

CHAS. S. DAVIS

67

FIELD BOOK

740

TABLE FOR REDUCING PERCHES TO FEET AND INCHES.

| PERCH | FEET.    | PERCH. | FEET.      | PERCH. | FEET.      | PERCH. | FEET.       | PERCH. | FEET.       | PERCH. | FEET. |
|-------|----------|--------|------------|--------|------------|--------|-------------|--------|-------------|--------|-------|
| 1     | 16.6 in. | 21     | 3.46.6 in. | 41     | 6.76.6 in. | 61     | 10.06.6 in. | 81     | 13.36.6 in. |        |       |
| 2     | 33.0     | 22     | 3.63.0     | 42     | 6.93.0     | 62     | 10.23.0     | 82     | 13.53.0     |        |       |
| 3     | 49.6     | 23     | 3.79.6     | 43     | 7.09.6     | 63     | 10.39.6     | 83     | 13.69.6     |        |       |
| 4     | 66.0     | 24     | 3.96.0     | 44     | 7.26.0     | 64     | 10.56.0     | 84     | 13.86.0     |        |       |
| 5     | 82.6     | 25     | 4.12.6     | 45     | 7.42.6     | 65     | 10.72.6     | 85     | 14.02.6     |        |       |
| 6     | 99.0     | 26     | 4.29.0     | 46     | 7.59.0     | 66     | 10.89.0     | 86     | 14.19.0     |        |       |
| 7     | 1.15.6   | 27     | 4.45.6     | 47     | 7.75.6     | 67     | 11.05.6     | 87     | 14.35.6     |        |       |
| 8     | 1.32.0   | 28     | 4.62.0     | 48     | 7.92.0     | 68     | 11.22.0     | 88     | 14.52.0     |        |       |
| 9     | 1.48.6   | 29     | 4.78.6     | 49     | 8.08.6     | 69     | 11.38.6     | 89     | 14.68.6     |        |       |
| 10    | 1.65.0   | 30     | 4.95.0     | 50     | 8.25.0     | 70     | 11.55.0     | 90     | 14.85.0     |        |       |
| 11    | 1.81.6   | 31     | 5.11.6     | 51     | 8.41.6     | 71     | 11.71.6     | 91     | 15.01.6     |        |       |
| 12    | 1.98.0   | 32     | 5.28.0     | 52     | 8.58.0     | 72     | 11.88.0     | 92     | 15.18.0     |        |       |
| 13    | 2.14.6   | 33     | 5.44.6     | 53     | 8.74.6     | 73     | 12.04.6     | 93     | 15.34.6     |        |       |
| 14    | 2.31.0   | 34     | 5.61.0     | 54     | 8.91.0     | 74     | 12.21.0     | 94     | 15.51.0     |        |       |
| 15    | 2.47.6   | 35     | 5.77.6     | 55     | 9.07.6     | 75     | 12.37.6     | 95     | 15.67.6     |        |       |
| 16    | 2.64.0   | 36     | 5.94.0     | 56     | 9.24.0     | 76     | 12.54.0     | 96     | 15.84.0     |        |       |
| 17    | 2.80.6   | 37     | 6.10.6     | 57     | 9.40.6     | 77     | 12.70.6     | 97     | 16.00.6     |        |       |
| 18    | 2.97.0   | 38     | 6.27.0     | 58     | 9.57.0     | 78     | 12.87.0     | 98     | 16.17.0     |        |       |
| 19    | 3.13.6   | 39     | 6.43.6     | 59     | 9.73.6     | 79     | 13.03.6     | 99     | 16.33.6     |        |       |
| 20    | 3.30.0   | 40     | 6.60.0     | 60     | 9.90.0     | 80     | 13.20.0     | 100    | 16.50.0     |        |       |

COURT HOUSE  
CHARDON, O.  
PHONE 250-X

B. K. ELLIOTT COMPANY, PITTSBURG, PA.

DRAWING MATERIALS AND SURVEYING INSTRUMENTS

Scotland Station Road  
North  
Chester Township  
7-053 3000

67

#157

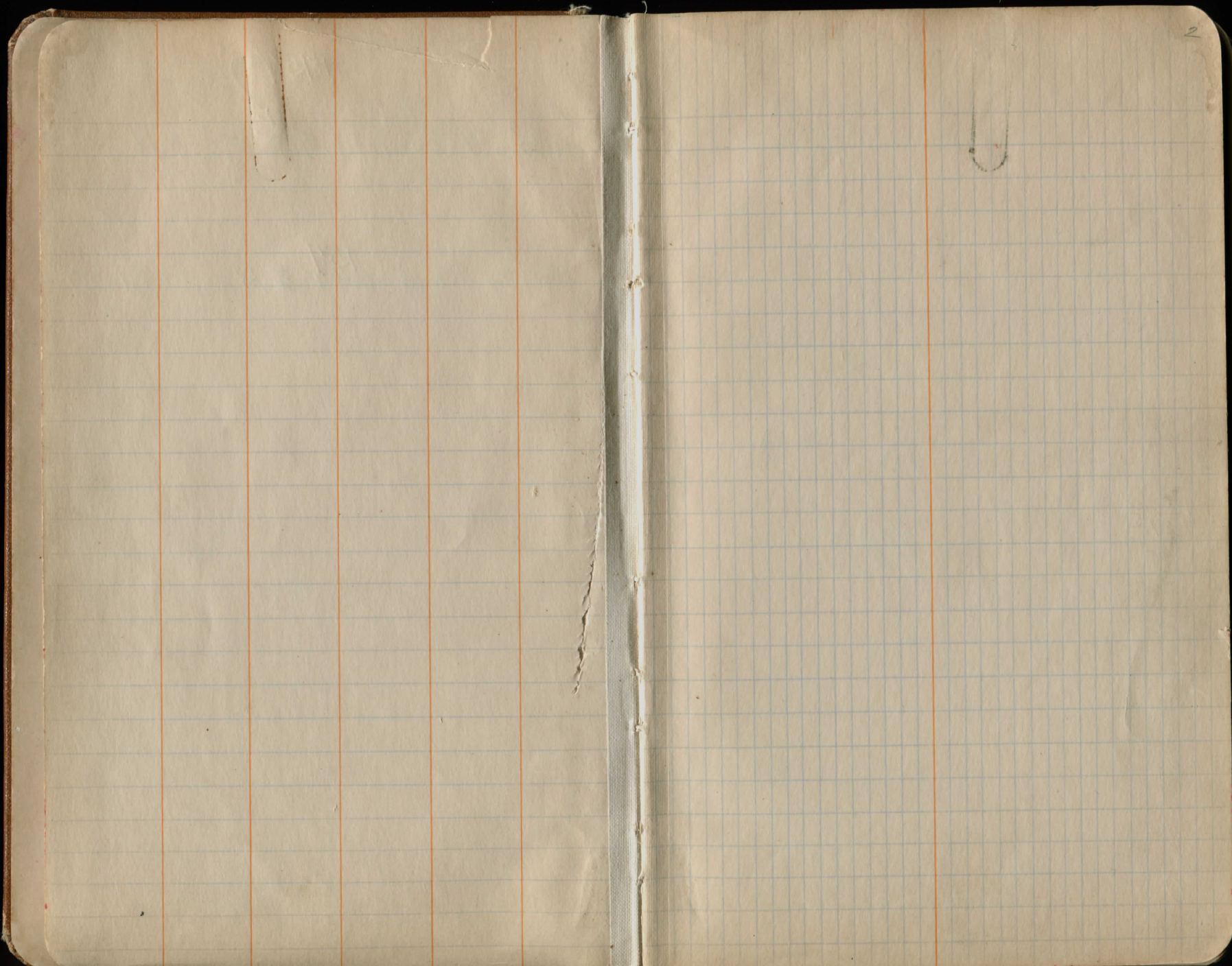
- INDEX -

Caves Road #~~47~~<sup>157</sup>-~~EG~~<sup>H</sup> EFGH

Transit notes, alignment 3-14

Topography 15-26

Caves Road #~~47~~<sup>157</sup>-~~2~~<sup>H</sup> 27-29



11-6-19 Thu  
Fair-Muddy

Let McLaughlin  
A.P. Harris  
S.H. Drake

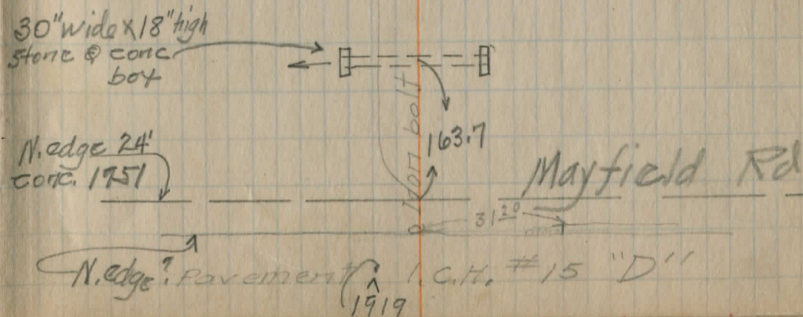
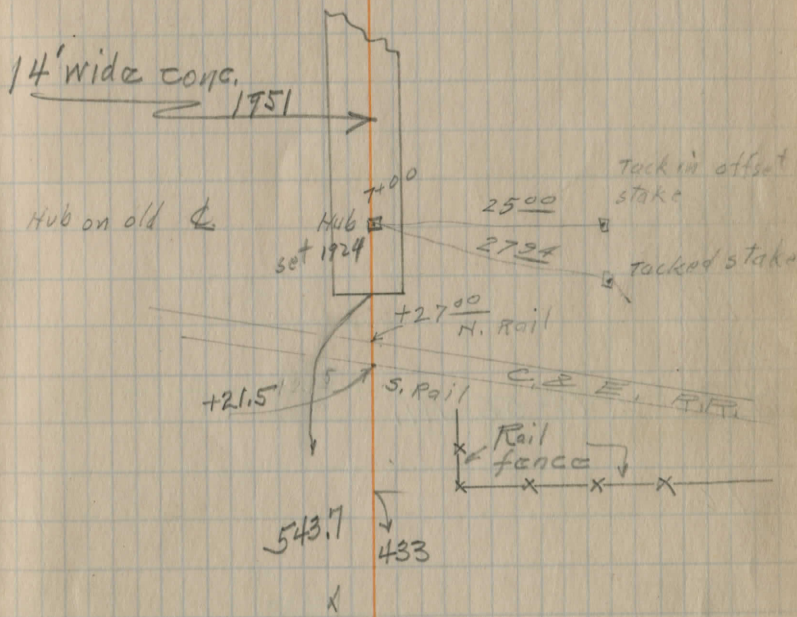
| Sta. | Angle | Bearing |
|------|-------|---------|
| 11   |       |         |
| 10   |       |         |
| 9    |       |         |
| 8    |       |         |
| 7    |       |         |
| 6    |       |         |
| 5    |       |         |
| 4    |       |         |
| 3    |       |         |
| 2    |       |         |
| 1    |       |         |
| 0    |       |         |

N. 20° - 0' E.

See pg 30  
for 1964 Survey  
Mayfield Rd to Sherman Rd

Lt.  $\text{\$}$  Rt.

Offset stakes are set 25' Rt. of  $\text{\$}$  unless otherwise noted.



Sta. Angle Bearing

22

21

20

19

18

17

+96<sup>5</sup> Δ 0°-56' Rt.

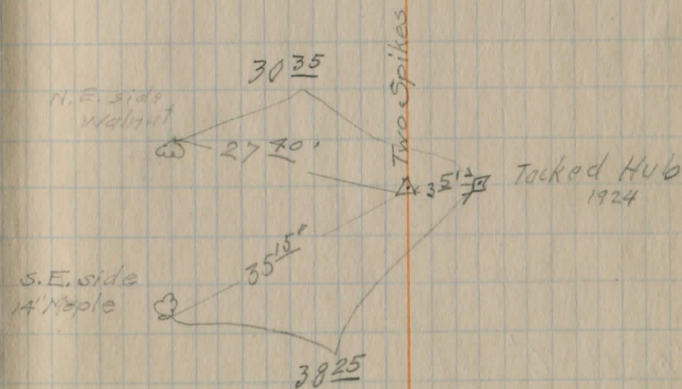
16

15

14

13

12



Sta. Angle Bearing

32

31

30

29

+948  $\Delta$  0°-0'

28

27

26

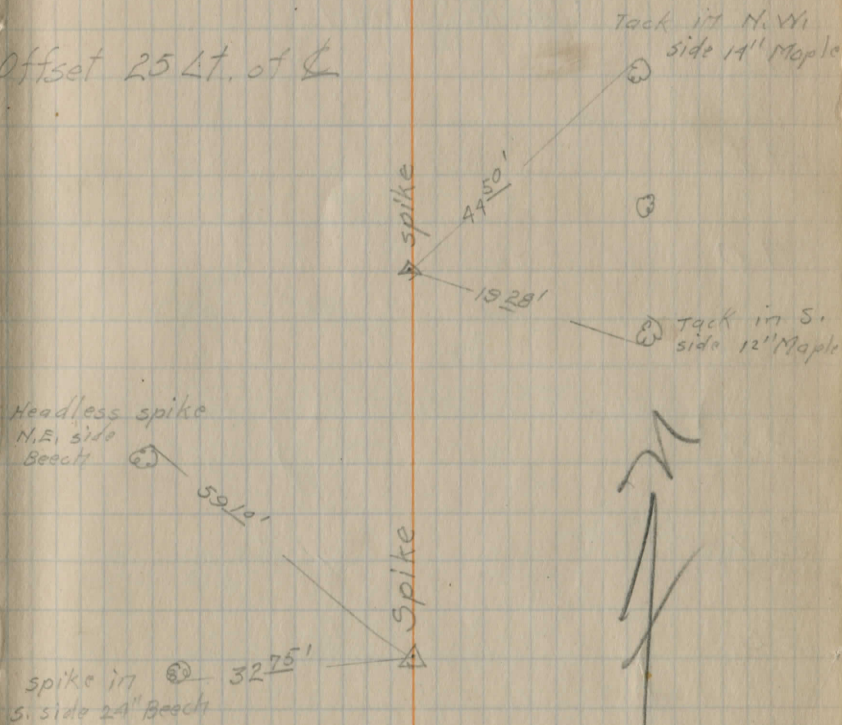
+30<sup>2</sup>  $\Delta$  0°-0'

25

24

23

Offset 25 Lt. of  $\Delta$



Sta. Angle Bearing

43

+954  $\Delta$  0°-0'

+27.  $\phi$  Sherman  
Center Road

42

41

40

39

38

37

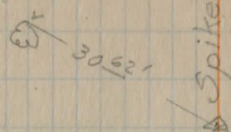
36

35

34

33

Nail N.E. side  
18" tree

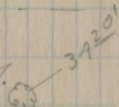


30.621

Spike

$\phi$  Sherman Center Rd.

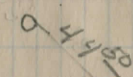
Nail in B.M.  
28" Maple



39.20

Note: Below - refs from FB # 137 pg. 33  
for Intsat. Caves & Sherman.

Spk E. side  
Tel. Pole



44.50

Caves

Spk S.W. side  
# 378432



40.43

$\phi$  Sherman

rd. 8/3/73



37.03

Spk N.W. side  
Tel. Pole



41.25

Sp R.W. side  
CEI 399242

Sta Angle Bearing

55

54

53

52

51

50

49

48

47

46

45

44

Sta. Angle Bearing

66

65

64

63

62

61

60

59

58

+302 Δ 0°-32' Rt.

57

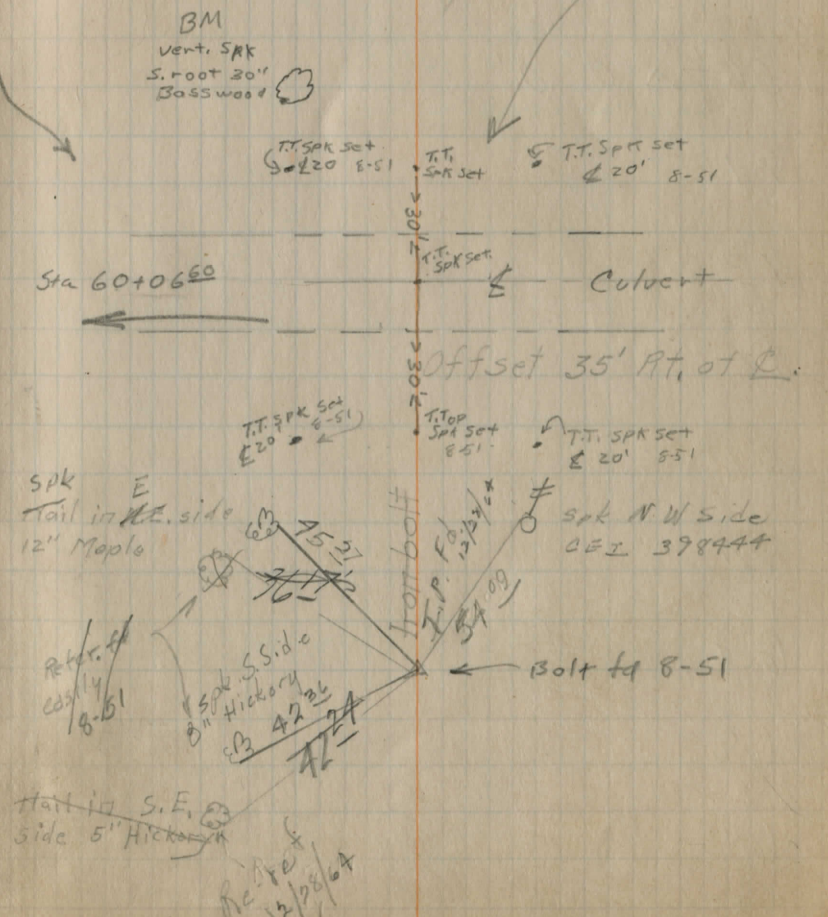
56

Replaced Sept '51 with  
2 @ 36" R. C. pipe

M. 4°-30' E

| Sta)         | B.S. | HI.    | F.S. | Elev   |
|--------------|------|--------|------|--------|
| B.M.         | 3.75 | 103.75 | —    | 100.00 |
| ⊕            | B.M. |        | 5.2  | 98.55  |
| W. Cap Stone |      |        | 11.8 | 91.95  |
| E. Cap Stone |      |        | 11.7 | 92.05  |

Levels on  
culvert 60+06.60



Sta. Angles Bearing

+58

76

75

+56<sup>L</sup> Δ 0°-0'

74

73

72

71

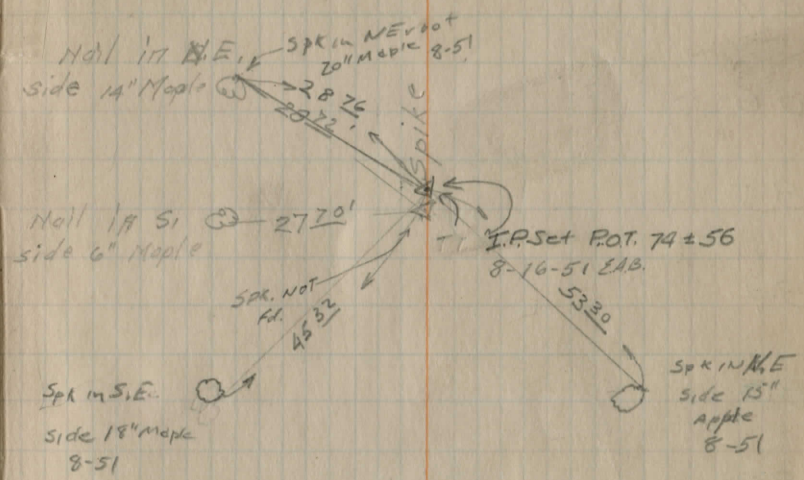
70

69

68

67

+58 Road - Wilson Mills



Offset 25' Lt. ♀

Sta. Angle Bearing

88

87

86

85

84

83

82

81

80

79

78

77

Sta. Angle Bearing

99

98

97

96

95

+83<sup>7</sup> Δ 0°-0'

94

93

92

91

90

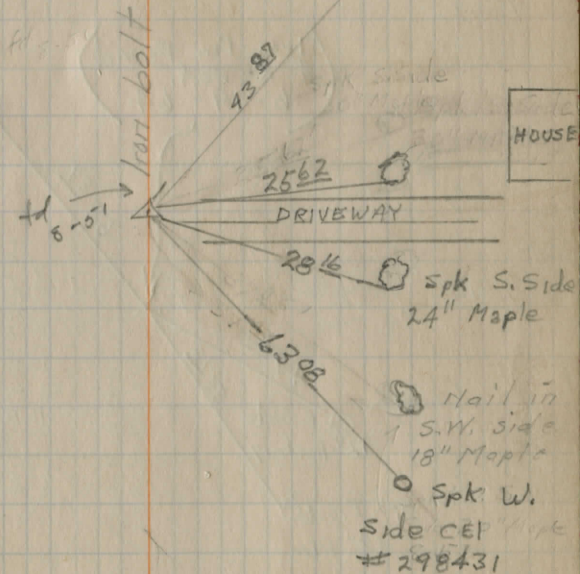
89

2562

(Refer 6-19-64)  
IRON PIPE FOUND

Spk SE side

36" Maple



Sta. Angle Bearing

110

109

108

107

106

105

+104 A 8°-06' 11"

104

Spk

E. side  
12" Hickory

103

Spk E. side  
18" Elm

102

101

100

(Iron Pin Found  
& Re-ref.  
6-19-64)

Spk W. Side  
24" Maple

63.87

$\Delta = 8^{\circ}-06'$   
 $D = 2^{\circ}-00'$   
 $PT = 104 + 40.44$   
 $T = 2 + 02.38$   
 $P.C. = 102 + 37.56$   
 $L = 4 \ 051.00$   
 $PT = 106 + 42.56$   
 Def. per. Ft. = 0.4'  
 Ext. = 7' 17"

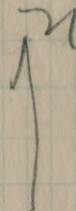
Int. 1° Curve = 405.682  
 Ext. 1° Curve = 14.346

Nail in  
S. side → 1750'

4436'

Nail in  
N.W. side  
Hedge tree

Iron Bolt



121

120

119

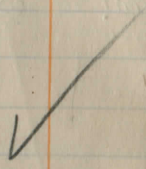
118

117

116

115

114



+17'  $\Delta 9^{\circ} 17'$  Lt

Ext. 1<sup>st</sup> Curve = 18.855.  
Tot. 1<sup>st</sup> Curve = 165.193.

