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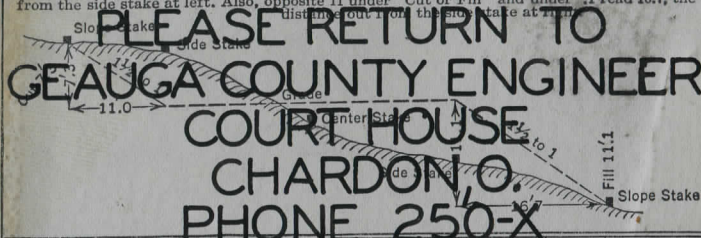
K & E  
FIELD BOOK  
F. 360

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DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1/2 to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.



Cut or Fill	Distance out from Side or Shoulder Stake									Cut or Fill	
	0	.1	.2	.3	.4	.5	.6	.7	.8		.9
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

KEUFFEL & ESSER CO., N. Y.

For Curve Tables see end of book.

PROPERTY OF BOOK 163  
COUNTY ENGINEER  
CHARDON, O.

SUN  
P-3 T.H. 66 Brown Rd. - Montville

T.H. 112  
P-12 L. Durkee Hill Rd. Relocation

Pgs 17-33 Cross Sect's Burton-Windsor ✓  
C.H. 14

East Durkee Road (Pinconet to Clay) 3A- ✓

Burton Sta. drainage 40-41 ✓

The paper in this book No. F360

is made of 100% high grade rag stock

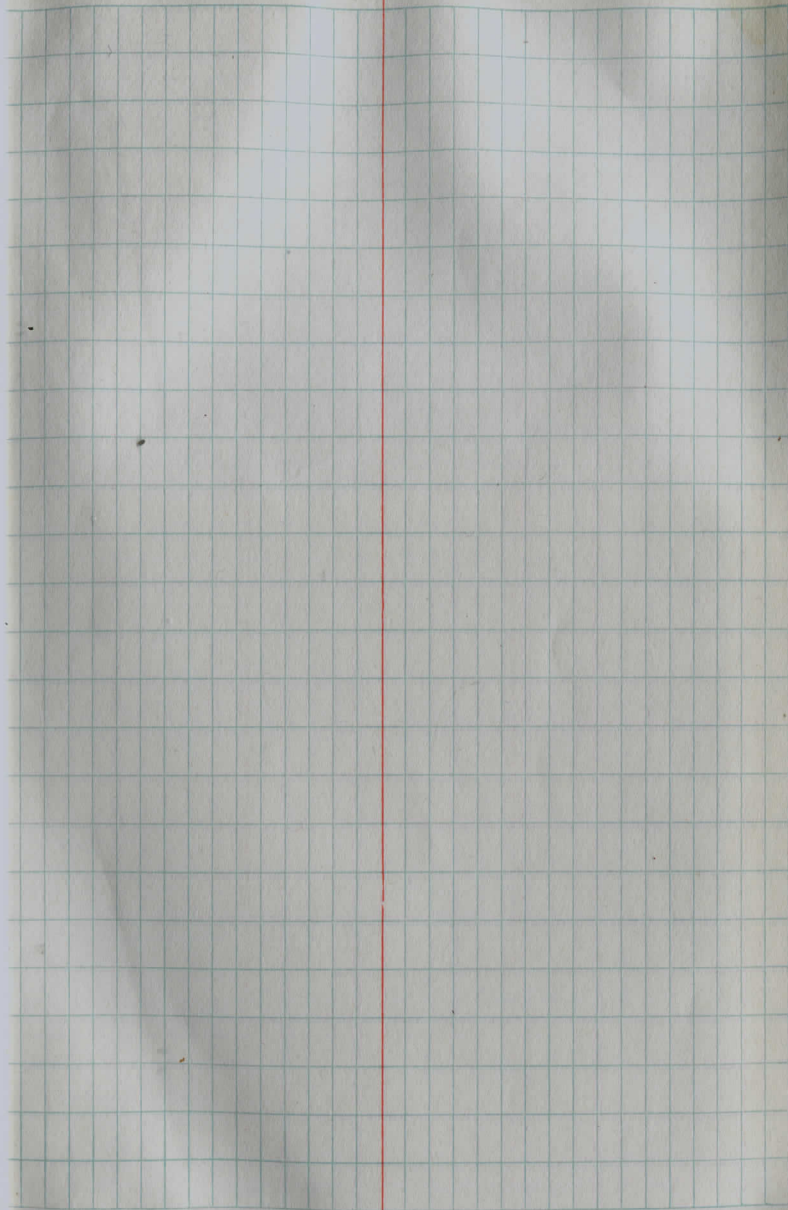
with a WATER RESISTING surface sizing.

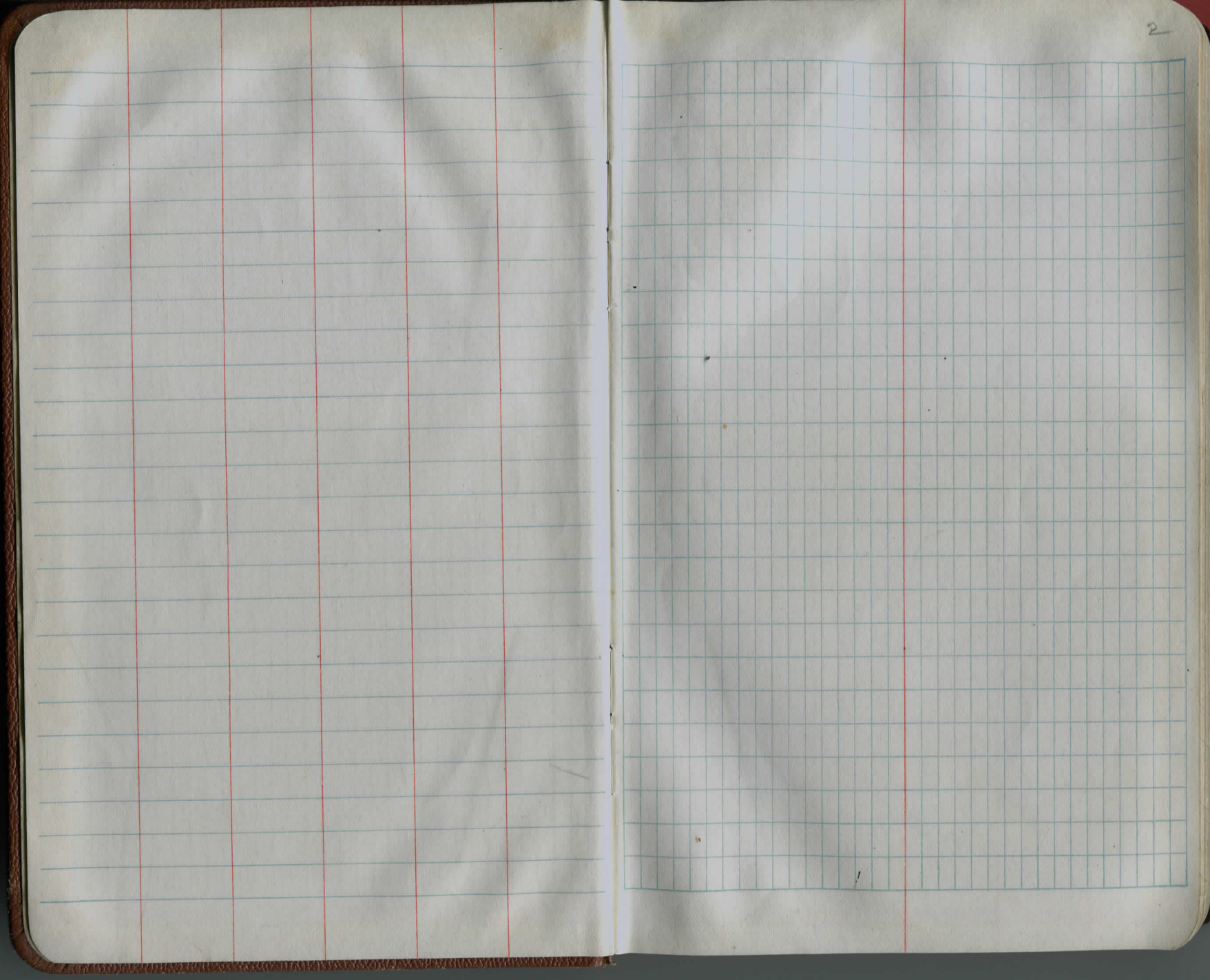
In the  
from

GE

Cut or  
Fill

0  
1  
2  
3  
4  
5  
6  
7  
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9  
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40





T.H. 66  
SUN

BROWN ROAD, Montville

Stakes Set on 20' offset RT of  $\phi$ .

Road is 30' wide (R/W)

3-31-39. T 32"

Graber  
Pomeroy  
Richards.

Nail W. S. 5" Pear

SEE Pg 79

$\phi$  Whitney  
19+61.27

Spike E S C&E Hole  
Spike E.S.  
6' Pear.

3

30.00  
51.57  
90°-27'

30' R/W.

$\phi$  N 4°-30' E

21°-15'

Bolt Set

2442.3

O.L.

O.L.

Occup. used.

$\phi$  Route 86  
79°-13'

IRON Bolt, N Margin  
and East End of 24' Cor. Exp.

22.51

Bolt Set

104.00

149.10

N.W. Cor. So  
Head wall

PCG  
M.R.

Locations  
BROWN ROAD Montville  
3-31-39.

	East	0+00 RTSG	West	4
		13	21	0+28 = 24" Corr. I.P.
T.P. 0		12	1447	
T.P. 1	12'		4+36	
	4+70	5	8" Corr. I.P.	
			4 Farm Dr. 6+56	
		8	10'	
			6+88 culv. 10" Corr. I.P.	
T.P. 0	13'		6+96	
			8+60 Culvert?	
T.P. 0	13'		9+52	
			11+23	Culvert 7" water to N of road
			15'	11+99
T.P. 6	13		12+10	
			12+50	Place Culv.
T.P. 0	14.5		14+70	
				Place Culv.
T.P. 0	19.5		17+25	
			15'	
			19+40	S.L. Whittacy Rd. X
			12" Corr 12'	
		13.5	14.8	
			16.	

↓  
North

Brown Rd

	+	H.F.	-	E
B.M.	0.78	1174.15		1173.37
T.P.	0.37	1163.47	11.05	1163.10
T.P.	1.07	1154.59	9.95	1153.52

8.21

5.81

0 to 3.52

1 to

2 to

3 to

B.A.M. 7.83

4 to

5 to

6 to

T.P. 2.38 1156.99 5.90 1148.61

6 to 90

7 to

8 to

8 to 60

9 to

10 to

11 to

12 to Place 10" Colut. or carry to N.

12 to

15 to

F.L. Colut S.H. 153

F.L. Pipe slice

3.52

4.11

4.53

5.18

4.90

4.57

5.27

Spk in W. root 30" Maple on Lot Line 300' Rt

5.92

5.90

6.73

6.90

5.80

5.99

J+K 6 to

$$\frac{81}{150} \quad \frac{862}{FL}$$

7.76

3.90

11.45

F.L.

100

7.8

7.80

6.1

6.04

7.0

3.3

100

11.0

200

6.3

6.68 = 6.6

4.0

4.33

5.15

5.18

$$\frac{49}{150}$$

5.1

8.5

100

5.2

4.90

7.0

8.3

E 2 FL

100

1156.99

13to				
B.M.			3.16	
T.P.	0.45	1158.84	4.60	1152.39
14to				
15to				
16to				
17to				
+25				
18to				
19to				
+42				

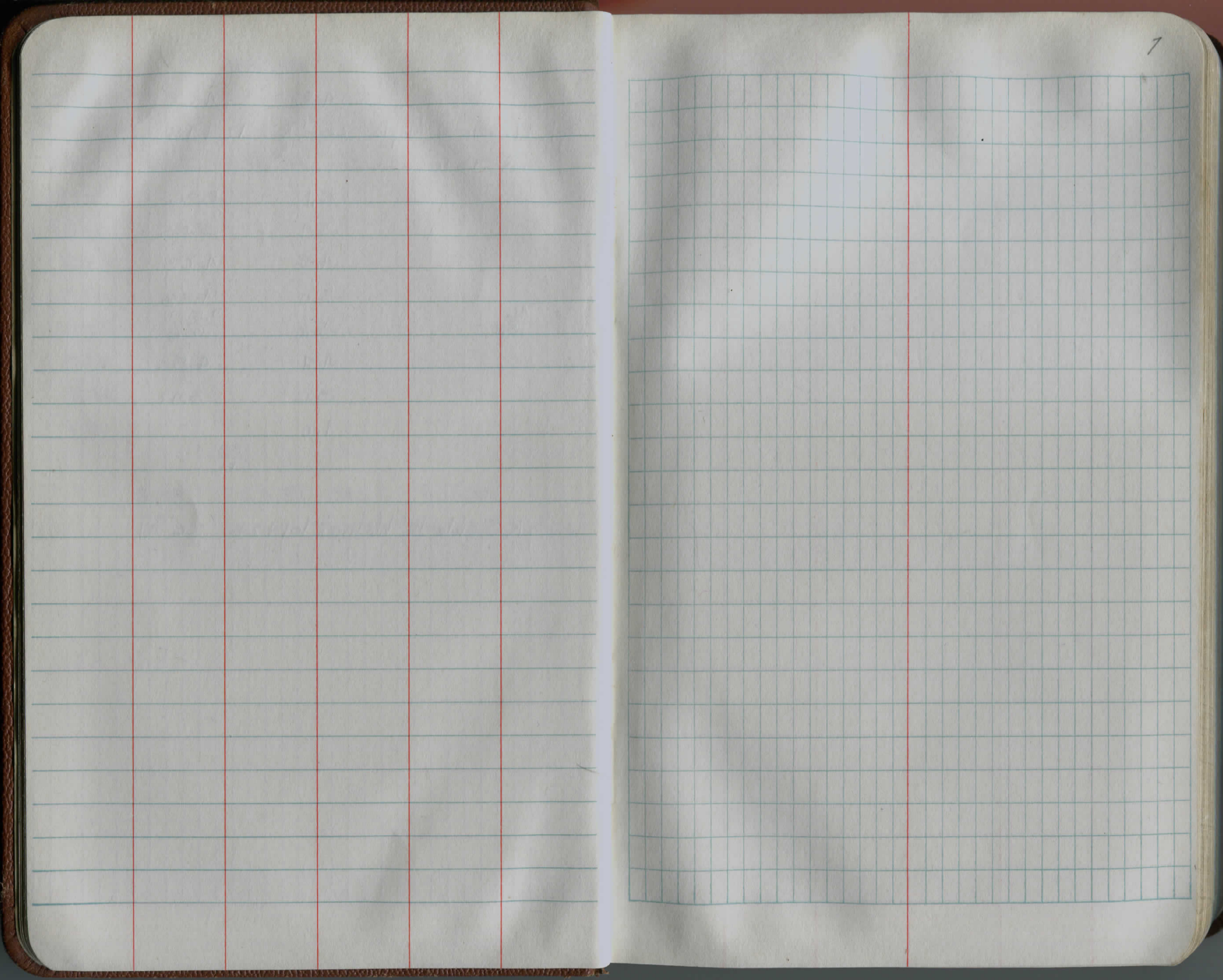
T.P.	3.15	1163.54	3.42	1155.42
B.M.			3.22	1160.35 (1160.46)

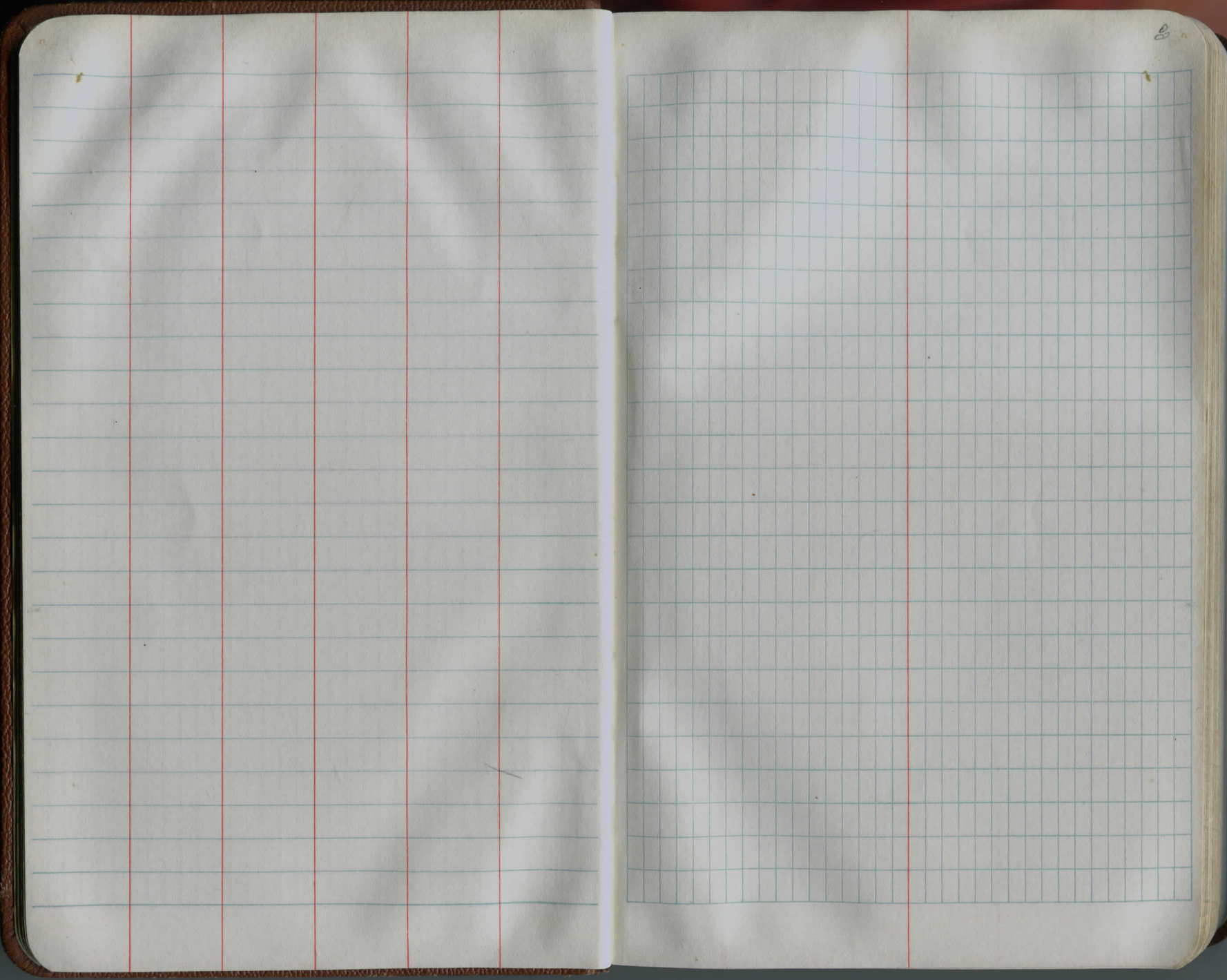
	4.8	4.60
Spk W. side 4" Maple	200'R	12+75
Spk 13to		

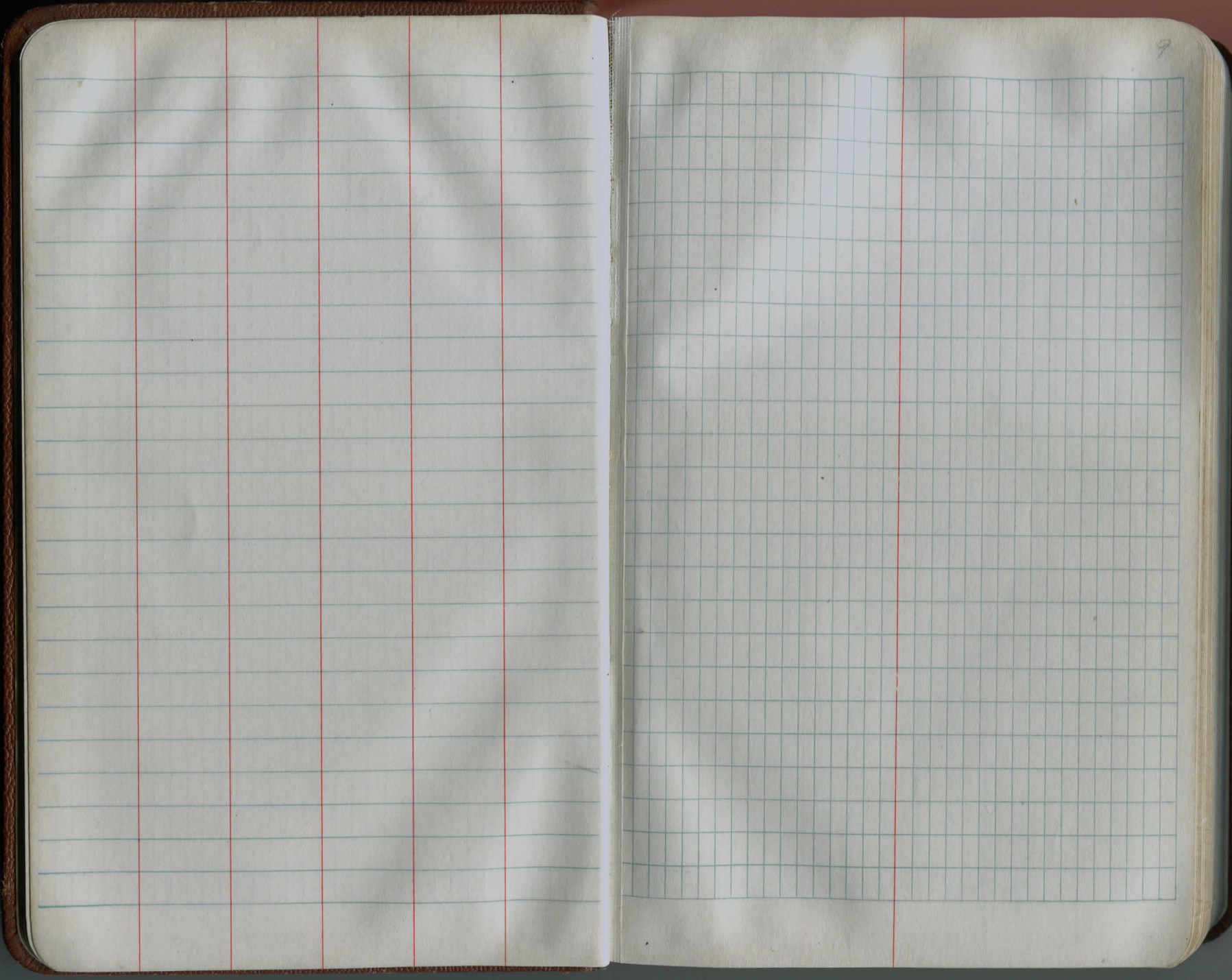
	6.1	5.96
	5.7	5.55
	4.8	4.73
	5.0	4.58
$\frac{46}{50}$	5.0	$\frac{7.5}{100}$
	4.1	4.50
	3.6	3.42
	1.0	

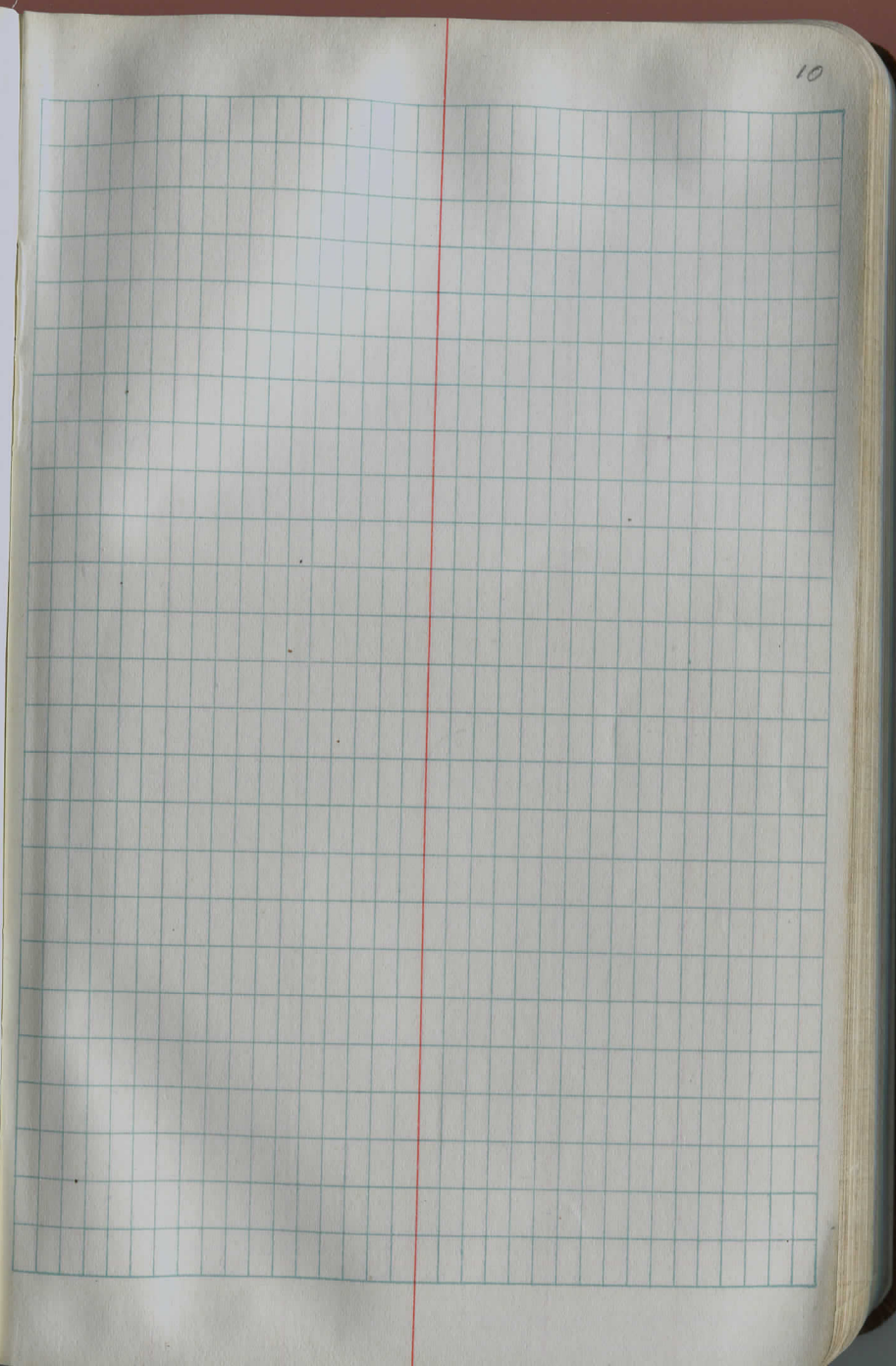
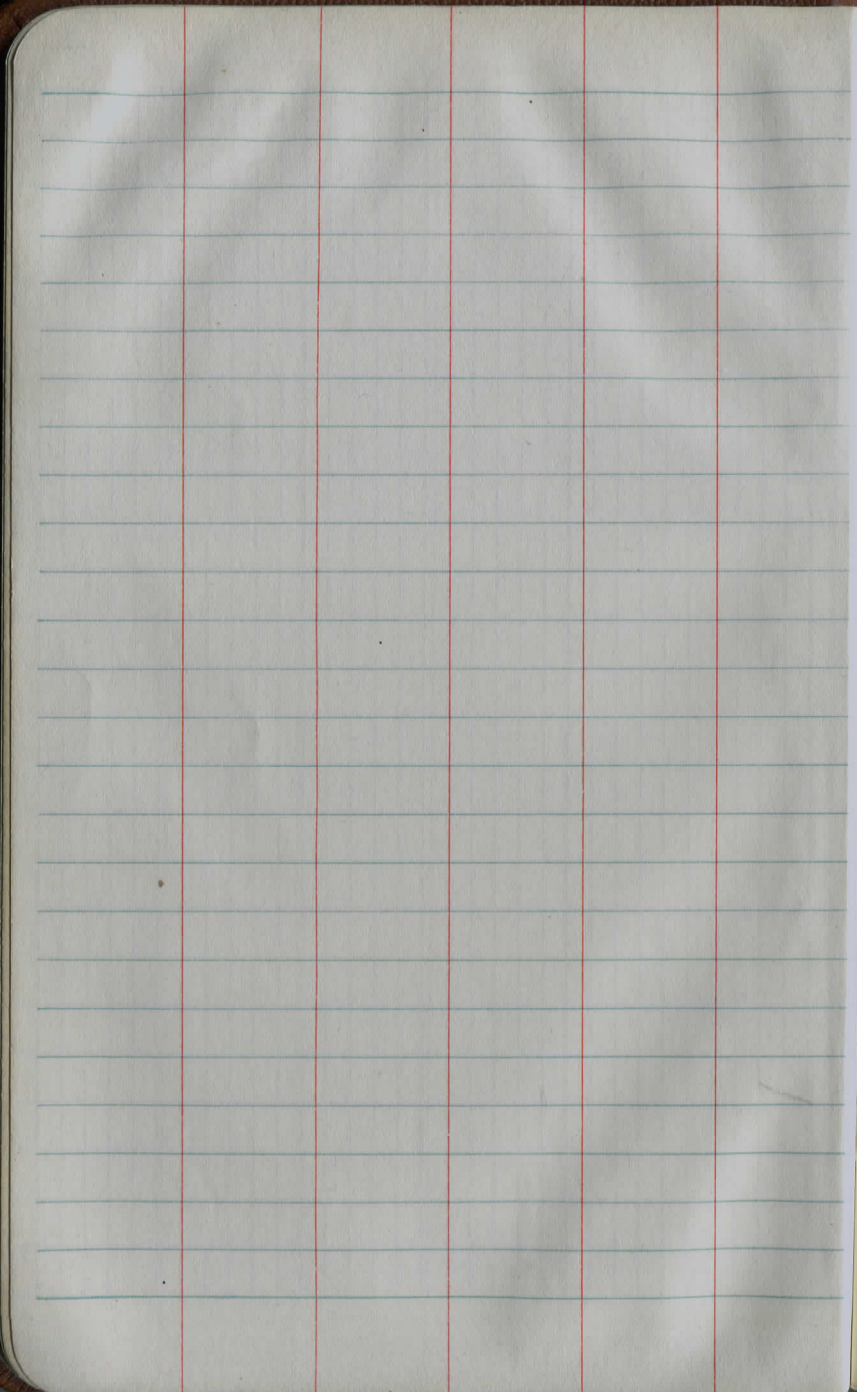
 $\frac{39}{FL}$ 

