

1886

86

DITZGEN
 TRADE MARK

ENGINEERS'
FIELD BOOK
No. 400

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and
SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

Distances from center of roadway to mass-sectioning
Roadway feet wide Slopes 1 on 1

For Single Track Embankment

GEAUGA COUNTY ENGINEER

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

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

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Chardon Kirtland Road ^{CH. 17}

Chardon Kirtland Rd. Bridge

Retaining Wall on River Road Page 61

Index - Next Page

86

CH#17 Index
Chardon Kirtland Road, P. 1 - 6
CH#5 CHARDON-MENTOR ROAD
Slope Stakes P. 7-35
Extra Work P. 75

GRADES CENTER ST., CHARDON VIL Pgs 13-16

, 38-39

FILING DATA T.H. 83 by CH.#17
84

61

Bridge (CHAGRIN RIVER) CH.#17

62

CHARDON-KIRTLAND RD.

P.I. 10+38.15 spike $A = 8^{\circ}15'$ Right
 $D = 2000'$
 $T = 206.61$

P.C. = 8+31.54

10 10+41' L = 4 12.50

9 9+041' P.T = 12+44.04

P.C. 8+31.54 + 31.54 spike
^{69.76}

863.65

3+11 Culvert

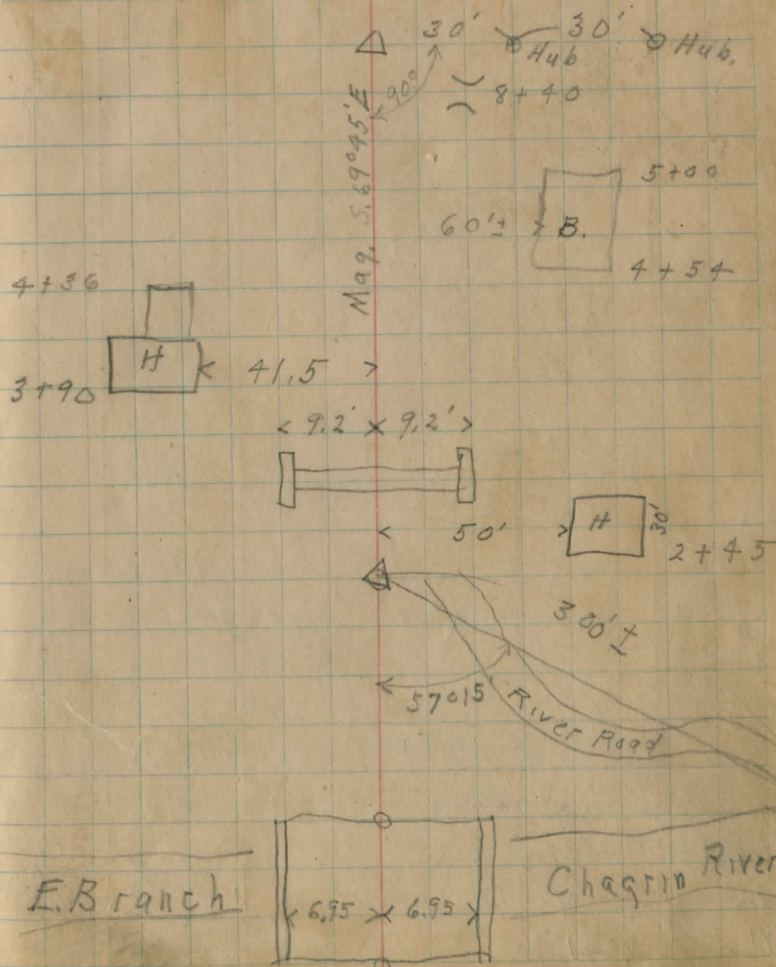
1+74.5 spike $\Delta = 6^{\circ}46'$ Right

0+68.55 spike, E. End Bridge floor

0+00 spike, N. End Bridge Floor

June 20-1925
Fair.

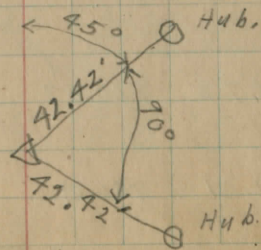
Fiedler, A.M.
Marks + Gray - All day



P.T. 12741' $4^{\circ} 07\frac{1}{2}'$

12 $3^{\circ} 41'$

11 $2^{\circ} 41'$



2.-	878.00		876.-
0		2.0	876.0
0+68.5		2.2	875.8
1		4.1	873.9
2			871.2
3			874.3
9.74	885.54	2.20	875.80
4			878.9
12.02	897.16	0.40	885.14
5			885.2
5+50			890.0
6+00			896.0
12.32	908.3	1.17	895.99
6+00			
7+00			905.5
11.98	920.07	0.22	908.09
8+00			912.1
11.01	930.19	0.89	919.18
9			922.1

(from U.S.G.S. Map.)
 El. of Road intersection N. of River

Bridge floor

Bridge floor

slopedown $\frac{4.4}{9}$ $\frac{4.1}{6}$ $\frac{4.6}{10}$ slopedown

Ditch Slopedown $\frac{6.9}{8}$ $\frac{6.8}{5}$ $\frac{7.3}{9}$ $\frac{7.0}{12}$ $\frac{9.8}{30}$

slope Down to ditch $\frac{3.8}{8}$ $\frac{3.7}{6}$ $\frac{2.8}{30}$

N.E. cor. N. Headwall, Culvert at 3+11

$\frac{5.0}{30}$ $\frac{6.3}{12}$ $\frac{7.6}{10}$ $\frac{8.8}{5}$ $\frac{6.6}{6}$ $\frac{6.8}{6}$ $\frac{7.3}{10}$ $\frac{6.6}{12}$ $\frac{6.0}{27}$
f

$\frac{14.4}{17}$ $\frac{12.4}{14-12}$ $\frac{13.5}{11}$ $\frac{13.5}{9}$ $\frac{12.4}{7}$ $\frac{12.0}{6}$ $\frac{12.4}{9}$ $\frac{12.8}{11}$ $\frac{11.7}{15}$ $\frac{10.5}{26}$

$\frac{1.8}{30}$ $\frac{2.8}{17}$ $\frac{8.0}{12-10}$ $\frac{7.3}{7}$ $\frac{7.2}{6}$ $\frac{7.8}{7}$ $\frac{9.2}{10}$ $\frac{6.8}{12}$ $\frac{3.2}{21}$ 30
f

$\frac{2.9}{13}$ $\frac{2.0}{11}$ $\frac{1.2}{6}$ $\frac{1.8}{8}$ $\frac{2.5}{10}$

$\frac{8.9}{30}$ $\frac{9.8}{17}$

$\frac{8.6}{17}$ $\frac{8.8}{21}$ $\frac{10.0}{30}$

5+7 trees
5-20" walnuts

$\frac{3.1}{30}$ $\frac{2.5}{16}$ $\frac{4.5}{15-14}$ $\frac{3.8}{12}$ $\frac{3.1}{8}$ $\frac{2.8}{6}$ $\frac{3.4}{7}$ $\frac{3.8}{10}$ $\frac{2.2}{12}$ $\frac{1.1}{16}$ $\frac{1.1}{23-30}$
f

$\frac{10.4}{30}$ $\frac{8.2}{15}$ $\frac{9.9}{13}$ $\frac{8.2}{7}$ $\frac{8.0}{6}$ $\frac{8.2}{5}$ $\frac{9.0}{10}$ $\frac{8.6}{12}$ $\frac{7.8}{27}$ 30
f

$\frac{6.1}{30}$ $\frac{6.0}{18}$ $\frac{10.4}{15}$ $\frac{8.8}{7}$ $\frac{8.1}{6}$ $\frac{8.2}{7}$ $\frac{6.6}{16}$ $\frac{8.6}{18}$ $\frac{5.5}{30}$
f

930.19

9+50		✓	1.7	928.5
	12.37	942.45	0.13	930.06
10		✓	6.7	935.8
	12.38	954.09	0.74	941.71
10+50			10.0	944.1
11		✓	1.8	952.3
	12.62	966.08	0.63	953.46
11+50			6.6	959.5
12		✓	0.5	965.6
	11.59	977.65	0.02	966.06
12+44			7.2	970.5
13		✓	2.5	975.2
	11.34	988.25	0.74	976.91
14			7.5	980.7
15			3.7	984.5
16		✓	0.1	988.1
	12.72	1000.92	0.05	988.20
	7.60	1002.74	5.78	995.14
			0.20	1002.54

Bent Spike, S. Root, Maple Leaf Sta. 18 ±

June 22, 1925 Marks, Grav., A.M., 5
Fair,

10 5.5 941.3 935.8
8.6 949.9 0.0 941.3

10

10 10.6 946.4 935.8

10+50 5.5 949.6 944.1

10+50 10.8 960.04 0.0 949.6

10+50 5.5 949.6 944.1

10+50 7.3 956.9 0.0 949.6

11 5.5 957.8 952.3

11 11.7 969.5 0.0 957.8

11 5.5 957.8 952.3

11 10.5 968.3 0.0 957.8

11+50 5.5 965.0 959.5

11+50 8.6 973.6 0.0 965.0

$\frac{5.5}{0} \frac{5.9}{5} \frac{6.3}{9} \frac{5.9}{14} \frac{4.8}{17} \frac{0.0}{24}$

$\frac{1.9}{33} \frac{1.0}{40}$

$\frac{1.0}{40} \frac{2.5}{30} \frac{11.0}{18} \frac{12.8}{12} \frac{11.2}{7}$

$\frac{5.5}{0} \frac{5.6}{7} \frac{6.0}{10} \frac{4.6}{16} \frac{0.0}{22}$

$\frac{2.6}{30} \frac{1.1}{40}$

$\frac{0.0}{22} \frac{4.6}{17} \frac{7.0}{10} \frac{5.7}{6}$

$\frac{0.5}{40} \frac{0.8}{35} \frac{2.2}{30}$

$\frac{5.5}{0} \frac{5.6}{7} \frac{6.1}{9} \frac{3.7}{15} \frac{0.0}{20}$

$\frac{4.3}{30} \frac{4.0}{40}$

$\frac{0.0}{22} \frac{4.5}{17} \frac{4.5}{9}$

$\frac{3.6}{40} \frac{3.2}{32} \frac{4.8}{28}$

$\frac{5.5}{0} \frac{5.7}{9} \frac{6.3}{11} \frac{4.1}{15} \frac{0.0}{20}$

$\frac{3.1}{23} \frac{1.3}{40}$

11+50 5.5 965.0 959.5
9.8 974.8 0.0 965.0

11+50

12 10.7 976.3 965.6

13.0 978.6 965.6

12+44 7.4 977.9 970.5

12+44 9.6 980.1 970.5

13+00 5.5 980.7 975.2

5.8 985.5 1.0 979.7

13+00

14 5.5 980.7

15 5.5 990.0 984.5

15 4.2 988.7 984.5

16 5.5 993.6 988.1

0.0 5.0 6.5
18 12 7

3.0 3.5 2.5 4.6
40 37 30 22

10.7 11.0 11.5 8.2 2.2 2.5
0 9 13 17 22 40

2.7 3.2 2.3 3.6 5.8 13.0 13.6 13.0
40 34 28 23 17 11 7 0

7.4 7.9 8.9 7.4 2.6 2.6 3.8
0 10 13 17 23 30 40

0.7 0.7 1.9 8.4 10.0 9.4 9.6
40 30 22 13 8 5 0

1.0 4.4 6.3 5.5 5.5 6.0 6.5 4.0 4.0 3.3 5.3
20 14 9 6 0 8 11 16 21 23 40

7.2 5.0
40 30

8.6 6.4 7.5 6.7 5.8 5.5 4.8 5.7 4.6 5.1 6.0
30 25 14 11 7 0 9 11 14 30 40

12.0 9.6 7.5 4.7 5.2 5.5 5.7 7.0 2.8 1.6 1.4
55 25 17 11 10 0 7 11 17 30 40

12.0 9.6 7.5 4.7 5.2 7.2
35 25 17 11 10 0

4.8 3.8 6.5 5.7 5.5 5.7 7.0 1.4 0.7 0.1
30 18 11 8 0 7 11 17 30 40

CH.#5 CHARDON-MEN

B.M.	9.67	1294.04		1284.37
77				1286.50
76				1288.40
75				1289.00
74				1289.25
73				1290.00
72				1291.00
	10.26	1300.05	4.25	1289.79
71				1292.00
70				1293.00
69				1294.00
68				1295.25
67				1297.00
	12.80	1309.55	3.30	1296.75
66				1299.00

TOP ROAD

Aug. 10, 1927 - Marks, Hassel

S.W. side, N.E. side
 Left, on W. side of Center Road.
 B.M. Nail in N.E. Root, 40" Elm (stump,)

7.54	C 1.0	C 1.4
	23.5	25.0
5.64	C 0.8	C 1.8
	23.5	25.5
5.04	F 1.1	0.0
	20.5	22.5
4.79	F 1.7	F 0.9
	19.5	20.5
4.04	F 1.9	F 1.7
	19.5	20.0
3.04	F 1.2	F 1.4
	20.5	20.5
8.05	C 2.5	C 0.3
	16.5	23.5
7.05	C 2.6	F 0.3
	26.0	23.0
6.05	C 0.3	F 0.7
	22.0	21.5
4.80	F 0.7	F 0.9
	21.5	22.0
3.05	F 0.8	F 0.3
	21.0	22.5
10.55	F 1.4	C 0.9
	19.5	23.5

1309.55

65 1301.00

64 1303.00

63 1305.00

62 1307.00

5.18 1312.72 2.11 1307.44

61 1308.25

60 1308.00

59 1307.00

8.36 1304.36

58 1306.00

57 1305.00

56 7.72 1305.00 1304.00

T.P. 1.84 1306.84 1305.00

55 1303.25

54 1303.00

53 Dig in Ravine to N. of W

53 1303.00

S.W. Side

8.55 $\frac{F0.8}{21.0}$ 6.55 $\frac{C1.9}{25.0}$ 4.55 $\frac{F0.4}{21.5}$ 2.55 $\frac{C0.4}{22.5}$ 4.47 $\frac{C2.3}{25.5}$ 4.72 $\frac{F1.3}{20.0}$ 5.72 $\frac{F1.9}{19.5}$

B.M., Left, 58+80

6.72 $\frac{F1.7}{20.0}$ 7.72 $\frac{F0.2}{23.0}$ 8.72 $\frac{C0.8}{24.0}$

Aug. 12, 1927, Marks + Hassel

3.59 $\frac{F0.2}{23.0}$ 3.84 $\frac{F0.9}{23.0}$

$$\begin{array}{r} 16.6 \\ 6.00 \\ \hline 3.84 \end{array} \quad \begin{array}{r} 9.3 \\ 4.00 \\ \hline 3.84 \end{array} \quad \begin{array}{r} 7.6 \\ 3.00 \\ \hline 4.6 \end{array} \quad \begin{array}{r} 6.4 \\ 2.00 \\ \hline 4.4 \end{array} \quad \begin{array}{r} 5.5 \\ 5.0 \\ \hline 0.5 \end{array}$$

$$\begin{array}{r} 5.1 \\ 3.00 \\ \hline 3.84 \end{array} \quad \begin{array}{r} 4.2 \\ 2.50 \\ \hline 3.84 \end{array} \quad \begin{array}{r} 5.2 \\ 1.50 \\ \hline 3.7 \end{array} \quad \begin{array}{r} 4.1 \\ 5.0 \\ \hline 0.9 \end{array}$$

N.E. Side. 8

 $\frac{C1.5}{24.5}$ $\frac{C0.7}{23.0}$ $\frac{F1.4}{21.0}$ $\frac{C1.1}{24.5}$ $\frac{C2.2}{25.5}$ $\frac{F0.5}{21.0}$ $\frac{F1.4}{20.0}$ $\frac{F0.7}{21.0}$ $\frac{C1.5}{24.5}$ $\frac{C1.0}{24.0}$ T.P. on Right Stake $\frac{0.0}{22.0}$ $\frac{F0.8}{23.5}$ $\frac{F1.1}{23.5}$

1306.84

52 1303.00

51 1303.00

50 1303.00

49 1303.00

6.82 1309.43 4.23 1302.61
48 1303.00

47 1303.33

46 1304.34

45 1305.68

9.25 1315.54 3.14 1306.29

44 1307.02

43 1308.60

42 1309.70

41 1311.04

40 1311.88

S.W. Side

3.84 $\frac{F0.6}{23.0}$ 3.84 $\frac{F1.0}{22.5}$ 3.84 $\frac{F1.1}{22.0}$ 3.84 $\frac{F0.2}{22.5}$ 6.43 $\frac{F0.8}{22.0}$ 6.10 $\frac{F0.6}{22.0}$ 5.09 $\frac{0.0}{22.0}$ 3.75 $\frac{F0.1}{21.5}$ 8.52 $\frac{0.5}{22.5}$ 6.94 $\frac{F0.1}{22.0}$ 5.84 $\frac{0.0}{22.0}$ 4.50 $\frac{F0.3}{21.5}$ 3.66 $\frac{F0.8}{21.0}$

N.E. Side 9

 $\frac{F0.6}{23.0}$ $\frac{F0.9}{23.0}$ $\frac{F0.7}{22.0}$ $\frac{F0.4}{23.0}$ $\frac{F1.0}{21.5}$ $\frac{F0.9}{21.0}$ $\frac{F1.0}{21.0}$ $\frac{F1.2}{20.5}$ $\frac{F0.7}{22.5}$ $\frac{F0.1}{23.0}$ $\frac{F0.8}{22.0}$ $\frac{F0.7}{21.5}$ $\frac{F0.5}{21.5}$

1315.54

39

1311.74

38

1310.61

37

1308.60

1.01 1310.15 6.40 1309.14

36

1305.90

35

1303.46

B.M., Right 34+90

5.18

1306.25

9.05

1301.10

1301.07 Rec.

34

1302.16

33

1301.84

32

1300.53

31

1298.06

2.46 1299.44 9.27 1296.98

30

1295.40

29

1292.54

28

1289.13

0.49 1291.51 8.42 1291.02

27

1281.06

S.W. Side

3.80

 $\frac{C0.6}{23.0}$

4.93

 $\frac{C0.4}{22.5}$

7.04

 $\frac{C1.3}{24.0}$

4.25

 $\frac{C2.1}{25.0}$

6.69

 $\frac{F1.5}{19.5}$

4.09

 $\frac{F2.5}{19.0}$

4.41

 $\frac{C2.8}{26.5}$

5.72

 $\frac{C4.0}{29.0}$

8.19

 $\frac{C1.1}{29.0}$

4.04

 $\frac{C0.7}{23.5}$

6.90

 $\frac{C4.3}{29.0}$

11.71

 $\frac{C2.7}{26.0}$

10.51

 $\frac{C5.1}{30.0}$

N.E. Side, 10

 $\frac{C0.5}{23.0}$ $\frac{C0.5}{22.5}$ $\frac{C0.6}{23.0}$ $\frac{C1.0}{24.0}$ $\frac{F2.0}{19.5}$ $\frac{F2.9}{20.0}$ $\frac{C0.2}{22.0}$ $\frac{C2.8}{24.0}$ 1% slope $\frac{F1.1}{20.5}$ $\frac{C0.1}{22.5}$ $\frac{C2.5}{25.5}$ $\frac{C3.3}{27.5}$ $\frac{C5.8}{32.5}$

