

314

KΣ

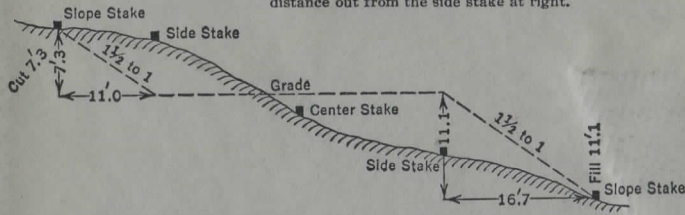
FIELD BOOK

W 360

**DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING**

Roadway of any Width. Side Slopes 1 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.

#23 Revere Rd Align. - Bundyburg Rd E. to Co line (Pg 1)

S. of S.R. 88  
Old State Rd - Stone Arch Pipe ext. Levels 4/30/47 (Pg 5)

Elev. of channel on arch struct.

CR #6 S. of S.R. 88 Pg 5

#27 Revere Rd Align. Old State to Bundyburg Pg 4-7

Mitchell Mills Rd (T.H. 88) Profile (1966) 2 = 9

CH 33 - LEGGATT - DRAINAGE PROB. AT 16508 27

Ditch Levels Boyles prop. Wilson Mills Rd. 2nd to last Pg. this book

The paper in this book No. 360 is made of 100% high grade rag stock with a WATER RESISTING surface sizing.







H. Patterson  
R. Diedrich

Reeves Rd. TH 213  
Old State Rd to Bundysburg Rd  
12-1-65

30°  
clear

15739.61

2763.12

0+0

Drill Hole

see Pg 7 for Final Data

Cont. Pg 6

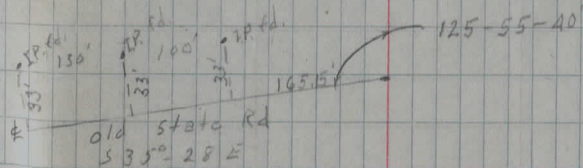
SPK W. side  
579018 x  
CE# 28°

SPK 12' wood stake  
set.

1276.49'

wood stake 11.8' SPK 12.2' wood stake  
set.

263.12  
587-32-40C



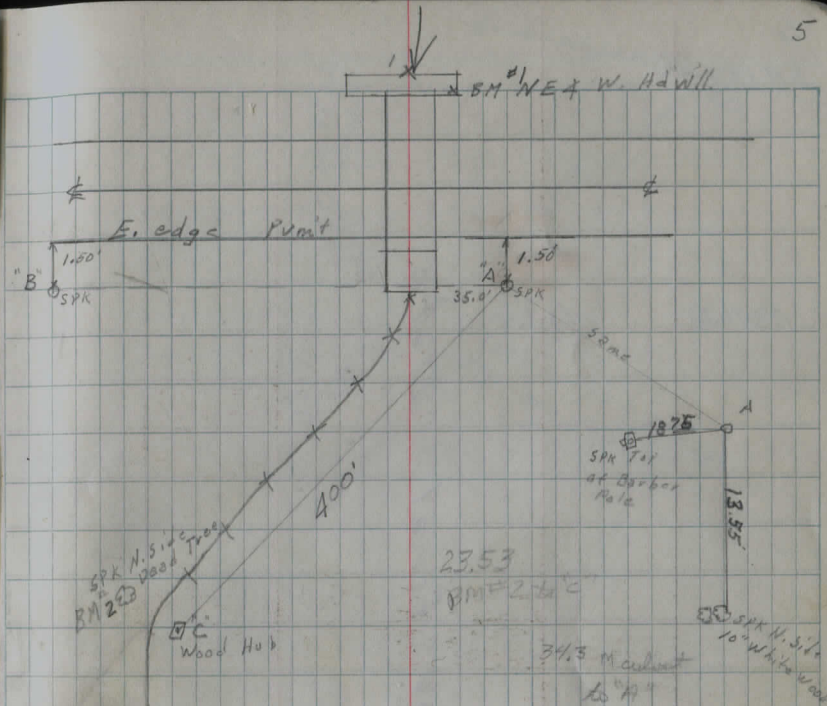
H. Patterson  
 A. Winchall  
 P. Ranney

Old State Rd ± 1000 ft S. of SR 88  
 6-30-64 sunny 90°  
 Stone Arch Culvert. w/Pipe Arch Ext

	+	HI	-	Elev
BM #1	6.65	106.65		100.00
BM #2	322°-04'		9.87	96.78
A-BS-B	Hort &	Vert &	Rod	Stad. Dist. Elev.
1 Fl Inlet	36°-54'		13.26	45.0 93.39
2 Fl outlet	334°-05'		13.61	36.0 93.04
Sta C Wood Hub	320°-44'			400.00

Set on C, back site on A. & s clockwise

	+	HI			
BM #2	1.85	98.63		96.78	vert &
	Hor &	stadia	rod (-)		
1	358°-48'	309	4.22	92.56	
2	358°-25'	200	4.64	92.14	
3	355°-29'	99	4.95	91.83	
4	226°-03'	12	6.73	90.05	







Reeves Rd TH 213  
Old State Rd to Bundysburg Rd.

15739.61

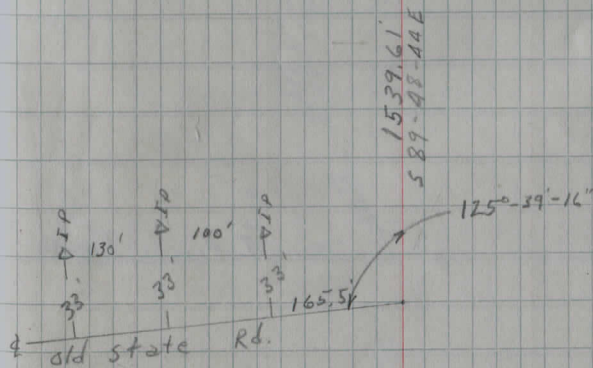
I Pin Pot

0x0

Drill Hole

943.42'

I 579018X  
SPK w side CEL  
0 20.66



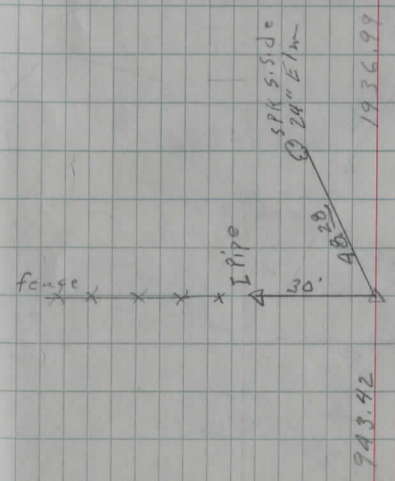
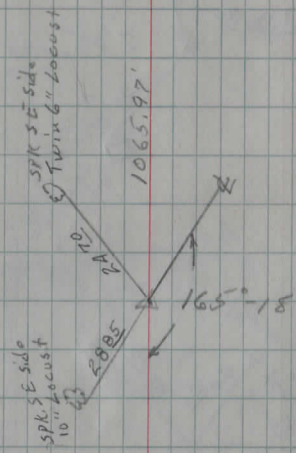
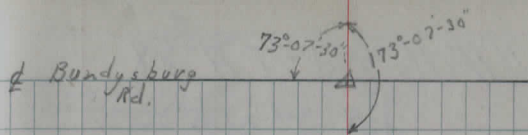
54+85.92