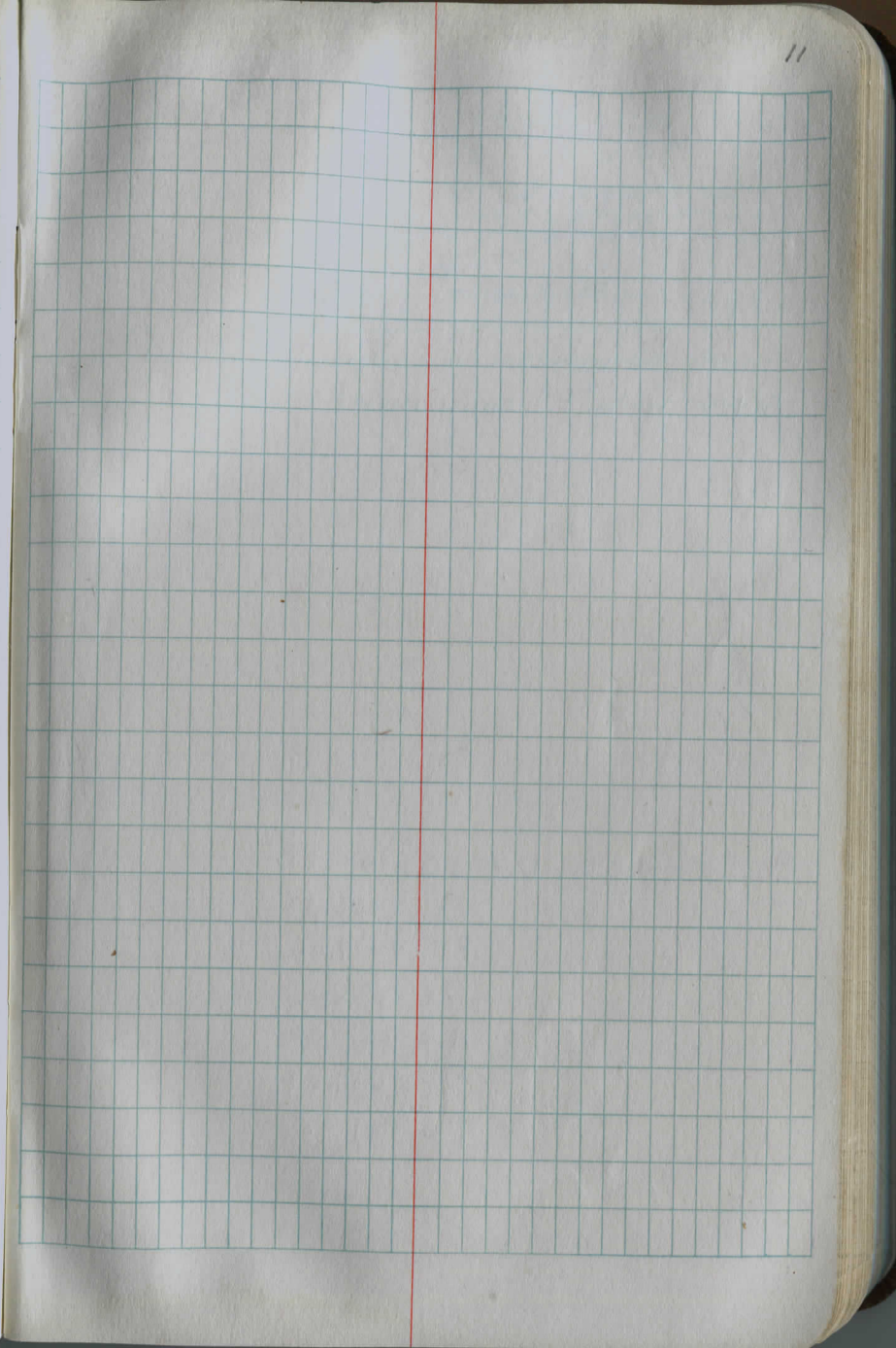
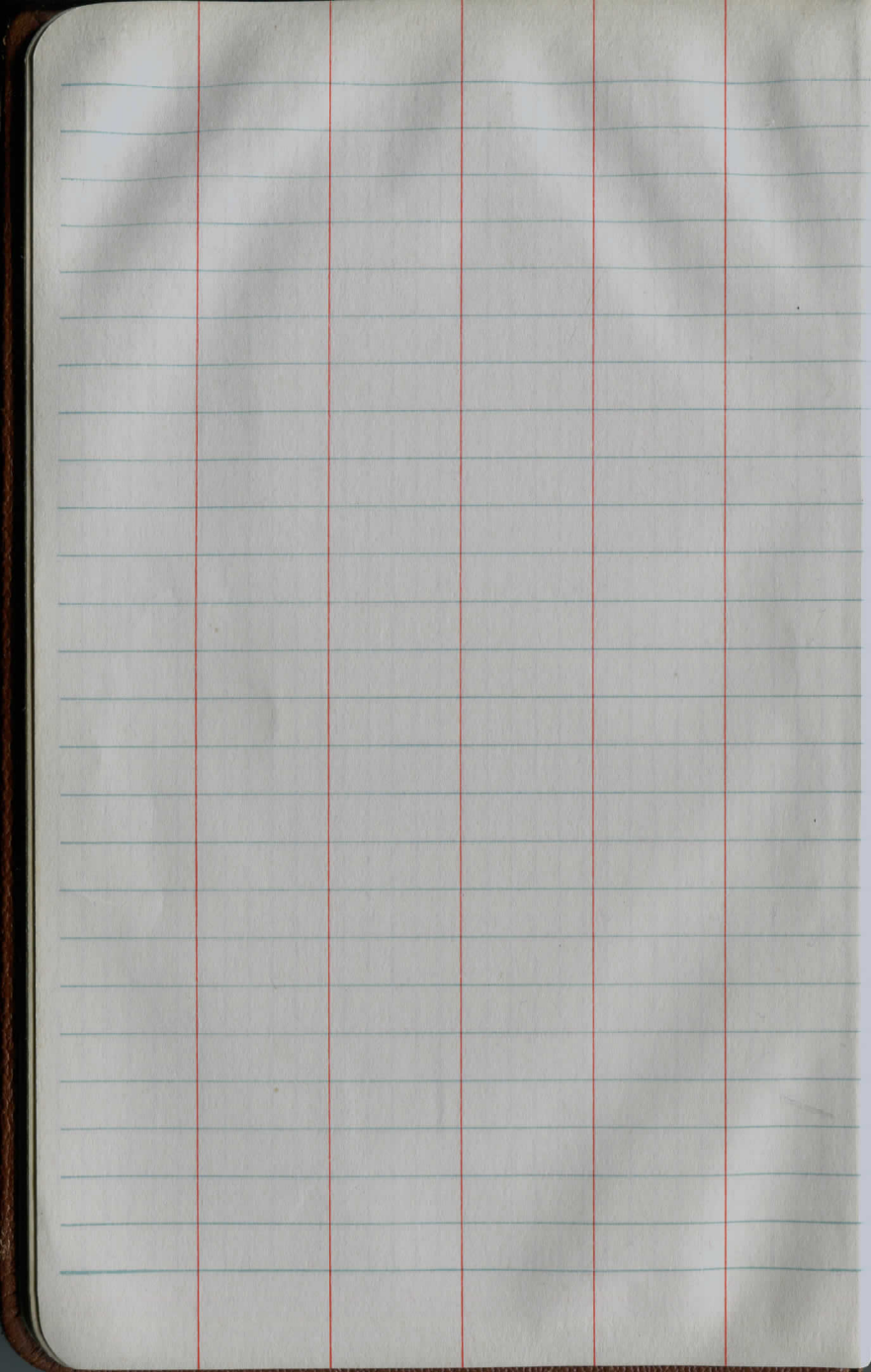
Spk S side 18" Walnut	101+25	26'RT
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E DURKEE ROAD 7-4-39

Graber  
Pomeroy  
Richards

Relocation  
NW Cor. Middlefield Twp.

1566.72 to intersection Princeton Road  
501.50 W to P.I. monument

P.I. 5+48.53 Def  $26^{\circ}-16'$  Rt.  
 Pc. 1+66.58  
 Pt. 9+17.06  
 D =  $3^{\circ}-30'$   
 $\Delta = 26^{\circ}-06'$   
 R = 1637.02  
 T = 381.95

0+00

~~Not used~~

Spike E Root  
15" W.C.H.

71.45

Spike SW Root  
15" Elm Stump. 12

45.66  
151.90

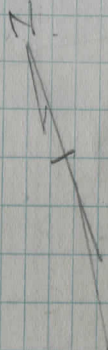
Spike in N. Root  
15" Hickory

Old Road  
N  $85^{\circ}-30' W$

Bolt set

$65^{\circ}-45'$

R = 200  
T = 129.22



637.13

206.16

48.53

Bolt set  
Sta 37+00  
old state

1889.20 to So. L. O. L.I  
Old state  
Road

211.51

E. DURKEE ROAD 2/21/39

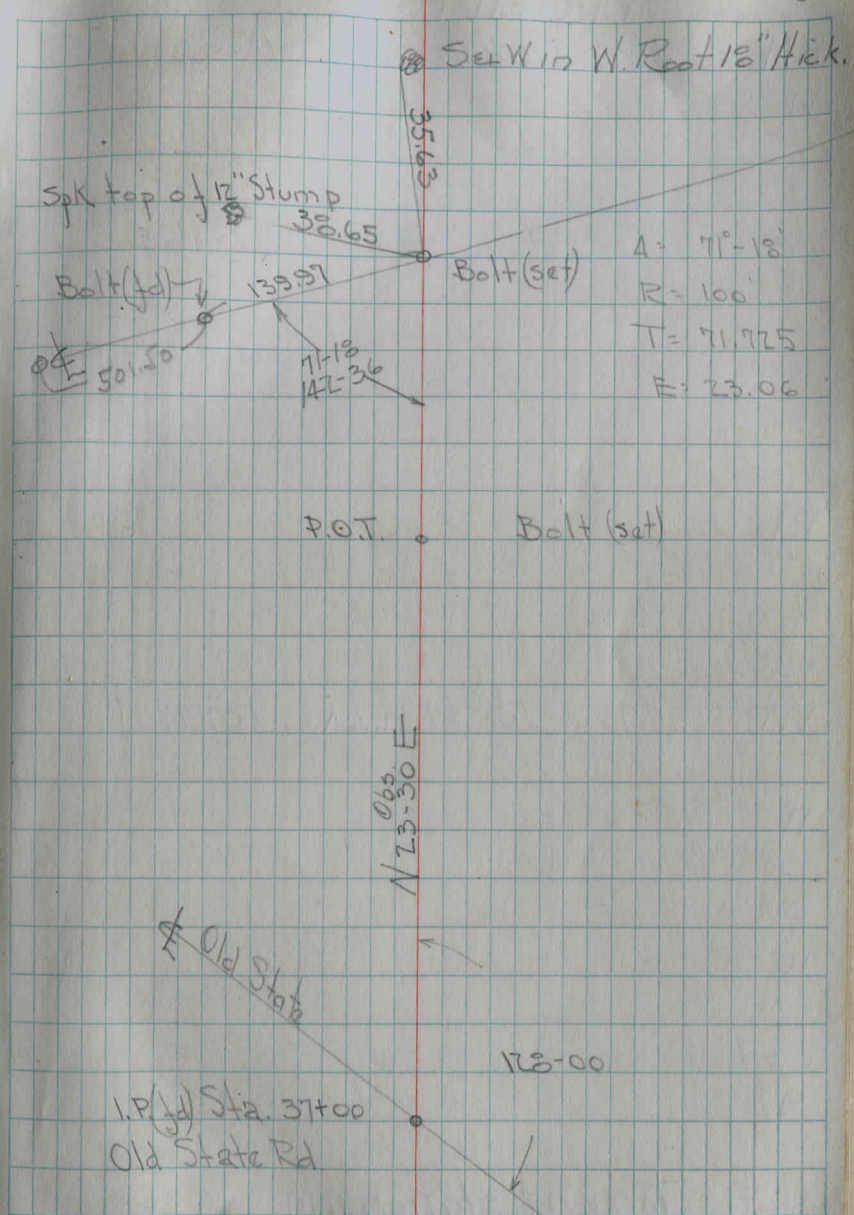
Pomeroy  
Richards  
Clause

11 + 91.42

8+0

0+0

13



PROFILE

BM 492 104.92 100.00

14

13

P.T.

P.I.

P.C.

T.P. 5.93 108.21 2.64 102.28

11

10

9

Note: Tangent stationing

N E S

17

Rel. Pt. S E W in W. Root 18" Hick.

101.82 101.10  
3.10 3.9 4.6  
stk E Old Rd

101.82 101.1  
3.10 3.8 4.3  
stk E Old Rd

101.21 100.5  
3.71 4.4 4.9  
stk E Old Rd

100.6  
4.3

102.23  
2.69  
stk

100.6  
4.3

102.43  
2.49  
stk

101.2  
7.0

103.18  
5.03

103.2  
5.0

104.7  
3.50

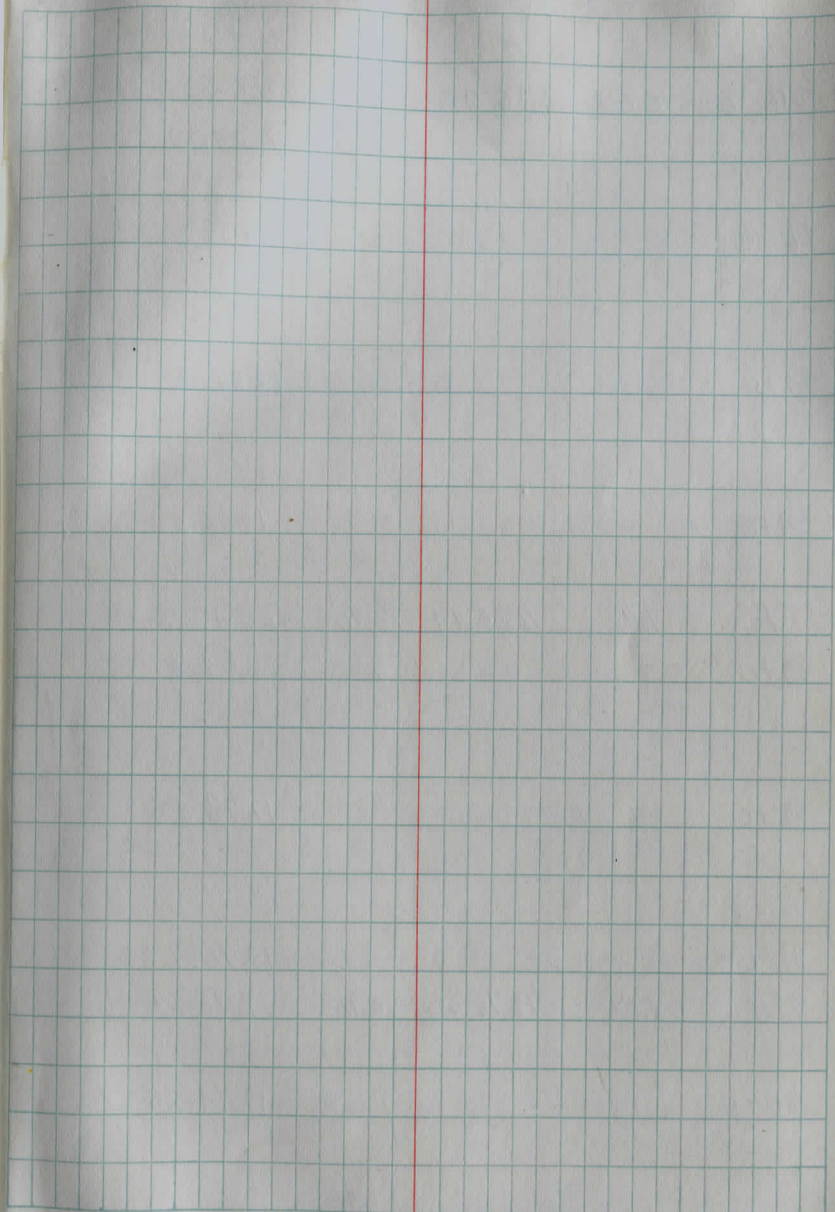
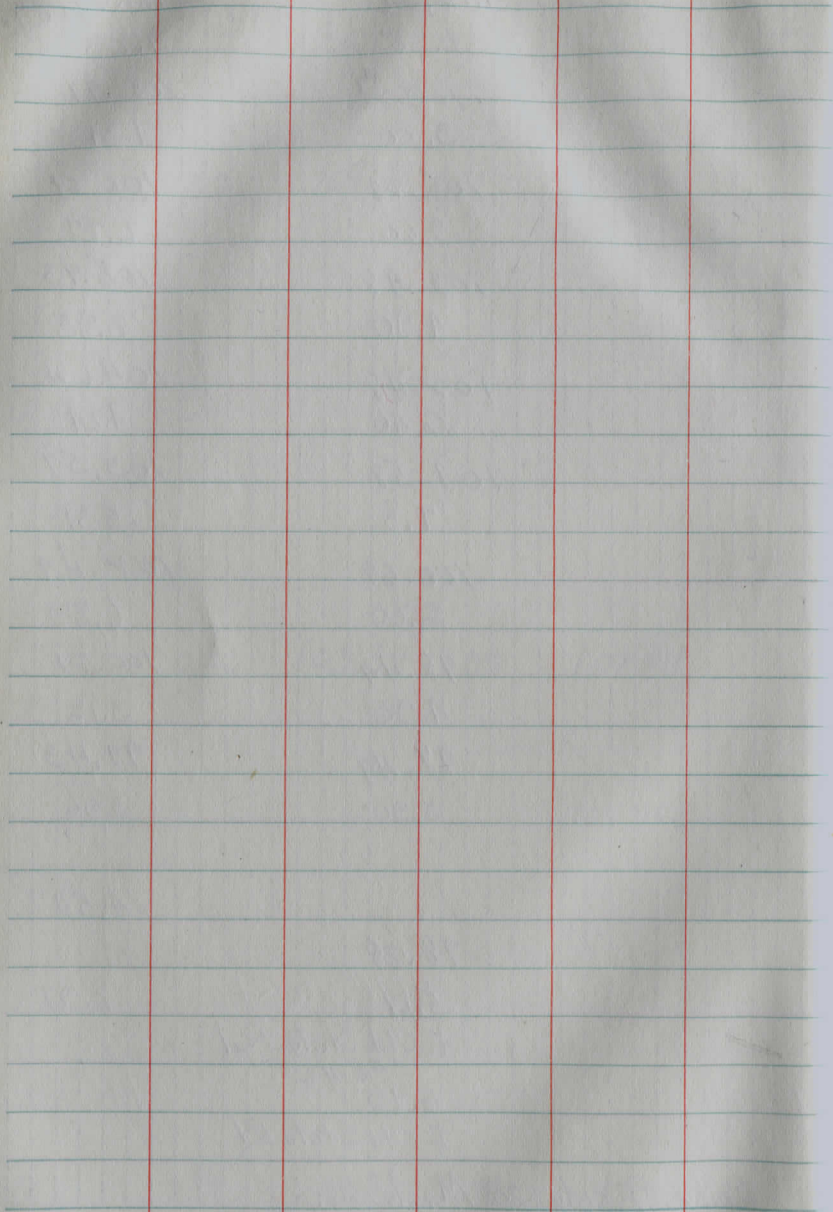
104.71  
3.50

106.81  
1.40

E

	+	H.I.	-	Elev
8to		108.21		
7to				
T.P.	1.92	108.88	1.31	106.90
6to				
5to				
4to				
3to				
2to				
T.P.	0.40	103.39	6.39	102.49
1to				
P.T.				
P.I.				
P.C.				
P.I.				
BM	2.78	99.98	6.19	97.20
BM(?)			3.27	96.11 1255.84

	±	Margin 15'
	104.86	Stakes 106.98
	3.35	1.23
	105.21	106.91
	3.00	1.31
	105.28	106.61
	3.60	2.27
	103.98	105.93
	4.90	2.55
	102.48	104.64
	6.40	4.24
	101.58	103.57
	7.3	5.31
	100.68	102.49
	8.70	6.39
	98.49	100.21
	4.90	3.18
	97.49	99.43
	5.90	3.96
		4.54
	98.38	
	5.01	2.97
	± Old State Rd	
	96.46	
	6.93	
	± Old State Rd	
	Spike E side 30' Maple	
	Nail W Root " "	



# CROSS SECTIONS

8/30/39  
 Pomeroy Richards  
 Remarks  
 Clause

	+	H.I.	-		Remarks
BM. #	0.09	1296.98		1296.89	May have settled.
T.P.			2.59	1294.39	
36+0				1292.4	
35+0				1291.2	
34+0				1286.5	
T.P.	1.16	1285.44	12.70	1284.28	
33+0				1281.8	
32+0				1278.5	
31+0				1276.2	
T.P.	1.33	1276.62	10.15	1275.29	
30+0				1274.25	

# BURTON - WINDSOR C.H. #14

17

North

South

V in N.E. Cor. top step of house 34+39 Rt  
 Rock 36+ N

3.4 3.2 5.5 3.4 2.74 2.60 3.0 4.1 3.0 1.7  
 30 22 16 12 8 11 16 20 30

7.2 6.7 8.0 6.5 5.9 5.78 6.3 7.6 5.8 5.7  
 30 23 17 12 8 14 18 22 30

11.8 12.0 14.0 11.0 10.87 10.50 11.1 11.2 11.4 10.3 9.1  
 30 23 18 12 8 13 16 18 21 30

← H.I.

33+

4.15  
 F.L. House Drain

4.3 4.5 6.8 4.5 3.82 3.62 4.5 4.9 3.6 2.7  
 30 23 16 12 8 12 17 21 30

7.4 7.0 9.3 7.6 7.04 6.95 6.9 7.3 8.1 5.8  
 30 23 17 12 8 11 13 16 22-30

9.9 10.0 9.4 11.6 10.2 9.3 9.21 9.3 10.0 10.3 9.3 8.3  
 30 20 22 16 12 8 11 14 18 21 23-30

3.3 2.7 3.2 5.6 2.9 2.52 2.35 2.6 2.9 3.7 3.0 2.4  
 30 26 21 17 12 8 10 13 16 20 30

Sta. + H.I. - E  
1276.62

29+0 1271.3

28+0 1267.2

BM #1 (set) 1.63 1268.66 9.59 1267.03

27+25<sup>60</sup> Side Rd to south Profile

27+0 1263.05

26+96<sup>80</sup> 1263.0

± Profile along Rd (West)

T.P. 12.28 1306.67 1294.39

37+0 1299.0

38+0 1303.7

T.P. 9.74 1315.68 0.13 1305.94

North South

18

5.1 4.7 5.3 6.7 2.6 5.9 5.5 0.5 3.0 5.8 7.0 5.6 5.4  
30 27 25 22 17 12 8 ± 12 17 22 30

9.4 9.2 9.6 13.0 10.5 9.5 8.9 3.9 10.0 10.7 9.3 9.0  
32 29 27 17 12 8 ± 11 16 22 30  
20

Spike in N.W. Root 15" Maple Sta. 27+1 RT

1.88 7.45 4.65 5.3 5.5 6.5 7.9 9.6  
FL pipe FL pipe  
W end E end  
± 20 50 100 150 200

6.8 7.8 6.7 5.7 5.65 6.0 7.9 6.6 4.0  
30-27-20 17 13 8 ± 10 15 18 20-30

5.73  
±

8.25 10.85 14.05  
26+50 26+0 25+50

8.5 8.6 10.9 8.6 7.94 7.73 8.4 9.2 8.2 7.8  
30 23 15 12 8 ± 11 16 19 30  
19

4.8 4.4 6.4 4.3 3.19 3.03 3.8 4.3 2.9 2.5  
30 21 15 12 8 ± 13 15 19 30  
19

Sta.	+	H.I.	-	E
39 to		1315.68		1307.5
40 to				1309.6
41 to				1311.9
T.P.	2.66	1322.22	2.12	1313.56
42 to				1314.3
43 to				1316.4
44 to				1316.1
45 to				1314.1
46 to				1311.85
BM <sup>#</sup> 3	0.37	1314.12	2.47	1313.75 (1313.70)

19

North											South									
9.0	2.9	10.6	2.9	2.23	2.17	9.0	9.4	7.2	6.9											
30	18	14	12	2	±	13	16	20	30											
		16																		
5.7	6.3	2.1	6.7	6.16	6.06	7.0	7.5	5.5	5.3											
30	21	13	11	2	±	13	17	21	30											
		15																		
2.5	3.3	5.5	4.6	3.93	3.83	4.6	5.1	3.3	2.4	2.3										
30	20	14	12	2	±	14	16	20	24	30										
		15																		
7.1	7.3	7.8	9.5	2.5	2.0	7.90	2.4	2.8	7.1	6.4										
30	25	19	15	12	2	±	13	16	21	30										
6.0	6.3	7.7	6.3	5.25	5.78	6.3	6.8	5.4	5.2											
30	22	16	13	2	±	13	15	18	30											
		19																		
5.7	6.2	7.7	6.5	6.13	6.06	6.9	7.1	5.7	5.3											
30	20	14	11	2	±	13	15	18	30											
		17																		
7.5	2.3	9.7	2.7	2.23	2.10	2.6	9.1	7.1	6.5											
30	19	14	11	2	±	14	17	22	30											
		16																		
9.3	10.2	11.2	10.2	10.56	10.35	11.1	11.5	9.7	9.2											
30	20	14	12	2	±	13	17	22	30											
		16																		
V in S.E. Cor. lower stone step of house Sta 46 + 60 Lt																				

Sta. + H.I. - E

47+0 1314.12 1309.3

48+0 1306.3

49+0 1301.7

T.P. 0.79 1302.49 12.42 1301.70

50+0 1296.4

51+0 1290.4

T.P. 0.56 1290.92 12.13 1290.36

52+0 1284.9

53+0 1278.7

T.P. 0.14 1278.84 12.22 1278.70

54+0 1272.6

North South

20

3.9 5.1 6.8 5.0 4.8 4.7 5.7 6.6 6.3 4.8 4.0  
30 18 12 10 8 E 12 15 19 27 30

6.8 6.4 9.6 2.0 7.8 7.7 9.0 9.8 7.4 7.2  
30 22 12 10 8 E 13 16 22 30

10.8 11.2 14.2 12.8 12.6 12.4 13.4 14.0 10.7 10.7  
24 22 14 11 8 E 13 17 22 32  
30 16

E 49+0

4.4 7.7 6.4 6.1 6.1 6.9 7.9 5.0 5.5  
24 14 11 8 E 13 16 22 30  
30 18

7.8 8.8 12.6 13.4 12.3 12.1 12.1 12.3 13.6 9.7 9.6  
30 25 19 13 11 8 14 16 25 30  
16

E 51+0

1.0 6.6 7.8 6.2 5.9 6.0 6.6 7.5 4.2 4.4  
26 18 13 10 8 E 14 16 22  
30 16

6.6 7.1 13.8 12.5 12.2 13.2 13.8 13.1 12.7 2.5 9.0  
30 26 13 10 8 - E 13 15.5 16.5 18 26 30  
16

E 53+0

3.5 7.9 6.6 6.2 7.5 6.8 2.5  
25 14 11 8 - E 15 16.5 26  
30 17 30

Sta. + H.I. - E

1272.34

55 to 1266.7

T.P. 0.60 1267.35 12.09 1266.75

56 to 1261.25

57 to 1257.3

58 to 1254.45

T.P. 2.08 1256.56 12.87 1254.48

59 to 1252.8

59+73 Stone Box Culit 1252.0

60 to 1251.95

61 to 1251.0

North

South

21

12.8	12.6	14.3	12.2	12.03	12.11	13.4	13.0	11.1
30	23	14	10.5	8	±	15	16.5	21
		18						30

± 55 to

3.4	4.6	6.9	7.6	6.4	6.0	6.12	7.1	7.2	7.9	8.5
30	25	18	13	11	8	±	14	17	23	30
			16							

7.0	8.7	12.0	10.5	10.12	10.05	10.4	10.8	10.0	11.0
27	19	13	10	8	±	14	16	19.5	25
30		15							30

12.1	12.6	12.4	14.7	13.1	13.01	12.90	13.2	13.4	10.8
30	25	16	14	11	8	±	13	15	22
									30

4.5	4.9	4.3	6.0	4.4	3.93	3.82	4.5	7.6	8.6
30	23	17	13	11	8	±	13	25	30
			15						

8.7	10.6	5.12	4.55	4.56	5.5	5.52	10.6	11.0	13.0
30	FL.	Hdwall	8	±	14.5	Hdwall	FL	30	50
channel									channel

49.5 51.6 51.8 51.6 50.5 50.4

7.1	5.1	4.76	4.65	5.0	6.1	6.2
28	15	8	±	12	17	30
30						

0.1	1.5	2.5	4.9	5.62	5.58	6.0	6.5	4.4	4.1
30	24	18	11	8	±	12	16	21.5	30

1256.56

62+0

1249.7

B.M. 4

2.92

1253.20

6.28

1250.28

63+0

1248.3

64+0

1244.65

T.P.

12.35

1240.85

2/31/39 Clear 82°

T.P.

5.60

1246.45

1240.85

65+0

1241.9

65+

Stone Box Culit

1241.45

66+0

1241.35

67+0

1242.67

North

South

22

5.1	6.6	2.0	7.0	6.29	6.92	7.6	8.3	8.2	9.3
30	18	14	11	8	8	12	16	24	30

Bent Spike in N Root Maple Sta. 62+63 Rt. 17'

1.7	5.7	6.3	4.85	4.94	5.9	6.3	4.4	5.2
29	19	14	8	8	12	15.5	19	30
30		16	11					

3.9	2.7	9.8	2.6	2.49	3.55	9.2	8.3	6.5
25	18	14	11	8	8	11	13	30
30								

N.E. &amp; North Hd wall 65+10

6.8	6.0	6.6	4.5	4.43	4.55	5.5	6.2	8.3	9.5
26	20	15	11	8	8	13	16	23	30
30									

8.2	9.1	10.8	5.64	5.3	4.98	5.02	5.7	6.00	10.5	11.8	14.3
50	30	FL	Hdwl	14	8	8	13	Hdwl	FL	30	50
											Ch

6.5	6.9	7.0	5.23	5.07	5.5	7.9	9.3	9.0
30	23	16	8	8	13	18	26	30

4.0	2.9	5.9	3.9	3.78	4.5	5.6	3.5
32	22	15	10	8	13	17	24
		13				19	30



Sta. + H.I. - E

1256.96

76 to 1251.1

77 to 1249.7

T.P. 1.17 1250.78 7.35 1249.61

78 to 1246.0

79 to 1241.4

T.P. 2.97 1240.75 13.00 1237.78

80 to 1236.56

BM<sup>6</sup> (adj) corrected  
1240.80 5.89 1234.86 (1234.91)

81 to On N is profile of Side Rd 1230.9

81 to Side Rd Culvert

T.P. 1.18 1228.85 13.13 1227.67

82 to 1224.96

83 to 1218.85

T.P. 0.50 1216.88 12.47 1216.38

North South 24

3.1	3.6	6.8	6.03	5.93	6.4	7.8	6.6	7.1
30	23	15	11	13	13	16	20	30
		17	11			18		

4.1	5.1	9.0	7.5	7.39	1.34	8.3	8.8	7.7	8.3
30	22	13	11	11	13	16	19	30	
		16							

E 77 to

3.1	2.8	5.9	4.84	4.77	6.0	5.8	4.2	4.9
30	22	14	8	14	11	20	30	
		16	11					

6.1	8.0	10.2	9.32	9.42	10.8	10.4	8.0	8.7
30	19	14	8	15	17	22	30	
		16	11					

1.6	2.0	5.1	4.4	4.18	4.19	5.3	5.2	3.8
30	23	14	11	8	14	17	23	30
		16						

V in SW of W. Hdwall x Rd Culvert Sta 81 to Lt

6.9	7.1	7.78	1.94	9.84	9.87	10.7	10.6	7.8	7.9
150	100	50	30	8	14	17	23	30	

30.6	29.9
10.2	10.9
FL West	FL East

2.4	5.2	4.2	3.94	3.89	5.2	5.4	1.7
25	17	12	8	13	20	26	30
30							

9.7	9.9	12.0	10.3	10.04	10.00	11.2	11.6	10.2
24	21	15	11	8	13.5	19	30	
30		18						

1216.82

84+0

1212.95

85+0

1207.1

BM7<sup>rd</sup>

May have settled

7.93

1208.95 (1209.03)

T.P.