		1291.51			
26	0.66 Back-sight. +	1281.09	11.08	1280.43	Profile Grade 1274.00
		H.I.	Fore-sight -	Elevation	
25					1267.00
	2.18	1270.40	12.87	1268.22	
24					1266.00
	0.17	1258.30	12.27	1258.13	
23					1253.00
	3.13	1252.65	8.81	1249.49	B.M. L ₂₂
				1249.52	
22					1246.54
					1245.00
21					1243.88
20					1245.54
	11.92	1259.58	4.99	1247.66	
19					1251.00
	10.08	1267.24	2.42	1257.16	
18					1257.00
	10.32	1275.07	2.49	1264.75	
17					1263.00
	9.31	1281.31			
T.P., stone Hub.		High T, 1700	3.07	1272.00	
16					1269.50
					Hassel + Gran Gully
15					1273.00
14					1277.00

	S.W. Side	N.E. Side
	Grade Rod.	F0.2
	7.09	23.5
		22.0
		28.6
	14.09	37.0
		27.0
		6.1
	10.40	28.0
		29.5
		F1.1
		F2.7
	5.30	21.0
		23.5
	+70 Rec, 1249.52	A 49.13, 1927-Marks-Hassel
		F3.1
	6.11	21.0
		F2.6
	7.65	F1.5
	8.77	19.0
		F1.6
		20.5
		F2.5
	7.11	19.5
		F4.0
	8.58	24.0
		F3.3
		22.0
		C0.2
	10.24	21.5
		C7.7
		34.5
		C2.4
	97	26.5
	12.07	
		C9.0
		35.0
		C3.0
	12.81	27.0
		C6.4
		31.5
		C2.9
	8.31	27.5
		C5.7
		31.5
		F0.4
	4.31	20.5
		F0.3
		22.0

1281.31

13 1291.00

T.P 9.96 1290.42 0.85 1280.46

12 1285.00

T.P 8.70 1298.50 0.62 1289.80

11 1288.61

10 1291.44

9 1293.50

8 1295.10

7 1296.83

T.P 10.62 1306.70 2.42 1296.08

6 1298.50

5 1300.14

4 1301.83

T.P 6.30 1311.14 1.86 1304.84

3 1305.50

2 1305.10

1 1305.00

S.W. Side

0.31 1.56 F1.2
19.54.58 6.62 F2.1
19.09.89 9.4 C0.5
25.07.06 5.6 C1.4
24.55.00 2.7 2.3
25.53.33 2.3 C1.0
23.51.67 1.42 C0.3
22.58.2 9.2 F0.2
22.06.53 6.11 C0.4
22.54.87 2.86 C2.0
25.57.64 5.35 C2.3
25.55.97 3.78 C2.2
25.06.14 5.08 C1.1
23.5N.E. side¹²0.83 F0.5
20.04.16 C0.4
23.58.7 C1.2
23.56.6 C0.4
23.54.2 C0.8
23.53.34 2.0
22.02.42 F0.8
21.58.82 F0.6
21.06.7 F0.2
21.53.96 C1.4
23.56.3 C1.3
24.54.32 C1.7
25.05.67 C0.5
22.5

	+		-	Elev. Prod.
0		1311.14		1303.00
B.M.			8.06	1303.09

B.M. 3.46 1306.55 1303.09

1 1301.0

2 1299.6

TP 4.83 1303.52 7.86 1298.69

3 1299.4

4.61 1303.81 4.32 1299.20

4 1299.8

5 1300.2

6 1300.6

TP 3.46 1304.35 2.92 1300.89

7 1299.8

TP 3.58 1299.73 8.00 1298.35

8 1296.9

B.M. 9.55 1299.38

TP 2.87 1295.28 7.77 1292.41

9 1291.2

S.W. Side

C0.8

8.14 7.36 22.0

(Rec. 1303.09)

N.E. Side, 13

F0.1

8.22 2.10

VILLAGE SECTION.

Left, N.E. Side Right S.W. Side
Aug. 19, 1927, Parks & Grau.

5.55 6.76 F1.2 20.5 6.16 F0.6 21.0

6.95 8.28 F1.3 19.5 8.96 F2.0 19.5

4.12 1.91 C1.7 22.5 3.52 C0.6 23.6

4.01 4.33 F0.6 21.5 3.72 3.34 C0.7 23.0

3.61 4.31 C0.7 21.0 2.71 C0.9 22.5

3.21 2.68 C0.8 23.0 1.09 C1.2 24.5

5.55 2.50 C3.0 25.0 1.40 C4.1 25.5

4.00 10.93 C3.1 24.5 1.57 C2.4 23.5

4.0 1.69 C2.4 0.

1295,28

9
T.P. 2,89 1287,72 10,45 1284,83
10
2,47 1277,73 12,46 1275,26
11
1277,7
12
T.P. 5,28 1276,48 6,53 1271,20
13
1271,8
14
T.P. 7,72 1274,26 9,94 1266,54
15
T.P. 3,27 1266,25 11,28 1262,98
16
1261,0
17
1259,9
18
T.P. 3,97 1265,04 5,18 1261,07
19
1260,9
20
1258,35

4,08 169 $\frac{C,24}{25,0}$ 0,44 $\frac{C 3,6}{26,0}$
3,92 0,27 $\frac{C 3,7}{27,0}$ 2,49 $\frac{C 1,5}{24,0}$
0,00 0,26 $\frac{F 2,36}{19,5}$ 2,80 $\frac{F 2,8}{20,5}$
3,53 7,14 $\frac{F 3,6}{19,5}$ 5,90 $\frac{F 2,4}{19,5}$
4,68 5,44 $\frac{F 0,8}{21,0}$ 0,89 $\frac{C 3,7}{26,0}$
7,78 3,75 $\frac{C 4,0}{26,5}$ 1,08 $\frac{C 6,7}{28,0}$
9,56 6,44 $\frac{C 3,1}{25,5}$ 5,61 $\frac{C 3,9}{26,5}$
4,25 5,32 $\frac{F 1,3}{23,0}$ 1,07 $\frac{C 2,5}{26,0}$
6,35 9,21 $\frac{F 2,4}{18,5}$ 6,30 $\frac{C 0,0}{21,5}$
4,91 - 1,78 $\frac{C 3,2}{26,0}$
4,14 3,25 $\frac{C 0,9}{25,5}$ 2,08 $\frac{C 2,1}{26,5}$
6,69 5,30 $\frac{C 1,3}{23,0}$ 4,20 $\frac{C 2,4}{25,0}$

1265,04

21				1255,15
B.M.		857	1256,47	
T.P.	1,77	1253,86	12,95	1252,09
22				1252,55
23				1249,9
24				1247,8
25				1245,94
26				1244,08
T.P.	3,75	1246,65	10,96	1242,90
27				1242,23
28				1240,38
29				1238,20
30				1235,20
T.P.	2,68	1237,05	12,28	1234,37
31				1233,15
32				1231,14

15

9,78	7,60	$\frac{C2,3}{24,5}$	6,78	$\frac{C3,2}{25,0}$
1,31	1,31	$\frac{0,2}{21,5}$	2,37	$\frac{F1,1}{21,0}$
3,96	4,50	$\frac{F0,6}{21,0}$	2,05	$\frac{C1,9}{23,0}$
6,06	6,49	$\frac{F0,4}{21,5}$	5,63	$\frac{C0,4}{21,0}$
7,92	9,22	$\frac{F1,3}{21,0}$	7,76	$\frac{C0,2}{22,0}$
9,78	9,93	$\frac{F0,2}{21,5}$	8,47	$\frac{C1,3}{23,5}$
4,42	3,75	$\frac{F0,7}{22,5}$	2,48	$\frac{C2,0}{24,5}$
6,27	5,62	$\frac{C0,6}{22,5}$	3,29	$\frac{C3,0}{25,5}$
8,45	8,64	$\frac{F0,2}{21,5}$	6,55	$\frac{C1,9}{26,0}$
11,45	10,19	$\frac{C1,2}{22,5}$	9,16	$\frac{C2,3}{26,0}$
3,70	1,50	$\frac{C2,4}{26,5}$	1,40	$\frac{C2,5}{25,0}$
5,91	2,40	$\frac{C2,5}{26,0}$	5,40	$\frac{C0,5}{22,0}$

1287.55

32 + 49.29

1280.18

33 + 98.74

1229.11

33 + 53.87

1227.98

B. 17

8.16 1228.89

1228.37

Center Char

5.59 1289.96 5.59 1284.37

78 1284.00

79 1281.50

80 1279.00

0.97 1299.10 11.83 1278.13

81 1276.50

82 1277.00

83 1272.12

84 1271.50

9.65 1280.42 8.33 1270.77

85 1272.12

16

6.92 7.38 $\frac{F 0.4}{20.5}$ 5.22 $\frac{C 1.7}{26.0}$ ~~7.94 7.79 $\frac{C 0.3}{21.5}$ 7.58 $\frac{C 0.4}{25.5}$~~ ~~9.07 9.56 $\frac{F 0.5}{21.0}$ 9.33 $\frac{F 0.3}{24.0}$~~

11.48

dom West
S.W. SideAug 20 Parkst/Hassel
N.E. Side5.96 396 $\frac{C 2.0}{23.0}$ 6.12 $\frac{F 0.2}{25.0}$ 8.46 982 $\frac{C 0.6}{23.0}$ 6.99 $\frac{C 2.0}{23.5}$ 10.96 708 $\frac{C 1.9}{24.5}$ $\frac{C 1.4}{23.5}$ 2.6 296 $\frac{F 0.4}{21.0}$ 2.03 $\frac{C 0.6}{23.5}$ 5.1 462 $\frac{C 0.5}{23.0}$ $\frac{C 0.2}{23.0}$ 6.98 $\frac{0.0}{22.0}$ 7.64 $\frac{F 0.7}{23.5}$ 7.6 983 $\frac{F 2.3}{19.5}$ 10.05 $\frac{F 2.5}{19.0}$ 8.13 $\frac{F 1.3}{24.5}$ 7.22 $\frac{C 1.0}{27.0}$

86 1274.00

87 1276.50

Right Side
T.P. 0.38 1279.14 1.66 1278.76

88 1277.65

89 1276.13

90 1273.85

91 1272.75

92 1272.25
T.P. 4.62 1275.95 7.81 1271.33

93 1271.75

94 1271.25

95 1270.37

96 1268.73

T.P. 1.87 1271.21 6.61 1269.34

97 1270.13

B.M. 1.16 1271.29 1.16 1270.13

~~97 1266.33~~

6.42 7.14 $\frac{F0.7}{22.0}$ 5.32 $\frac{C0.9}{23.5}$

3.92 3.66 $\frac{C0.3}{22.5}$ 2.83 $\frac{C1.1}{24.5}$

1.49 $\frac{C0.7}{23.5}$ 3.8 $\frac{C1.1}{24.0}$

3.01 $\frac{C0.3}{23.5}$ 4.07 $\frac{F1.0}{22.0}$

5.29 5.56 $\frac{F0.3}{22.0}$ 6.02 $\frac{F0.7}{22.0}$

6.39 7.14 $\frac{F1.6}{22.0}$ 6.72 $\frac{F0.5}{21.0}$

6.89 9.18 $\frac{F2.3}{20.0}$ 8.06 $\frac{F1.2}{20.5}$

5.51 4.20 5.01 $\frac{F0.8}{21.0}$ 4.62 $\frac{F0.4}{21.5}$

4.70 6.03 $\frac{F1.3}{20.5}$ 5.03 $\frac{F0.3}{22.0}$

5.58 6.25 $\frac{F0.7}{21.0}$ 4.02 $\frac{C0.9}{24.0}$

3.98 7.22 3.28 $\frac{C0.7}{21.5}$ 6.62 $\frac{C0.6}{23.5}$

~~4.96 4.48 $\frac{C0.5}{22.0}$ 5.58 $\frac{F0.6}{22.0}$~~

127129

98				1263,55
T.P.	3,00	1262,21	12,08	1259,21
99				1260,78
100				1256,70
101				1250,00
T.P.	0,08	1249,55	12,74	1249,47
102				1242,00
T.P.	1,11	1238,48	12,18	1237,37
103				1234,00
T.P.	0,82	1227,12	12,18	1226,30
104				1226,00
B.M.		2,10		1225,02
105				1219,12
106				1214,50
T.P.	0,70	1215,07	12,75	1214,37
107				1211,55
108				1209,70
109				1208,40

Sept

night

18

7,74	8,91	11,2 20,5	4,96	20,8 23,5
4,72	3,00	11,2 20,5	1,22	20,5 21,0
5,51	1,1	11,2 26,5	2,27	29,7 26,0
12,21	6,22	16,0 31,0	6,61	55,6 32,0
7,56	7,32	15,0 22,0	8,59	11,0 19,5
4,48	7,69	13,2 21,0	8,01	11,0 21,5
1,12	2,57	11,4 20,0	3,14	19,0 19,5
8,00	8,36	20,0 21,0	8,44	20,4 20,5
12,62	12,75	10,1 21,0	12,90	10,2 21,0
4,52	3,77	20,0 21,0	3,70	20,8 21,0
5,37	6,00	10,7 20,0	6,14	10,9 20,5
6,67	7,92	11,2 20,0	7,03	10,1 21,0

1215.67

110

7.91

1211.20

8.78

1206.29

1207.10

111

1205.80

112

1204.50

113

1208.00

114

1201.15

115

1199.10

8.01

1206.43

12.78

1198.42

116

1197.05

B.177

4.62

1201.81

117

1194.23

118

1189.85

119

7.97

8.78

~~F0.8~~
20.0

8.31

~~F0.4~~
20.5

5.40

5.00

~~C0.4~~
22.0

4.98

~~C0.5~~
22.0

6.70

4.84

~~C1.9~~
24.0

5.89

~~C0.9~~
22.5

8.20

5.60

~~C2.6~~
25.0

6.86

~~C1.4~~
28.0

10.05

19.26

~~C0.8~~
22.0

10.05

~~C0.0~~
21.0

7.33
12.20

9.66

~~C2.5~~
24.5

7.33

5.86

~~C1.5~~
23.5

~~22.5~~

~~22.5~~

~~25.5~~

~~22.0~~

~~23.5~~

~~24.5~~

	+	H ₁	-	Clev
B M	0,55	1270,28		1270,13
97				1266,33
Hasselt + Parks Aug 24				
98				1263,55
99				1260,78
T.P.	1,85	1259,89	12,24	1258,04
100				1256,90
101				1250,00
	0,70	1248,47	12,12	1247,77
102				1242,08
	0,55	1236,06	12,94	1235,51
103				1234,00
104				1226,00
B, M 57104100			11,72	1224,34
	11,72	1236,03		1224,31 Rec.
T.P.	0,20	1223,44	12,79	1223,24
105				1219,12
106				1214,50
107				1211,55
T.P.	0,40	1210,99	12,87	1210,57

4,35	4,97	<u>F0,6</u> 22,0	3,86	<u>C0,5</u> 22,0
7,13	8,29	<u>F1,1</u> 20,5	6,29	<u>C0,9</u> 23,5
9,90	11,47	<u>F1,5</u> 20,5	10,88	<u>F0,9</u> 21,0
3,19		<u>C1,7</u> 26,5	0,65	<u>C2,5</u> 26,0
9,89	4,67	<u>C5,2</u> 31,0	4,99	<u>C3,9</u> 32,0
6,47	6,95	<u>F0,5</u> 22,0	8,20	<u>F1,7</u> 19,5
2,06	5,97	<u>F3,9</u> 21,0	6,31	<u>F4,2</u> 21,5
10,06	12,79	<u>F2,7</u> 20,0	12,22	<u>F2,1</u> 19,5
4,32	5,44	<u>F1,1</u> 21,0	5,52	<u>F1,2</u> 20,5
8,94	7,83	<u>F0,9</u> 21,0	9,97	<u>F1,0</u> 21,0
11,89	12,92	<u>F1,0</u> 21,0	12,84	<u>F1,0</u> 21,0

1210.97

108				1209.70
109				1208.10
110				1207.10
111				1205.80
112				1204.50
	2.76	1208.37	5.36	1205.41
113				1203.00
114				1201.15
B. M.			7.22	1201.15
T.B. B. M.	0.94	1202.12	7.22	1201.18 Rec.
115				1199.10
116				1197.05
117				1194.23
T.P	4.01	1198.11	8.02	1194.10
118				1189.85
119				1184.70

21

Left		Fl. 4	Right	Fl. 5
1.29	2.67	20.0	2.77	20.5
		Fl. 2.0		
2.57	4.59	20.0	3.70	21.0
		Fl. 6		
3.87	5.44	20.0	5.06	20.5
		Fl. 4		
5.17	5.50	22.0	5.52	22.0
		C. 1.1		
6.47	5.34	24.0	6.37	22.5
		C. 1.8		
5.37	3.51	25.0	4.76	23.0
		C. 0.1		
7.22	7.13	22.0	7.92	21.0
		C. 1.8		
3.02	1.2	24.5	2.2	23.5
		C. 0.5		
5.07	5.02	22.5	5.24	23.0
		C. 2.0		
7.99	5.92	25.5	8.0	22.0
		C. 9.3		
8.26	4.01	22.5	7.48	24.5
		C. 6.0		
13.91	7.43	31.5	10.36	27.5

T.P.	1.00	1191.68	7.43	1190.68	
120					1179.05
T.P.	2.98	1183.22	11.44	1180.24	
121					1174.40
T.P.	4.74	1175.86	12.10	1171.12	
122					1169.25
123					1164.10
T.P.	1.81	1165.79	11.88	1163.98	
124					1158.95
125					1153.14
T.P.	1.84	1155.00	12.63	1153.16	
126					1146.00
T.P.	1.80	1148.04	8.76	1146.24	
127					1138.20
T.P.	2.29	1138.13	12.20	1135.84	
128					1130.40
B. m st	5.14	1138.08	5.14	1132.94	1132.94 Hess.
129					1123.10
T.P.	0.90	1128.32	10.66	1127.42	
130					1116.80
T.P.	0.48	1120.05	8.75	1119.57	
131					1111.60
T.P.	1.99	1110.33	11.71	1108.34	
132					1107.20

12/13	1114	<u>C10</u> 22.0	1197	<u>C0.7</u> 24.0
8.82	1032	<u>F15</u> 19.0	9.7	<u>F0.9</u> 22.0
6.61	272	<u>C3.9</u> 23.0	5.82	<u>C0.8</u> 24.0
11.70	8.00	<u>C3.8</u> 28.0	10.90	<u>C1.7</u> 24.5
6.84	1.81	<u>C5.0</u> 31.0	6.43	<u>C0.4</u> 23.5
12.65	6.57	<u>C6.1</u> 31.5	10.60	<u>C2.0</u> 26.0
9.05	3.01	<u>C6.0</u> 33.0	7.86	<u>C6.1</u> 24.5
9.84	7.19	<u>C2.7</u> 27.0	12.20	<u>F2.4</u> 20.0
7.68	2.57	<u>C5.1</u> 30.0	7.34	<u>C0.3</u> 23.5
14.99	10.75	<u>C4.2</u> 29.5	10.68	<u>C4.3</u> 31.0
11.52	9.46	<u>C2.1</u> 25.0	8.69	<u>C2.7</u> 26.5
8.55	6.25	<u>C2.3</u> 25.5	11.71	<u>F3.2</u> 20.0
3.13	5.84	<u>F2.7</u> 19.0	6.45	<u>F3.3</u> 21.5

133	1110.33			1103.90
	0.44	1102.36	8.41	1101.92
134			1.44	1100.92
B.M.	1.44	1102.43		1100.99 Rec.
135		1102.50		1099.80
136				1098.00
137				1097.50
138				1097.00
139				1096.44
T.P. ^{PROP} ₁₉₀	124	1098.36	5.31	1097.12
140				1095.44
141				1093.94
142				1092.00
T.P.	425	1094.33	8.28	1090.08
143				1090.13
144				1089.13
145				1089.00

