

Hotchkiss Road

FIELD BOOK  
1308

PLEASE RETURN TO  
GEAUGA COUNTY ENGINEER  
COURT HOUSE  
CHARDON, O.  
PHONE 250-X

Hotchkiss Road - No. 30

Sec. A.B.C.D

~~P~~  
GEAL

4

7

6

5

4

3

2

1

0+00 = BURTON - NEWBURY TWP LINE

NOTE! SEE 1952 DRAINAGE INFO STA 0+00 TO 14+00  
IN F.B. #125 Pg 59

⊕

pipe  
see FB 125

⊠ Tack Red Hub.

38.00  
38.44

39'  
~~38.8'~~

2 Marks N.E. Side  
12" Hickory  
+ 30'

2 Marks  
N.W. Side  
16" Oak

3

15

14

13

12

11

10

9+45.13 P.T.

9

8+00.93 = P.I.

8

7

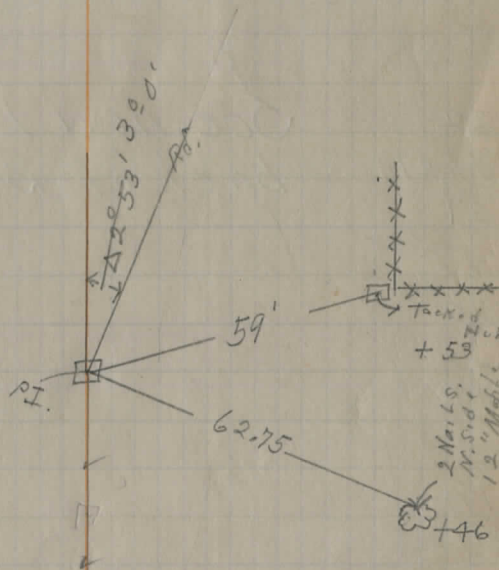
6+56.80 = P.C.

⊕

7

Side staked to Sta 14+00

$\Delta = 30-0'$   
 $\Delta = (2^{\circ} 53')$   
 $Ext. = 1.82$   
 $Tan. = 144.20$   
 $D = 1^{\circ}$   
 $L = 288.33$



5

24

23

22

P121+

21

20

19

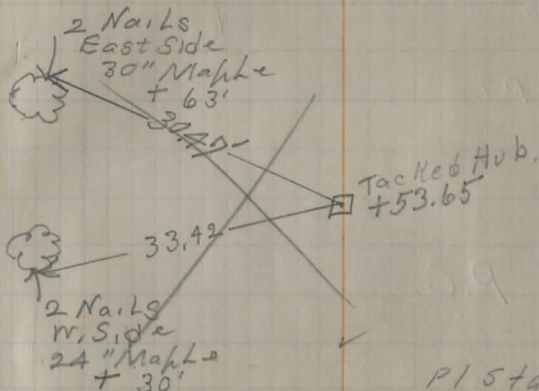
18

17

16

See new Location  
back of Book

6



P15+21

See back of book  
for relocation  
Sta 21 to end  
Pg 125

7  
 $29 + 47.68 = P.T.$

29 Offset 35'

$28 + 92.60 = P.I.$

$27 + 38.85 = P.C.$

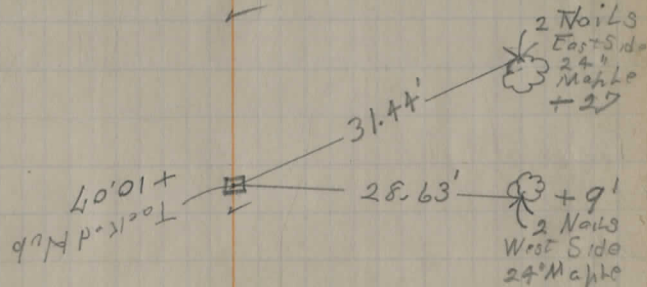
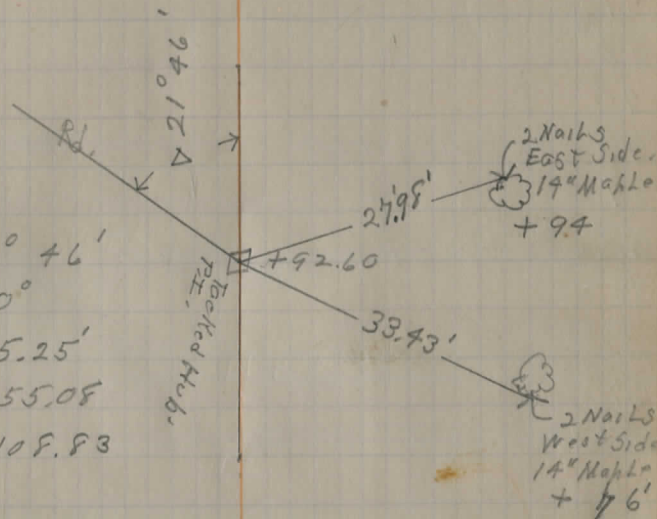
28

27

26

25

$A = 21^{\circ} 46'$   
 $D = 20^{\circ}$   
 $Ext. = 5.25'$   
 $Tan. = 55.08$   
 $L = 108.83$



9 ✓

42

41

40

39

38

37

36

35

34

33

32

31

30

⊕

10

11

49 + 30.95 = P.T.

49

48

47

46 + 82.77 = P.I.

46

45

44 + 47.10 = P.C.

45

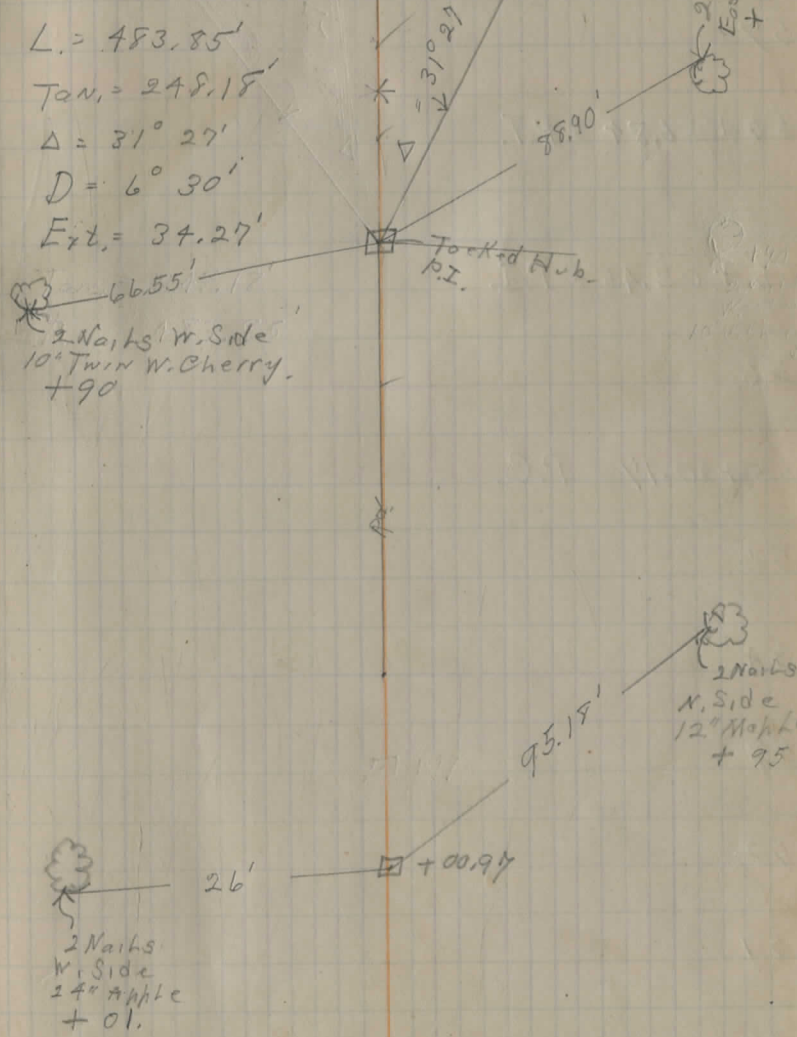
44

44 + 00.97

44

43

Q



$L = 483.85'$   
 $Tan_1 = 248.18'$   
 $\Delta = 31^\circ 27'$   
 $D = 6^\circ 30'$   
 $Ext. = 34.27'$

12

57

$$56 + 86.84 = P.T.$$

$$56 + 03.45 = P.I.$$

56

$$55 + 20.17 = P.C.$$

55

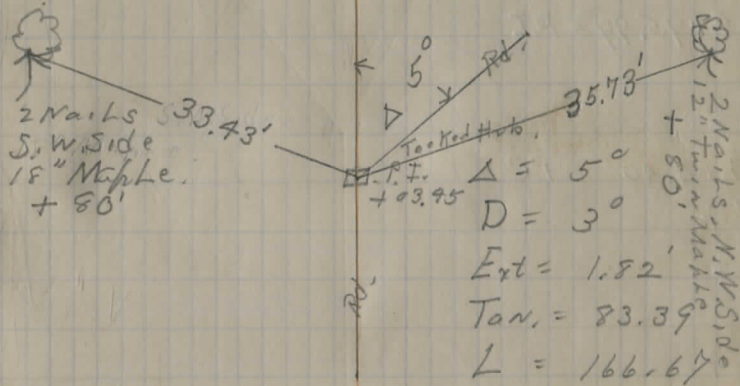
54

53

52

51

50



15

65 + 87.73 = P.T.

65

64 + 95.99 = P.I.

64 + 4.40 = P.C.

64

63

62

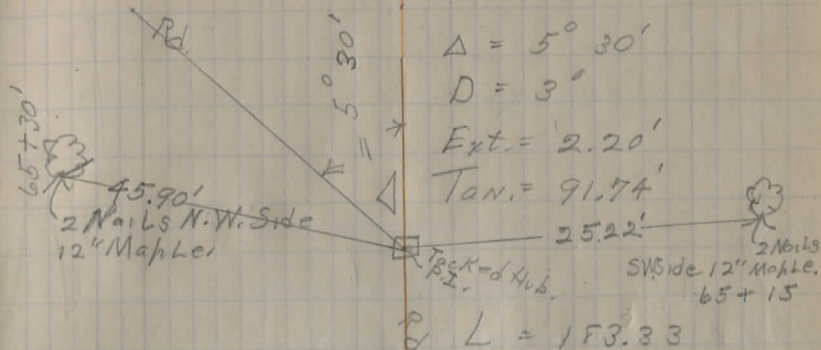
61

60

59

58

16



17

75

74

73

72

71

70

69

68

67

66

18

18

19

82

81

80

79 + 75.42 = P.T.

79 + 02.91 = P.I.

79

78 + 31.33 = P.C.

78

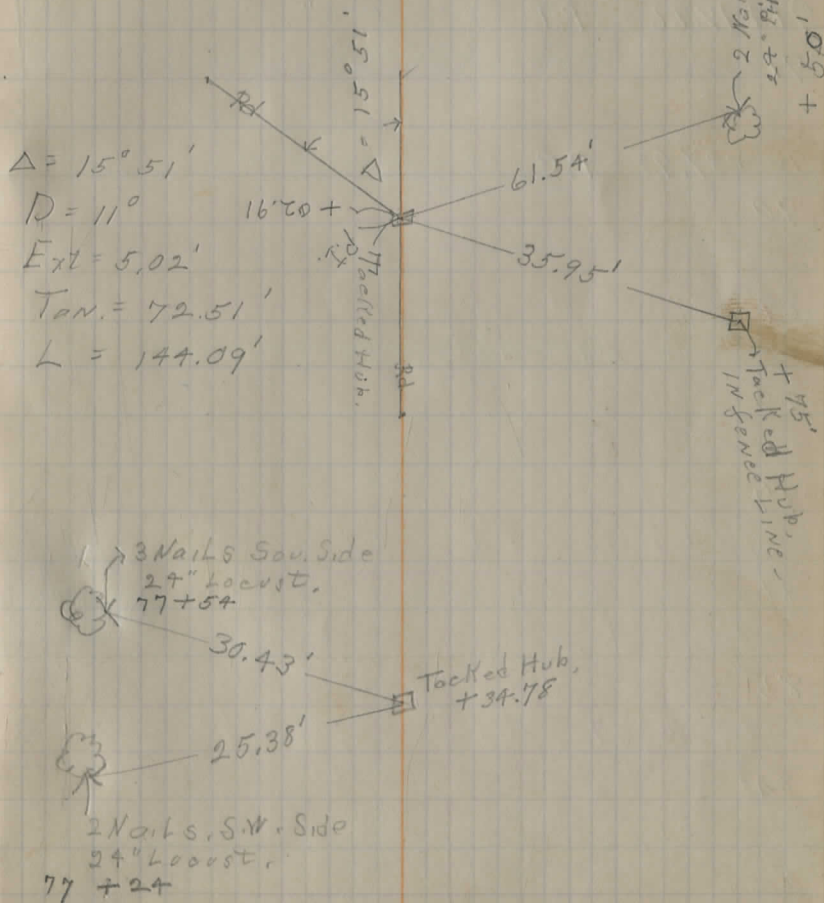
77 + 34.75

77

76

20

20





101

100

99

98

97

96

95 + 23.09 = P.T.

95

94 + 42.96 = P.I.

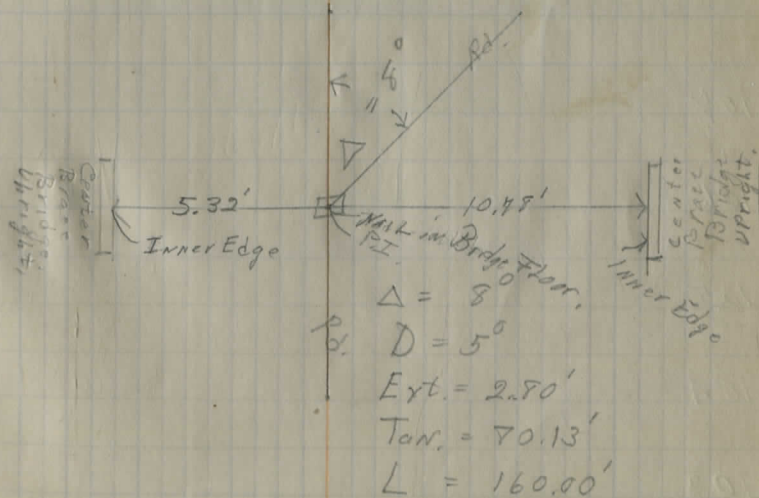
94

93 + 63.09 = P.C.

93

24

24



111

110

109

108

107 + 55.91

107

106

105

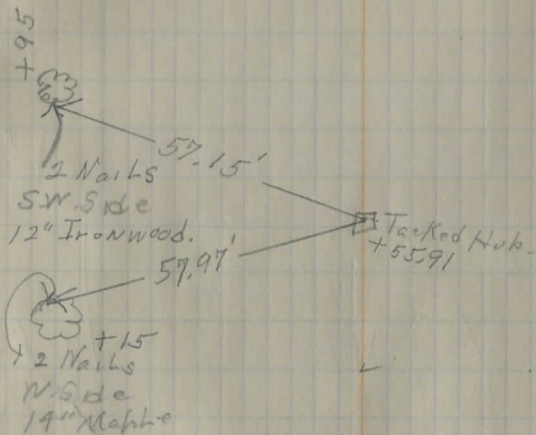
104

103

102

25

26



119

118 + 48.40

118

117

116

115

114

113

112

+90  
2 Nails  
N.E. Side  
15" W. Cherry.

49.98'

+48.40

Tacked Hub.