I Pin

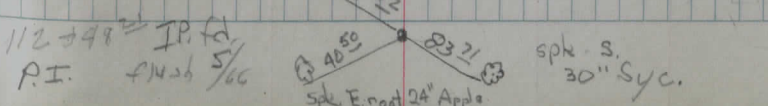
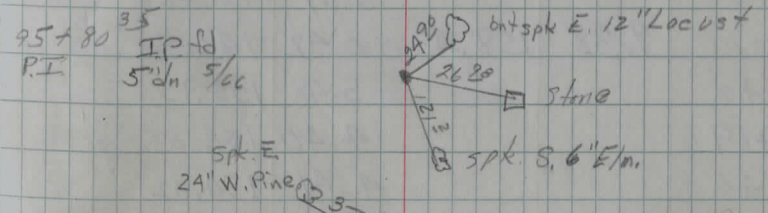
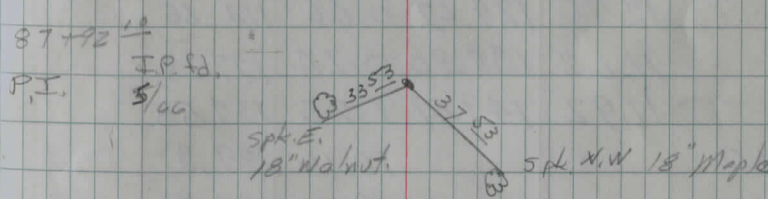
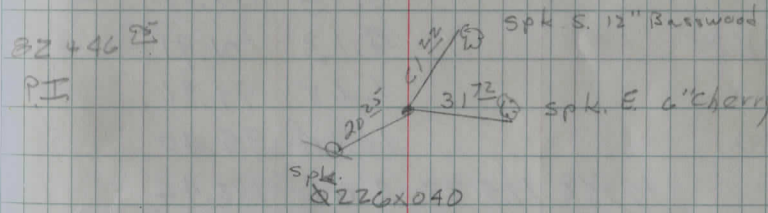
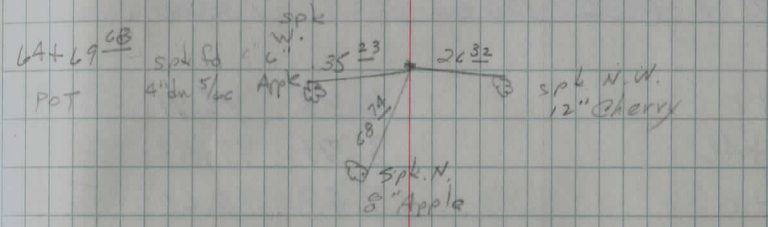
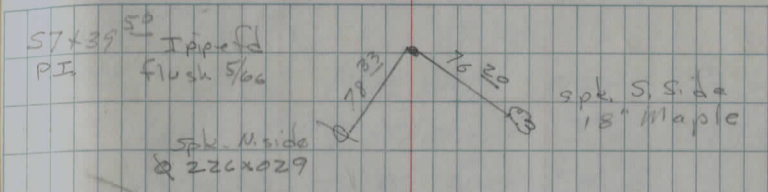
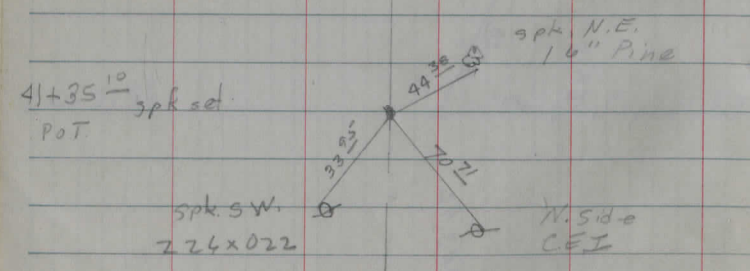
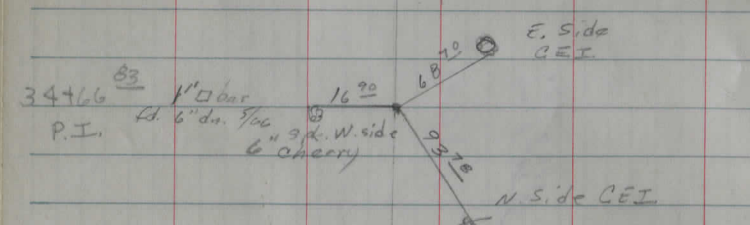
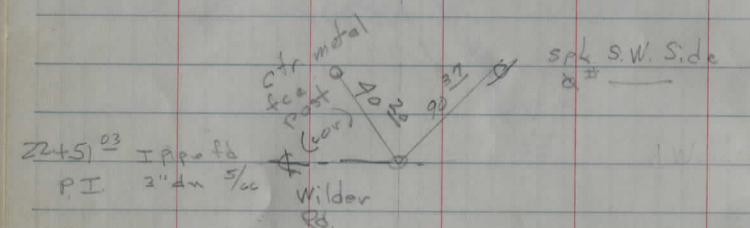
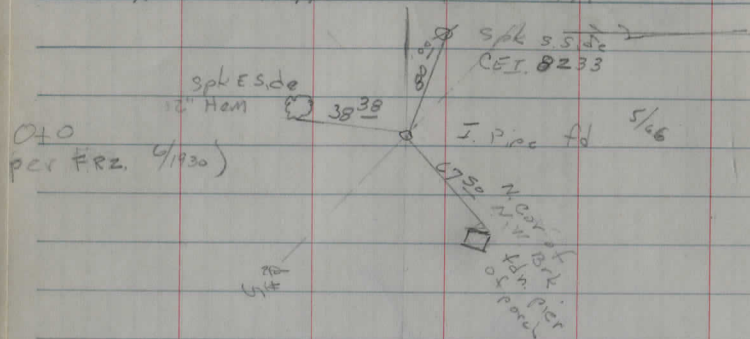
44+20.02  $\triangle = 14^{\circ}42'$  Rt. I Pin

24+83.03

I. Pin POT



Mitchell Mills Rd - T.H. 88



Mitchell Mills (T.H. 88)

T.M. #1	6.04	106.04		100.00
83+0			10.33	95.71
82+46			8.51	97.53
82+0			7.43	98.61
81+0			5.15	100.89
80+68			4.13	101.91
80+0			6.68	99.36
79+0			10.64	95.40
	12.88	115.32	3.60	102.44
	12.76	127.42	0.66	114.66
	11.62	138.80	0.24	127.18
	11.92	149.47	1.25	137.55
67+0			10.16	139.31
66+0			3.51	145.96
	9.38	158.43	0.42	149.05
65+0			5.48	152.95
64+19			4.40	154.03
64+0			4.41	154.02

Davidson  
Patterson  
R. Dietrich

cldy-cool

5/18/66 10

Stas used this work per Ref.  
data F.R. Zethmayer June 1930  
- RUN E. to W. from C.H. #5.

spk NE side of #220 x 0.40 Sta. 82+35 13'S.

⊕

PI

⊕

⊕

⊕ brk. grd.

⊕

⊕

⊕

⊕

⊕

⊕ brk. grd. (POT.)

⊕

TH #88

Mitchell Mills

158.43

63+0		8.77	149.66
62+0		11.30	147.13
5.A0	152.19	11.64	146.79
64+0		7.09	145.10
12.62	164.48	0.33	151.86
57+39	P.I.		

57+0

12.88 177.06 0.30 164.18

56+0

11.04 166.02

55+0

7.91 169.15

54+0

4.77 172.29

53+0

10.10 186.91 0.25 176.81

52+0

5.76 181.15

51+64

4.43 182.48

51+0

5.16 181.75

50+0

12.44 192.73 6.62 180.29

12.70 205.33 0.10 192.63

11.43 216.15 0.61 204.72

44+50

44+0

5/18/66

11

⊕  
⊕

⊕

(Top IR)

157.06  
7.42  
160.56  
3.92

Trail  
A  
5%  
A  
3%

⊕

⊕

⊕

⊕

⊕

⊕ brk. grad

⊕

⊕ (spk)

rain 11/5

210.95  
209.65  
205.95  
204.95  
205.45  
205.55  
205.77  
205.75  
205.45  
205.25  
204.85  
207.85  
208.25  
208.55  
208.70  
208.84  
208.45  
208.15  
207.15  
209.35  
209.75

TH #88

216.15

43+0

9.21 224.39 0.97 215.18

42+0

41+46 bck. grd

41+0

40+0

9.87 224.13 10.13 214.26

39+20 "rd. v. 16" comp.

39+0

38+0

37+0 bck. grd.

36+0

3.68 219.26 8.55 215.58

35+0

34+0

11.42 209.84

5/19/60

12

213.45 213.05 211.85 211.85 212.05 212.05 211.85 211.45 211.75

218.44 218.29 216.44 215.59 215.79 215.79 215.31 214.77 215.79 219.79 219.39

220.39 219.29 217.09 217.59 217.79 217.97 217.89 217.69 219.09 219.99

217.59 217.59 215.59 216.29 216.49 216.72 216.79 216.59 217.99 219.29

214.79 214.69 214.01 213.39 213.79 214.31 214.64 214.29 214.09 214.79 215.59 215.89

212.73 213.03 213.43 213.83 214.18 213.93 213.63 213.83 213.03 212.53 212.63

216.43 216.33 216.13 215.13 215.33 215.13 214.43 216.03 216.23

221.93 222.53 219.03 219.43 219.64 219.33 219.13 222.83 222.83

220.44 219.13 216.23 216.73 216.93 217.09 216.83 216.43 219.03 218.93

217.26 215.76 212.26 211.26 211.76 211.98 211.66 211.06 216.76 216.46 216.46

209.06 207.86 208.56 210.96 210.16

220.43  
217.06

TH 88

1.71 209.55 207.84

34+0

33+80

33+70 end cut extg rd  
5.08 206.42 8.21 201.34

33+0

32+70 stone culv. 3'x3'

B32+0

B.M. #4	8.88	210.27	5.03	201.39
	11.22	221.43	0.06	210.21
	4.06	218.19	7.30	214.13
	1.53	210.80	8.92	209.27
B.M. #3	0.90	205.10	6.60	204.20
	0.26	193.64	11.72	193.38
	0.07	182.59	11.12	182.52
	0.30	171.56	11.33	171.26
B.M. #2	1.08	167.33	5.31	166.25
			12.80	154.58

5/19/66

203.35  
6.7/14.2  
202.65  
6.9/13.8  
203.55  
6.0/6.0  
203.84  
5.71  
203.46  
6.7/8.3  
202.85  
6.7/12.7  
204.05  
5.5/15.0

201.05  
2.5/10.0  
201.15  
8.4/22.2  
202.15  
1.4/1.4  
201.75  
1.0/1.5  
202.15  
2.4/2.0  
202.28  
7.27  
201.95  
7.2/2.0  
201.25  
8.3/4.0  
201.25  
8.3/3.0

197.25  
2.5/2.0  
198.52  
1.4/3.2  
199.32  
7.1/2.0  
200.82  
5.6/4.0  
201.12  
5.3/7.2  
201.34  
5.08  
201.17  
5.3/4.0  
200.92  
5.5/0.0  
197.62  
8.8/2.0  
197.52  
9.1/3.0

202.72  
2.0/2.0  
203.62  
2.8/3.2  
203.32  
5.1/1.0  
202.72  
3.1/1.5  
195.82  
10.6/13.4  
203.52  
2.0/2.0  
201.53  
1.89  
195.52  
10.7/13.0  
203.98  
1.44  
203.82  
2.6/5.3  
202.82  
3.6/12.3  
203.22  
3.3/4.2  
203.32  
3.1/2.2  
203.32  
3.7/3.0  
202.77  
3.7/3.0