2.05

1206.59

12.34

1204.54

86+0

1201.0

87+0

1194.5

T.P.

1.33

1196.12

11.80

1194.79

88+0

1188.4

T.P.

1.61

1186.46

11.27

1184.85

89+0

1183.0

90+0

1179.4

91+0

1176.3

2.2	5.0	6.4	4.2	4.0	3.95	5.2	5.8	4.7	4.9
22	19	14	12	8	8	13.5	16	22	30
30		17					18		

4.8	9.6	11.4	10.4	10.0	9.84	10.8	11.6	7.4	7.8
29	19	14	12	8	8	13	16	25	30
34		16							

V-N.W. ≠ Stone step house 85+50 Rt

+1.6	4.3	5.7	7.3	5.8	5.65	5.6	6.5	6.8	4.2	0.9	1.0
30	22	19	14	12	8	8	12	15	19	25	30
			17								

9.1	9.3	13.9	12.1	12.15	12.10	13.5	14.5	8.5	10.5
30	24	16	12	8	8	14	16	25	30
		18							

5.8	6.3	8.9	10.0	8.2	7.83	7.68	8.7	10.3	9.5	11.6
30	25	19	16	12	8	8	14	16	19	30
			18					18		

4.1	4.3	5.1	4.2	3.72	3.52	4.1	4.7	4.3	5.7
22	17	15	12	8	8	14	16	23	30
30									

6.2	6.7	7.9	8.9	7.3	7.19	7.08	7.6	8.7	7.5	7.0	8.7
25	22	16	14.5	11	8	8	14	16.5	19.5	23	30
30											

8.9	9.7	11.5	10.3	10.22	10.9	11.7	9.4	11.0
30	17	14	8	8	14	16.5	21	30
				11				

Sta	+	H.1	-	E
		1186.46		
T.P	1.18	1177.42	10.22	1176.24
92+0				1173.2
93+0				1169.8
94+0				1165.3
T.P	0.67	1166.00	12.09	1165.33
95+0				1160.6
96+0				1155.7
T.P	1.52	1154.81	12.71	1153.29
9/1/39 Fair - 87°				
97+0				1150.9
98+0				1147.06
99+0				1144.5

North										South										26	
± 91+0																					
0.9	2.1	4.7	5.7	4.4	4.18	4.16	4.9	6.1	3.1	3.7	3.7	4.3	3.0	9.2	7.66	7.56	8.6	9.1	5.0	3.5	
30	21	15	13.5	12	8	8	14	15.5	21	30	30	22	17	13	8	15	17	23	30		
														15	11						
2.1	12.1	13.9	12.4	12.22	12.10	13.4	14.6	3.3	9.5		2.1	12.1	13.9	12.4	12.22	12.10	13.4	14.6	3.3	9.5	
24	17	13	12	8	8	15	17	25	30		24	17	13	12	8	8	15	17	25	30	
30		15									30		15								
5.9	5.8	7.4	5.7	5.48	5.42	6.8	8.3	7.4	7.7		5.9	5.8	7.4	5.7	5.48	5.42	6.8	8.3	7.4	7.7	
20	16	12	11	8	8	15	18	20	30		20	16	12	11	8	8	15	18	20	30	
30		14									30		14								
4.8	10.3	10.9	11.9	10.8	10.36	10.26	11.5	12.2	9.7	10.7	4.8	10.3	10.9	11.9	10.8	10.36	10.26	11.5	12.2	9.7	10.7
28	21	18	14	11	8	8	15.5	18	22	30	28	21	18	14	11	8	8	15.5	18	22	30
30			17								30			17							
96+50																					
2.9	3.4	5.2	6.0	4.1	3.86	3.94	5.1	5.9	4.6	4.8	2.9	3.4	5.2	6.0	4.1	3.86	3.94	5.1	5.9	4.6	4.8
30	25	17.5	14	11	8	8	14	19	25	30	30	25	17.5	14	11	8	8	14	19	25	30
			16											16							
2.1	2.3	9.2	2.1	7.90	7.75	2.1	2.7	9.0	9.2		2.1	2.3	9.2	2.1	7.90	7.75	2.1	2.7	9.0	9.2	
25	18	14	11	8	8	13	18	24	30		25	18	14	11	8	8	13	18	24	30	
30		17									30		17								
4.6	4.1	4.3	4.2	4.4			4.3	4.3	4.3	4.3	4.6	4.1	4.3	4.2	4.4			4.3	4.3	4.3	4.3
10.2	10.7	11.4	10.6	10.38	10.33	10.5	11.6	11.4	11.5		10.2	10.7	11.4	10.6	10.38	10.33	10.5	11.6	11.4	11.5	
30	16	14	12	8	8	13	16	22	30		30	16	14	12	8	8	13	16	22	30	

Sta.	+	H.L.		E
		1154.81		
T.P.	2.91	1147.39	10.33	1144.48
100 to				1142.79
BM <sup>#</sup> 601	4.16	1147.39	4.16	1143.23
101 to				1141.7
1014	Stone Box Culvert			1141.4
102				1140.6
103				1138.2
T.P.	5.11	1143.34	9.16	1138.23
104				1134.2
T.P.	1.52	1139.75		1138.23
105				1129.09
T.P.	0.25	1128.30	11.70	1128.05
106				1123.9

North												South			
± 99															
5.7	5.2	5.0	5.3	6.5	4.9	4.7	4.6	5.1	5.8	6.1	6.2				
30	25	21	17	15	12	8	±	14	18	26	30				
Spike in SE Root 12" Maple Sta 99+73 Lt 27'															
10.4	10.2	8.4	6.3	6.0	5.7	4	6.2	8.4	7.8	8.6					
30	27	18	12	8	±	12	15	20	30						
11.5	10.7	9.7	6.0	6.1	5.9	6.3	6.4	9.7	9.4	9.0					
50	30	FL	Hdwl	±	11	Hdwl	FL	30	30						
Sharp drop															
9.2	8.5	9.2	7.5	7.0	6.7	8.5	5.9	5.7							
30	24	17	14	8	±	13	15	25	30						
sharp drop															
9.6	7.6	11.3	9.8	9.5	9.1	9.6	9.3	6.1	1.9	0.0					
30	24	17	12	8	±	13	15	23	29	35					
± 103															
8.1	7.2	9.3	11.7	9.6	9.3	9.0	9.9	7.9	5.6	2.6	2.4				
30	26	23	14	12	8	±	14	21	26	30	35				
± 103															
12.1	10.6	12.2	10.9	10.7	10.6	12.0	11.8	8.1							
30	19	13	11	8	±	15	18	30							
8.5 5.6 4.3 4.9 4.6 4.3 4.3 5.8 5.3 4.8 4.1															
30	27	18	14	12	8	±	14	17	24	30					

Sta.

+

H.I.

-

E

1120.30

107+0

1119.05

T.P. 2.00

1120.64

10.46

1119.24

107+0

108+0

1114.0

109+0

1111.1

T.P. 3.59

1114.70

9.53

1111.11

BM #9 set

2.69

1112.01

109+93

Culvert

1110.5

110+0

1110.5

111+0

1110.2

Note: Channel turns South  $\pm$  111+50

112+0

1109.6

North

South

20

16.1	17.0	17.4	18.3	18.9	...
12.2	11.3	10.9	10.0	9.36	9.25
30	19	16	10	8	$\pm$
		13			

18.1 17.8 18.5 18.1 17.9

$\pm$	11	15	16	25	30
	2.5	2.8	2.1	2.5	2.7

9.9	9.7	9.1	7.1	6.26	6.64	7.1	7.9	7.7
30	23	18	11	8	$\pm$	12	15	23
								30

11.2	11.1	11.2	9.2	9.66	9.54	9.9	11.7	11.8
30	26	17	14	10	$\pm$	11	16	25
		20						30

 $\pm$  109X in NE.  $\pm$  of N Hdwall 5 to 109+

6.7	7.1	8.8	2.67	3.7	4.03	4.19	4.0	2.81	4.28	3.8	9.5	6.3	5.9	7.0
21	18	FL	Hdwl	11.5	8	$\pm$	11.5	Hdwl	$\uparrow$	FL	2.7	3.0	3.5	4.0
30														

Top opening

8.2	8.7	8.1	4.0	4.07	4.21	6.7	8.8	9.5	7.3	6.2	5.9	
30	21	18	13	10	$\pm$	11.5	13	22	25	32	35	40
	Ch.								29			
									Channel			

4.4	4.0	2.8	6.2	4.4	4.35	4.54	5.5	5.3	4.1	5.9	10.8	7.6	6.7	7.0
30	28	23	17	14	9	$\pm$	15	16	19	24	26	33	35	40
			19								29			
											Ch			

4.9	6.8	5.4	5.06	5.9	8.7	9.0	6.9	7.0	
27	17	12	8.5	$\pm$	13	20	30	33	40
30	21								

Sta + H.I. - E

1114.70

113+0 1109.1

T.P. 2.96 1112.05 5.61 1109.09

114+0 1108.73

114+ West end Steel Truss Bridge <sup>1108.72</sup>

114+ East " " " 1107.65

BM<sup>10</sup> (Jd) corrected  
1112.00 4.42 1107.63 (1107.58)

115+0 1107.3

115+ Slab Top Bridge (Overflow bridge) <sup>1106.9</sup>

116+0 1106.9

117+0 1106.6

118+0 1106.6

T.P. 4.82 1111.45 5.37 1106.63

North

South

29

15	3.7	8.1	5.9	5.49	5.61	6.5	7.1	6.1	8.0	12.9
30	27	15	12	8	±	14	18	21	29	35
		19								ch.

± 113

6.7	6.2	3.8	3.30	3.32	3.5	9.2	11.4	2.0
30	23	11	7	±	9	16	19	25
							24	30
							ch.	

3.33

±

4.40

±

X in N.W. ± of E. Abut. Steel Truss Bridge 114+

8.0	4.59	4.74	5.8	7.2	19
30	3	±	8.5	16	30
			18		

11.1	10.3	9.5	9.0	4.7	5.20	5.06	5.1	9.8	8.9	9.3
33	28	21	13.5	11	10	±	2	9.5	19	24
			FL					FL		30

10.6	9.1	5.8	5.30	5.12	5.8	8.4	8.1	8.8
24	19	11	7	±	11	17	22	30
30								

9.7	9.8	9.5	5.8	5.52	5.42	6.0	8.1	8.6
24	23	19	11	7.5	±	12.5	19	25
30								30

9.2	9.5	8.6	5.8	5.45	5.38	6.0	7.8	7.2
25	20	16	10.5	7.5	±	12	13	22
30	24					17	17	30

± 118

1111.45

119+0

1106.8

120+0

1106.69

121+0

1106.78

121+

1106.89  
Slab Top Bridge (Overflow bridge)

122+0

1106.71

123+0

1106.8

T.P.

5.15

1111.95

4.65

1106.80

123+

Overflow bridge

1106.87

124+0

1107.0

9.3	29	5.2	4.78	4.65	5.2	6.8	7.1
23	18	11	8	E	12	15	20
30							30

8.8	9.0	8.6	5.1	4.74	4.76	5.4	6.8	7.2
27	24	19	11	8	E	12	14	20
30								30

8.7	8.4	5.2	4.72	4.67	5.0	4.9	6.6	7.2	7.3
24	20	11.5	8	E	10.5	12.5	16	21.5	27
30									30

8.5	8.3	8.8	4.2	4.56	4.4	9.2	7.9
22	11.5	11	9	E	10	11.5	21.5
30		FL				FL	30

8.4	8.5	5.4	4.65	4.74	5.4	8.2	7.4	7.0
30	20	11	8	E	12	16	21	27
	27					18		30

7.0	8.0	5.3	4.76	4.65	5.4	8.3	6.4
26	17	12	8	E	12	13	28
30	22					21	30

9.0	9.6	9.8	4.9	5.08	5.0	9.3	9.2	8.9
24	18	11	10	E	9	11	21	30
30		FL				FL		

7.9	8.7	5.5	5.06	4.95	5.4	8.1	7.0
26	19	11	8		12	17	25
30	21					20	30

Sta.

+

Ht.

=

1111.95

125 to

1106.95

126 to

1106.9

126 to

Corrug pipe culvert

1107.16

127 to

1107.12

T.P.

6.25

1113.37

4.83

1107.12

128 to

1107.3

129 to

1107.9

130 to

1109.7

BM # 11

(30')

111

1112.26

T.P.

8.99

1119.22

3.14

1110.23

North

South

31

7.3	2.7	5.5	5.03	5.00	5.5	8.3	7.3
24	17	11	8	£	13	18	26
30	21					21	30

7.3	2.3	8.4	5.5	5.09	5.05	5.4	8.2	8.3	7.3
27	25	19	12	8	£	12	17	21	23
30									30

5.2	5.92	5.1	4.77	4.79	5.4	6.1		in pond
21.5	17.5	14	8	£	10	14		30
30								

Top of pipe                      Top of pipe

7.9	8.4	5.1	5.01	4.83	5.1	7.1		8.0
26	20	12.5	8	£	10	15		23
30								Edge of pond

£ 127

8.4	8.7	8.1	6.4	6.16	6.10	6.5	8.4	7.8	8.1
28	24	18	12.5	8	£	10	15	20	25
30									30

7.9	5.6	5.40	5.46	5.8	6.2	6.6		
18.5	12	8	£	13	18	25		
30						30		

4.1	4.7	5.0	3.5	3.30	3.69	4.7	4.6	1.9	0.9	0.4
27	21.5	16	12.5	8	£	12.5	17	21	27	30
30		18								

Spike in N.E. Root 12" Maple 129+74 R+20'  
P.T. 130+?



1137.03

135+

1135.1

T.P. 12.33 1149.21 0.15 1136.88  
 BN<sup>#</sup> 12 (Jd) 9.16 1140.05 (1140.5)  
 136±0 1136.9

137±0

1141.6

137±0

F.L. Conc. pipe

T.P. 10.89 1158.41 1.69 1147.52

138±0

1147.5

138±

F.L. x Road Culot (out let)

138±35

1150.2

139

1155.86

139±30

1158.16

North  
Ditch Esida R.R.

5.3 4.96 4.5 1.69 1.92 1.10 3.9  
 100 50 FL 1/16 Hdwl # 13 Hdwl FL.

V in SE of Conc. block SE. of store 136±20

10.9 11.5 12.36 12.33 13.0 15.3 12.2 9.9 10.2  
 30 21 8 # 13 15 20 26 30  
 14 17

W 2 4.9 5.96 4.15  
 7.0 7.3 9.6 7.0 7.61 8.4 9.4 8.2 7.3 7.2  
 30 21 17 8 # 13 15 18 21 30  
 13

39.0

10.28

F.L.

#

4.6

4.89

4.68

4.93

4.95

8.1 8.2 12.4 11.2 10.91 10.89 11.7 12.5 11.6 9.1 8.9  
 30 23 14 14 8 # 13 15 16 21 27 30  
 17

10.30

F.L.

4.6 5.2 5.7 6.4 8.18 8.21 8.8 9.4 5.8 5.3 5.5  
 150 100 50 35 8 # 12 13 20 22 30  
 15

2.55

#

0.25

#

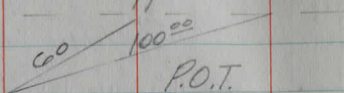
#

East Durkee Road (Clay St to Princeton Rd)

stakes set at 30'  
 0 to 20 Lt  
 20 to Rt

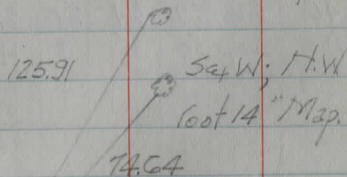
13+00.00 1 Bolt set

Bolts approx. in P.L.



obs  
586-40E

Set W; H root 24" Map



0 to 1 Pin Fd  
1 down

Corn  
Grib

End brush 23+75

21+85 2' spring hole

Begin brush 12 to

Field Dr Saldam used 17+47

P.L. Begin light brush 17+37

15+02 5' Spring hole

13+40 P.L.

Hay field  
 Can build x roadcut & carry H<sub>2</sub>O NE. 10+25

End light brush 9+75

Begin light brush 6+50

+59 32' 20" Map.

2+21 33' 24" Map.

+29

+74 33' 22" Map

+64 24' stone post

+49 23.5' step stone

+34 24' stone post

+28 ± 70'

14+21 33' 24" Map

+68 33' 14" Map

12' Wood milk stand

+20

± 29°-40°

Princeton  
Road  
20 Rdway

185 Gravel Dr. +00

10' x 21.5'  
Coll. P.P. 604

0-233 15' Comp. pipe

20 Rdway



B.M. spike N. side 36" Elm

37-17.20

23

See W; SE side

24" twin Elm

59.41

25.35

pipe (fd)

36 + 97.18

58.87

34 + 44.13

Bolt set

4 I.P. (Fd)

12" Conc pipe

N.B.R. 90-32

Burton-Windsor Road  
22' Rdway

Clay St.

22' Rdway

12" C.I.P.

pipe (fd)

15.3

N.B.R. 126-44

176-48

± 39'

1/2" I.S.P.

± 28'

12" Coll.

160.77

0-13

176-14

+ 25

End brush both sides

15" W.Ch. @

25'

+ 49

22" W.Ch. @

25'

30 + 45



	+	H.L.	-	E
30				31.9
29				28.2
1935		5/31/40	65°-Cloudy	F.C.P. -E.R.-L.H.
28				29.7
T.P.	7.63	1139.69	13.00	1132.06
27				33.2
26				40.3
T.P.	0.07	1145.06	11.25	1144.99
25				43.4
24				46.4
23				50.6
T.P.	1.16	1156.24	12.80	1155.08
22				55.8
21				60.7
B.M.	0.43	1167.88	10.63	1167.45
20 to				64.9
19 to				69.2
18 to				73.1
T.P.	0.18	1178.08	11.43	1177.90
17 to				77.9
16 to				83.8
T.P.	0.16	1189.33	11.21	1189.17
15 to				90.7
14 to				96.4
		1200.38		

				7.8
				11.5
	15.9			11.5
	FL.			10.0
			16.0	Fall O.K.
			FL.	
				11.9
				4.8
				12.8
				9.8
				5.6
				12.1
				7.2
	Bent spk	11' root 13" Maple	20+54	32' Rt
				13.2
				8.9
				5.0
				11.4
				5.5
				9.7
				4.0

26 High

B.M.		2.59	1122.07 (1121.51)
T.P.	333	1130.66	10.73 1126.83
469	Intersection High Rds		26.8
36			29.6
35			34.3
34			34.1
T.P.	0.91	1137.56	3.04 1136.65
33			35.5
32			36.9
31 to			38.2
		1139.09	

2.1  
37+69

<del>24</del>	<del>100</del>	<del>12.56</del>	10.8		
		FL.	2.0	12.1	9.0
			3.3	FL.	100
			2.9		
			4.2		
			2.8		
			1.5		

# Burton Sta. Drainage

0+0 =  $\frac{1}{2}$  road  
 2+34 = culvert. xing. tracks  $\rightarrow$

B.M.	0.63	1140.68		1140.05
Top	15" V.S.P.	0 to South	6.65	11340 11327.FL.
0+0			5.63	1135.1
0+0			6.26	1134.4
0+			9.03	1131.7
0+			8.55	1132.1
T.P.	3.23	1137.65	6.26	1134.42
			5.20	1132.5
0+50			3.54	1134.2
0+50			5.4	1137.3
1+0			3.77	1133.9
1+0			6.0	1131.7
1+50			4.06	1133.6
"			6.7	1131.0
2+0			4.44	1133.3
"			7.4	1130.3
2+34			4.64	1133.1
"			8.7	1129.0
"			9.6	1128.1

8-17-02  
 Graber  
 Pomeroy

(27.5 of 24" V.S.P.)

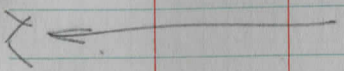
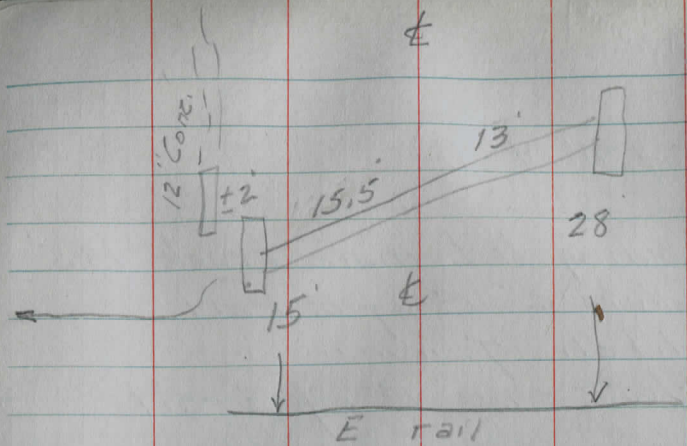
$\frac{1}{2}$  siding to  $\frac{1}{2}$  main track 13.5'  
 culvert 6' E of E rail  
 ditch 7' " " " "  
 R/W  $\pm$  21.5' E of E rail

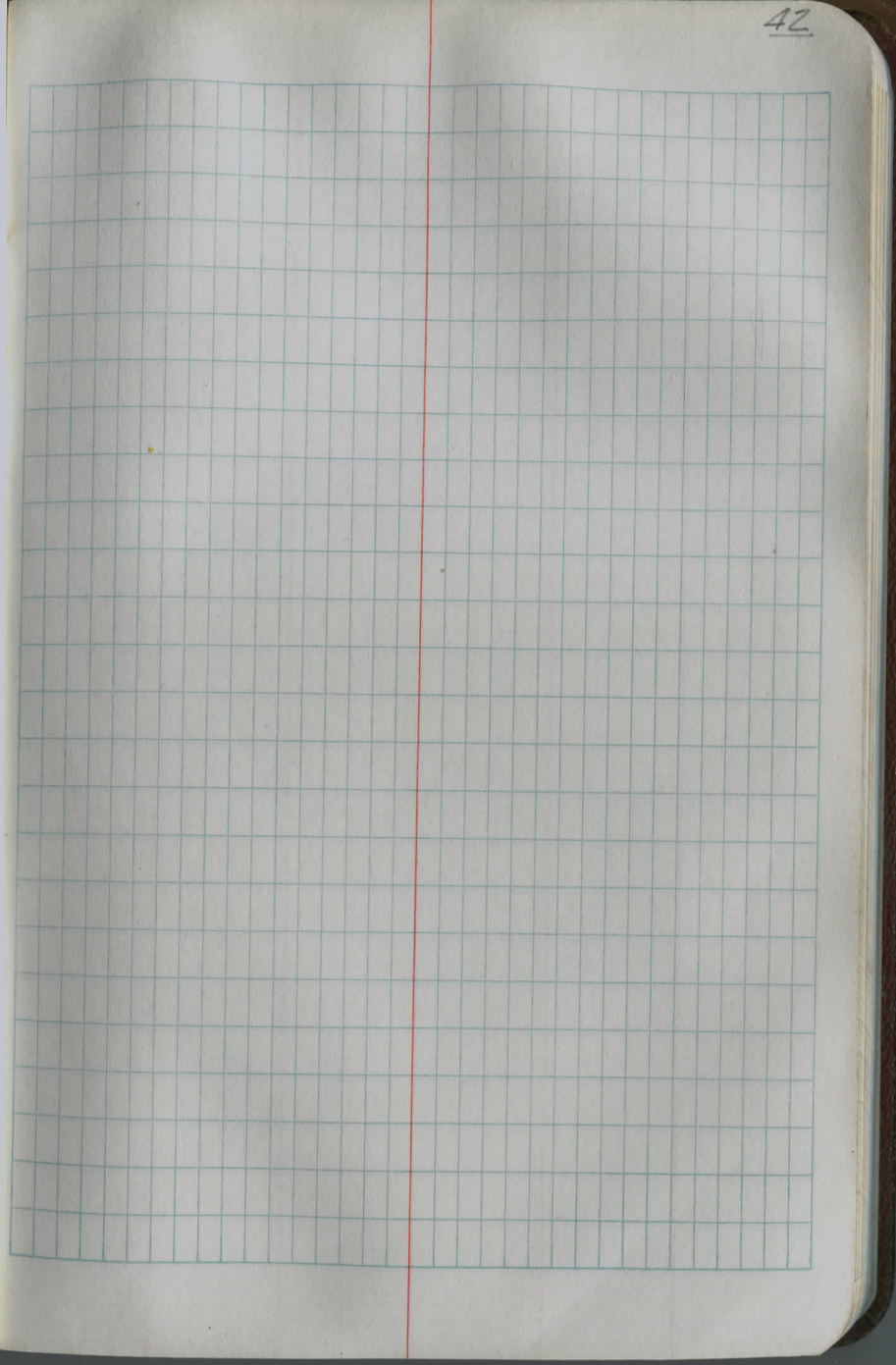
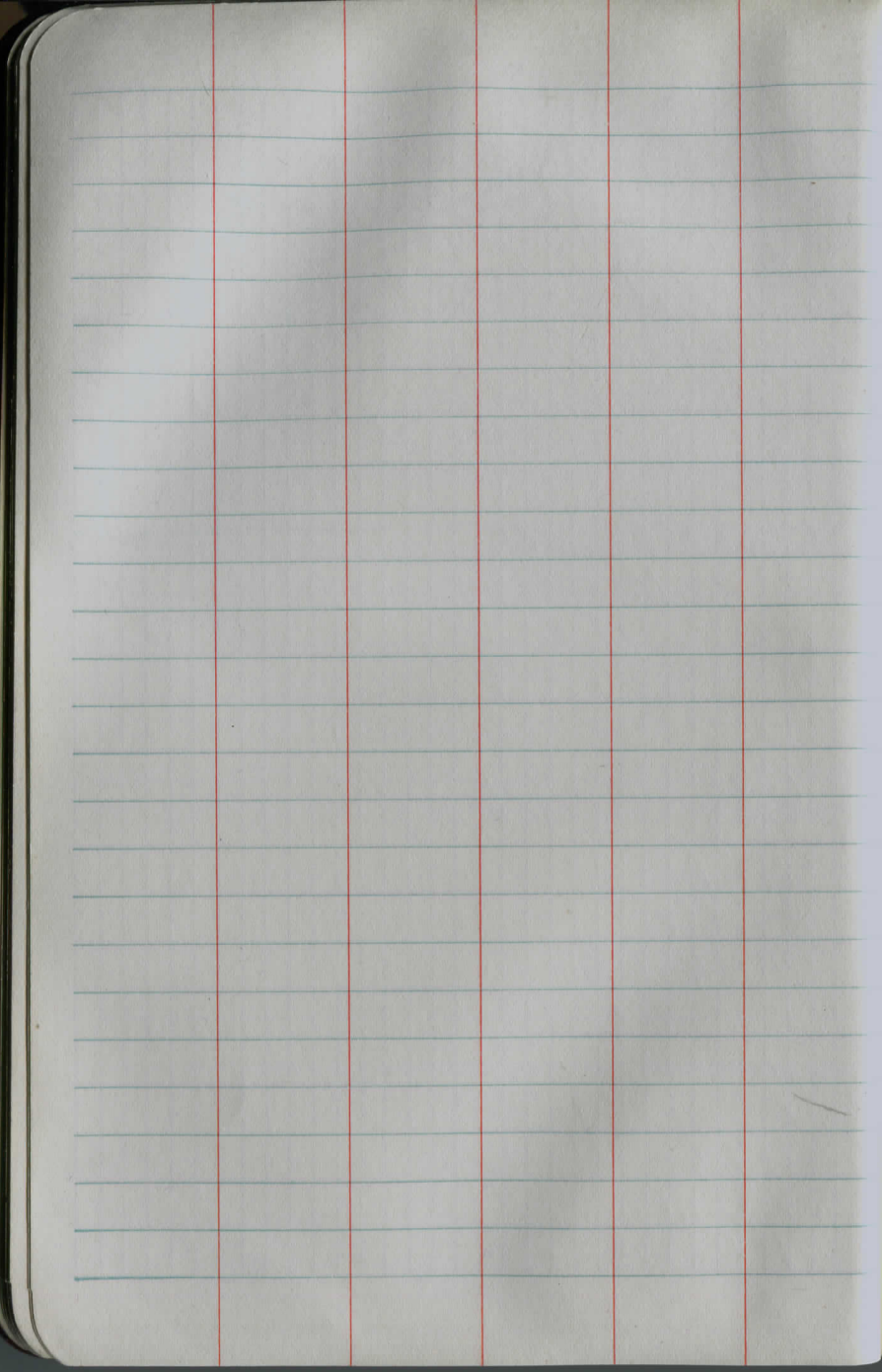
$\frac{1}{2}$  rd &  $\frac{1}{2}$  culvert  
 E rail  
 F.L. (outlet) 15" pipe  
 " 12" Concl. "