6.13	5.64	$\frac{C0.8}{23.5}$	7.96	$\frac{F1.5}{20.5}$
0.76	1.09	$\frac{F0.3}{22.5}$	0.44	$\frac{C0.8}{23.5}$
2.70		$\frac{0.0}{22.5}$	1.94	$\frac{C0.7}{23.0}$
2.63	2.72	$\frac{0.0}{22.5}$		
4.50		$\frac{C0.3}{23.0}$	4.65	$\frac{F0.2}{22.5}$
4.43	4.24	$\frac{0.0}{25.0}$		
4.93	5.43	$\frac{F0.5}{22.0}$	5.73	$\frac{F0.8}{20.5}$
5.43	6.67	$\frac{F1.2}{22.5}$	7.07	$\frac{F1.6}{20.5}$
5.99	7.54	$\frac{F1.6}{20.5}$	4.37	$\frac{C1.6}{24.5}$
2.92	1.32	$\frac{C1.6}{24.5}$	1.24	$\frac{C1.7}{23.0}$
4.42	1.66	$\frac{C2.8}{25.0}$	5.38	$\frac{F1.0}{21.5}$
6.36	5.76	$\frac{C0.7}{21.0}$	7.37	$\frac{F1.0}{20.5}$
4.20	4.25	$\frac{F0.5}{21.0}$	4.7	$\frac{F0.5}{21.0}$
5.20	5.26	$\frac{F0.1}{22.0}$	5.9	$\frac{F0.7}{20.5}$
5.33	6.32	$\frac{F1.0}{20.5}$	6.32	$\frac{F1.0}{20.5}$

146				1088.00
T.P	7.42	1094.89	6.86	1087.77
147				1089.18
148				1090.32
BM	3.90	1094.93	3.90	1090.99
149				1091.12
				1091.03 Rec
150				1091.32
Left side				
151				1090.92
T.P	1.30	1092.75	3.48	1091.45
152				1090.00
153				1089.00
154				1088.69
T.P	7.00	1088.43	11.32	1091.43
155				1081.25
T.P	6.85	1083.78	11.50	1076.93
156				1075.50
T.P	2.43	1073.41	12.80	1070.98
157				1068.25
158				1063.05

5.33	686	$\frac{F1.5}{20.0}$	58	$\frac{F0.5}{21.5}$
5.71	6.92	$\frac{F1.2}{20.5}$	6.9	$\frac{F1.0}{20.5}$
4.57	376	$\frac{C0.8}{24.0}$	3.74	$\frac{C0.8}{23.5}$
3.81	2.8	$\frac{C1.0}{24.5}$	3.83	$\frac{C0.0}{22.5}$
3.61	2.8	$\frac{C0.8}{24.0}$	3.7	$\frac{F0.3}{22.0}$
7.01	3.47	$\frac{C0.5}{21.5}$	4.78	$\frac{F0.9}{21.5}$
2.75	5.27	$\frac{3.5}{19.0}$	4.77	$\frac{F2.0}{19.5}$
3.75	2.92	$\frac{C0.8}{23.0}$	4.4	$\frac{F0.7}{21.5}$
6.06	6.6	$\frac{F0.5}{21.5}$	4.73	$\frac{C1.3}{24.5}$
6.68	7.00	$\frac{F0.3}{22.5}$	3.7	$\frac{C3.0}{24.0}$
8.28	10.7	$\frac{F2.1}{20.0}$	1.32	$\frac{C7.0}{34.5}$
4.16	4.43	$\frac{F0.3}{22.0}$	2.06	$\frac{C2.1}{25.0}$
10.33	7.03	$\frac{C1.3}{24.5}$	9.76	$\frac{C0.4}{22.5}$

T.P. 1.03 1064.46 9.98 1063.43
 159 1058.47

160 1052.50
 T.P. 0.93 1052.69 12.71 1051.75
 161 1048.17

162 1044.45
 T.P. 3.51 1046.07 10.12 1042.56
 163 1041.35

164 1038.30
 165 1035.25
 T.P. 0.48 1033.47 13.06 1033.01
 166 1032.20

167 1028.15
 168 1026.10
 T.P. 3.39 1025.49 11.44 1022.05
 169 1023.05
 BM 1.73 2.59 1022.94 Rec
 170 1018.59
 B.M. 173 1024.67 1022.94
 171 1012.50

6.99 5.59 $\frac{C1.2}{24.5}$ 6.98 $\frac{0.0}{20.0}$

11.96 10.14 $\frac{C1.8}{25.0}$ 11.98 $\frac{0.0}{21.5}$

4.51 2.98 $\frac{C1.0}{24.5}$ 5.57 $\frac{F1.1}{20.0}$

8.20 7.77 $\frac{C0.5}{22.5}$ 7.81 $\frac{C0.4}{23.0}$

4.72 6.28 $\frac{F1.6}{20.0}$ 3.72 $\frac{C1.0}{24.0}$

7.77 3.94 $\frac{C3.8}{28.5}$ 3.97 $\frac{C3.8}{28.0}$

10.82 6.72 $\frac{C4.1}{29.0}$ 8.29 $\frac{C2.5}{26.0}$

1.29 1.41 $\frac{F0.1}{22.0}$ 2.85 $\frac{F1.6}{19.5}$

4.34 7.62 $\frac{F3.3}{20.0}$ 6.57 $\frac{F2.2}{19.0}$

7.39 11.44 $\frac{F4.1}{21.0}$ 9.06 $\frac{F1.7}{19.5}$

2.39 3.38 $\frac{F1.0}{20.5}$ 3.06 $\frac{F0.7}{21.5}$

6.55 4.69 $\frac{C1.9}{27.5}$ 5.62 $\frac{C0.8}{24.0}$

Sept 15 1927 B. Parker C. Rand
 12.77 7.43 $\frac{C4.7}{31.5}$ 6.61 $\frac{C5.6}{29.0}$

102467

172 1004.67

SLOPES TO AC
+ P 172 1.11 1012.56 13.22 1011.45

173 995.85

174 982.29

+ P 0.06 998.17 14.45 998.11

175 975.90

+ P 0.56 983.17 15.56 982.61

176 965.10

+ P 0.74 970.44 13.47 969.70

177 954.30

+ P 1.52 955.97 15.99 954.45

178 942.18

+ P 0.47 942.65 13.79 942.18

1.92 931.66 12.91 929.74

B. M. 8.48 923.18

4.51 952.41 947.90

181 F50 940.00

182 2.76 949.65 944.00

183 7.64 957.29 952.00

Sept. 15, 1927 D. Parker C. Rand 26

20.08 14.13 $\frac{C6.0}{33.5}$ 13.22 $\frac{C6.9}{31.0}$ 16.41 8.22 $\frac{C8.2}{38.0}$ 7.95 $\frac{C8.5}{33.5}$ 25.97 16.27 $\frac{C9.7}{39.0}$ 14.45 $\frac{C11.5}{37.0}$ 21.97 8.25 $\frac{C13.7}{44.0}$ 11.13 $\frac{C10.8}{38.5}$ 17.77 7.63 $\frac{C10.1}{41.5}$ 5104 0.84 $\frac{C4.2}{30.5}$ 16.74 22.5 15.99 $\frac{E0.2}{27.0}$ 1.62 772 $\frac{F6.1}{29.0}$ Apr. 28, 1928 ^{Cloudy} W.C. Marks, D. Parks
C. Rand. H. Clause School Yard.
B.M., R.P., S. side Tom cherry, Back of swings in12.41 $\frac{C6.0}{19.5}$ 6.40 $\frac{C6.0}{29.0}$ 8.41 $\frac{C5.7}{17.5}$ 2.76 $\frac{C5.7}{31.0}$ 5.29 $\frac{C1.6}{26.0}$ 3.69 0.77 $\frac{C4.5}{29.5}$

Aug. 30, 1927 27
 FGrau & Pat KS.

on W. end of Twin Cherry

at sta 1851
 B.M. 4.94 952.84 947.90

T.P. 12.39 964.49 0.74 952.10

184 960.00

T.P. 12.62 975.32 1.79 962.70

185 968.00

11.18 985.81 0.59 974.78

186 975.44

T.P. 3.04 991.64 2.39 983.62

187 981.27

these are the stations that 188 checked

188 you and Charley checked. 986.98

8.01 998.44 1.03 990.63

189 991.10

190 994.09

191 996.00

192 997.41

T.P. 5.67 1003.65 0.66 997.98

193 999.20

Back of Swings in school yard
 B.M., R.P. Spike, S. side Twin Cherry,

4.49 1.80 $\frac{C2.7}{27.5}$ 15.32 966 $\frac{C5.7}{32.0}$

7.32 2.67 $\frac{C4.7}{30.0}$ 1.10 $\frac{C6.2}{32.5}$

10.47 4.93 $\frac{C5.5}{32.5}$ 3.04 $\frac{C7.4}{33.5}$

19.89 7.21 $\frac{C2.6}{27.0}$ 7.41 $\frac{C5.5}{31.5}$

4.68 3.38 $\frac{C1.3}{24.0}$ 1.77 $\frac{C3.9}{26.0}$

7.54 6.08 $\frac{C1.6}{25.0}$ 7.82 $\frac{C3.7}{25.5}$

4.55 4.05 $\frac{C0.5}{22.5}$ 4.51 $\frac{0.0}{22.5}$

2.64 4.26 $\frac{F1.6}{20.5}$ 2.76 $\frac{F0.1}{21.0}$

1.04 2.28 $\frac{F1.6}{21.0}$ 6.05 5.03 $\frac{C1.0}{24.0}$

4.45 2.62 $\frac{C1.8}{25.0}$ 2.43 $\frac{C2.0}{25.5}$

1003.65
 T.P. 5.28 1006.07 3.26 1000.39
 194 1003.91
 B 177 3.59 1007.62 1.88 1009.19 1004.08
 195 1003.66
 T.P. 10.11 1014.89 2.84 1004.78
 196 1007.50
 197 1012.50
 T.P. 12.02 1025.93 0.98 1018.91
 198 1018.60
 T.P. 8.07 1032.56 1.44 1024.49
 199 1025.81
 T.P. 9.64 1040.71 1.49 1031.07
 200 1033.60
 T.P. 8.81 1049.28 0.24 1040.47
 201 1041.51
 T.P. 9.89 1057.24 1.33 1047.95
 202 1049.17
 T.P. 11.02 1068.86 0.0 1057.84
 203 1056.96
 204 1064.75
 T.P. 10.73 1078.45 1.14 1067.72
 205 1072.34
 T.P. 6.87 1084.55 0.77 1077.68

1.03 3.58 $\frac{C0.6}{25.0}$ 6.56 $\frac{F2.4}{20.5}$
 3.96 4.26 $\frac{F0.3}{21.5}$ 6.69 $\frac{F2.7}{19.5}$
 7.39 6.37 $\frac{C1.0}{25.0}$ 9.48 $\frac{F2.2}{19.5}$
 13.43 9.27 $\frac{C2.2}{29.0}$ 2.39 4.36 $\frac{F3.0}{20.0}$
 7.33 4.13 $\frac{C3.2}{26.5}$ 7.01 $\frac{C0.3}{22.0}$
 6.75 3.21 $\frac{C2.9}{27.5}$ 8.12 $\frac{F1.4}{20.5}$
 7.11 3.98 $\frac{C3.1}{27.0}$ 5.08 $\frac{C2.1}{25.0}$
 7.89 6.47 $\frac{C1.4}{24.5}$ 2.75 $\frac{C5.4}{20.0}$
 8.67 6.41 $\frac{C2.3}{26.0}$ 3.77 $\frac{C4.9}{27.0}$
 11.90 11.02 $\frac{C0.9}{24.5}$ 7.70 $\frac{C4.2}{27.5}$
 4.11 2.99 $\frac{C1.1}{25.0}$ 0.64 $\frac{C3.5}{26.5}$
 5.91 4.57 $\frac{C1.4}{24.5}$ 3.45 $\frac{C2.5}{25.5}$

1587.43

206 1080.82

T.P. 12.64 1096.42 0.77 1083.78

207 1086.81

B.M. 1096.44 2.63 1093.81 REC

208 1090.70

209 1092.80

210 1092.40

T.P. 6.63 1097.33 5.74 1090.70

211 1092.73

212 1095.98

T.P. 10.94 1105.86 2.41 1094.92

213 1111.75

T.P. 9.13 1114.90 0.09 1105.77

214 1107.90

215 1111.65

216 1113.80

13.03 1127.02 0.91 1113.99

217 1114.75

218 1118.00

Q49.31 1927 29
F. Graub & Parks3.78 2.33 C1.4 1.89 C1.8
24.0 25.59.61 6.22 C2.8 5.74 C3.9
25.5 28.05.74 4.77 C1.0 2.77 C3.0
23.5 24.04.44 6.77 F2.3 5.77 F1A
20.0 20.05.33 4.44 8.73 F3.5 6.83 F2.4
21.0 20.04.78 5.40 6.03 F1.6 5.52 F0.1
20.0 21.09.88 8.11 C1.8 8.02 C1.9
24.0 25.04.11 1.15 C4.0 0.32 C3.8
27.5 29.07.00 4.97 C2.2 3.93 C3.2
25.0 26.53.25 5.24 F2.0 3.03 C0.2
20.0 22.01.90 4.32 F2.4 3.07 F1.2
19.0 20.512.27 11.59 C0.8 12.26 10.0
23.0 22.59.02 6.81 C2.2 8.63 C0.4
25.5 21.0

219				1121,00
220				1123,00
T.P.	6.92	1130,24	3,70	1123,32
221				1123,10
B.77.		1130,29	6,50	1123,79 rec.
222				1121,20
223				1117,50
	0,92	1118,64	12,57	1117,72
224				1112,00
225			12,73	1106,00
T.P.	0,09	1106,00	12,73	1105,91
226				1100,00
227				1094,00
T.P.	1,09	1094,36	12,73	1093,27
228				1088,76
	0,69	1086,30	8,75	1085,61
229				1085,05
230				1082,86
231				1081,43

5,52	3,90	<u>C1.6</u>		2,79	<u>C2.7</u>
		24,5			25,5
3,82	2,79	<u>C1.0</u>		701	<u>C3.5</u>
		24,5		3,56	27,0
7,14	6,61	<u>C0.5</u>		382	<u>C3.3</u>
		23,5			26,5
9,09	8,88	<u>C0.2</u>			<u>C2.7</u>
		23,0		6,40	25,5
12,79	12,57	<u>C0.2</u>			<u>C0.4</u>
		22,5		12,42	21,5
6,64	7,58	<u>F0.9</u>			<u>C0.5</u>
		22,0		6,13	22,0
12,64	12,49	<u>C0.2</u>			<u>C3.1</u>
		23,5		9,56	26,5
6,00	5,62	<u>C0.5</u>			<u>C3.3</u>
		25,0		2,72	27,5
12,00	12,28	<u>F0.7</u>			<u>C0.1</u>
		21,0		11,92	21,5
5,60	5,94	<u>F0.3</u>			<u>C1.1</u>
		20,0		4,49	23,0
1,25	1,88	<u>F0.6</u>			<u>C0.6</u>
		22,0		0,69	22,5
3,44	4,91	<u>F1.5</u>			<u>F0.6</u>
		20,0		4,00	21,5
4,87	7,35	<u>F2.5</u>			<u>F1.2</u>
		19,5		6,11	20,5

		1086.30			
T.P.	2.59	1080.21	8.68	1077.62	
232				1078.82	
233				1075.30	
234				1070.80	
T.P.	0.60	1067.82	12.39	1067.82	
235				1065.88	
236				1060.10	
T.P.	2.65	1058.50	11.97	1055.85	
237				1053.50	
T.P.	3.86	1050.98	11.38	1047.12	
238	Sept 6	C. Rand & D. Parks		1048.43	
T.P.	6.25	1053.54	3.69	1047.29	
239				1047.63	
T.P.	8.38	1050.67	3.69	1047.29	
240				1045.49	
T.P.	0.77	1043.82	12.22	1043.05	
241				1041.70	
242				1032.75	
T.P.	1.50	1035.06	10.26	1033.56	
243				1032.48	
B.M		1035.28	3.67	1031.39	
244				1031.21	Rec.
				1029.68	

		<u>F1.0</u>		<u>CO.2</u>
1.39	2.38	21.5	1.24	22.0
		<u>CO.8</u>		<u>C1.0</u>
4.91	4.10	24.0	3.88	23.5
		<u>CO.8</u>		<u>CO.6</u>
9.35	8.58	22.5	8.75	20.5
		<u>C1.1</u>		<u>C1.0</u>
1.94	0.84	24.5	0.94	22.5
		<u>C1.7</u>		<u>C1.8</u>
7.72	6.00	25.0	5.88	25.5
		<u>C4.1</u>		<u>C4.0</u>
5.00	0.92	28.5	1.02	28.5
		<u>F1.2</u>		<u>F1.2</u>
2.55	4.27	19.0	6.73	21.0
		<u>C2.1</u>		<u>C6.3</u>
5.91	3.78	26.0	8.04	31.0
		<u>C1.8</u>		<u>C4.8</u>
10.18	8.38	25.5	5.61	28.0
		<u>F0.9</u>		<u>C0.7</u>
1.35	2.27	23.0	0.48	24.0
		<u>F0.1</u>		<u>C50.8</u>
7.07	7.00	22.5	6.28	23.5
		<u>00</u>		<u>C1.1</u>
2.58	2.58	22.5	1.52	24.0
		<u>C0.3</u>		<u>C1.4</u>
5.60	5.33	22.5	4.17	24.0

B. Min 7 5.35 1234.16 1228.81

34 1227.07

33+50 1227.98

33. 1229.11

32 3.8 1231.14

31 1.8 1233.15

Sept. 1, 1927 W. Markes & Parks

34+47 X on N.E. Cor, S.H.W.