S.W. & S. Adwt. culv Sta 32+70

N.E. & In. 200 S. Side Sta 44+75

ret spk # 226 X 029 S. Side Sta 56+61

TH #88

1.53	156.06		154.53
0.02	143.10	1298	143.08
0.44	131.88	11.66	131.44
1.08	120.23	12.73	119.15
1.97	110.24	11.96	108.27
2.49	104.21	8.52	101.72
		4.22	99.99

TBM#1

TBM	1.82	101.92	100.00
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83+0			95.72
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TP	6.50	105.11	3.21	98.61
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82+0			98.61
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81+0			100.90
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TP	5.26	107.11	3.26	101.85
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80+95	fld. dr. S.		101.85
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5/19/66

14

Δ 29

Δ 20

Ø# 226x040 ck 0.01%

Davidson  
Patterson &  
R.D.ovich  
L. Moore

6/7/66

sd. NE side Ø# 226x040 Sta 82+35 - 185

1.5/30° 1.5/22° 1.0/13° 1.4/11° 6.2/6° 6.10 1.6 1.4/13° 1.4/12° 1.6/14° 1.0/10° 1.0/10°

1.4/30° 5.4/14° 1.0/11° 1.4/12° 6.50 1.6 1.4/13° 1.4/12° 1.8/10° 1.2/30°

1.8/30° 1.2/11° 1.0/10° 1.4/11° 1.4/12° 1.2 1.6 1.4/13° 1.4/12° 2.4/10° 2.8/30°

104.8  
2/50°

103.0  
2/31° 526

107.5  
100

106.6  
75



7-H #88

107.11

80+0 99.36

TP. 4.46 100.81 10.76 96.35

79+0 (Wend cap stone S Side of culv. N Side) 95.38

78+97 3x3 Stone culv. (S Side)

78+0 96.71

TP. 10.91 109.91 1.81 99.00

77+0 101.93

TP. 10.01 117.28 2.64 107.27

76+0 107.27

TP. 10.84 123.62 4.50 112.78

75+0 112.78

TP. 9.36 127.87 5.13 118.49

74+0 118.51

TP. 4.55 123.32

89.4

4/7/66

15

~~7/30~~ ~~4/19~~ ~~8 1/11~~ ~~7.9/5~~ ~~7.75~~ ~~7 1/5~~ ~~8 0/5~~ ~~8 1/11~~ ~~4.5/23~~ ~~5 1/30~~

~~9 2/30~~ ~~9 8/21~~ ~~8 1/11~~ ~~6 1/10~~ ~~5 1/5~~ ~~5.46~~ ~~5 3/5~~ ~~5 5/14~~ ~~5 6/5~~ ~~9 1/30~~

Ind 89.4  
1/19

89.4  
1/19

~~4 3/30~~ ~~4 6/8~~ ~~5 3/11~~ ~~4 6/9~~ ~~4 3/4~~ ~~4.10~~ ~~4 1/3~~ ~~4 2/11~~ ~~4 6/5~~ ~~4 4/16~~ ~~5 0/30~~

~~4 1/30~~ ~~4 1/13~~ ~~4 1/11~~ ~~8 1/9~~ ~~8 2/11~~ ~~7 9/8~~ ~~8 1/20~~ ~~8 1/13~~ ~~8 2/16~~ ~~9 1/16~~ ~~6 2/21~~ ~~6 9/30~~

~~6 2/30~~ ~~5 9/20~~ ~~10 1/12~~ ~~10 1/8~~ ~~10 1/100~~ ~~10 1/3~~ ~~10 2/11~~ ~~10 5/14~~ ~~11 1/15~~ ~~9 1/21~~ ~~7 7/30~~

~~5 2/30~~ ~~5 1/21~~ ~~11 1/13~~ ~~11 0/11~~ ~~10 9/8~~ ~~10 1/4~~ ~~10 1/20~~ ~~11 2/10~~ ~~11 6/13~~ ~~12 1/14~~ ~~8 5/17~~ ~~8 5/30~~

~~6 2/30~~ ~~5 1/22~~ ~~10 1/11~~ ~~9 1/11~~ ~~9 3/7~~ ~~9 3/6~~ ~~9 1/2~~ ~~9 7/9~~ ~~10 2/3~~ ~~10 0/19~~ ~~6 0/30~~

T.H. #88

T.P. 8.98 132.30 123.32  
73+0 123.32

T.P. 4.12 139.21 5.21 127.09  
72+0 127.09

T.P. 8.10 137.48 4.83 129.38  
71+0 129.38

T.P. 7.79 139.81 5.46 132.02  
70+0 131.99

69+70 dr. N. ~~150~~ 132.61

T.P. 7.00 141.05 5.76 134.05  
69+0 134.05

T.P. 5.93 141.98 5.00 136.05  
68+0 136.05

T.P. 7.51 146.81 2.68 139.30  
67+0 139.30

T.P. 0.86 145.95

~~7~~  
5/30° 5/22° 10/14° 9/13° 9/8° 8.98 8.9/8° 9/10° 9/13° 5/9° 4/30°

5/30° 5/20° 8/14° 7/13° 7/9° 7.12 7/2° 7/10° 8/13° 7/15° 9/30°

5/30° 5/20° 5/14° 9/13° 8/12° 8/9° 8.10 8/9° 8/13° 7/16° 9/30°

7/30° 4/14° 4/20° 8/14° 8/12° 8/10° 7.82 8/10° 8/13° 9/30°

7.20 9/33° 10/50°

2/30° 3/20° 2/14° 2/13° 1/10° 1.00 7/3° 7/13° 7/13° 11/30°

3/30° 5/19° 6/10° 6/14° 6/9° 5.93 6/8° 6/10° 5/11° 6/16° 8/30°

7/30° 6/13° 4/17° 2/15° 7/10° 7.51 7/11° 8/11° 7/12° 6/16° 7/30°

5/30° @ 60+0

T.H. = 88

T.P. 9.29 155.24 145.95

66+0

145.95

T.P. 6.06 159.01 2.29 152.95

65+0

152.95

64+69 (bik grd)

154.06

64+0

154.01

T.P. 6.92 156.56 9.37 149.64

63+0

149.64

T.P. 5.45 152.59 9.44 147.12

62+0

147.12

T.P. 10.50 155.59 7.48 145.09

61+0

145.09

T.P. 11.60 155.45 11.74 143.85

60+65

143.85

T.P.

11.62

143.85

Paulson  
P. Peterson  
K. Diederich  
L. Moore

6/8/00

17

151.14	150.64	144.04	144.94	145.44	145.74	145.55	145.64	145.14	145.74	149.84	149.74
$\frac{2.5}{30}$	$\frac{0.5}{22}$	$\frac{0.2}{16}$	$\frac{0.3}{15}$	$\frac{0.8}{14}$	$\frac{0.5}{12}$	$\frac{0.2}{9}$	$\frac{0.3}{8}$	$\frac{0.1}{11}$	$\frac{0.5}{12}$	$\frac{5.8}{9}$	$\frac{5.1}{30}$
157.31	156.51	153.21	153.21	152.61	153.81	152.95	152.51	151.91	152.61	154.01	152.01
$\frac{1.1}{30}$	$\frac{2.5}{32}$	$\frac{5.1}{15}$	$\frac{6.1}{14}$	$\frac{6.4}{13}$	$\frac{6.2}{10}$	6.6	$\frac{6.5}{8}$	$\frac{7.1}{11}$	$\frac{6.8}{12}$	$\frac{5.0}{6}$	$\frac{6.1}{30}$
158.11	157.51	154.31	153.41	153.31	154.01	154.06	153.51	153.01	152.21		151.91
$\frac{0.9}{30}$	$\frac{1.5}{28}$	$\frac{0.8}{14}$	$\frac{5.4}{15}$	$\frac{5.3}{11}$	$\frac{5.3}{11}$	0.95	$\frac{5.5}{7}$	$\frac{6.0}{11}$	$\frac{4.8}{16}$		$\frac{7.1}{32}$
157.51	156.51	153.11	153.71	153.91	154.01	153.61	153.21	154.11	152.21		
$\frac{1.5}{30}$	$\frac{2.5}{24}$	$\frac{5.9}{16}$	$\frac{5.3}{14}$	$\frac{5.1}{12}$	5.00	$\frac{5.1}{7}$	$\frac{5.1}{11}$	$\frac{4.9}{15}$	$\frac{6.8}{30}$		
152.96	152.26	149.36	148.36	147.16	149.46	149.64	149.26	149.06	148.76	149.26	151.16
$\frac{2.5}{30}$	$\frac{0.3}{21}$	$\frac{0.2}{17}$	$\frac{0.6}{16}$	$\frac{1.1}{14}$	$\frac{1.1}{9}$	0.92	$\frac{2.3}{14}$	$\frac{7.5}{10}$	$\frac{7.1}{11}$	$\frac{7.1}{13}$	$\frac{5.1}{17}$
150.07	148.87	146.27	146.87	146.87	146.87	143.12	146.87	146.37	143.57		
$\frac{2.5}{30}$	$\frac{2.1}{22}$	$\frac{4.3}{18}$	$\frac{5.1}{13}$	$\frac{5.1}{9}$	5.05	5.05	$\frac{5.1}{8}$	$\frac{5.1}{12}$	$\frac{9.0}{30}$		
152.91	152.09	145.19	144.09	144.69	144.79	145.09	144.79	143.89	144.19	142.49	146.39
$\frac{2.6}{30}$	$\frac{3.1}{25}$	$\frac{10.1}{14}$	$\frac{11.0}{15}$	$\frac{10.1}{12}$	$\frac{10.8}{9}$	10.50	$\frac{10.6}{8}$	$\frac{11.2}{13}$	$\frac{10.1}{14}$	$\frac{8.1}{23}$	$\frac{9.2}{30}$
153.05	152.55	143.05	143.55	143.55	143.55	143.85	143.45	143.95			141.35
$\frac{2.4}{30}$	$\frac{2.9}{25}$	$\frac{12.1}{14}$	$\frac{11.9}{13}$	$\frac{11.9}{9}$	11.60	11.60	$\frac{2.9}{9}$	$\frac{12.3}{14}$			$\frac{1.1}{30}$