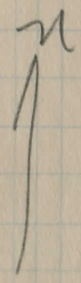
$\Delta = 9^{\circ} 17'$  Lt.  
 $D = 12^{\circ} 00'$   
 $P.I. = 113^{\circ} 17' 20''$   
 $T = 98.97$   
 $P.C. = 112^{\circ} 79.23$   
 $A = 77.32$   
 $P.T. = 113^{\circ} 54.29$   
Def. per. Ft. = .06°  
Ext. = 1.57 ft.

113

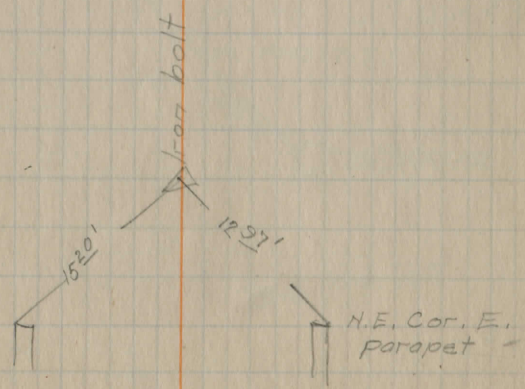
112

111

Exact Tot. = 38.84 ft.



N.W. Cor. W.  
Parapet



N.E. Cor. E.  
Parapet

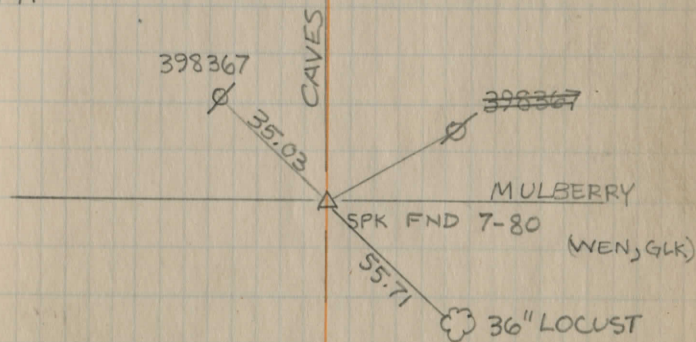
(2.32)

5280 / 12268.9  
10560  
17089  
15840  
12490

+68.9 end

122

77+71<sup>35</sup>



MULBERRY

Nail NW side 6" Maple

39°00'

see pg. 27

x road RD (FCP)

37°00'

Tack N.E. side 6" Hedge tree

TOPO

End of survey  
X Road

15

35' 144 23'

25' +24  
+22 24'

122

+30

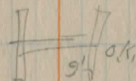
25' +50

25' +20  
121

+75 23'

+15 20'

120



119

+50  
brush ends

118

117

116

+30

115

Brush

Brush

Swamp & U. Br. Ash  
 2 +45 35'  
 110 25'  
 114

OK  
 +04  
 115

Maple ③ 24<sup>5</sup> +30

Maple ③ 22<sup>5</sup> +15

112

③ 15' +90

③

Maple ③ 18' +25

Maple ③ 16' +10

111

30'

③ 12' +40

③ 25' +30

+10

OK

110

109

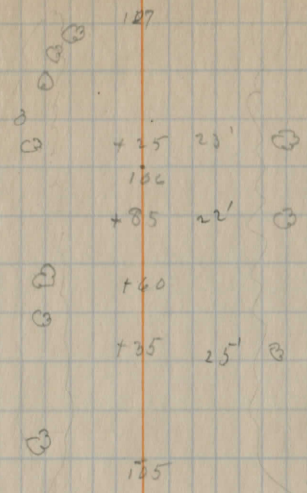
Brush ③ 25' +75

108

③ 15' +90

107

Brush



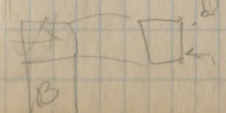
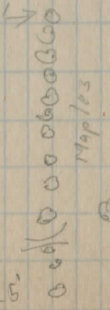
gates

PF.?

25' 104

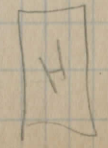
ridge

1502 26' 97



80  
+75  
+60  
95  
+30

25'



Gates

PL

+90

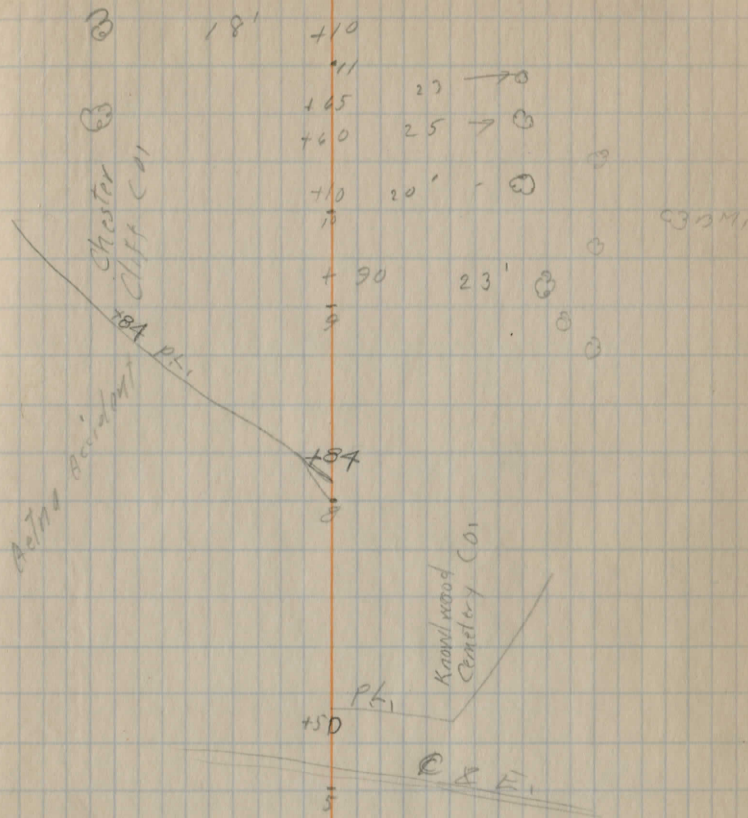
PL

Leicht

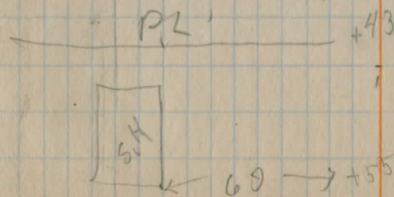
93

Dr. Eddy

Topo



J. Mapco



⊙ 25' — +90 — 25' —  
 700  
 19

⊙<sub>PM</sub> 25' +90  
 18

⊙ 15' +70

⊙ 15' +60

⊙ 17 12

+40 24  
 15

⊙ 25' 73

⊙ 6 +61 26'

⊙ 6 +55 20' ⊙

+15 25' ⊙

⊙ 25' +95  
 12

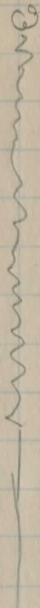
under brush

+60 20' ⊙

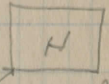
+30 27' ⊙

J. Moore

R.L.



+70 10' †  
 27' 30'  
 +80 20' ⊙  
 +70 20' ⊙  
 +110 20' ⊙  
 +110 75'  
 24 20' ⊙  
 +70 20' ⊙  
 28  
 +90 20' ⊙  
 +90 20' ⊙  
 +30 20' ⊙  
 27



W. C. White

P.L.  
⊙

+33  
25

P.L.

D. Elliott Gilmore

+62  
23

D.W.

+60

21

P.L.

+19

20

Mapes



Peterson

PL1

|   |      |     |   |
|---|------|-----|---|
|   | +70  | 30  | ⊙ |
|   | +35  |     |   |
|   | +15  |     |   |
|   | +75  |     |   |
|   | +81  |     |   |
| ⊙ | +25' | +75 |   |
|   | +60  | 30  | ⊙ |
|   | +90  | 30  | ⊙ |
|   | +70  | 30' | ⊙ |
|   | -50  |     |   |

+15'+55'

x +40 30' ⊙

+8 30' ⊙

+75 30' ⊙

+40 30' ⊙

+0 30' ⊙

47

+15'+20'

+46

+25'+95

+60

30' ⊙

+25' 75

+14'+85

+28' +16

+70

+30 +70

+20

H

Peterson

White

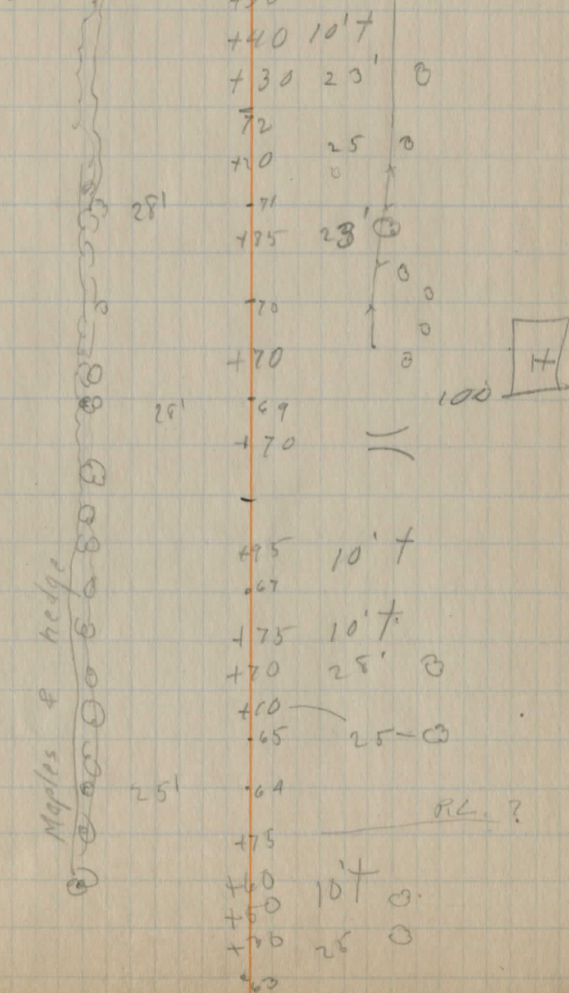
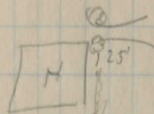
20'

4 string lines



B.M.  $\rightarrow$   $\odot$  28'  $\rightarrow$  +75  
 +70

$\odot$  27'  $\rightarrow$  +75  
 +48 20'  $\dagger$



Netter

Maples & hedge

about 100' dip in front of Eddy's Loom

$$\begin{array}{r} + 18' + 10 \\ - 93 \end{array}$$

$$+ 16' + 60$$

$$\begin{array}{r} \textcircled{3} 25' + 30 \\ 90 \end{array}$$

$$\begin{array}{r} + 17' + 45 \\ 85 \end{array}$$

$$\begin{array}{r} \square 4.100 \\ \textcircled{3} 25' + 35 \end{array}$$

$$\begin{array}{r} ) \\ 85 \end{array}$$

600000

84

$$\begin{array}{r} + 15' \\ 83 \end{array}$$

$$\begin{array}{r} \textcircled{0} + 20' \\ + 40 \end{array}$$

$$\begin{array}{r} \textcircled{0} \\ \textcircled{0} \\ 80 \end{array}$$

$$\begin{array}{r} \textcircled{0} + 17' \\ + 40 \end{array}$$

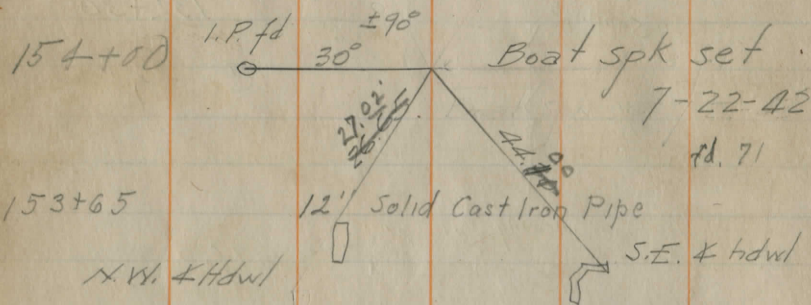
$$\begin{array}{r} \textcircled{0} 27' \\ 78 \end{array}$$

600000



Aug. 21, 1931, High clouds, N.E. Wind, 75°  
 W. C. Marks, D. R. Parks, T. Snyder.

164+39 ± 4" Sectional Cast Iron Pipe  
 S.E. & hdwl

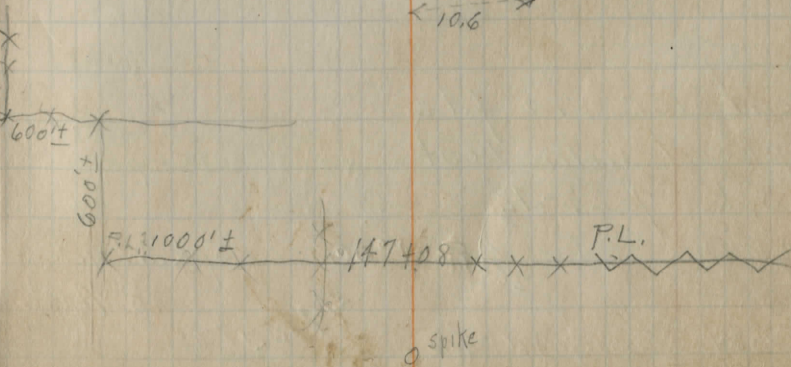
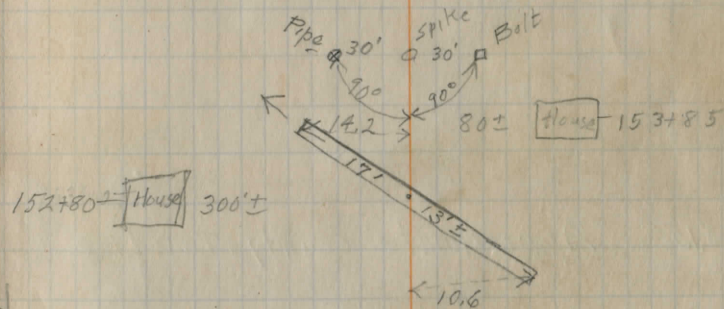
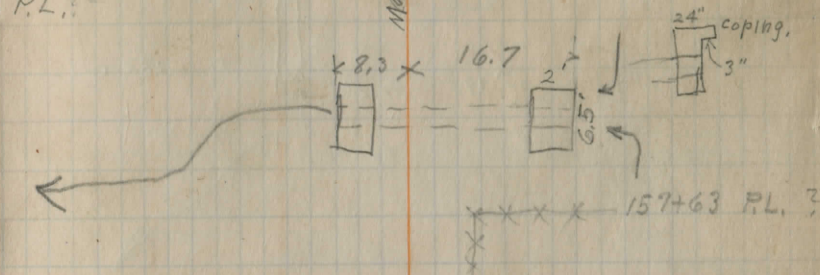
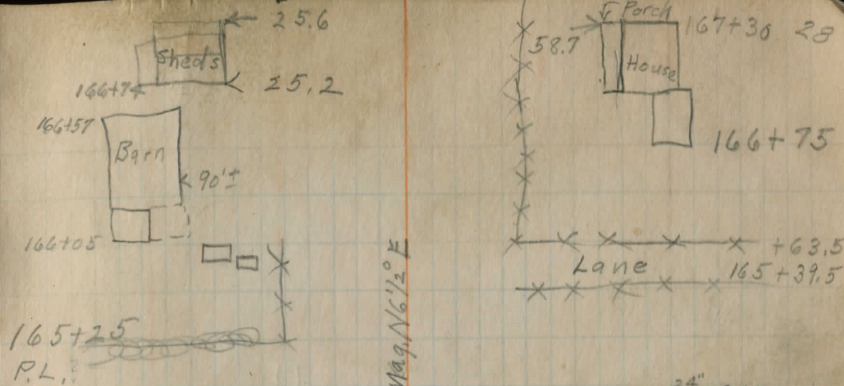


SPK N.E. side  
 SET # 380063

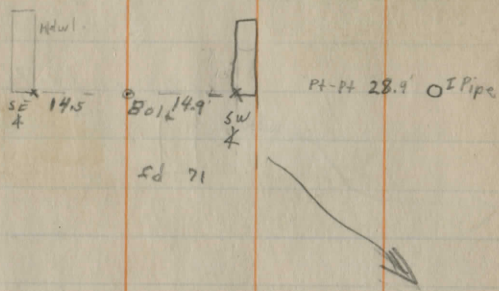
144+84.4

SPK SE side  
 15 Maple

49. spk  
 set 71

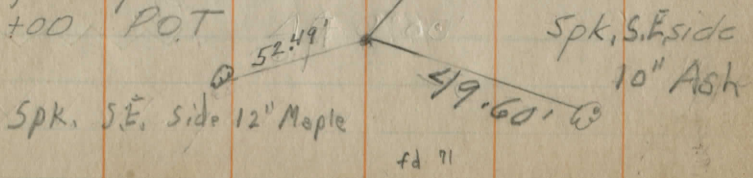


17358.15, N. line of Chester Twp.  
 12268.5 # Mulberry Road.  
 5089.65 Feet.  
 0.964 Miles

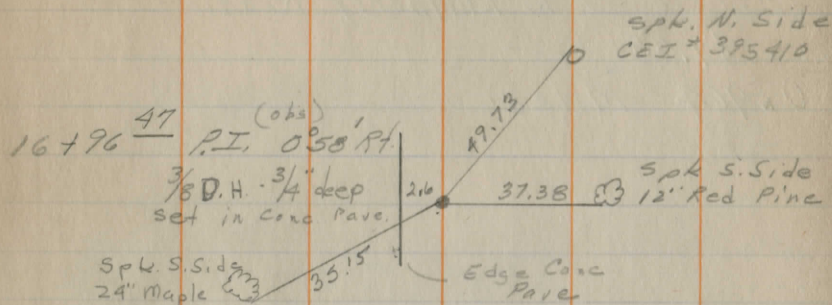


173+58.15 Approximate County + Twp. Line  
 173+59, 12" Pipe Culvert.

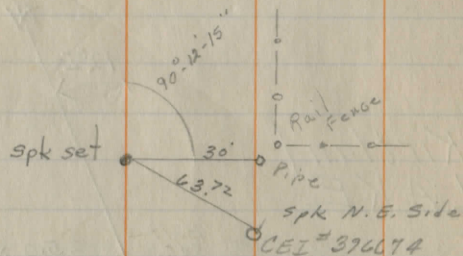
Bent over pin fd &  
 replaced with boat  
 spk 7-23-42  
 170+00 P.O.T



Caves Rd.  
T. H. #157



4+36<sup>71</sup> POT



6.79  
Approx Traveled  $\frac{1}{2}$  Mayfield

Davidson  
Ranney  
Young

12/30/64

30

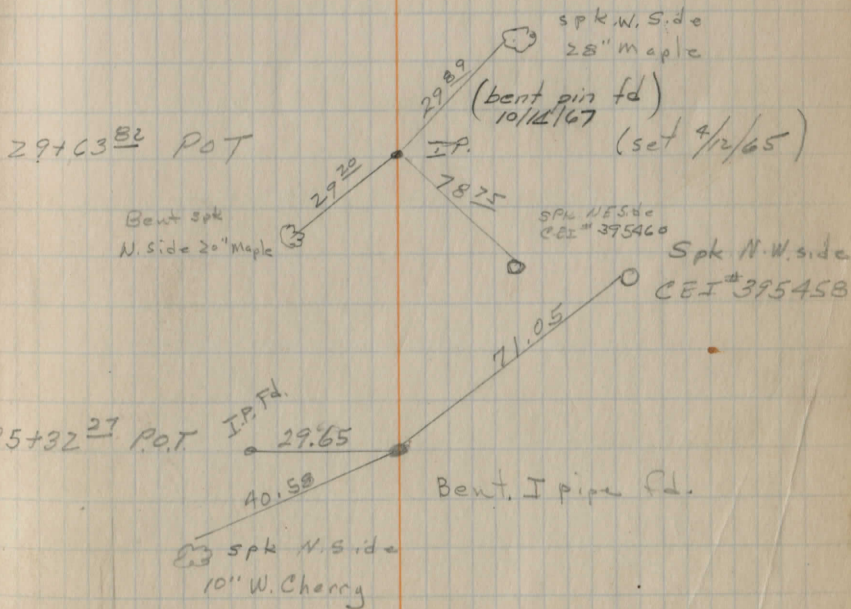
30

(pin fd. 10/12/67)