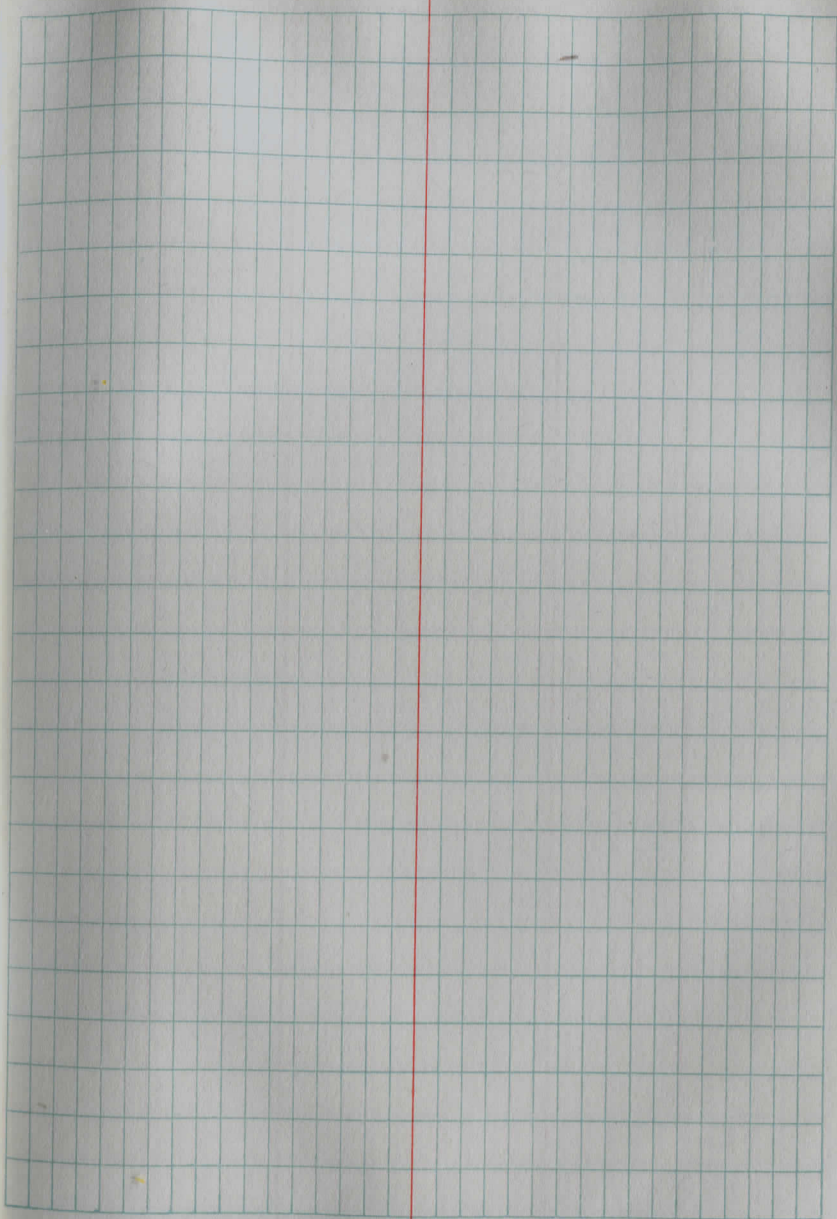
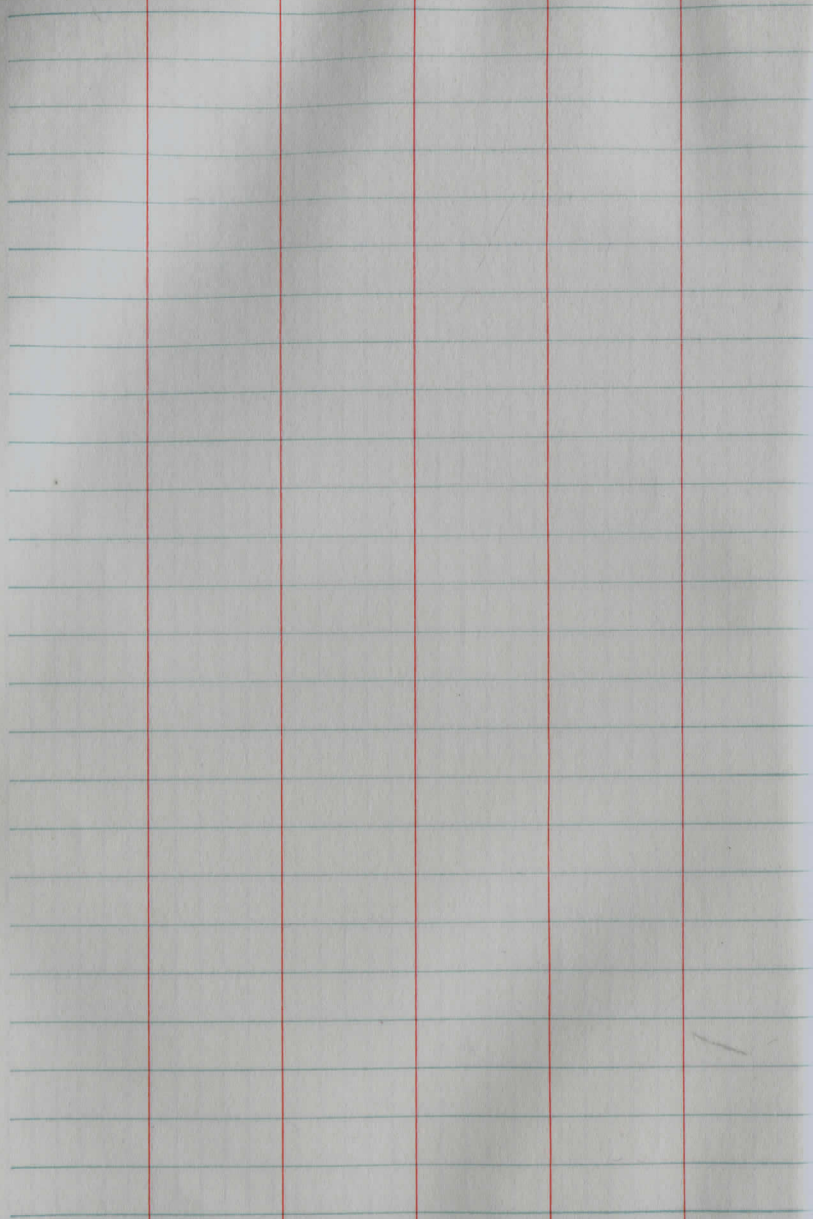
ditch 4' N of culvert  
 E rail  
 ditch  
 E rail  
 ditch  
 E rail  
 ditch  
 E rail  
 FL E

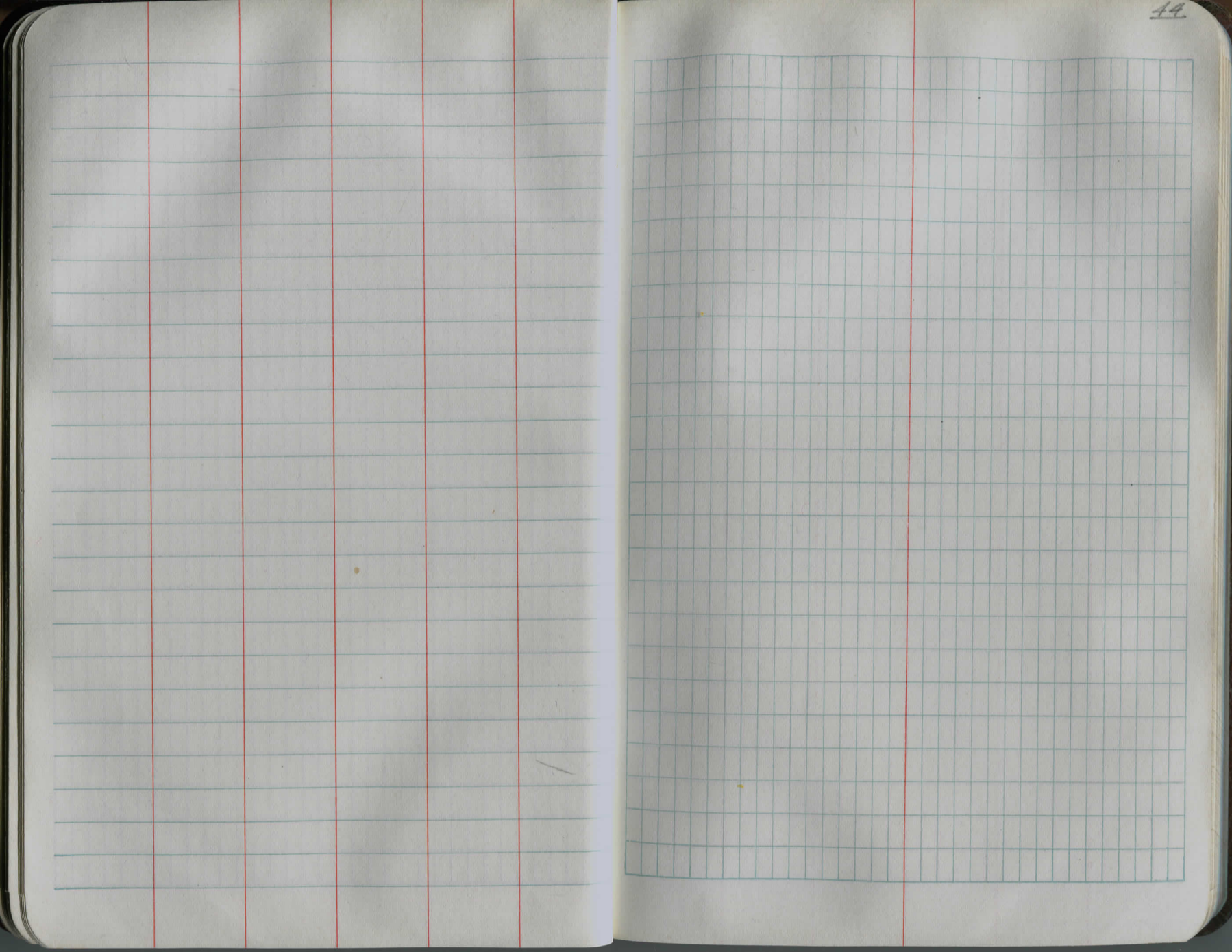
See next page

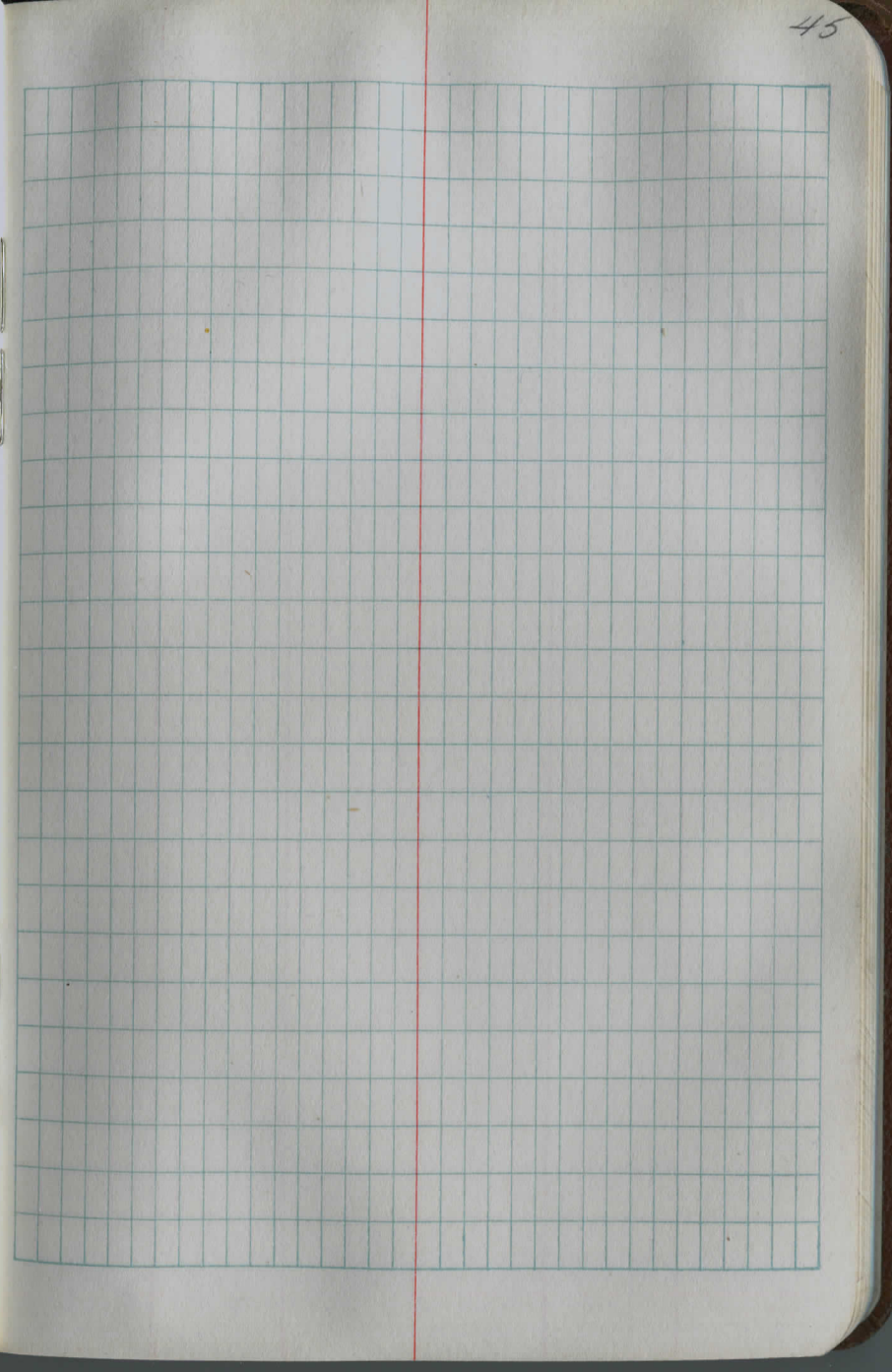
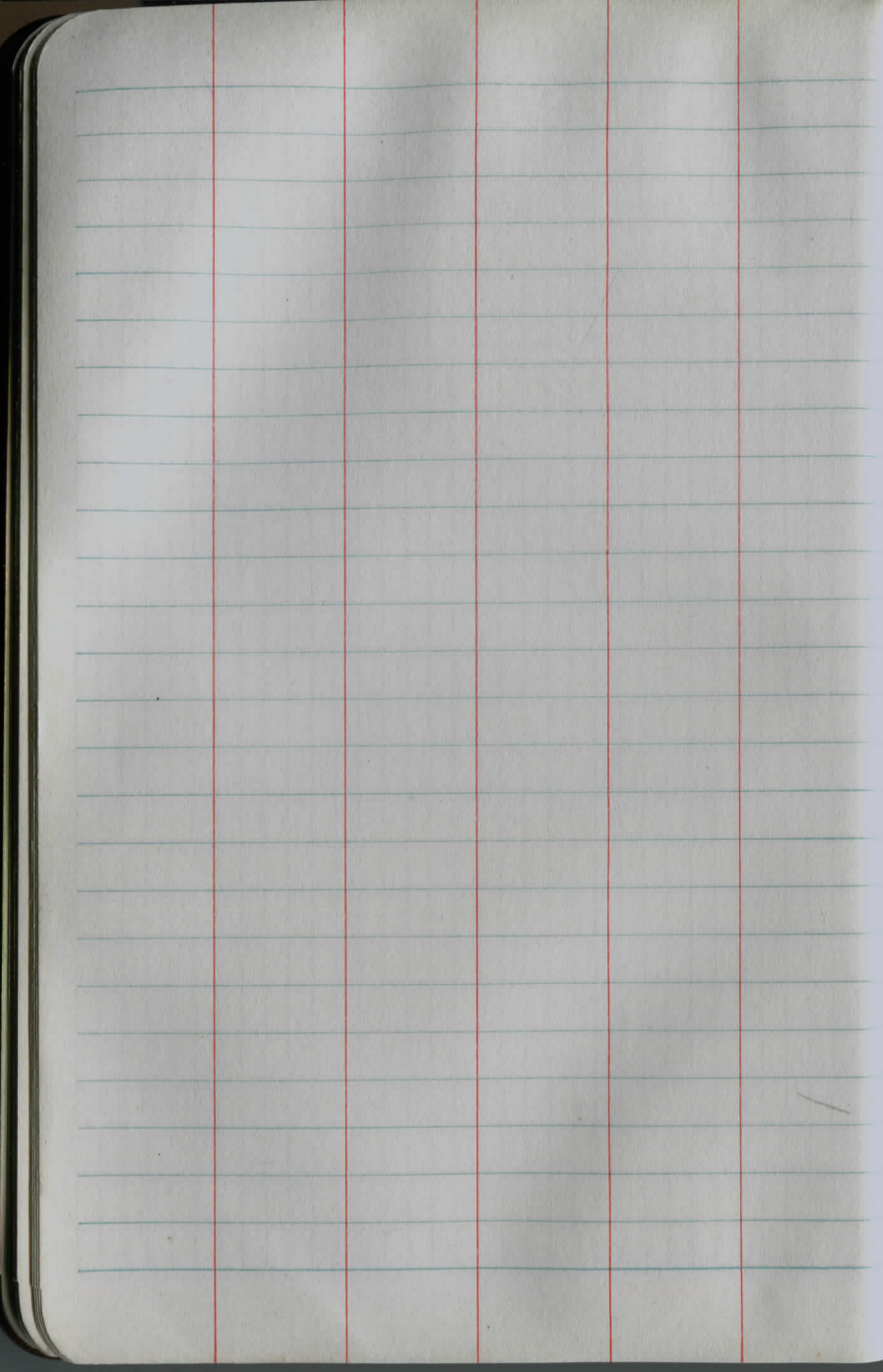
F.L. vk

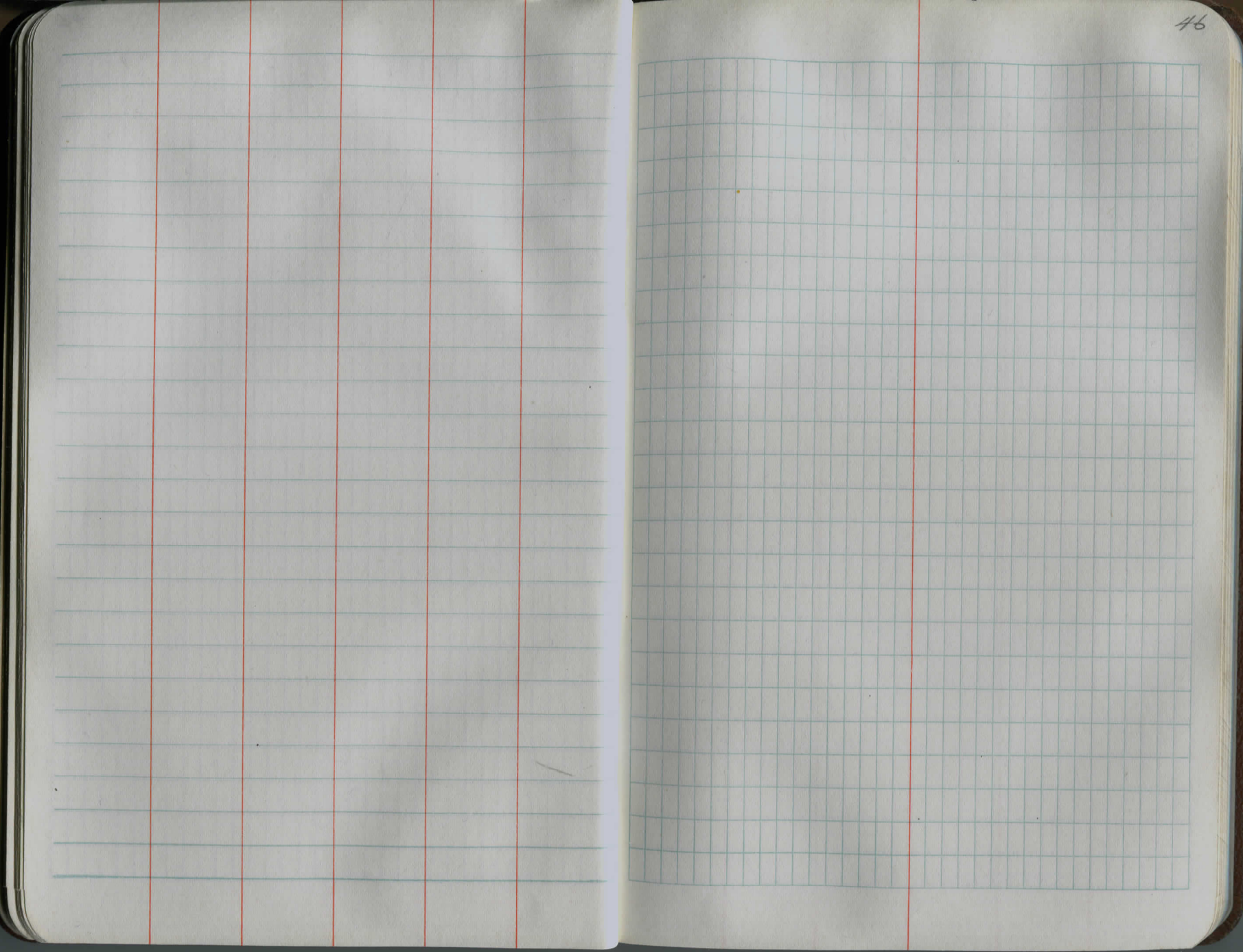






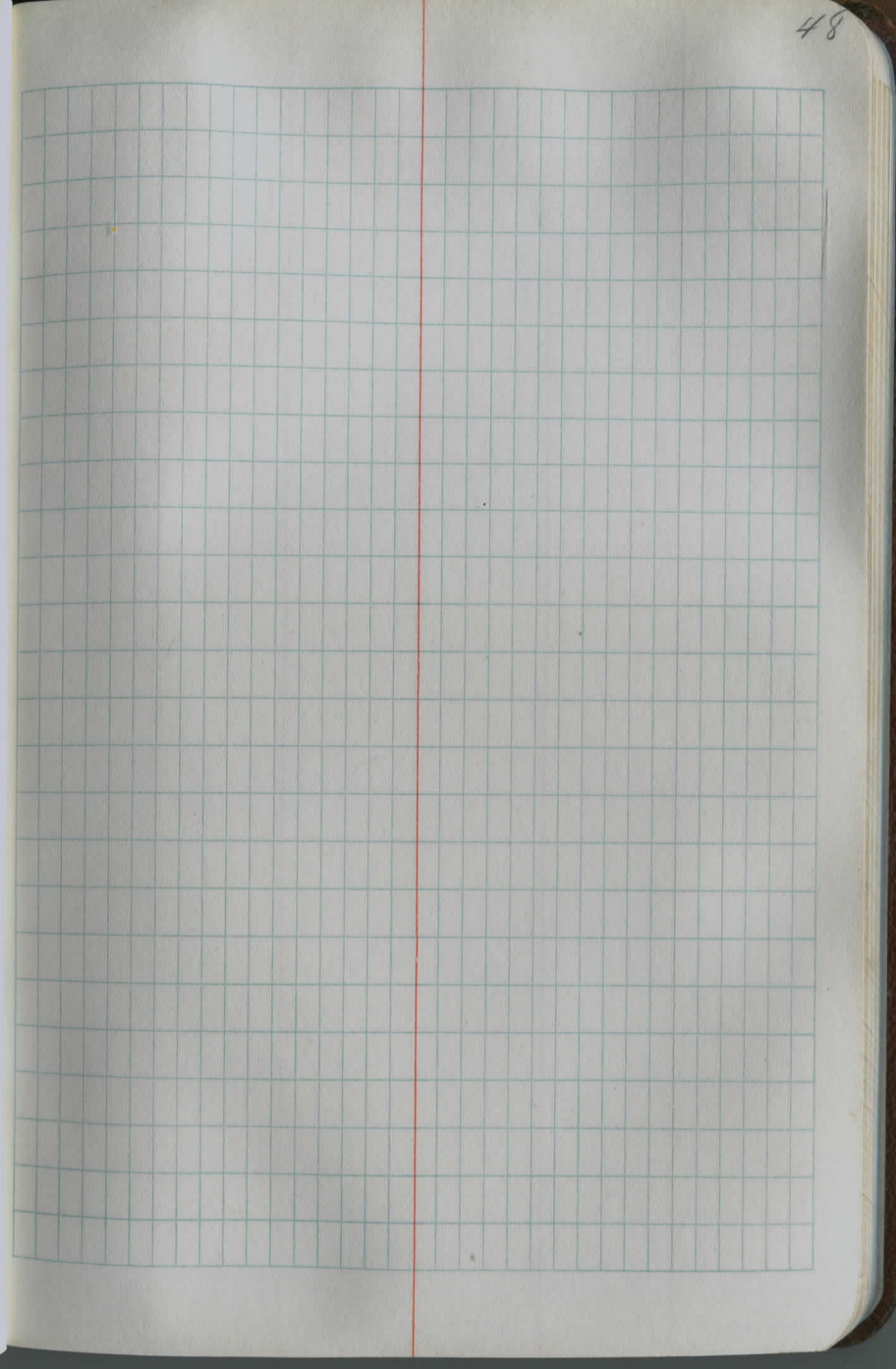
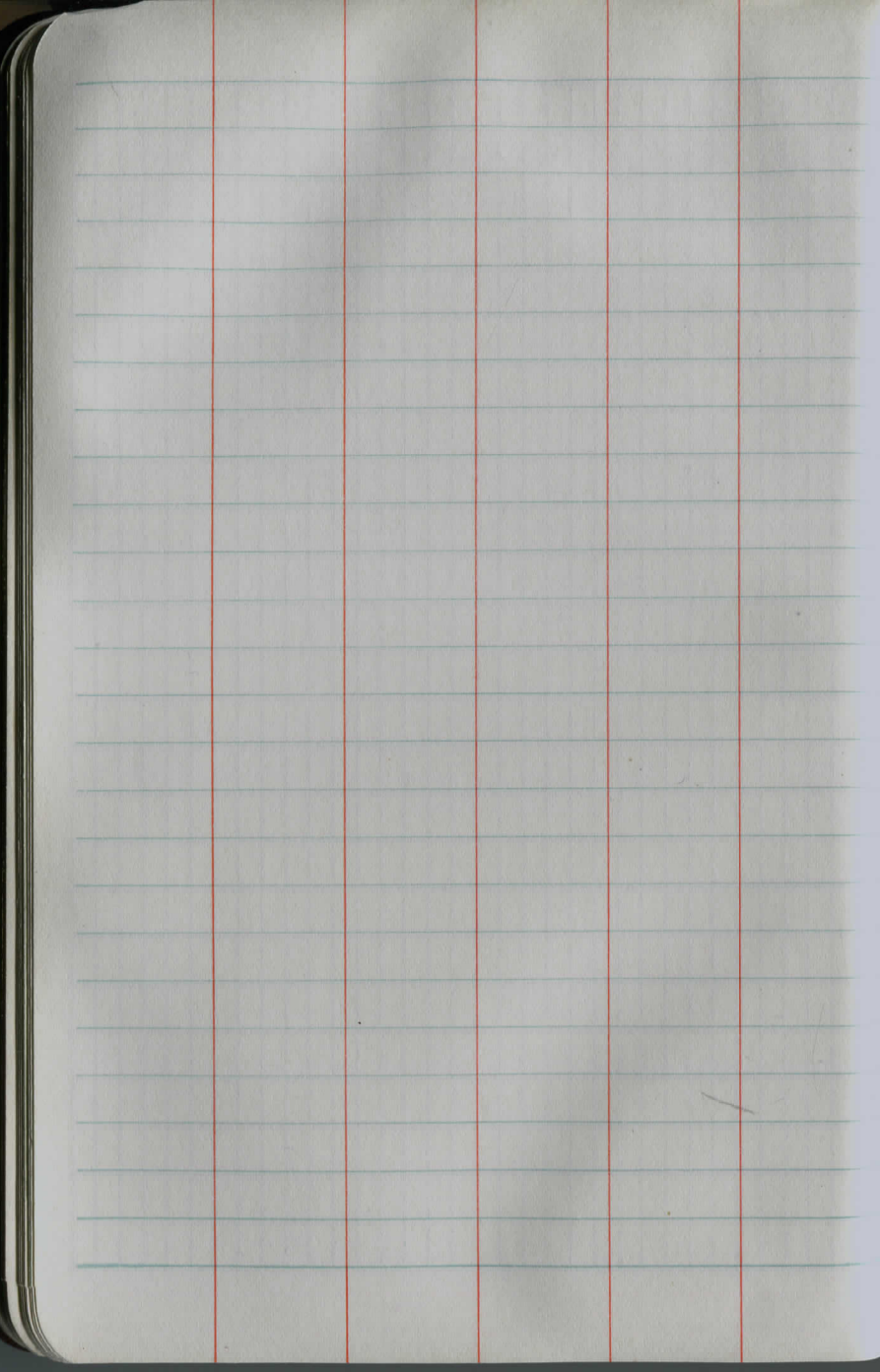


