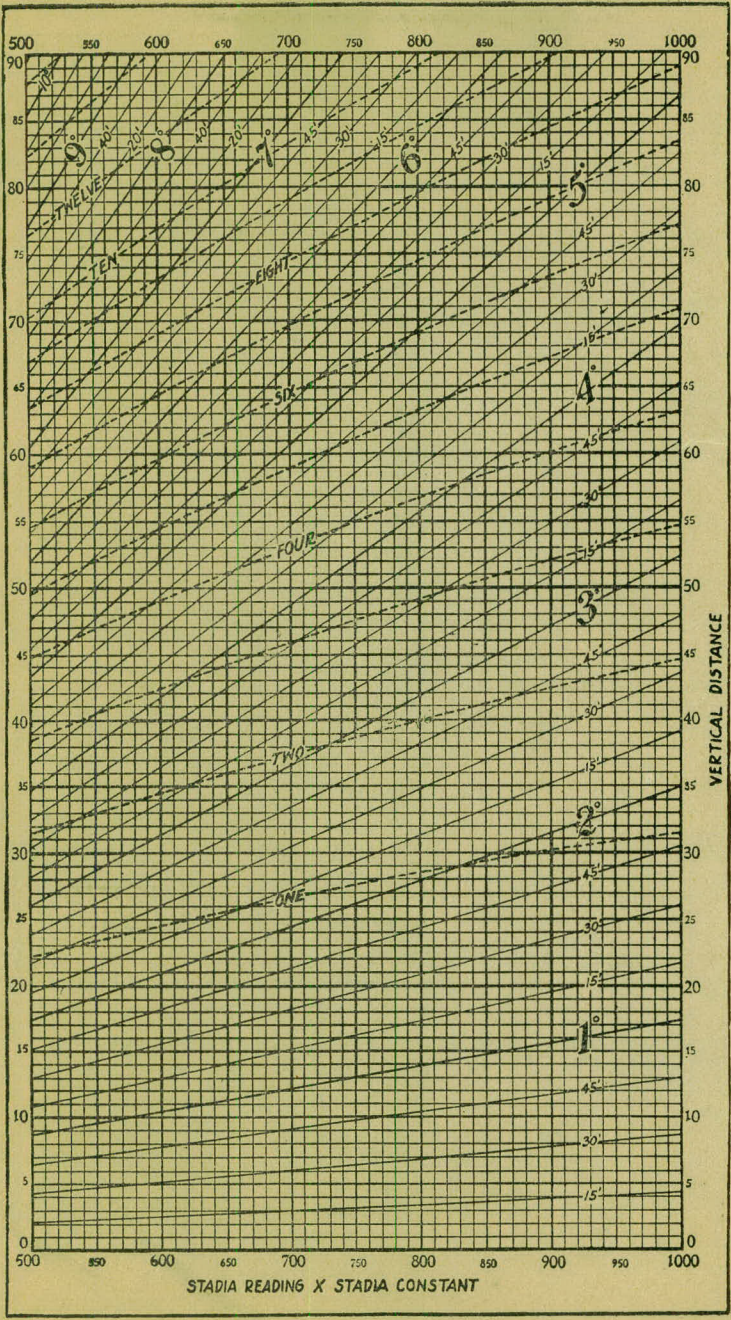
Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering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

DIAGRAM FOR OBTAINING HORIZONTAL DISTANCES AND VERTICAL DISTANCES FROM STADIA READINGS

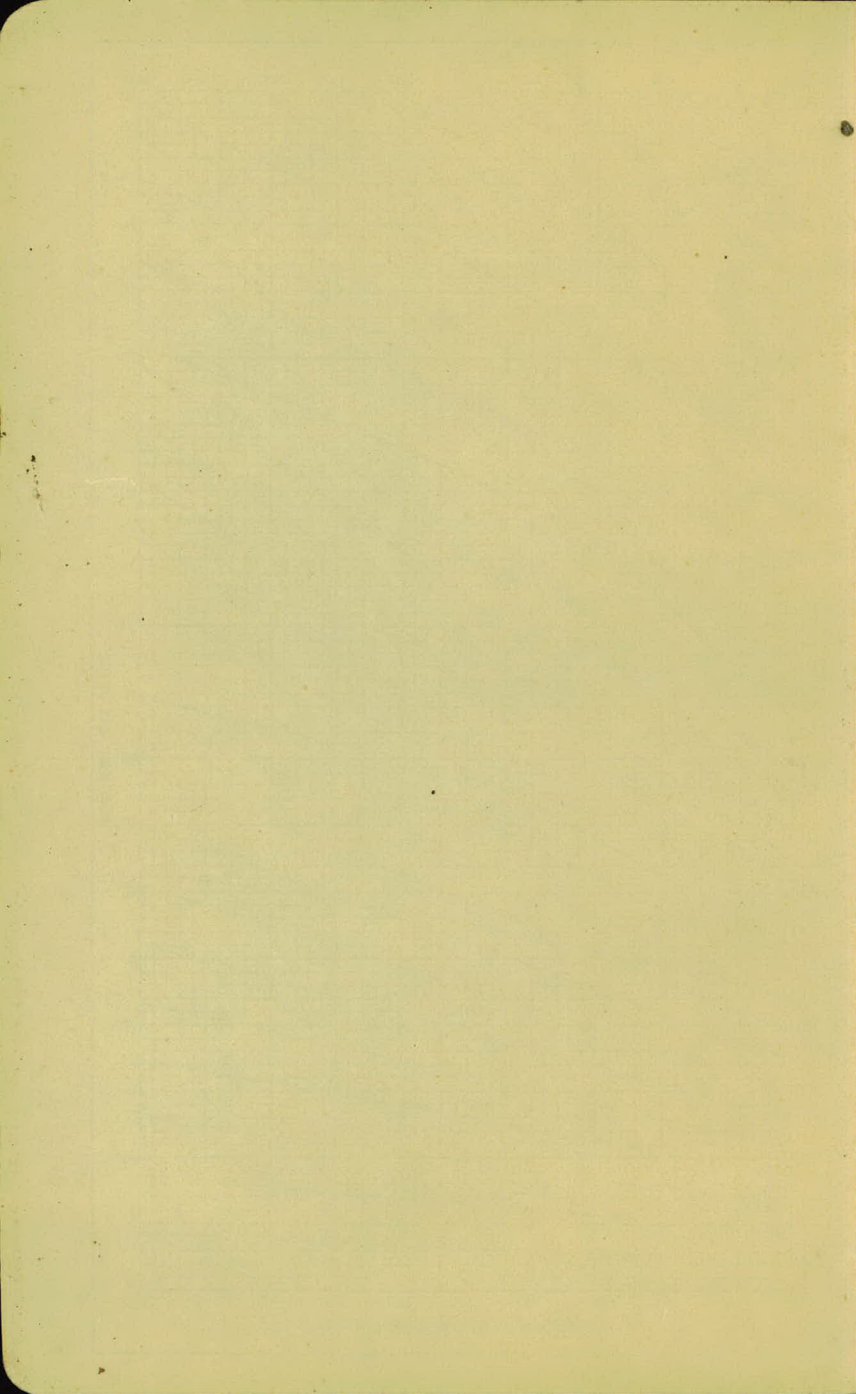
Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the 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 [$-(f+c \sin \alpha)$] is the Vertical Distance.

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STADIA READING X STADIA CONSTANT



DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½. 4-1263
0.65
For Single Track Embankment.

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

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

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