T.H #88

4.24 148.07 143.83

60+08 Inv 12" Cmp (S. Side)

60+0 fld. dr. S. 142.88

59+90 Inv. 8" VTP. S. Side

59+35 Inv. 24" R.C.P. 143.17

59+0 144.13

TP. 10.21 155.01 3.27 144.80

58+65 146.02

TP. 11.82 163.05 3.78 151.23

58+0 151.23

TP. 9.68 170.23 2.50 160.55

57+0 160.55

IBM # 4.05 166.18

6/8/CC

18

~~143.47~~ ~~142.77~~ ~~142.57~~ ~~142.88~~ ~~142.67~~ ~~142.77~~ ~~137.77~~  
~~6 1/2~~ ~~5 3/4~~ ~~5 5/8~~ ~~5 1/2~~ ~~5 3/8~~ ~~5 3/8~~ ~~10 3/30~~  
~~6 7/14~~ ~~132.87~~ ~~143.17~~ ~~136.97~~  
~~10 2/20~~ ~~4.90~~ ~~11.6/22~~  
~~141.37~~ ~~142.57~~ ~~143.97~~ ~~144.07~~ ~~144.13~~ ~~143.87~~ ~~143.67~~ ~~144.07~~ ~~143.27~~ ~~144.47~~  
~~6 1/30~~ ~~5 5/15~~ ~~4 1/2~~ ~~4 0/7~~ ~~3.94~~ ~~4 2/8~~ ~~4 4/10~~ ~~4 9/11~~ ~~4 8/21~~ ~~3 4/30~~  
~~45.81~~ ~~46.51~~ ~~44.41~~ ~~45.91~~ ~~46.11~~ ~~46.02~~ ~~45.91~~ ~~46.21~~ ~~45.31~~ ~~46.61~~ ~~45.51~~ ~~45.01~~  
~~9 1/30~~ ~~9 5/23~~ ~~10 1/19~~ ~~9 1/22~~ ~~9 9/18~~ ~~8.99~~ ~~9 1/8~~ ~~8 8/22~~ ~~9 7/14~~ ~~8 5/15~~ ~~3 1/24~~ ~~2 0/30~~  
~~149.85~~ ~~153.35~~ ~~149.75~~ ~~151.15~~ ~~151.25~~ ~~151.23~~ ~~151.75~~ ~~150.85~~ ~~150.45~~ ~~149.95~~ ~~151.85~~ ~~151.95~~ ~~150.5~~  
~~1 2/30~~ ~~9 1/9~~ ~~10 3/14~~ ~~11 1/9~~ ~~11 1/6~~ ~~11.82~~ ~~12 1/25~~ ~~12 1/12~~ ~~13 0/33~~ ~~13 1/41~~ ~~13 1/16~~ ~~14 1/27~~ ~~15 0/30~~  
~~162.23~~ ~~163.23~~ ~~159.93~~ ~~160.33~~ ~~160.53~~ ~~160.55~~ ~~160.43~~ ~~160.03~~ ~~159.83~~ ~~159.43~~ ~~159.93~~ ~~165.33~~ ~~166.23~~  
~~1 1/30~~ ~~7 1/19~~ ~~10 1/14~~ ~~9 9/11~~ ~~9 1/5~~ ~~9.68~~ ~~9 3/5~~ ~~10 2/11~~ ~~10 1/13~~ ~~10 1/14~~ ~~10 1/15~~ ~~4 5/25~~ ~~4 0/30~~  
 226x029 ok 16.25 0.017

T.H. 84

7BM<sup>#2</sup> 7.08 173.33 166.25

56+30 Inv. 14" C.I.P. 165.23

56+25 fld. dr. S. 165.23

56+20 Inv. 14" C.I.P. 166.08

55+0 169.21

T.P. 11 10 183.44 0.99 172.34  
54+0 172.34

53+0 176.88

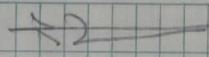
T.P. 10.13 191.35 2.22 181.22  
52+0 181.22

51+64 (bkgrd.) 182.52

185.75  
5/30

6/8/66

19



$\frac{164.93}{8 \times \frac{50}{30}}$   $\frac{165.93}{7 \frac{1}{2} \times \frac{76}{30}}$   $\frac{165.63}{7 \frac{1}{2} \times \frac{76}{30}}$   $\frac{165.13}{8 \frac{1}{2} \times \frac{76}{30}}$   $\frac{165.33}{8 \frac{1}{2} \times \frac{76}{30}}$   $\frac{165.23}{8.10}$

$\frac{167.13}{1 \frac{1}{2} \times \frac{30}{30}}$   $\frac{167.73}{5 \frac{1}{2} \times \frac{22}{30}}$   $\frac{165.23}{5 \frac{1}{2} \times \frac{22}{30}}$   $\frac{166.03}{7 \frac{3}{4} \times \frac{15}{30}}$   $\frac{166.23}{7 \frac{3}{4} \times \frac{15}{30}}$   $\frac{166.08}{7.25}$   $\frac{165.63}{7 \frac{1}{2} \times \frac{20}{30}}$   $\frac{165.33}{8 \frac{1}{2} \times \frac{20}{30}}$   $\frac{165.13}{8 \frac{1}{2} \times \frac{20}{30}}$   $\frac{165.63}{7 \frac{1}{2} \times \frac{20}{30}}$   $\frac{165.33}{6 \frac{10}{18} \times \frac{30}{30}}$   $\frac{166.83}{6 \frac{5}{30} \times \frac{30}{30}}$

$\frac{168.23}{4 \frac{6}{30} \times \frac{30}{30}}$   $\frac{168.33}{5 \frac{0}{15} \times \frac{30}{30}}$   $\frac{167.93}{5 \frac{4}{15} \times \frac{30}{30}}$   $\frac{168.33}{5 \frac{0}{15} \times \frac{30}{30}}$   $\frac{168.23}{4 \frac{11}{11} \times \frac{30}{30}}$   $\frac{169.03}{4 \frac{3}{8} \times \frac{30}{30}}$   $\frac{169.21}{4 \frac{12}{12} \times \frac{30}{30}}$   $\frac{168.93}{4 \frac{4}{9} \times \frac{30}{30}}$   $\frac{168.73}{4 \frac{6}{2} \times \frac{30}{30}}$   $\frac{168.23}{5 \frac{3}{3} \times \frac{30}{30}}$   $\frac{169.03}{4 \frac{3}{15} \times \frac{30}{30}}$   $\frac{168.23}{4 \frac{9}{30} \times \frac{30}{30}}$

$\frac{174.54}{5 \frac{0}{30} \times \frac{30}{30}}$   $\frac{174.24}{4 \frac{2}{2} \times \frac{30}{30}}$   $\frac{172.64}{4 \frac{6}{12} \times \frac{30}{30}}$   $\frac{171.24}{4 \frac{2}{14} \times \frac{30}{30}}$   $\frac{171.94}{4 \frac{5}{12} \times \frac{30}{30}}$   $\frac{172.14}{4 \frac{3}{8} \times \frac{30}{30}}$   $\frac{172.34}{11.10}$   $\frac{172.04}{4 \frac{4}{7} \times \frac{30}{30}}$   $\frac{171.54}{4 \frac{6}{12} \times \frac{30}{30}}$   $\frac{172.24}{4 \frac{3}{3} \times \frac{30}{30}}$   $\frac{173.84}{9 \frac{6}{16} \times \frac{30}{30}}$   $\frac{17384}{9 \frac{6}{30} \times \frac{30}{30}}$

$\frac{178.74}{4 \frac{1}{30} \times \frac{30}{30}}$   $\frac{178.67}{4 \frac{8}{16} \times \frac{30}{30}}$   $\frac{176.04}{7 \frac{4}{12} \times \frac{30}{30}}$   $\frac{176.74}{6 \frac{11}{12} \times \frac{30}{30}}$   $\frac{176.74}{6 \frac{7}{8} \times \frac{30}{30}}$   $\frac{176.74}{6 \frac{5}{4} \times \frac{30}{30}}$   $\frac{176.88}{6 \frac{8}{8} \times \frac{30}{30}}$   $\frac{176.64}{7 \frac{0}{11} \times \frac{30}{30}}$   $\frac{176.74}{7 \frac{2}{11} \times \frac{30}{30}}$   $\frac{176.24}{6 \frac{5}{13} \times \frac{30}{30}}$   $\frac{176.94}{4 \frac{3}{17} \times \frac{30}{30}}$   $\frac{179.14}{4 \frac{4}{30} \times \frac{30}{30}}$