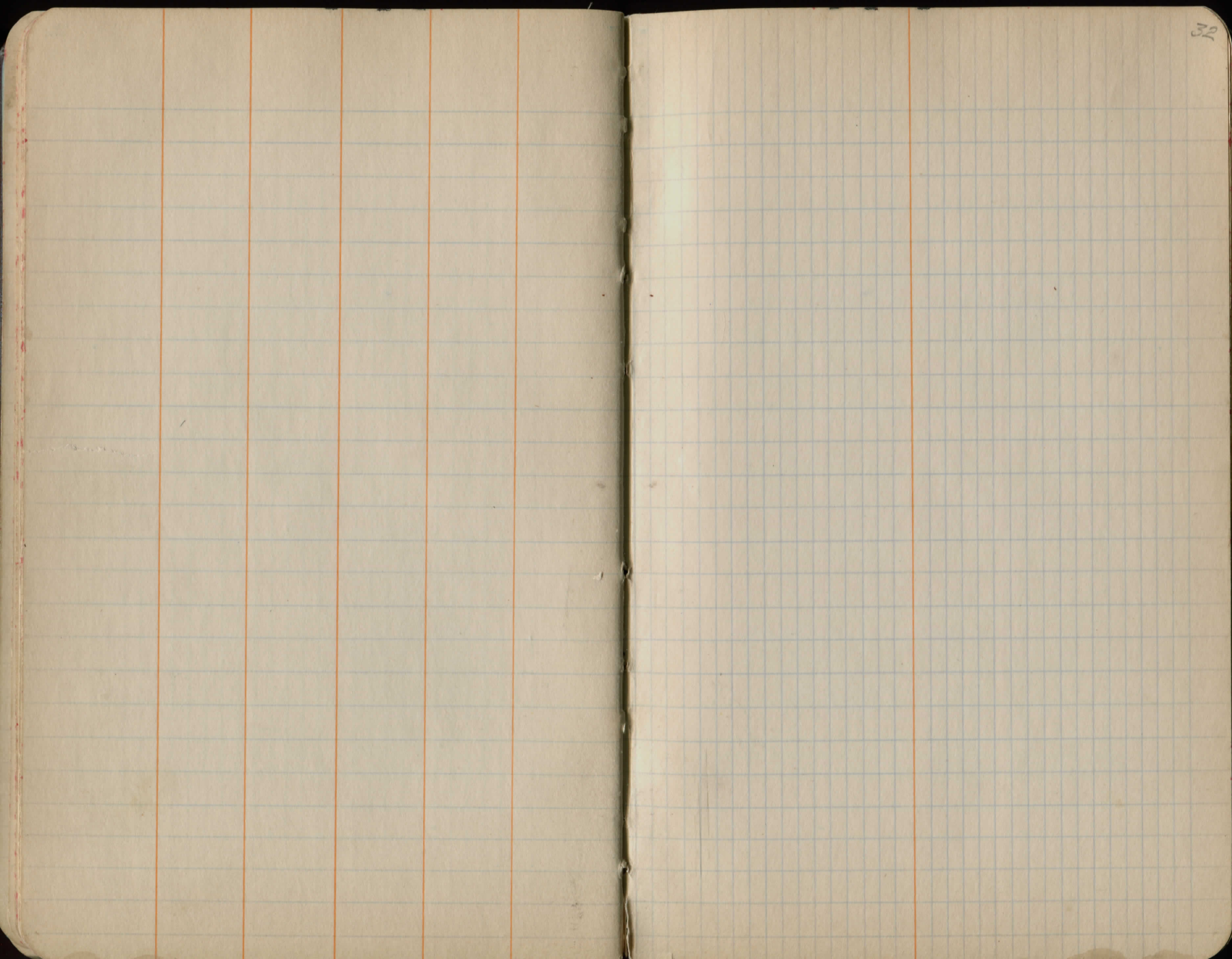
Sherman Rd

42+27<sup>0</sup> P.I. 0°-3'-45" Lt.  
(obs)