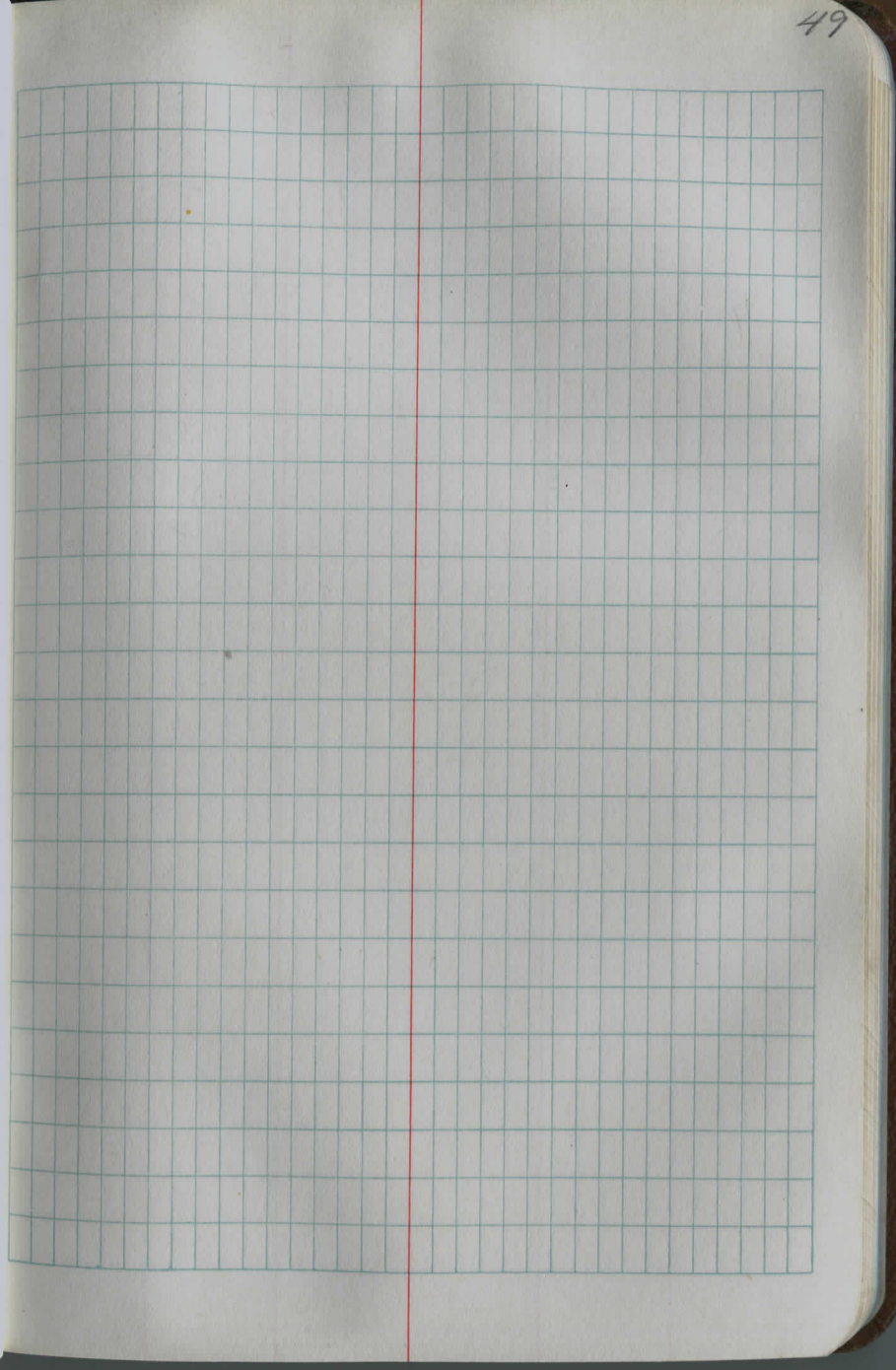


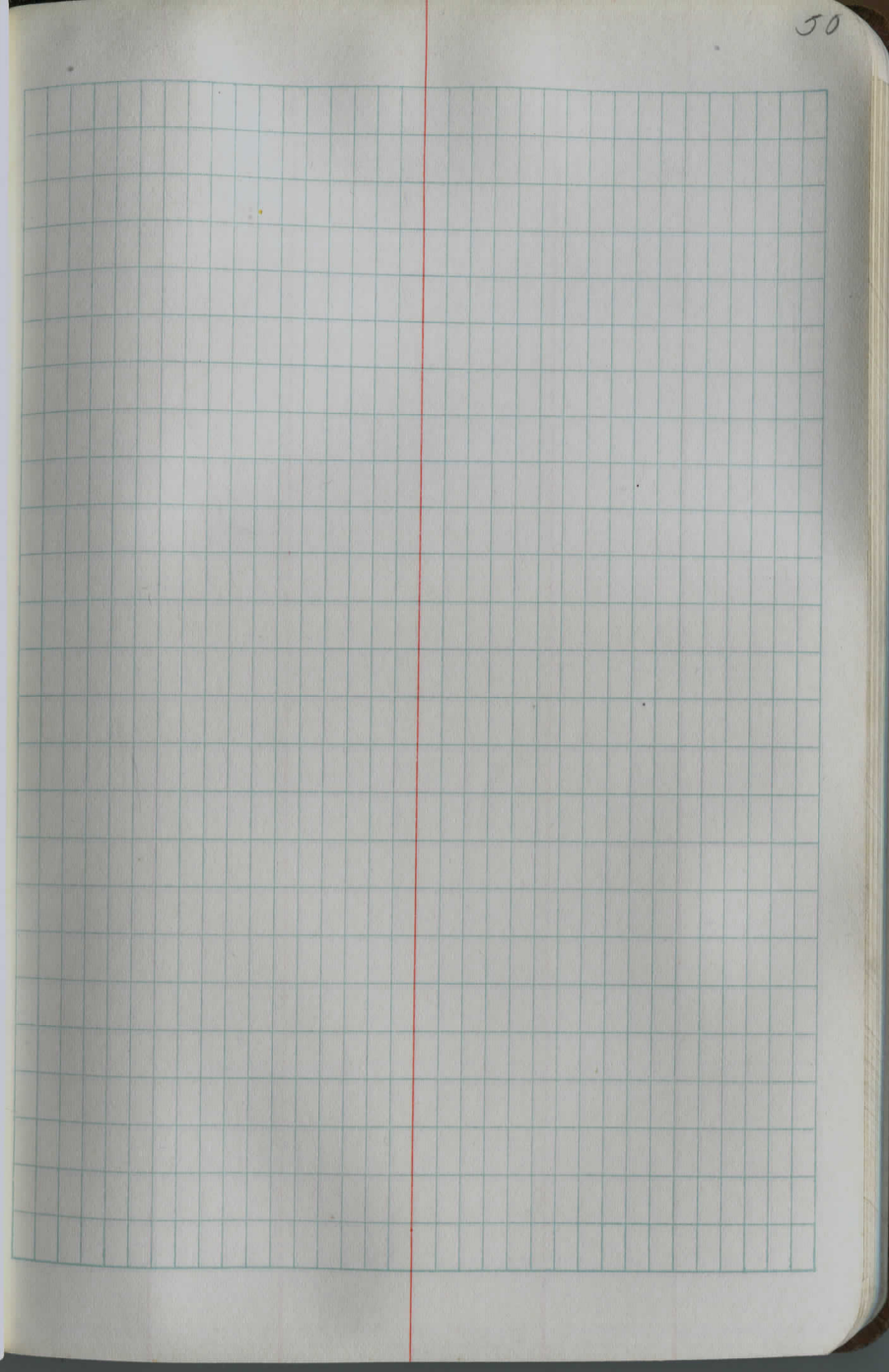
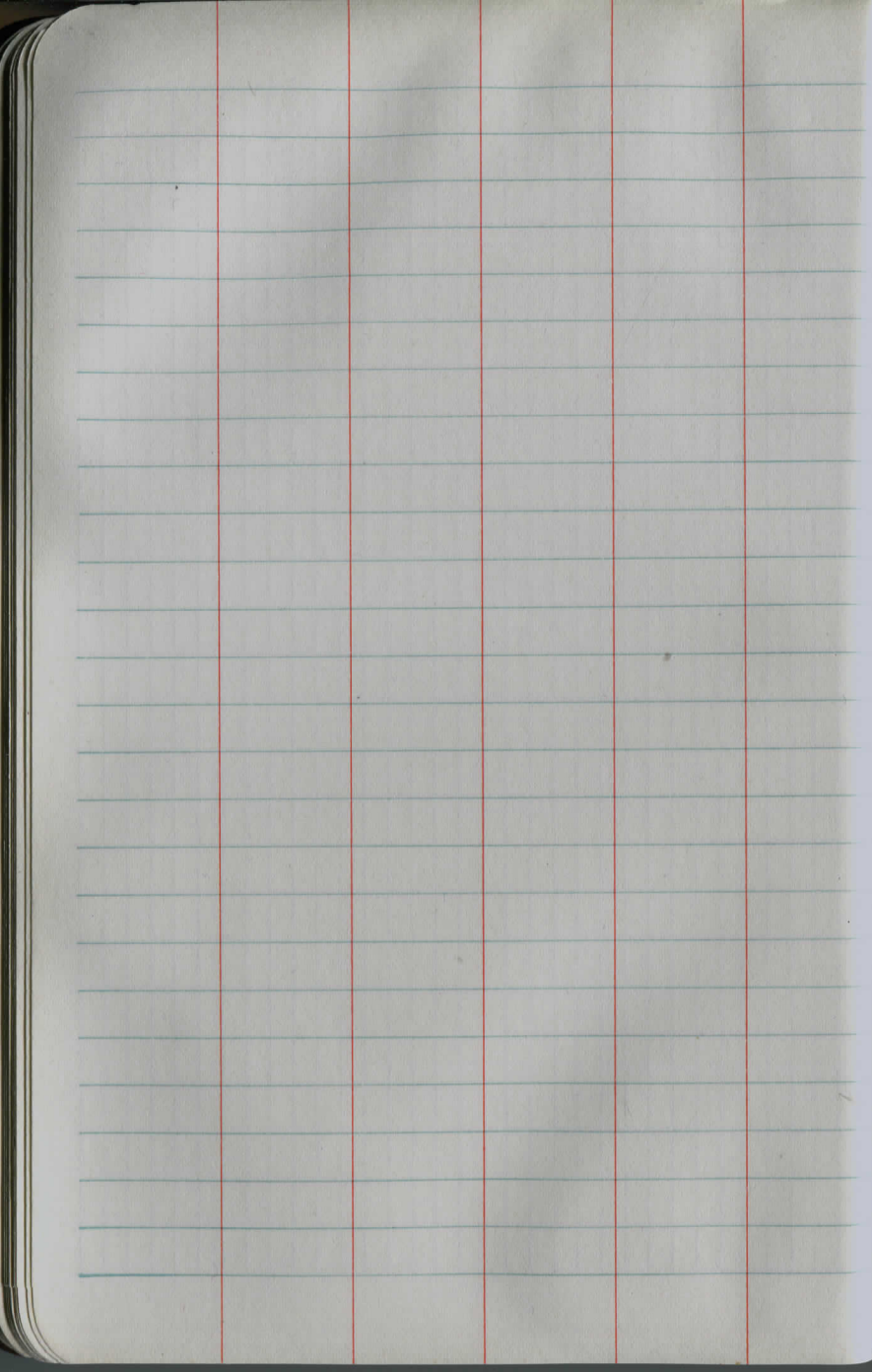


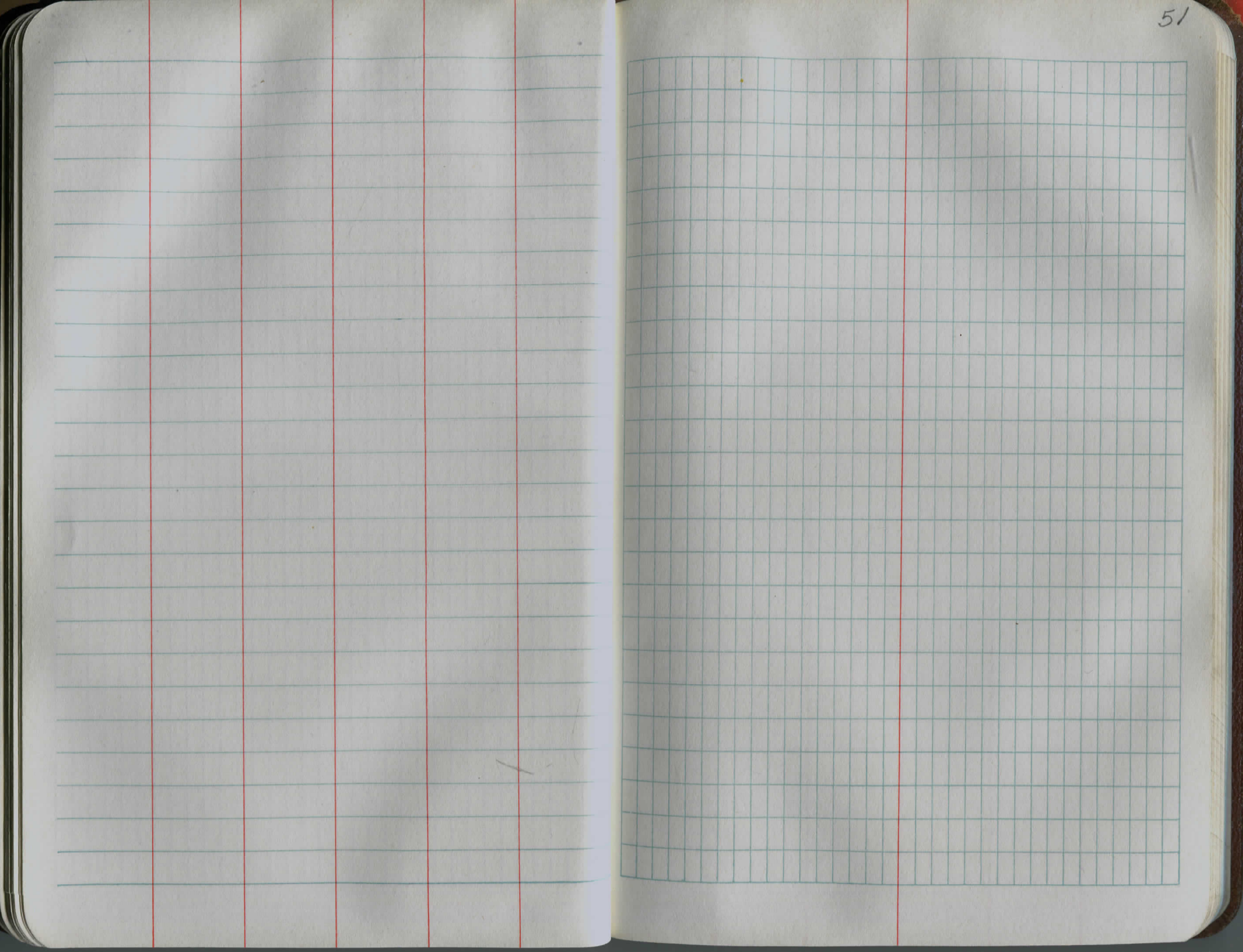
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Blank grid page with a vertical red margin line on the left side.









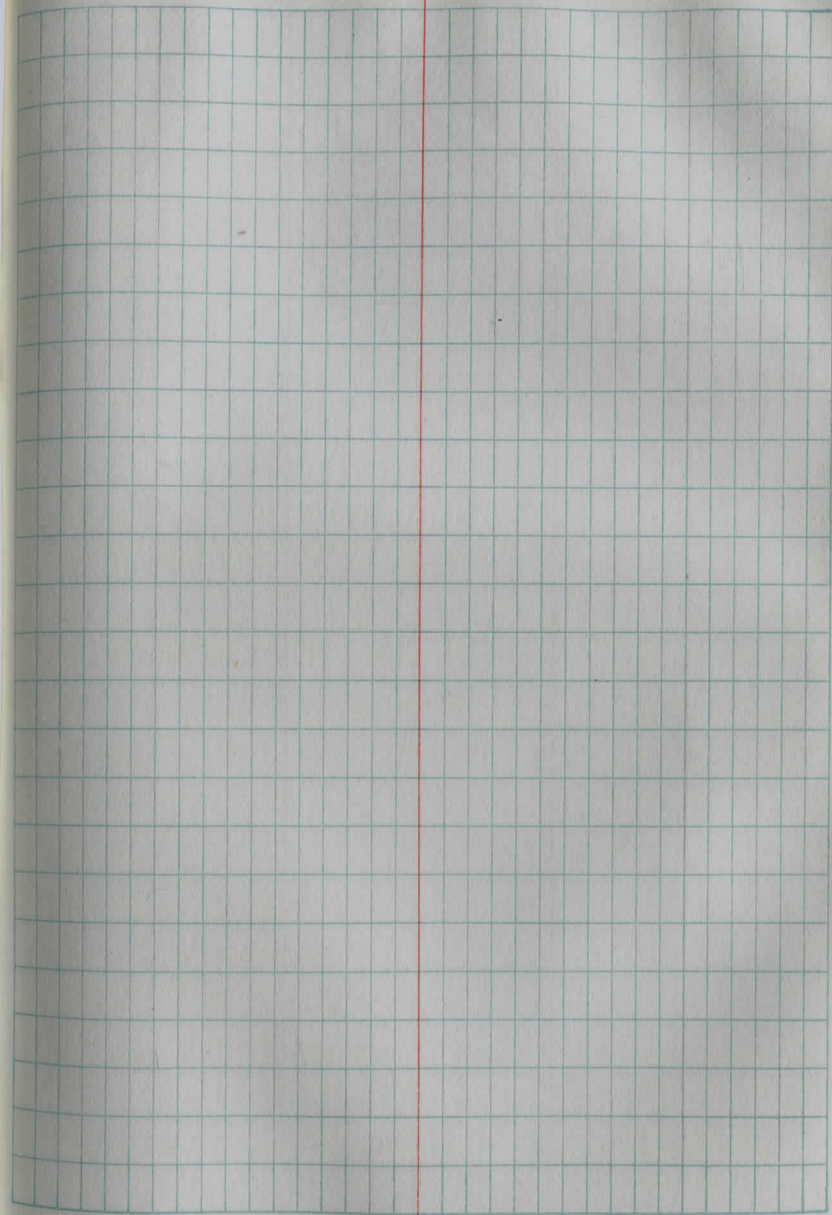
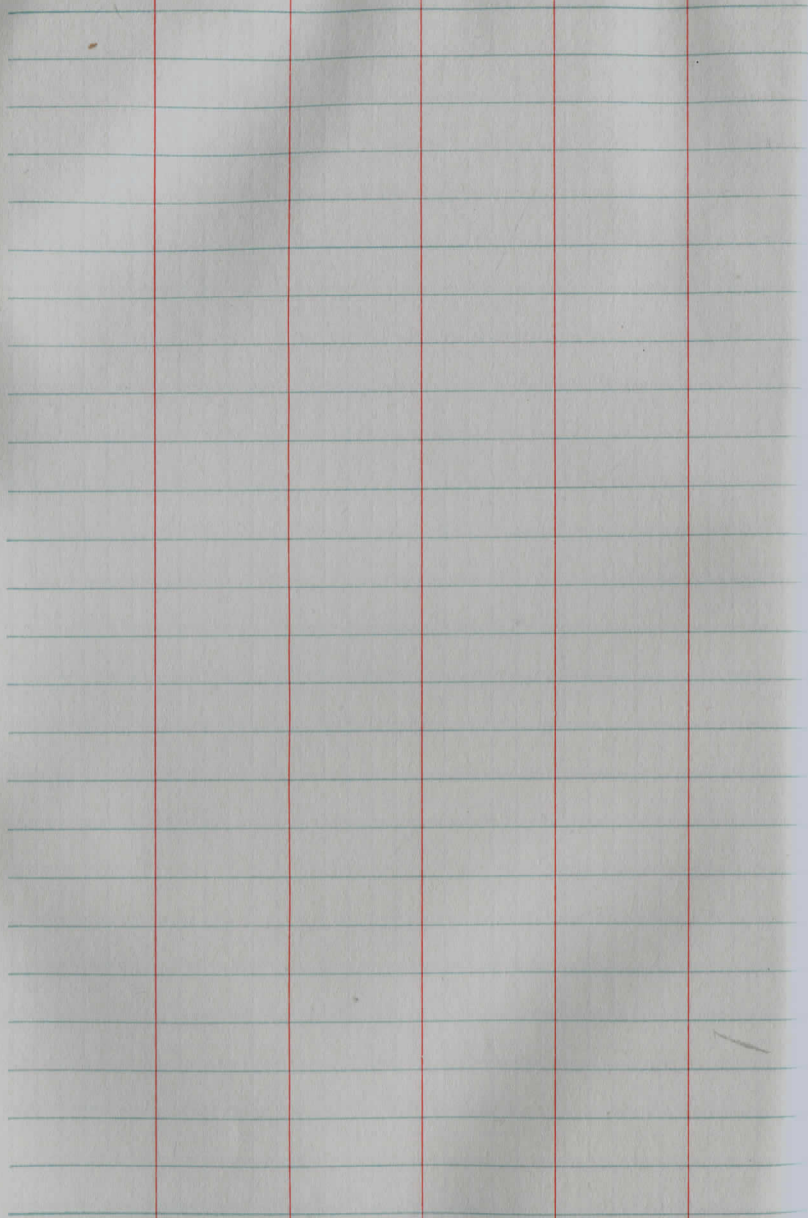
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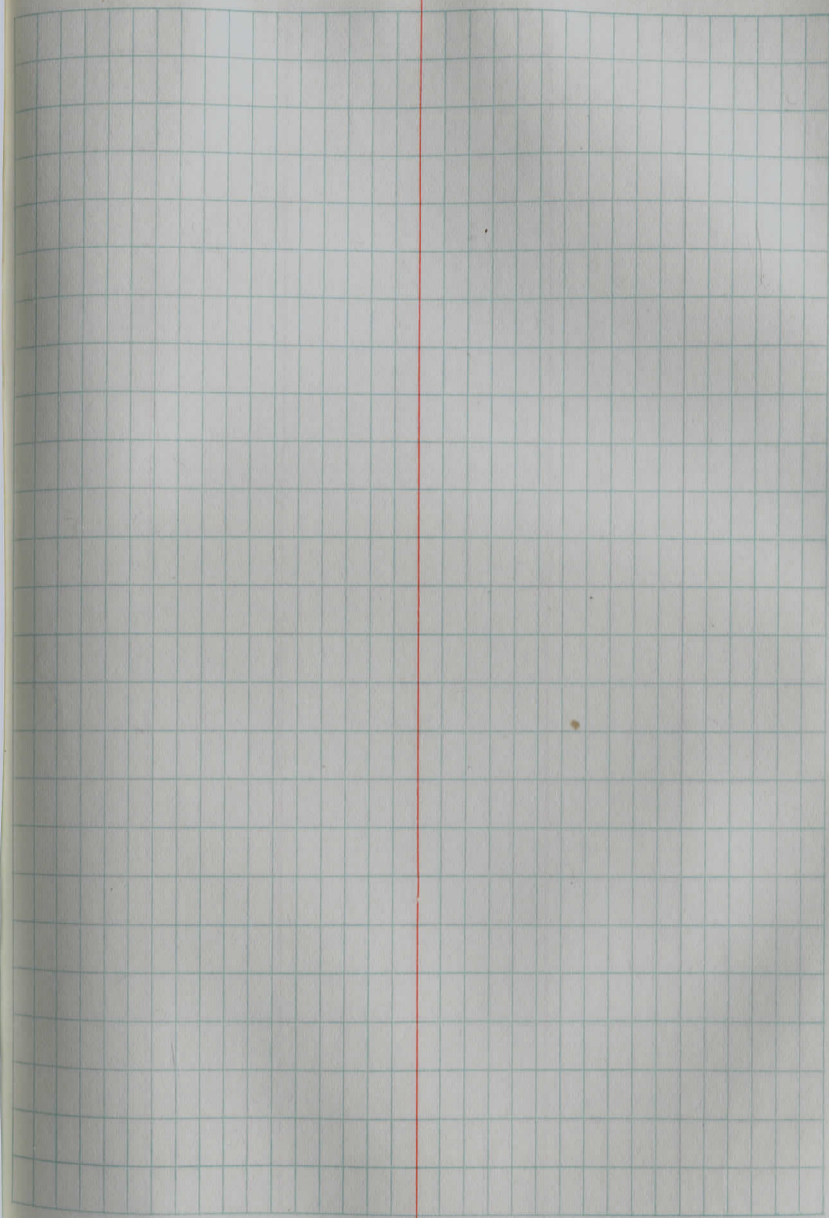
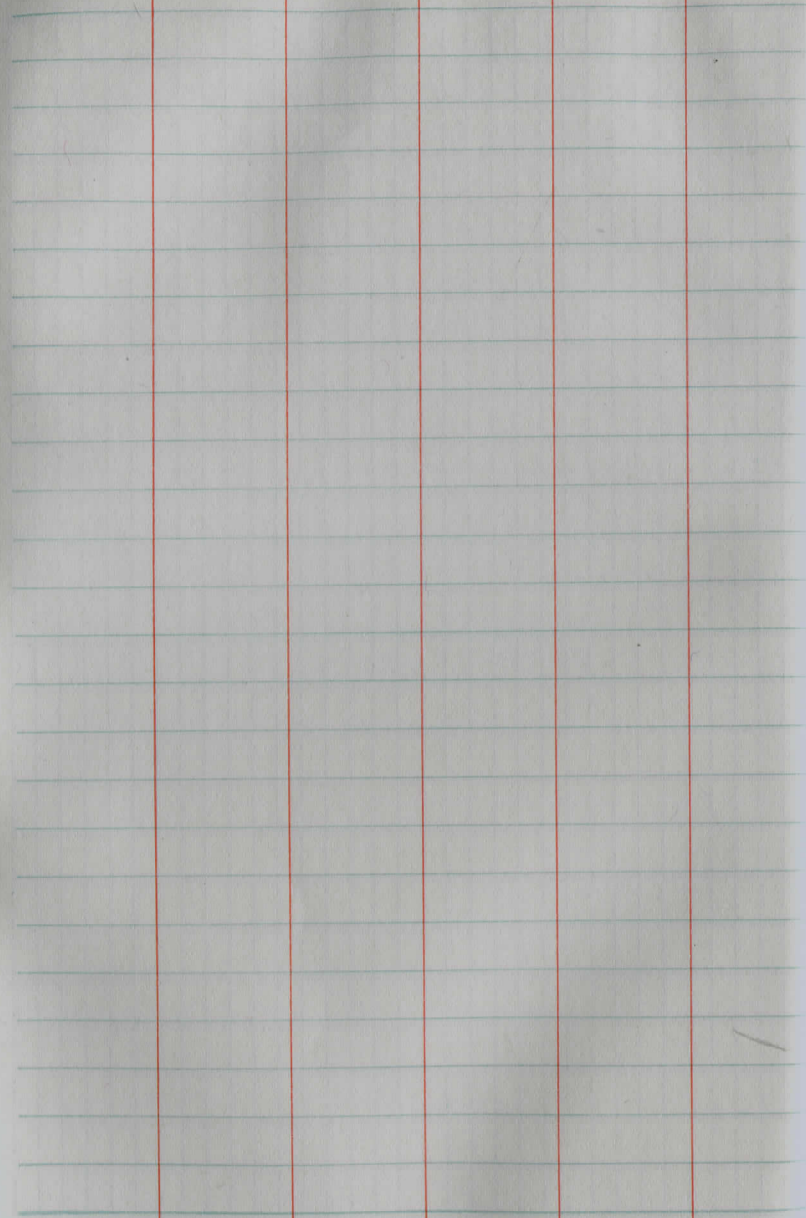
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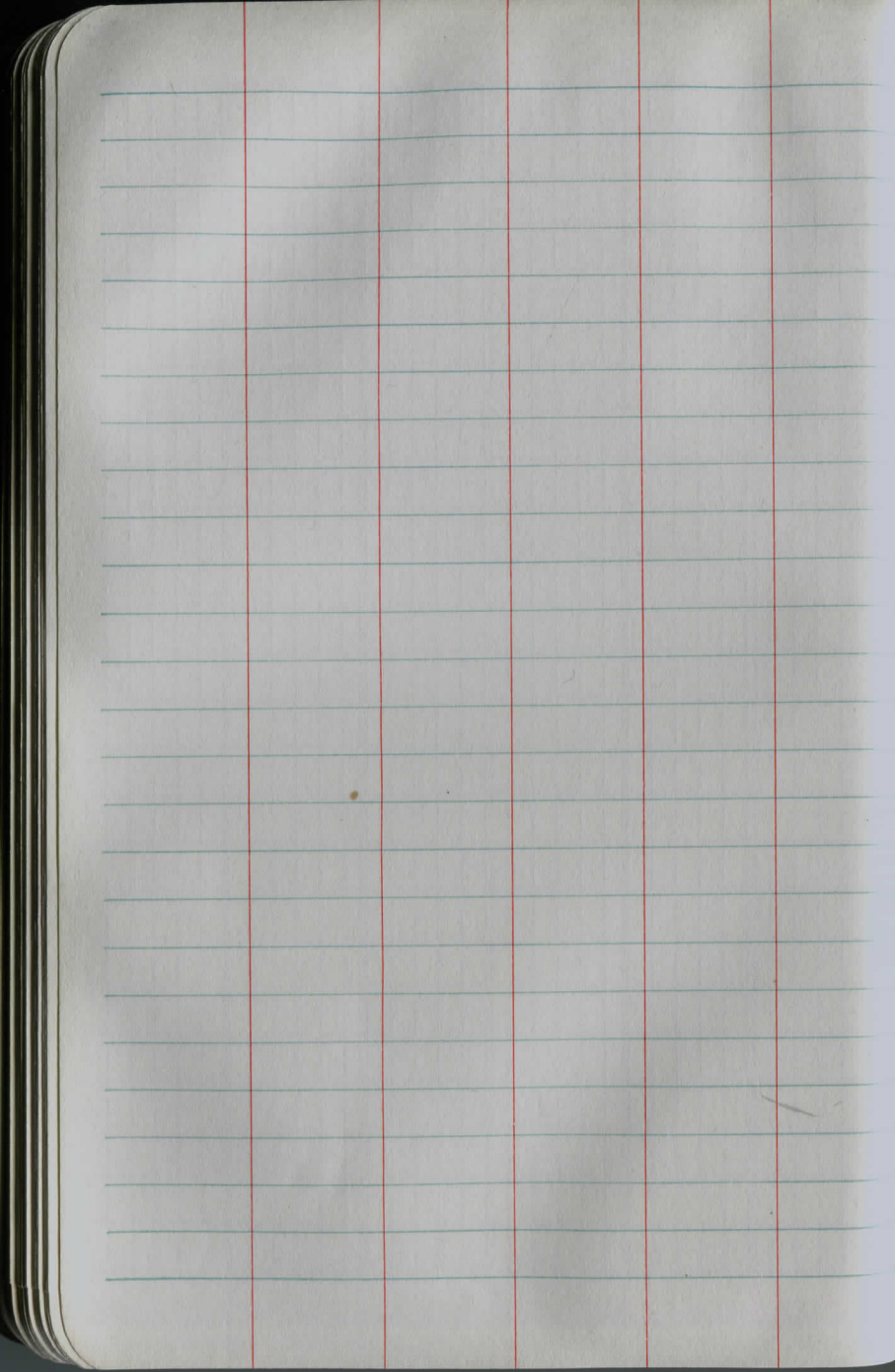
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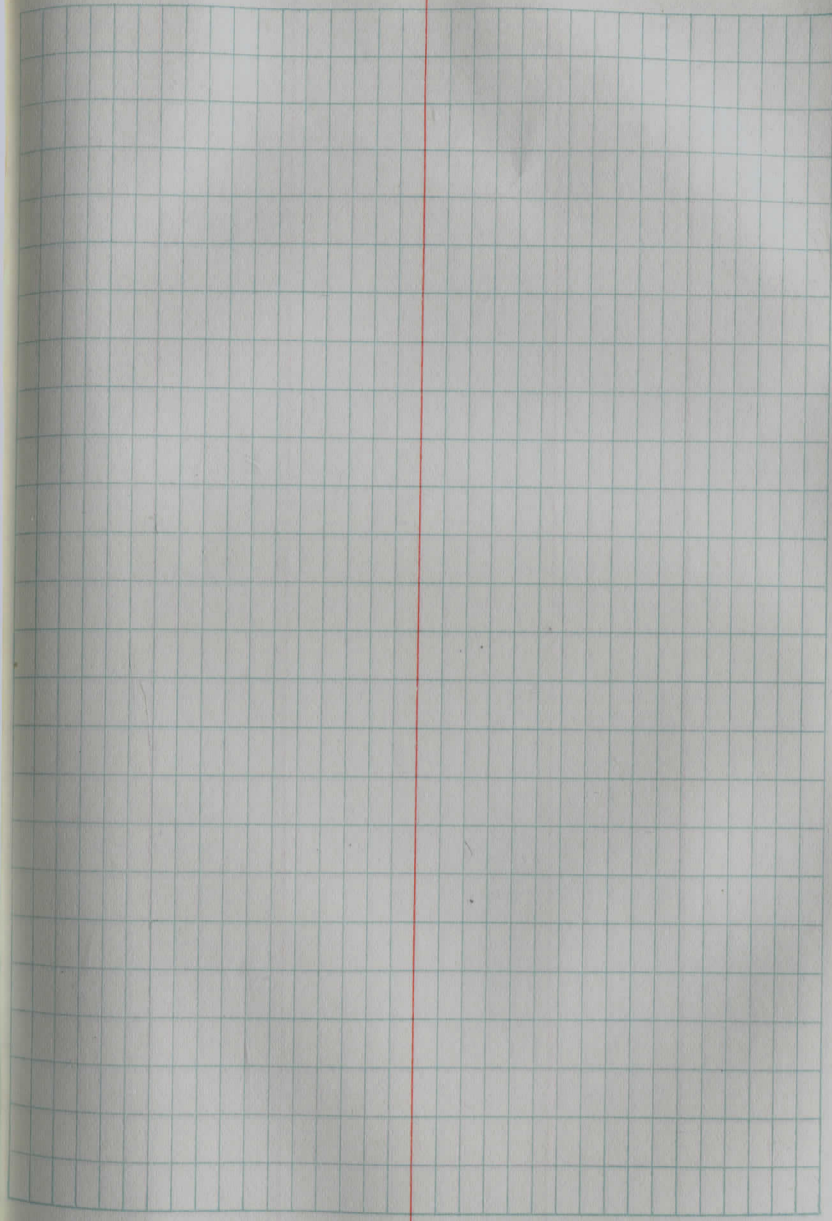
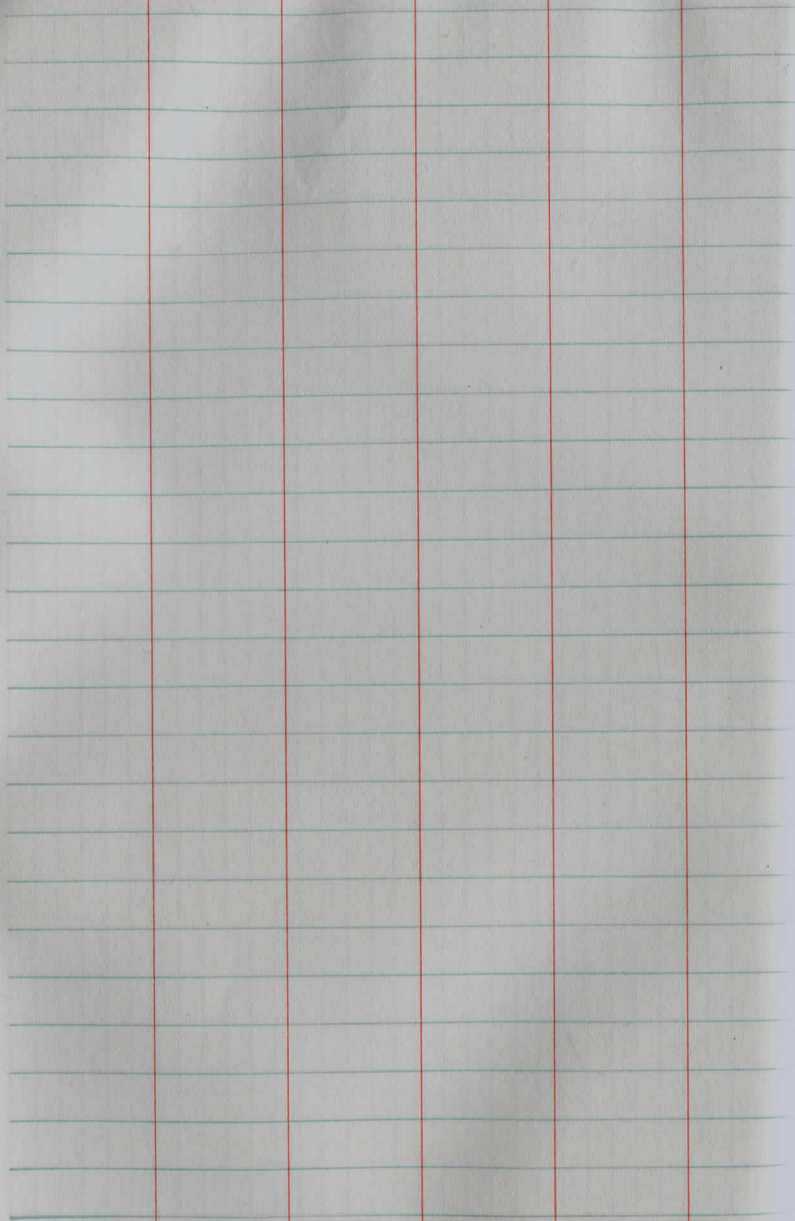
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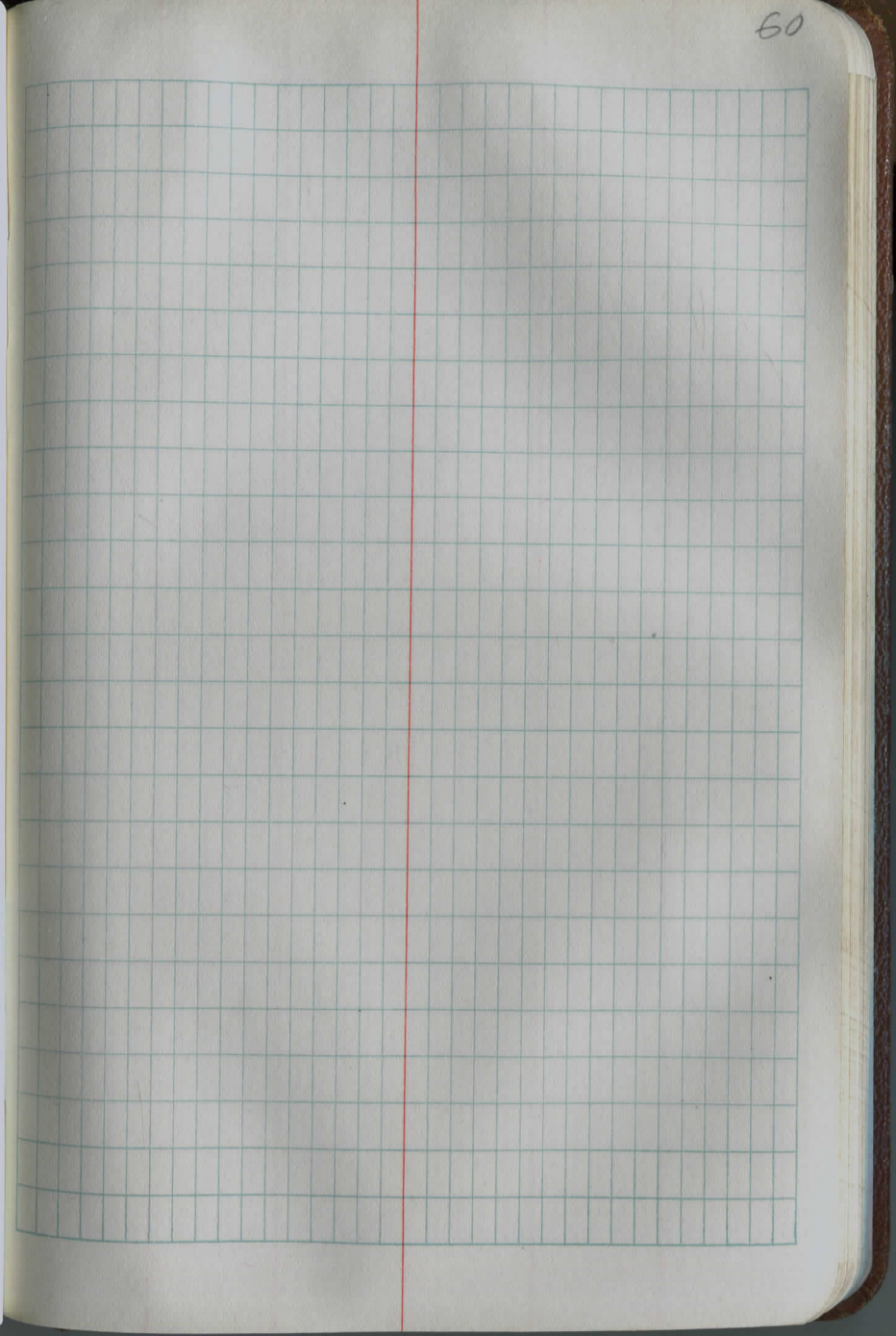
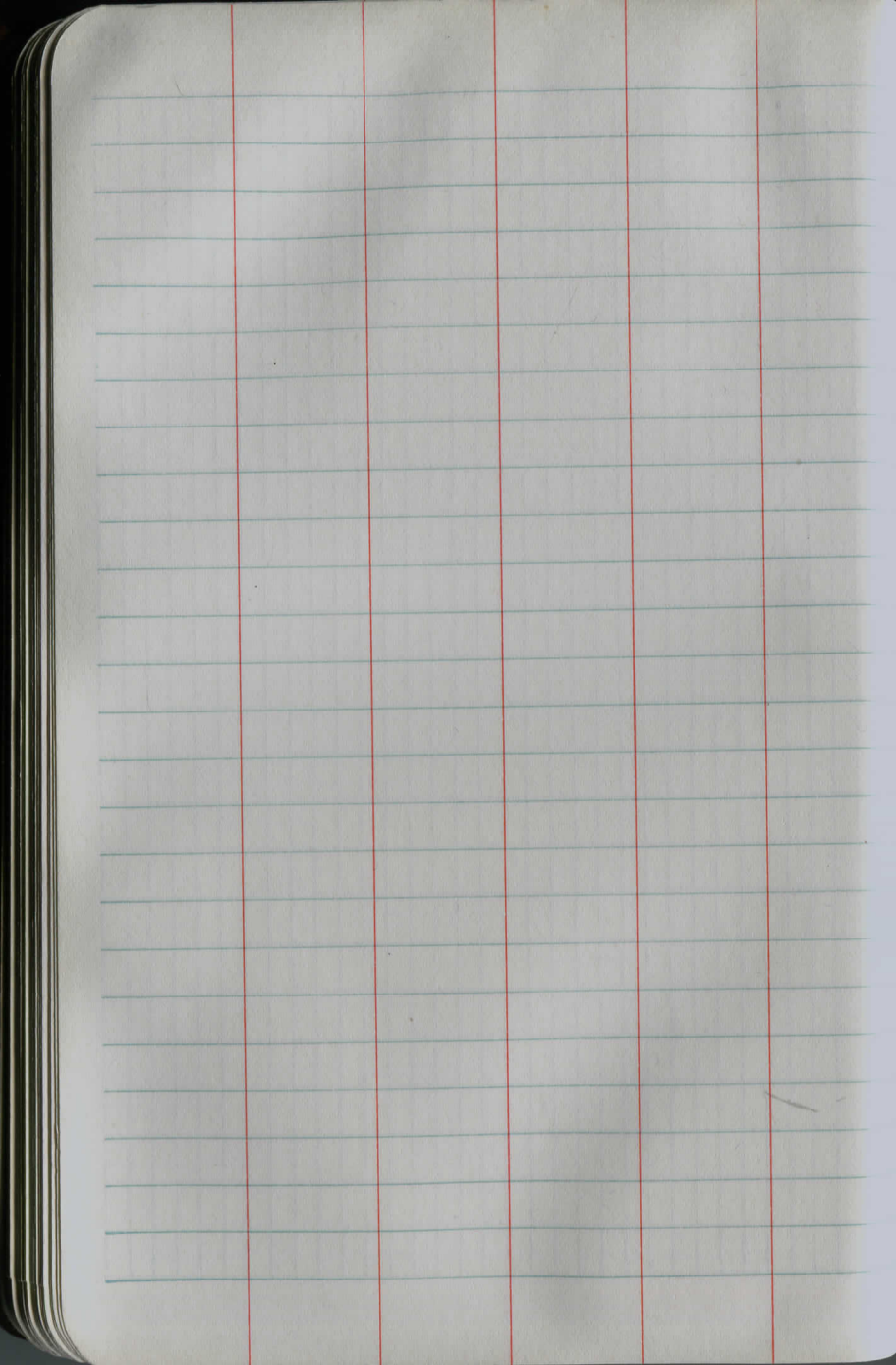