64.55'



+90

2 Nails. S.E. Side  
12" Hickory.

7

8



133

Offset 35'

132

$$\begin{array}{r} 126495.45 \\ 1211977 \\ \hline 57568 \\ 200 \\ \hline 375.68 \end{array}$$

131

130

129

128

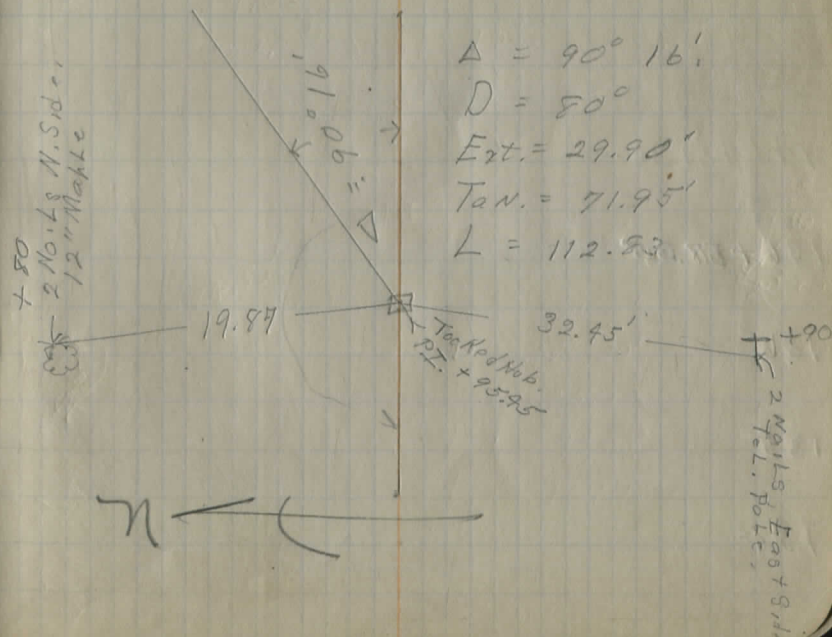
$$\frac{2.404 \text{ miles}}{5280} = 12695.4$$

$$127 + 67.65 = P.T.$$

$$127 + \text{Offset} - 35'$$

$$126 + 95.45 = P.I.$$

$$126 + 54.82 = P.C.$$



142

141

140

139

138

137

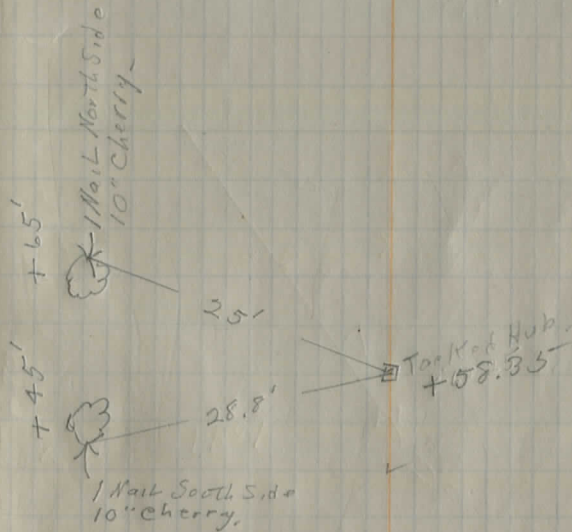
136 + 58.35

136

135

134

L



147+13  
 121 19.77  
 -----  
 25 93.23  
 - 5 44.40  
 -----  
 2048.83

X 147+13

147

617

X 146+51.30

146

145

144

143

← Winslow Rd.

147+13  
 146+51.30  
 145  
 144  
 143

2 Nails, N.E. Side  
 16" Gumbo



29.67'

⊥

⊠ Tacked Hub.  
 +13

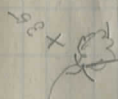
40.88'

147+13  
 146+51.30  
 145  
 144  
 143

31.33'

⊠ Tacked Hub.  
 +51.30

24.05'



2 Nails, S.E. Side  
 14" Maple

Vertical text in the center gutter, possibly bleed-through from the reverse side.

Faint horizontal text on the left page, possibly bleed-through.

Vertical text in the center gutter, possibly bleed-through.

Faint horizontal text on the left page, possibly bleed-through.

Vertical text in the center gutter, possibly bleed-through.



Topography Hatchkiss Rd.

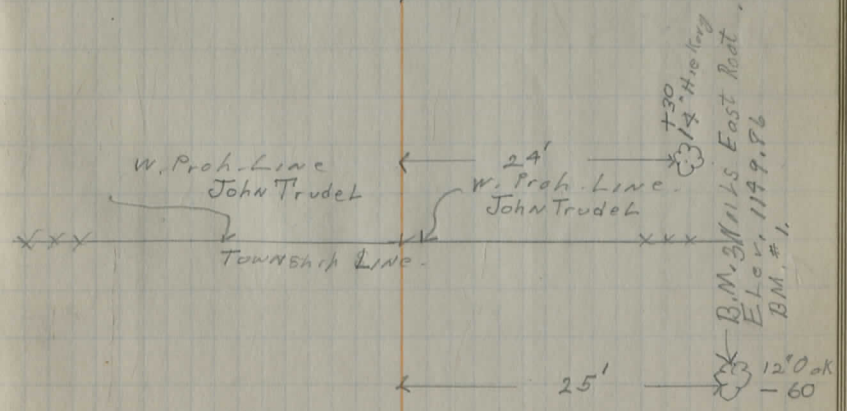
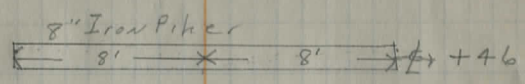
ELwell  
Grou  
Juss

3

2

1

0+00




7


6

5

4

← 25' —  13" Mahl-  
+45

✓

← 26' —  +55  
3 Noths  
North Root  
18" AppLo.  
BM. #2  
Elev.  
1150.15

✓

✓

✓

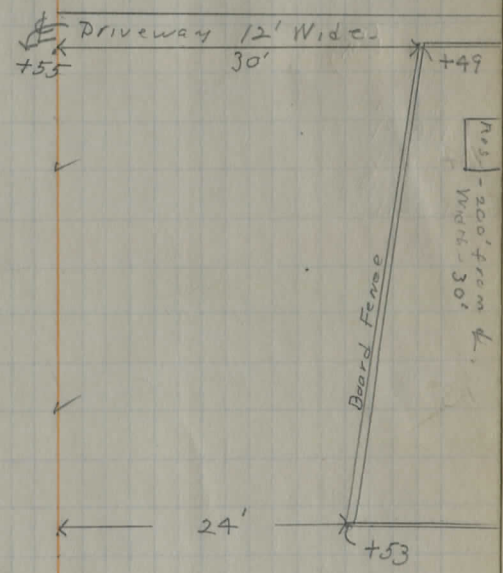
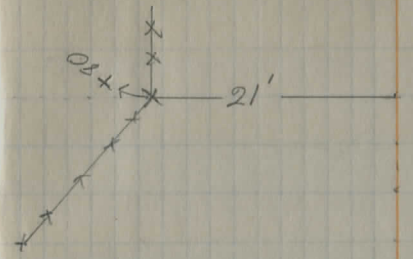
11

72 + 83

10

9

8

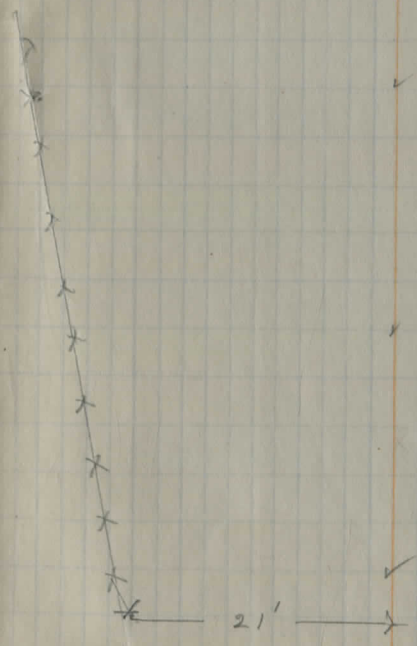
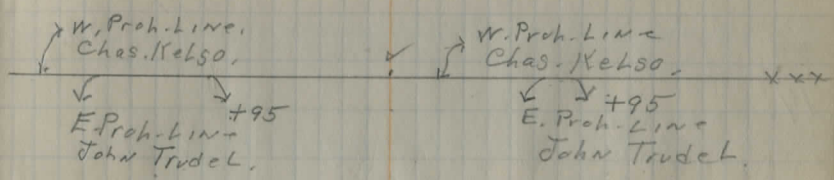


15

14

13

12

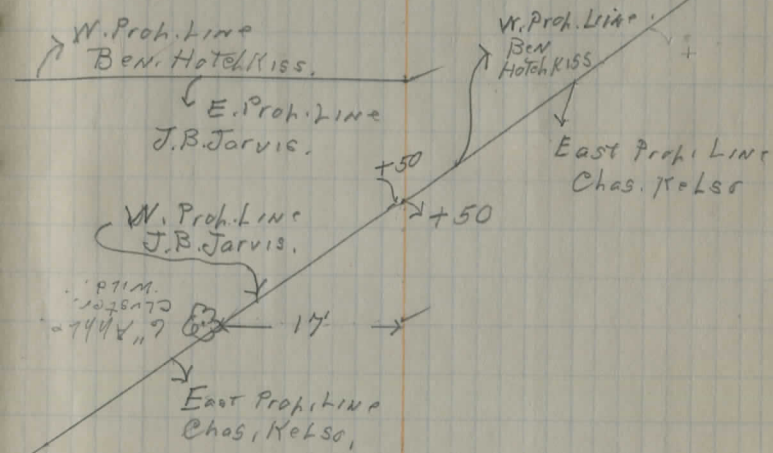


19

18

17

16



23

22

21

20

✓

✓

✓

✓

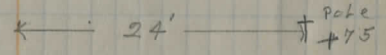
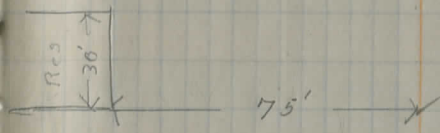
27

26

25

24

52



✓

✓

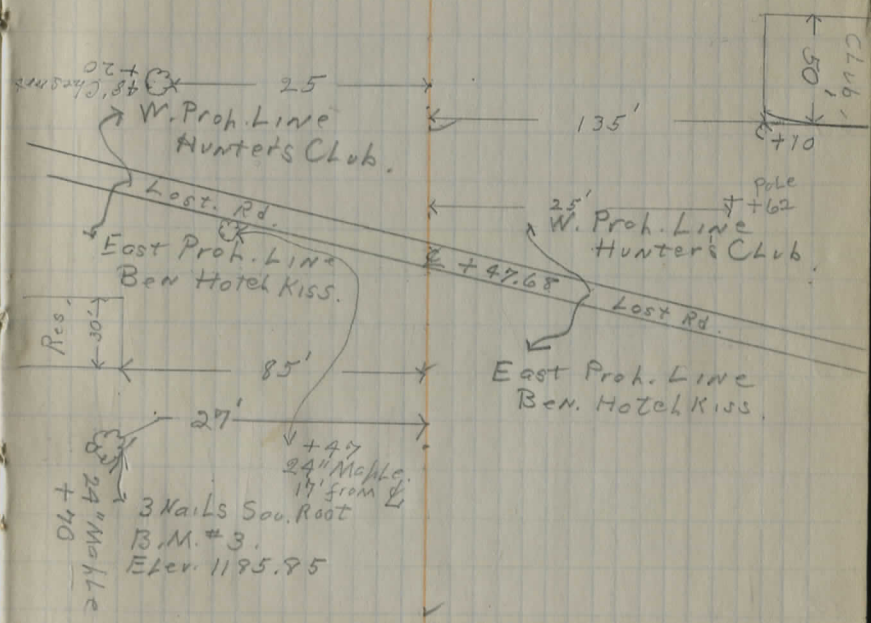
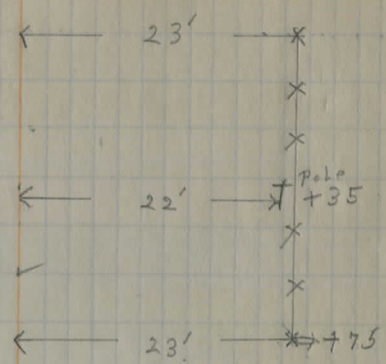
✓