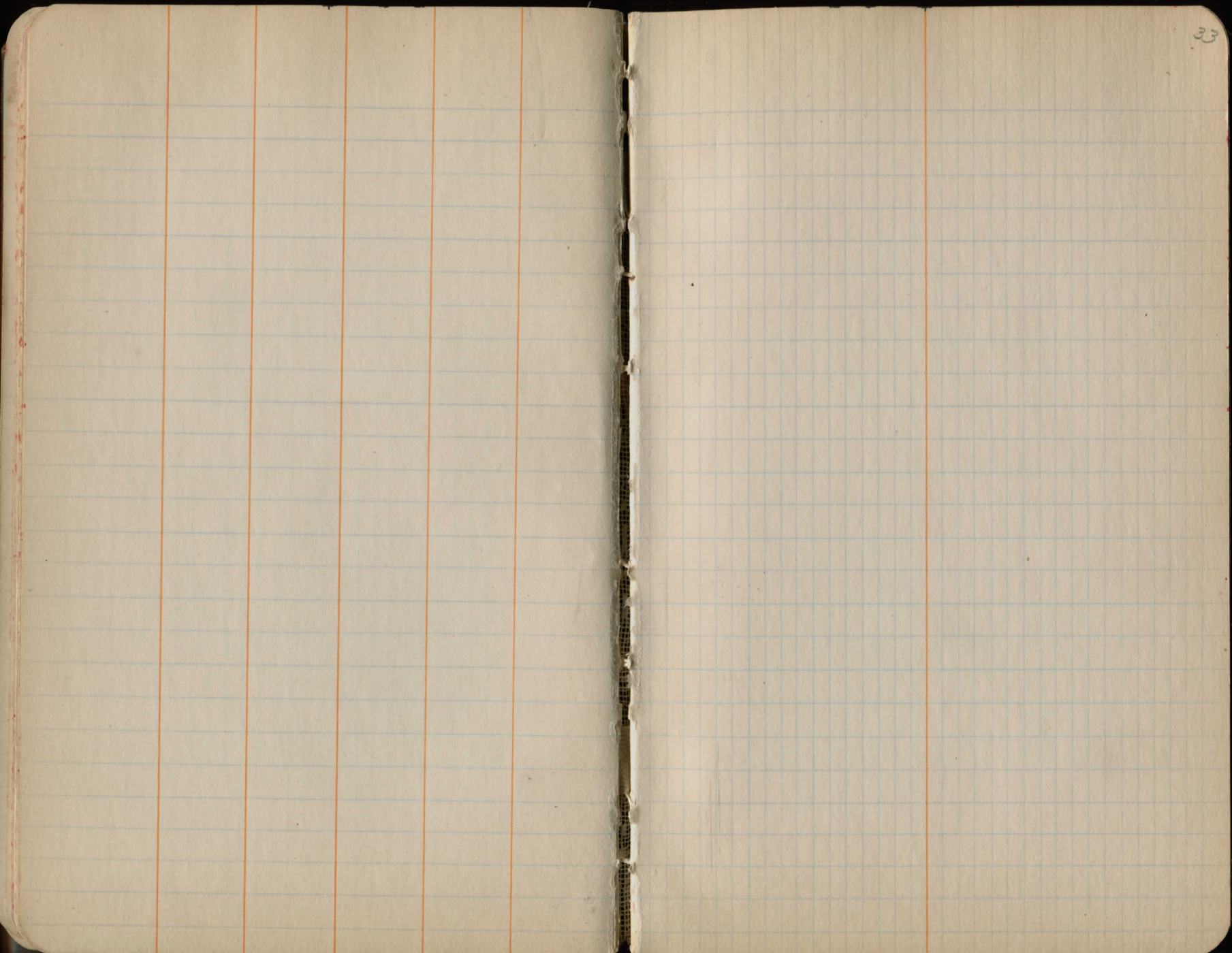
I.P. set from refs  
FB #/39 pg 33





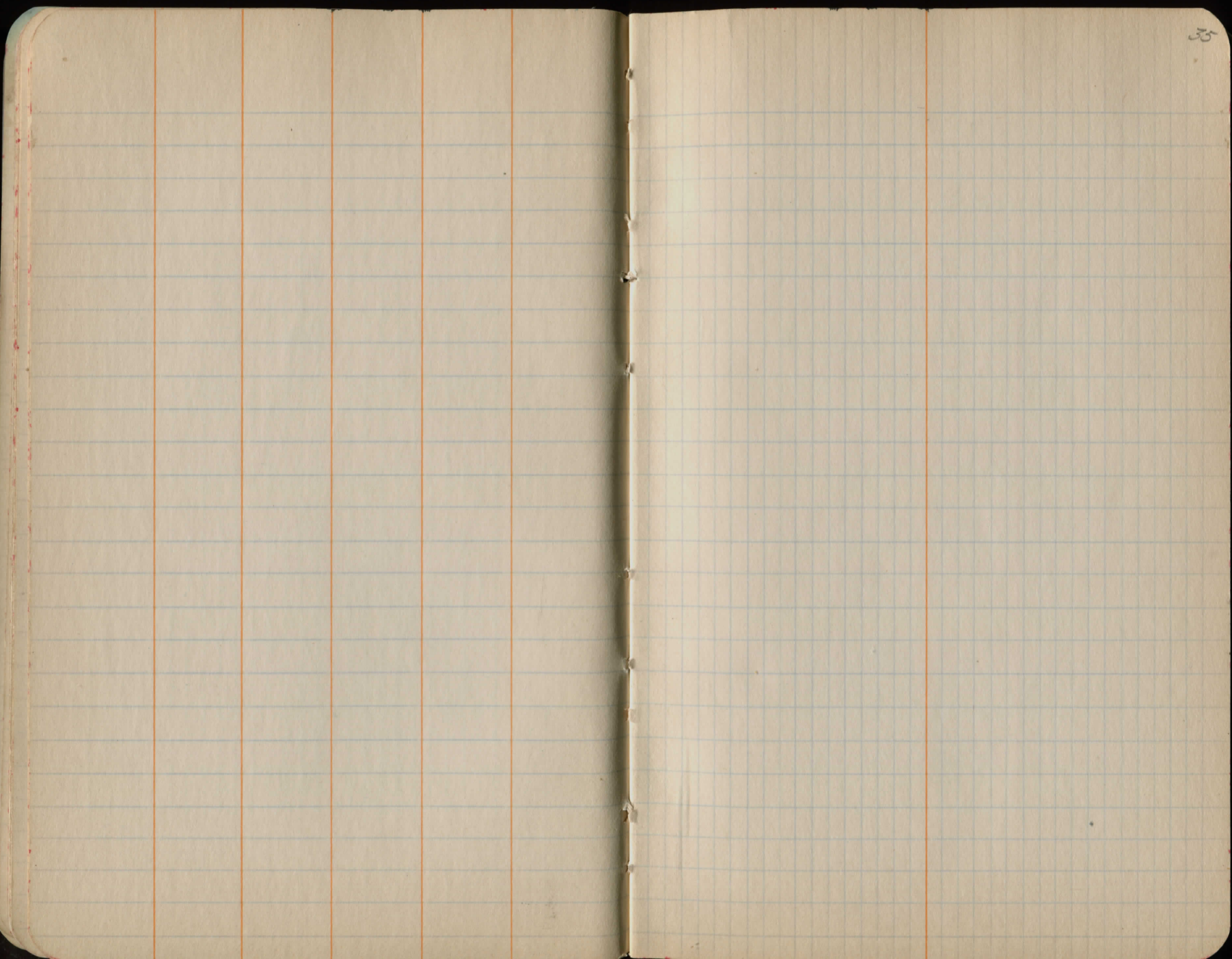


20



37





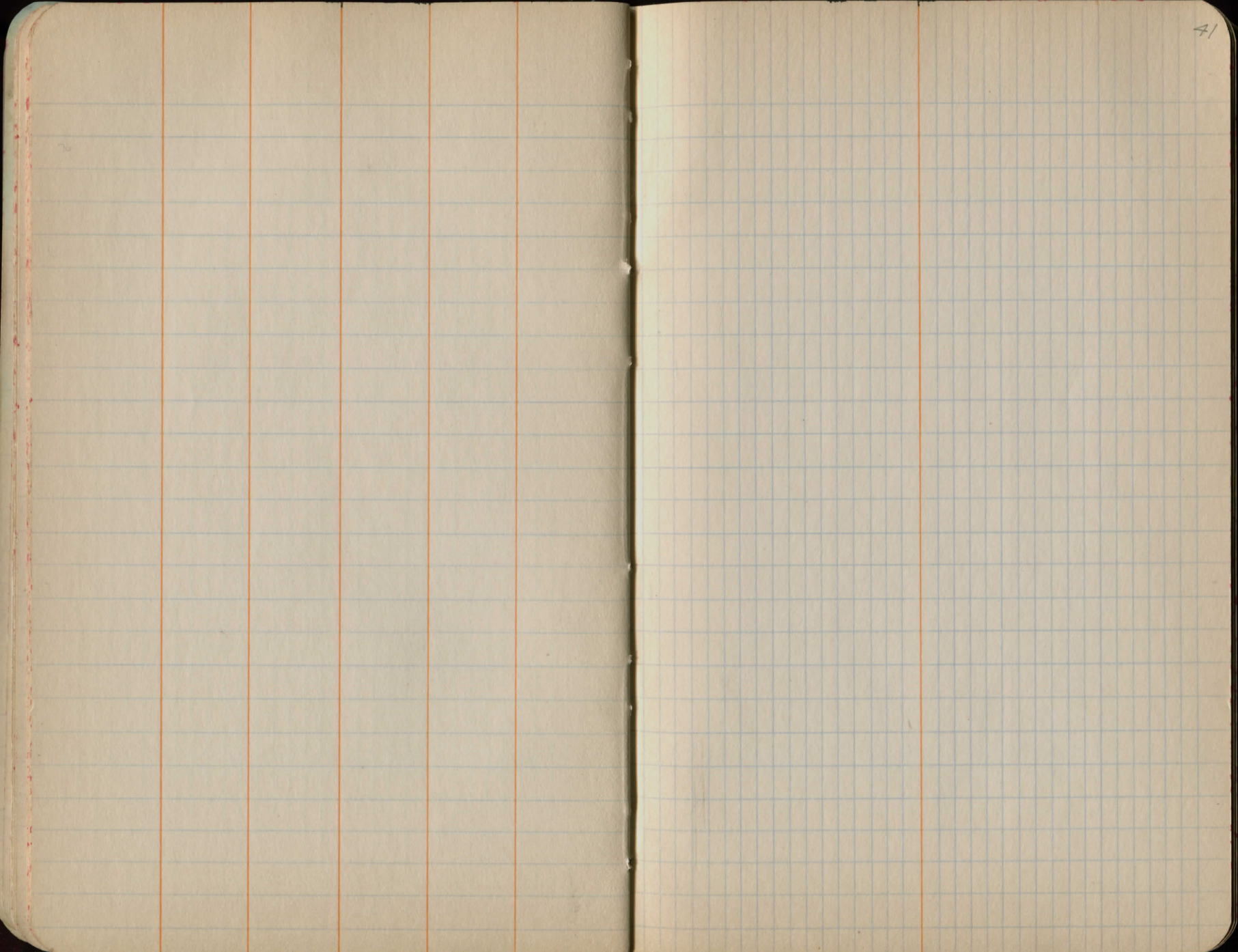






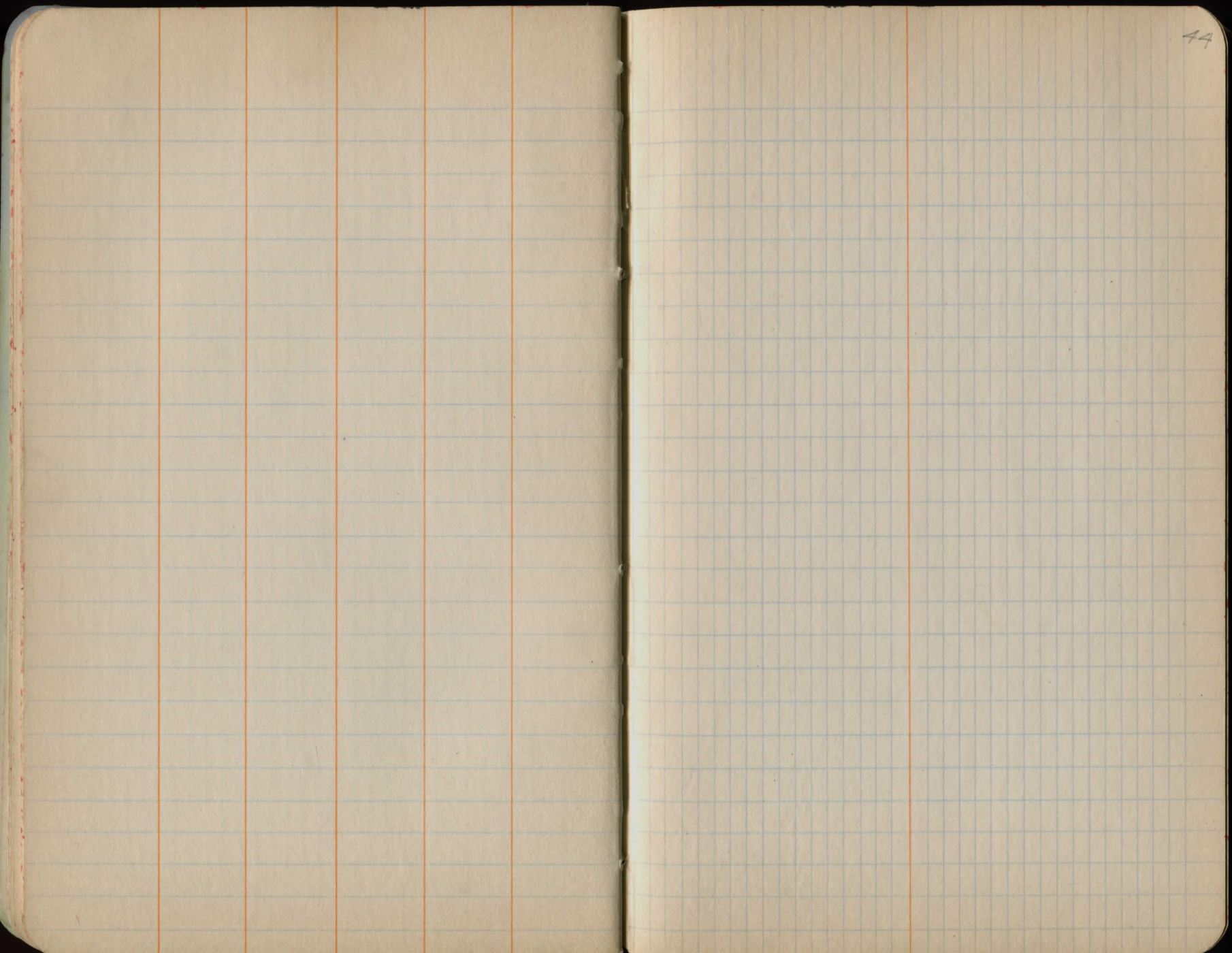








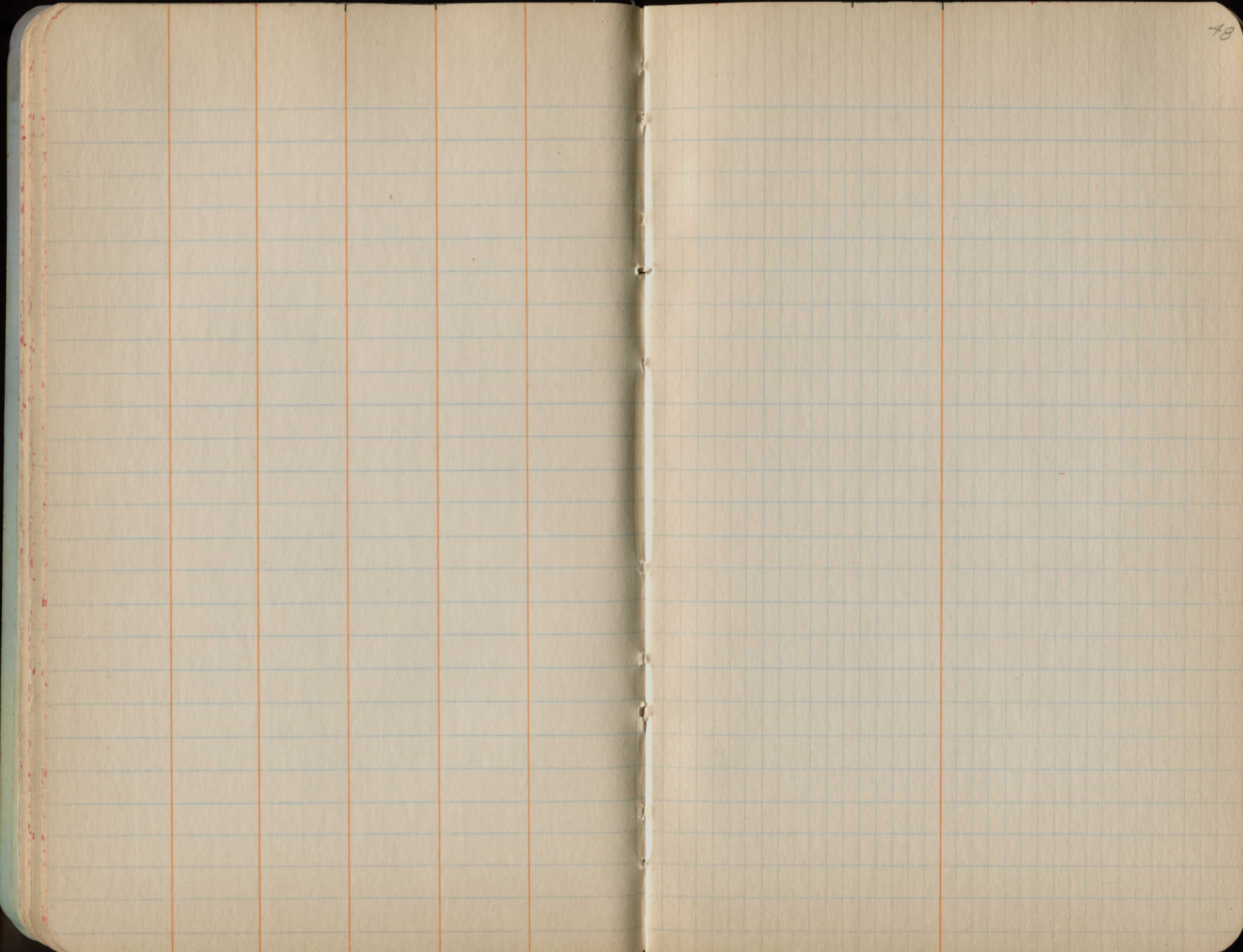






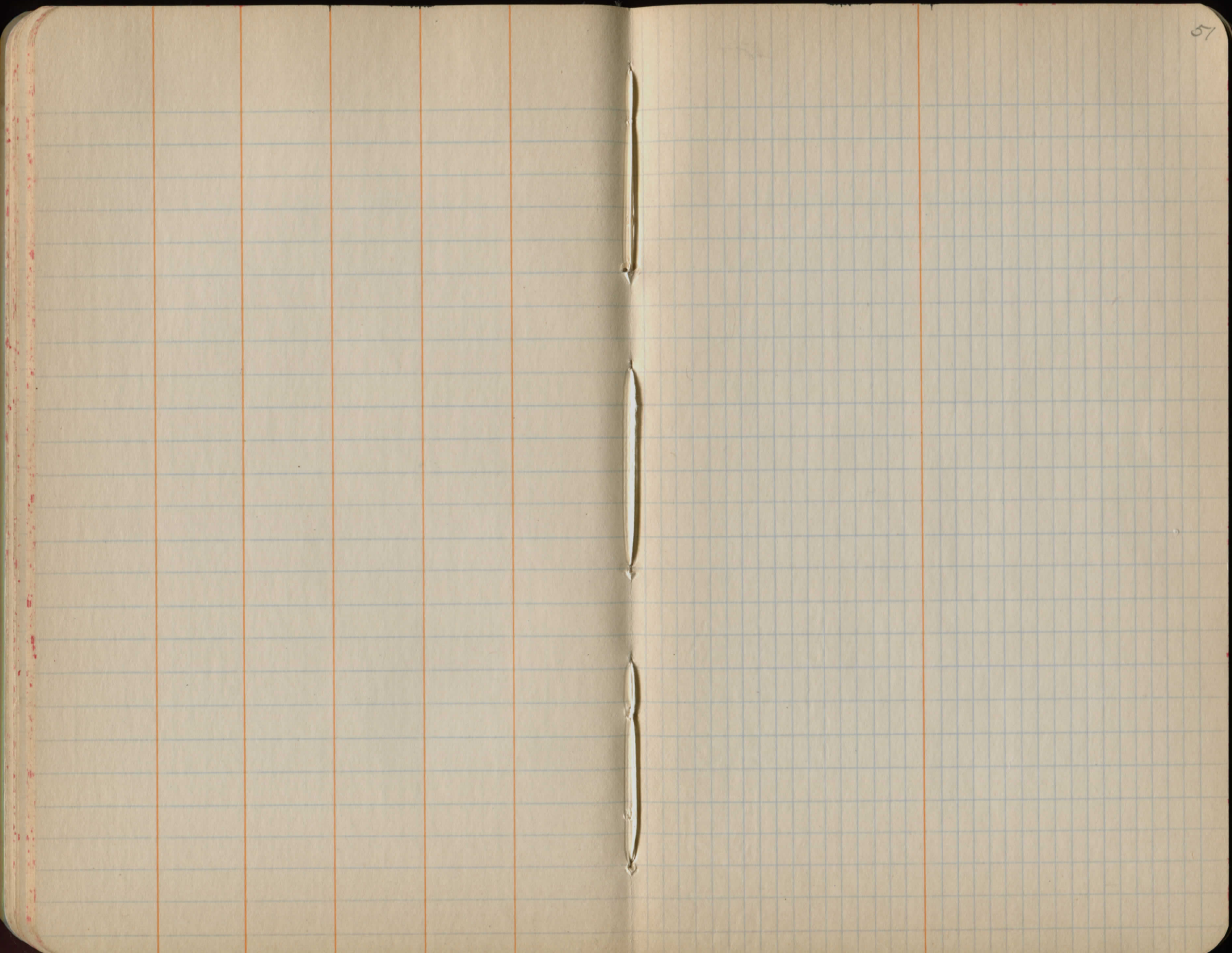






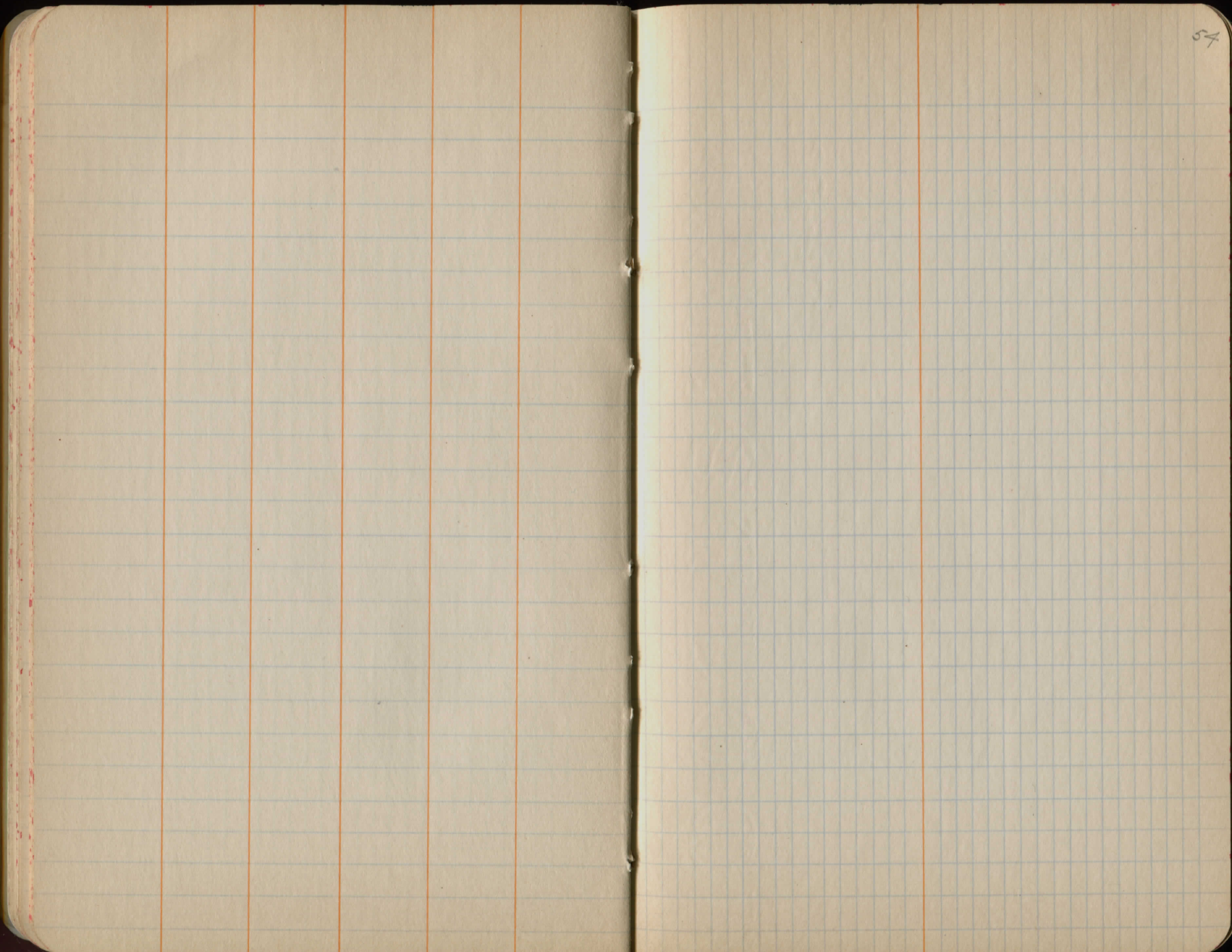


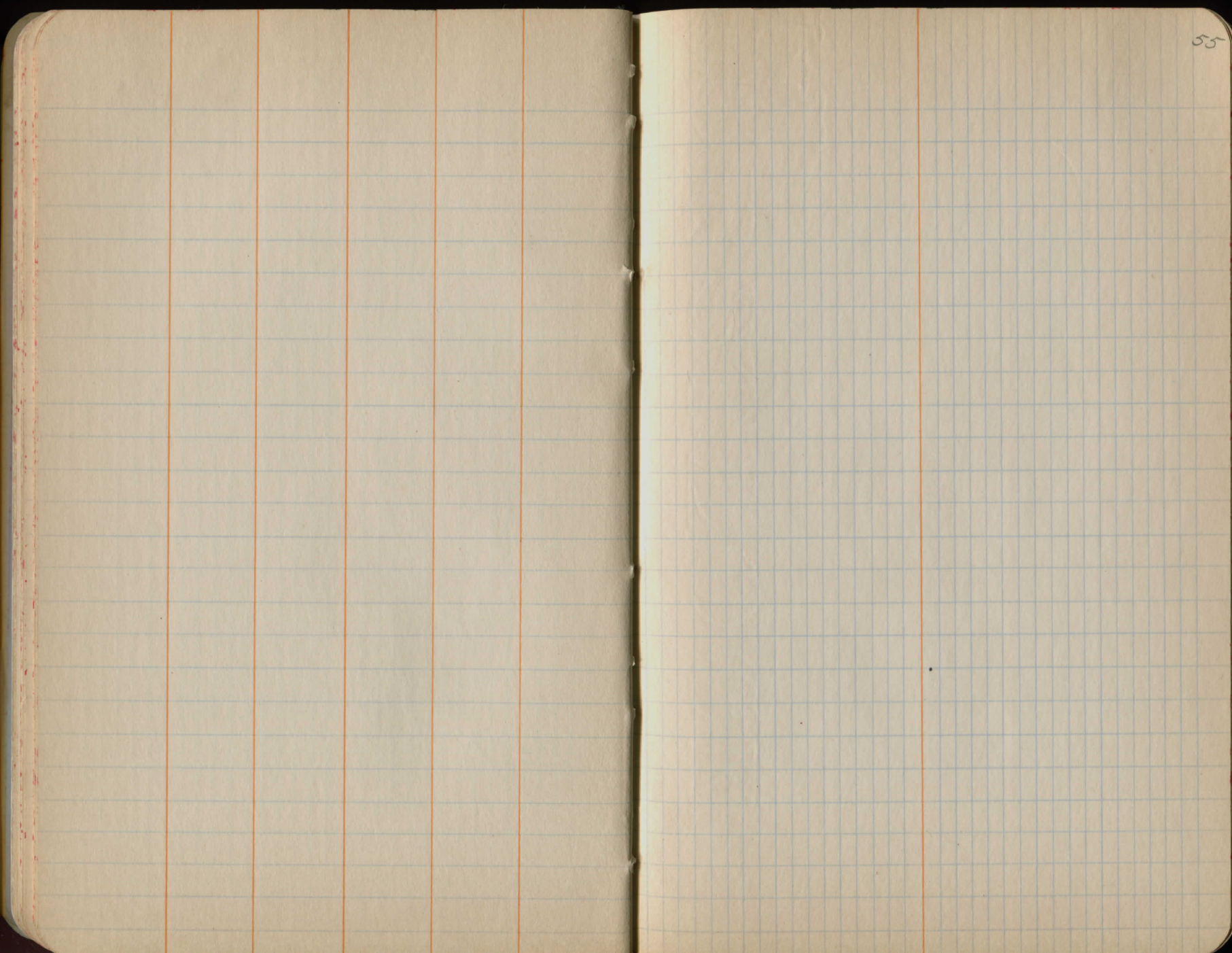


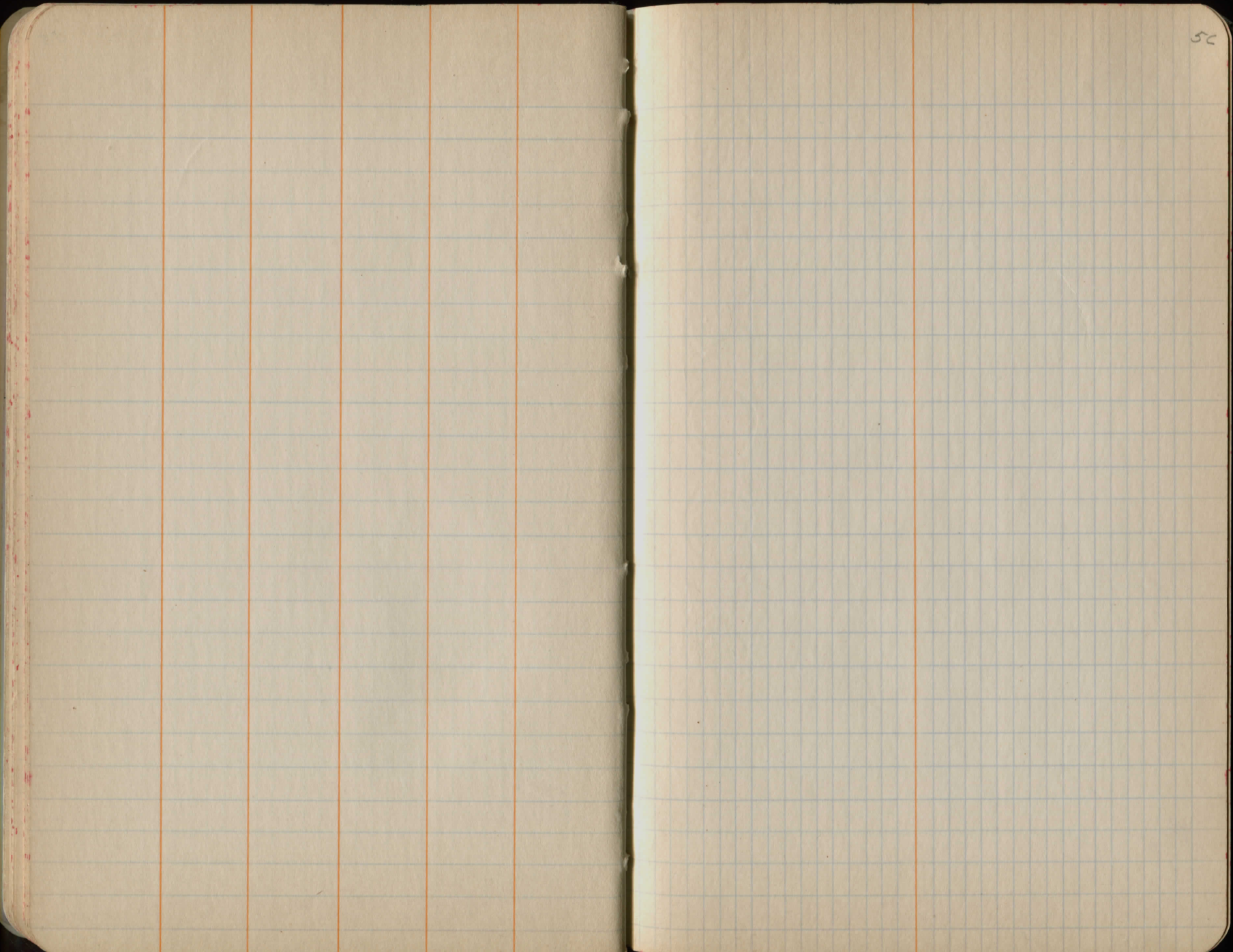




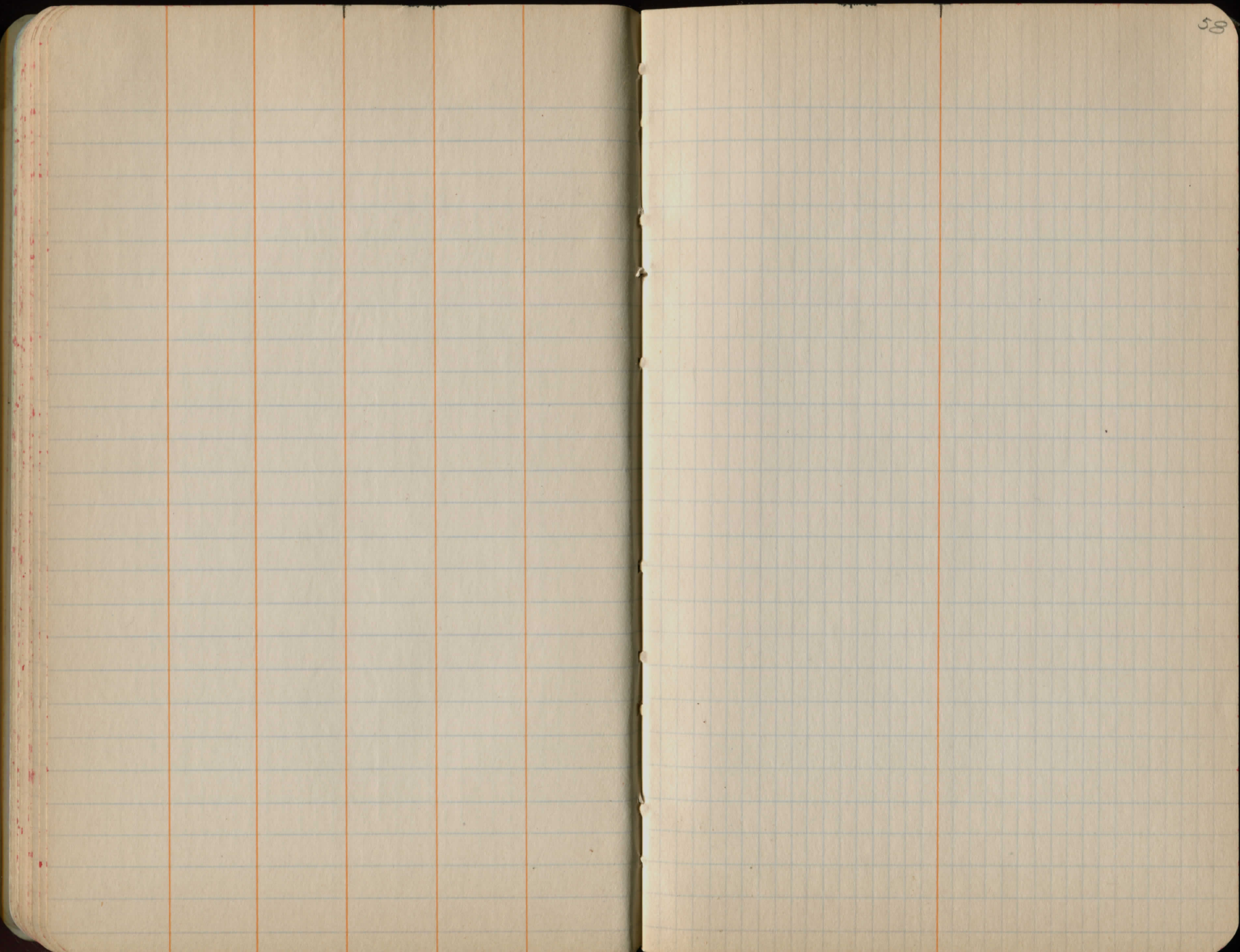


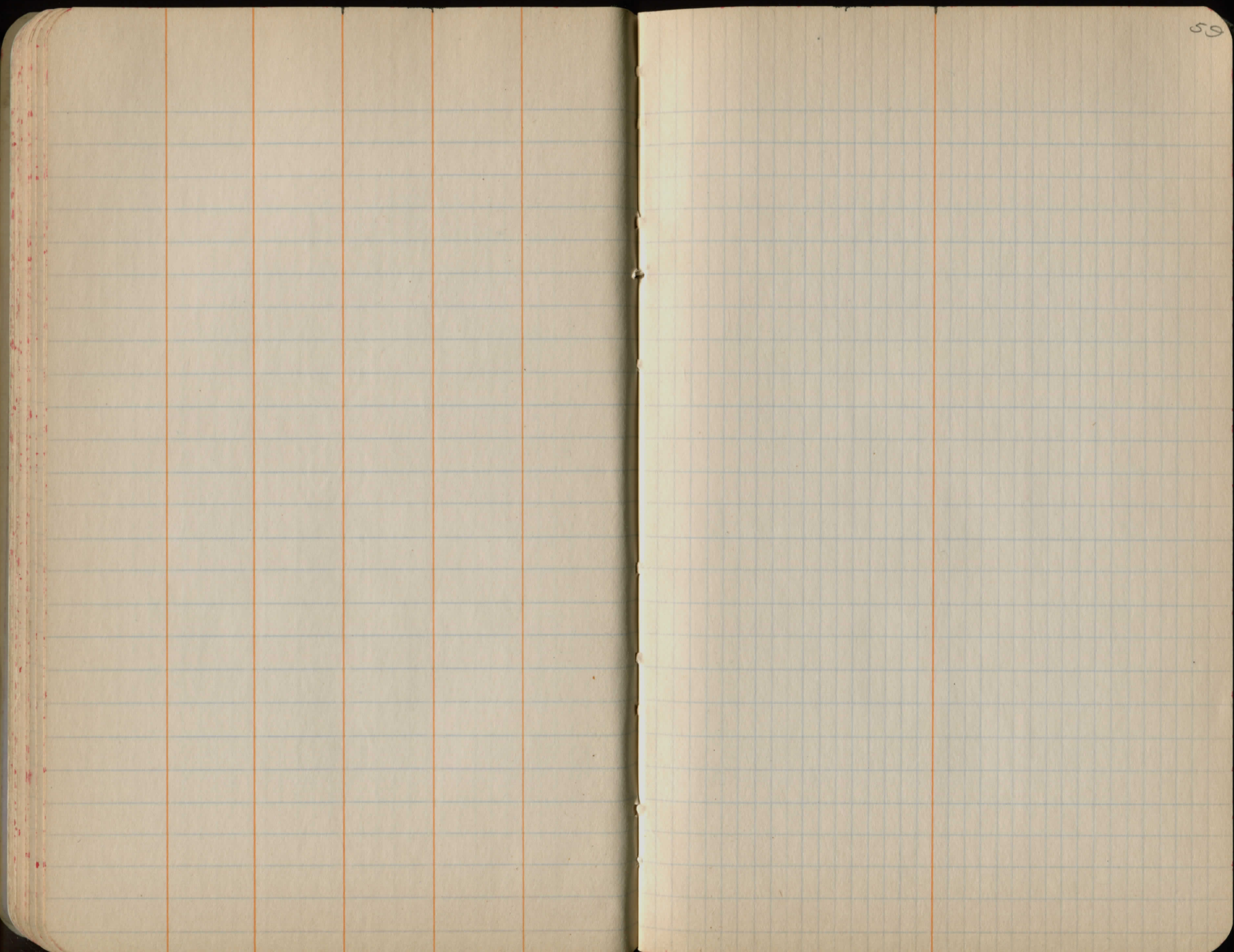




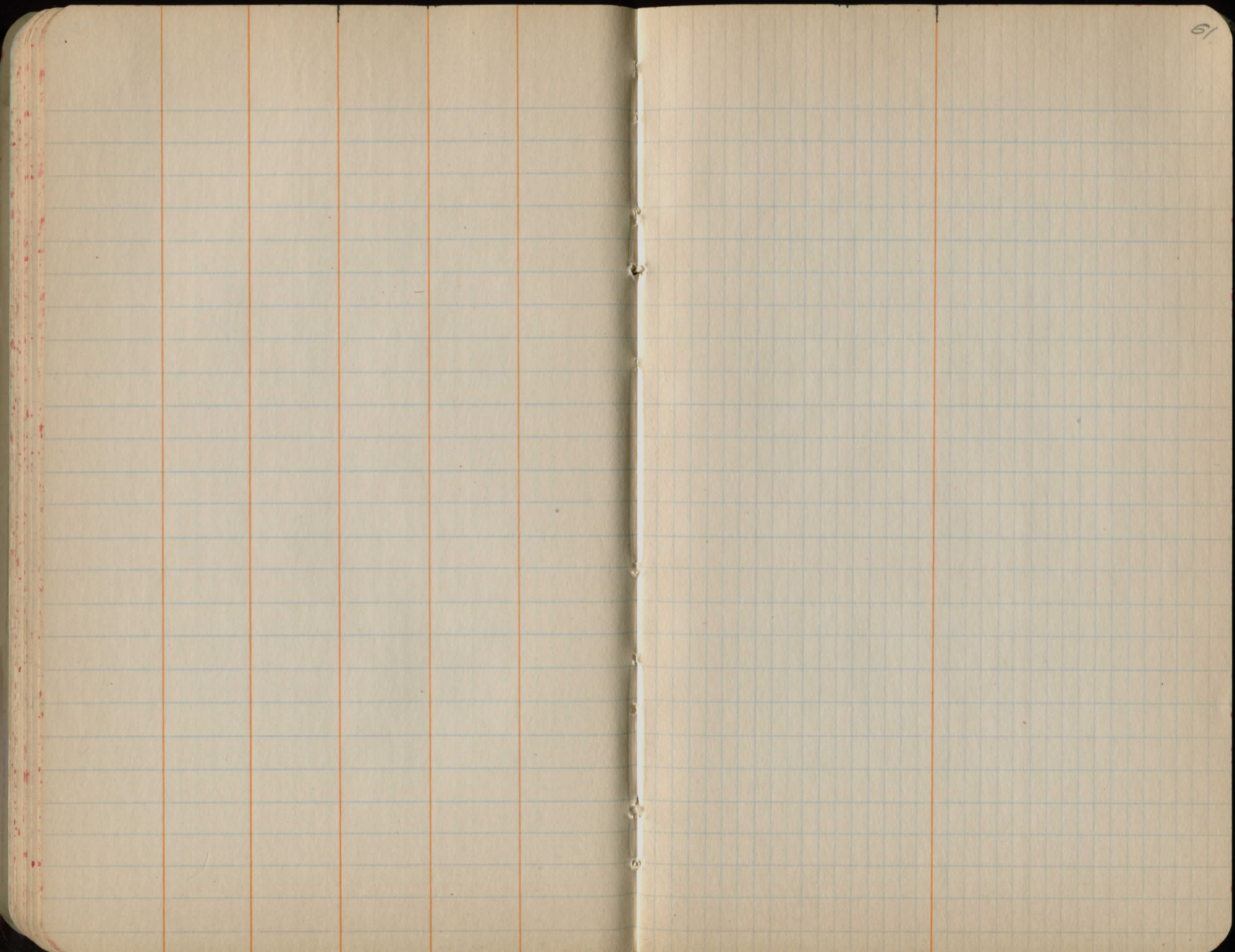






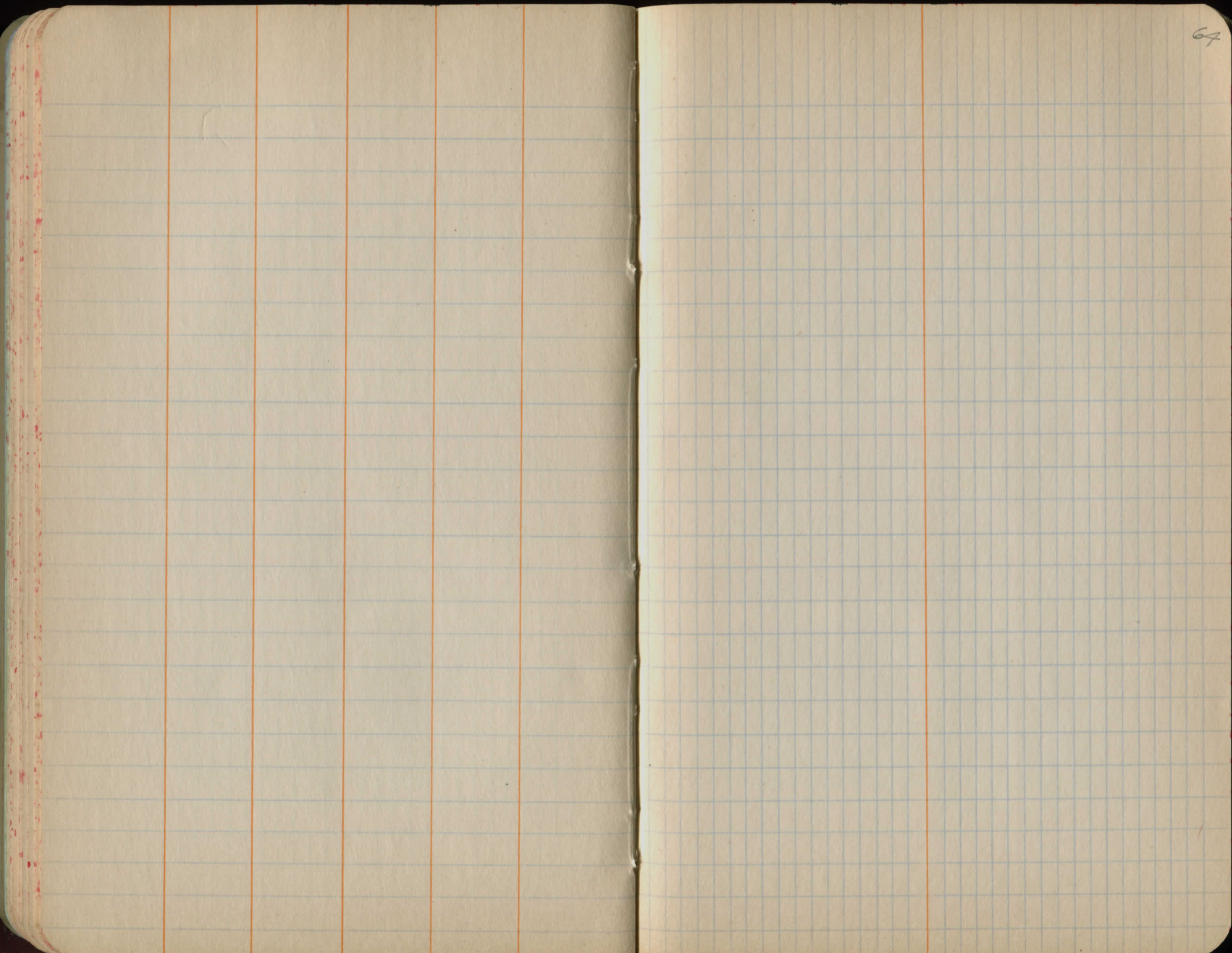


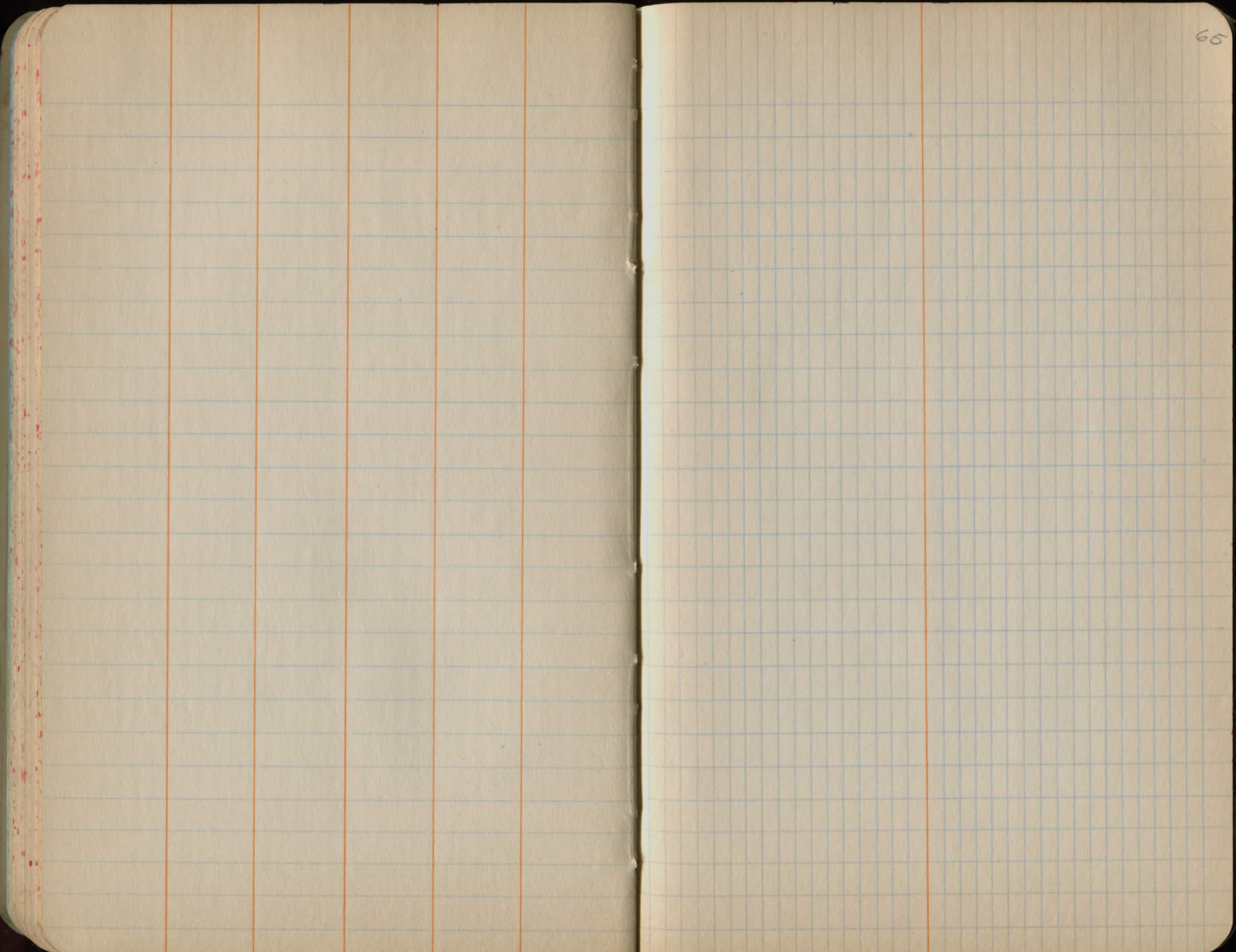


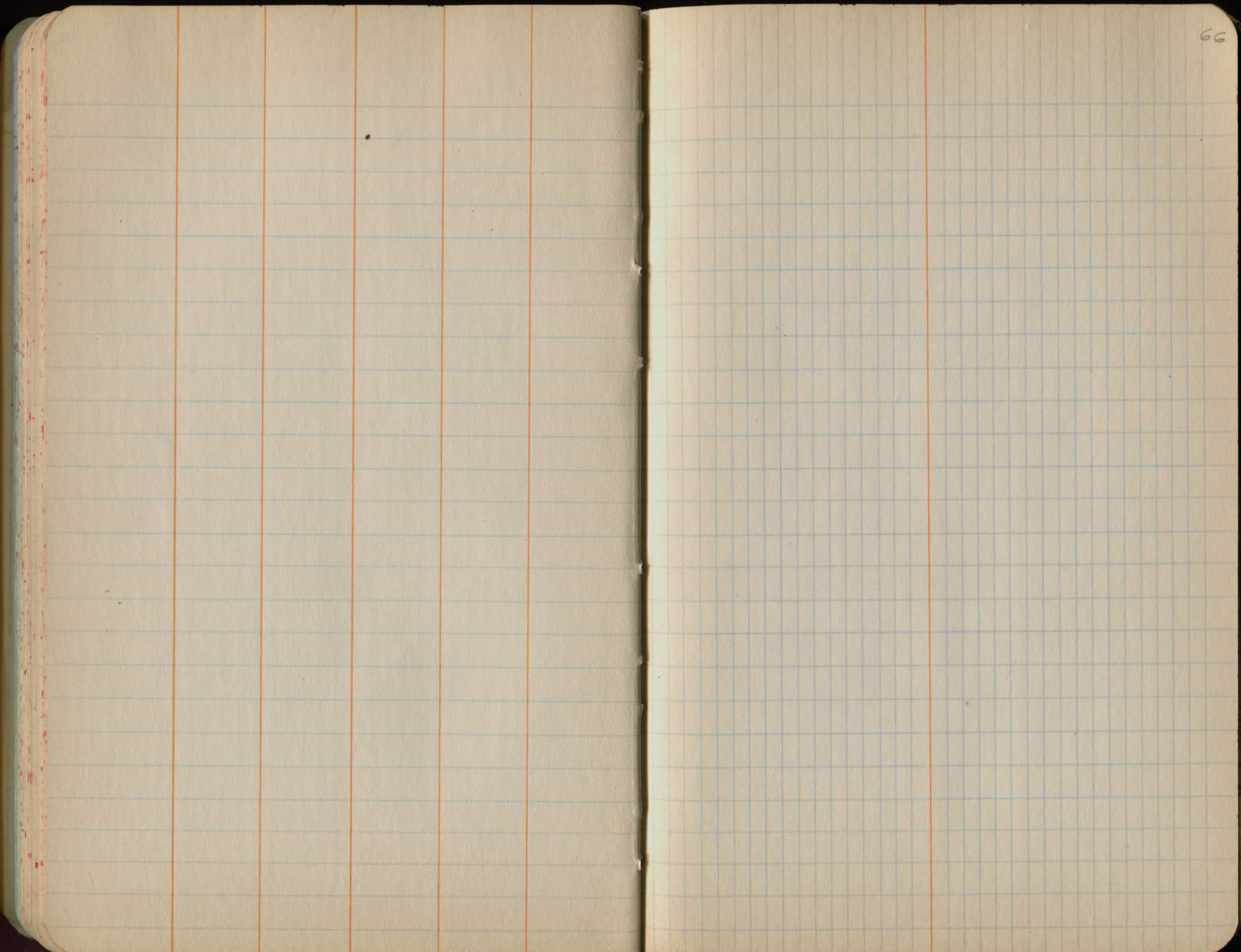


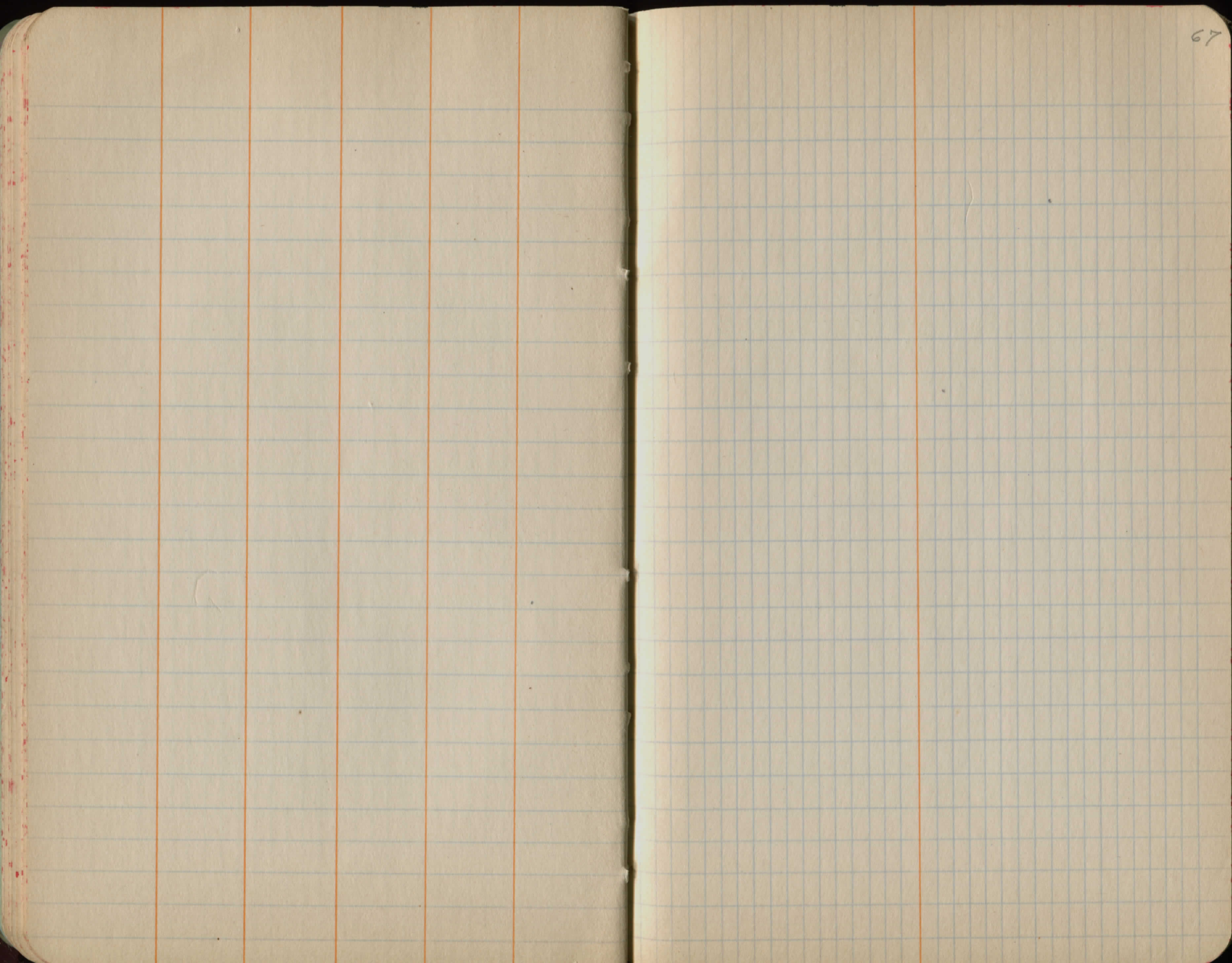


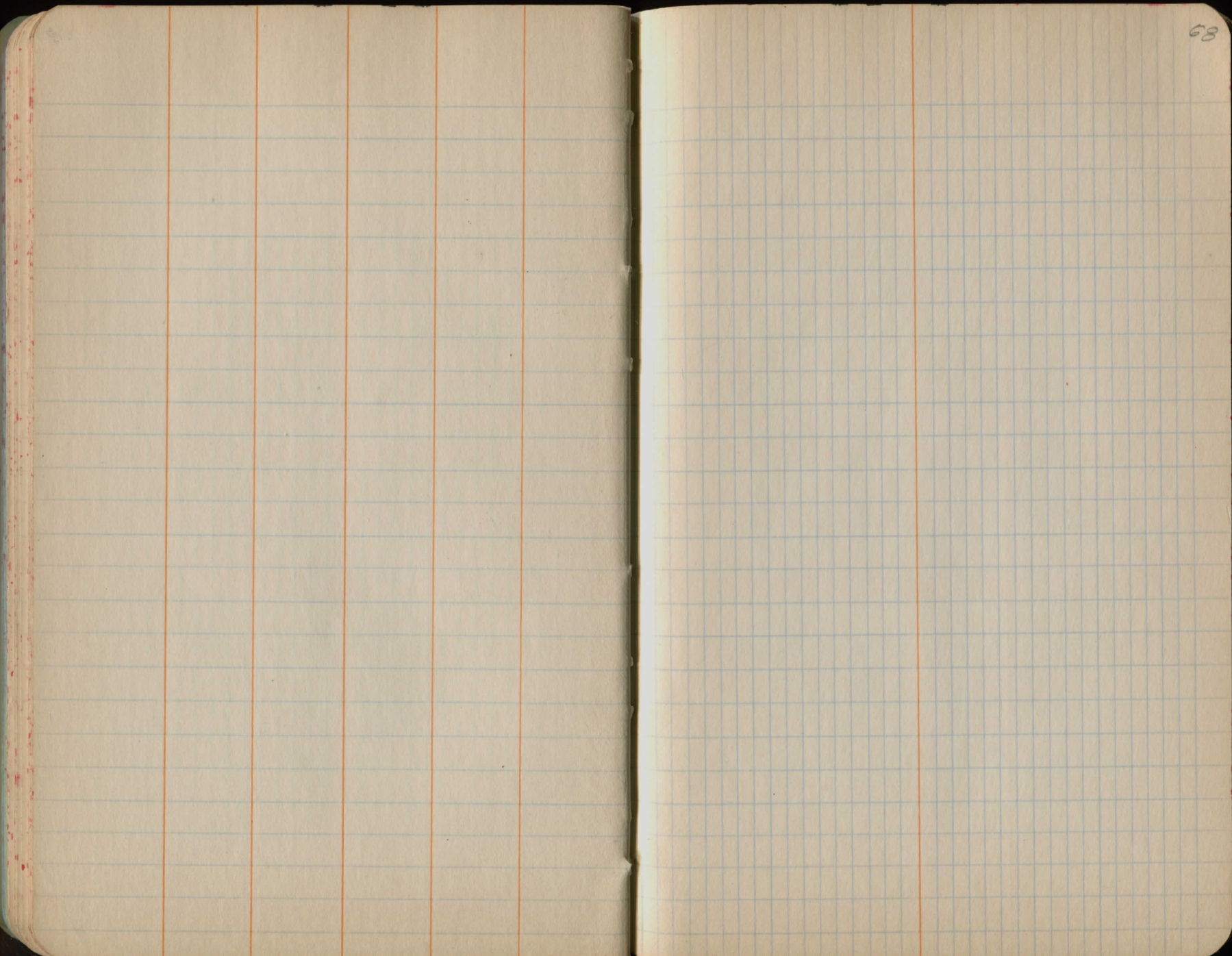


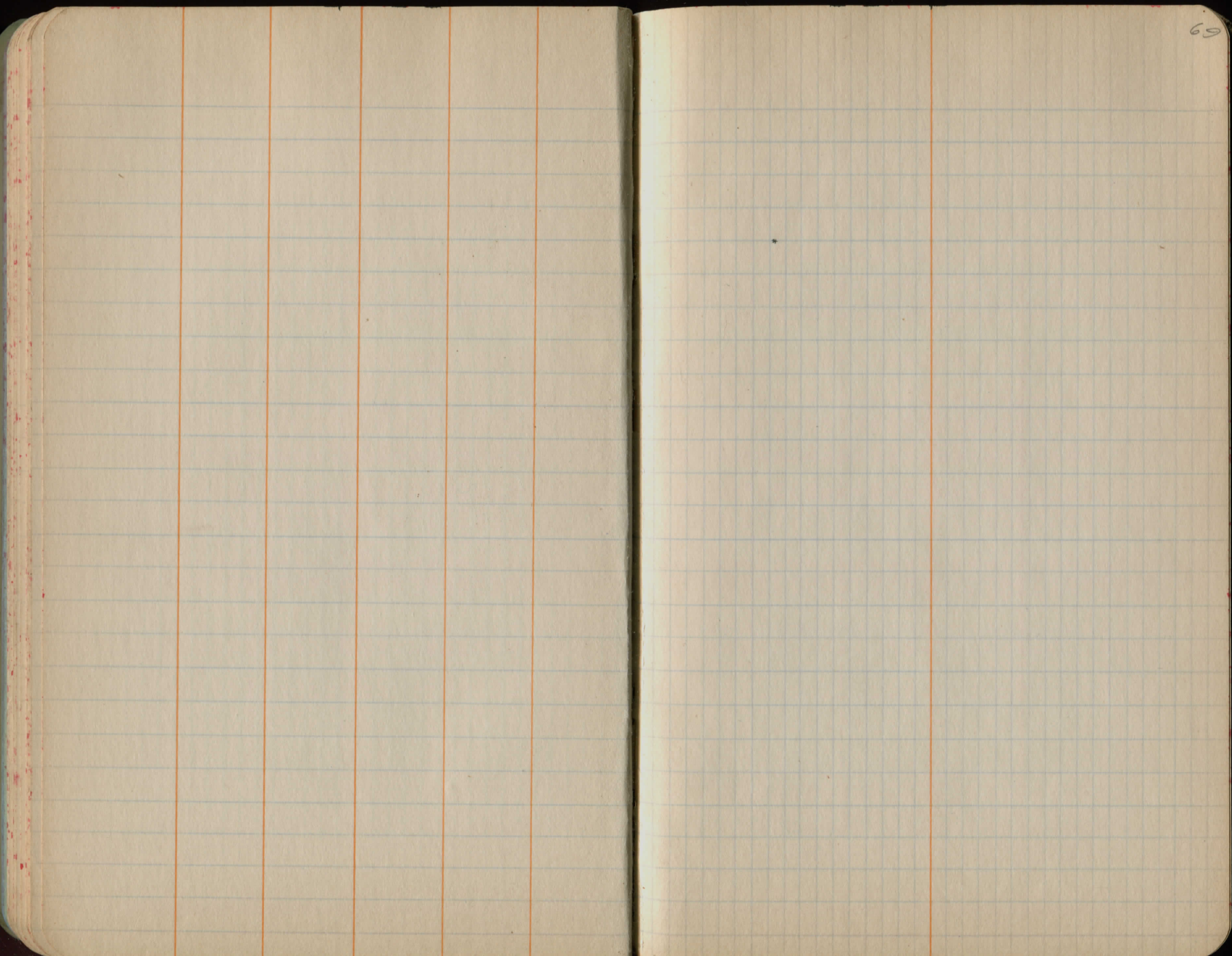


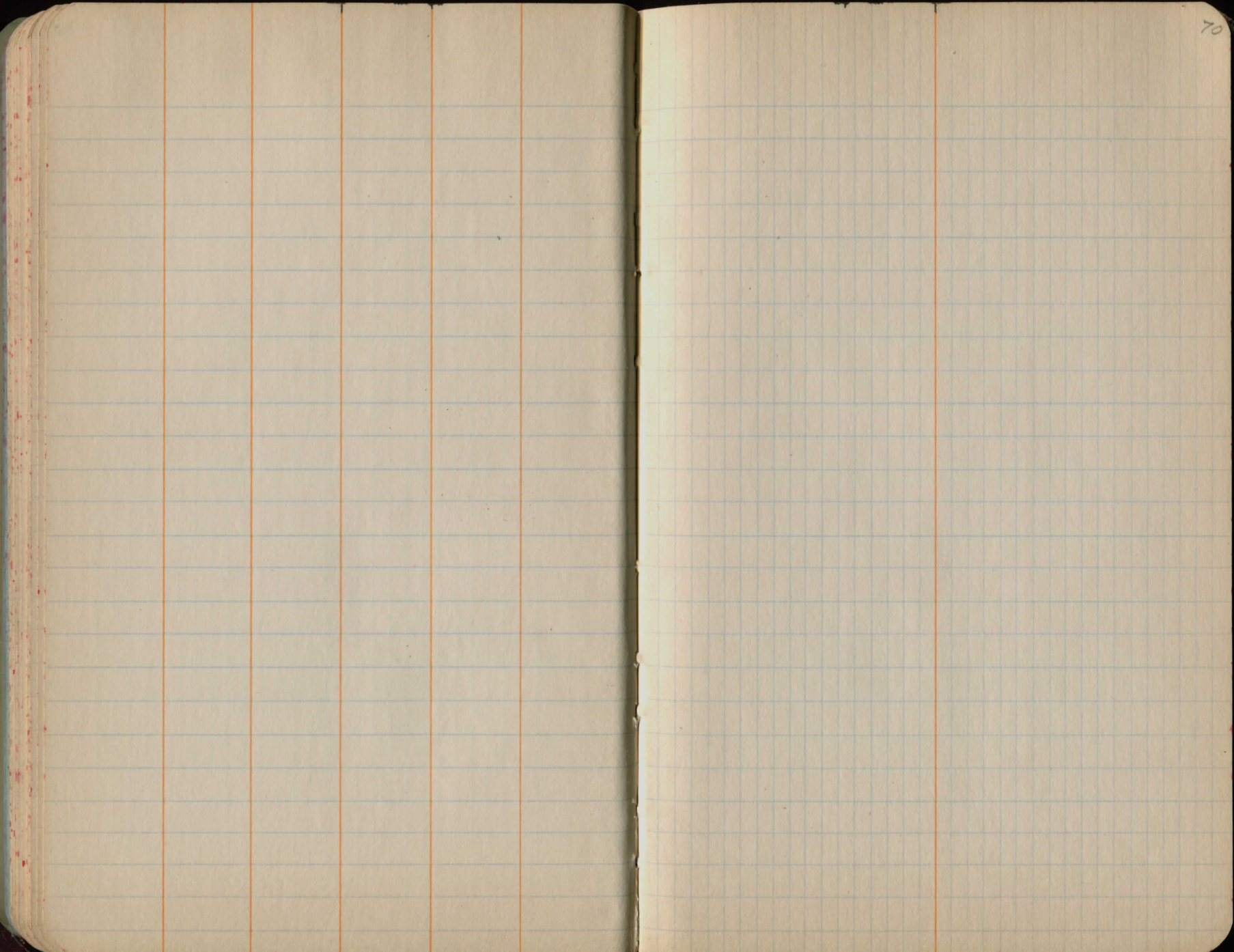


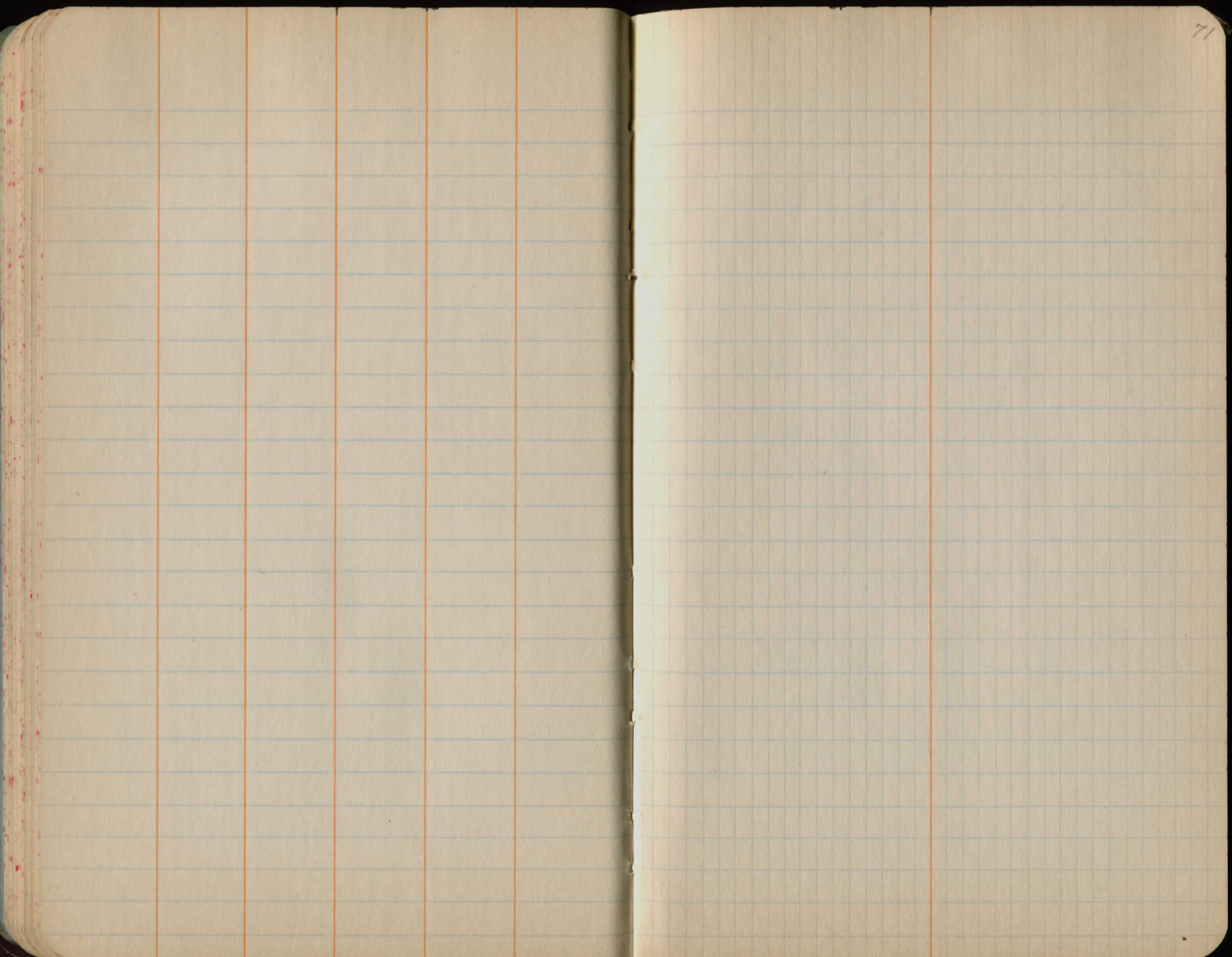




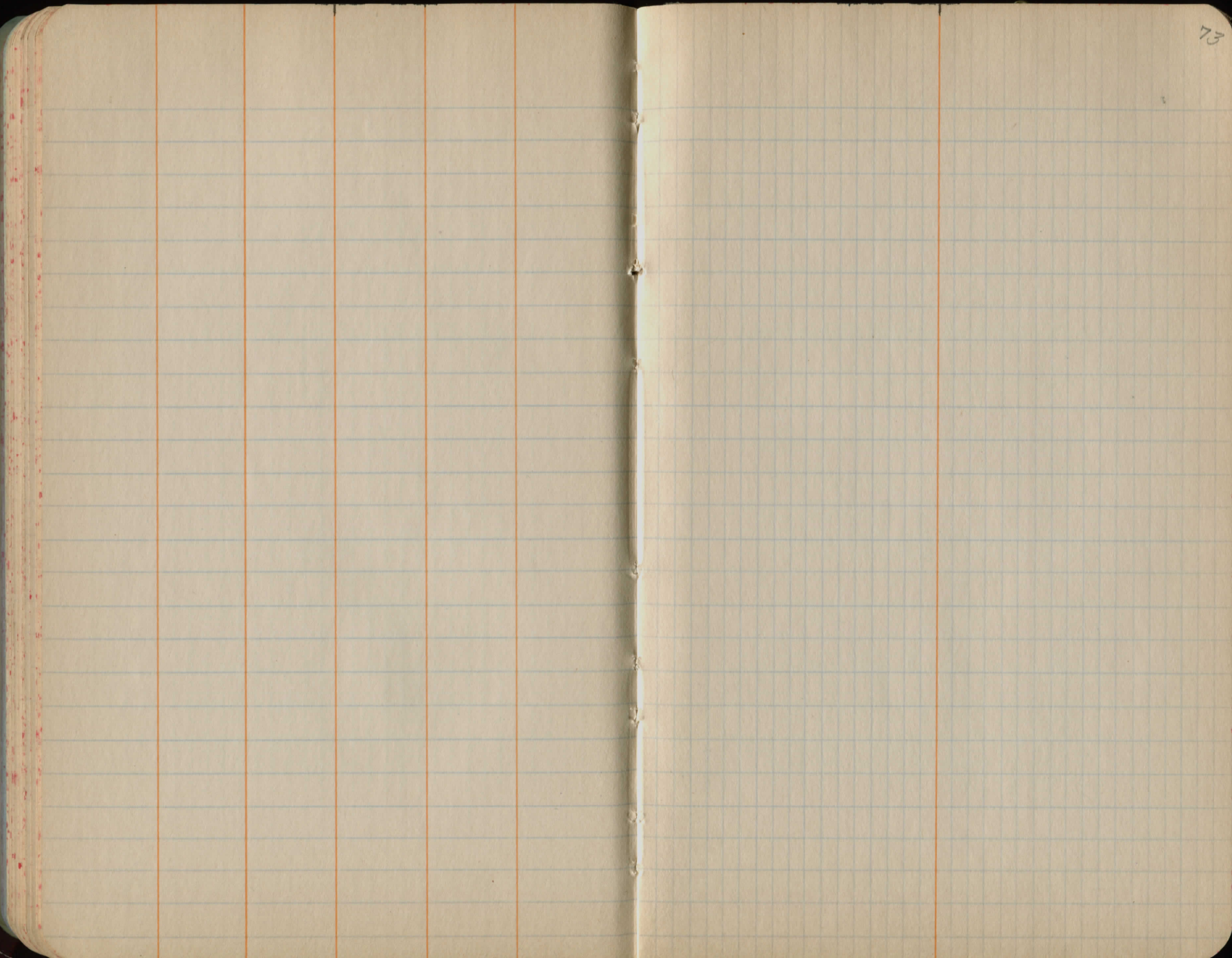






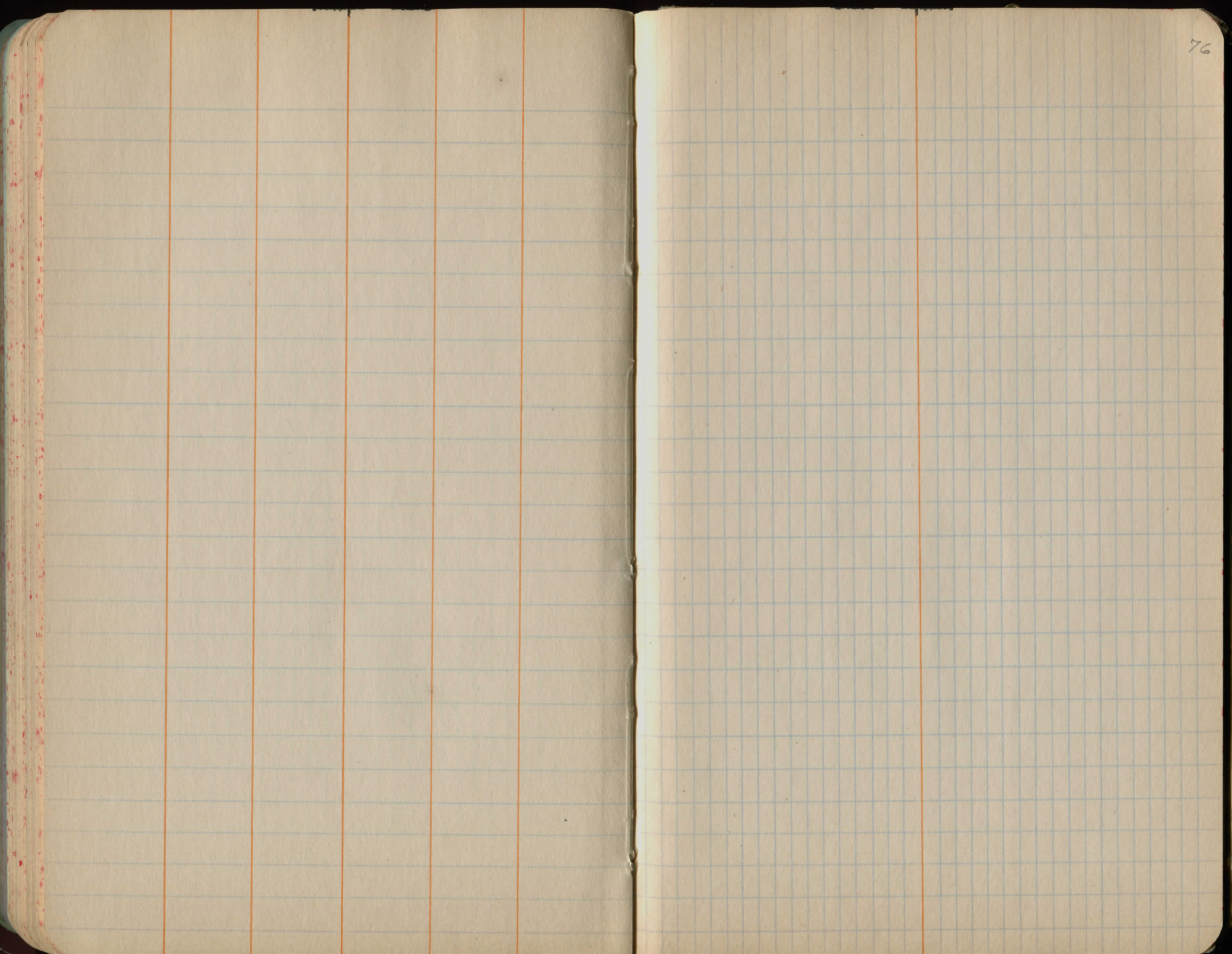


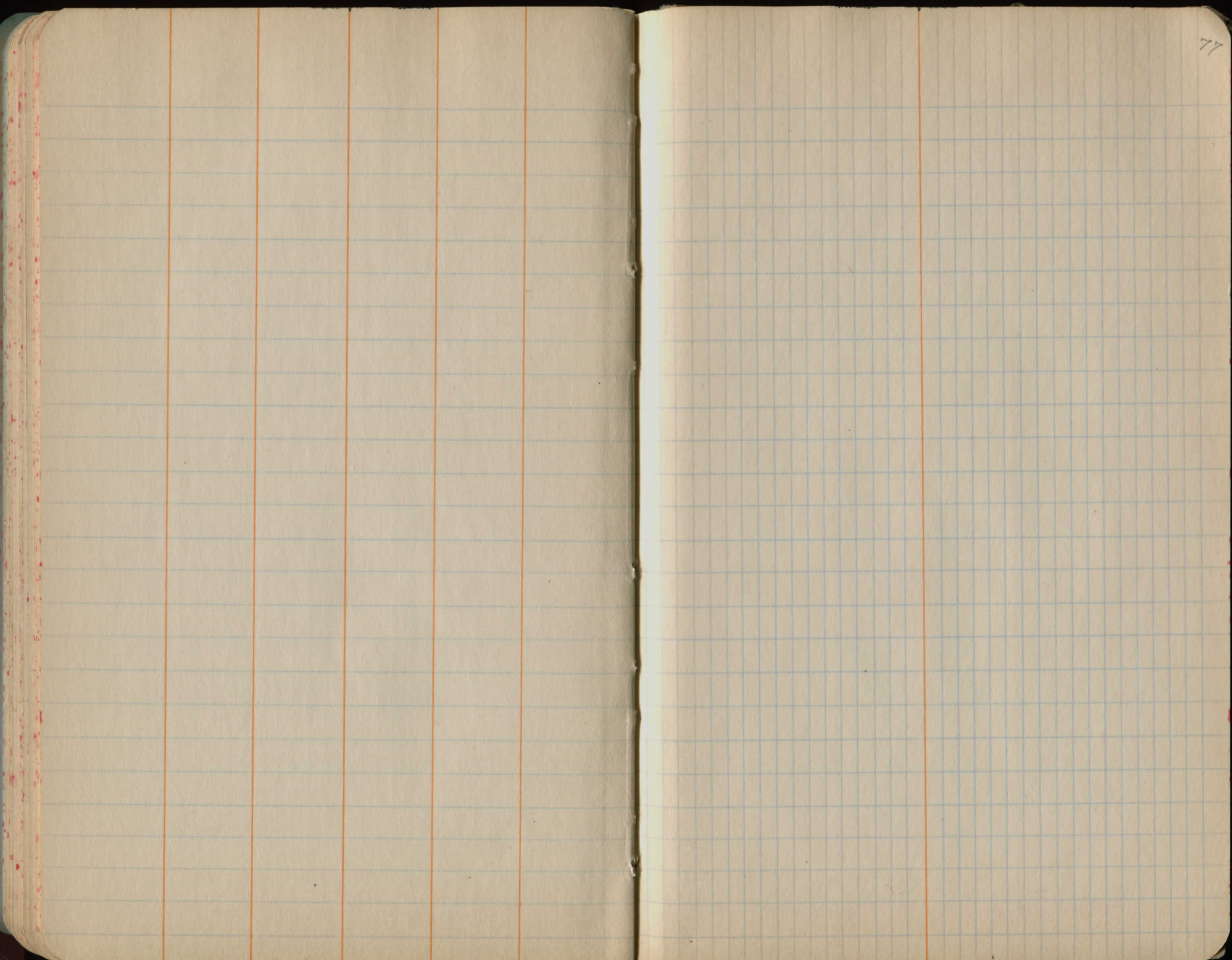


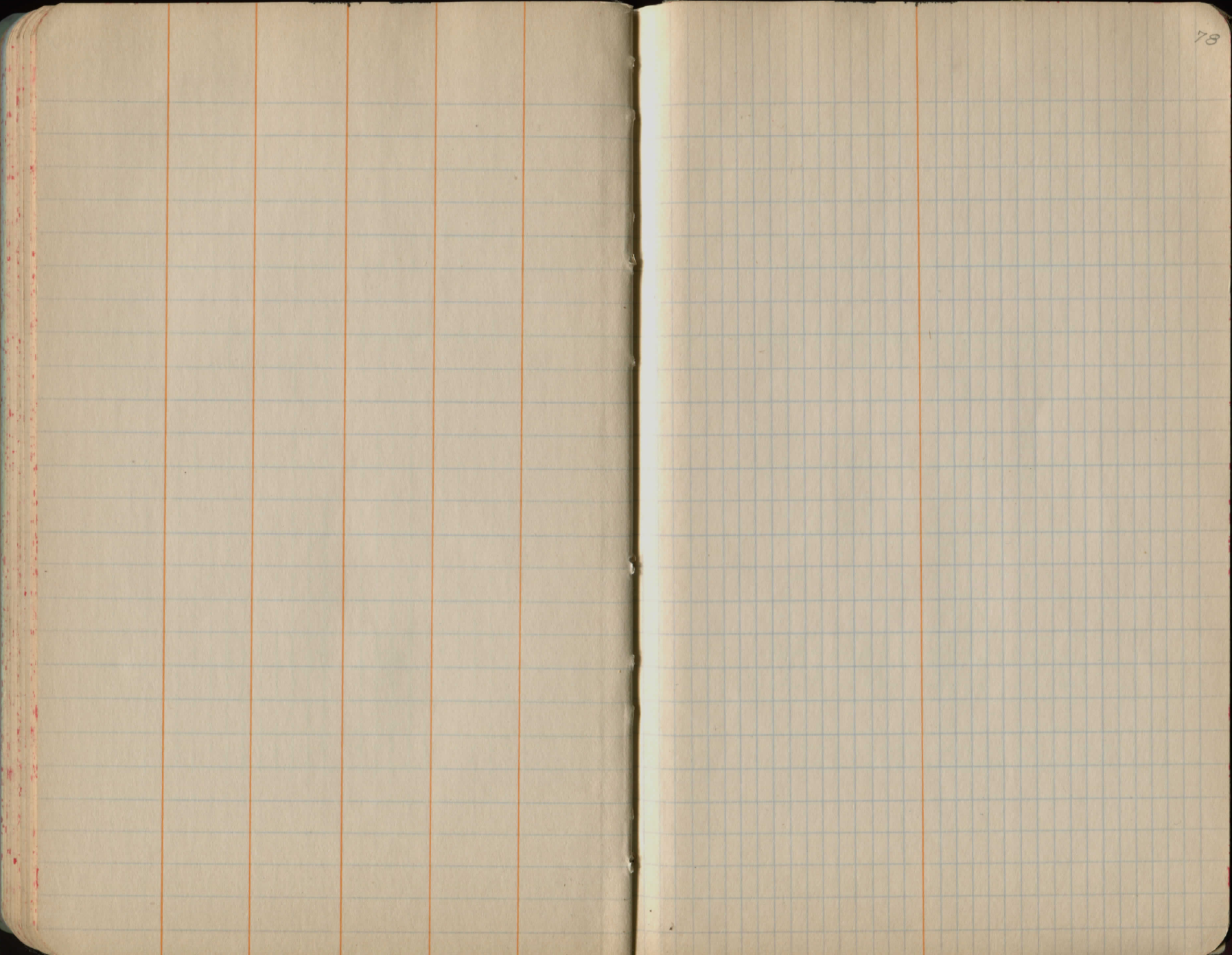


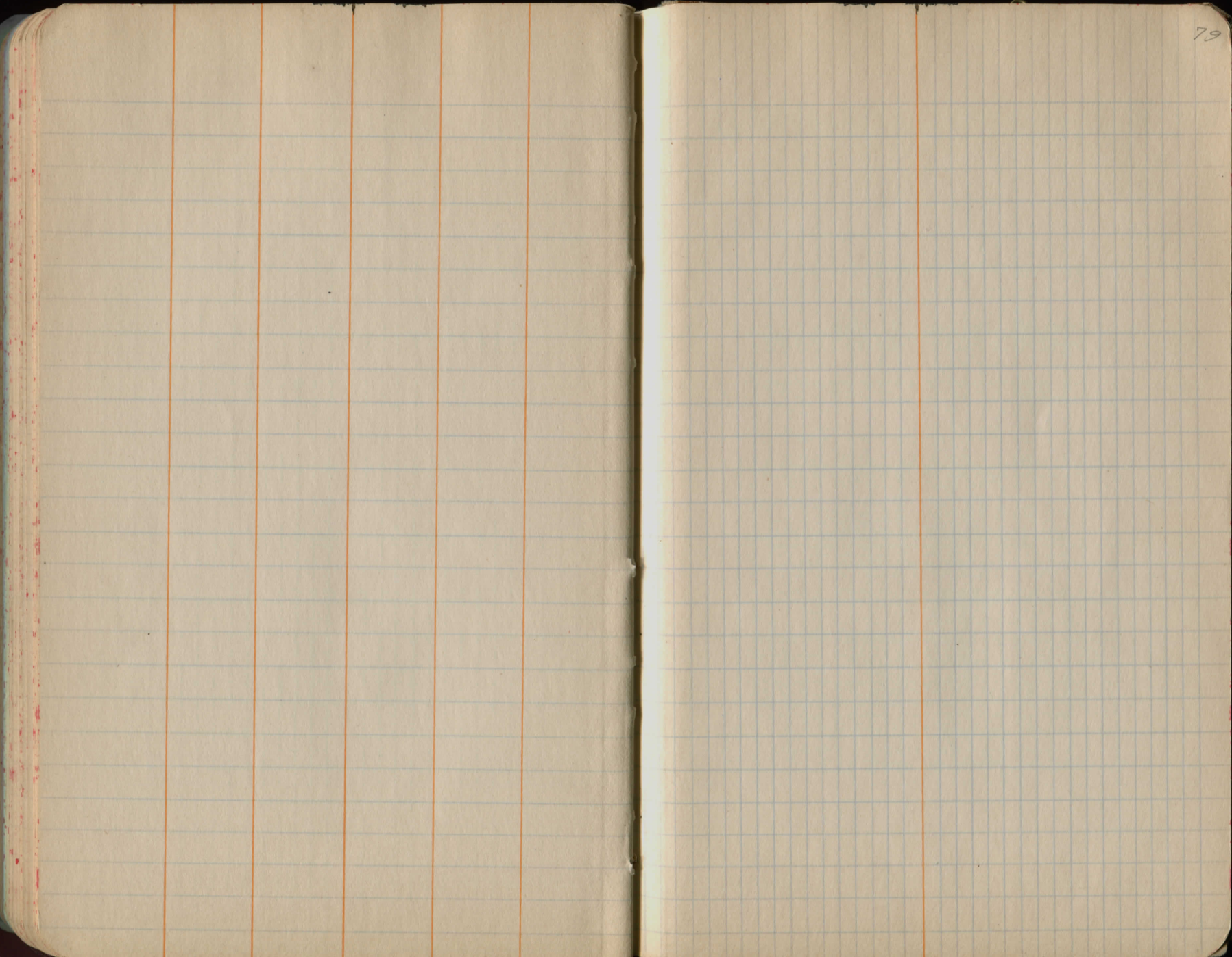


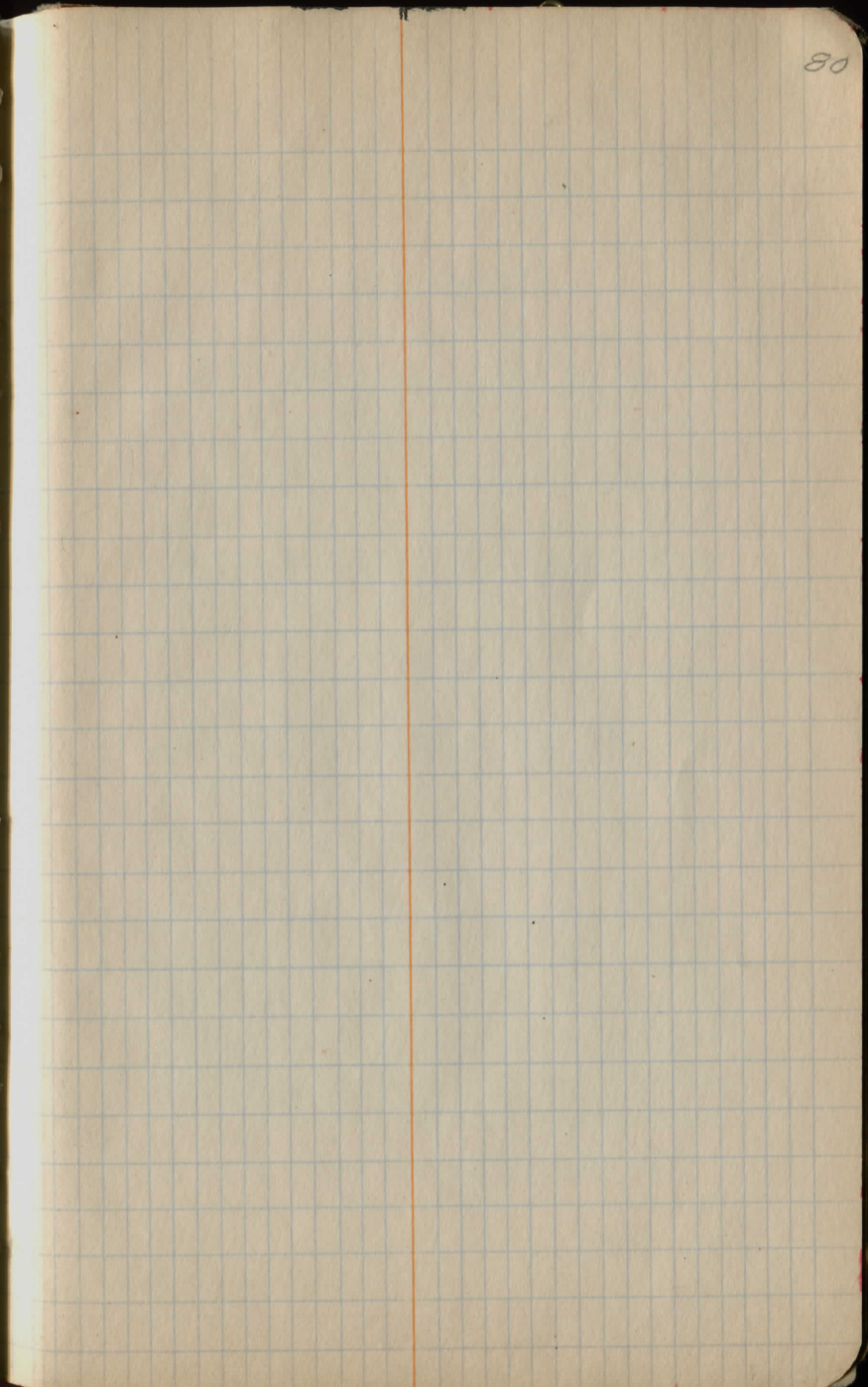
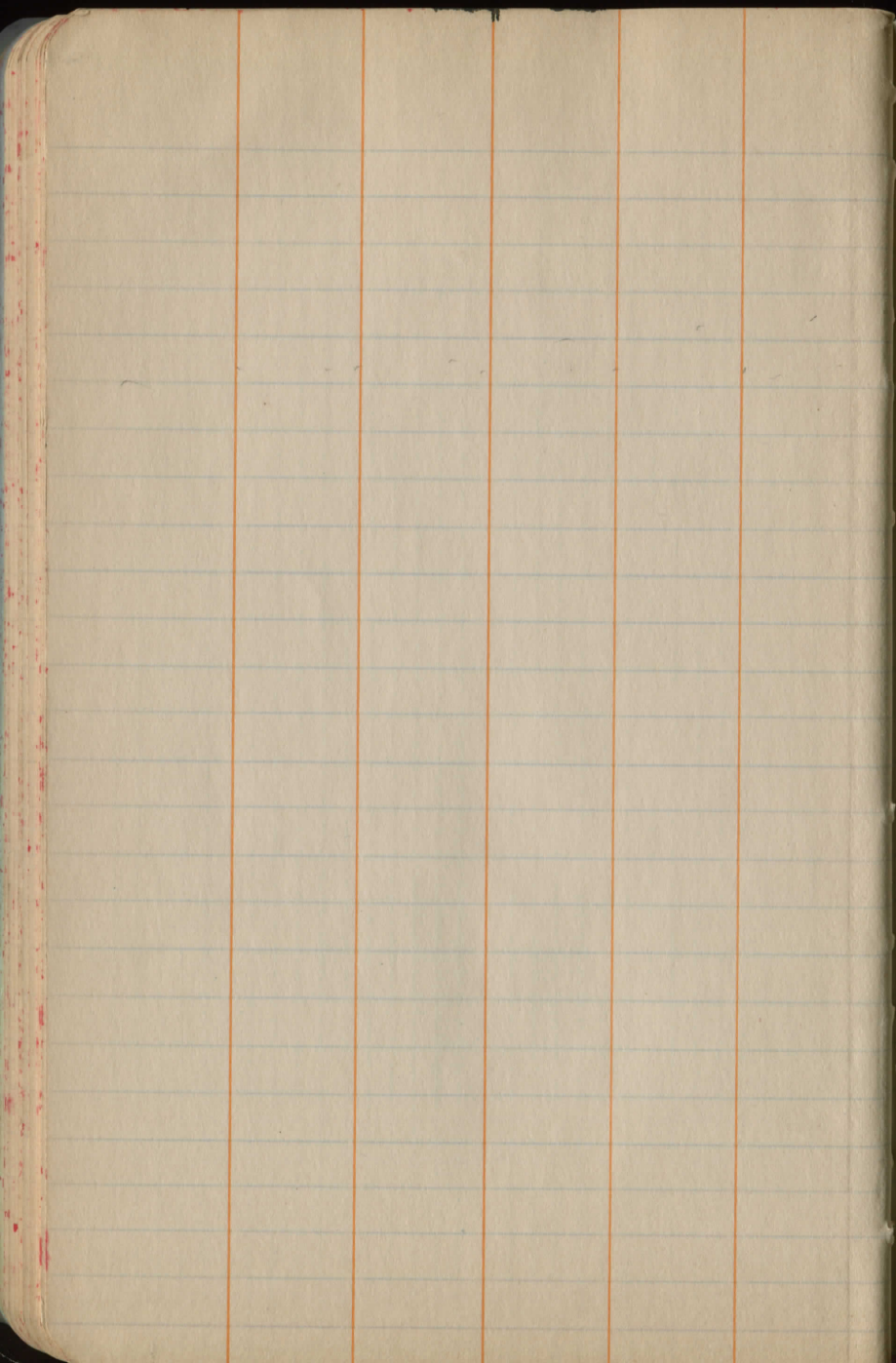












DIRECTIONS FOR USE OF TABLES

TABLE No. 1.

Distance of slope stake from side or shoulder  
stake 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

the column and top row. The number in body  
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  $L$  may be found  
by dividing tangent (or external), opposite  $L$  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.

A

A

X



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

TABLE III  
INCHES AND FRACTIONS OF AN INCH IN DECIMALS OF A FOOT

|                 |       |       |       |       |       |       |       |       |       |       |       |        |                 |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-----------------|
|                 | 0     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11     |                 |
| $\frac{1}{16}$  | .0052 | .0885 | .1719 | .2552 | .3385 | .4219 | .5052 | .5885 | .6719 | .7552 | .8385 | .9219  | $\frac{1}{16}$  |