$\frac{184.25}{7 \frac{2}{30} \times \frac{30}{30}}$   $\frac{185.45}{7 \frac{9}{17} \times \frac{30}{30}}$   $\frac{181.55}{9 \frac{1}{13} \times \frac{30}{30}}$   $\frac{180.75}{10 \frac{5}{12} \times \frac{30}{30}}$   $\frac{181.05}{10 \frac{7}{11} \times \frac{30}{30}}$   $\frac{181.05}{10 \frac{7}{11} \times \frac{30}{30}}$   $\frac{181.22}{10.13}$   $\frac{180.95}{10 \frac{4}{8} \times \frac{30}{30}}$   $\frac{180.65}{10 \frac{2}{6} \times \frac{30}{30}}$   $\frac{181.15}{10 \frac{3}{13} \times \frac{30}{30}}$   $\frac{184.15}{7 \frac{2}{8} \times \frac{30}{30}}$   $\frac{184.25}{7 \frac{2}{30} \times \frac{30}{30}}$

$\frac{186.35}{5 \frac{7}{9} \times \frac{30}{30}}$   $\frac{185.55}{5 \frac{1}{11} \times \frac{30}{30}}$   $\frac{182.65}{9 \frac{1}{13} \times \frac{30}{30}}$   $\frac{181.75}{9 \frac{0}{12} \times \frac{30}{30}}$   $\frac{182.25}{9 \frac{1}{11} \times \frac{30}{30}}$   $\frac{182.35}{9 \frac{0}{11} \times \frac{30}{30}}$   $\frac{182.52}{8.83}$   $\frac{182.25}{9 \frac{2}{8} \times \frac{30}{30}}$   $\frac{182.15}{9 \frac{2}{13} \times \frac{30}{30}}$   $\frac{183.15}{8 \frac{3}{14} \times \frac{30}{30}}$   $\frac{184.55}{6 \frac{5}{17} \times \frac{30}{30}}$   $\frac{183.75}{7 \frac{6}{30} \times \frac{30}{30}}$

T.H. #88

191.35

51+0 181.83

T.P. 886 189.21 11.00 180.35

50+0 180.35

49+10 Inv. 14" C.I.P. 180.67

49+0 180.76

48+0 182.77

T.P. 10.53 199.17 5.57 183.64

47+70 Dr. N. <sup>180°</sup> ~~Appox~~ 183.71

47+0 186.42  $\frac{2}{30}$

T.P. 12.80 202.87 4.10 190.07

46+0 192.91  $\frac{4}{30}$

T.P. 7.14 195.73

6/8/66

20

184.75	183.65	181.85	181.15	181.75	181.75	181.83	181.35	181.15	181.83	180.35
$\frac{5.5}{30}$	$\frac{1.8}{30}$	$\frac{4.5}{30}$	$\frac{10.7}{30}$	$\frac{9.6}{30}$	$\frac{9.6}{30}$	$\frac{9.52}{30}$	$\frac{19.0}{30}$	$\frac{10.2}{30}$	$\frac{10.2}{30}$	$\frac{11.9}{30}$
184.11	182.81	180.11	179.51	180.11	180.11	180.35	180.01	179.91	180.01	178.21
$\frac{5.1}{30}$	$\frac{4.4}{30}$	$\frac{9.1}{30}$	$\frac{9.1}{30}$	$\frac{9.1}{30}$	$\frac{9.1}{30}$	$\frac{8.16}{30}$	$\frac{9.2}{30}$	$\frac{9.2}{30}$	$\frac{9.2}{30}$	$\frac{11.0}{30}$
						$\frac{19.0}{30}$	8.54	$\frac{12.4}{30}$		
182.31	180.61	179.51	180.91	180.41	180.36	180.31	180.11	179.41		176.71
$\frac{4.9}{30}$	$\frac{8.4}{30}$	$\frac{9.1}{30}$	$\frac{8.3}{30}$	$\frac{8.6}{30}$	8.45	$\frac{8.9}{30}$	$\frac{9.1}{30}$	$\frac{9.8}{30}$		$\frac{12.5}{30}$
185.21	183.71	182.31	182.81	182.81	182.77	182.61	182.21	182.41		181.41
$\frac{9.0}{30}$	$\frac{5.5}{30}$	$\frac{6.9}{30}$	$\frac{6.4}{30}$	$\frac{6.4}{30}$	6.44	$\frac{6.7}{30}$	$\frac{7.0}{30}$	$\frac{6.8}{30}$		$\frac{7.8}{30}$
						83.21	183.27	180.77		179.97
						10.46	$\frac{18.9}{30}$	$\frac{3.4}{30}$		$\frac{14.2}{50}$
191.67	186.57	186.77	185.97	186.27	186.37	186.42	186.07	185.67	185.17	184.17
$\frac{2.5}{30}$	$\frac{7.6}{30}$	$\frac{7.4}{30}$	$\frac{8.2}{30}$	$\frac{7.9}{30}$	$\frac{7.1}{30}$	7.75	$\frac{8.1}{30}$	$\frac{8.5}{30}$	$\frac{9.0}{30}$	$\frac{8.0}{30}$
198.67	194.27	192.97	192.07	192.57	192.27	192.97	192.57	192.07	191.57	190.77
$\frac{1.2}{30}$	$\frac{8.6}{30}$	$\frac{9.9}{30}$	$\frac{10.6}{30}$	$\frac{10.2}{30}$	$\frac{10.1}{30}$	$\frac{10.1}{30}$	$\frac{10.2}{30}$	$\frac{10.2}{30}$	$\frac{10.5}{30}$	$\frac{10.1}{30}$
						19.96	$\frac{10.4}{30}$	$\frac{10.2}{30}$	$\frac{10.5}{30}$	$\frac{10.1}{30}$
							19.57	19.207	19.157	19.07
							$\frac{10.1}{30}$	$\frac{10.1}{30}$	$\frac{10.1}{30}$	$\frac{10.1}{30}$
										$\frac{10.1}{30}$

T.H. #88

TP	8.20	203.93		195.73
	6.40	208.83	1.50	202.43
TBM #3	2.51	206.71	4.63	204.20
	1.85	196.29	12.27	194.44

47410 INV. 8" VTP. STAIN drain

SP.	11.28	207.00	0.57	195.72
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45+55 Bot. Inl. Basin 2'x2' Conc

45+50				196.92
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45+48 Inv. 12" Conc.

45+30	dr. N.	$\frac{85}{\text{Approx}}$		198.78
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45+26 INV. 12" Conc.

TP.	11.78	212.98	5.80	201.20
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44+75 Bot. In. basin 2'x2' Conc

44+50				205.75
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6/8/60

21

204.20 0.00

$\frac{11.4}{13.8}$

$\frac{12.0}{12.3}$

198.80  
 $\frac{8.2}{16.2}$   
 196.10  
 $\frac{10.9}{20.1}$   
 196.40  
 $\frac{12.6}{11.1}$   
 197.20  
 $\frac{9.8}{8.5}$   
 196.70  
 $\frac{10.3}{5.9}$   
 196.80  
 $\frac{10.2}{2.1}$   
 196.92  
 $\frac{10.0}{10.08}$   
 196.90  
 $\frac{10.1}{9.6}$   
 196.80  
 $\frac{10.2}{12.2}$   
 196.60  
 $\frac{10.2}{16.8}$   
 195.10  
 $\frac{11.9}{18.4}$   
 196.70  
 $\frac{10.0}{20.0}$   
 196.70  
 $\frac{5.8}{27.5}$   
 196.90  
 $\frac{10.1}{20.1}$

$\frac{11.4}{12.5}$

198.28  
 8.22  
 $\frac{8.7}{13.5}$   
 198.30  
 $\frac{8.9}{16.5}$   
 198.10  
 $\frac{8.4}{19.2}$   
 198.60  
 $\frac{7.9}{16.2}$   
 198.10  
 $\frac{8.0}{50.0}$   
 199.00

$\frac{9.4}{18.4}$

$\frac{10.3}{12.3}$

903

T.H. # 88

2/2.98

43+70 dr. S <sup>100°</sup><sub>App</sub> 210.16

43+48 Bot Inl basin (8" VTP-T)

T.P. 9.12 221.23 0.87 212.11

41+62 ~~90°~~<sub>App</sub> dr. S 217.27

41+24 dr. N (90°)

T.P. 1.96 214.11 9.08 212.15

1BM #3 9.91 204.20

1BM #4 11.15 212.54 201.39

T.P. 12.53 224.15 0.92 211.62

31+0 211.62

T.P. 3.50 220.65

4/8/66

22

$\frac{0.5}{20.6}$   $\frac{1.3}{20}$   $\frac{2.7}{A}$  2.82

209.54  
 $\frac{3.44}{12}$

(219.1)  
 $\frac{2.1}{50}$

(217.1)  
 $\frac{4.1}{11}$

(217.2)  
 $\frac{4.0}{6.3}$

(217.3)  
3.96

(220.1)  
 $\frac{1.00}{100}$

(219.7)  
 $\frac{1.7}{75}$

217.6  
3.62

(217.6)  
 $\frac{3.6}{10}$

(218.3)  
 $\frac{2.9}{25}$

(219.1)  
 $\frac{2.1}{50}$

(219.6)  
 $\frac{1.6}{75}$

(219.9)  
 $\frac{1.9}{100}$

NE cor In Basin 44+75 ck 204.20 0.00

SW cor S. toward @ 32470

221.65  
 $\frac{2.5}{30}$  211.75  
 $\frac{1.2}{17}$  210.75  
 $\frac{1.3}{15}$  211.35  
 $\frac{1.2}{14}$  211.55  
 $\frac{1.2}{10.2}$  211.62  
12.53 211.45  
 $\frac{1.7}{12}$  P 211.05  
 $\frac{1.3}{13}$  M 212.05  
 $\frac{1.1}{15}$  212.15  
 $\frac{1.2}{11}$  218.95  
 $\frac{5.3}{26}$  219.15  
 $\frac{1.5}{10}$