7.09 $\frac{0.3}{21.5}$ 21.8 $\frac{0.5}{26.0}$

6.18 $\frac{0.0}{21.0}$ 21.0 $\frac{0.4}{26.5}$

5.05 $\frac{0.0}{22.0}$ 22.0 $\frac{0.3}{25.5}$

3.02

1.01

1035.28

245				1028.55
T.P.	3.58	1031.38	7.48	1027.80
246				1027.75
247				1027.15
248				1026.55
249				1025.95
T.P.	4.57	1029.63	6.32	1023.06
250				1025.35
251				1024.75
252				1024.21
	11.03	1034.36	6.30	1023.33
253				1024.97
254				1027.55
255				1031.94
T.P.	9.07	1042.19	1.24	1033.12
256				1037.20
257				1039.47

Sept 6, 1927 C. Rand & D. Parks

33

2.93	7.32	F0.4 21.5	5.94	C1.0 23.5
		1.0		0.3
3.63	3.95	F0.3 20.0	4.66	F1.0 21.5
		F1.9		F1.2
4.23	6.11	20.0	5.50	20.0
		F2.0		F2.1
4.83	6.87	19.0	6.95	19.0
		F1.9		F0.3
5.43	7.33	20.0	6.28	20.0
		F0.9		C0.3
4.28	5.17	22.0	3.94	22.5
		F0.3		C0.8
4.88	5.20	22.0	7.05	24.0
		F0.5		C0.1
5.42	5.91	21.5	5.32	20.0
		F1.8		F1.4
7.39	11.18	19.5	10.82	19.5
		F0.1		C1.8
6.81	6.90	22.5	5.00	24.5
		C1.8		C1.7
2.42	0.65	24.5	0.74	25.0
		C0.2		C1.9
4.99	4.78	22.5	3.50	24.0
		F1.0		C1.3
2.72	3.73	21.0	1.44	24.0

		1042.49			
258	1.48	1040.23	3.39	1038.80	1038.70
259					1037.50
260					1036.30
261					1036.00
262					1036.00
T.P.	4.88	1040.08	5.05	1035.18	
263					1036.20
T.P.	7.56	1043.10	4.54	1035.54	
264					1039.40
265					1038.49
T.P.	^{R. Slope} ₂₆₆ 3.58	1039.42	7.26	1035.84	
266					1035.81
267					1033.13
268					1030.15
T.P.	1.45	1030.50	10.37	1029.05	
269					1027.77

1.53						<u>F0.8</u>			<u>C1.9</u>
						21.5		0.12	24.0
2.73						<u>F1.7</u>			<u>C1.1</u>
						20.0		1.46	23.5
3.93						<u>F1.6</u>			<u>F0.6</u>
						19.5		4.49	21.0
4.23						<u>F1.7</u>			<u>F0.8</u>
						20.0		5.01	20.0
4.23						<u>F0.1</u>			<u>F0.6</u>
						22.0		4.84	21.0
3.41						<u>C1.6</u>			<u>C0.8</u>
						25.0		2.60	23.5
3.70						<u>C2.5</u>			<u>C0.6</u>
						25.5		3.12	23.0
4.61						<u>C3.4</u>			<u>F1.1</u>
						27.0		5.72	23.5
Sept 12 1927 D. Parkes C. Rangel									
3.61						<u>F3.4</u>			<u>C0.7</u>
						21.0		3.58	22.0
7.129						<u>C1.4</u>			<u>C0.4</u>
						22.0		6.90	22.0
8.97						<u>C0.8</u>			<u>C1.0</u>
						23.5		7.97	23.0
2.73						<u>C0.8</u>			<u>C1.1</u>
						22.5		1.59	23.5

1030,50

270 1025,09

271 1019,75

T.P. 0,34 1019,12 11,72 1018,78

272 1011,75

F.P. 0,05 1008,11 11,06 1008,06

273 1008,75

274 995,75

T.P. 0,92 997,70 11,33 996,78

275 987,75

14,52 1000,58 11,64 986,06

B.M. 4,53 996,05

996,06 Rec

35

5,46 21,0 6,10 $\frac{F0,6}{21,5}$ 10,75 8,12 $\frac{C2,6}{24,5}$ 7,84 $\frac{C2,9}{19,0}$ 7,37 6,84 $\frac{C0,5}{21,0}$ 3,78 $\frac{C3,6}{24,5}$ 4,36 4,72 $\frac{F0,4}{21,0}$ 2,93 $\frac{C1,4}{22,0}$ 12,36 11,65 $\frac{C0,7}{21,5}$ 10,21 $\frac{C2,2}{22,5}$ 9,95 8,31 $\frac{C1,6}{23,0}$ 7,18 $\frac{C2,8}{24,5}$

Profile
Grade

7.20	1308.27	1307.07	
35	5.1	1303.2	1303.46
34	6.6	1301.7	1302.16
33	7.3	1301.0	1301.84
32	8.4	1299.9	1300.52
31	10.7	1297.6	1298.06
30	13.1	1295.2	1295.40
T.P.	2.25	1294.53	15.99 1292.28
29	3.0	1291.5	1292.54
28	8.3	1286.2	1287.73
27	13.8	1280.7	1281.06

GRADE STAKES ON CURVE

7.63 1233.00 1225.37

34+50
34+25
34
33+75
33+50
33+25
33
32+75
32+50
32+25
32

B.M. Right 34+90

Apr. 23, 1928 W.C. Marks, D. Parks,
 C. Rand, H. Clause
 End of center st. Paving at ♀.

1225.90	7.10	1226.61	
1226.41	6.59	1227.95	5.05 5.55
1226.92	6.08 6.28	1228.46	4.54 5.02 4.50
1227.43	5.57 5.97	1228.97	4.03 4.43
1227.94	5.06 5.46	1229.48	3.52 3.92
1228.45	4.55 4.95	1229.99	3.01 3.41
1228.96	4.04 4.44	1230.50	2.50 2.90
1229.47	3.53 3.93	1231.01	1.99 2.39
1229.98	3.02 3.42	1231.14	1.50 2.98
1230.49		1231.32	1.06
1231.00	2.00	1231.56	1.44

	4.36	1228.67		1224.31
104+00				1226.00
+50				1222.28
105				1219.12
+50	1.58	1218.08	1217	1216.50
106				1214.50
+50				1212.89
107				1211.55

	0.50	1270.63		1270.13
99	1.96	1264.23	8.36	1262.27
+50				1260.78
				1259.07
100	1.83	1258.53	7.53	1256.70
+50				1253.68
101				1250.00

	1.00	941.00		940.00
181				936.00
180+50				932.80
180				931.20
179+5				931.44
	13.56	953.56		940.00
177+50				948.90
	11.17	961.18	3.55	950.01
177				954.36

B.M. - Right 104+00

2.67
6.39
9.55
12.14
3.58
5.19
6.53

B.M. Right 96+50

3.45
5.16
7.53
4.85
8.53

May 5, 1928 Marks, D. Parks, C. Rand
Top of Grade Stake, 181+50

5.00		
8.20		
9.80		
9.56		
Top of Grade Stake, 181+50		
950.01	3.55	948.07
<u>4.00</u>		<u>4.00</u>
955.13	6.05	953.47
<u>30</u>		<u>30</u>

GRADE STAKES

CHARDON VILLAGE

B.M.	B.S.†	H.I.	F.S.-	E.I.	Gr.
0	4.29	1307.38		1303.09	1303.00
1			9.41	1297.97	1301.00
2	5.64	1303.61	7.71		1299.60
3					1299.40
4			3.81	1299.80	1299.80
5	4.74	1304.54	5.11		1300.20
6					1300.30
7			4.74	1299.80	1299.20
8	0.45	1299.81		1299.36	1296.0
9					1296.9
10	0.76	1284.76	15.8	1284.00	1290.5
11					1291.2
12					1284.0
13					1283.8
14	1.06	1269.76	16.06	1268.70	1277.70
15					8.50
16					1274.20
17					1271.8
18					1271.8
19					1268.7
20					1268.7
21			14.31		1264.7
					1262.0
					1261.0
					1260.4
					1259.7
					1260.8
					1261.34
					1260.4
					1260.9
					1258.35
					1255.45

April 19, 1928. D. Parks, C. Rand

H. C. Clouse

Gr. Red Right of 0+20

- 5.47
- 6.38
- 7.78
- 4.21
- 3.81
- 4.34
- 4.24
- 4.74 5.34

Apr. 20, 1928

B.M. Right. 8+02

	Subgrade	Grade
3.81	4.5	1295.3
9.31	9.6	1290.2
15.81	16.3	1283.5
6.26	6.8	1278.0
10.56	10.9	1273.9
12.96	13.6	1271.1
16.06	16.7	1268.1
5.06		
7.76	8.3	1261.4
9.36	9.7	1260.1
8.96	9.6	1260.2
9.36	10.3	1259.5
11.41	11.9	1257.9
14.31	14.8	1255.0

0.48 1256.90 1256.42

22 1252.55

23 1249.90

24 1247.80

25 1245.94

26 1244.08

27 14.60 1242.30 1242.23

28 1240.38

29 1238.20

30 1235.70

31 9.70 1233.25 1233.25

32 0.69 1233.97 1231.47

+50

+75

33 1229.69

+25

+50

+75

34 1227.97

+25

+50

+75

+87.84 End of Center St Parng. 7.63 1226.31

34 + 42.5 New Concrete Deck of Culvert 1227.57

388) 6.940 (1.78

388
3060
276
344

Apr. 23, 1928 - Cloudy W.C. Marks - D. Parks 39.
C. Rand H. Clause

B.M. Sta. 21+42, N. Root, Ash, S. side of Road

Gr. Rod

4.35

7.00

9.10

10.96

12.82

14.60

2.57

4.75

7.25

9.70

N. side

S. side

1231.32 2.62

1232.32 1.62

1230.43 3.51

1231.93 2.01

1229.99 3.95

1231.49 2.45

1229.54 4.40

1231.04 2.90

1229.10 4.84

1230.60 3.34

1228.65 5.29

3.99

1228.21 5.73

4.64

1227.76 6.18

5.29

1227.32 6.62

1228.00 5.94

1226.87 7.07

North

South

7.57 1226.37

7.20 1226.74

GRADE STAKES, CHARDON TWP.

B.M	5.38	1308.77		1303.09
0				1303.00
1				1305.00
2				1305.16
3			4.97	1303.50
4	1.97	1305.47		1303.50
5				1301.83
6				1300.17
7				1298.50
8			8.64	1296.83
9	1.78	1298.61		1296.83
10				1295.17
				1293.50
				1291.44

B.M.	2.78	1252.30		1249.52
20				1247.50
21				1246.50
22				1248.10

B.M.	16.36	1265.88		1249.52
23				1253.00
24				1260.00
TP			0.04	1265.84
	13.34	1279.18		
25				1267.00

20				1247.00
21				1246.50
22				1248.00

Nail in Maple, L.O-20

5.47
3.47
3.31
4.97
3.64
5.31
6.97
8.64
5.44
5.11

Apr. 23, 1928 Grade Revision
Large Oak, Left of 22+70

4.80
5.80
4.30

Apr

12.88
5.88

12.18

1277.78

26 1274.60
 T.P. 0.37 1278.81
 13.23 1292.04
 27 1281.00
 28 1287.73
 T.P. 1.64 1290.40 1292.54
 13.21 1303.61
 29 1292.34
 30 1295.40
 31 1298.06
 32 1300.53
 2.51 1301.10

B.M. 6.07 1307.14 1301.07
 33 1301.84
 34 1302.76
 35 1303.46
 36 1305.90
 T.P. 8.48 1315.51 0.11 1307.03
 37 1308.50
 38 1310.41
 39 1311.74
 40 1311.88
 41 1311.04
 42 1309.70

5.18

11.04

4.31

4.31

11.07

8.21

5.55

3.08

Nail in S. root 24" Maple R. Sta 34+95

5.30

4.98

3.68

1.24

7.01

4.90

3.77

3.63

4.47

5.81

1315,51

T.P.	1.03	1309.95	6.59	1308.92
43				1308.63
44				1307.02
45				1305.48
46				1304.34
47				1303.33
48				1303.00
49				1303.00

T.P.	4.09	1307.44	6.60	1303.35
50				1303.00
51				1303.00
52				1303.00
53				1303.00
54				1303.00
55				1303.25
56				1304.00
57				1305.00

T.P.	5.28	1311.51	1.21	1306.23
58				1306.00
59				1307.00
60				1308.00

B.M., 7.15 1304.36
1304.37 record

1.32
2.93
4.27
5.61
6.62
6.95
6.95

7.44
4.44
4.44
4.44
4.44
4.19
3.44
2.44

5.51
4.51
5.51

Ngil) 17 N.W. root 15" Hickory 27' L., Sta 58+80

B.M. 8.46 1312.83 1304.37

61 1308.25

62 1307.00

63 1305.00

T.P. 0.44 1304.09 9.18 1303.65

64 1303.00

65 1301.00

66 1299.00

67 1297.00

68 1295.25

69 1294.00

TP 0.46 1294.41 10.14 1293.95

70 1293.00

71 1292.00

72 1291.00

73 1290.00

74 1289.25

75 1289.00

76 1288.40

77 1286.50

T.P. 5.44 1291.94 7.91 1286.50

B.M. 7.58 1284.36

1284.37 record

Nail in N.W. root 15" Hickory 27' L 58+80

4.58

5.85

7.83

1.09

3.09

5.09

7.65

8.84

10.09

1.41

2.41

3.41

4.41

5.16

5.41

6.01

7.91

Nail in N.E. root, 40" Elm (stump)

Left on W. side of center Road

B.M.	0.04	1022.98		1022.94
171				1012.50
T.P.	0.82	1008.79	15.01	1007.97
172				1004.59
173				995.85
T.P.	0.92	993.28	16.43	992.36
174				986.29
175				975.90
	0.19	978.09	15.38	977.90
176				965.10

May 12, 1928
Fair, Windy

W. C. Marks
D. Parks
C. Rand

44

Bottom of Corner Board, S.E. cor. House, Left 169+15

10.48	10.48		10.48
4.20	Grade	2.20	C 2.0
12.94	Grade	9.94	C 3.0
6.99	4.99	C 2.0	4.99 C 2.0
17.38	15.38	C 2.0	15.38 C 2.0
12.49	12.49	965.60	965.10 12.99 Grade

20	7.54	1255.04		1247.50
19				1251.30
	1.67	1275.04		1273.37
16				1268.0
15			1.24	1272.80
15				1272.8
15	14.32	1287.12		
14				1276.84
13				1280.89
12			2.19	1284.93
	9.88	1294.81		1284.93
11				1288.41
				1291.17
	16.20	1265.72		1249.52
23				1253.00
24				1260.00
	16.48	1281.84	0.36	1265.36
25				1267.00
26				1274.00
27			0.84	1281.00
	14.65	1295.65		1281.00
28				1287.73
29			3.11	1292.54
	13.92	1306.46		1292.54
30				1295.44

May 15, 1928
Fair

N. C. Marks
D. Parks
C. Rand.

45

7.54 Grade stake 20+00

3.74

B. M. Left of 15+45

7.69

2.24

10.28

6.23

2.19

6.40

3.70

B. M. N.W. Root 36" Oak, L. 22775

12.72

5.72

14.84

7.84

0.84

7.92

3.11

11.02

1306.46 1302.95

31			1298.06
32			1300.53
33			1301.84

5.37 1301.09

B.M.	8.32	1031.26	1022.94
------	------	---------	---------

169			1023.05
168			1026.10
167			1028.15

166			1032.20
165			1035.25

B.M	2.61	1203.79	1201.18
-----	------	---------	---------

115			1199.10
116		6.74	1197.05
+P			

8.40

5.93

4.62

B.M. S. root, 24" Maple R. ^{Rec 1301.07} 34+95
 May 18, 1928 W. Marks, D. Parks, C. Rand
 L. 169+15

8.21

5.16

2.11

Nail, ^mS root 4' Chestnut 17' R. Sta 114+90

4.69

6.74

	5.44	1106.43		1100.99	
130.				1098.00	
135				1099.80	
134				1101.60	
133			2.54	1103.89	1103.98
T.P.	13.40	1117.29			
132				1107.20	
131				1111.50	
130			0.49	1116.80	1116.80
	15.71	1132.51			
129				1123.10	
128				1130.40	
T.P.	15.43	1147.88	0.06	1132.45	
127				1138.20	
126				1146.00	
	15.83	1163.46	0.25	1147.63	
125				1153.14	
124				1158.95	
	14.50	1177.63	0.33	1163.13	
123				1164.10	
122			8.38	1169.25	1169.25
	16.54	1185.79	1.37		
121				1174.40	

May 22, 1928 Marks, D. Parks, Hassel
Fair.

47

B. M. Right of 134 + 90

8.43

6.63

4.83

2.53

10.09

5.79

0.49

9.41

2.11

9.68

1.88

10.32

4.51

13.53

8.38

11.39

1185.79

120 1179.65

119 1.09 1184.70 1184.70

15.02 1199.72

118 1189.85

117 1194.23

116 2.58 1197.14 1197.05

B.M. 9.20 1210.38 1201.18

115 1199.10

114 1201.15

113 1203.00

112 1204.50

111 1205.80

110 1207.10

109 1208.40

108 0.68 1209.70 1209.70

T.P. 14.65 1224.35

107 1211.55

106 1214.50

105 1219.12

T.P. 9.16 1232.04 1.47 1222.88

B.M. 7.75 1224.29

1224.31 record

May 22, 1928 W.C. Marks, D. Parks, R. Hasse, 48
Fair.

6.24

1.09

9.87

5.49

2.67

May 23, 1928, Fair. W.C. Marks, D. Parks, R. Hasse

Spike in S. root, 4' Chestnut, R. 114+90

11.28

9.23

7.38

5.88

4.58

3.28

1.98

0.68

12.80

9.85

5.23

Nail in S.W. root Apple 35' R., Sta 104

B.M.	14.79	1239.10		1224.31
104				1226.00
103				1234.00
	16.54	1255.06	0.58	1238.52
102				1242.00
101				1247.4 1250.00
	15.80	1270.65	0.21	1254.85
	0.58	1270.71		1270.13
100				1256.10
99				1256.70
98				1260.20
97				1260.78
96				1263.55
95				1266.33
B.M.			0.58	1270.13
T.P.	6.29	1276.66	0.34	1270.37
94				1271.25
93				1271.75
92				1272.25
91				1272.75
90				1273.85
89				1276.13
	2.05	1278.18	0.53	1276.13
88				1277.65
87				1276.50
86				1274.00

B.M., right	104+00	
13.10		✓
5.10		
13.06		Sub-Grade
5.66		
5.06		6.4 1248.7
(4.6)		15.0 1255.7
10.51		11.2 1259.5
		8.0 1262.7
7.16		5.2 1265.5
4.38		2.6 1268.1
1.98		0.9 1269.8
0.34		
Right, 96+50 Rec. 1270.13		
Right Grade Hub, 95+00		
5.41		
4.91		
4.41		
1.91		
2.81		
0.53		
Both Grade Stakes, 89+00		
0.53		
1.68		
4.18		

85				1272,12
T.P.	7.01	1278,20	6.99	1271,19
84				1271,50
83				1272,12
82				1274,00
81			1.70	1276,50
	10,08	1286,58	1.70	
80				1279,00
79				1281,50
78				1284,00
77			1.11	1286,50

B.M. 0,77 1023,71 1022,94

170 1018,89
 171 1012,50
 1.30 1009,36 15,65 1008,06

172 1004,59

173 996,85

B.M. 8.61 1031,55 1022,94

169 1023,05

6,06

N.W. Corner R. Head Wall

6,70

6,08

4,20

1,70 Rt. Stake Sta 81

7,58

5,68

2,58

0,08

May 26, 1928 Fair Cloudy D. Parks, R. Hassel
 checked by C. Rand

R. Hassel

4,82

11,21

4,77

13,51

8,50

1031,55

168				1026,10
167				1029,15
	11,84	1042,03	1,36	1030,19
166				1032,20
165				1035,25
164				1038,30
163			0,68	1041,35
T.P	12,10	1053,45		
162				1044,48
161				1048,17
160			0,95	1052,50
	16,44	1068,94		
159				1057,47
158				1063,08
	12,76	1081,42	0,28	1068,26
157				1069,25
156				1075,80
	10,93	1094,61	0,74	1080,68
155				1081,75
154				1086,64
T.P	4,14	1093,93	1,82	1089,79
153				1089,00
152				

Warm cloudy May 28 1928 P. Parks, R. Hassel, C. Rand

5,95
2,40
9,83
6,78
3,73
0,68
Star Grade Stake Rt, Sta. 163
8,97
5,28
0,95 Grade stake Left Sta 160
11,47
5,86
12,17
5,92
9,86
4,92
Slope Hub Left side of Sta 153
4,93

1093.93

152			1090.00
151			1090.12
150			1091.32
149			1091.12
B.M.		2.90	1091.03
	2.89	1093.92	1091.03 record
148			1090.32
147			1089.18
146			1089.00
145			1089.00
144			1089.13
143			1090.13
142			1092.00
	9.68	1101.22	1.98 1091.94
141			1093.94
140			1095.44
139			1096.44
138			1097.00
137			1097.50
B.M.		0.62	1101.00
			1100.99 record