| $\frac{3}{16}$  | .0104 | .0938 | .1771 | .2604 | .3438 | .4271 | .5104 | .5938 | .6771 | .7604 | .8438 | .9271  | $\frac{3}{16}$  |
| $\frac{1}{4}$   | .0156 | .0990 | .1823 | .2656 | .3490 | .4323 | .5156 | .5990 | .6823 | .7656 | .8490 | .9323  | $\frac{1}{4}$   |
| $\frac{5}{16}$  | .0208 | .1042 | .1875 | .2708 | .3542 | .4375 | .5208 | .6042 | .6875 | .7708 | .8542 | .9375  | $\frac{5}{16}$  |
| $\frac{3}{8}$   | .0260 | .1094 | .1927 | .2760 | .3594 | .4427 | .5260 | .6094 | .6927 | .7760 | .8594 | .9427  | $\frac{3}{8}$   |
| $\frac{7}{16}$  | .0313 | .1146 | .1979 | .2813 | .3646 | .4479 | .5313 | .6146 | .6979 | .7813 | .8646 | .9479  | $\frac{7}{16}$  |
| $\frac{1}{2}$   | .0365 | .1198 | .2031 | .2865 | .3698 | .4531 | .5365 | .6198 | .7031 | .7865 | .8698 | .9531  | $\frac{1}{2}$   |
| $\frac{9}{16}$  | .0417 | .1250 | .2083 | .2917 | .3750 | .4583 | .5417 | .6250 | .7083 | .7917 | .8750 | .9583  | $\frac{9}{16}$  |
| $\frac{5}{8}$   | .0469 | .1302 | .2135 | .2969 | .3803 | .4635 | .5469 | .6302 | .7135 | .7969 | .8802 | .9635  | $\frac{5}{8}$   |
| $\frac{11}{16}$ | .0521 | .1354 | .2188 | .3021 | .3854 | .4688 | .5521 | .6354 | .7188 | .8021 | .8854 | .9688  | $\frac{11}{16}$ |
| $\frac{3}{4}$   | .0573 | .1406 | .2240 | .3073 | .3906 | .4740 | .5573 | .6406 | .7240 | .8073 | .8906 | .9740  | $\frac{3}{4}$   |
| $\frac{13}{16}$ | .0625 | .1458 | .2292 | .3125 | .3958 | .4792 | .5625 | .6458 | .7292 | .8125 | .8958 | .9792  | $\frac{13}{16}$ |
| $\frac{7}{8}$   | .0677 | .1510 | .2344 | .3177 | .4010 | .4844 | .5677 | .6510 | .7344 | .8177 | .9010 | .9844  | $\frac{7}{8}$   |
| $\frac{15}{16}$ | .0729 | .1563 | .2396 | .3229 | .4063 | .4896 | .5729 | .6563 | .7396 | .8229 | .9063 | .9896  | $\frac{15}{16}$ |
| 1               | .0781 | .1615 | .2448 | .3281 | .4115 | .4948 | .5781 | .6615 | .7448 | .8281 | .9115 | .9948  | 1               |
|                 | .0833 | .1667 | .2500 | .3333 | .4167 | .5000 | .5833 | .6667 | .7500 | .8333 | .9167 | 1.0000 |                 |
|                 | 0     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11     |                 |