T.H. #88

I.P. 10.46 231.11 220.65

30+0 220.65

I.P. 10.99 239.10 3.00 228.11

29+0 228.11

28+0 234.66  $1\frac{1}{30}$   $5\frac{1}{21}$

I.P. 11.84 250.71 0.23 238.87

27+0 240.67

I.P. 7.86 254.54 4.03 246.68

26+0 246.65

I.B.M. #5 3.02 254.07 3.49 251.05

I.P. 0.16 241.24 12.93 241.14

I.P. 0.29 229.09 12.44 228.80

I.P. 0.31 216.80 12.60 216.49

I.P. 3.88 209.26 11.42 205.38

I.B.M. #A 1.83 201.43

6/8/66

23

~~227.21 226.71 220.31 219.31 220.01 220.41 220.65 220.31 219.91 219.11 221.21 226.31 225.51~~

$6\frac{1}{30}$   $6\frac{1}{30}$   $11\frac{0}{19}$   $12\frac{0}{18}$   $11\frac{5}{17}$   $11\frac{1}{10}$  10.99  $11\frac{2}{6}$   $11\frac{6}{12}$   $12\frac{2}{13}$   $11\frac{1}{14}$   $7\frac{4}{21}$   $7\frac{9}{30}$

$11\frac{1}{14}$   $5\frac{1}{20}$   $5\frac{1}{19}$   $6\frac{0}{17}$   $4\frac{6}{16}$   $4\frac{5}{15}$  4.44  $4\frac{6}{17}$   $5\frac{3}{20}$   $5\frac{7}{13}$   $4\frac{0}{15}$   $1\frac{0}{20}$   $0\frac{9}{30}$

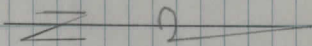
$7\frac{0}{30}$   $7\frac{1}{30}$   $7\frac{2}{30}$   $11\frac{1}{19}$   $10\frac{5}{18}$   $10\frac{2}{17}$   $10\frac{1}{16}$   $10\frac{1}{15}$  10.04  $10\frac{1}{14}$   $11\frac{0}{12}$   $11\frac{1}{13}$   $10\frac{5}{14}$   $6\frac{2}{22}$   $5\frac{0}{30}$

$7\frac{1}{29}$   $5\frac{1}{25}$   $7\frac{1}{25}$   $7\frac{0}{24}$   $7\frac{0}{23}$   $8\frac{1}{20}$   $8\frac{0}{19}$   $7\frac{1}{18}$  7.89  $8\frac{1}{15}$   $8\frac{1}{11}$   $9\frac{0}{12}$   $7\frac{5}{14}$   $4\frac{2}{21}$   $4\frac{7}{30}$

Top 2" Galv. Pipe - flag pole base @ Sta 26+0 - 36" N.  
F.W. Klingemier Res

OK 20139 D.O.K.

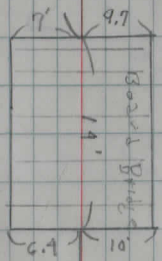
I.P. Fnd



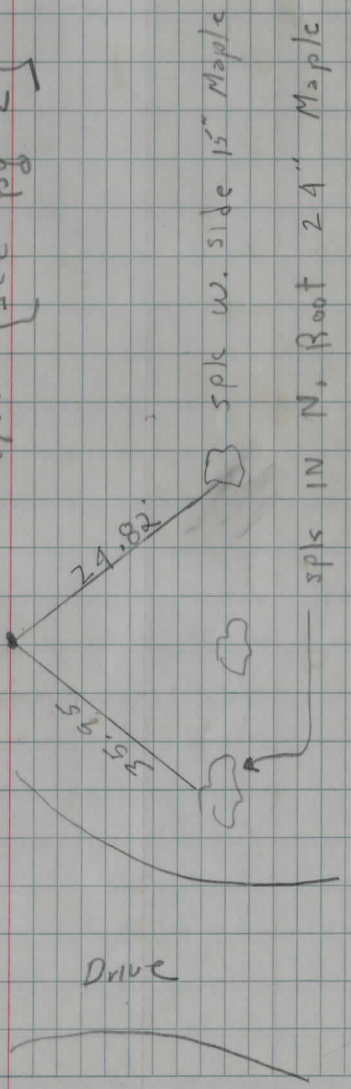
500.00'

I.P. Fnd

288.00'



P.O.T. Iron Belt set  
c/cx [see pg 2]





A blank page with horizontal blue lines and three vertical red margin lines.

A blank page with a grid pattern of blue lines. A vertical red margin line is present on the right side.

TOPO. N DITCH LINE

7+85 OLD FIELD  
 7+35 OLD FIELD  
 6+78 END DITCH, FLOWS TO OLD FIELD  
 6+32 OLD FIELD  
 5+76 PRAIRIE  
 5+46 PIPE OUT  
 5+38 ♀ GRAVEL DRIVE  
 5+26 PIPE INLET  
 4+81 PRAIRIE  
 4+31 PASTURE  
 3+95 PIPE OUTLET  
 3+85 ♀ GRAVEL DRIVE PIPE FULL-FILTERS APPROX.  
 3+75 PASTURE LAKE PIPE IN  
 3+36 PASTURE  
 2+68 LAWN  
 2+29 PIPE OUT  
 2+19 ♀ DRIVE  
 2+09 PIPE IN  
 1+87 GILMARTIN LAKE  
 1+57 FIELD  
 1+25 PIPE OUT  
 1+13 ♀ GRAVEL LANE  
 1+00 FIELD BACK OF DITCH  
 1+05 PIPE IN  
 0+00 ⌀ 579894 AT BRINGER PTY.

R.E. HERSHBERGER  
 G.A. MONNACSKY  
 D.V. SEWELL

CH33 LEGGETT  
 DRAINAGE PROB. AT 16508

10 AUGUST 1982  
 M.C., WINDY 27  
 67°F.

15+75 X CULV. OUT,  
 15+00 BRUSH  
 14+64 OUT 8" PIPE  
 14+49 ♀ FIELD DR.  
 14+28 PIPE IN  
 14+00 GARDEN  
 13+50 GARDEN  
 12+66 LAWN  
 12+34 OUT PIPE - "16508  
 12+23 ♀ GRAVEL DRIVE  
 12+14 IN 8" PIPE  
 11+96 ⌀ 9701 018  
 11+66 LAWN  
 11+48 OUT 6" PIPE  
 11+34 ♀ GRAVEL DRIVE "16508  
 11+27 PIPE IN  
 10+98 LAWN  
 10+39 LAWN  
 9+83 OLD FENCE LINE  
 9+32 OLD FIELD  
 8+79 OLD FIELD  
 8+30 OLD FIELD

R.E. HERSHBERGER  
G.A. MOHINACSKY  
D.W. SEWELL P

16508 LEGGETT RD.  
DRAINAGE PROB.

10 AUGUST 1982  
M.C., WINDY, 67°F.

1/4

OLD FIELD	7+85
OLD FIELD	7+35
OLD FIELD END DITCH	6+78
OLD FIELD	6+32
PRAIRIE	5+76
PIPE OUT	5+46
GRAVEL DRIVE	5+38
PRAIRIE PIPE IN	5+26
PRAIRIE	4+81
PASTURE	4+31
PIPE OUT	3+95
GRAVEL DRIVE NO PIPE, FILTERS THROUGH,	3+85
PASTURE - PIPE IN	3+75
PASTURE	3+36
LAWN	2+68
PIPE OUT	2+29
DRIVE	2+19
PIPE IN	2+09
GILMARTIN LAWN	1+87
DITCH	1+57
FIELD	1+40
PIPE OUT	1+35
GRAVEL LANE	1+13
FIELD	7+00
PIPE IN	1+05
579394	0+00

BRINKMEER

J.L. DARLING CORP.  
TACOMA WASH. U.S.A.

Plastic in the Rain's  
WEATHERPROOF

No. 312

X. CULV. OUT.		15+75
BRUSH		15+00
PIPE OUT 8"		14+64
FIELD DR.		14+49
FIELD DR START - PIPE IN		14+29
GARDEN		14+00
GARDEN		13+50
LAWN		12+86
PIPE OUT	16508	12+34
GRAVEL DRIVE		12+23
PIPE IN 8"		11+14
POLE #	9701 018	11+96
LAWN		11+66
PIPE OUT 6"		11+48
GRAVEL DRIVE	16508	11+34
PIPE IN		11+27
LAWN		10+98
LAWN		10+39
OLD FENCE LINE		9+83
OLD FIELD		9+32
OLD FIELD		9+19
OLD FIELD		8+30

R.E.H.  
G.A.M.  
D.W.S.

16508 LEGGETT  
DRAINAGE  
ELEVATIONS P.S.

10 AUG. '82

(2)

B.S.

H.I.

ELEV.