3.98

3.01

2.61

2.81

Nail with cap in S.W. root 18" Maple 22' R

Sta 148+98

3.20

4.74

4.92

4.92

4.79

3.79

1.92

7.68

6.18

5.18

4.62

4.12

Elev. 3.87 on RT

Nail with tin cap in W. root 20" Maple, 30' R, Sta. 134+80

B.M.	0.35	1004.38		1004.03
195				1005.66
199				1000.94
193				999.20
192				997.60
191				976.00
T.P.	0.82	995.83	9.35	995.03
190				994.09
189				991.10
188				986.98
T.P.	0.97	984.99	11.83	984.02
187				981.77
186				975.44
T.P.	0.94	973.74	12.19	972.80
185				968.00
T.P.	0.78	962.23	12.29	961.45
184				960.00
T.P.	2.40	952.59	12.04	950.19
B.M.			4.70	947.89
				947.90 record
183				

53

Rainy Forenoon Sun out in afternoon
 June 14, 1928, D. Parks, C. Rand, R. Hassel
 fir headed oak, N.E. root 18" Maple, 30' L 57q 1944

0.72

3.44

5.18

6.78

8.38

1.76

4.75

8.87

3.22

9.55

5.74

2.23

R.P. Spike, Back of swings in school yard
 S. side twin Cherry

B.M	8,81	1031,75		1022,94
167				1029,15
168				1026,10
169				1023,05
170				1018,89
	0,63	1017,98	14,40	1017,35
171				1012,50
172				1004,59
	0,55	1002,33	16,20	1001,78
173				995,85
174				986,29
	0,20	986,49	16,04	986,29
175				975,90
	0,06	970,68	15,87	970,62
176				965,10
176+50				959,70
	0,13	954,95	15,84	954,82
177				954,30
177+50				948,90
178				943,50
178+50				938,81
	1,86	940,88	15,93	939,02
			2,42	

Bottom S.E. Corner Board House 50' x 25' 169,15			
			2,60
			5,65
			8,70
			12,86
			5,42
			13,39
			6,48
			16,54
RT Grade Stake Sta 178			
		10,34	10,59
		5,08	5,74
		5,58	5,64
		10,98	11,14
		10,48	
		0,65	0,81
		0,15	
		4,05	6,21
		5,55	
		11,45	11,53
		11,20	
		15,24	15,90
		16,14	16,14
		178+50	1,86
N.E. Corner of S Head Wall			

1063, 06

15.82 1077.17 1.71 1061.35

204 1064.75

205 1072.54

15.90 1092.86 0.21 1076.96

206 1080.22

207 1086.81

208 1090.70

1.35 1095.93 1.28 1091.58

B.M. 2.04 1093.89

3.16 1096.97 1093.81

recom

1090.37

1090.70

1091.60

1092.00

1092.97

1092.73

208 1096.40

209 1092.00

210 1092.97

211 1092.73

1 11.60 1108.00 0.57 1096.40

212 1096.20

1101.90

1101.75

1107.50

1107.30

1111.15

1111.65

213 1107.50

214 16.45 1123.95 0.50 1107.50

sub-grade

215 13.41 1110.54

216 11.28 1112.67 1113.43

217 9.20 1114.75 1115.71

218 6.33 1117.62 1118.00

219 3.84 1120.11 1120.33

220 2.88 1121.07 1121.33

221 3.61 1120.34 1121.00

222 5.34 1118.61 1119.33

223 9.11 1114.84 1116.33

12.42

4.63

18.54

6.05

2.15

Tin headed tack, W. post 10" maple, for front of house
showers
June 18, 1928, Marks, Parks, Rand, Hesse

6.60

6.27

5.37

4.97

4.00

11.80

6.10

0.50

12.80

10.52

8.24

5.95

3.62

2.62

2.95

		1123.95			
T.P.	4.39	1125.39	2.95	1121.00	
			1.67	1123.72	
	0.48	1124.27		1123.79	
222				1119.33	
223				1116.33	
224				1112.00	
	1.40	1109.37	16.30	1107.97	
225			2.5 ^{sub grade}	1106.9	1107.50
226			7.9	1101.5	1102.00
227			14.2	1095.1	1096.00
T.P.	0.82	1093.81	16.38	1092.99	
228			4.1	1089.4	1090.00
229			8.8	1085.0	1085.60
230			11.7	1082.1	1082.80
231			13.9	1079.9	1080.60 1081.42
232			16.2	1077.6	1078.30 1078.22
	0.26	1078.55	15.52	1078.29	
233			4.7	1073.9	1074.50
234			8.9	1069.7	1070.23
235			13.8	1064.8	1065.40
T.P.	0.23	1065.63	13.15	1065.48	
236			6.8	1058.8	1059.40 1060.10
237			12.0	1053.6	1054.10 1053.50
238			16.6	1049.0	1049.60 1048.43

Rec. 1123.79

June, 19, 1928 Marks, Parks, Rand-Hassel
Heavy Fog in A.M., Cloudy in P.M.

4.94

7.94

12.27

7.87

7.37

13.37

3.81

8.21

11.01

13.21

15.51

4.05

8.32

13.15

6.23

11.53

B.M.	13.16	1044.77		1031.61
241				1041.70
242				1036.75
243				1032.48

B.M.	0.54	1032.15		1031.61
244				1029.95
245				1028.35
246				1027.75
247				1026.85
248				1027.15
249				1025.95
				1026.55
				1025.65
				1025.95

3.98 1029.63 6.50 1025.65

250				1025.35
251				1024.75
252				1024.21

B.M.	5.75	1001.81		996.06
275				987.75
277				995.75
+ I.P.	16.27	1017.82	0.26	1001.55

273				1003.75
272				1011.75

T.P.	11.18	1028.89	0.11	1017.71
271				1019.75
270				1025.09
269				1027.77

W. Root, 15" Maple, Right 243+60

3.07
8.02
12.29

Right, 243+60

2.20
~~2.47~~
3.80
4.40
5.30
~~5.00~~
6.20
~~5.00~~
6.50

Right Grade Stake, 249+00

4.28
4.88
5.42

Fair Windy

June 22 1928 D. Park, Grand, R. Hassel

Nail, S.E. root, 30" Elm L. Sta 274+10

17.06
6.06
14.07
6.07

9.14
3.80
1.12

1028,89

B.M,		2.90	1025,98	
	2,90	1028,93	1026.03	record
T.P,	11.14	1039,97	0.10	1028,83
228-				1030,45
267				1033,13
266				1035,81
265				1038,49
264				1039,40
263				1036,67
262				1036,00
261				1036,00
T.P,	6.96	1042,49	4.44	1035,53
260				1036,30
259				1037,50
258				1038,70
257				1039,47
256				1037,20
255				1031,90
T.P,	1.28	1031,42	12,35	1030,14
254				1027,55
253				1024,97
252				1024,21
251				1024,75

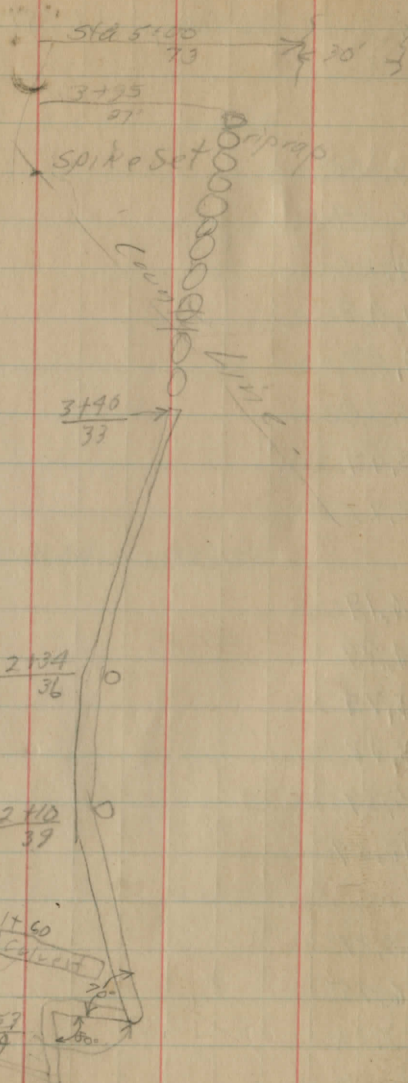
F.ROOT 30" Maple L Sta 269+92

9,52
 6,84
 4,16
 1,48
 0,57
 3,30
 3,97
 3,97
 6,19
 4,99
 3,79
 3,02
 5,29
 10,59
 3,87
 6,45
 7,21
 6,67

Data on Retaining Wall on River
Sta 6+84 Angle in road

Sta 3+76.24

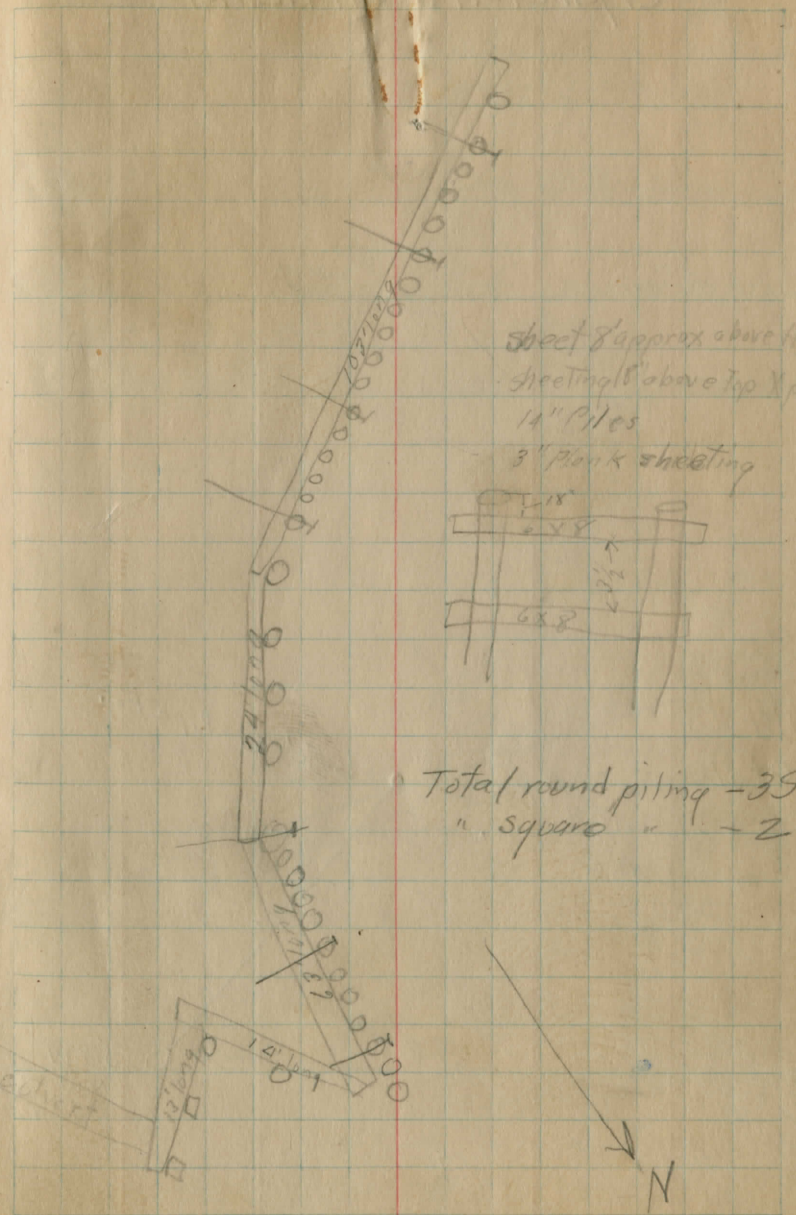
North
↑



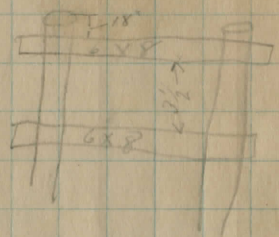
advert 43' Long
3' x 3' box extended
with 24' 36" cone pipe

Sta 0+00 = Sta 1+74.50 of Chardon Kentland Imp.
SW Quadrant = 57°15'

Road Chardon Twp.



sheet 8' approx above
sheeting 1' above top
14" Piles
3" plank sheeting



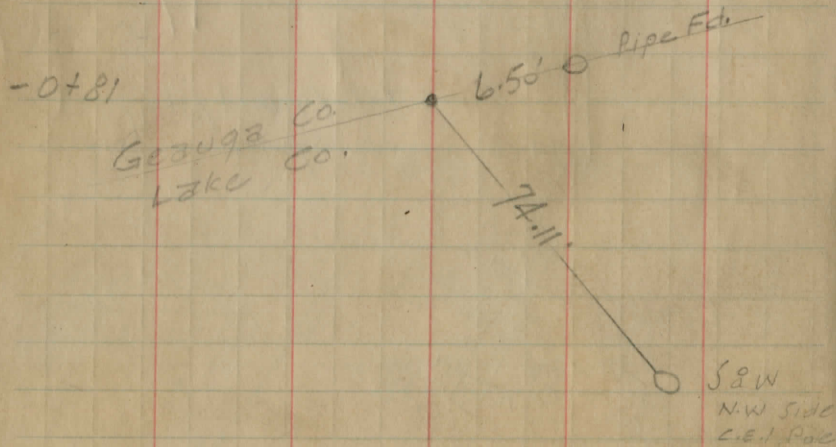
Total round piling - 35
" square " - 2

N
↓

S. Gold Jr
S. Merritt
H. Barton

Chardon, Kirtland Co.

196
25.5

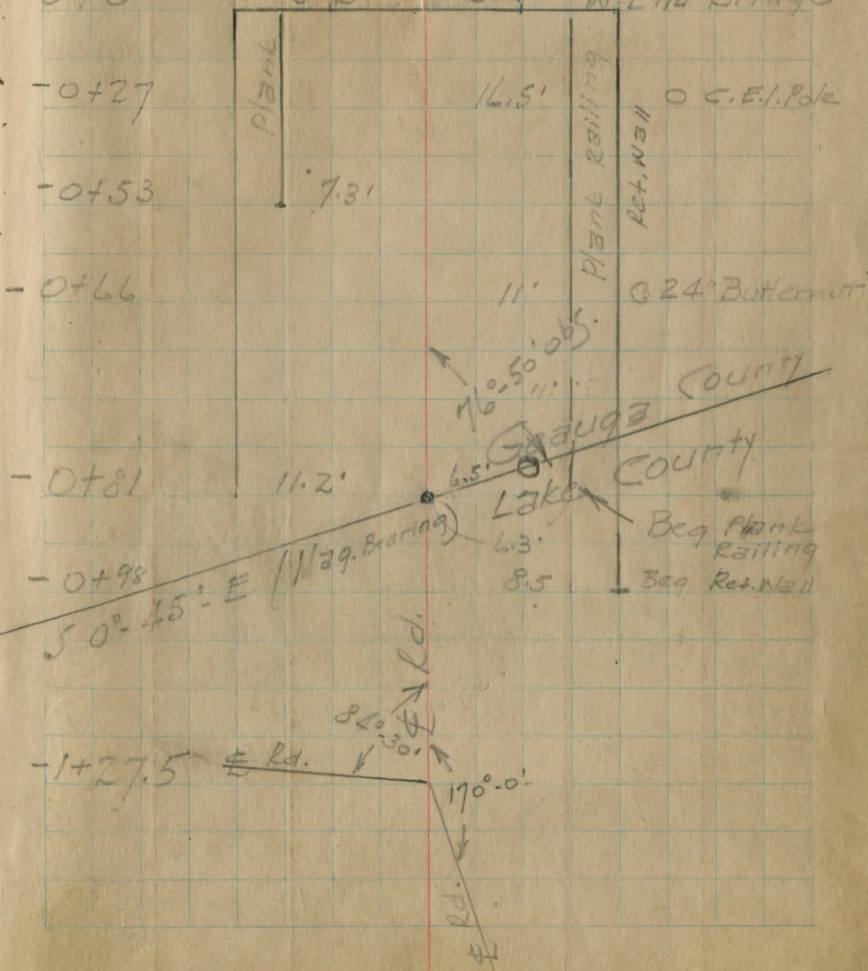


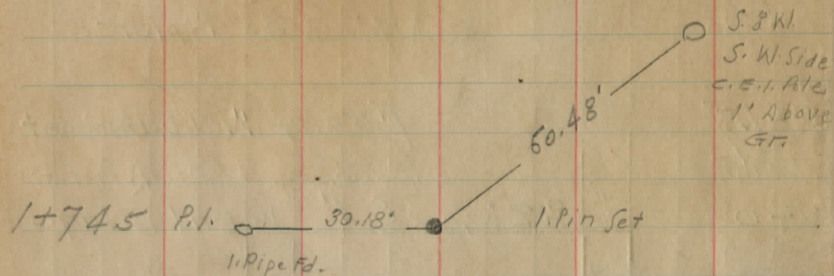
(Bridge) July 2, 1931 Temp 102° 62

0+08 9' 3 3/4" Poplar

0+17 Face of W. Abutment

0+0 8.2' 8.4' W. End Bridge





Spike set 10⁵⁸ North of P.I.
in New Guard Rail

+17 Plank 8.3
Rail

+27

2+16

+90

+74.5 P.I.

1+42

+35

1+25

1+20

1+16

1+08

1+0

0+86

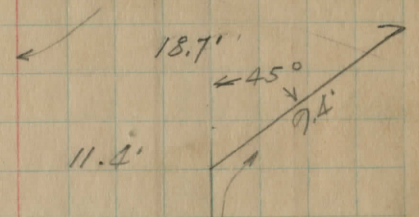
0+85

± Drive

28' O C.E.I. Pole

± Traveled Rd.

2. Wrong. ± Rd. 164'
1. Pin Set



25' O C.E.I. Pole

8.7' 9.9'

7.2'

7.6'

7.4'

7.7'

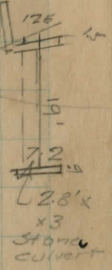
Top of Bank

Retaining Wall

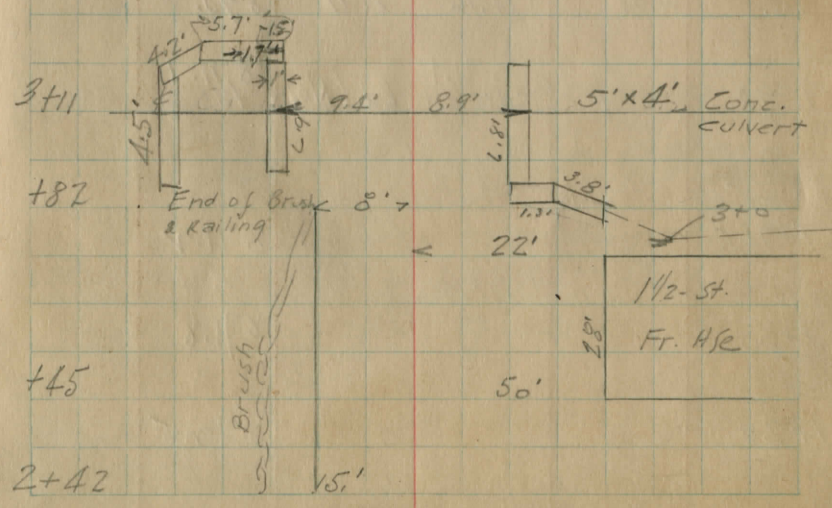
Plank railing

Retaining Wall

Plank Railing



- +30 ————— End Fence
- 4+0 ————— 21'
- +83 ————— 16.5' 8" Apple
- +51 12" Maple 3 21'
- +33 16" Maple 6 22'
- +29 ————— 22' Wire Fence C.E. Pole
- +27 C.E. Pole 22.5
- +20 ————— 17.5'
- +12 18" Maple 3 22'



2+42 ————— 15'

Sta + 4.1 - Elev. Reming
 B.M. 6.90 882.70 875.80 X ON NE
 4+0 879.0 CORNER
 N. H. HANON
 CULVERT
 5' x 3' 4"

3+50 876.9

3+11 ± Culvert / outlet Ditch 11 to Rd) 875.0

T.P. 3.04 878.84 6.90 875.20

3+0 874.3

2+50 872.4

2+27 ± Drive South 870.8

2+0 871.0

T.P. 4.03 874.16 8.71 870.13

1+90 ± Traveled Rd. (Notes taken on Tangent) 871.1

1+74.5 871.7

1+50 871.8

1+20 872.5

North ± South 65

2.0 2.7 3.4 4.4 4.5 3.8 3.6 3.7 4.0 4.5 4.4 4.1 3.5 3.1 3.5 4.0
 30 20 12 10 9 8 1 6 8 10 10 14 21 28 30

6.6 6.0 6.0 6.4 6.7 6.6 6.3 5.7 5.8 5.9 6.3 6.4 5.9 5.7 8.0
 30 21 17 11 10 7 7 6 8 9 10 15 30

9.5 9.5 12.4 12.7 12.3 6.9 6.9 7.6 7.3 7.3 7.0 7.0 12.6 11.6 9.3
 17 18 18 13 FL 10 9 9 8 8 9 12 15 100

8.5 7.6 10.3 10.4
 20 22 24 25
 5.1 7.8 8.5 8.7 7.0 5.8 5.2 4.4 4.5 4.3 4.5 4.4 3.3
 21 20 19 15 13 7 10 7 2 1 5 → End of Gravel

4.9 7.4
 24 30
 9.2 7.6 7.6 10.2 9.1 5.9 4.2 4.4 6.3 2.8 0.8
 30 25 21 20 11 8 1 7 30 House Found.