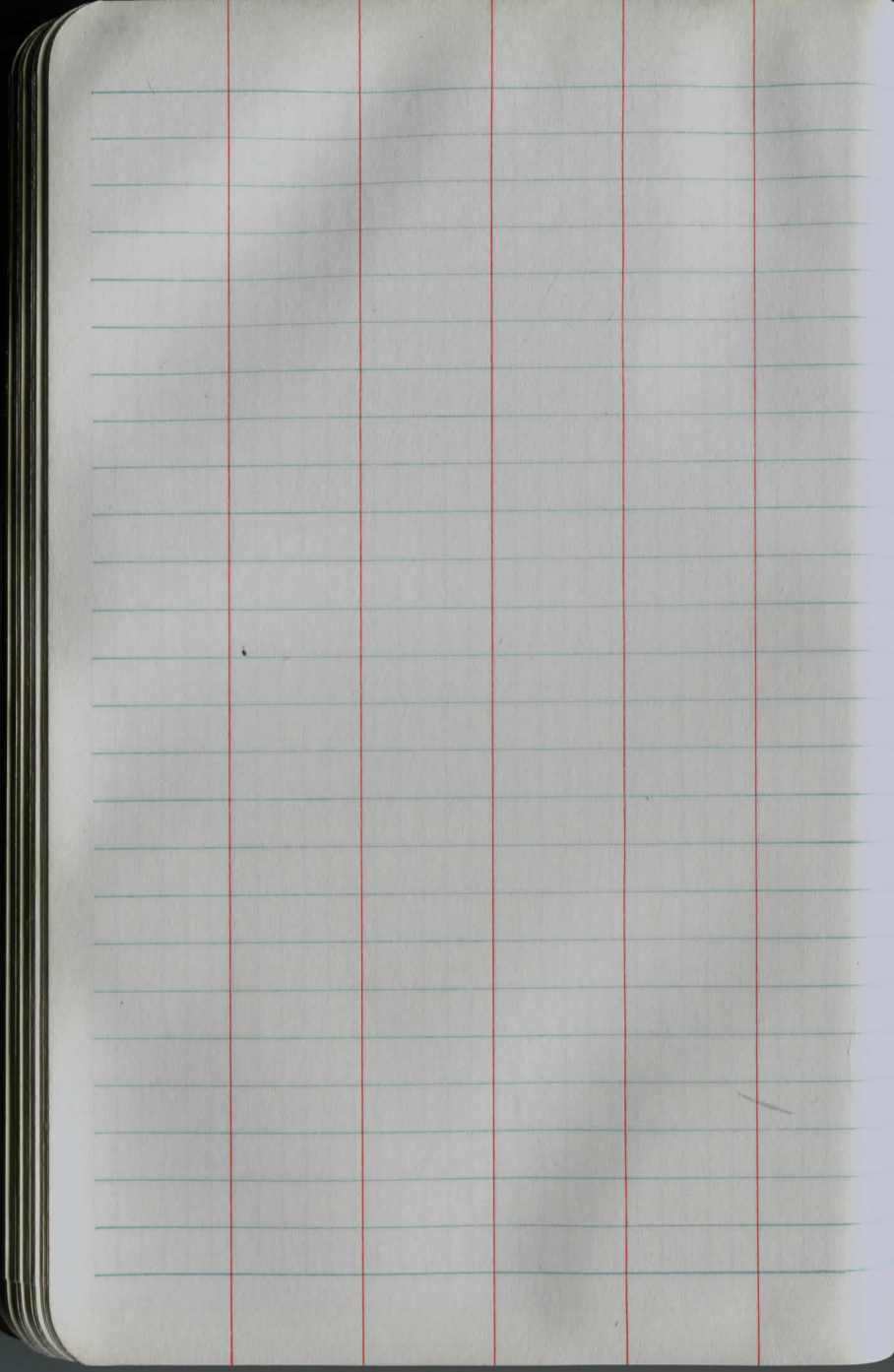


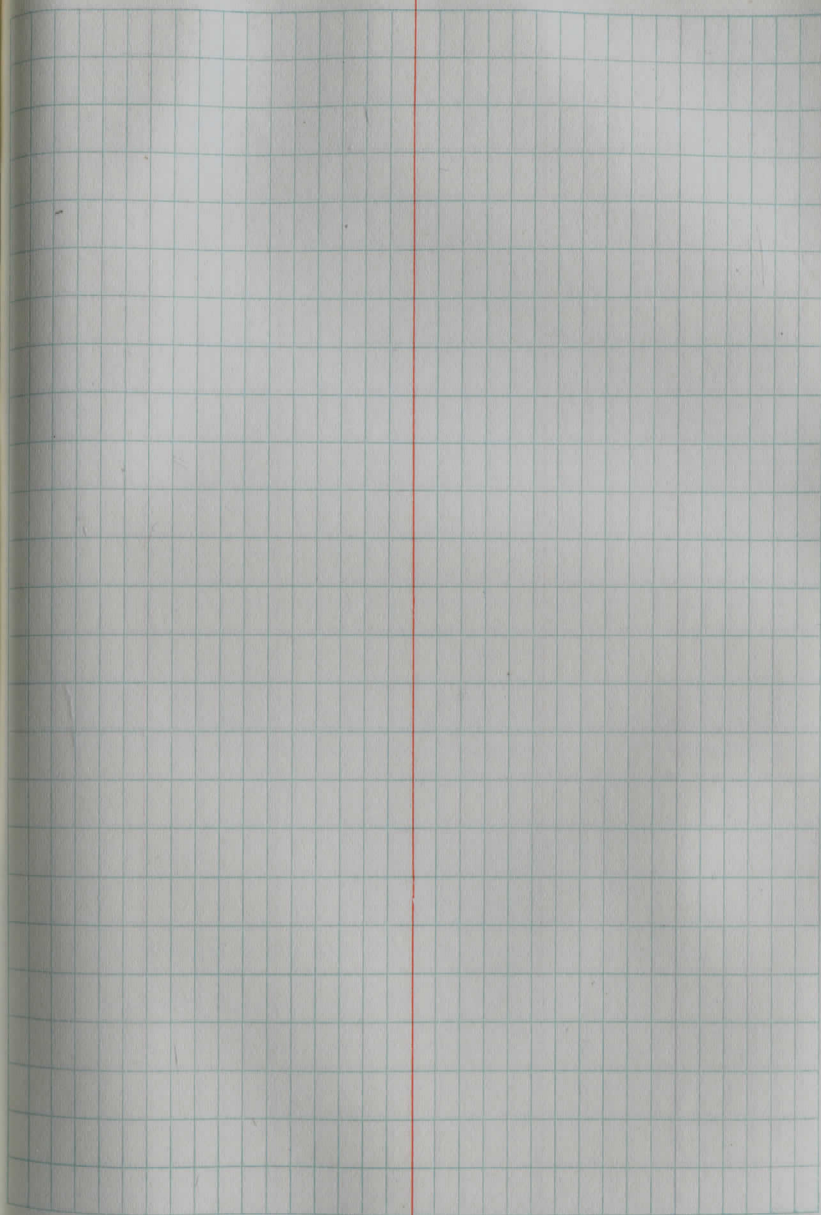
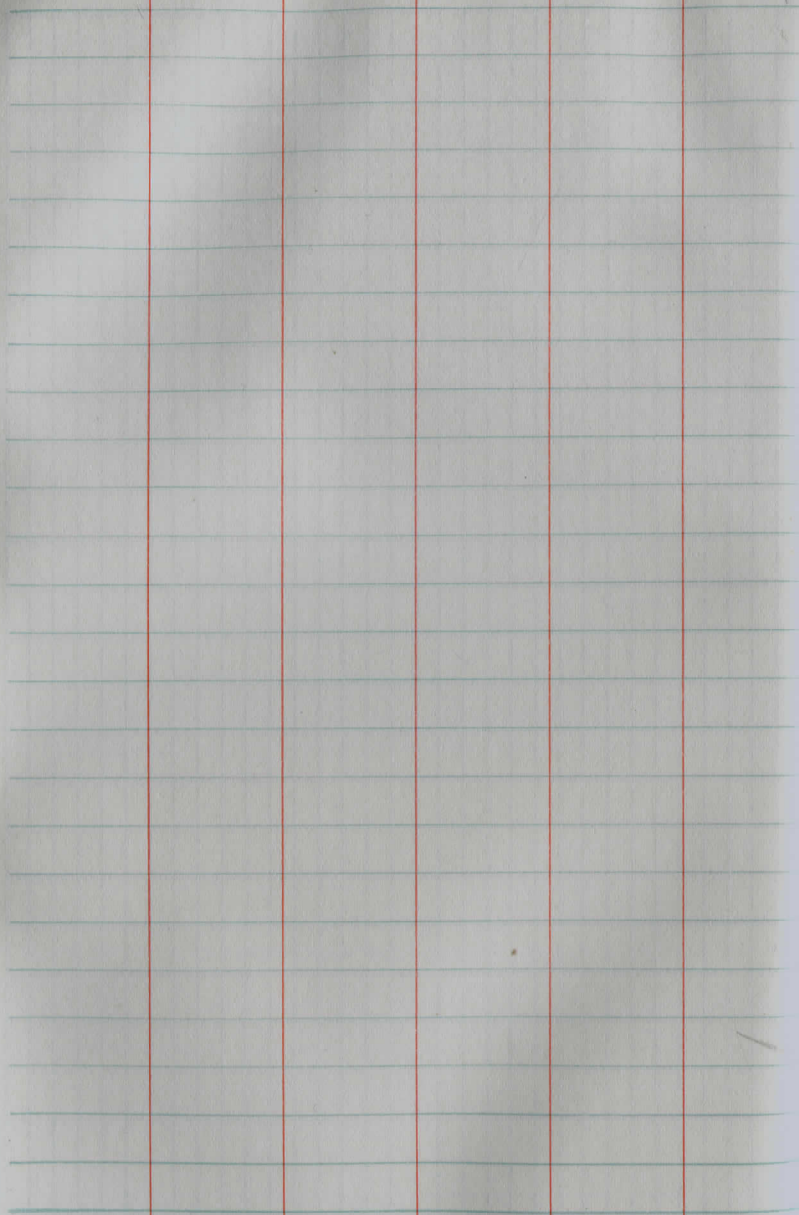


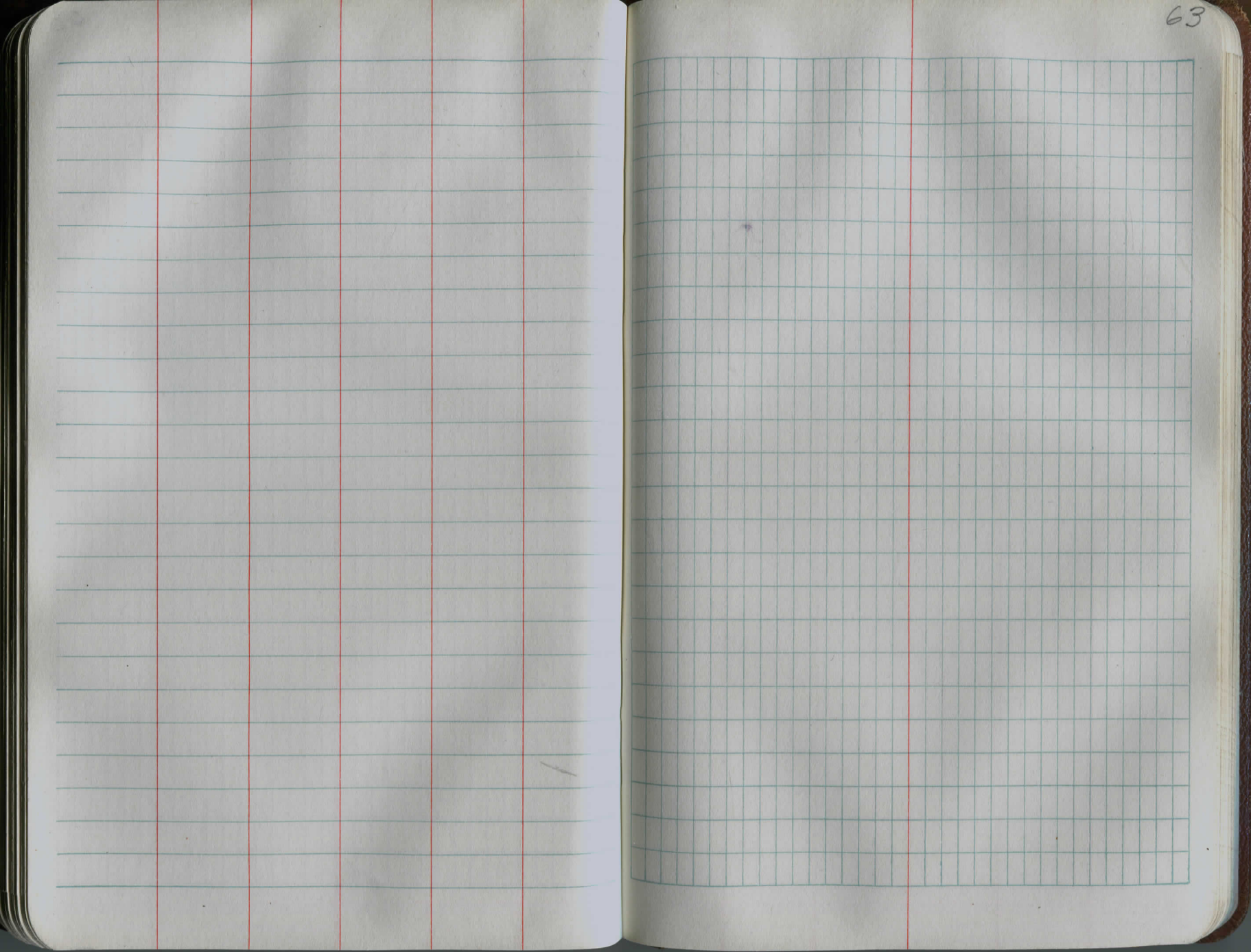


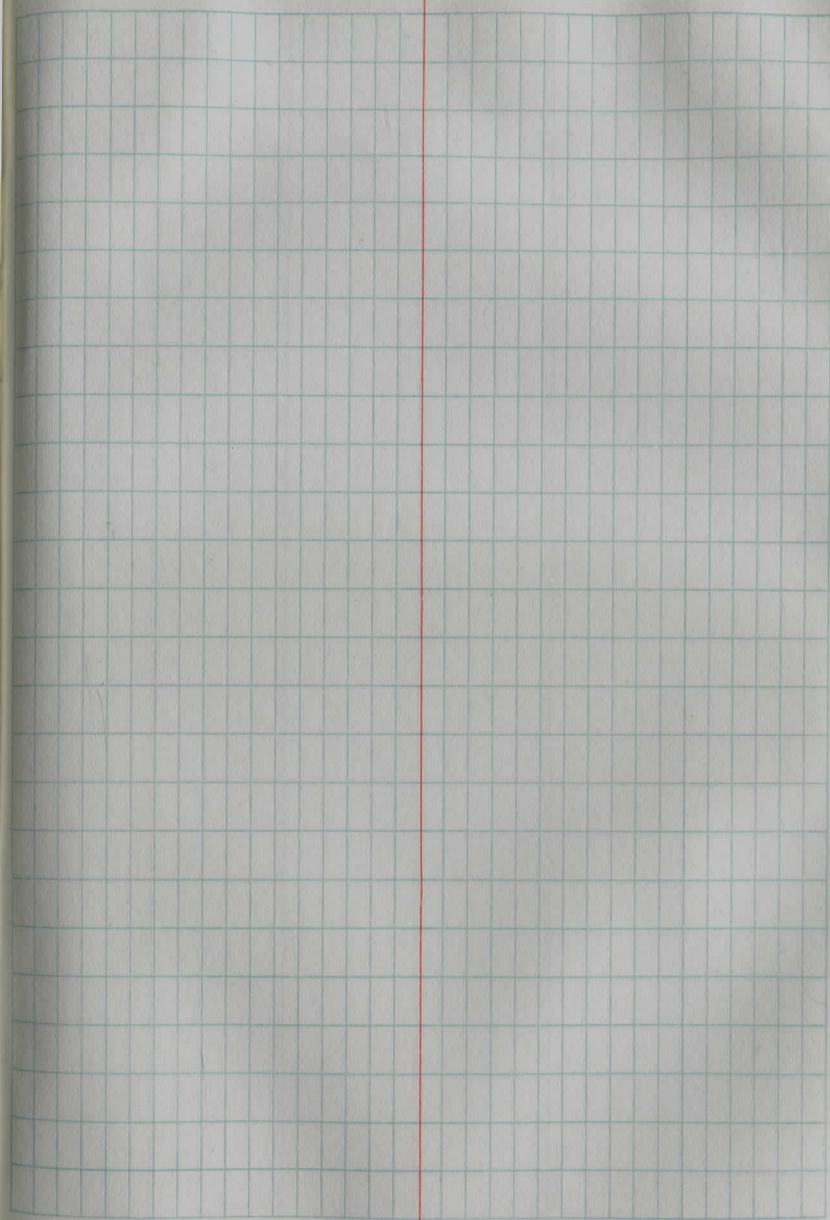
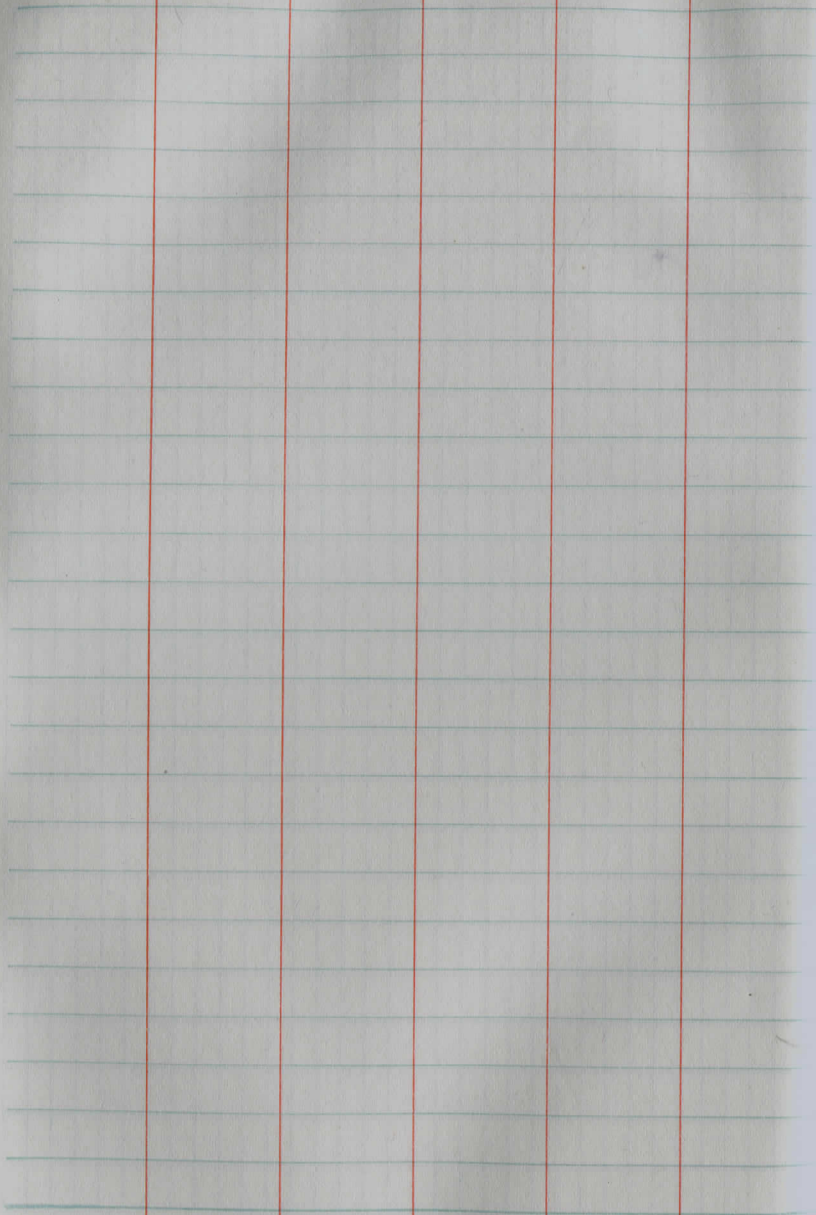