31

30

29

28

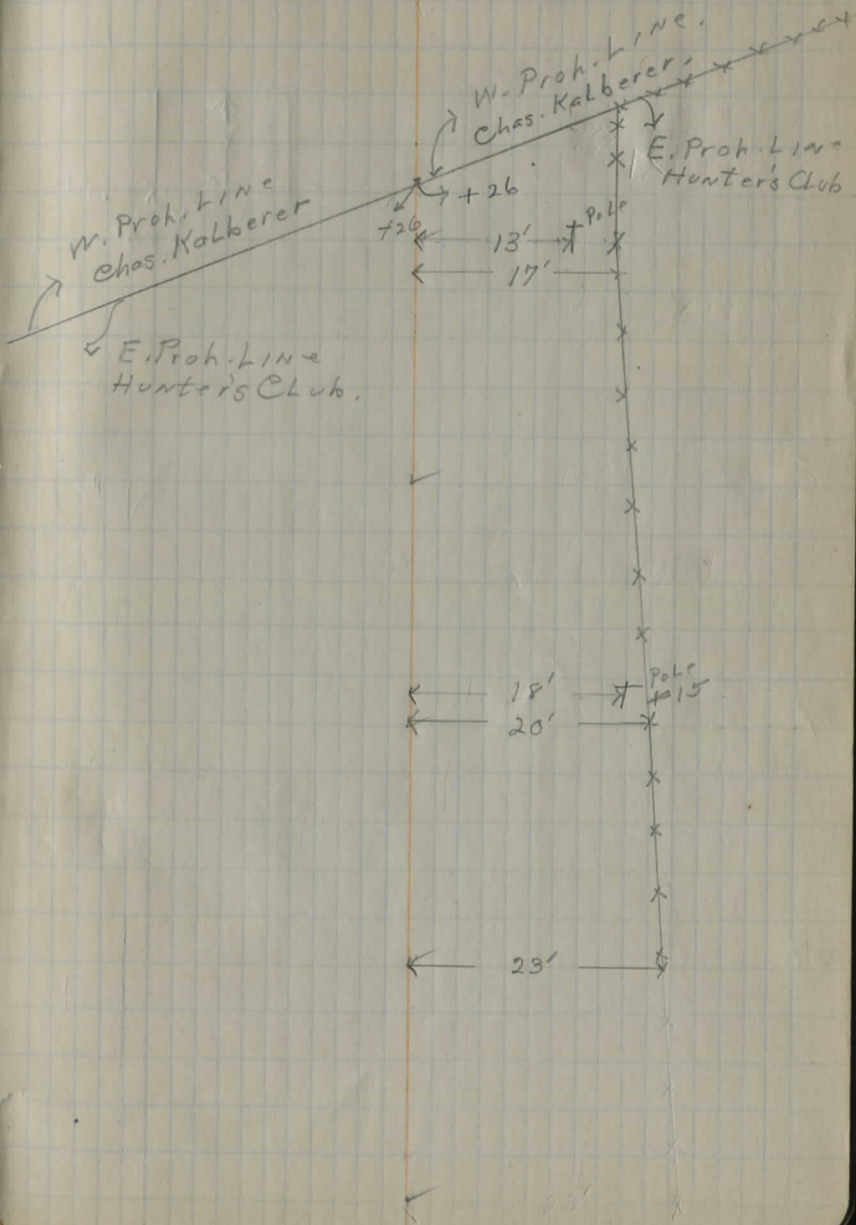


35

34

33

32





43

42

41

40

L

← 22' — Pole +78

← 22' — x x x x  
x → +15

← 22' — Pole +25

← 24' — x

← 26' — x +70

← 22' — Pole +50

← 25' — 12" Butter nut +15

← 25' — 18" Butter nut +10 nut

← 23' — 48" Nipple +10

← 70' — 30' Basin

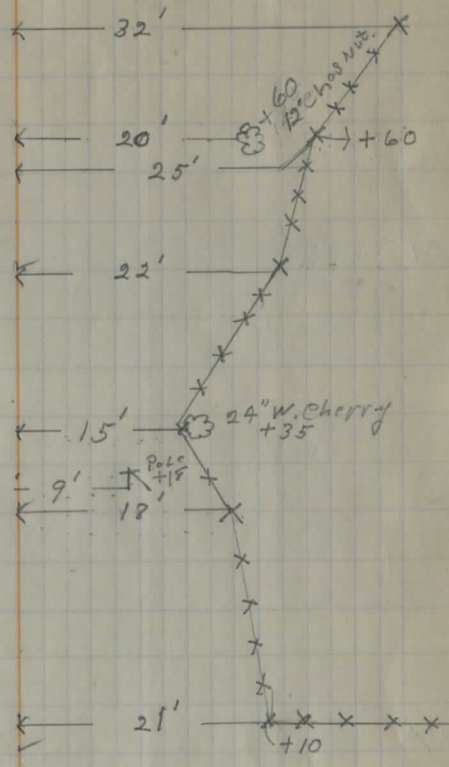
Basin

47

46

45

44



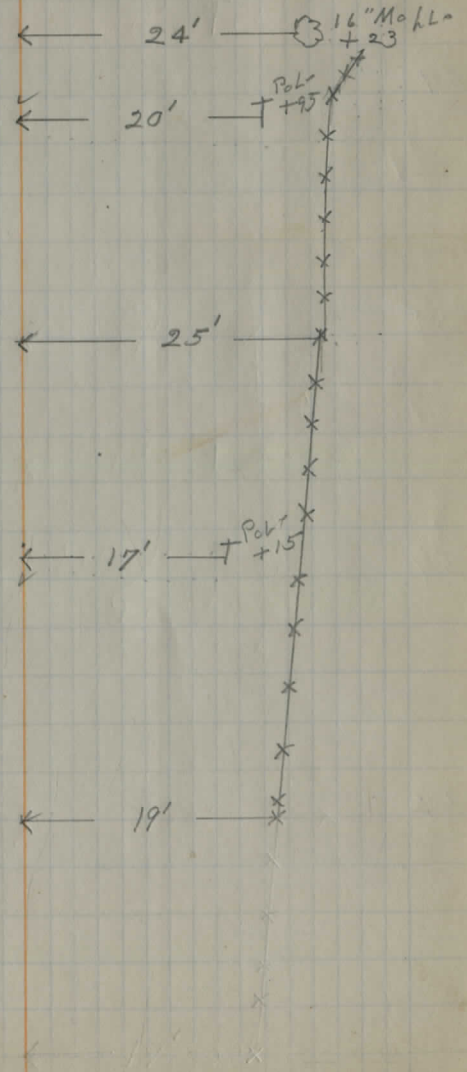


55

54

53

52





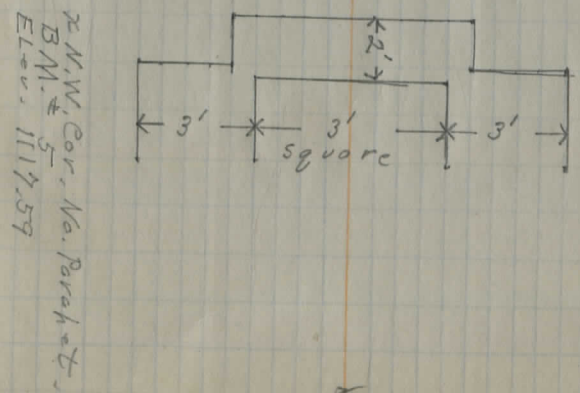
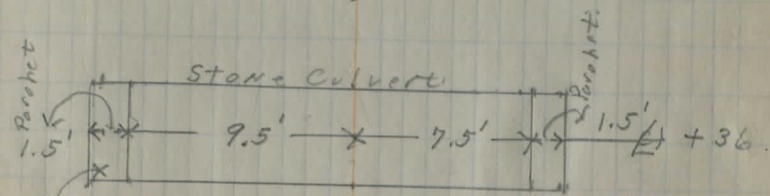
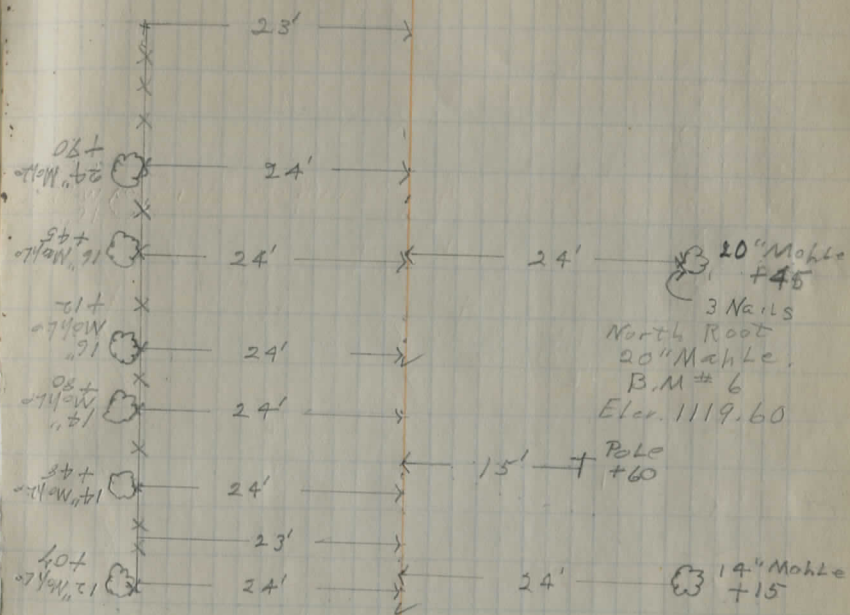
61

62

60

61

60







77

72

71

70

W. Prop. Line  
Joe Adamich

E. Prop. Line  
S. & C. Camp, L. L.

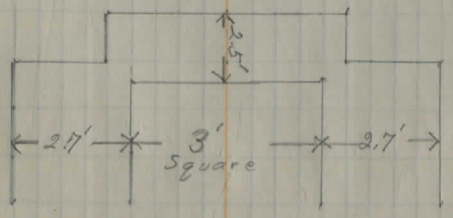
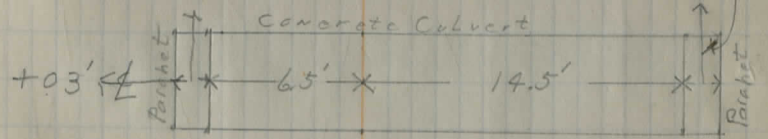
78

75

+70

17' Pol. +60

064	16" Mohl	19'	→
074	12" Mohl	19'	→
079	8" Mohl	19'	→



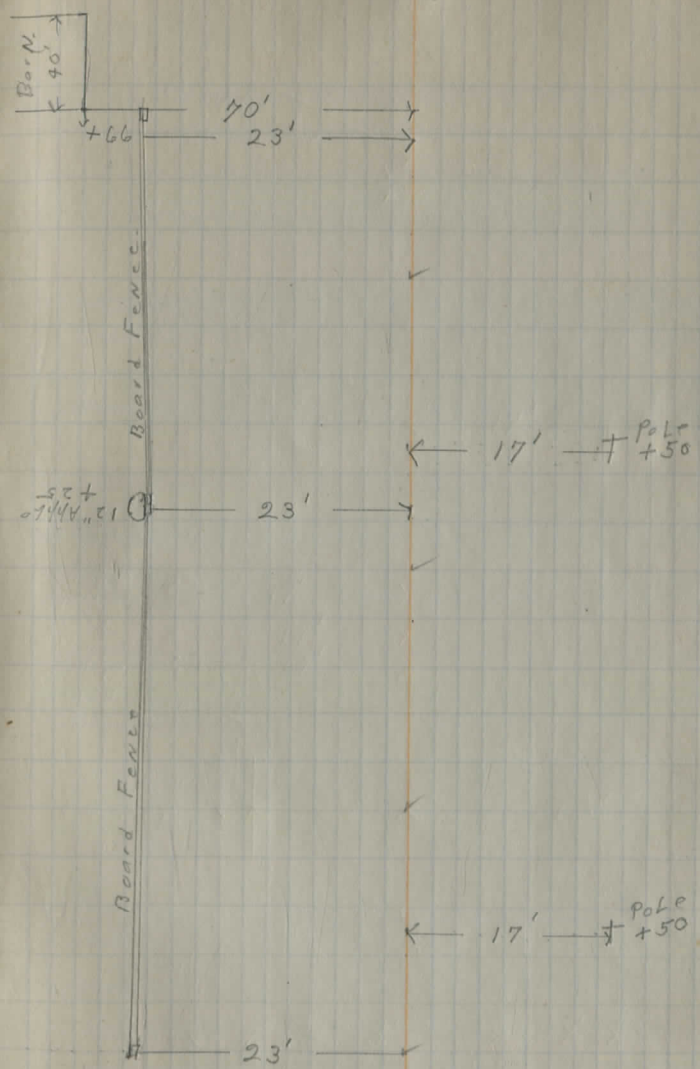
S. E. Cor. Squ. Parahet.  
B.M. # 7  
Elev. 1113.46

76

75

74

73



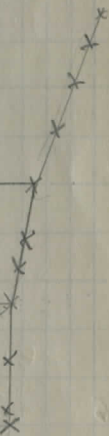
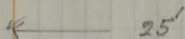
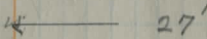
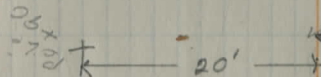
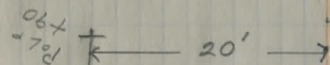
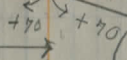
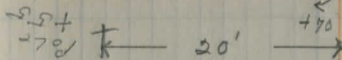


W. Prop. Line  
Edw. Williams.

East Prop. Line  
Joe Adamich

W. Prop. Line  
Fred Talcott.

East Prop. Line  
C. Williams.



89

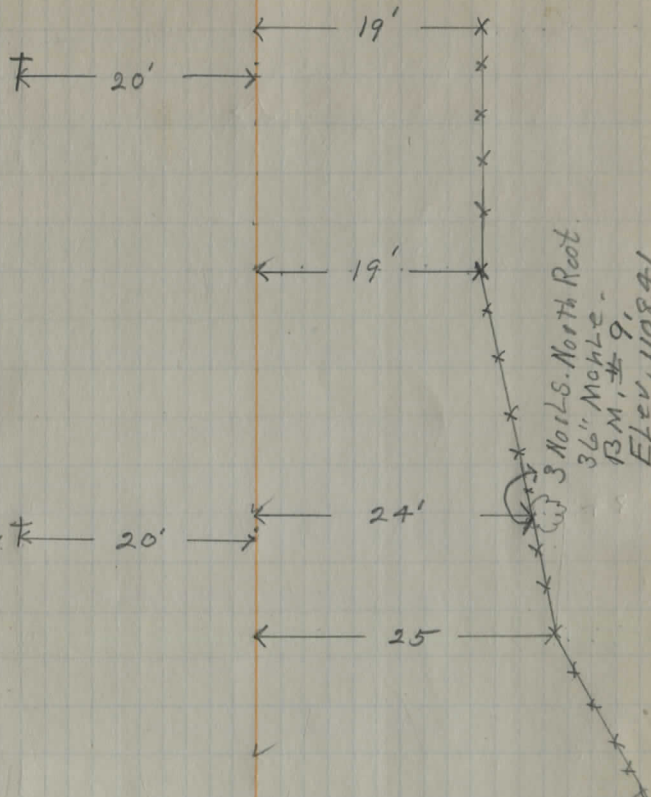
88

87

86

58x  
270

⊥



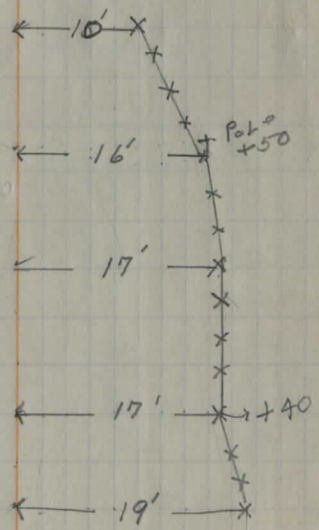
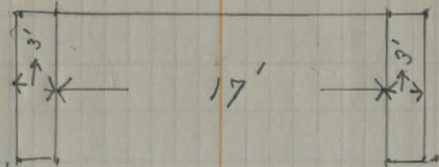
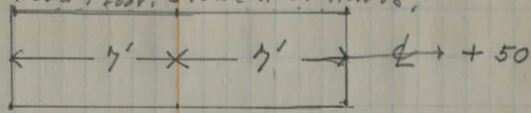
06x  
270

92

91

90

Wood Floor, Stone Abutments,

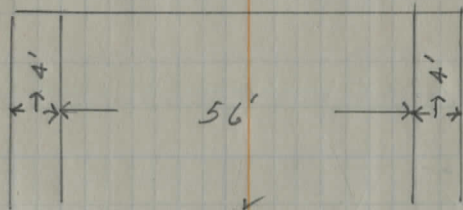
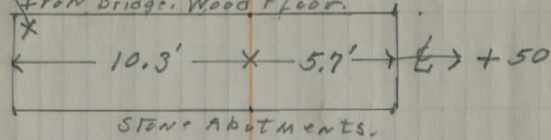


17'

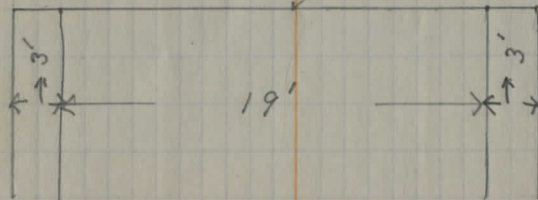
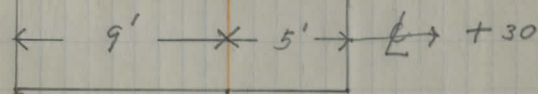
L

x N.W. cor.  
North Abutment.  
B.M. # 11.  
Elev. 1107.07

From Bridge. Wood Floor.



Wooden Floor. Stone Abutments.