12 12.3 9.4 8.5 7.2 6.6 6.6 6.9 7.0 6.8 3.2
 19 7 13 7 7 8 4 4 5 50

11.1 7.9 8.0 8.6 8.7
 21 26 29 30 40
 12.0 8.2 7.6 7.8 7.6 8.2 7.9 6.9 5.8 5.1 N.W.
 10 11 4 41 10 11 21 30 36 MS-L

15.3 15.5 6.6 8.9 9.6
 22 25 26 30 40

3.1 3.0 3.1 4.0 5.3 5.8 ±
 5 11 33 100 100 → ELEVATION
 W. Side 5.9 5.1 5.1 10.4
 4 8 9 14 FL
 E. Side 5.5 5.9 5.4 10.3 8.6
 9 9 15 FL 30

5.6 4.7 4.3 9.8 9.9 7.2 6.2 3.6 3.0 2.7 3.0 4.4 4.1 2.9
 40 30 26 21 19 12 7 3 3 3 10 26 27 38

35 5.0 6.0 7.3 7.8 8.0 7.4 5.1 4.1 2.3 2.4 3.2 4.4 3.8 4.2 5.0 5.3
 40 27 24 15 13 6 5 4 2 2 9 17 18 23 29 37

6.7 9.6 8.5 6.4 7.2 5.2 3.7 1.8 1.7 6.7 2.1 2.0 0.6 0.6 1.3 1.4 1.4
 10 10 20 14 12 8 3 2 3 3 4 7 8 9 9 25 10
 10.5 6.3 6.2 4.3 4.4
 26 26 30 5
 4.4 6.1 7.2 7.2
 10 24 30 38

Sta	+	H.L.	-	Elev.	Remarks
B.M.	1.86	884.66		877.80	
T.P.	8.88	892.55	0.99	883.67	
5+0				885.2	

+15				886.5	
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T.P.	6.24	898.02	0.77	891.78	
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5+30				887.7	
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T.P.	9.85	906.58	1.29	896.73	
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6+0				895.6	
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+50				900.4	
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T.P.	11.90	916.24	2.24	904.34	
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7+0				905.1	
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8+0				913.4	
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T.P.	12.26	927.40	1.10	915.14	
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8+31.54 P.C.				916.4	
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9+0				924.1	
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B.M.			^{7.15} 7.7	926.68	
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+vto.4	±	Culvert		926.9	
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T.P.	11.17	937.85	0.77	926.68	
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X on S.E. Cor.
S.W. Wall
Culvert Sta 9+
El. 926.685

North	±	South
-------	---	-------

11.2	2.9	7.8	8.7	8.3	7.6	7.4	7.4	7.6	8.5	8.1	7.4	7.2	6.0
30'	17'	12'	10'	9'	6.5	7.4	6	8	10	11.5	14	22.5	33

9.1	7.6	6.8	5.8	6.2	7.5	6.5	6.1	6.3	7.1	7.2	6.5	5.9	5.2	8.9	7.9
30	24.5	17.8	13	12	10	8	6.1	7	9.5	11	12	15.5	18	22.5	35

3.7	4.7	7.3	11.1	11.1	10.1	10.4	10.3	10.5	11.7	11.4	9.9	9.4	7.0	5.6	4.8
35'	29'	16.5	11'	10'	9'	6	10.3	7.5	10	11	13	12	22.5	33	35'

6.9	7.8	12.1	12.8	11.5	11.2	11.0	11.1	11.6	10.2	6.7	8.6
35'	17.5	14	13	11	7.5	11.0	5	8.5	11	18	35'

3.8	3.1	7.9	6.6	6.4	6.2	6.2	6.3	7.2	7.1	6.2	1.7	6.6
35'	19'	13	10.5	7	6.2	4	6.5	8.5	10	10.5	19.5	35'

10.7	12.2	12.6	12.0	11.4	11.3	11.0	11.1	11.3	11.7	12.7	11.3	10.8	9.7	9.2	8.8	8.8
6.5	14.8	18	12.5	10.5	8	7.5	11.1	3.5	7	8.5	10	11	14.5	18	22.5	35'
10.6	11.1	10.6	11.5													
17.5	19.5	21.5	33'													

10.7
35'

5.2	5.2	5.5	4.9	4.6	4.0	3.3	2.8	3.2	3.6	3.7	3.2	3.4
24	21	19.5	18.5	16	13.5	7	2.8	6.5	10.5	15	25.5	35'

14.1	13.1	13.7	11.8	11.0	11.5	11.9	11.2	10.6
35'	20	18	9	11.0	8.5	19	26.5	35'

3.1	3.5	3.5	5.1	4.0	3.3	3.7	3.6	3.7	5.7	5.1	4.1	3.9	3.9	3.6
35'	30'	24'	17.5	8.5	3.3	7	10.5	16.5	19	20.5	21.5	25	28	35'

4.1	5.0	8.7
F.L.	1'	30'

Sta + H.I. - Elevation Reading

9+50 930.6
 937.85

10+0 T.P. 11.14 948.39 0.60 937.25

10+50 944.5

10+50 T.P. 11.73 959.64 0.48 947.91

11+0 951.7

11+50 T.P. 9.37 968.55 0.46 959.18

11+50 964.2

12+0 T.P. 11.25 977.29 2.51 966.04

11+50

12+0

12+0

North \pm South

35 39 41 20 94 102 95 83 7.3 8.1 9.1 9.8 8.3 7.2 1.7 0.9
 40' 34' 24.5' 24.5' 14' 14' 11.5' 9.5'

0.6 0.3 2.4 1.4 0.6 0.4 1.3 1.9 0.0
 20' 15' 13.5' 7.5' 5' 12' 13.5' 16'

1.8 3.2 4.6 7.2 10.9 7.9 1.3 0.0 + 0.3 + 0.1
 40' 30.5' 30' 29' 20' 23' 30' 37' 40' 44'

2.1 4.9 6.1 5.4 4.5 3.9 4.3 5.2 2.7
 19.5' 14' 13' 12' 7'

3.4 2.9 2.8 4.2 7.6 9.9 1.8 0.3
 43.5' 41' 35' 30.5' 25' 24.5' 32' 50'

2.4 2.2 4.9 7.1 9.4 8.8 8.5 7.9 8.2 8.2 8.9 7.8 5.8 2.1
 47' 50' 21' 15' 11' 10.5' 7'

0.6 2.5 1.7 1.1
 12' 8.5' 6.5'

3.6 2.7 4.2 3.4 3.2 4.4 13.3 11.5 6.9 3.5 2.7
 50' 47' 41' 30.5' 35' 30' 21.5' 30' 27' 30' 50'

7.1 9.5? 10.7 11.3 10.8 10.2 2.7
 17' 12' 8.5' 10.5' 11.5' 13.5' 22'

1.2 3.6 5.6 4.9 4.7 4.4 4.8 5.4
 16' 12' 9' 8' 6'

4.1 5.5 4.8 6.6 8.6 6.6 4.0
 50' 38.5' 32' 26' 25.5' 28' 50'

0.8 1.4 0.9 1.9 6.9 13.3 7.5 4.3 3.5 3.8 4.1
 50' 34' 30' 27' 22.5' 13.5' 20.5' 22' 20.5' 45' 50'

Sta	+	H.I.	-	Elev	Remig
12+44.04	P.T.	977.29		969.0	
13+0				973.6	
T.P.	9.80	983.36	3.73	973.56	
12+44.04	P.T.				
13+0					
14+0				980.1	
T.P.	11.65	992.72	2.49	980.87	
15+0				984.1	
16+0				987.9	
17+0				992.4	
T.P.	11.07	1003.74	0.05	992.67	
16+0					
18+0				997.1	
B.M.			1.23	1102.54	Spike in 5.2009 36" Maple 26' Lt. Sta 18+20

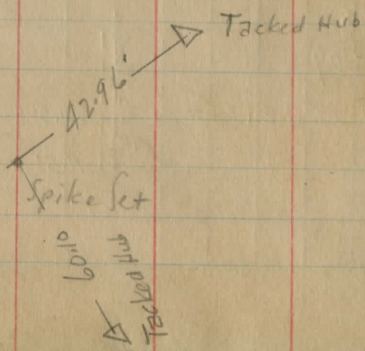
North	±	South
44 6.0 8.1 10.1 9.1 8.6 8.3 8.8 9.3 10.2 9.7 8.0 7.3 6.0 3.6 168' 155' 125' 10' 8' 5'		7' 11.5' 125' 14' 15.5' 17.5' 19' 20'
		2.0 5.5 24' 50'
1.1 3.0 5.3 4.5 3.7 17' 10.5' 10' 7'		
3.5 4.4 4.1 4.7 5.5 7.9 50' 38.5' 30' 27' 28' 22'		
2.2 3.4 3.9 50' 26' 20.5'	11.1 13'	9.5 7.2 6.2 8.4 11.0 16' 16.5' 25' 40' 50'
7.4 3.3 1.7 4.1 4.3 3.3 3.4 3.5 4.6 4.5 1.9 1.7 2.4 3.5 35' 235' 15' 11' 10'		4' 8' 10' 12' 14.5' 17' 21.5' 45'
18.6 12.4 9.0 9.4 8.6 8.5 9.1 10.0 10.0 7.2 6.0 5.0 5.5 5.1 40' 19' 12' 10.5'		7' 10' 11' 11.5' 14' 16' 13' 21.5' 22'
		4.5 35'
3.7 2.8 4.9 5.1 5.9 5.0 4.8 4.9 6.3 0.4 30' 10.5' 10.5' 12' 10.5' 8.5'		7' 9.5' 16'
	0.2	
		11.3 10.5 23' 35'
	6.6	

4-1-86604

Creek L 450 365' So-

9+20.8 ± Culvert 12" Cor. 1 Hillside

12+44.04 P.C.



6.1	5.25	6.55	6.2
365'	WL	100'	WL

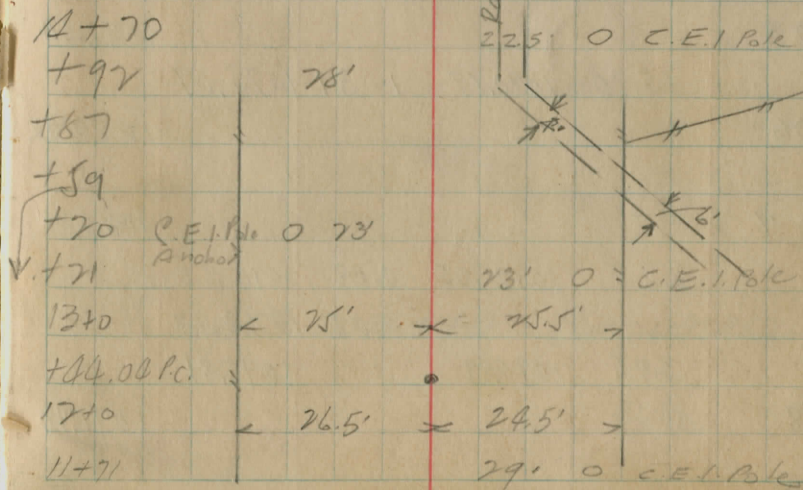
North

South

5.9	2.2	3.4
FL	H&W	

3.47
H&W

B.M.



Slope Stakes

B.M	15.65	1019.68		1004.03	1004.03
198					1018.60
TP	15.08	1034.03	0.73	1018.95	
199					1025.81
	15.81	1049.50	0.34	1033.69	
200					1033.60
201					1041.39
	15.21	1064.06	0.65	1048.85	
202					1049.17
					1053.16
203					1056.96
	12.84	1076.40	0.46	1063.60	
204					1064.75
205					1072.54
	15.90	1090.99	1.31	1075.09	
206					1080.32
207					1086.81
	6.25	1097.05	0.19	1090.80	
			3.08	1093.97	
B.M	3.08	1096.89		1093.81	
208					1090.70
209					1092.0

May 24 1928
Cool, Windy

Marks, Parks
Rand & Hassel

1.07		0.73	0.73	00.73
8.22	5.21	<u>C 3.0</u>	9.82	F 1.6
		27.5		20.55
15.90		<u>27.0</u>	13.7	<u>C 2.2</u>
				25.0
8.11			2.61	<u>C 5.5</u>
				30.0
14.89			9.89	<u>F 6.50</u>
				28.0
7.10			2.80	<u>C 4.3</u>
				27.5
11.65			8.68	<u>C 3.0</u>
				26.5
3.86			1.29	<u>C 2.6</u>
				25.5
10.67			8.27	<u>C 2.4</u>
				25.5
4.18			0.19	<u>C 4.0</u>
				28.0
B.M. right 207# + 40 Rec. 1093.81				
6.17			3.30	<u>C 2.9</u>
4.89			6.34	<u>F 1.4</u>
				20.0

B.M	6.47	1100.28		1093.81
210				1092.00
211				1092.23
212				1095.98
	12.00	1110.90	1.38	1098.90
213				1101.75
214				1107.90
	6.03	1116.86	0.07	1110.83
215				1111.65
216				1113.00
217				1114.75
	11.16	1127.53	0.49	1116.37
218				1118.00
219				1120.33
	4.05	1130.16	3.42	1124.11
220				1121.38
221				1121.00
B.M			6.42	1123.74
	2.12	1125.91		1123.79 record
222				1119.33
223				1116.33
	0.49	1114.86	11.54	1114.37
224				1112.01
225				1106.00

May 25 1928

74

Warm Clear

D. Parks, C. Rand, P. Hassel

night of 207+40

F, 20				10.93	F2.6
7.55	9.16	F1.5		8.48	F0.2
4.30	2.93	20.0			21.0
		C1.4			C1.7
		24.0			23.0
9.15	6.48	C2.7		5.79	C3.7
		27.5			24.0
3.00	0.98	C2.4		0.09	C2.9
		25.0			26.3
5.21	7.14	F1.9		5.21	0.0
		20.0			22.0
3.26	6.36	F2.5		5.35	F1.5
		17.0			20.8
2.11	1.76	C0.4		2.14	00
		23.0			22.5
9.53	7.30	C2.2			21.0
		25.5			C4.0
7.20	4.67	C2.5		5.20	27.5
		26.0			
8.78	5.89	C2.9		3.36	C5.4
		24.5			27.0
9.16	6.49	C2.7		3.74	C5.4
		23.5			26.5
Tin headed tack, M foot 32" Ask L opposite Hitchcock Est,					
6.58	4.46	C2.1		1.99	C4.6
		23.0			25.5
9.58	8.18	C1.4		8.02	C1.6
		22.5			21.5
2.86	3.83	F0.9		2.37	C0.5
		21.0			22.0
8.86		C0.2		5.72	C3.1
		23.0			25.5

Sta to Sta,
18+00 21+44 Ditch change on left
21+44 Outlet Ditch from

Extra Work

75

Culvert

100. cu. yds. earth excav.
25. cu. yds. earth excav.

		1114.8L		
T.P.	0.64	1104.14	11.36	1103.50
226				1100.00
227				1094.00
	6.97	1100.11	11.00	1093.14
B.M	1.37	1125.12		1123.79.
222				1119.33
223				1116.33
224				1112.00
	0.42	1110.28	15.30	1109.86.
225				1107.00
226				1102.00
227	0.62		16.25	1094.03
227	0.62	1094.65		1097.00
228				1092.00
T.P.			4.74	

4.14	3.69	$\frac{C0.5}{23.0}$	0.86	$\frac{C3.3}{27.5}$
10.14	10.99	$\frac{F0.9}{21.0}$	10.09	$\frac{C0.1}{21.5}$
Left slope Hub				

5.83	3.71	$\frac{C2.1}{23.0}$	1.23	$\frac{C7.6}{25.5}$
8.83	7.73	$\frac{C1.4}{22.5}$	7.28	$\frac{C1.4}{21.5}$
13.46	14.28	$\frac{F1.1}{21.0}$	12.26	$\frac{C0.5}{22.0}$

Stone in road.