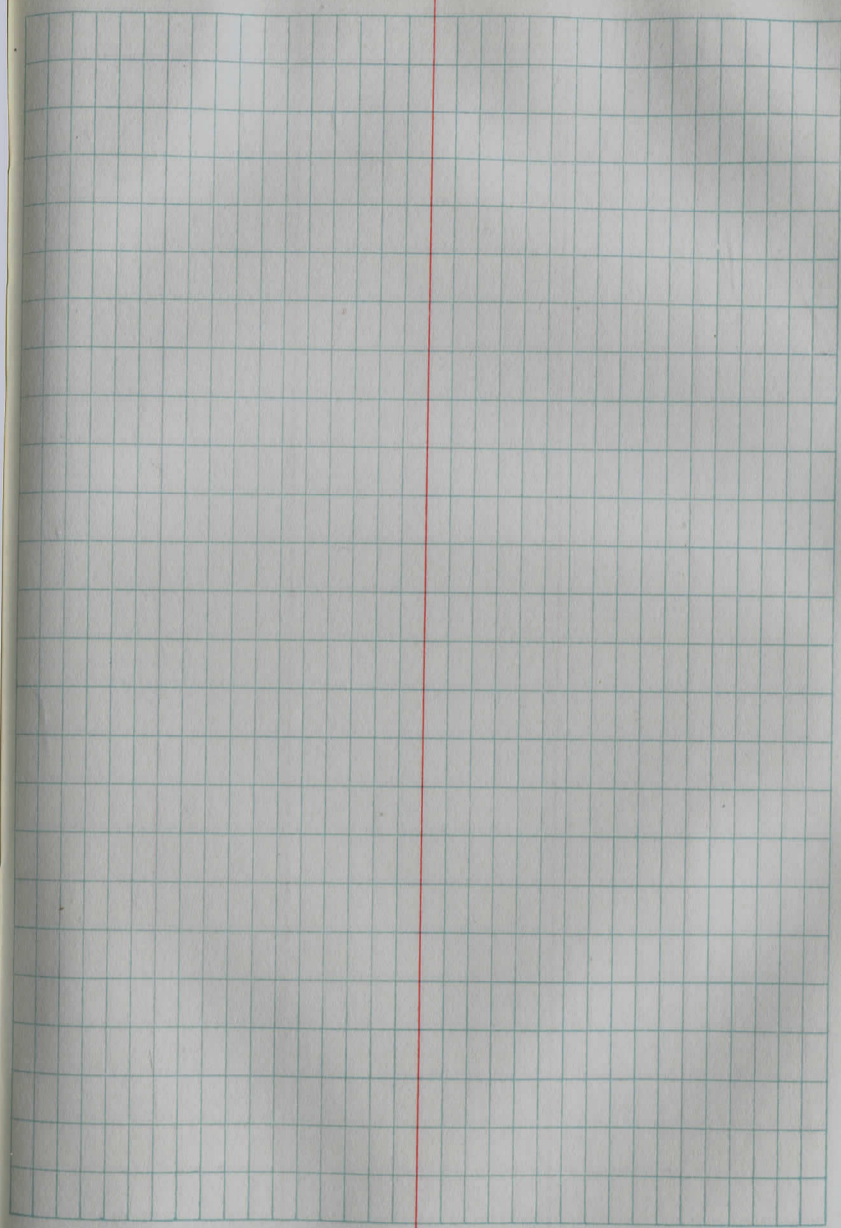
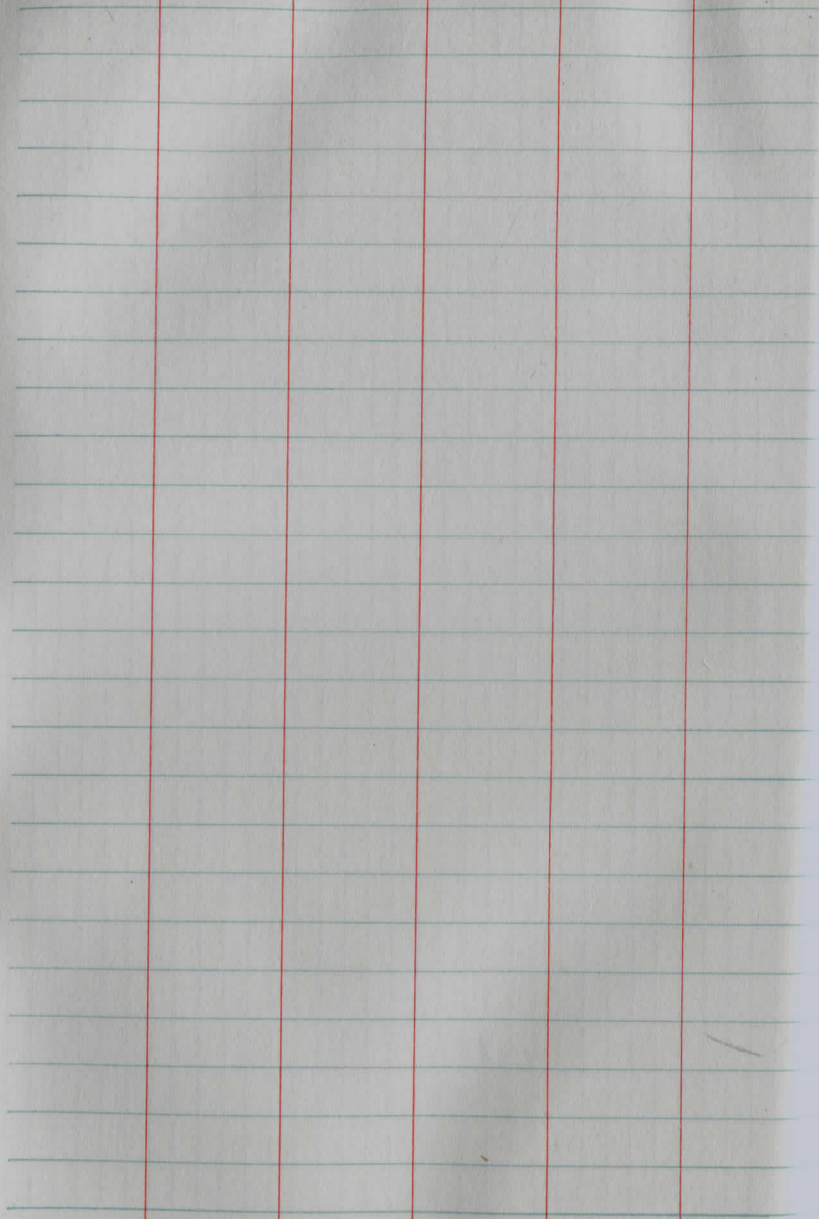






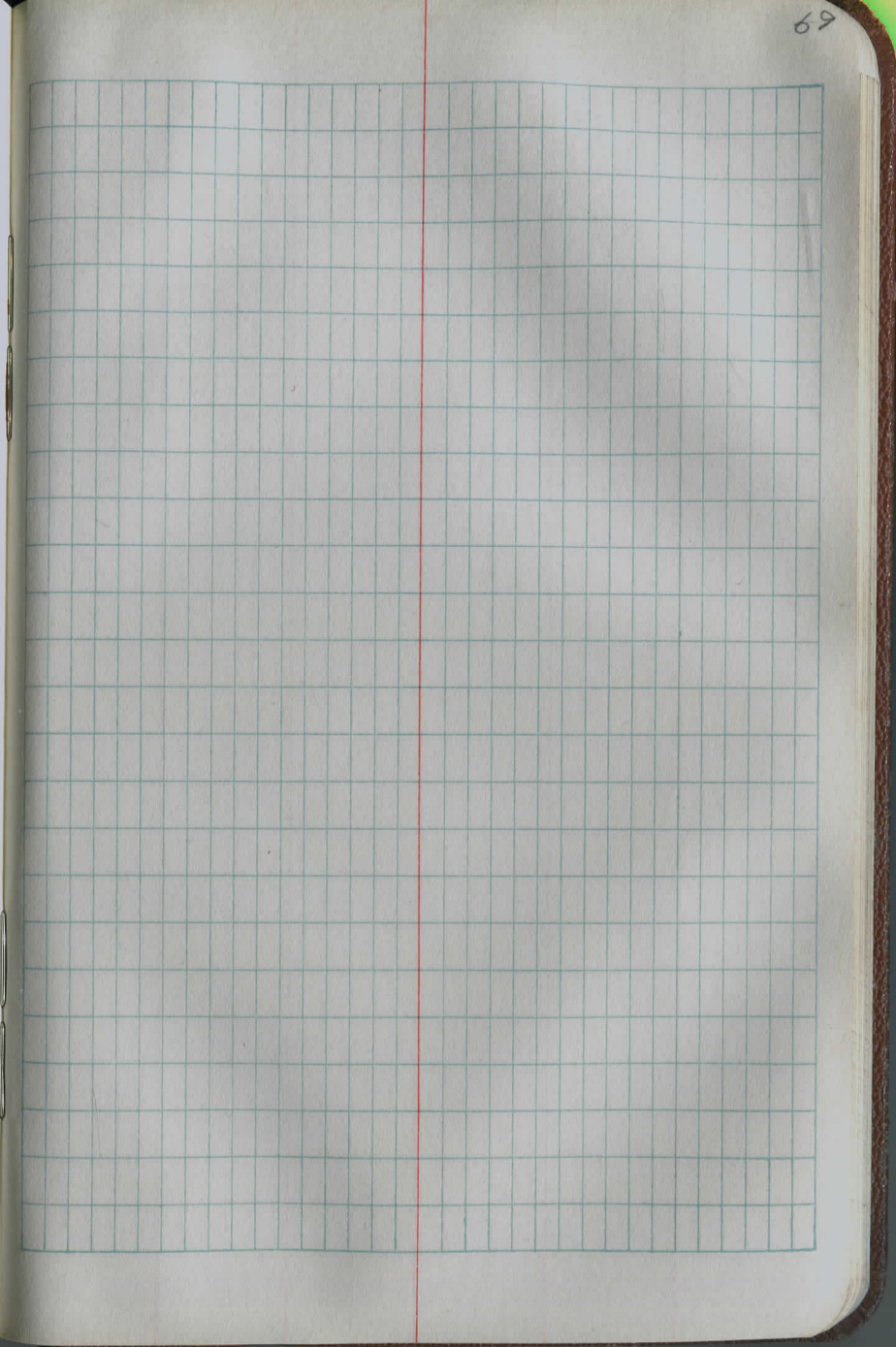


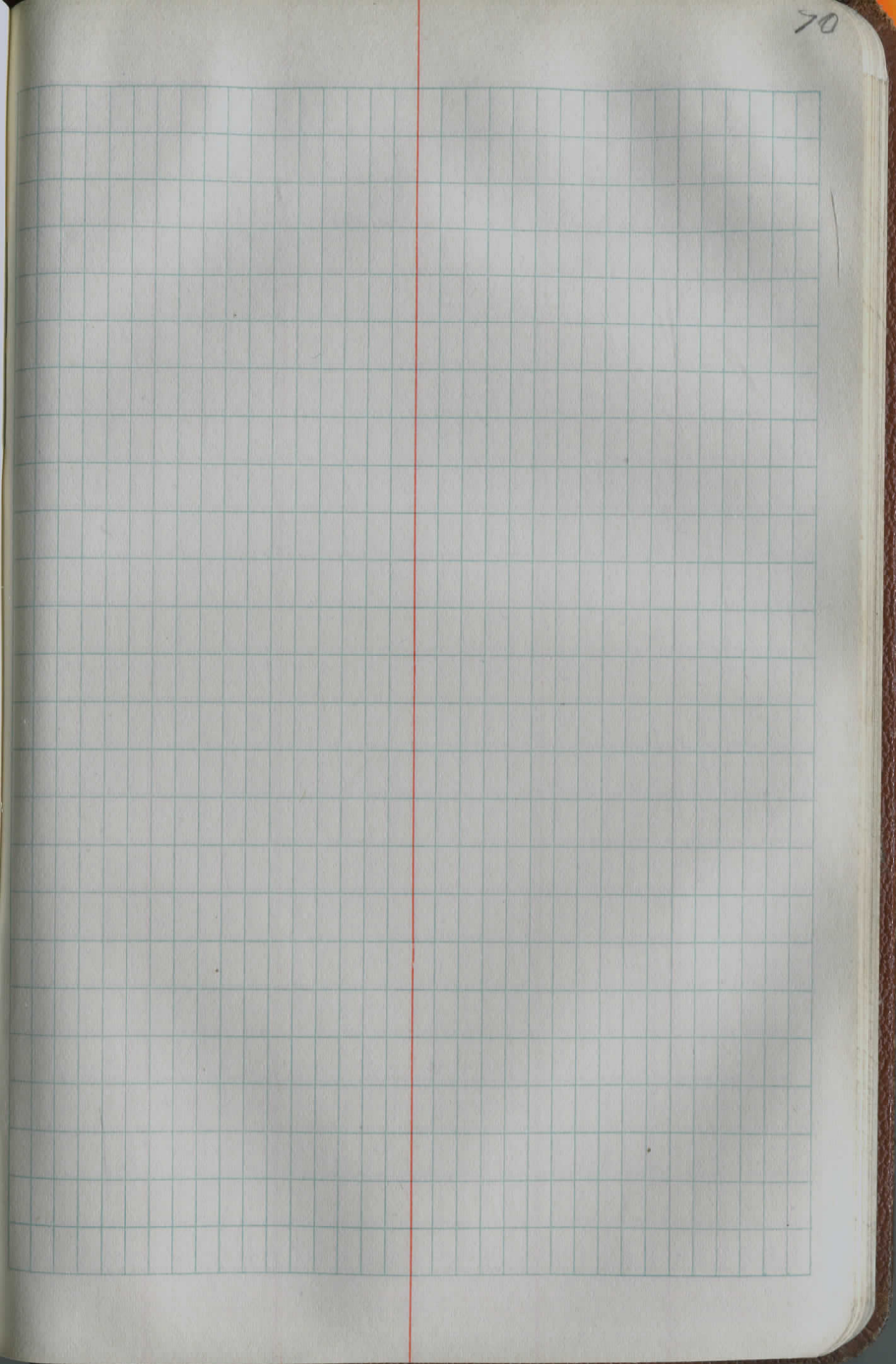
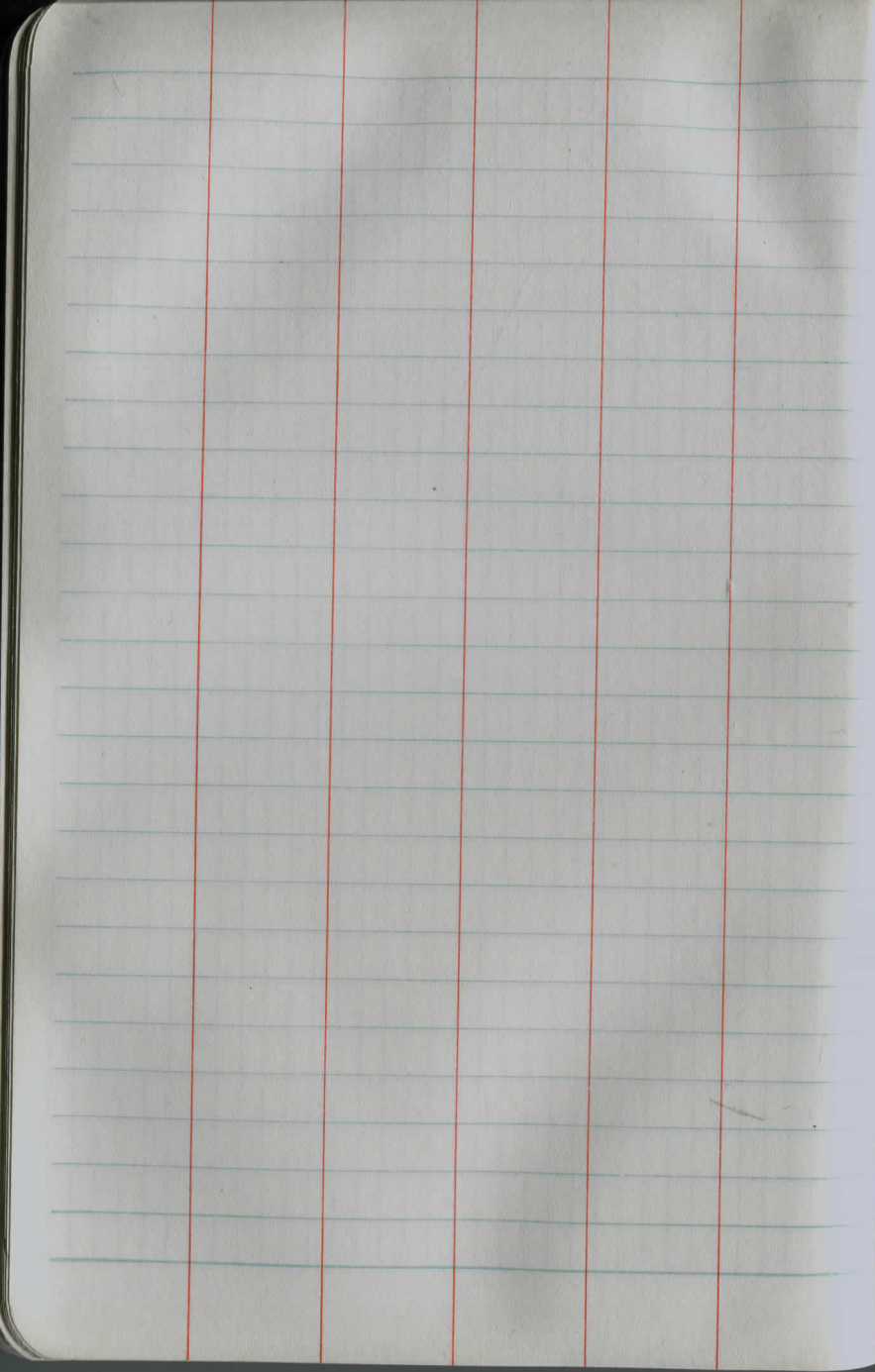