94

93



99

98

97

96

L

← 23' — X

X

X

← 17' — X Pole  
+50

X

X

X

X

X

X

X

← 23' — X

X

← 17' — X Pole  
+60

X

X

← 23' — X

X

X

X

X

X

← 25' — X

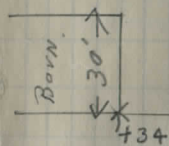
X

103

102

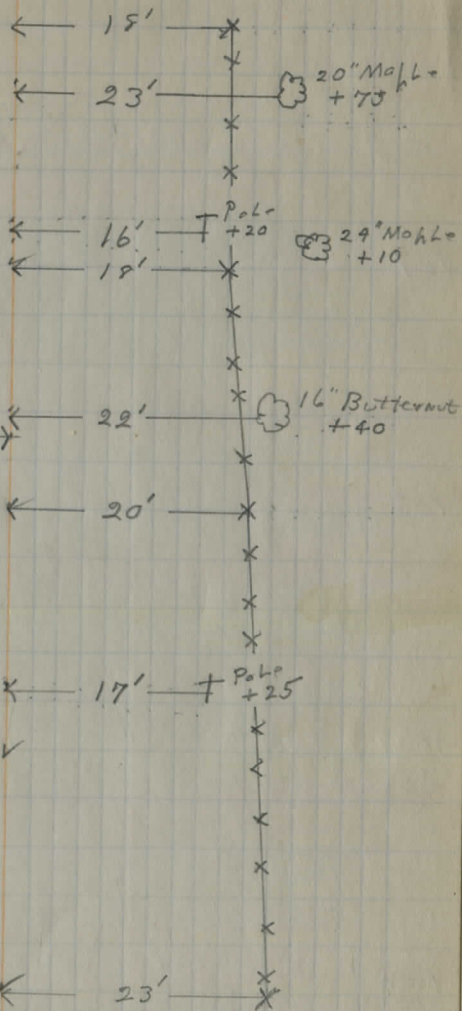
101

100



150'

L





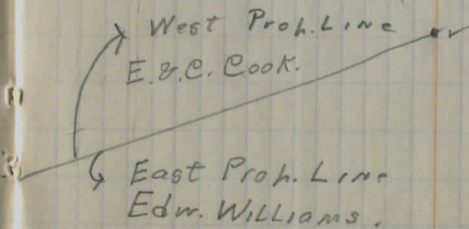
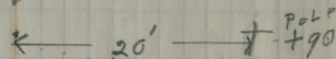
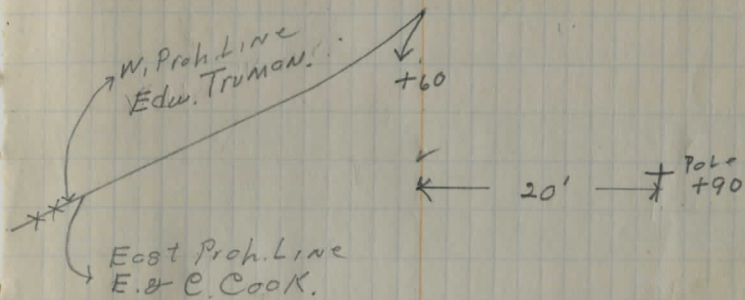


115

114

113

112

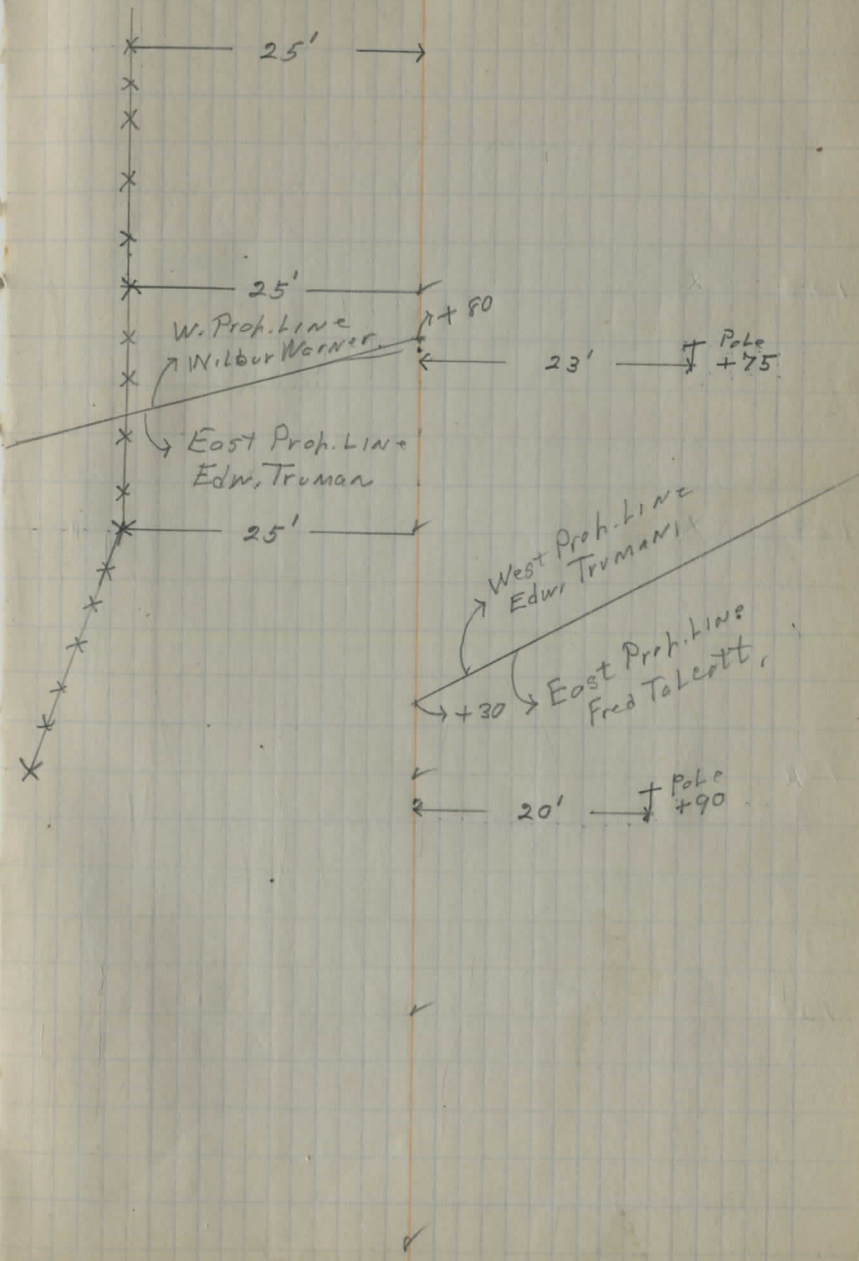


119

118

117

116

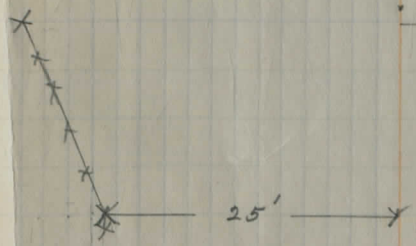
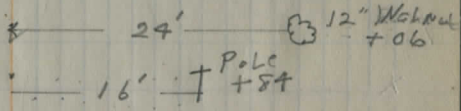
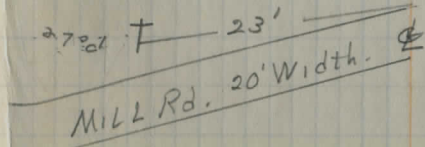
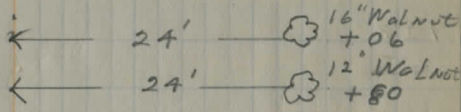
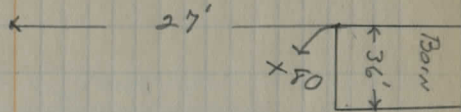


123

122

121

120



See page 119

127

+95.41

126

125

124

West Prop. Line  
Claude Strang.

Poke Cor's Rd. Width - 50'

25'

12" Maple  
+90

22'

10" Maple  
+80East Prop. Line  
Edw. Truman.

25'

16' 18" ELM

40'

55'

24" Walnut  
+40

24'

3+09

3 Nails  
No. Root  
24" B. Walnut  
B.M. # 13.  
Elev. 1232.14

126 + 95.41 - 54' 56" + 20' 1/2"

05 + T  
+79'Roo.  
24"  
+30Blind  
11"

109

131

130

129

128

110

2

+95  
+70  
k 15'

✓

+15  
+70  
k 15'

✓

+50  
+70  
k 15'

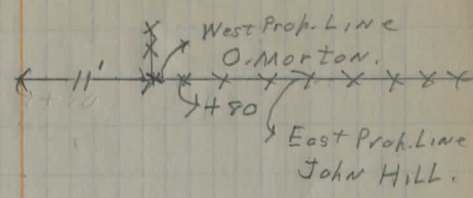
✓

✓

135

West Prop. Line  
S.W. Mauck.

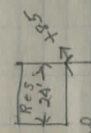
East Prop. Line  
Wilbur Warner.



+25

134

Driveway, 10' Wide.



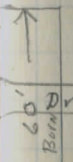
65'

Pole  
+36

+20

133

Driveway - 10' Wide.



60'

200'

West Prop. Line  
John Hill.

Rd. 50' Wide, +20  
Carleton St.

East Prop. Line  
Claude Strang.

+80

132

♀

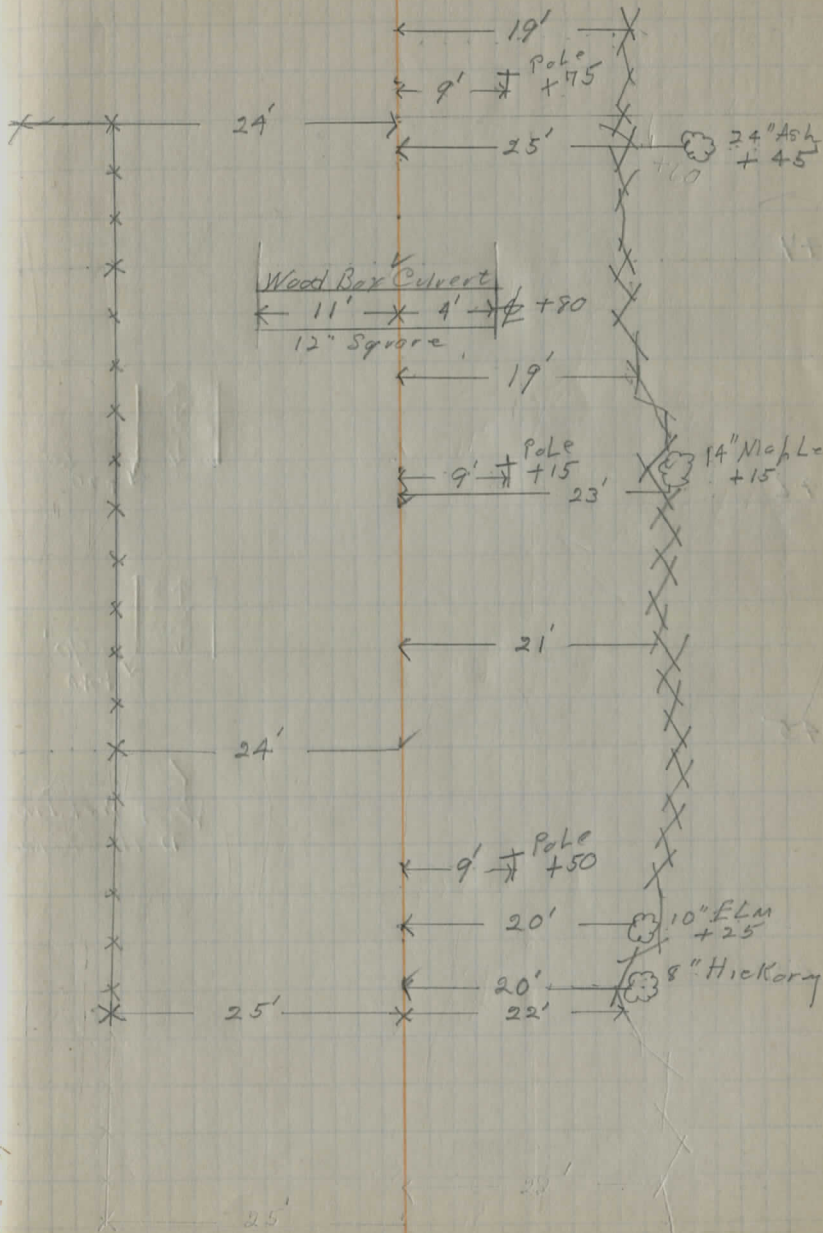


143

142

141

140





1. 10/10/1919  
 2. 10/11/1919  
 3. 10/12/1919  
 4. 10/13/1919  
 5. 10/14/1919  
 6. 10/15/1919  
 7. 10/16/1919  
 8. 10/17/1919  
 9. 10/18/1919  
 10. 10/19/1919  
 11. 10/20/1919  
 12. 10/21/1919  
 13. 10/22/1919  
 14. 10/23/1919  
 15. 10/24/1919  
 16. 10/25/1919  
 17. 10/26/1919  
 18. 10/27/1919  
 19. 10/28/1919  
 20. 10/29/1919  
 21. 10/30/1919  
 22. 10/31/1919

1. 10/10/1919  
 2. 10/11/1919  
 3. 10/12/1919  
 4. 10/13/1919  
 5. 10/14/1919  
 6. 10/15/1919  
 7. 10/16/1919  
 8. 10/17/1919  
 9. 10/18/1919  
 10. 10/19/1919  
 11. 10/20/1919  
 12. 10/21/1919  
 13. 10/22/1919  
 14. 10/23/1919  
 15. 10/24/1919  
 16. 10/25/1919  
 17. 10/26/1919  
 18. 10/27/1919  
 19. 10/28/1919  
 20. 10/29/1919  
 21. 10/30/1919  
 22. 10/31/1919

121

122

123

124

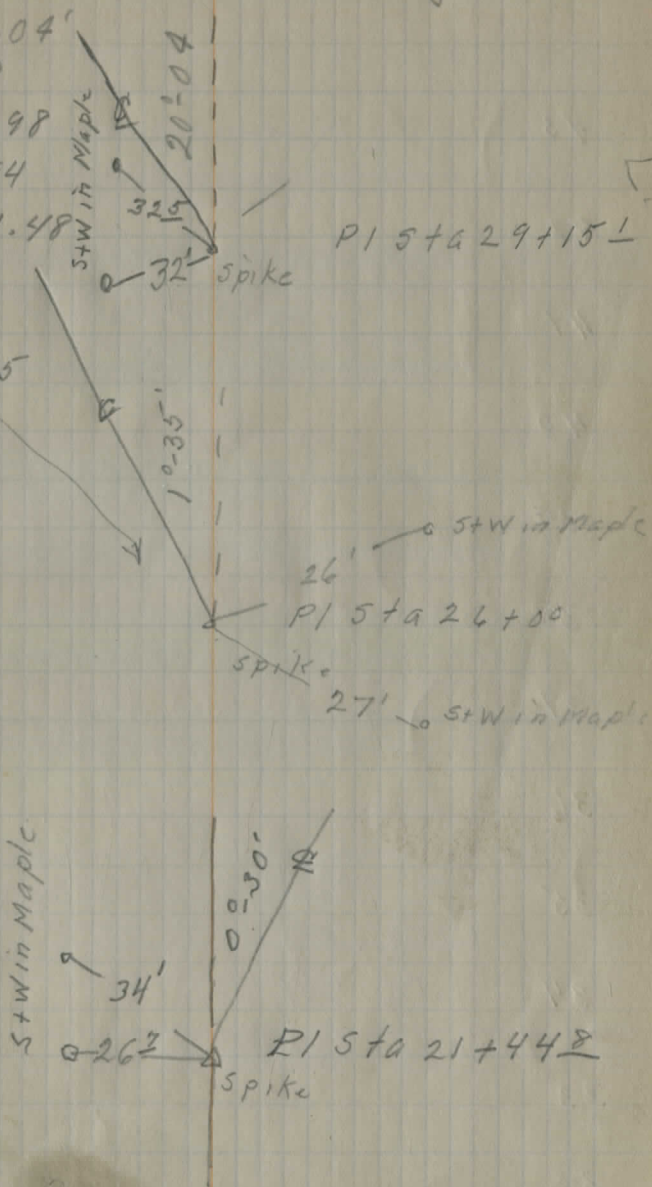
New Location Sta

1850 20 4-19-20  
L=104.00 @ 4 ac  
30

- 31 
$$\begin{array}{r} 1018.9 \\ 1016.3 \\ \hline 8.6 \\ 3.44 \end{array}$$
- 30 
$$\begin{array}{r} 1010.3 \\ 18 \overline{)11043.74} \quad (57.99 \\ \underline{180} \\ 1843 \\ \underline{180} \\ 177 \\ \underline{150} \end{array}$$
- 29 18 
$$\begin{array}{r} 20.066 \overline{)111.48} \\ \underline{18} \\ 20 \\ \underline{28} \\ 26 \\ \underline{18} \\ 86 \\ \underline{72} \\ 140 \end{array}$$
- 28 
$$\begin{array}{r} 29 + 15.1 \\ \underline{60.0} \\ 21 + 55.1 \\ \underline{1 + 11.48} \\ 29 + 66.58 \\ \underline{60.1} \\ 57.89 \\ 57.39 \\ \hline 1.50 \\ 60.0 \end{array}$$
- 27 
$$\begin{array}{r} 29 + 15.1 \\ \underline{60} \\ 29 + 75.1 \end{array}$$
- 26 
$$\begin{array}{r} 1004.0 \\ 46.88 \\ \hline 83.42 \end{array}$$
- 25 
$$\begin{array}{r} 5 \overline{)55.99} \quad (11.198 \\ \underline{5} \\ 55 \\ \underline{55} \\ 39 \\ \underline{35} \\ 49 \end{array}$$
- 24 
$$\begin{array}{r} 18 \overline{)88.99} \quad (4.94 \\ \underline{18} \\ 70 \\ \underline{72} \\ 164 \\ \underline{152} \\ 79 \end{array}$$
- 23
- 22
- 21