T.B.M. TOP OF FENCE POST, N. MOST IN N-S LINE, S SIDE RD. 100.00

Station	116.37	114.39	114.32	112.58	111.97
T.P. 1				0.34	104.63
1+00	0.15 268	11.89 238	2.19 70	3.94 6	11.55 0
1+13	116.01	112.19	1.58 227	3.02 60	4.78 0
1+40	0.51 240	4.33 185	4.51 61	5.89 7	8.03 2
1+57	115.66	112.07	4.45 237	6.28 67	6.26 0
1+87		112.17	4.35 185	108.57	107.05
1+05				1.95 9	8.13 0
1+25				9.47 4	108.35
2+09				5.63	106.24
2+19		111.49	5.03 210	7.06 155	10.28
2+29		108.83		108.15	106.74
2+63	7.69 220	9.18 163	10.55 30	12.22 7	11.68 0
TP 2				10.23	106.29
				2.35	108.64

EDGE OF ROAD

J.L. DARLING CORP.  
TACOMA, WASH. U.S.A.  
"Rite in the Rain" WEATHERPROOF

No. 312



3+36

189

46

4.63

108.64  
112 8.65

54

126

69

3

5.60

0

106.75

3+75

21

145

6.24

75

4.45

42

5.52

7

8.26

3

1

103.04

108.75

3+85

1.59

136

5.48

78

5.19

50

6.33

10

7.02

0

107.05

3+95

2.44

110

9.02

53

6.68

30

6.67

9

9.85

3

8.70

0

106.2

4+81

5.43

150

10.35

60

9.20

9

10.32

3

9.64

0

103.2

5+26

5+46

5+38

5+76

TB4

G+32

96.6

1204

180

13.11

86

12.67

70

10.97

18

10.16

4

10.37

10.37

13.55

183

12.7

140

10.44

12

12.15

4

10.89

10.89

11.29

11.29

97.35

97.35

97.67

97.67

98.48

98.48

98.27

98.27

1.58

101.58

864

100.00

93.32

92.67

95

95.28

60

96.3

95.66

97.15

8.26

185

5.98

60

5.28

10

5.92

5

4.13

0

REH  
GAM  
DWS

16508 LEGGETT  
DRAINAGE

10 AUGUST 1982  
72° M.L., WINDY

(3)  
4

6+78  $\frac{10.52}{240} \frac{7.08}{120} \frac{8.06}{78} \frac{7.95}{40} \frac{7.01}{7} \frac{5.28}{0}$

7+35  $\frac{11.75}{240} \frac{12.00}{165} \frac{10.62}{90} \frac{6.86}{10} \frac{5.37}{0}$

7+21 BM

11 AUGUST 1982  
66° P.C., W. BREEZE

R.E.H.  
G.A.M.  
D.W.S.

7+85  $\frac{12.72}{180} \frac{11.57}{100} \frac{11.15}{80} \frac{6.66}{4} \frac{6.68}{2} \frac{5.75}{2}$

8+30  $\frac{11.16}{93} \frac{6.28}{25} \frac{5.59}{6} \frac{7.13}{2} \frac{-5.95}{0}$

8+79  $\frac{6.30}{66} \frac{4.80}{39} \frac{3.87}{9} \frac{7.56}{2} \frac{6.67}{0}$

$\frac{16.9}{354} \frac{15.85}{300} \frac{17.95}{228} \frac{13.25}{183} \frac{15.35}{510}$

$\frac{14.5}{300} \frac{13.72}{255} \frac{14.15}{200} \frac{12.73}{150}$

$\frac{16.4}{435}$

J.L. DARLING CORP.  
TACOMA, WASH. U.S.A.

Write in this Raincoat  
WEATHERPROOF

No. 312

9+32

$\frac{2.58}{100}$

$\frac{6.45}{10}$

$\frac{9.03}{2}$

$\frac{8.31}{0}$

T.P

106.86

6.96

94.90

$\frac{1.49}{6.04}$   
165

96.39

9+83

$\frac{2.56}{63}$

$\frac{3.59}{4}$

$\frac{5.86}{2}$

$\frac{4.11}{0}$

10+39

$\frac{10.77}{.156}$

$\frac{5.23}{4}$

$\frac{6.62}{2}$

$\frac{5.37}{0}$

10+98

$\frac{10.43}{146}$

$\frac{6.38}{6}$

$\frac{7.39}{4}$

$\frac{6.37}{0}$

11+27

$\frac{8.67}{4}$

11+34

$\frac{6.28}{50}$

$\frac{6.95}{6}$

$\frac{7.62}{0}$

11+48

$\frac{9.26}{6}$

11+66

$\frac{6.81}{40}$

$\frac{6.05}{15}$

$\frac{10.94}{5}$

$\frac{9.96}{0}$

T.P

96.39

11.91

84.48

1.54

86.02

12+83

12+14

$\frac{3.49}{4}$

R.E.H.  $\Phi$   
G.A.M.  $\pi$   
D.W.S.  $\Phi$

16508 LEGGETT  
DRAINAGE PROB.

W. 11 AUGUST 1982  
68 OF. M.C., BREEZY

4/4

12+23

$\frac{2.54}{96}$   $\frac{2.26}{4}$   $\frac{2.23}{0}$

12+34

$\frac{5.28}{4}$

12+66

$\frac{6.57}{50}$   $\frac{4.54}{10}$   $\frac{6.60}{4}$   $\frac{4.70}{0}$

13+50

$\frac{8.75}{50}$   $\frac{7.45}{10}$   $\frac{11.13}{4}$   $\frac{9.91}{0}$

14+00

$\frac{10.06}{50}$   $\frac{9.06}{10}$   $\frac{14.5}{4}$   $\frac{13.30}{0}$

T.P.

11.70 74.32

0.81 75.13

14+28

$\frac{5.53}{4}$   $\frac{69.6}{69.79}$

14+49

$\frac{0.65}{75}$   $\frac{2.65}{25}$   $\frac{4.52}{4}$   $\frac{15.34}{0}$

14+64

$\frac{7.23}{4}$

15+00

$\frac{7.31}{6}$   $\frac{8.62}{2}$   $\frac{7.81}{0}$

15+75

$\frac{14.85}{4}$

J. L. DARLING CORP.  
TACOMA, WASH. U.S.A.

Plot in the Rain  
WEATHERPROOF

No. 312

	+	̄	-	E
		75.13		
T.P.			0.11	75.02
	12.47	87.49		
T.P.			0.21	87.28
	9.49	96.77		
T.P.			1.26	95.51
	6.52	102.03		
B.M.			2.03	100.00

TPs CHKD 08/11/82 GDM

STA.	B.S.	H.I.	F.S.	ELEV.			
T.B.M.				100.00			
	4.97	104.97					
T.P.1			0.37	104.63			
	11.89	116.52					
1+00	$\frac{0.15}{268}$	$\frac{2.18}{238}$	$\frac{2.19}{70}$	$\frac{3.94}{6}$	$\frac{5.36}{2}$	$\frac{4.55}{0}$	EDGE OF ROAD
1+13	$\frac{1.58}{227}$	$\frac{3.02}{60}$		$\frac{4.63}{2}$	$\frac{4.78}{0}$		
1+40	$\frac{0.51}{240}$	$\frac{4.33}{185}$	$\frac{3.22}{145}$	$\frac{4.57}{67}$	$\frac{5.89}{7}$	$\frac{8.03}{3}$	$\frac{6.26}{0}$
1+57	$\frac{0.86}{291}$	$\frac{4.45}{237}$	$\frac{6.28}{67}$	$\frac{8.36}{7}$	$\frac{8.69}{3}$	$\frac{7.22}{0}$	
1+87		$\frac{4.35}{185}$	$\frac{7.95}{9}$	$\frac{9.47}{4}$	$\frac{8.13}{0}$		
1+05			5.63				
1+25			6.17				
2+09			10.28				
2+19	$\frac{5.03}{210}$	$\frac{7.06}{155}$		$\frac{8.37}{20}$	$\frac{9.48}{0}$		
2+29			11.38				
2+68	$\frac{7.69}{220}$	$\frac{9.18}{163}$	$\frac{10.55}{30}$	$\frac{12.22}{7}$	$\frac{13.97}{4}$	$\frac{11.68}{0}$	
TP <sub>2</sub>			10.23	106.29			
	2.35	108.64					

TOP OF FENCE  
POST, N<sup>W</sup> CORNER  
IF N-S LINE,  
S SIDE RD.

R.E.H.  
G.A.M.  
D.N.S.

CH 33 LEGGETT  
DRAINAGE PROB. @ 16508  
C.T.D.

10 AUG. 182  
72' N.C. W. 28  
182

3+36	$\frac{1.89}{146}$	$\frac{4.63}{112}$	$\frac{3.09}{65}$	$\frac{5.14}{6}$	$\frac{6.91}{3}$	$\frac{5.60}{0}$	
3+75	$\frac{0.21}{145}$	$\frac{6.24}{75}$	$\frac{4.45}{42}$	$\frac{5.52}{7}$	$\frac{8.26}{3}$		
3+85	$\frac{1.59}{136}$	$\frac{5.48}{78}$	$\frac{5.19}{50}$	$\frac{6.38}{10}$	$\frac{7.03}{0}$		
3+95				8.91			
4+31	$\frac{2.44}{110}$	$\frac{9.02}{53}$	$\frac{6.68}{30}$	$\frac{6.67}{9}$	$\frac{9.85}{3}$	$\frac{8.70}{0}$	
4+81	$\frac{5.43}{150}$	$\frac{10.35}{60}$		$\frac{9.20}{9}$	$\frac{10.82}{3}$	$\frac{9.64}{0}$	
5+26				11.26			
5+38	$\frac{12.04}{180}$	$\frac{13.11}{86}$	$\frac{12.67}{70}$	$\frac{10.97}{18}$	$\frac{10.16}{7}$	$\frac{10.37}{0}$	
5+76	$\frac{13.55}{183}$	$\frac{14.7}{140}$	$\frac{10.44}{12}$	$\frac{12.15}{4}$	$\frac{10.89}{0}$		
T.B.M.				8.64	100.00		
	1.58	101.58					
6+32	$\frac{8.26}{230}$	$\frac{8.91}{185}$	$\frac{5.98}{60}$	$\frac{5.28}{10}$	$\frac{5.92}{5}$	$\frac{4.43}{0}$	
6+78	$\frac{10.52}{240}$	$\frac{7.08}{120}$	$\frac{8.06}{78}$	$\frac{7.93}{40}$	$\frac{7.01}{7}$	$\frac{5.28}{0}$	
7+35	$\frac{11.75}{240}$	$\frac{12.08}{165}$	$\frac{10.62}{90}$	$\frac{6.86}{10}$	$\frac{5.37}{0}$		

P.E.H.  
G.A.M.  
D.W.S.