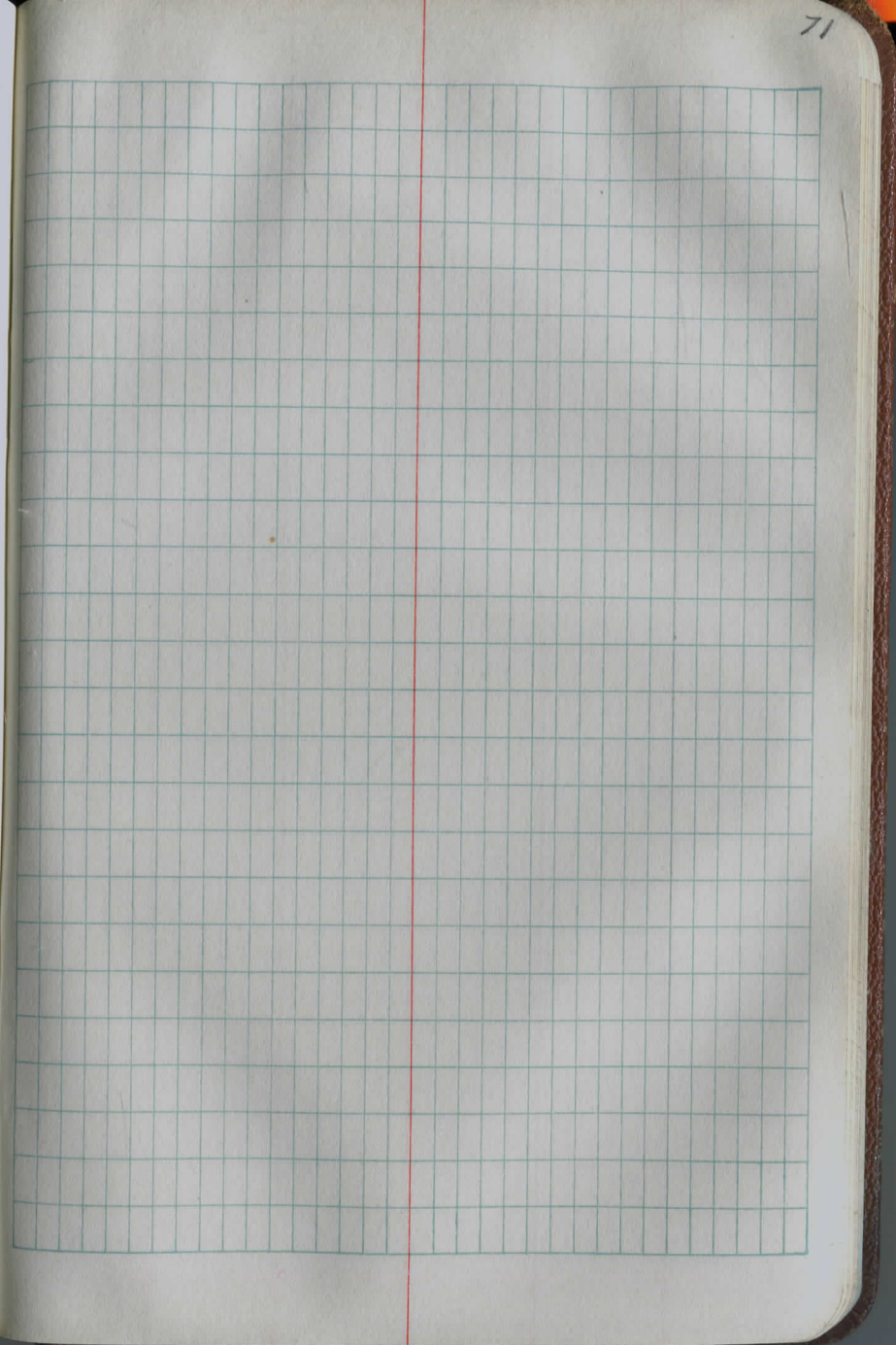


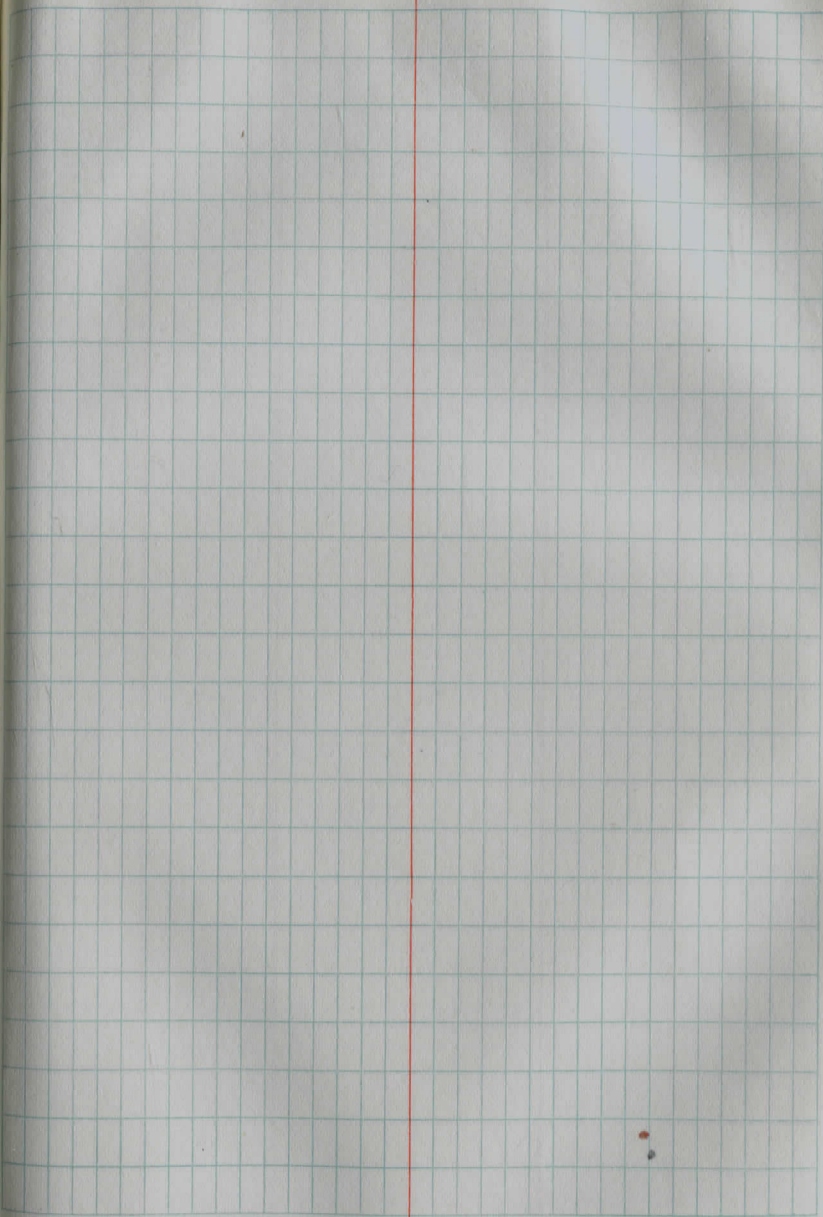
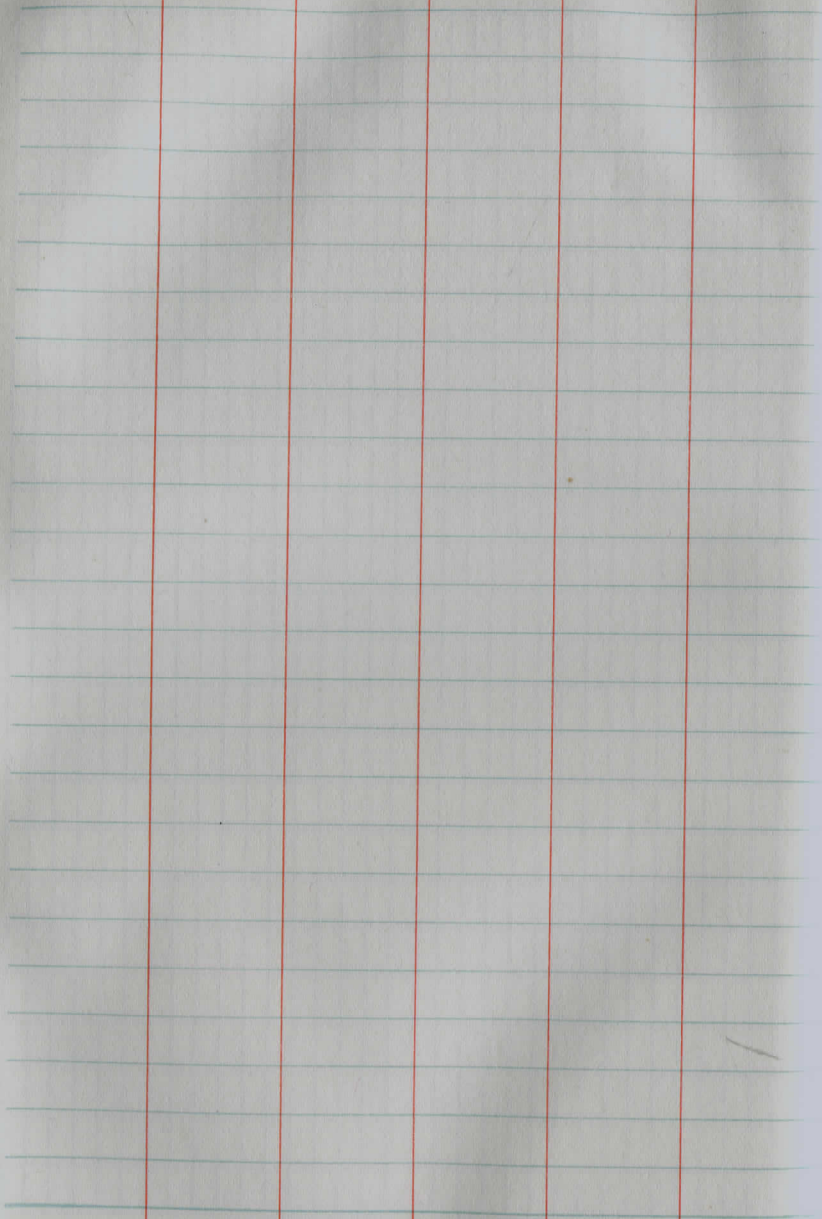
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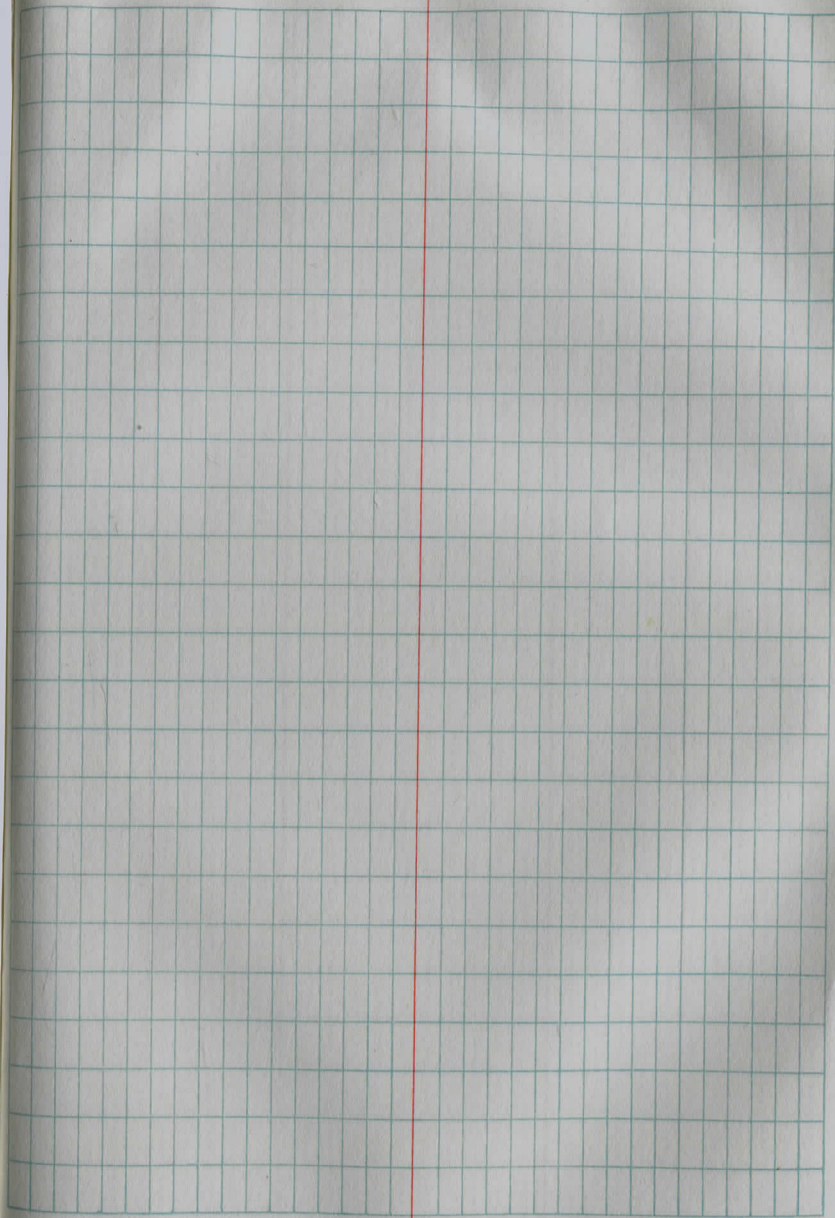
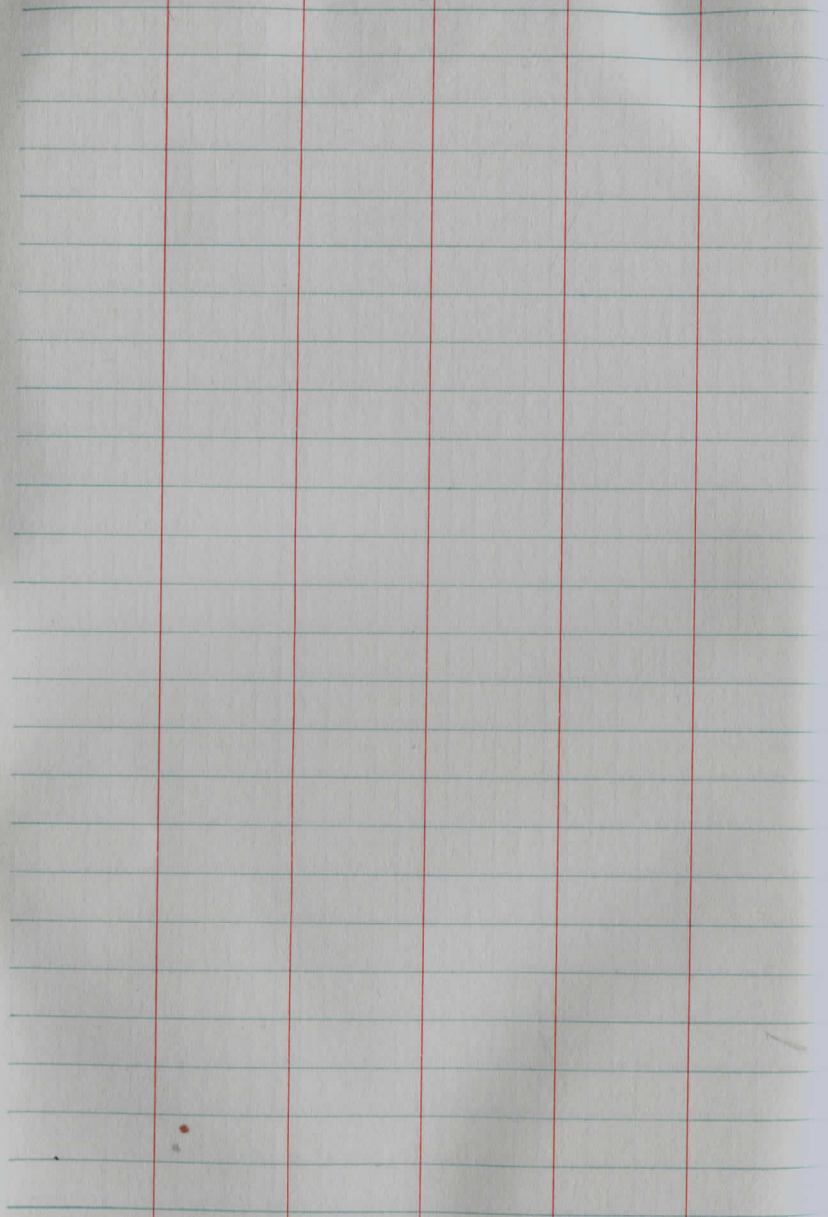
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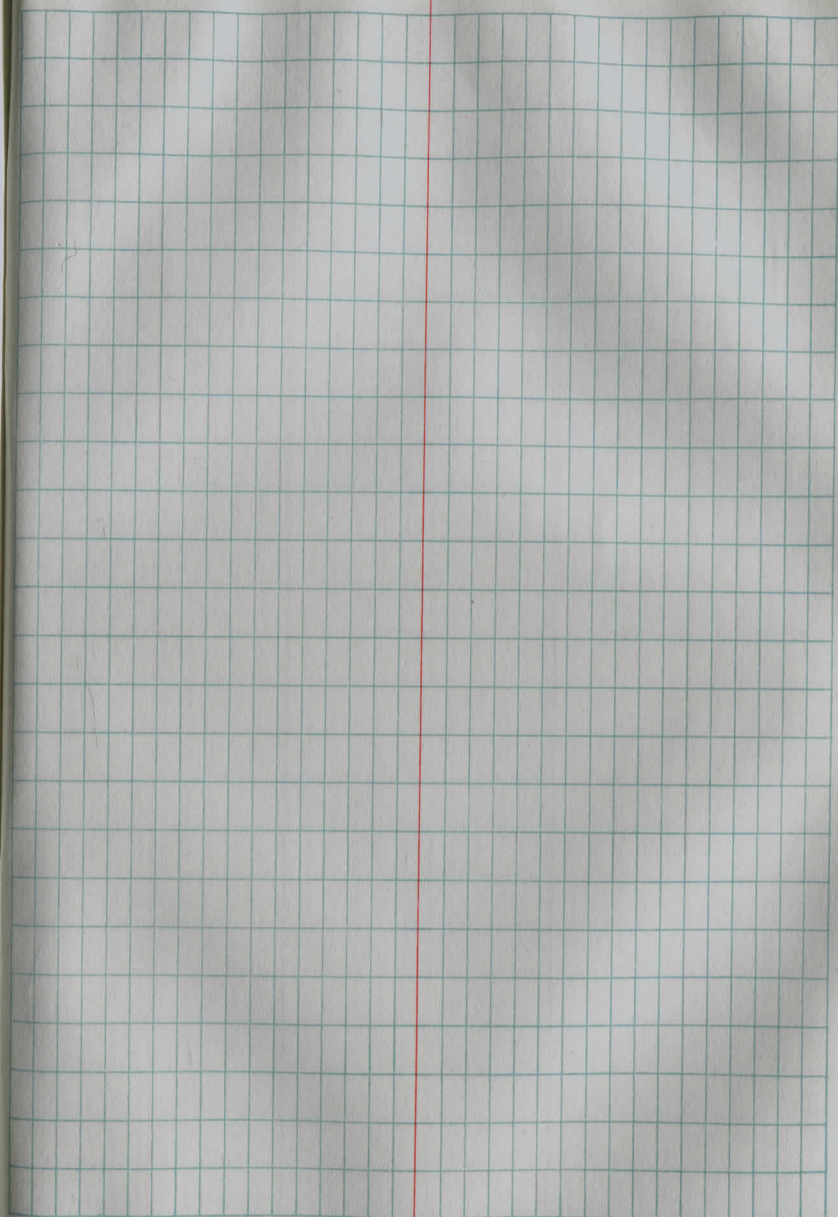
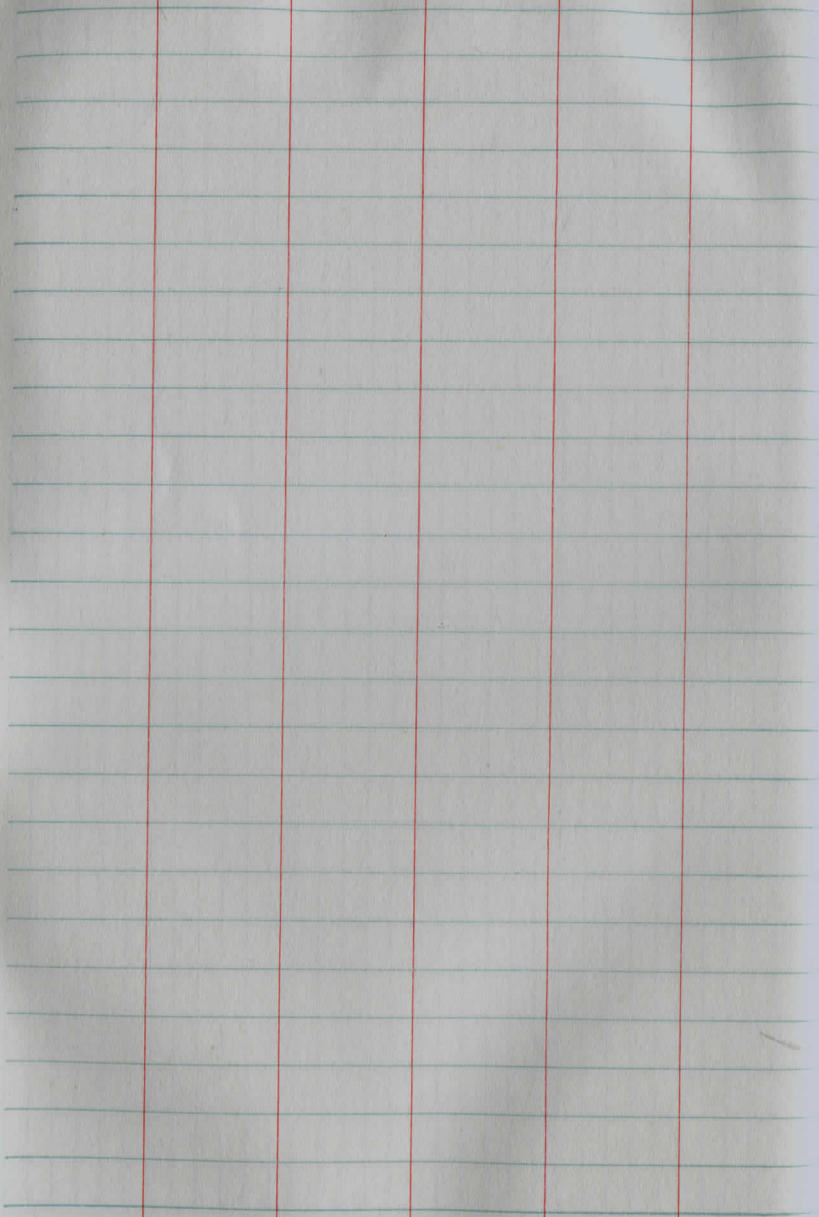


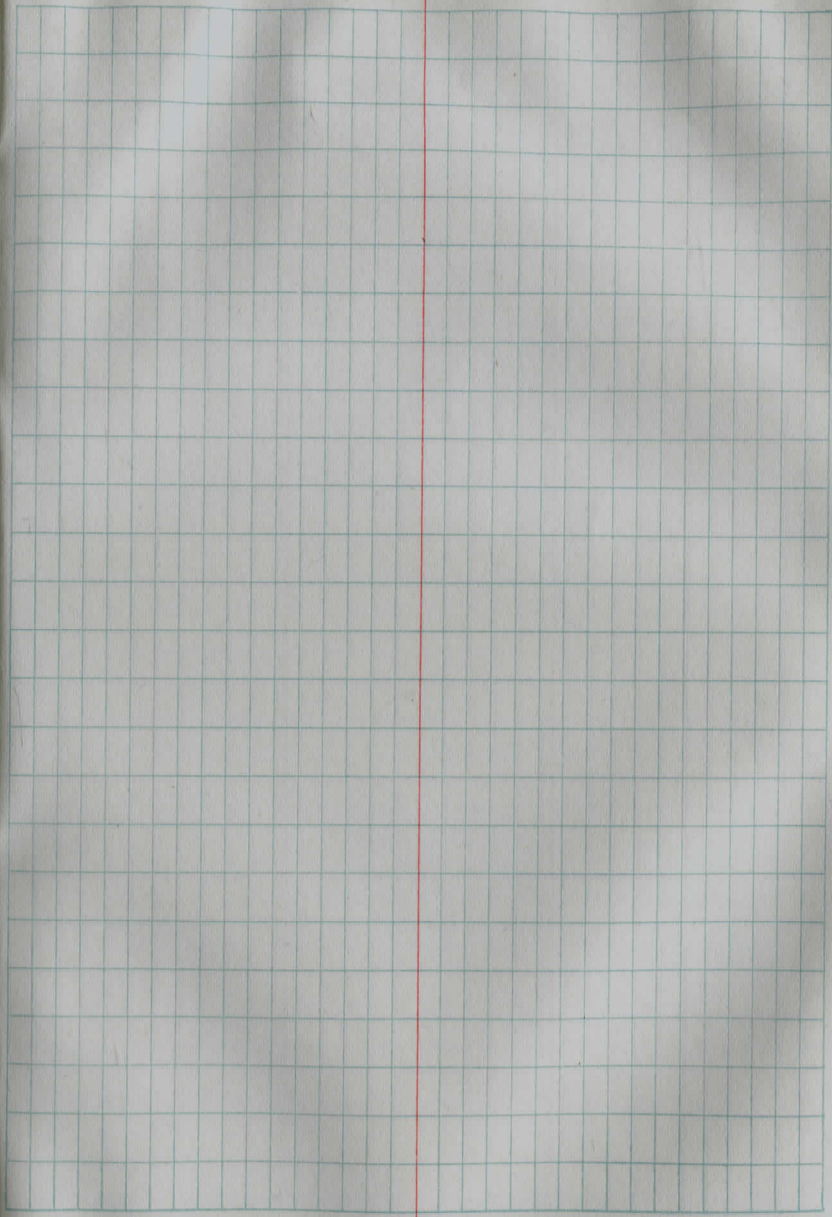
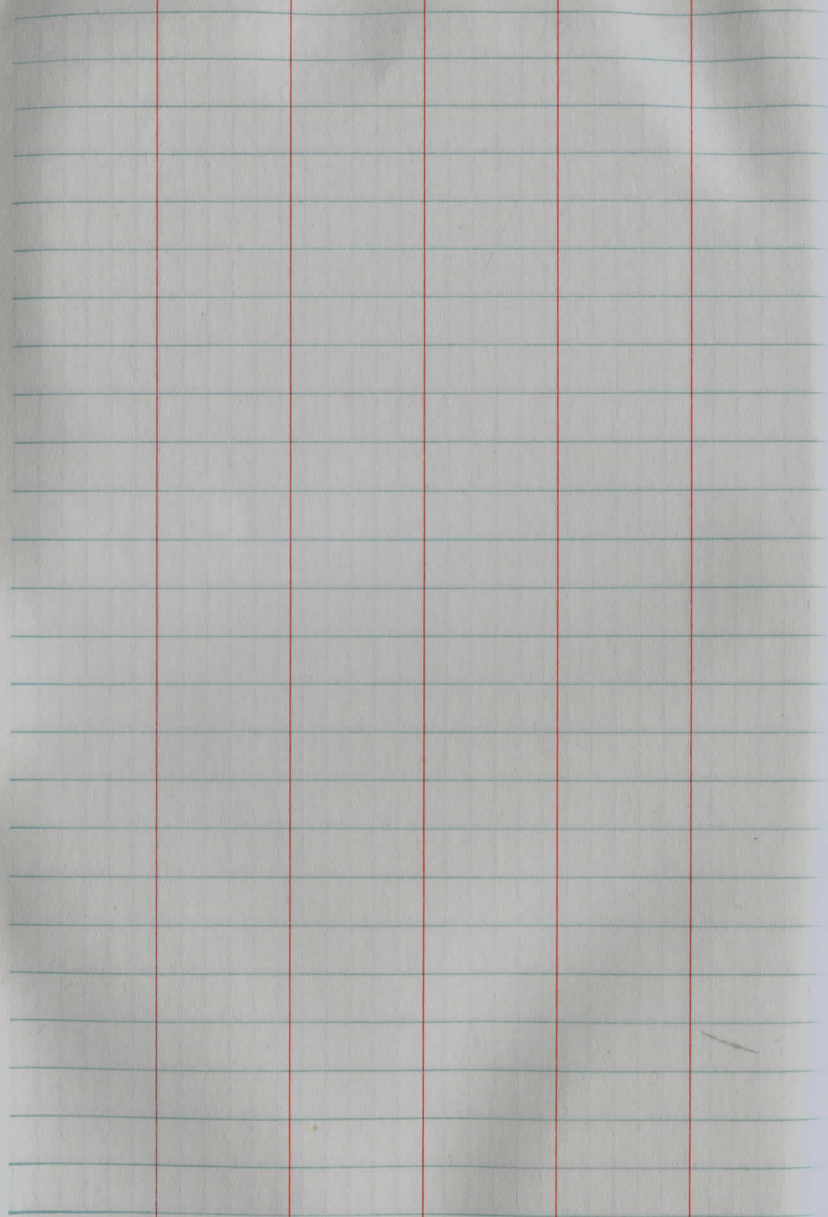


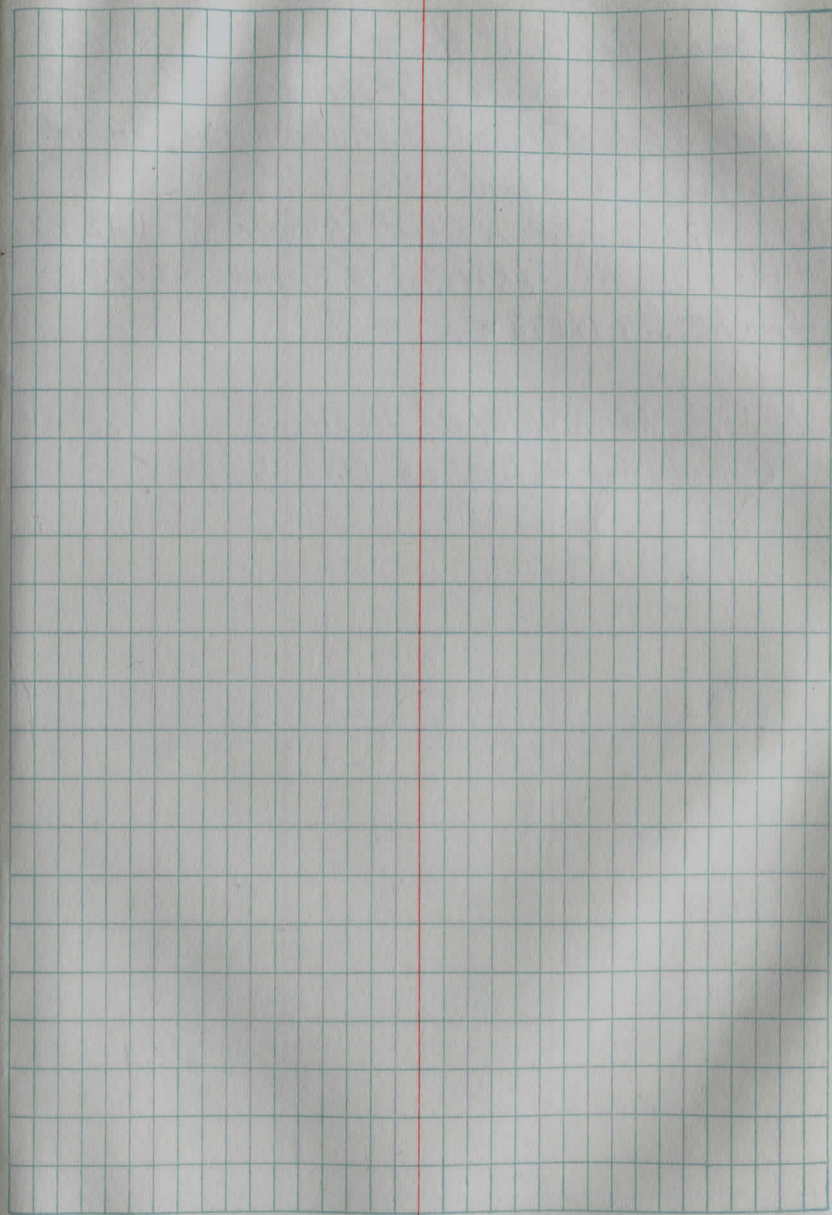
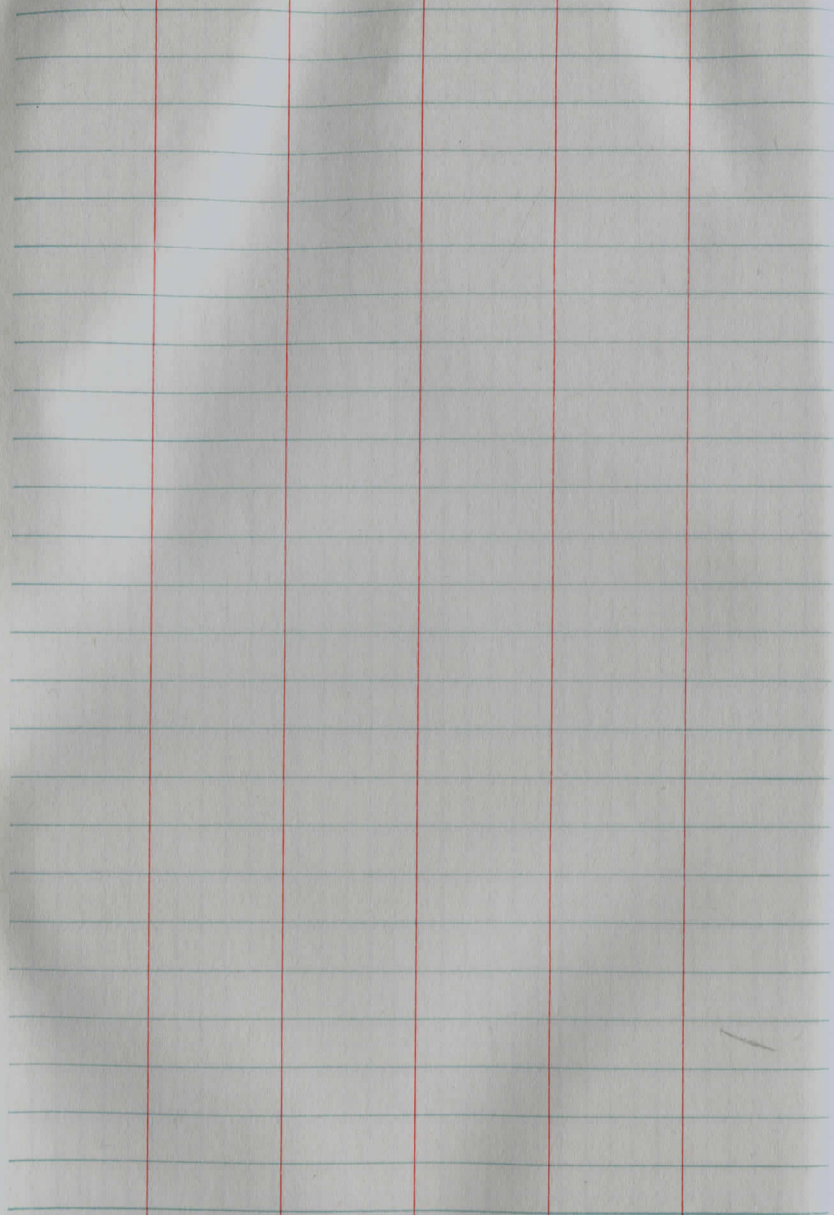


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BMS Whitney Rd

#11 X-in ledge Rock 40' RT Sta 115+60 1214.79

#10 Spike N.W. Root 10' Maple 27' RT Sta 109+60 1186.98

#9 Spike S Side 18' Walnut 20' RT Sta 101+25 1160.46

BMS Route 86 Mantville

116+90 25' LT Spike NE Root 26' Maple 1142.82

134+12 30' RT Spk W Root 15' Evergreen 1173.37

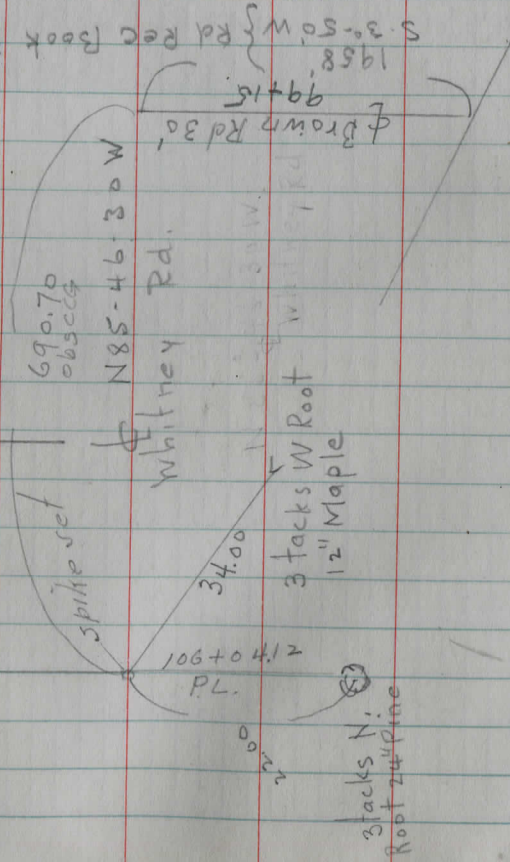
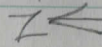
Brown Rd Sta 125+82

Old State Rd Middlefield Sta 37+00 } 1755.84

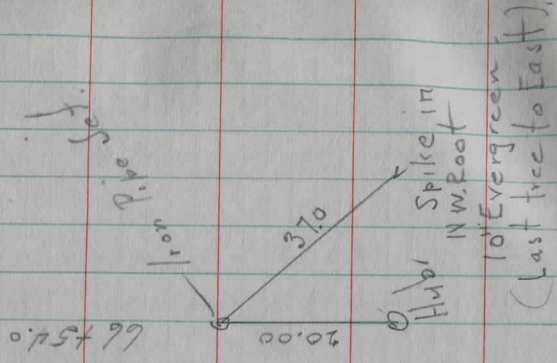
W. Root Maple (long) 23' Lt. }

Carried from plan.

3-31-79  
@2001



3 stacks N.  
Root 2 1/2" Pine

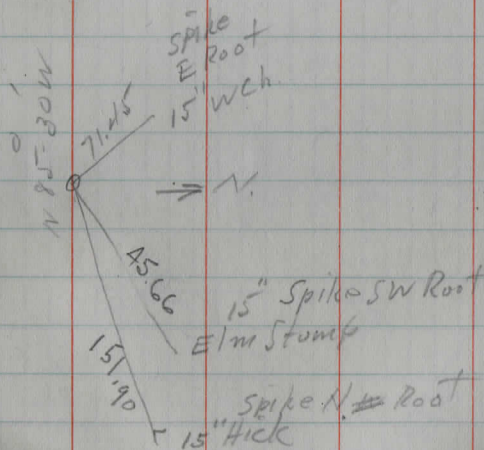


\* 400 claims Total.  $\frac{0}{1}$

$\frac{206-06}{180}$   
 { 102.90 + west A = 206.06  
 { 445.63

Pl. { 445.63  $\frac{204-22}{24-22}$   
 { 191.50 PT to & Rd East

SL Lot = 0-00  
 along OSRA - 6 + 10.60  
 18 + 892 & Rd/oc  
 Wend 211° 14' SE  
 E End 65° 45' NW



$\frac{150.71}{1.2}$   
 $\frac{3) 152.0}{50.6}$

5) 26.1

$\frac{.88}{6}$   
 $\frac{528}{1331.6}$   
 $\frac{5.28}{1336.88}$   
 3) 445.63

206-16  
 4-26-16  
 D=30  
 $\frac{152.69}{1.2}$   
 3) 153.89  
 E 51.29

$\frac{152.69}{150.71}$   
 $\frac{3}{5} \frac{1.98}{1.17}$

1297.7  
 $\frac{1340.4}{31.6}$   
 $\frac{3}{5} \frac{8.8}{5.25}$   
 1.75

$\frac{154.69}{152.69}$   
 $\frac{3}{5} \frac{2.00}{1.2}$   
 D = 26° 16'

204° 22'  
206° 14'

176-48 Johnsons Ks  
353-36 E. Duiker

1566.72  
501.50

10.5

12 46 48

1.7  
88 51  
3 13967

TRIGONOMETRIC FORMULÆ



PLEASE RETURN TO  
GAUGA COUNTY ENGINEER  
COURT HOUSE  
CHARDON, OH  
PHONE 250-X

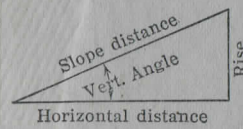
For Angle A.  $\sin \frac{a}{c} = \cos \frac{b}{c}$ ,  $\tan = \frac{a}{b}$ ,  $\cot = \frac{b}{a}$ ,  $\sec = \frac{c}{b}$ ,  $\operatorname{cosec} = \frac{c}{a}$

Given	Required	Formulas
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B$ , $c = \sqrt{a^2 + b^2} = a \sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B$ , $b = \sqrt{(c+a)(c-a)} = c \sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90^\circ - A$ , $b = a \cot A$ , $c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90^\circ - A$ , $a = b \tan A$ , $c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90^\circ - A$ , $a = c \sin A$ , $b = c \cos A$

Solution of Oblique Triangles

Given	Required	Formulas
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}$ , $C = 180^\circ - (A + B)$ , $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$ , $C = 180^\circ - (A + B)$ , $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180^\circ - C$ , $\tan \frac{1}{2}(A - B) = \frac{(a - b) \tan \frac{1}{2}(A + B)}{a + b}$ , $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a + b + c}{2}$ , $\sin \frac{1}{2}A = \sqrt{\frac{(s - b)(s - c)}{bc}}$ , $\sin \frac{1}{2}B = \sqrt{\frac{(s - a)(s - c)}{ac}}$ , $C = 180^\circ - (A + B)$
a, b, c	Area	$s = \frac{a + b + c}{2}$ , $\text{area} = \sqrt{s(s - a)(s - b)(s - c)}$
A, b, c	Area	$\text{area} = \frac{b c \sin A}{2}$
A, B, C, a	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10'. From Table, Page IX.  $\cos 5^\circ 10' = .9959$ . Horizontal distance = 319.4 × .9959 = 318.09 ft. Horizontal distance also = Slope distance minus slope distance times (1 - cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained.  $\cos 5^\circ 10' = .9959$ .  $1 - .9959 = .0041$ .  $319.4 \times .0041 = 1.31$ .  $319.4 - 1.31 = 318.09$  ft. When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft. slope distance = 302.6 ft. Horizontal distance =  $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$  ft.