21+00 to End of Survey

$\Delta = 20^{\circ}04'$   
 $D = 18^{\circ}$   
 $T = 59.98$   
 $E = 4.94$   
 $L = 111.48$



43

42

41

40

39

38

37

36

35

34

33

32

J+W in  
 Maple  
 1810-20'  
 54°  
 29° PISTO 39+1985

$$\frac{7}{8} 17 = 10$$

54

$$\frac{7}{8} 17 = 17.5$$

$$\frac{7}{8} 2 = 1.75$$

53

$$\frac{7}{8} 1.28 = 1.1$$

52

51

50

49

48

47

$$\Delta = 30^\circ - 50'$$

$$D = 7^\circ - 30'$$

46

$$E = 28^\circ - 52'$$

$$T = 210.7$$

45

$$L = 411.11$$

$$E_{94} = 10.3$$

44

$$PC = 45 + 06.3$$

$$PT = 49 + 17.4$$

$$\frac{7.5}{45} 26 = 10.6$$

$$\frac{52.5}{45}$$

$$\frac{210.7}{45} = 4.68$$

$$\frac{50}{45} = 1.11$$

$$\frac{20}{45} = 0.44$$

$$\frac{5.25}{45} = 0.117$$

$$\frac{36.75}{45} = 0.817$$

$$\frac{8.25}{45} = 0.183$$

$$185.25$$

$$\frac{211}{53}$$

$$\frac{128}{53}$$

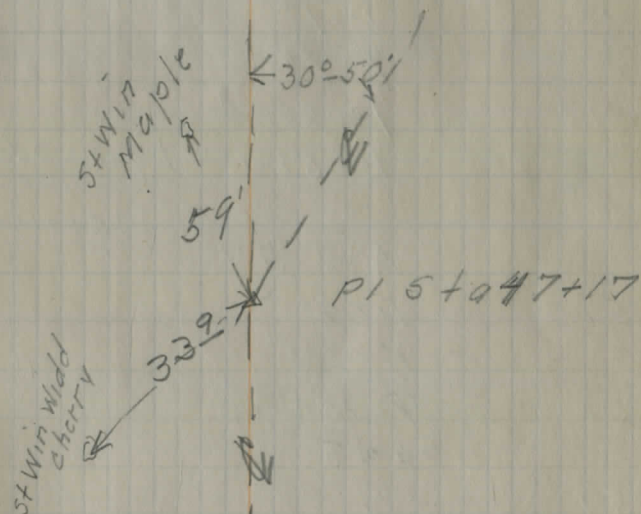
$$\frac{1.3}{39}$$

$$\frac{1.3}{39}$$

$$\frac{1.3}{39}$$

$$\frac{1.3}{39}$$

$$\frac{1.3}{39}$$



131  
 $7 \overline{) 53.4743}$   
 $7 \overline{) 784.0(112}$

$\Delta = 150.35'$   
 $D = 70.00$   $E_{qu} = 1.7$   
 $T = 112.0$   
 $E = 763$   
 $L = 222.6$

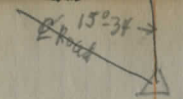
$7 \overline{) 155833(2226}$   
 $\underline{14}$   
 $18$   
 $\underline{18}$   
 $43$

5.48 5.80

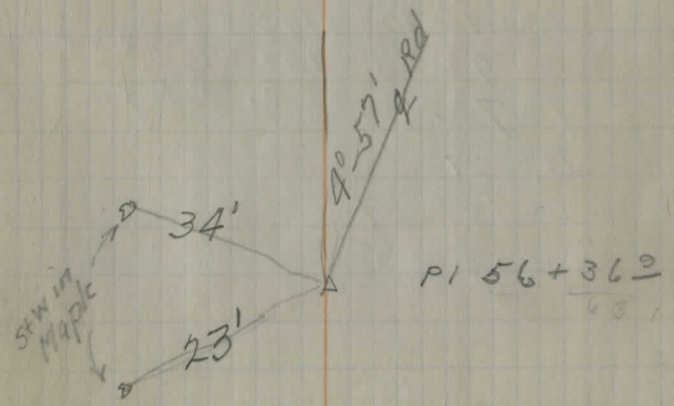
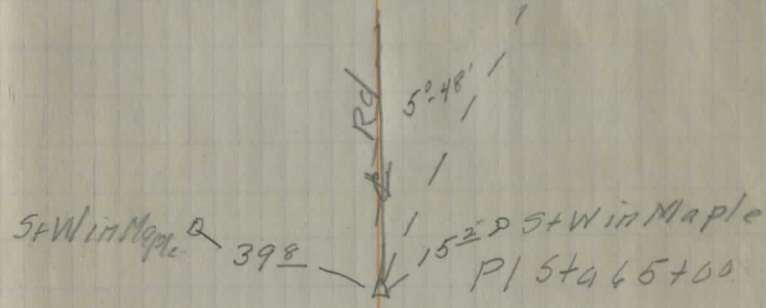
66  
 65  
 64  
 63  
 62  
 61  
 60  
 59  
 58  
 57  
 56  
 55

$\Delta = 50.48'$   $\frac{2}{5} \cdot \frac{-8'}{3\frac{1}{2}}$   
 $D = 1^{\circ}$   
 $E = 74$   $290.3$   
 $T = 290.3$   $\underline{580.6}$   
 $L = 580$   $E_{qu} = 0.6$

$\Delta = 4^{\circ}57'$   $3 \overline{) 55118}$   
 $D = 2^{\circ}$   $\frac{2}{25}$   
 $E = 225'$   
 $T = 150.05$   
 $K = 5$



$282 \circ S+W in FP 132$   
 $PI 5+9.78+73'$   
 $25L \circ S+W in FP$



133  
 3) 5.5 (183  
 25  
 3) 257.2 (834  
 24 1668  
 2  
 3) 5 U66Z  
 2

$A = 50.00'$   
 $T = 834$   
 $D = 30.00'$   
 $E = 1.83$   
 $L = 166Z$

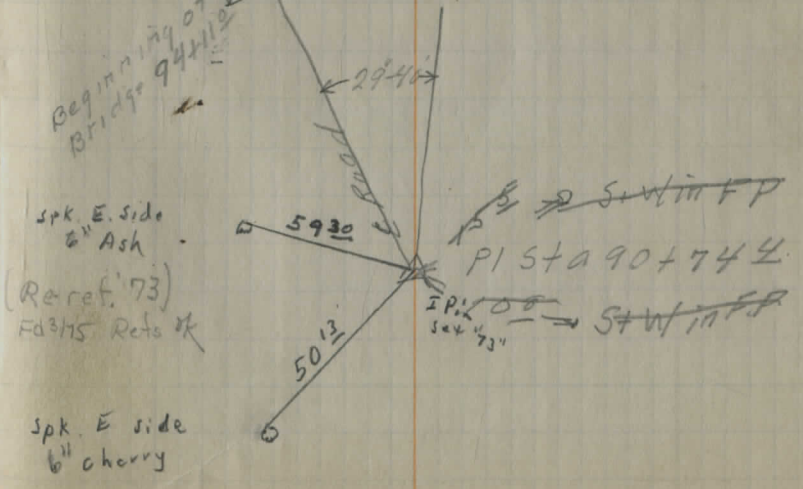
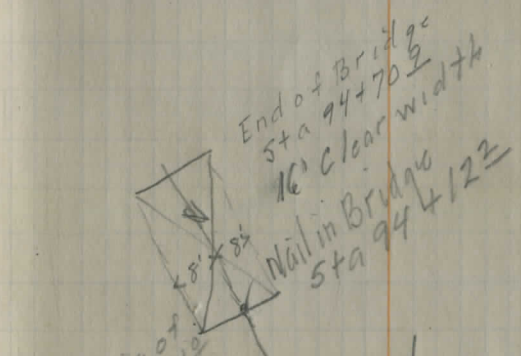
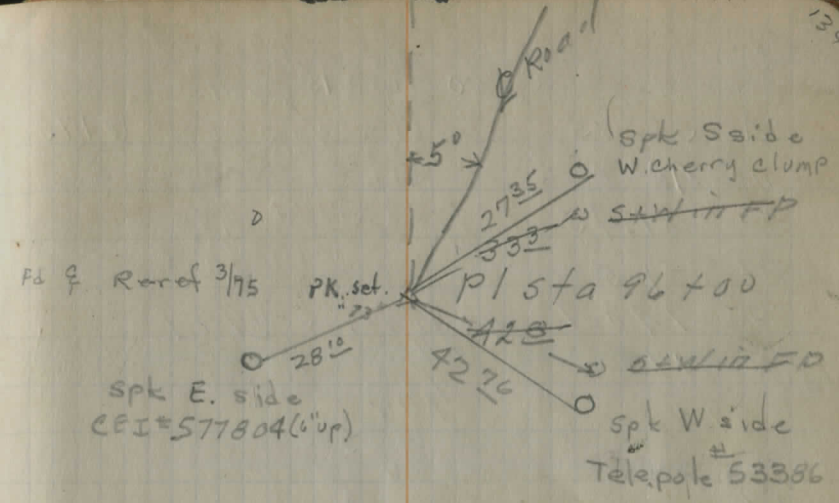
96  
 77709  
 1878  
 129.1

21) 1517.4 (7226  
 147  
 47  
 42  
 54  
 820  
 120  
 1517.4

21) 29.6667 (14127  
 21  
 86  
 84  
 26  
 21  
 56  
 42  
 740

21) 157.5 (94  
 189  
 298  
 9) 97.5 (21  
 157

$A = 29.40'$  144.52  
 $E = 94$  141.27  
 $T = 72.26$  3.25 Equ  
 $D = 21$   
 $L = 141.27$   
 $Equ = 3.25$



$\Delta = 59^{\circ}15'$   
 $D = 40^{\circ}00'$   
 $T = 81.45$   
 $E = 21.5$   
 $L = 148.1$   
 $Eqn. 148$

$81.45$   
 $\frac{2}{162.90}$   
 $\frac{148.10}{14.80}$

$12$   
 $\frac{81.5}{345}$   
 $47.0$

120-48

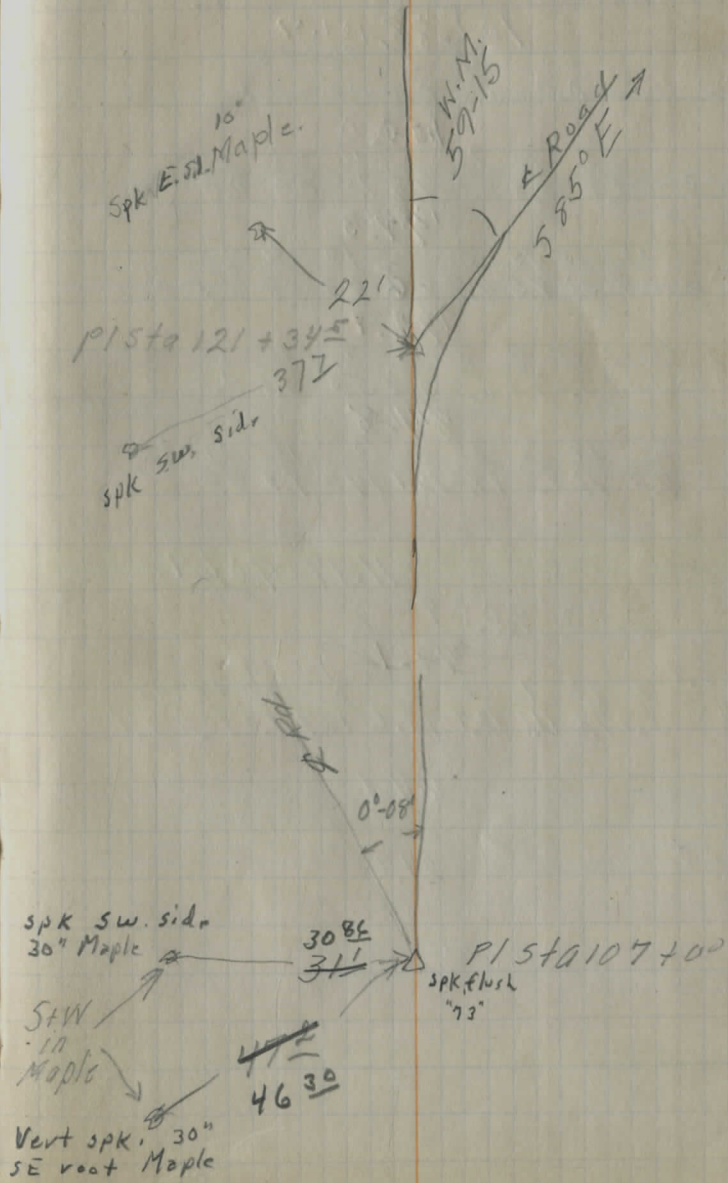
$179-60$   
 $\frac{120-48}{59-15}$   
 $40 \overline{) 3258.218145}$   
 $\frac{320}{58}$   
 $\frac{40}{192}$   
 $\frac{160}{325}$   
 $\frac{160}{225}$

$40 \overline{) 59.25 (1481}$   
 $\frac{40}{192}$   
 $\frac{160}{325}$   
 $\frac{320}{50}$

$100$   
 $\frac{34.5}{65.5}$

$107$   
 $\frac{9670}{11}$

$179-60$   
 $\frac{5915}{120-45}$



$0^{\circ}08'$   
 $308E$   
 $\frac{311}{4630}$   
 $Pista 107 + 00$   
 $Spk flush "73"$   
 $SW in Maple$   
 $Vert Spk. 30" SE root Maple$

# Levels for Hill on Hotchkiss Road

1.88

100.00 B.M.A

summed 30' L + E Sta 107+05 Spike in E Root Maple

	$\frac{25}{2.5}$	$\frac{19}{2.3}$	$\frac{13}{2.1}$	$\frac{9}{1.9}$	$\frac{3}{1.8}$	$\frac{11}{2.5}$	
109+00	0.0	0.6	0.0	0.2	-0.3		

	$\frac{25}{2.8}$	$\frac{19}{2.3}$	$\frac{10}{2.1}$	$\frac{9}{1.9}$	$\frac{11}{1.8}$	$\frac{2.2}{0.0}$	$\frac{2.6}{0.0}$
108+00							

	$\frac{25}{2.4}$	$\frac{15}{3.0}$	$\frac{13}{2.5}$	$\frac{9}{4.9}$	$\frac{3}{4.6}$	$\frac{13}{4.5}$	$\frac{14}{3.6}$	$\frac{2.5}{2.5}$
107+00								

	$\frac{25}{3.2}$	$\frac{17}{3.0}$	$\frac{15}{5.2}$	$\frac{9}{4.9}$	$\frac{3}{6.0}$	$\frac{2}{5.8}$	$\frac{7}{5.5}$	$\frac{15}{5.1}$	$\frac{17}{3.3}$	$\frac{2.5}{2.7}$
106+80										