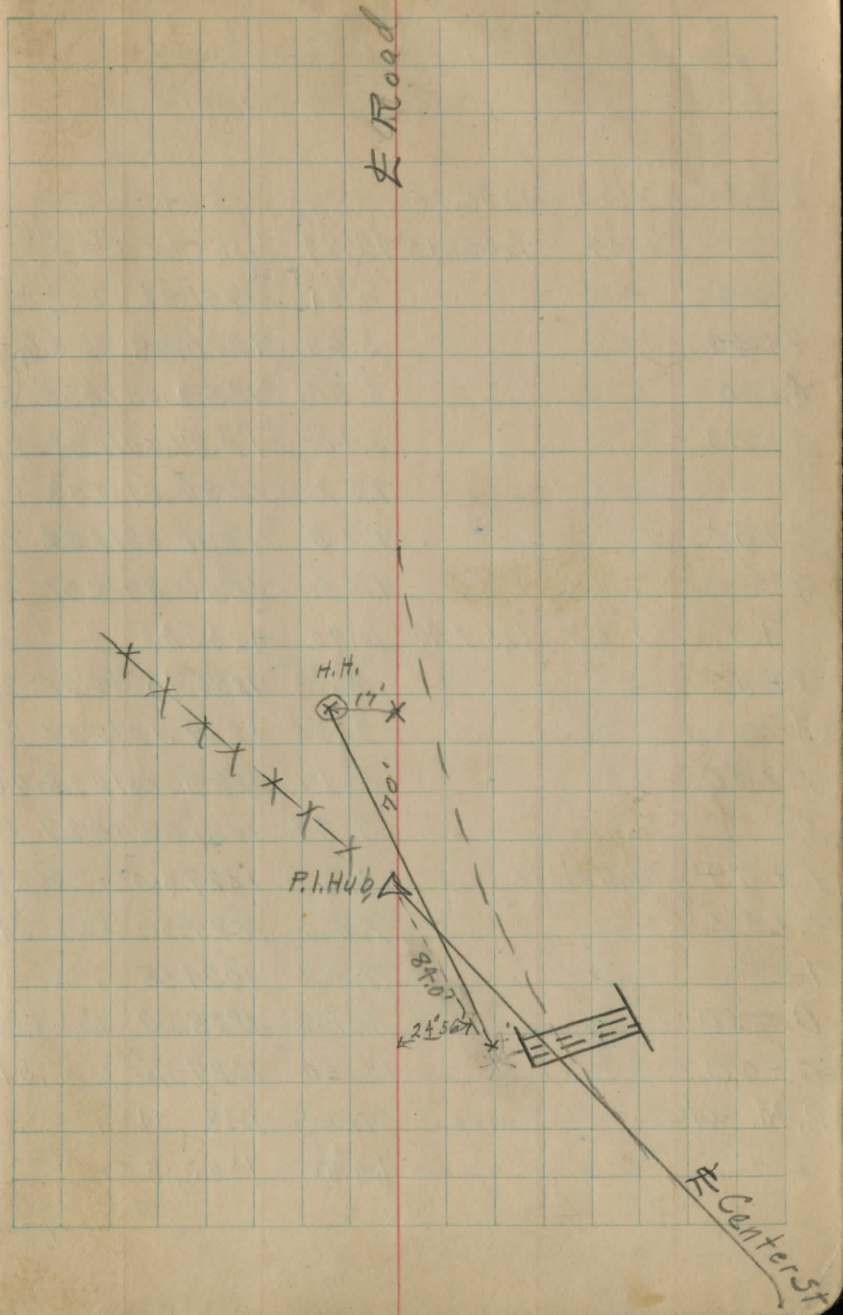
3.28	4.13	$\frac{F0.9}{23.0}$	1.15	$\frac{C2.1}{25.5}$
2.28	9.95	$\frac{F1.7}{23.5}$	7.02	$\frac{C1.3}{27.5}$

Slope Stake 177 Side Sta. 227

2.35	1.52	$\frac{F3.9}{21.0}$	0.62	$\frac{F3.0}{21.5}$
2.65	6.21	$\frac{F3.6}{21.0}$	4.74	$\frac{F2.1}{21.5}$

Slope Stake RT side Sta 228

7+00
 6+50 inlet
 6+00
 5+50
 5+00
 4+50
 4+00
 3+50
 3+00
 2+50
 2+00
 1+54 M.H. $\Delta = 19^{\circ}55'$ Right
 1+50
 1+00
 0+50
 0+00 outlet



B.M	0.13	1256.55	1256.42	
	2.47	1246.13	1243.66	Grade
7+00			1241.82	1237.20
6+50			1240.48	1236.20
6+00			1239.63	1235.20
5+50			1237.67	1234.20
5			1236.61	1233.20
4+50			1236.88	1232.20
4			1236.49	1231.20
T.P.	2.03	1237.46	1235.43	
3+50			1235.43	1230.20
3			1234.92	1229.20
2+50			1233.08	1228.20
2			1231.63	1227.20
1+54	Man Hole		1229.86	1226.28
1+50			1229.80	1226.21
1			1229.58	1225.31
0+50			1228.30	1224.41
0+00			1227.46	1223.51
B.M. Set			1228.21	
			1223.5	

Fair Cloudy

W.C. Marks
Sept. 7 1928 D. Parks C. Ford, T. Hassel

3 spikes W side 20" Ash (S. side yd)	21442			
Cut,	#Sewer			± Road,
4.62	4' 7 1/2"	6.5		4.4 1241.7
4.28	4' 3 3/8"	7.5		5.4 1240.7
4.43	4' 5 1/8"	8.8		6.5 1239.6
3.47	3' 5 5/8"	9.4		7.5 1238.6
3.41	3' 5"	10.7		8.6 1237.5
4.68	4' 8 1/8"	11.9		9.9 1236.2
5.29	5' 3 1/2"	13.3		10.9 1235.2
5.23	5' 2 3/4"	5.5		3.6 1233.9
5.72	5' 8 5/8"	6.3		4.5 1233.0
4.88	4' 10 1/2"	6.0		5.3 1232.2
4.43	4' 5 1/8"	8.1		5.9 1231.6
3.58	3' 7"	7.6		6.6 1230.9
3.59	3' 7 1/8"	7.7		6.8 1230.7
4.27	4' 3 1/4"	9.0		7.7 1229.8
3.89	3' 10 3/4"	9.8		8.7 1228.8
3.95	3' 11 3/8"	12.3		9.9 1227.6
S.W. Cor. S. Headwall, Culvert W. of Cherry St.				
Flow Line, Inlet to Stone Culvert				

2.87 1231.08 / 1228.21

4.7 1226.4

5.8 1225.3

7.3

7.1

8.7

9.5

9.7 1221.4

B.M. S.W. Cor., S.W. H.W

E. end of Center St. Raing, E. line of Cherry

Outlet of Culvert

Ditch, 100' E. of Outlet

" 200' " " "

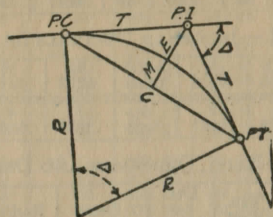
" 300' " " "

" 350' " " "

" 380' " " " Ditch Running North
Junction with

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

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



CURVE FORMULAS

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

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

$$\text{Middle ordinate} = M = R(1 - \cos. \frac{\Delta}{2}) = R \text{vers} \frac{\Delta}{2} \quad (5)$$

$$\text{External} = E = T \tan \frac{\Delta}{4} \quad (7) = R \div \cos. \frac{\Delta}{2} - R \quad (8) = R \text{exsec} \frac{\Delta}{2} \quad (9)$$

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

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.=Sta. 161+60.35 to find Sta. of P. C. and P. T. $\Delta=62^{\circ} 10'$ $D=8^{\circ} 20'$. From Table IV for 1° curve $T=3454.1$ and $+8\frac{1}{3}=414.49$ ft. From Table V correction=.36 or $T=414.85$ ft. P. C.=Sta. P. I.— $T=157+45.50$. Also from (4) $L=746.00$ and P. T.=Sta. P. C. + $L=164+91.50$.

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

Deflections.—Deflection angle= $\frac{1}{2} D$ for 100 ft., $\frac{1}{4} D$ for 50 ft., etc. For c ft.=(in minutes) $.3 \times C \times D^{\circ}$ or=defl. for 1 ft. from Table III $\times C$. For Sta. 158 of above curve=.3 $\times 54.5 \times 8\frac{1}{3}=136.2'$ or $2^{\circ} 16.2'$, or=2.50 $\times 54.5=136.2'$ from Table III. For Sta. 159 deflection angle= $2^{\circ} 16.2' + 8^{\circ} 20' \div 2=6^{\circ} 26.2'$, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 91.37. For from Table IV for 1° curve $E=960.6$ for $8^{\circ} 20'=960.6 \div 8\frac{1}{3}=91.27$ and from Table V correction=.10 or $E=91.37$ ft. Or suppose $\Delta=32^{\circ}$ and E is measured and found to be 42 ft. What is D ? From Table IV $E=230.9$ and $\div 42=5.5$ or $D=5^{\circ} 30'$.

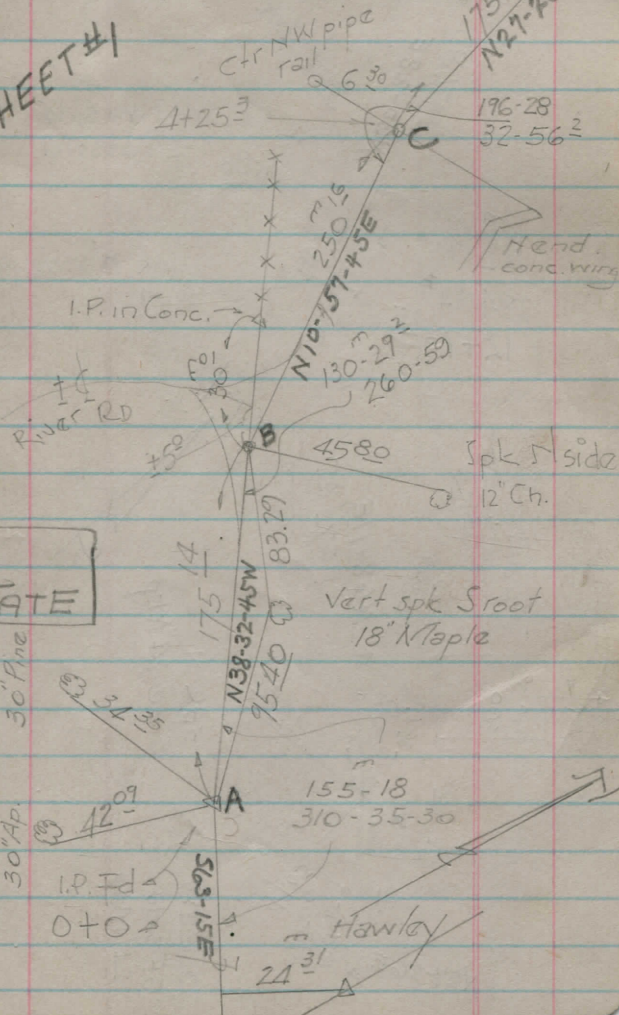
RIVER RD.
3-19-46

Form
Thrasher
Randles

OVER
6 to 100

$\Delta+25^2$ = + Head of 12 span
conc. slab top colut
19' effective roadway

SHEET #1



H. TATE

Sec #2

1730

16+36
+ctr

old Stone Arch

SEE bk of #3

N 20-28 E
45.80

Spk NW side
30 88 12" basswid

142-17

284-34

12+73

15

E

Spk N side 14' Elm

100

A Bolt Id
← splits bje

CHAG
RIVER

308

106-10
212-38

N 68-11 E
672 15

Spk N
side 24" Map

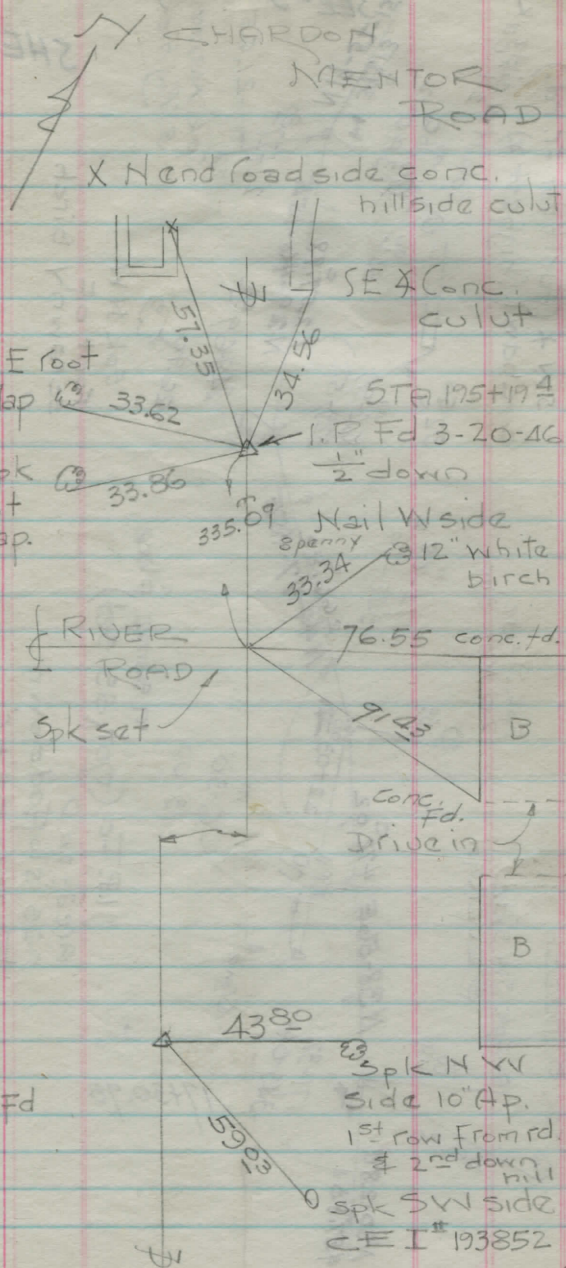
42 50

6+01 81

N 27-26 E
130-15
278-30 5

Spk W
SE side
24" Map

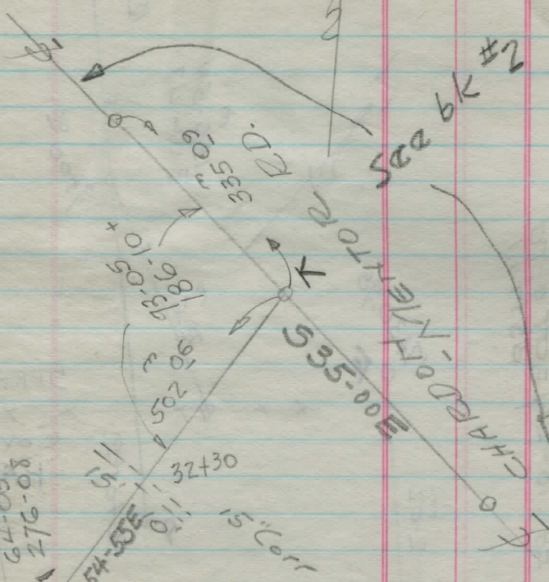
175



SPK SW
Foot 24" Wd.
SPK E Foot
12" thick

257.98
N29-46-15E ↘
393.3
N19-52-15E ↘
31+21.0

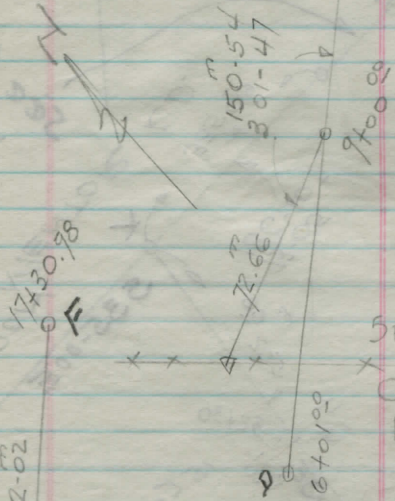
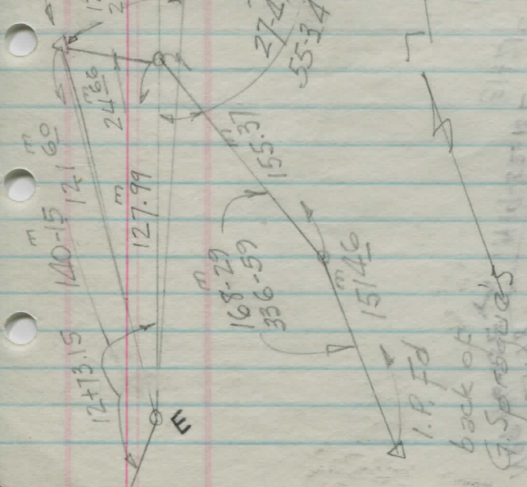
63.30
32.19
212-02
64-05
276-08



+ 10⁵ Ext

CHARGE MENTOR
SEE BK #2

Old 2" Iron
Axle Fd 18" Ely = ctr of Fd
station.



SPRAGUE
X X X
COWLES
HAWLEY
?

I.R. Fd
back of
F. Sprague's
sh. house

ϕ = ϕ as
trav.

Sheet #4

Lt
D
A
O
V
R
W
Z
A

Rt

	Dist	STA	Dist	
		0+0	9 ⁵	ϕ
		1+0	5 ⁰	"
		+75 ¹⁴	22 ⁰	"
		2+0	13 ⁰	"
		+50	6 ⁰	"
		3+0	2 ⁰	"
		4+0	0	"
		+25 ³	4 ⁰	"
		5+0	0	"
turnout	6 ⁰	6+0	12 ⁵	"
		7+0	1 ⁰	"
		8+0	1 ⁰	Wedge rd.
		"	9 ⁰	ϕ
		9+0	2 ⁵	Wedge Rd
		"	11 ⁵	ϕ
on bk. of ck.		10+0	12 ⁰	ϕ
		"	3 ⁰	Wedge Rd
ck. bank	2 ⁵	11+0	7 ⁰	ϕ
edge rd & top ck. bk.	17 ⁰	11+50	9'	bank straight up ^{18' high}
	ϕ	3'	12+0	
	ϕ	22'	+73 ¹⁵	
	ϕ	18'	13+0	
top ck. bk.	33'	13+0		
	ϕ	10'	14+0	0 = Rt edge rd.

Lt Rt

DIST STA DIST

⊕ 15 15to 7' Rt edge

Lt edge 7' 16to 7' " "

17to 1-° ⊕ of steep

17to 14' Begin 50' bk(up)

15' perp. drop 13' 17+31 16' steep bk. up

bk sluffing into 7' 17+60
ck

18to 13^s Lt to drop 6' Rt to ⊕

19' Rt to ditch

19+0 = ⊕

19+50 6' Lt = ⊕

20to = toe of 15' steep bank (up)

" 9' Lt = ⊕

20+55 17' Lt = steep drop to ck

" 3' Rt = steep up

21to = Lt wheel track

" 4' Lt = drop 13' Rt = up

21+50 6' Rt drop to ck

22to 3' Lt " " "

" 20' Rt steep up

23to 4' Rt = Lt edge Rd = steep drop

to ck 10.5' R = ⊕ 20' R = steep up

23+50 ± 10' R = Lt edge Rd.

Sheet #5

24+0 6'L = drop to ck, 11'R+ = \perp
 28'R = ditch & steep up

24+83 8'L = \perp 32.5 L = outside edge
 conc. hdwl $\pm 90^\circ$ top of wall
 = $\pm 4'$ lower than rd.
 culvert op. = 5.5' x 4.4' 2'R = Rt
 edge rd.

25+08⁵ 12'R+ = hdwl on \perp culvert
 top hdwl = $\pm 4'$ lower than rd

25+50 2.5'L = Rt edge rd

5'R+ = drop to ck

25+0 to 26+0 = $\pm 9\%$ gr up

26+0 = Rt wh. tk. 18.5 L = str. up
 $\pm 18'$ 16'R = drop to ck.

26+60 End bk on Lt

26+0 to 27+0 = $\pm 7\%$

27+0 2'L = \perp 12'R+ = drop to ck

27+0 to 28+50 = $\pm 11\%$ gr. up

27+60 = end drop on Rt

28+0 = \perp

29+0 = \perp

30+0 = \perp = \pm PC

35+0 = \perp

TABLE I.—MINUTES IN DECIMALS OF A DEGREE.

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

TABLE II.—INCHES IN DECIMALS OF A FOOT.

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

TABLE III.—RADII, ORDINATES AND DEFLECTIONS.

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot
0° 10'	34377.5	.036	.145	0.05	7°	819.02	1.528	6.105	2.10
20	17188.8	.073	.291	0.10	20'	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25	8	716.78	1.746	6.976	2.40
1	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
10	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
30	3819.83	.327	1.309	0.45	9	637.28	1.965	7.846	2.70
40	3437.87	.364	1.454	0.50	20	614.56	2.037	8.136	2.80
50	3125.36	.400	1.600	0.55	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	10	573.69	2.183	8.716	3.00
20	2455.70	.509	2.036	0.70	30	546.44	2.292	9.150	3.15
30	2292.01	.545	2.181	0.75	11	521.67	2.402	9.585	3.30
40	2148.79	.582	2.327	0.80	30	499.06	2.511	10.02	3.45
50	2022.41	.618	2.472	0.85	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	97.67
10'	58.34	.30	10'	560.11	27.81	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	483.3	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
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	23

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
91°	5830.5	2444.9	101°	6950.6	3278.1	111°	8336.7	4386.1
10'	5847.5	2457.1	10'	6971.3	3294.1	10'	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	102	7075.5	3374.9	112	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	103	7203.2	3474.4	113	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	104	7333.6	3576.8	114	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	105	7467.0	3682.3	115	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	106	7603.5	3791.0	116	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	107	7743.2	3902.9	117	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	108	7886.2	4018.2	118	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	109	8032.7	4137.1	119	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	6808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	110	8182.8	4259.7	120	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

TABLE V.—CORRECTIONS FOR TANGENTS AND EXTERNALS.