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        |

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

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

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

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

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

$$\pi = 3.141592654 \quad \sqrt{\frac{1}{4}} = 0.564190$$

$$\frac{\pi}{4} = 0.785398163 \quad \sqrt[3]{\frac{6}{\pi}} = 1.240700982$$

$$\frac{\pi}{6} = 0.523598776 \quad \pi^2 = 9.869604401$$

$$\sqrt{\frac{4}{\pi}} = 1.128379167 \quad \frac{1}{\pi^2} = 0.101321184$$

$$\frac{\pi}{6} = 0.523598776 \quad \sqrt{\pi} = 1.772453851$$

$$\frac{4\pi}{3} = 4.188790205 \quad \frac{1}{\pi} = 0.3183099$$

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

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

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 FORMULAE.

$$\text{Horizontal Distance} = R - R \sin^2 a + C \cos a$$

$$\text{Vertical Distance} = R \frac{1}{2} \sin 2a + C \sin a$$

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

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   | 1.445  | 075     | 1.609   | 088     | 1.775   | 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     | 3.2041  | 555     | 3.2371  | 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     | 5.5764  | 10  |
| 80  | 9848   | 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  | 9998   | 57.290 | 9999    | 68.750  | 9999    | 85.940  | 9999    | 114.58  | 1.000   | 171.88  | 1.000   | 343.77  | 0   |
| 60' | cos    | 60'    | cos     | 50'     | cos     | 40'     | cos     | 30'     | cos     | 20'     | cos     | 10'     | cos |
| deg | cos    | cot    | cos     | cot     | cos     | cot     | cos     | cot     | cos     | cot     | cos     | cot     | deg |

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 | Links | Feet Inches |
|-------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|-------------|
| 1     | 0- 7.92     | 18    | 11-10.56    | 35    | 23- 1.20    | 52    | 34- 3.84    | 69    | 45- 6.48    | 86    | 56- 9.12    |