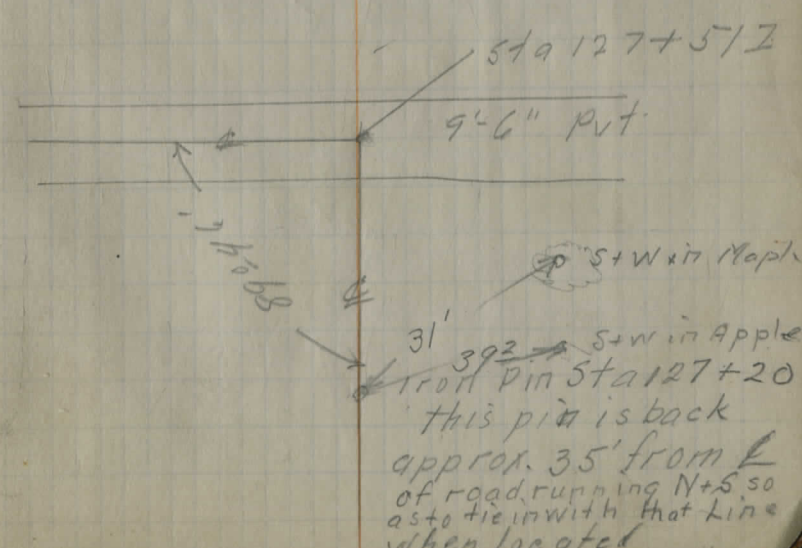
	$\frac{25}{7.2}$	$\frac{19}{7.0}$	$\frac{16}{8.6}$	$\frac{3}{14.2}$	$\frac{3}{14.1}$	$\frac{3}{14.2}$	$\frac{18}{9.3}$	$\frac{21-25}{8.2}$
106+00								

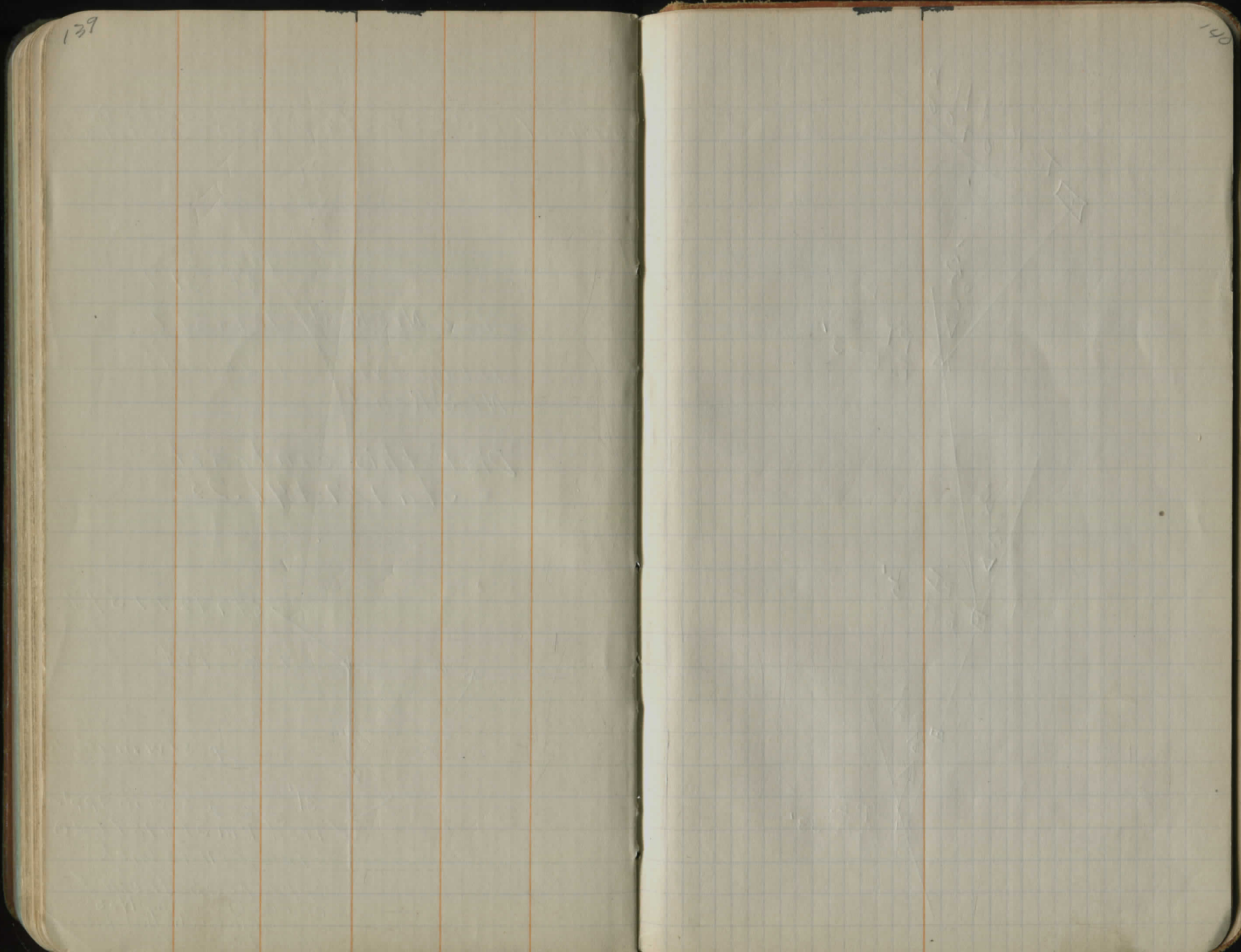
	0.00	90.69								
	$\frac{25}{5.8}$									
105+00	5.7	7.8	11.6	12.9	12.6	12.7	11.3	10.2	8.7	9.3

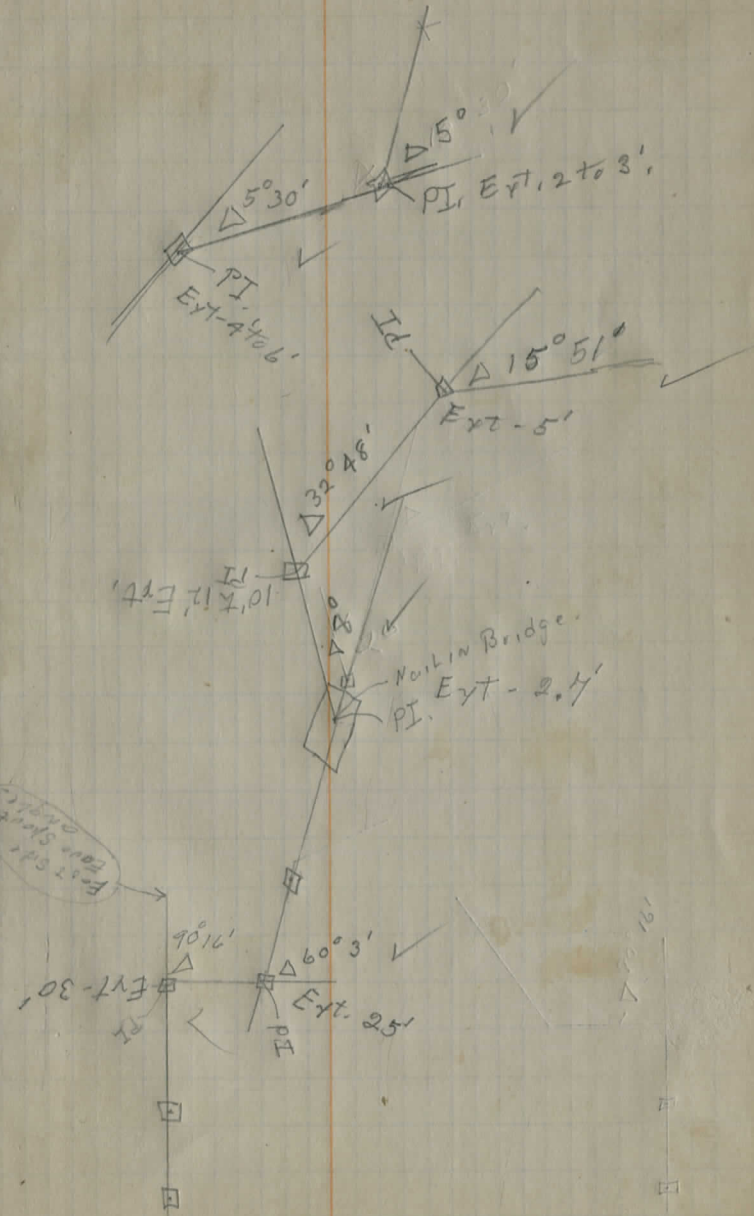
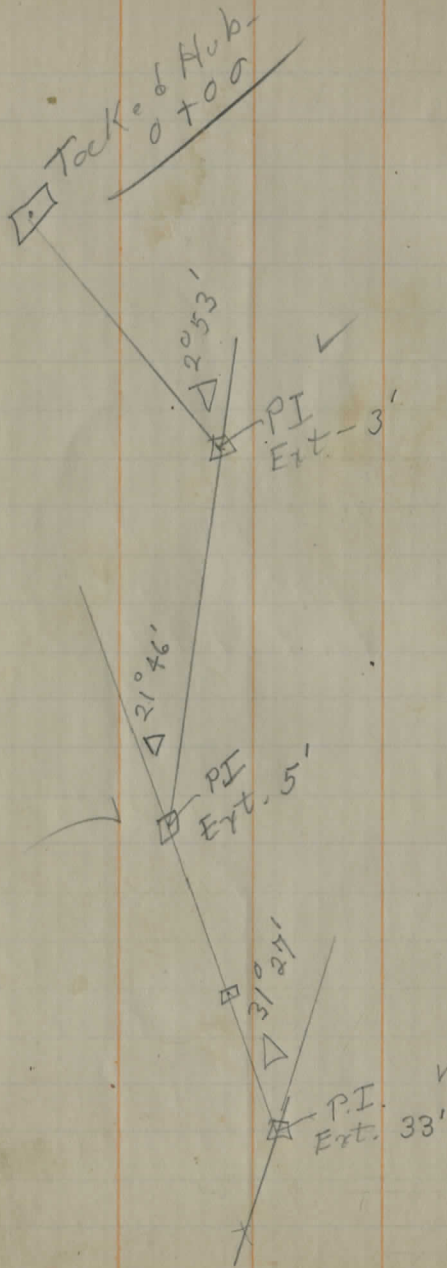
104+00										

	$\frac{127+20}{81}$	$\frac{31.7}{31.7}$
to N+S Road	$\frac{127+51.7}{4.75}$	
to Edge Pvt. N+S Road	$\frac{127+46.95}{}$	

Dist this contract = Sta 127+46.95







DIRECTIONS FOR USE OF TABLES

TABLE No. 1.

Distance of slope stake from side or shoulder  
take for any width roadway, slope 1/2 to 1.  
If ground is nearly level, the cut or fill at side  
stake is located by the double entry method in  
this table.

of table in same row and column gives distance

**IMPROVED TABLES**  
AND  
**INFORMATION**

TABLE No. 2.

To find Tangent and External for curve of  
any other degree, divide by degree of curve and  
add correction found in column of corrections.

Degree of curve with a given T may be found  
by dividing tangent (or external) opposite T by  
given tangent (or external).

The distance from a point on the tangent to  
the curve is very nearly the square of the tangent  
length divided by twice the radius.



TABLE II—Continued  
TRIGONOMETRIC FORMULAE (continued)

In any triangle:

Given a, b, C; to find c, B, A.

Use Law of Lines.

Given A, B, c; to find a, b, C.

Use Law of Lines.

Given a, b, c; to find A, B, C.

$$\text{Let } \frac{a+b+c}{2} = s, \sqrt{\frac{(s-a)(s-b)(s-c)}{s}} = r$$

$$\cos \frac{1}{2} A = \sqrt{\frac{s(s-a)}{bc}}$$

$$\tan \frac{1}{2} A = \frac{r}{s-a}$$

$$\tan \frac{1}{2} B = \frac{r}{s-b}$$

$$\tan \frac{1}{2} C = \frac{r}{s-c}$$

Area of a triangle:

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

PRISMOIDAL FORMULA.

$$\text{Vol.} = \frac{h}{6} (B+b+4M)$$

h = altitude; b, B = bases; M = midsection

necessary.

TABLE No. 9.

To find Tangent and External for curve of any other degree, divide by degree of curve and add correction found in column of corrections.

Degree of curve with a given I may be found by dividing tangent, (or external), opposite I by given tangent, (or external).

The distance from a point on the tangent to the curve is very nearly the square of the tangent length divided by twice the radius.

TABLE IV  
USEFUL RELATIONS.

Lineal feet	×.00019	= miles
Lineal yards	×.0006	= miles
Square inches	×.007	= square feet
Square feet	×.111	= square yards
Square yards	×.0002067	= acres
Acres	×4840	= square yards
Cubic inches	×.00058	= cubic feet
Cubic feet	×.03704	= cubic yards
Links	×.22	= yards
Links	×.66	= feet
Feet	×1.5	= links

$$360^\circ = 21600' = 1296000''$$

$$\text{Radius} = \text{arc of } 57.2957790^\circ$$

$$\text{Arc of } 1^\circ (\text{radius} = 1) = .017453292$$

$$\text{Arc of } 1' (\text{radius} = 1) = .000290888$$

$$\text{Arc of } 1'' (\text{radius} = 1) = .000004848$$

$$\pi = 3.141592654$$

$$\sqrt{\frac{1}{4}} = 0.564190$$

$$\frac{\pi}{4} = 0.785398163$$

$$\sqrt[3]{\frac{6}{\pi}} = 1.240700982$$

$$\frac{\pi}{6} = 0.523598776$$

$$\pi^2 = 9.869604401$$

$$\sqrt{\frac{4}{\pi}} = 1.128379167$$

$$\frac{1}{\pi^2} = 0.101321184$$

$$\frac{\pi}{6} = 0.523598776$$

$$\sqrt{\pi} = 1.772453851$$

$$\frac{4\pi}{3} = 4.188790205$$

$$\frac{1}{\pi} = 0.3183099$$

Curvature of Earth's surface = about 0.7 feet in 1 mile

Curvature in feet = 0.667 (Dist. in miles)<sup>2</sup>

Difference between arc and chord length, 0.05 feet in 11½ miles

$$\text{Probable error of a single observation} = 0.6754 \sqrt{\frac{M v^2}{n-1}}$$

Error in chaining of 0.01 feet in 100 feet:

Due to—

1. Length of tape error of 0.01 feet
2. Alignment. One end 1.4 feet out of line
3. Sag of tape at centre of 0.61 feet.
4. Temperature difference of 15°
5. Difference of pull of 15 lbs.

STADIA REDUCTION FORMULÆ.