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

FOR TANGENTS ADD

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

FOR EXTERNALS ADD

Central Angle	DEGREE OF CURVE													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.032	.035	.039	.043	.047	.051	.054
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.081
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.103	.120	.127	.135
30°	.012	.025	.038	.051	.065	.078	.090	.103	.116	.129	.140	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.058	.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	.618	.707	.797	.887	.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					

TABLE VI.—CORRECTIONS FOR SUB-CHORDS AND LONG CHORDS.

FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.57
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.57
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.05	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

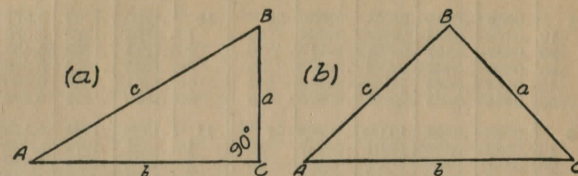
SLOPE REDUCTIONS.

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=15²÷2×250.3=.45 (by slide rule) or horizontal distance=250.3—.45=249.85. When vertical angle=V. A. is measured horizontal distance=slope distance—slope distance (1—Cos. V. A.). Thus for slope distance of 248.7 ft. and V. A. of 4° 20' from Table VIII Cos=.99714 and correction=1—.99714=.00286 per foot or total of .286×2½ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

See fig. (a).

TRIGONOMETRICAL FORMULAS.

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



FORMULA FOR SOLVING TRIANGLES.

- | | | |
|------------|---------|---|
| Given | Sought. | Right triangles. See fig. (a). |
| a, c | A, B, b | $\sin. A = \frac{a}{c}, \cos. B = \frac{a}{c}, b = \sqrt{(c+a)(c-a)}$ |
| a, b | A, B, c | $\tan. A = \frac{a}{b}, \cot. B = \frac{a}{b}, c = \sqrt{a^2 + b^2}$ |
| A, a | B, b, c | $B = 90^\circ - A, b = a \cot. A, c = \frac{a}{\sin. A}$ |
| 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 | $\left\{ \begin{array}{l} \text{If } s = \frac{1}{2}(a + b + c), \sin. \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{bc}} \\ \cos. \frac{1}{2} A = \sqrt{\frac{s(s-a)}{bc}}, \tan. \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}} \\ \sin. A = 2 \sqrt{\frac{(s-a)(s-b)(s-c)}{bc} s} \end{array} \right.$ |
| A, B, C, a | area | $\text{area} = \frac{a^2 \sin. B \sin. C}{2 \sin. A}$ |
| A, b, c | area | $\text{area} = \frac{1}{2} b c \sin. A$ |
| a, b, c | area | $s = \frac{1}{2}(a + b + c), \text{area} = \sqrt{s(s-a)(s-b)(s-c)}$ |

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.	Angle	Sine.	Tan.	Cotg.	Cosin.		
0	0	0	∞	1	90	1	∞	0	0		
10	.0029	.0029	343.8	.99985	50	.7660	.7660	1.264	.6428		
20	.0058	.0058	171.9	.99980	40	.6428	.6428	1.556	.7660		
30	.0087	.0087	114.6	.99966	30	.5196	.5196	1.961	.8660		
40	.0116	.0116	85.94	.99933	20	.3420	.3420	2.924	.9397		
50	.0145	.0145	68.75	.99889	10	.1736	.1736	5.769	.9848		
1	.0175	.0175	57.29	.99885	89	.1564	.1564	6.314	.98769		
10	.0204	.0204	49.10	.99979	50	.1593	.1614	6.197	.98723		
20	.0233	.0233	42.96	.99973	40	.2012	.2044	5.876	.98029		
30	.0262	.0262	38.19	.99966	30	.2427	.2473	5.495	.96985		
40	.0291	.0291	34.37	.99958	20	.2828	.2894	5.061	.95630		
50	.0320	.0320	31.24	.99949	10	.3215	.3293	4.591	.94017		
2	.0349	.0349	28.64	.99939	88	.1736	.1763	5.671	.98481		
10	.0378	.0378	26.43	.99929	50	.1765	.1793	5.576	.98430		
20	.0407	.0407	24.54	.99917	40	.2179	.2223	5.183	.97378		
30	.0436	.0437	22.90	.99905	30	.2582	.2633	4.783	.96325		
40	.0465	.0466	21.47	.99892	20	.2973	.3031	4.380	.95272		
50	.0494	.0495	20.21	.99878	10	.3351	.3411	3.983	.94218		
3	.0523	.0524	19.08	.99863	87	.1908	.1944	5.145	.98163		
10	.0552	.0553	18.07	.99847	50	.1937	.1974	5.066	.98117		
20	.0581	.0582	17.17	.99831	40	.2356	.2404	4.689	.97064		
30	.0610	.0612	16.35	.99813	30	.2761	.2813	4.315	.96010		
40	.0640	.0641	15.60	.99795	20	.3153	.3209	3.943	.94956		
50	.0669	.0670	14.92	.99776	10	.3532	.3591	3.573	.93901		
4	.0698	.0699	14.30	.99756	86	.2079	.2126	4.705	.97815		
10	.0727	.0729	13.73	.99736	50	.2108	.2156	4.638	.97764		
20	.0756	.0758	13.20	.99714	40	.2516	.2566	4.274	.96710		
30	.0785	.0787	12.71	.99692	30	.2911	.2961	3.911	.95656		
40	.0814	.0816	12.25	.99668	20	.3293	.3343	3.543	.94601		
50	.0843	.0846	11.83	.99644	10	.3662	.3711	3.173	.93546		
5	.0872	.0875	11.43	.99619	85	.2250	.2309	4.331	.97437		
10	.0901	.0904	11.06	.99594	50	.2278	.2339	4.275	.97371		
20	.0929	.0934	10.71	.99567	40	.2684	.2737	3.904	.96317		
30	.0958	.0963	10.39	.99540	30	.3077	.3131	3.533	.95262		
40	.0987	.0992	10.08	.99511	20	.3457	.3511	3.163	.94207		
50	.1016	.1022	9.788	.99482	10	.3824	.3877	2.793	.93152		
6	.1045	.1051	9.514	.99452	84	.2419	.2493	4.011	.97030		
10	.1074	.1080	9.255	.99421	50	.2447	.2524	3.962	.96959		
20	.1103	.1110	9.010	.99390	40	.2847	.2925	3.591	.95905		
30	.1132	.1139	8.777	.99357	30	.3234	.3311	3.220	.94850		
40	.1161	.1169	8.556	.99324	20	.3609	.3684	2.849	.93795		
50	.1190	.1198	8.345	.99290	10	.3972	.4045	2.478	.92740		
7	.1219	.1228	8.144	.99255	83	.2588	.2679	3.732	.96593		
10	.1248	.1257	7.953	.99219	50	.2616	.2711	3.689	.96517		
20	.1276	.1287	7.770	.99182	40	.3001	.3094	3.318	.95462		
30	.1305	.1317	7.596	.99144	30	.3374	.3465	2.947	.94407		
40	.1334	.1346	7.429	.99106	20	.3735	.3824	2.576	.93352		
50	.1363	.1376	7.269	.99067	10	.4084	.4171	2.205	.92297		
				82					74		
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.	Angle	Sine.	Tan.	Cotg.	Cosin.		
16	.2756	.2867	3.487	.96126	74	.4607	.4452	2.246	.91355		
10	.2781	.2899	3.450	.96046	50	.4094	.4487	2.229	.91236		
20	.2812	.2931	3.412	.95964	40	.3612	.4522	2.211	.91116		
30	.2840	.2962	3.376	.95882	30	.3161	.4557	2.194	.90996		
40	.2868	.2994	3.340	.95799	20	.2731	.4592	2.177	.90875		
50	.2896	.3026	3.305	.95715	10	.2320	.4628	2.161	.90753		
17	.2924	.3057	3.271	.95615	73	.4226	.4663	2.145	.90631		
10	.2952	.3089	3.237	.95545	50	.4253	.4699	2.128	.90507		
20	.2979	.3121	3.204	.95459	40	.4279	.4734	2.112	.90383		
30	.3007	.3153	3.172	.95372	30	.4305	.4770	2.097	.90259		
40	.3035	.3185	3.140	.95284	20	.4331	.4806	2.081	.90133		
50	.3062	.3217	3.108	.95195	10	.4358	.4841	2.066	.90007		
18	.3090	.3249	3.078	.95106	72	.4384	.4877	2.050	.89879		
10	.3118	.3281	3.048	.95015	50	.4410	.4913	2.035	.89752		
20	.3145	.3314	3.018	.94924	40	.4436	.4950	2.020	.89623		
30	.3173	.3346	2.989	.94832	30	.4462	.4986	2.006	.89493		
40	.3201	.3378	2.960	.94740	20	.4488	.5022	1.991	.89363		
50	.3228	.3411	2.932	.94646	10	.4514	.5059	1.977	.89232		
19	.3256	.3443	2.904	.94552	71	.4540	.5095	1.963	.89101		
10	.3283	.3476	2.877	.94457	50	.4566	.5132	1.949	.88968		
20	.3311	.3508	2.850	.94361	40	.4592	.5169	1.935	.88835		
30	.3338	.3541	2.824	.94264	30	.4617	.5206	1.921	.88701		
40	.3365	.3574	2.798	.94167	20	.4643	.5243	1.907	.88566		
50	.3393	.3607	2.773	.94068	10	.4669	.5280	1.894	.88431		
20	.3420	.3640	2.747	.93969	70	.4695	.5317	1.881	.88295		
10	.3448	.3673	2.723	.93869	50	.4720	.5354	1.868	.88158		
20	.3475	.3706	2.699	.93769	40	.4746	.5392	1.855	.88020		
30	.3502	.3739	2.675	.93667	30	.4772	.5430	1.842	.87882		
40	.3529	.3772	2.651	.93565	20	.4797	.5467	1.829	.87743		
50	.3557	.3805	2.628	.93462	10	.4823	.5505	1.816	.87603		
21	.3584	.3839	2.605	.93358	69	.4848	.5543	1.804	.87462		
10	.3611	.3872	2.583	.93253	50	.4874	.5581	1.792	.87321		
20	.3638	.3906	2.560	.93148	40	.4899	.5619	1.780	.87178		
30	.3665	.3939	2.539	.93042	30	.4924	.5658	1.767	.87036		
40	.3692	.3973	2.517	.92935	20	.4950	.5696	1.756	.86892		
50	.3719	.4006	2.496	.92827	10	.4975	.5735	1.744	.86748		
22	.3746	.4040	2.475	.92718	68	.4900	.5774	1.732	.86603		
10	.3773	.4074	2.455	.92609	50	.5025	.5812	1.720	.86457		
20	.3800	.4108	2.434	.92499	40	.5050	.5851	1.709	.86310		
30	.3827	.4142	2.414	.92388	30	.5075	.5890	1.698	.86163		
40	.3854	.4176	2.394	.92276	20	.5100	.5930	1.688	.86015		
50	.3881	.4210	2.375	.92164	10	.5125	.5969	1.675	.85866		
23	.3907	.4245	2.356	.92050	67	.5150	.6009	1.664	.85717		
10	.3934	.4279	2.337	.91936	50	.5175	.6048	1.653	.85567		
20	.3961	.4314	2.318	.91822	40	.5200	.6088	1.643	.85416		
30	.3987	.4348	2.300	.91707	30	.5225	.6128	1.632	.85264		
40	.4014	.4383	2.282	.91590	20	.5250	.6168	1.621	.85112		
50	.4041	.4417	2.264	.91472	10	.5275	.6208	1.611	.84959		
				66					58		
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

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

TABLE IX.—CALCULATION OF EARTHWORK.

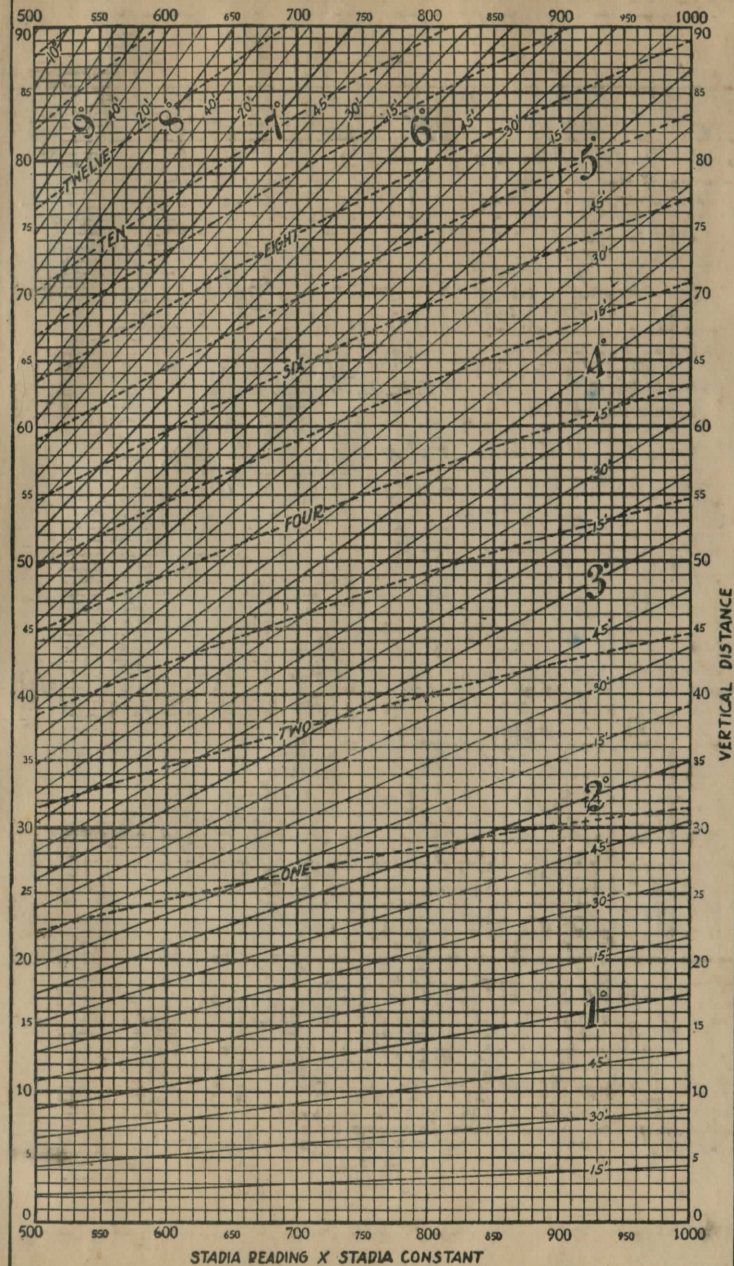
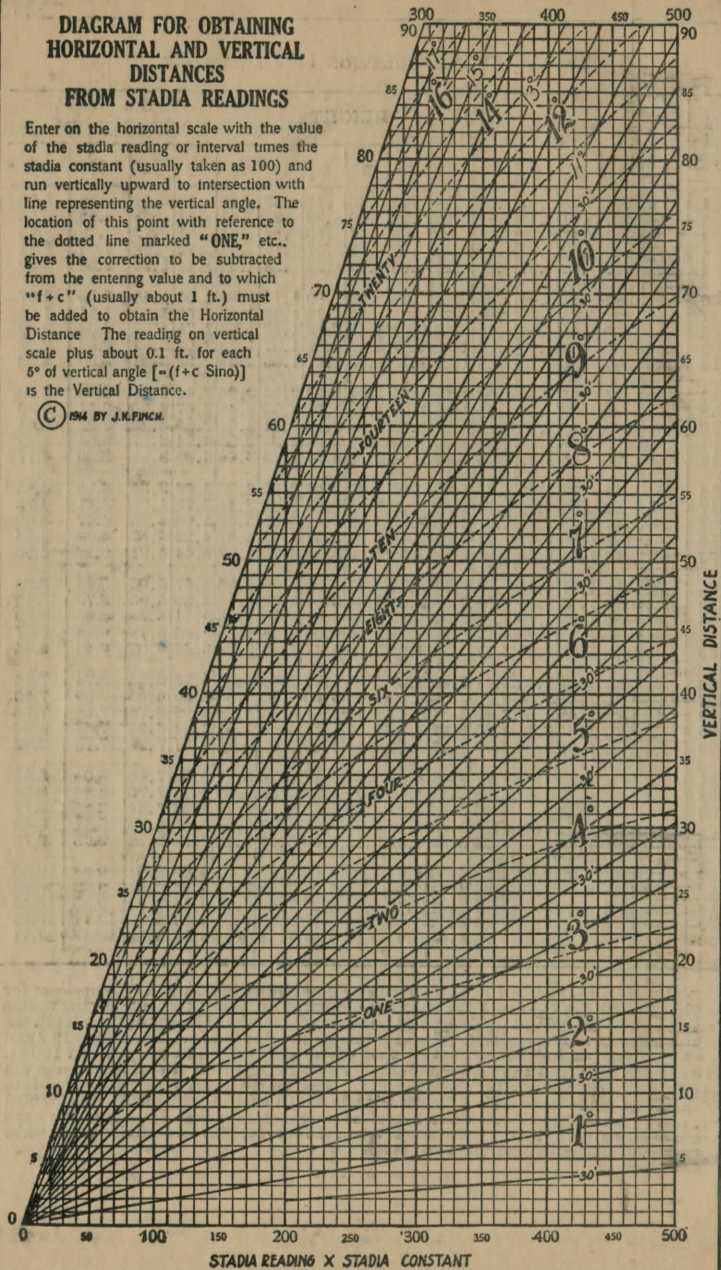
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96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

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

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

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X-on W End Bridge (Seat) 874.79

2.M. 874.79

+ 468

N 1.879.57

10.6
10.0

10.8

Unit. Gr. 8.4
1.57 W/W

83 38
1.57 W/W

3.9

T/W

9.6

9.9

0/W

9.9

1.21

10.3
14.2
20.7
W/W

879.27

155

170

Unit. Gr. 11.101

14.1

220

11.5

87652

1.74

87478

1307.38
1308.00
4.38

2.11
1.9
4.01
2.59
1.72

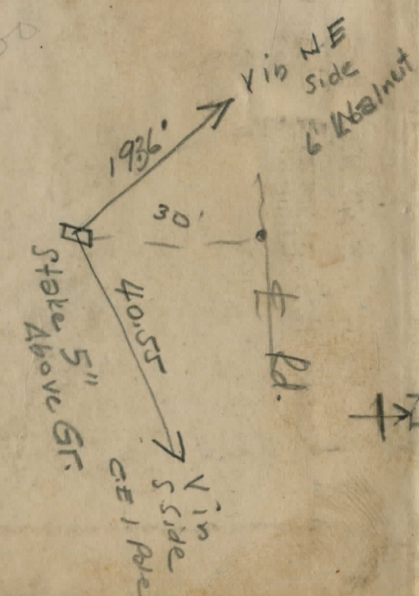
1307.38

1301.38

103.815
1.745
863.65
2.5532
1118.97

1303.00
1304.38

170.09
170.56
29.53



DISTANCES FROM CENTER OF ROADWAY FOR
CROSS-SECTIONING.

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

**PLEASE RETURN TO
GEAUGA COUNTY ENGINEER**

COURT HOUSE

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.2	8.4	8.5	8.7	8.9	9.1	9.2	9.4	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	26.2	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

CHARDON O.
PHONE 250 X

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

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