| 2     | 1- 3.84     | 19    | 12- 6.48    | 36    | 23- 9.12    | 53    | 34-11.76    | 70    | 46- 2.40    | 87    | 57- 5.04    |
| 3     | 1-11.76     | 20    | 13- 2.40    | 37    | 24- 5.04    | 54    | 35- 7.68    | 71    | 46-10.32    | 88    | 58- 0.96    |
| 4     | 2- 7.68     | 21    | 13-10.32    | 38    | 25- 0.96    | 55    | 36- 3.60    | 72    | 47- 6.24    | 89    | 58- 8.88    |
| 5     | 3- 3.60     | 22    | 14- 6.24    | 39    | 25- 8.88    | 56    | 36-11.52    | 73    | 48- 2.16    | 90    | 59- 4.80    |
| 6     | 3-11.52     | 23    | 15- 2.16    | 40    | 26- 4.80    | 57    | 37- 7.44    | 74    | 48-10.08    | 91    | 60- 0.72    |
| 7     | 4- 7.44     | 24    | 15-10.08    | 41    | 27- 0.72    | 58    | 38- 3.36    | 75    | 49- 6.00    | 92    | 60- 8.64    |
| 8     | 5- 3.36     | 25    | 16- 6.00    | 42    | 27- 8.64    | 59    | 38-11.28    | 76    | 50- 1.92    | 93    | 61- 4.56    |
| 9     | 5-11.28     | 26    | 17- 1.92    | 43    | 28- 4.56    | 60    | 39- 7.20    | 77    | 50- 9.84    | 94    | 62- 0.48    |
| 10    | 6- 7.20     | 27    | 17- 9.84    | 44    | 29- 0.48    | 61    | 40- 3.12    | 78    | 51- 5.76    | 95    | 62- 8.40    |
| 11    | 7- 3.12     | 28    | 18- 5.76    | 45    | 29- 8.40    | 62    | 40-11.04    | 79    | 52- 1.68    | 96    | 63- 4.32    |
| 12    | 7-11.04     | 29    | 19- 1.68    | 46    | 30- 4.32    | 63    | 41- 6.96    | 80    | 52- 9.60    | 97    | 64- 0.24    |
| 13    | 8- 6.96     | 30    | 19- 9.60    | 47    | 31- 0.24    | 64    | 42- 2.88    | 81    | 53- 5.52    | 98    | 64- 8.16    |
| 14    | 9- 2.88     | 31    | 20- 5.52    | 48    | 31- 8.16    | 65    | 42-10.80    | 82    | 54- 1.44    | 99    | 65- 4.08    |
| 15    | 9-10.80     | 32    | 21- 1.44    | 49    | 32- 4.08    | 66    | 43- 6.72    | 83    | 54- 9.36    | 100   | 66- 0.00    |
| 16    | 10- 6.72    | 33    | 21- 9.36    | 50    | 33- 0.00    | 67    | 44- 2.64    | 84    | 55- 5.28    | 101   | 66- 7.92    |
| 17    | 11- 2.64    | 34    | 22- 5.28    | 51    | 33- 7.92    | 68    | 44-10.56    | 85    | 56- 1.20    | 102   | 67- 3.84    |