Horizontal Distance = R — R sin<sup>2</sup> a + C cos a

Vertical Distance = R ½ sin 2 a + C sin a

$$R = \text{Reading} \times \frac{\text{distance from Object glass to cross hairs}}{\text{distance between cross hairs}}$$

C = distance from Object glass to cross hairs + distance from Object glass to center of instrument.

a = angle of elevation for mid Reading



TABLE VI (continued)  
SINES, COSINES, TANGENTS, COTANGENTS (continued)

deg	sin 0'	tan 0'	sin 10'	tan 10'	sin 20'	tan 20'	sin 30'	tan 30'	sin 40'	tan 40'	sin 50'	tan 50'	deg
46	7193	1.0355	7214	1.0416	7234	1.0477	7254	1.0533	7274	1.0599	7294	1.0661	43
47	314	.0724	333	.0786	353	.0850	373	.0913	392	.0977	412	.1041	42
48	431	.1106	451	.1171	470	.1237	490	.1303	509	.1369	528	.1436	41
49	547	.1504	566	.1571	585	.1640	604	.1708	623	.1778	642	.1847	40
50	660	1.1918	7679	1.1988	7698	1.2059	7716	1.2131	7735	1.2203	7753	1.2276	39
51	771	.2349	790	.2423	808	.2497	826	.2572	844	.2647	862	.2723	38
52	880	.2799	898	.2876	916	.2954	934	.3032	951	.3111	969	.3190	37
53	986	.3270	8004	.3351	8021	.3452	8039	.3514	8056	.3597	8073	.3680	36
54	8090	.3764	107	.3848	124	.3934	141	.4019	158	.4106	175	.4193	35
55	192	.4281	208	.4370	225	.4460	241	.4550	258	.4641	274	.4733	34
56	290	.4826	307	.4919	323	.5013	339	.5108	355	.5204	371	.5301	33
57	387	.5399	403	.5497	418	.5597	434	.5697	450	.5798	465	.5900	32
58	480	.6003	496	.6107	511	.6212	526	.6319	542	.6426	557	.6534	31
59	572	.6643	587	.6753	601	.6864	616	.6977	631	.7090	646	.7205	30
60	660	1.7321	8675	1.7437	8689	1.7556	8704	1.7675	8718	1.7797	8732	1.7917	29
61	746	.8040	760	.8165	774	.8291	788	.8418	802	.8546	816	.8676	28
62	829	.8807	843	.8940	857	.9074	870	.9210	884	.9347	897	.9486	27
63	910	.9626	923	.9768	936	.9912	949	2.0057	962	2.0204	975	2.0353	26
64	988	2.0503	9001	2.0655	9013	2.0809	9026	.0965	9038	.1123	9051	.1283	25
65	9063	.1445	075	.1609	088	.1775	100	.1943	112	.2113	124	.2286	24
66	135	.2460	147	.2637	159	.2817	171	.2998	182	.3183	194	.3369	23
67	205	.3559	216	.3750	228	.3945	239	.4142	250	.4342	261	.4545	22
68	272	.4751	283	.4960	293	.5172	304	.5386	315	.5605	325	.5826	21
69	336	.6051	346	.6279	356	.6511	367	.6746	377	.6985	387	.7228	20
70	397	2.7475	9407	2.7725	9417	2.7980	9426	2.8239	9436	2.8502	9446	2.8770	19
71	455	.9042	465	.9319	474	.9600	483	.9887	492	3.0178	502	3.0475	18
72	511	3.0777	520	3.1084	528	3.1397	537	3.1716	546	.2041	555	.2371	17
73	563	.2709	572	.3052	580	.3402	588	.3759	596	.4124	605	.4495	16
74	613	.4874	621	.5261	628	.5656	636	.6059	644	.6470	652	.6891	15
75	659	.7321	667	.7760	674	.8208	681	.8657	689	.9136	696	.9617	14
76	703	4.0108	710	4.0611	717	4.1126	724	4.1653	730	4.2193	737	4.2747	13
77	744	.3315	750	.3897	757	.4494	763	.5107	769	.5736	775	.6382	12
78	781	.7046	787	.7729	793	.8430	799	.9152	805	.9894	811	5.0658	11
79	816	1.446	822	5.2257	827	5.3093	833	5.3955	838	5.4845	843	.5764	10
80	848	5.6713	9853	5.7694	9858	5.8708	9863	5.9758	9868	6.0844	9872	6.1970	9
81	877	6.3138	881	6.4348	886	6.5606	890	6.6912	894	.8269	899	.9682	8
82	903	7.1154	907	7.2687	911	7.4287	914	7.5958	918	7.7704	922	7.9530	7
83	925	8.1443	929	8.3450	932	8.5555	936	8.7769	939	9.0098	942	9.2553	6
84	945	9.5144	948	9.7882	951	10.078	954	10.385	957	10.711	959	11.059	5
85	962	11.430	964	11.826	967	12.250	969	12.706	971	13.197	974	13.727	4
86	976	14.300	978	14.924	980	15.605	981	16.350	983	17.169	985	18.075	3
87	986	19.081	988	20.206	989	21.470	990	22.903	992	24.542	993	26.432	2
88	994	28.636	995	31.242	996	34.368	997	38.189	997	42.964	998	49.104	1
89	999	57.290	999	63.750	999	85.940	999	114.58	1.000	171.88	1.000	343.77	0
deg	60'	60'	50'	50'	40'	40'	30'	30'	20'	30'	10'	10'	deg
cos	cot	cos	cot	cos	cot	cos	cot	cos	cot	cos	cot	cos	cot

TABLE VII  
RODS IN FEET AND INCHES

Rods	Feet Inches	Rods	Feet Inches	Rods	Feet Inches	Rods	Feet Inches	Rods	Feet Inches
1	16-6	21	346-6	41	676-6	61	1006-6	81	1336-6
2	33-0	22	363-0	42	693-0	62	1023-0	82	1353-0
3	49-6	23	379-6	43	709-6	63	1039-6	83	1369-6
4	66-0	24	396-0	44	726-0	64	1056-0	84	1386-0
5	82-6	25	412-6	45	742-6	65	1072-6	85	1402-6
6	99-0	26	429-0	46	759-0	66	1089-0	86	1419-0
7	115-6	27	445-6	47	775-6	67	1105-6	87	1435-6
8	132-0	28	462-0	48	792-0	68	1122-0	88	1452-0
9	148-6	29	478-6	49	808-6	69	1138-6	89	1468-6
10	165-0	30	495-0	50	825-0	70	1155-0	90	1485-0
11	181-6	31	511-6	51	841-6	71	1171-6	91	1501-6
12	198-0	32	528-0	52	858-0	72	1188-0	92	1518-0
13	214-6	33	544-6	53	874-6	73	1204-6	93	1534-6
14	231-0	34	561-0	54	891-0	74	1221-0	94	1551-0
15	247-6	35	577-6	55	907-6	75	1237-6	95	1567-6
16	264-0	36	594-0	56	924-0	76	1254-0	96	1584-0
17	280-6	37	610-6	57	940-6	77	1270-6	97	1600-6
18	297-0	38	627-0	58	957-0	78	1287-0	98	1617-0
19	313-6	39	643-6	59	973-6	79	1303-6	99	1633-6
20	330-0	40	660-0	60	990-0	80	1320-0	100	1650-0

TABLE VIII  
LINKS IN FEET AND INCHES

Links	Feet Inches	Links	Feet Inches	Links	Feet Inches	Links	Feet Inches	Links	Feet Inches
1	0-7.92	18	11-10.56	35	23-1.20	52	34-3.84	69	45-6.48
2	1-3.84	19	12-6.48	36	23-9.12	53	34-11.76	70	46-2.40
3	1-11.76	20	13-2.40	37	24-5.04	54	35-7.68	71	46-10.32
4	2-7.68	21	13-10.32	38	25-0.96	55	36-3.60	72	47-6.24
5	3-3.60	22	14-6.24	39	25-8.88	56	36-11.52	73	48-2.16
6	3-11.52	23	15-2.16	40	26-4.80	57	37-7.44	74	48-10.08
7	4-7.44	24	15-10.08	41	27-0.72	58	38-3.36	75	49-6.00
8	5-3.36	25	16-6.00	42	27-8.64	59	38-11.28	76	50-1.92
9	5-11.28	26	17-1.92	43	28-4.56	60	39-7.20	77	50-9.84
10	6-7.20	27	17-9.84	44	29-0.48	61	40-3.12	78	51-5.76
11	7-3.12	28	18-5.76	45	29-8.40	62	40-11.04	79	52-1.68
12	7-11.04	29	19-1.68	46	30-4.32	63	41-6.96	80	52-9.60
13	8-6.96	30	19-9.60	47	31-0.24	64	42-2.88	81	53-5.52
14	9-2.88	31	20-5.52	48	31-8.16	65	42-10.80	82	54-1.44
15	9-10.80	32	21-1.44	49	32-4.08	66	43-6.72	83	54-9.36
16	10-6.72	33	21-9.36	50	33-0.00	67	44-2.64	84	55-5.28
17	11-2.64	34	22-5.28	51	33-7.92	68	44-10.56	85	56-1.20

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=70°	I	T	E	I=80°	I	T	E	I=90°
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	5° C.	20'	4112.1	1322.9	5° C.	20'	4922.5	1824.1	5° C.
30'	3408.8	937.3	T	30'	4124.8	1330.3	T	30'	4937.0	1833.6	T
40'	3420.1	943.1	.25	40'	4137.4	1337.7	.30	40'	4951.5	1843.1	.36
50'	3431.4	948.9	E	50'	4150.1	1345.1	E	50'	4966.1	1852.6	E
62°	3442.7	954.8	.080	72°	4162.8	1352.6	.110	82°	4980.7	1862.2	.149
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	10° C.	73°	4239.7	1398.0	10° C.	83°	5069.2	1920.5	10° C.
10'	3522.6	996.2	T	10'	4252.6	1405.7	T	10'	5084.0	1930.4	T
20'	3534.1	1002.3		20'	4265.6	1413.5		20'	5099.0	1940.3	
30'	3545.6	1008.3	.51	30'	4278.5	1421.0	.61	30'	5113.9	1950.3	.72
40'	3557.2	1014.4	E	40'	4291.5	1429.2	E	40'	5128.9	1960.2	E
50'	3568.7	1020.5	.159	50'	4304.6	1436.8	.220	50'	5143.9	1970.3	.299
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	15° C.	50'	4383.3	1484.4	15° C.	50'	5234.9	2031.4	15° C.
65°	3650.2	1063.9	T	75°	4396.5	1492.4	T	85°	5250.3	2041.7	T
10'	3661.9	1070.2	.76	10'	4409.8	1500.5	.91	10'	5265.6	2052.1	1.09
20'	3673.7	1076.6	E	20'	4423.1	1508.6	E	20'	5281.0	2062.5	E
30'	3685.4	1082.9		30'	4436.4	1516.7		30'	5296.4	2073.0	
40'	3697.2	1089.3	.240	40'	4449.7	1524.9	.332	40'	5311.9	2083.5	.450
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	20° C.	40'	4530.4	1574.7	20° C.	40'	5405.6	2147.5	20° C.
50'	3780.4	1134.8	T	50'	4544.0	1583.1	T	50'	5421.4	2158.4	T
67°	3792.4	1141.4	1.02	77°	4557.6	1591.6	1.22	87°	5437.2	2169.2	1.45
10'	3804.4	1148.0	E	10'	4571.2	1600.1	E	10'	5453.1	2180.2	E
20'	3816.4	1154.7	.321	20'	4584.8	1608.6	.445	20'	5469.0	2191.1	.603
30'	3828.4	1161.3		30'	4598.5	1617.1		30'	5484.9	2202.2	
40'	3840.4	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	25° C.	20'	4667.4	1660.5	25° C.	20'	5565.4	2258.0	25° C.
30'	3901.2	1202.0	T	30'	4681.3	1669.2	T	30'	5581.6	2269.3	T
40'	3913.4	1208.9	1.28	40'	4695.2	1678.1	1.53	40'	5597.8	2280.6	1.83
50'	3925.6	1215.8	E	50'	4709.2	1686.9	E	50'	5614.2	2292.0	E
69°	3937.9	1222.7	.403	79°	4723.2	1695.8	.558	89°	5630.5	2303.5	.756
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	30° C.	80°	4807.7	1749.9	30° C.	90°	5729.7	2373.3	30° C.
10'	4024.4	1272.1	T	10'	4822.0	1759.0	T	10'	5746.3	2385.1	T
20'	4036.8	1279.3	1.54	20'	4836.2	1768.2	1.84	20'	5763.1	2397.0	2.20
30'	4049.3	1286.5	E	30'	4850.5	1777.4	E	30'	5779.9	2408.9	E
40'	4061.8	1293.6	.485	40'	4864.8	1786.7	.671	40'	5796.7	2420.9	.910
50'	4074.4	1300.9		50'	4879.2	1796.0		50'	5813.6	2432.9	

T = R tan ½ I

E = R exsec ½ I

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=100°	I	T	E	I=110°	I	T	E	I=120°
91°	5330.5	2444.9	+	101°	6950.6	3278.1	+	111°	8336.7	4386.1	+
10'	5347.5	2457.1		10'	6971.3	3294.1		10'	8362.7	4407.6	
20'	5364.6	2469.3	5° C.	20'	6992.0	3310.1	5° C.	20'	8388.9	4429.2	5° C.
30'	5381.7	2481.5	T	30'	7012.7	3326.3	T	30'	8415.1	4450.9	T
40'	5398.8	2493.8	.43	40'	7033.6	3342.3	.51	40'	8441.5	4472.7	.62
50'	5916.0	2506.1	E	50'	7054.5	3358.5	E	50'	8468.0	4494.6	E
92°	5933.2	2518.5	.200	102°	7075.5	3374.9	.268	112°	8494.6	4516.6	.360
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	10° C.	103°	7203.2	3474.4	10° C.	113°	8656.6	4651.3	10° C.
10'	6055.4	2606.8	T	10'	7224.7	3491.3	T	10'	8684.0	4674.2	T
20'	6073.1	2619.7	.86	20'	7246.3	3508.2	.103	20'	8711.5	4697.2	1.25
30'	6090.8	2632.6	E	30'	7268.0	3525.2	E	30'	8739.2	4720.3	E
40'	6108.6	2645.5	.401	40'	7289.8	3542.4	.536	40'	8767.0	4743.6	.721
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'	6162.2	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	15° C.	50'	7444.6	3664.5	15° C.	50'	8965.0	4909.9	15° C.
95°	6252.8	2751.3	T	105°	7467.0	3682.3	T	115°	8993.8	4934.1	T
10'	6271.1	2764.8	1.30	10'	7489.6	3700.2	1.56	10'	9022.7	4958.6	1.93
20'	6289.4	2778.3	E	20'	7512.2	3718.2	E	20'	9051.7	4983.1	E
30'	6307.7	2792.0	.604	30'	7534.9	3736.2	.806	30'	9080.9	5007.8	1.09
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	20° C.	30'	7672.9	3846.5	20° C.	30'	9259.0	5158.8	20° C.
40'	6438.4	2889.0	T	40'	7696.3	3865.2	T	40'	9289.2	5184.5	T
50'	6457.3	2903.1	1.74	50'	7719.7	3884.0	2.08	50'	9319.5	5210.3	2.52
97°	6476.2	2917.3	E	107°	7743.2	3902.9	E	117°	9349.9	5236.2	E
10'	6495.2	2931.6	.809	10'	7766.8	3921.9	1.03	10'	9380.5	5262.3	1.46
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	25° C.	20'	7934.6	4057.4	25° C.	20'	9598.9	5449.2	25° C.
30'	6649.6	3047.9	T	30'	7959.0	4077.2	T	30'	9630.7	5476.5	T
40'	6669.2	3062.8	2.18	40'	7983.5	4097.1	2.61	40'	9662.6	5504.0	3.16
50'	6688.8	3077.7	E	50'	8008.0	4117.0	E	50'	9694.7	5531.7	E
99°	6708.6	3092.7	1.02</								

TABLE X.  
MIDDLE ORDINATES OF RAILS  
Length of Rail (feet)

C	R	30	28	26	24	22	20	C	R	30	28	26	24	22	20
o /	Feet	Inch	Inch	Inch	Inch	Inch	Inch	o	Feet	Inch	Inch	Inch	Inch	Inch	Inch
0-20	17189	.08	.07	.06	.05	.04	.03	8	716.8	1.88	1.64	1.42	1.20	1.01	.84
0-40	8594	.16	.14	.12	.10	.08	.07	9	637.3	2.12	1.84	1.60	1.35	1.14	.94
1-0	5730	.24	.20	.18	.15	.13	.10	10	573.7	2.36	2.05	1.78	1.50	1.27	1.04
1-20	4297	.31	.27	.23	.20	.17	.13	11	521.7	2.59	2.26	1.95	1.65	1.39	1.15
1-40	3438	.39	.34	.29	.25	.21	.17	12	478.3	3.83	2.47	2.15	1.81	1.54	1.26
2-0	2865	.47	.41	.35	.30	.25	.20	13	441.7	3.05	2.66	2.30	1.96	1.66	1.36
2-20	2456	.55	.48	.41	.35	.29	.23	14	410.3	3.30	2.87	2.48	2.10	1.78	1.46
2-40	2149	.63	.55	.47	.40	.33	.27	15	383.1	3.54	3.08	2.68	2.26	1.91	1.57
3-0	1910	.71	.62	.53	.45	.38	.31	16	359.3	3.76	3.28	2.83	2.40	2.04	1.67
3-20	1719	.78	.68	.59	.50	.42	.35	17	338.3	4.00	3.48	3.02	2.57	2.16	1.78
3-40	1563	.86	.75	.65	.55	.46	.38	18	319.6	4.21	3.67	3.18	2.70	2.28	1.87
4-0	1433	.94	.82	.71	.60	.50	.42	19	302.9	4.45	3.89	3.36	2.86	2.41	1.98
4-20	1323	1.02	.89	.77	.65	.55	.45	20	287.9	4.70	4.09	3.55	3.00	2.54	2.09
4-40	1228	1.10	.96	.83	.70	.59	.48	22	262.0	5.16	4.44	3.84	3.30	2.80	2.29
5	1146	1.18	1.03	.89	.75	.63	.52	24	240.5	5.64	4.92	4.20	3.59	3.04	2.50
6	955.3	1.41	1.23	1.06	.90	.76	.62	26	222.3	6.07	5.29	4.58	3.88	3.29	2.70
7	819.0	1.65	1.44	1.24	1.05	.89	.73								

TABLE XI.  
SHORT RADIUS CURVES

Radius Feet	Chord Feet	Central Angle	Deflection Angle	Deflection for 1 Foot
35	10	16-26	8-13	49.3
45	10	12-46	6-23	38.3
50	15	17-16	8-38	34.5
60	15	14-22	7-11	28.8
75	15	11-30	5-45	23.0
100	20	11-30	5-45	17.3
120	20	9-34	4-47	14.3
150	20	7-39	3-49	11.5
190	25	7-32	3-46	9.15
200	25	7-10	3-35	8.6
225	25	6-25	3-12	7.7
240	25	5-58	2-59	7.2
250	25	5-44	2-52	6.9
275	25	5-12	2-36	6.2
288	50	9-58	4-59	6.0
300	50	9-32	4-46	5.7
350	50	8-12	4-06	4.9
376	50	7-40	3-50	4.6
400	50	7-10	3-35	4.3
410	50	7-00	3-30	4.2

To find length of curve divide angle from P. C. to P. T. by central angle of chord, and multiply by length of chord.

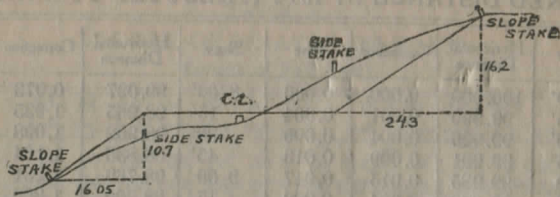
TABLE XII.  
INCLINED DISTANCE OF 100 FT. REDUCED TO HORIZONTAL

Slope	Horizontal Distance	Correction	Rise	Slope	Horizontal Distance	Correction	Rise
0°00'	100.000	0.000	0.000	8°00'	99.027	0.973	0.139
15'	99.999	0.001	0.004	15'	98.965	1.035	0.143
30'	99.996	0.004	0.009	30'	98.902	1.098	0.148
45'	99.991	0.009	0.013	45'	98.836	1.164	0.152
1 00	99.985	0.015	0.017	9 00	98.769	1.231	0.156
15	99.976	0.024	0.022	15	98.700	1.300	0.161
30	99.966	0.034	0.026	30	98.629	1.371	0.165
45	99.953	0.047	0.031	45	98.556	1.444	0.169
2 00	99.939	0.061	0.035	10 00	98.481	1.519	0.174
15	99.923	0.077	0.039	15	98.404	1.596	0.178
30	99.905	0.095	0.044	30	98.325	1.675	0.182
45	99.885	0.115	0.048	45	98.245	1.755	0.187
3 00	99.863	0.137	0.052	11 00	98.163	1.837	0.191
15	99.839	0.161	0.057	15	98.079	1.921	0.195
30	99.813	0.187	0.061	30	97.992	2.008	0.199
45	99.786	0.214	0.065	45	97.905	2.095	0.204
4 00	99.756	0.244	0.070	12 00	97.815	2.185	0.208
15	99.725	0.275	0.074	15	97.723	2.277	0.212
30	99.692	0.308	0.078	30	97.630	2.370	0.216
45	99.657	0.343	0.083	45	97.534	2.466	0.221
5 00	99.619	0.381	0.087	13 00	97.437	2.563	0.225
15	99.580	0.420	0.092	15	97.338	2.662	0.229
30	99.540	0.460	0.096	30	97.237	2.763	0.233
45	99.497	0.503	0.100	45	97.134	2.866	0.238
6 00	99.452	0.548	0.105	14 00	97.030	2.970	0.242
15	99.406	0.594	0.109	15	96.923	3.077	0.246
30	99.357	0.643	0.113	30	96.815	3.185	0.250
45	99.307	0.693	0.118	45	96.705	3.295	0.255
7 00	99.255	0.745	0.122	15 00	96.593	3.407	0.259
15	99.200	0.800	0.126	15	96.479	3.521	0.263
30	99.144	0.856	0.131	30	96.363	3.637	0.267
45	99.087	0.913	0.135	45	96.246	3.754	0.271

For each foot take one one-hundredth of each reading.

TABLE XIII.  
MINUTES IN DECIMALS OF A DEGREE.

0 30"	.00833	10 30"	.17500	20 30"	.34167	30 10"	.50833	40 30"	.67500	50 10"	.84167
1 00	.01667	11 00	.18333	21 00	.35000	31 00	.51667	41 00	.68333	51 00	.85000
30	.02500	30	.19167	30	.35833	30	.52500	30	.69167	30	.85833
2 00	.03333	12 00	.20000	22 00	.36667	32 00	.53333	42 00	.70000	52 00	.86667
30	.04167	30	.20833	30	.37500	30	.54167	30	.70833	30	.87500
3 00	.05000	13 00	.21667	23 00	.38333	33 00	.55000	43 00	.71667	53 00	.88333
30	.05833	30	.22500	30	.39167	30	.55833	30	.72500	30	.89167
4 00	.06667	14 00	.23333	24 00	.40000	34 00	.56667	44 00	.73333	54 00	.90000
30	.07500	30	.24167	30	.40833	30	.57500	30	.74167	30	.90833
5 00	.08333	15 00	.25000	25 00	.41667	35 00	.58333	45 00	.75000	55 00	.91667
30	.09167	30	.25833	30	.42500	30	.59167	30	.75833	30	.92500
6 00	.10000	16 00	.26667	26 00	.43333	36 00	.60000	46 00	.76667	56 00	.93333
30	.10833	30	.27500	30	.44167	30	.60833	30	.77500	30	.94167
7 00	.11667	17 00	.28333	27 00	.45000	37 00	.61667	47 00	.78333	57 00	.95000
30	.12500	30	.29167	30	.45833	30	.62500	30	.79167	30	.95833
8 00	.13333	18 00	.30000	28 00	.46667	38 00	.63333	48 00	.80000	58 00	.96667
30	.14167	30	.30833	30	.47500	30	.64167	30	.80833	30	.97500
9 00	.15000	19 00	.31667	29 00	.48333	39 00	.65000	49 00	.81667	59 00	.98333
30	.15833	30	.32500	30	.49167	30	.65833	30	.82500	30	.99167
10 00	.16667	20 00	.33333	30 00	.50000	40 00	.66667	50 00	.83333	60 00	1.00000



DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING.

SLOPE 1 1/2 TO 1, ROADWAY OF ANY WIDTH.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0 00	0 15	0 30	0 45	0 60	0 75	0 90	1 05	1 20	1 35	0
1	1 50	1 65	1 80	1 95	2 10	2 25	2 40	2 55	2 70	2 85	1
2	3 00	3 15	3 30	3 45	3 60	3 75	3 90	4 05	4 20	4 35	2
3	4 50	4 65	4 80	4 95	5 10	5 25	5 40	5 55	5 70	5 85	3
4	6 00	6 15	6 30	6 45	6 60	6 75	6 90	7 05	7 20	7 35	4
5	7 50	7 65	7 80	7 95	8 10	8 25	8 40	8 55	8 70	8 85	5
6	9 00	9 15	9 30	9 45	9 60	9 75	9 90	10 05	10 20	10 35	6
7	10 50	10 65	10 80	10 95	11 10	11 25	11 40	11 55	11 70	11 85	7
8	12 00	12 15	12 30	12 45	12 60	12 75	12 90	13 05	13 20	13 35	8
9	13 50	13 65	13 80	13 95	14 10	14 25	14 40	14 55	14 70	14 85	9
10	15 00	15 15	15 30	15 45	15 60	15 75	15 90	16 05	16 20	16 35	10
11	16 50	16 65	16 80	16 95	17 10	17 25	17 40	17 55	17 70	17 85	11
12	18 00	18 15	18 30	18 45	18 60	18 75	18 90	19 05	19 20	19 35	12
13	19 50	19 65	19 80	19 95	20 10	20 25	20 40	20 55	20 70	20 85	13
14	21 00	21 15	21 30	21 45	21 60	21 75	21 90	22 05	22 20	22 35	14
15	22 50	22 65	22 80	22 95	23 10	23 25	23 40	23 55	23 70	23 85	15
16	24 00	24 15	24 30	24 45	24 60	24 75	24 90	25 05	25 20	25 35	16
17	25 50	25 65	25 80	25 95	26 10	26 25	26 40	26 55	26 70	26 85	17
18	27 00	27 15	27 30	27 45	27 60	27 75	27 90	28 05	28 20	28 35	18
19	28 50	28 65	28 80	28 95	29 10	29 25	29 40	29 55	29 70	29 85	19
20	30 00	30 15	30 30	30 45	30 60	30 75	30 90	31 05	31 20	31 35	20
21	31 50	31 65	31 80	31 95	32 10	32 25	32 40	32 55	32 70	32 85	21
22	33 00	33 15	33 30	33 45	33 60	33 75	33 90	34 05	34 20	34 35	22
23	34 50	34 65	34 80	34 95	35 10	35 25	35 40	35 55	35 70	35 85	23
24	36 00	36 15	36 30	36 45	36 60	36 75	36 90	37 05	37 20	37 35	24
25	37 50	37 65	37 80	37 95	38 10	38 25	38 40	38 55	38 70	38 85	25
26	39 00	39 15	39 30	39 45	39 60	39 75	39 90	40 05	40 20	40 35	26
27	40 50	40 65	40 80	40 95	41 10	41 25	41 40	41 55	41 70	41 85	27
28	42 00	42 15	42 30	42 45	42 60	42 75	42 90	43 05	43 20	43 35	28
29	43 50	43 65	43 80	43 95	44 10	44 25	44 40	44 55	44 70	44 85	29
30	45 00	45 15	45 30	45 45	45 60	45 75	45 90	46 05	46 20	46 35	30
31	46 50	46 65	46 80	46 95	47 10	47 25	47 40	47 55	47 70	47 85	31
32	48 00	48 15	48 30	48 45	48 60	48 75	48 90	49 05	49 20	49 35	32
33	49 50	49 65	49 80	49 95	50 10	50 25	50 40	50 55	50 70	50 85	33
34	51 00	51 15	51 30	51 45	51 60	51 75	51 90	52 05	52 20	52 35	34
35	52 50	52 65	52 80	52 95	53 10	53 25	53 40	53 55	53 70	53 85	35
36	54 00	54 15	54 30	54 45	54 60	54 75	54 90	55 05	55 20	55 35	36
37	55 50	55 65	55 80	55 95	56 10	56 25	56 40	56 55	56 70	56 85	37
38	57 00	57 15	57 30	57 45	57 60	57 75	57 90	58 05	58 20	58 35	38
39	58 50	58 65	58 80	58 95	59 10	59 25	59 40	59 55	59 70	59 85	39
40	60 00	60 15	60 30	60 45	60 60	60 75	60 90	61 05	61 20	61 35	40
41	61 50	61 65	61 80	61 95	62 10	62 25	62 40	62 55	62 70	62 85	41
42	63 00	63 15	63 30	63 45	63 60	63 75	63 90	64 05	64 20	64 35	42
43	64 50	64 65	64 80	64 95	65 10	65 25	65 40	65 55	65 70	65 85	43
44	66 00	66 15	66 30	66 45	66 60	66 75	66 90	67 05	67 20	67 35	44
45	67 50	67 65	67 80	67 95	68 10	68 25	68 40	68 55	68 70	68 85	45
46	69 00	69 15	69 30	69 45	69 60	69 75	69 90	70 05	70 20	70 35	46
47	70 50	70 65	70 80	70 95	71 10	71 25	71 40	71 55	71 70	71 85	47
48	72 00	72 15	72 30	72 45	72 60	72 75	72 90	73 05	73 20	73 35	48
49	73 50	73 65	73 80	73 95	74 10	74 25	74 40	74 55	74 70	74 85	49
50	75 00	75 15	75 30	75 45	75 60	75 75	75 90	76 05	76 20	76 35	50

Computed by L. Leland Locke.

90+74.40

22.26

90+02.14

141.27

9193.41 PT.

9442.20

268.79

72.26

~~341.05~~

341.05

W. to PI

90+74.40

79+83.70

10+90.70

112.0

1202.70

W. to PI

96+00

94+12.2

107.80 E.

78+73.10

112.00

7761.10

222.6

79+83.20 PT

70.71  
78+73  
11.98

8.E of 2

57<sup>15</sup>  
120<sup>15</sup>  
94<sup>12</sup>  
91<sup>88</sup>

1434.5

94+12<sup>20</sup>  
90+74<sup>40</sup>  
337.80 W

147+13  
136 58 35  
16 54.65

96+00  
94+12<sup>20</sup>  
187.88 E

1021.00

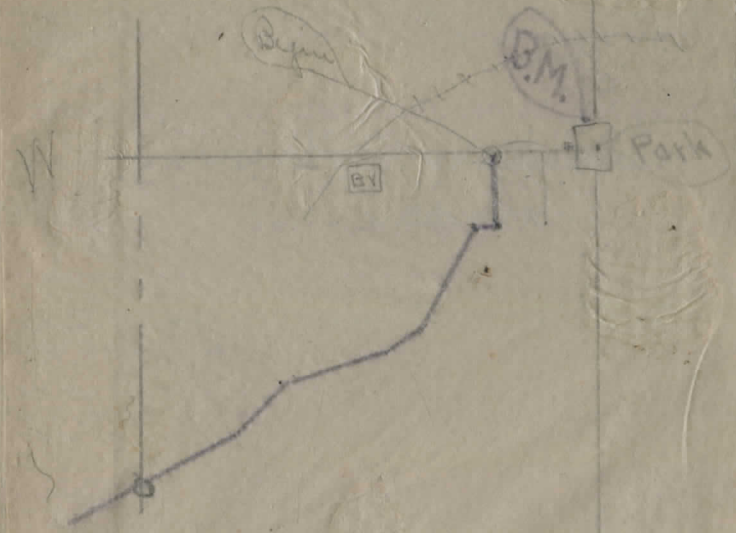
P.L.

147+13  
146 51.30  
61.70

12751.7  
12134.50  
617.2

126495.46  
1264977  
575.68

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Ben Holshues