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

| I   | T      | E      | I=10°  | I   | T      | E      | I=20°  | I   | T      | E      | I=30°  |
|-----|--------|--------|--------|-----|--------|--------|--------|-----|--------|--------|--------|
| 1°  | 50.00  | .218   | +      | 11° | 551.70 | 26.500 | +      | 21° | 1061.9 | 97.577 | +      |
| 10' | 58.34  | .297   |        | 10' | 560.11 | 27.313 |        | 20' | 1070.6 | 99.155 |        |
| 20' | 66.67  | .388   | 5° C.  | 20' | 568.53 | 28.137 | 5° C   | 20' | 1079.2 | 100.75 | 5° C   |
| 30' | 75.01  | .491   |        | 30' | 576.95 | 28.974 |        | 30' | 1087.8 | 102.35 |        |
| 40' | 83.34  | .606   | .03    | 40' | 585.36 | 29.824 | .06    | 40' | 1096.4 | 103.97 | .10    |
| 50' | 91.68  | .733   | E      | 50' | 593.79 | 30.686 | E      | 50' | 1105.1 | 105.60 | E      |
| 2°  | 100.01 | .873   | .001   | 12° | 602.21 | 31.561 | .006   | 22° | 1113.7 | 107.24 | .013   |
| 10' | 108.35 | 1.024  |        | 10' | 610.64 | 32.447 |        | 10' | 1122.4 | 108.90 |        |
| 20' | 116.68 | 1.188  |        | 20' | 619.07 | 33.347 |        | 20' | 1131.0 | 110.57 |        |
| 30' | 125.02 | 1.364  |        | 30' | 627.50 | 34.259 |        | 30' | 1139.7 | 112.25 |        |
| 40' | 133.36 | 1.552  |        | 40' | 635.93 | 35.183 |        | 40' | 1148.4 | 113.95 |        |
| 50' | 141.70 | 1.752  |        | 50' | 644.37 | 36.120 |        | 50' | 1157.0 | 115.66 |        |
| 3°  | 150.04 | 1.964  | 10° C. | 13° | 652.81 | 37.070 | 10° C. | 23° | 1165.7 | 117.38 | 10° C. |
| 10' | 158.38 | 2.188  | T      | 10' | 661.25 | 38.031 | T      | 10' | 1174.4 | 119.12 | T      |
| 20' | 166.72 | 2.425  |        | 20' | 669.70 | 39.006 |        | 20' | 1183.1 | 120.87 |        |
| 30' | 175.06 | 2.674  | .06    | 30' | 678.15 | 39.993 | .13    | 30' | 1191.8 | 122.63 | .19    |
| 40' | 183.40 | 2.934  | E      | 40' | 686.60 | 40.992 | E      | 40' | 1200.5 | 124.41 | E      |
| 50' | 191.74 | 3.207  | .003   | 50' | 695.06 | 42.004 | .011   | 50' | 1209.2 | 126.20 | .025   |
| 4°  | 200.08 | 3.492  |        | 14° | 703.51 | 43.029 |        | 24° | 1217.9 | 128.00 |        |
| 10' | 208.43 | 3.790  |        | 10' | 711.97 | 44.066 |        | 10' | 1226.6 | 129.82 |        |
| 20' | 216.77 | 4.099  |        | 20' | 720.44 | 45.116 |        | 20' | 1235.3 | 131.65 |        |
| 30' | 225.12 | 4.421  |        | 30' | 728.90 | 46.178 |        | 30' | 1244.0 | 133.50 |        |
| 40' | 233.47 | 4.755  |        | 40' | 737.37 | 47.253 |        | 40' | 1252.8 | 135.35 |        |
| 50' | 241.81 | 5.100  | 15° C. | 50' | 745.85 | 48.341 | 15° C. | 50' | 1261.5 | 137.23 | 15° C. |
| 5°  | 250.16 | 5.459  | T      | 15° | 754.32 | 49.441 | T      | 25° | 1270.2 | 139.11 | T      |
| 10' | 258.51 | 5.829  | .09    | 10' | 762.80 | 50.554 | .19    | 10' | 1279.0 | 141.01 | .29    |
| 20' | 266.86 | 6.211  | E      | 20' | 771.29 | 51.679 | E      | 20' | 1287.7 | 142.93 | E      |
| 30' | 275.21 | 6.606  |        | 30' | 779.77 | 52.818 |        | 30' | 1296.5 | 144.85 |        |
| 40' | 283.57 | 7.013  | .004   | 40' | 788.26 | 53.969 | .017   | 40' | 1305.3 | 146.79 | .038   |
| 50' | 291.92 | 7.432  |        | 50' | 796.75 | 55.132 |        | 50' | 1314.0 | 148.75 |        |
| 6°  | 300.28 | 7.863  |        | 16° | 805.25 | 56.309 |        | 26° | 1322.8 | 150.71 |        |
| 10' | 308.64 | 8.307  |        | 10' | 813.75 | 57.498 |        | 10' | 1331.6 | 152.69 |        |
| 20' | 316.99 | 8.762  |        | 20' | 822.25 | 58.699 |        | 20' | 1340.4 | 154.69 |        |
| 30' | 325.35 | 9.230  |        | 30' | 830.76 | 59.914 |        | 30' | 1349.2 | 156.70 |        |
| 40' | 333.71 | 9.710  | 20° C. | 40' | 839.27 | 61.141 | 20° C. | 40' | 1358.0 | 158.72 | 20° C. |
| 50' | 342.08 | 10.202 | T      | 50' | 847.78 | 62.381 | T      | 50' | 1366.8 | 160.76 | T      |
| 7°  | 350.44 | 10.707 | .13    | 17° | 856.30 | 63.634 | .26    | 27° | 1375.6 | 162.81 | .39    |
| 10' | 358.81 | 11.224 | E      | 10' | 864.82 | 64.900 | E      | 10' | 1384.4 | 164.86 | E      |
| 20' | 367.17 | 11.753 | .006   | 20' | 873.35 | 66.178 | .022   | 20' | 1393.2 | 166.95 | .051   |
| 30' | 375.54 | 12.294 |        | 30' | 881.88 | 67.470 |        | 30' | 1402.0 | 169.04 |        |
| 40' | 383.91 | 12.847 |        | 40' | 890.41 | 68.774 |        | 40' | 1410.9 | 171.15 |        |
| 50' | 392.28 | 13.413 |        | 50' | 898.95 | 70.091 |        | 50' | 1419.7 | 173.27 |        |
| 8°  | 400.66 | 13.991 |        | 18° | 907.49 | 71.421 |        | 28° | 1428.6 | 175.41 |        |
| 10' | 409.03 | 14.582 | 25° C. | 10' | 916.03 | 72.764 | 25° C. | 10' | 1437.4 | 177.55 | 25° C. |
| 20' | 417.41 | 15.184 |        | 20' | 924.58 | 74.119 |        | 20' | 1446.3 | 179.72 |        |
| 30' | 425.79 | 15.799 | T      | 30' | 933.13 | 75.488 | T      | 30' | 1455.1 | 181.89 | T      |
| 40' | 434.17 | 16.426 | .16    | 40' | 941.69 | 76.869 | .32    | 40' | 1464.0 | 184.08 | .49    |
| 50' | 442.55 | 17.065 | E      | 50' | 950.25 | 78.264 | E      | 50' | 1472.9 | 186.29 | E      |
| 9°  | 450.93 | 17.717 | .007   | 19° | 958.81 | 79.671 | .028   | 29° | 1481.8 | 188.51 | .065   |
| 10' | 459.32 | 18.381 |        | 10' | 967.38 | 81.092 |        | 10' | 1490.7 | 190.74 |        |
| 20' | 467.71 | 19.053 |        | 20' | 975.96 | 82.525 |        | 20' | 1499.6 | 192.99 |        |
| 30' | 476.10 | 19.746 |        | 30' | 984.53 | 83.972 |        | 30' | 1508.5 | 195.25 |        |
| 40' | 484.49 | 20.447 |        | 40' | 993.12 | 85.431 |        | 40' | 1517.4 | 197.53 |        |
| 50' | 492.88 | 21.161 |        | 50' | 1001.7 | 86.904 |        | 50' | 1526.3 | 199.82 |        |
| 10° | 501.28 | 21.887 | 30° C. | 20° | 1010.3 | 88.389 | 30° C. | 30° | 1535.3 | 202.12 | 30° C. |
| 10' | 509.68 | 22.624 | T      | 10' | 1018.9 | 89.888 | T      | 10' | 1544.2 | 204.44 | T      |
| 20' | 518.08 | 23.375 | .19    | 20' | 1027.5 | 91.399 | .39    | 20' | 1553.1 | 206.77 | .59    |
| 30' | 526.48 | 24.138 | E      | 30' | 1036.1 | 92.924 | E      | 30' | 1562.1 | 209.12 | E      |
| 40' | 534.89 | 24.913 |        | 40' | 1044.7 | 94.462 |        | 40' | 1571.0 | 211.48 |        |
| 50' | 543.29 | 25.700 | .008   | 50' | 1053.3 | 96.013 | .034   | 50' | 1580.0 | 213.86 | .078   |

T = R tan ½ I

E = R exsec ½ I

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

| I   | T      | E     | I=40°  | I   | T      | E     | I=50°  | I   | T      | E     | I=60°  |
|-----|--------|-------|--------|-----|--------|-------|--------|-----|--------|-------|--------|
| 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 | 5° C.  | 20' | 2161.2 | 394.1 | 5° C.  | 20' | 2753.4 | 627.2 | 5° C.  |
| 30' | 1615.9 | 223.5 |        | 30' | 2170.8 | 397.4 |        | 30' | 2763.7 | 631.7 |        |
| 40' | 1624.9 | 226.0 | .13    | 40' | 2180.3 | 400.8 | .17    | 40' | 2773.9 | 636.2 | .21    |
| 50' | 1633.9 | 228.4 | E      | 50' | 2189.9 | 404.2 | E      | 50' | 2784.2 | 640.7 | E      |
| 32° | 1643.0 | 230.9 | .023   | 42° | 2199.4 | 407.6 | .037   | 52° | 2794.5 | 645.2 | .056   |
| 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 | 10° C. | 43° | 2257.0 | 428.5 | 10° C. | 53° | 2856.7 | 672.7 | 10° C. |
| 10' | 1706.3 | 248.7 | T      | 10' | 2266.6 | 432.0 | T      | 10' | 2867.1 | 677.3 | T      |
| 20' | 1715.3 | 251.3 | .26    | 20' | 2276.2 | 435.6 | .34    | 20' | 2877.5 | 682.0 | .42    |
| 30' | 1724.4 | 253.9 |        | 30' | 2285.9 | 439.2 |        | 30' | 2888.0 | 686.7 |        |
| 40' | 1733.5 | 256.5 | E      | 40' | 2295.6 | 442.8 | E      | 40' | 2898.4 | 691.4 | E      |
| 50' | 1742.6 | 259.1 | .046   | 50' | 2305.2 | 446.4 | .075   | 50' | 2908.9 | 696.1 | .112   |
| 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 | 15° C. | 50' | 2363.5 | 468.4 | 15° C. | 50' | 2972.1 | 725.0 | 15° C. |
| 35° | 1806.6 | 278.1 | T      | 45° | 2373.3 | 472.1 | T      | 55° | 2982.7 | 729.9 | T      |
| 10' | 1815.7 | 280.8 | .40    | 10' | 2383.1 | 475.8 | .51    | 10' | 2993.3 | 734.8 | .63    |
| 20' | 1824.9 | 283.6 | E      | 20' | 2392.8 | 479.6 | E      | 20' | 3003.9 | 739.7 | E      |
| 30' | 1834.1 | 286.4 |        | 30' | 2402.6 | 483.4 |        | 30' | 3014.5 | 744.6 |        |
| 40' | 1843.3 | 289.2 | .070   | 40' | 2412.4 | 487.2 | .116   | 40' | 3025.2 | 749.6 | .168   |
| 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 | 20° C. | 40' | 2471.5 | 510.3 | 20° C. | 40' | 3089.4 | 779.8 | 20° C. |
| 50' | 1907.9 | 309.3 | T      | 50' | 2481.4 | 514.3 | T      | 50' | 3100.2 | 784.9 | T      |
| 37° | 1917.1 | 312.2 | .53    | 47° | 2491.3 | 518.2 | .68    | 57° | 3110.9 | 790.1 | .84    |
| 10' | 1926.4 | 315.2 | E      | 10' | 2501.2 | 522.2 | E      | 10' | 3121.7 | 795.2 | E      |
| 20' | 1935.7 | 318.1 | .093   | 20' | 2511.2 | 526.1 | .151   | 20' | 3132.6 | 800.4 | .225   |
| 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 | 25° C. | 10' | 2561.0 | 546.3 | 25° C. | 10' | 3186.9 | 826.7 | 25° C. |
| 20' | 1991.5 | 336.3 |        | 20' | 2571.0 | 550.4 |        | 20' | 3197.8 | 832.0 |        |
| 30' | 2000.9 | 339.3 | T      | 30' | 2581.0 | 554.5 | T      | 30' | 3208.8 | 837.3 | T      |
| 40' | 2010.2 | 342.4 | .67    | 40' | 2591.0 | 558.6 | .85    | 40' | 3219.7 | 842.7 | 1.05   |
| 50' | 2019.6 | 345.5 | E      | 50' | 2601.1 | 562.8 | E      | 50' | 3230.7 | 848.1 | E      |
| 39° | 2029.0 | 348.6 | .117   | 49° | 2611.2 | 566.9 | .189   | 59  |        |       |        |

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  |        | 30' | 4124.8 | 1330.3 |        | 30' | 4937.0 | 1833.6 |        |
| 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. | 78° | 4239.7 | 1398.0 | 10° C. | 88° | 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 | 1421.2 | .61    | 30' | 5113.9 | 1950.3 | .72    |
| 40' | 3557.2 | 1014.4 | E      | 40' | 4291.5 | 1429.0 | 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 |        | 10' | 4571.2 | 1600.1 |        | 10' | 5453.1 | 2180.2 |        |
| 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' | 3840.5 | 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 | 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° | 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 | 5° C.  | 20'  | 6992.0 | 3310.1 | 5° C.  | 20'  | 8388.9 | 4429.2 | 5° C.  |
| 30' | 5881.7 | 2481.5 |        | 30'  | 7012.7 | 3326.1 |        | 30'  | 8415.1 | 4450.9 |        |
| 40' | 5898.8 | 2493.8 | T      | 40'  | 7033.6 | 3342.3 | T      | 40'  | 8441.5 | 4472.7 | T      |
| 50' | 5916.0 | 2506.1 | .43    | 50'  | 7054.5 | 3358.5 | .51    | 50'  | 8468.0 | 4494.6 | .62    |
| 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 | 4605.8 |        |
| 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 |        | 20'  | 7246.3 | 3508.2 |        | 20'  | 8711.5 | 4697.2 |        |
| 30' | 6090.8 | 2632.6 | .86    | 30'  | 7268.0 | 3525.2 | .103   | 30'  | 8739.2 | 4720.3 | 1.25   |
| 40' | 6108.6 | 2645.5 | E      | 40'  | 7289.8 | 3542.4 | E      | 40'  | 8767.0 | 4743.6 | E      |
| 50' | 6126.4 | 2658.5 | .401   | 50'  | 7311.7 | 3559.6 | .536   | 50'  | 8794.9 | 4766.9 | .721   |
| 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 |        | 20'  | 7512.2 | 3718.2 | E      | 20'  | 9051.7 | 4983.1 | E      |
| 30' | 6307.9 | 2792.0 |        | 30'  | 7534.9 | 3736.2 | .806   | 30'  | 9080.9 | 5007.8 | 1.09   |
| 40' | 6326.3 | 2805.6 | .604   | 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 | 1.45   | 50'  | 7719.7 | 3884.0 | 1.74   | 50'  | 9319.5 | 5210.3 | 1.52   |
| 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 | 1.08   | 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 | 1.28   | 40'  | 7983.5 | 4097.1 | 2.61   | 40'  | 9662.6 |        |        |

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<br>Feet | Chord<br>Feet | Central<br>Angle | Deflection<br>Angle | Deflection<br>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                      |
| 283            | 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.

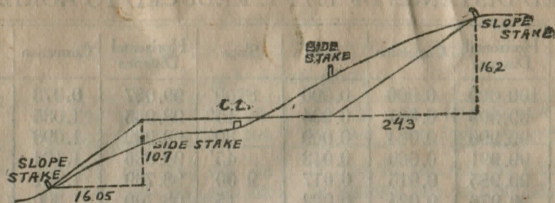
TABLE XII.  
INCLINED DISTANCE OF 100 FT. REDUCED TO HORIZONTAL

| Slope | Horizontal<br>Distance | Correction | Rise  | Slope | Horizontal<br>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      | 0.023 | 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  $1\frac{1}{2}$  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.

PLEASE RETURN TO  
 GAUGA COUNTY ENGINEER

COURT HOUSE  
 CHARDON O.  
 PHONE 250-X

TABLE OF INCHES REDUCED TO DECIMALS OF A FOOT.

| Ins.           | Dec.   | Ins.           | Dec.   | Ins.           | Dec.   | Ins.           | Dec.   | Ins.           | Dec.   | Ins.           | Dec.   | Ins.           | Dec.   | Ins.          | Dec.   |
|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|---------------|--------|
| $\frac{1}{16}$ | .0625  | $\frac{1}{8}$  | .1250  | $\frac{3}{16}$ | .1875  | $\frac{1}{2}$  | .2500  | $\frac{5}{16}$ | .3125  | $\frac{3}{8}$  | .3750  | $\frac{7}{16}$ | .4375  | $\frac{1}{2}$ | .5000  |
| $\frac{1}{8}$  | .1250  | $\frac{3}{16}$ | .1875  | $\frac{1}{2}$  | .2500  | $\frac{5}{16}$ | .3125  | $\frac{3}{8}$  | .3750  | $\frac{7}{16}$ | .4375  | $\frac{1}{2}$  | .5000  | $\frac{5}{8}$ | .6250  |
| $\frac{3}{16}$ | .1875  | $\frac{1}{2}$  | .2500  | $\frac{5}{16}$ | .3125  | $\frac{3}{8}$  | .3750  | $\frac{7}{16}$ | .4375  | $\frac{1}{2}$  | .5000  | $\frac{5}{8}$  | .6250  | $\frac{3}{4}$ | .7500  |
| $\frac{1}{2}$  | .2500  | $\frac{5}{16}$ | .3125  | $\frac{3}{8}$  | .3750  | $\frac{7}{16}$ | .4375  | $\frac{1}{2}$  | .5000  | $\frac{5}{8}$  | .6250  | $\frac{3}{4}$  | .7500  | $\frac{7}{8}$ | .8750  |
| $\frac{5}{16}$ | .3125  | $\frac{3}{8}$  | .3750  | $\frac{7}{16}$ | .4375  | $\frac{1}{2}$  | .5000  | $\frac{5}{8}$  | .6250  | $\frac{3}{4}$  | .7500  | $\frac{7}{8}$  | .8750  | 1             | 1.0000 |
| $\frac{3}{8}$  | .3750  | $\frac{7}{16}$ | .4375  | $\frac{1}{2}$  | .5000  | $\frac{5}{8}$  | .6250  | $\frac{3}{4}$  | .7500  | $\frac{7}{8}$  | .8750  | 1              | 1.0000 |               |        |
| $\frac{7}{16}$ | .4375  | $\frac{1}{2}$  | .5000  | $\frac{5}{8}$  | .6250  | $\frac{3}{4}$  | .7500  | $\frac{7}{8}$  | .8750  | 1              | 1.0000 |                |        |               |        |
| $\frac{1}{2}$  | .5000  | $\frac{5}{8}$  | .6250  | $\frac{3}{4}$  | .7500  | $\frac{7}{8}$  | .8750  | 1              | 1.0000 |                |        |                |        |               |        |
| $\frac{5}{8}$  | .6250  | $\frac{3}{4}$  | .7500  | $\frac{7}{8}$  | .8750  | 1              | 1.0000 |                |        |                |        |                |        |               |        |
| $\frac{3}{4}$  | .7500  | $\frac{7}{8}$  | .8750  | 1              | 1.0000 |                |        |                |        |                |        |                |        |               |        |
| $\frac{7}{8}$  | .8750  | 1              | 1.0000 |                |        |                |        |                |        |                |        |                |        |               |        |
| 1              | 1.0000 |                |        |                |        |                |        |                |        |                |        |                |        |               |        |

B. K. ELLIOTT COMPANY, PITTSBURG, PA.  
 DRAWING MATERIALS AND SURVEYING INSTRUMENTS

1264.25



Chester Road  
county line

↑

3

86.2 CHS

4

is on lot line

A 331  
1819

S. 60° W. 132.3

S. 20° E. 145.0

77.37

C 204  
1835

S. 1° E. 49.0

S. 9° E. 125

1. CH #15

C. H. Gates. 104-311 No measurements,

Mellie A. Wicks - Beginning at  $\perp$  of E. & W. Rd.  
leading from Mulberry Cors. to Wilsons Mill at  
S. E. cor of land conveyed this day to B. Crowell,  
thence along  $\perp$  of said Rd. as now traveled,  
S  $87^{\circ}-15' E$ .  $389^{91}$  ft. to the  $\perp$  of M. & S. Rd.  
leading thru said lot as now traveled,  
thence along  $\perp$  of M. & S. Rd. as now traveled  
N  $10^{\circ}-10' E$ .  $5672$  ft. to gas pipe stake at Cor  
of said Crowell's land thence N  $87^{\circ}-15' W$   
 $3272$  ft to gas pipe, S  $6^{\circ}-28' W$ .  $5680$  ft  
to place of beginning. Cost  $4^{665}$  A  
Apr. 1919.