16508 LECHETT  
DRAINAGE CTD

11 AUGUST 1982  
66° PC., LT. BRESSE 29

	+	∑	-	E.
7+21				100.00 TBM
T	1.86	101.86		
T	$\frac{12.72}{180}$	$\frac{11.57}{100}$	$\frac{11.15}{80}$	$\frac{6.66}{4}$ $\frac{6.68}{2}$ $\frac{5.75}{0}$
T	$\frac{12.75}{200}$	$\frac{10.76}{270}$	$\frac{13.25}{330}$	$\frac{13.8}{390}$
B	$\frac{11.16}{93}$	$\frac{6.28}{25}$	$\frac{5.59}{6}$	$\frac{7.13}{2}$ $\frac{5.95}{0}$
		$\frac{14.5}{300}$	$\frac{13.72}{255}$	$\frac{14.15}{200}$ $\frac{12.79}{150}$
	$\frac{10.74}{135}$	$\frac{6.30}{66}$	$\frac{4.80}{39}$	$\frac{3.87}{9}$ $\frac{7.66}{2}$ $\frac{6.67}{0}$
	$\frac{15.35}{50}$	$\frac{16.4}{435}$	$\frac{16.9}{354}$	$\frac{15.85}{300}$ $\frac{14.95}{228}$ $\frac{13.26}{183}$
	$\frac{2.58}{100}$	$\frac{6.45}{10}$	$\frac{9.03}{1}$	$\frac{8.31}{0}$
T.P.		6.96	94.90	
T.P.	1.49	96.39		
	$\frac{6.04}{165}$	$\frac{2.56}{63}$	$\frac{3.59}{4}$	$\frac{5.86}{2}$ $\frac{4.11}{0}$
	$\frac{10.77}{156}$	$\frac{5.23}{4}$	$\frac{6.62}{2}$	$\frac{5.37}{0}$
	$\frac{10.43}{146}$	$\frac{6.38}{6}$	$\frac{7.39}{4}$	$\frac{6.37}{0}$

			$\frac{8.67}{4}$	
		$\frac{6.28}{50}$	$\frac{6.95}{6}$	$\frac{7.62}{0}$
			$\frac{9.26}{6}$	
	$\frac{6.81}{40}$	$\frac{6.25}{15}$	$\frac{10.94}{5}$	$\frac{9.96}{0}$
T.P.		11.91	84.48	
	1.54	86.02		
			$\frac{3.49}{4}$	
		$\frac{2.54}{96}$	$\frac{2.26}{7}$	$\frac{2.23}{0}$
			$\frac{5.28}{4}$	
	$\frac{6.57}{50}$	$\frac{4.54}{10}$	$\frac{6.60}{4}$	$\frac{4.70}{0}$
	$\frac{8.70}{50}$	$\frac{7.45}{10}$	$\frac{11.13}{4}$	$\frac{9.91}{0}$
	$\frac{10.06}{50}$	$\frac{9.06}{10}$	$\frac{14.5}{4}$	$\frac{13.30}{0}$
T.P.		11.70	74.32	
	0.81	75.13		

75.13

I  
14+28 $\frac{5.53}{4}$ 

14+49

 $\frac{0.65}{75}$  $\frac{2.69}{25}$  $\frac{4.52}{4}$  $\frac{5.34}{0}$ I  
14+64 $\frac{7.23}{4}$ B  
15+00 $\frac{7.81}{6}$  $\frac{8.62}{2}$  $\frac{7.81}{0}$ 

15+75

 $\frac{14.85}{4}$ 

T.P.

0.11

75.02

12.47 87.49

T.P.

0.21

87.28

9.49 96.77

T.P.

1.26

95.51

6.52 102.03

B.M.

2.03

100.00

IP'S CHECK 02/11/92 Carl

R.E.H. M  
G.A.M. T  
D.W.S. P16508 LEGGETT W 11 AUGUST 1984 30  
DRAINAGE PROJ. CD. 68°F, M.C., BREEZY



T  
7  
7  
E

This page features four vertical red margin lines that divide the page into five columns. The rest of the page is filled with horizontal blue lines, creating a series of rows for writing.

This page is a grid of graph paper. It has a vertical red margin line on the left side, creating a narrow left margin. The rest of the page is a grid of small squares, with horizontal blue lines and vertical green lines forming the grid.

T  
7  
7  
E

This page is a blank ledger with horizontal blue lines and four vertical red lines. The red lines are positioned at approximately 15%, 20%, 25%, and 35% of the page width from the left margin, creating five columns of varying widths. The page is otherwise empty.

This page is a blank ledger with horizontal blue lines and a single vertical red line at approximately 15% of the page width from the left margin. A light blue grid is overlaid on the page, with vertical lines corresponding to the red line and the page's right edge. The page is otherwise empty.

1  
:  
:  
2

The right page of the notebook features a grid of 20 columns and 20 rows. A vertical red margin line is positioned on the left side of the grid, approximately one-fifth of the way across the page. The grid is composed of thin blue lines. The page is otherwise blank, with no text or markings within the grid area.

1

2

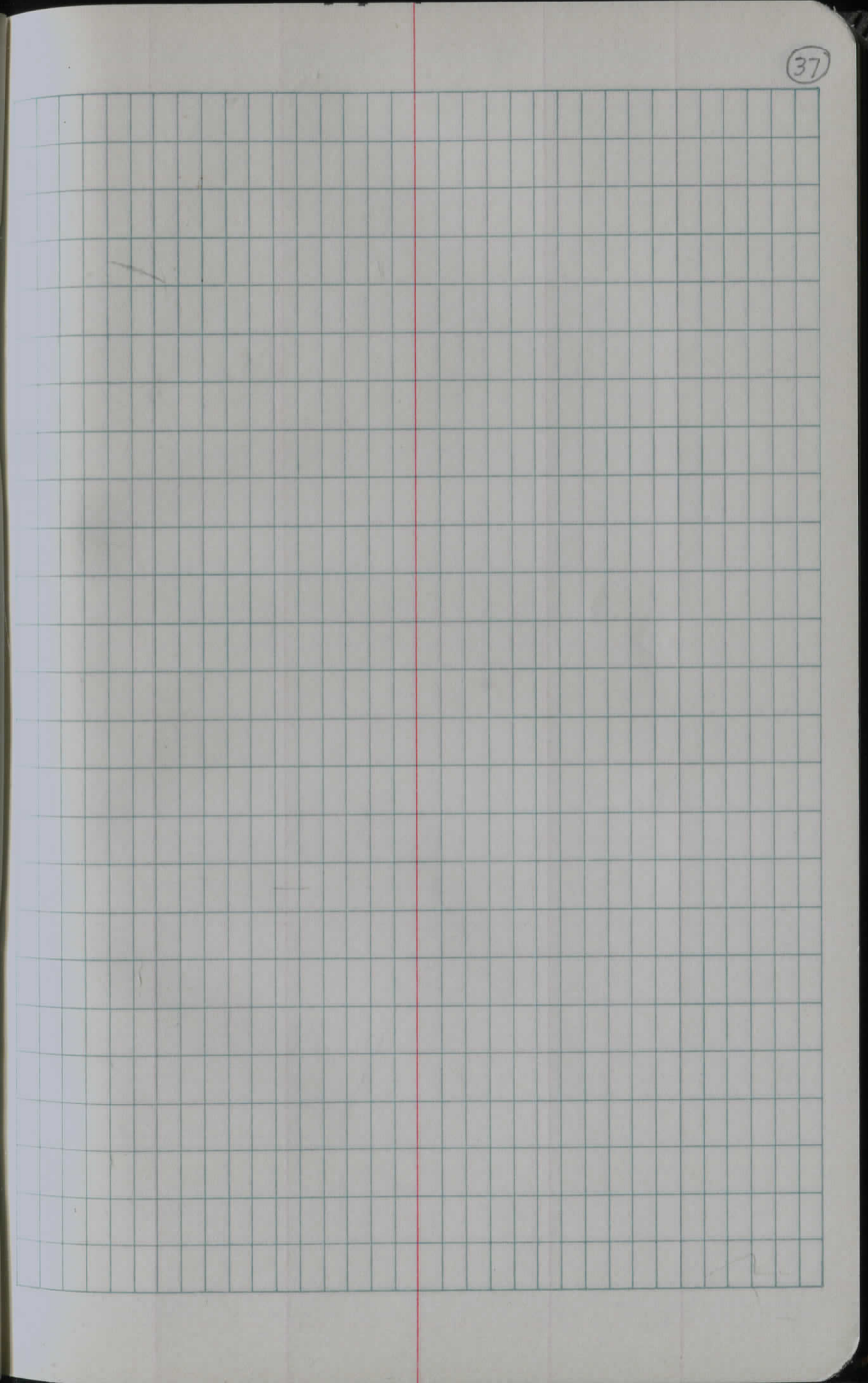
1

2

This page is a blank ledger sheet. It features a series of horizontal blue lines for writing. There are four vertical red lines that create five columns of varying widths, typical for accounting or record-keeping. The page is otherwise empty.

This page is a blank grid sheet. It has a vertical red margin line on the left side. The rest of the page is filled with a grid of blue lines, forming a table with 20 columns and 25 rows. The page is otherwise empty.



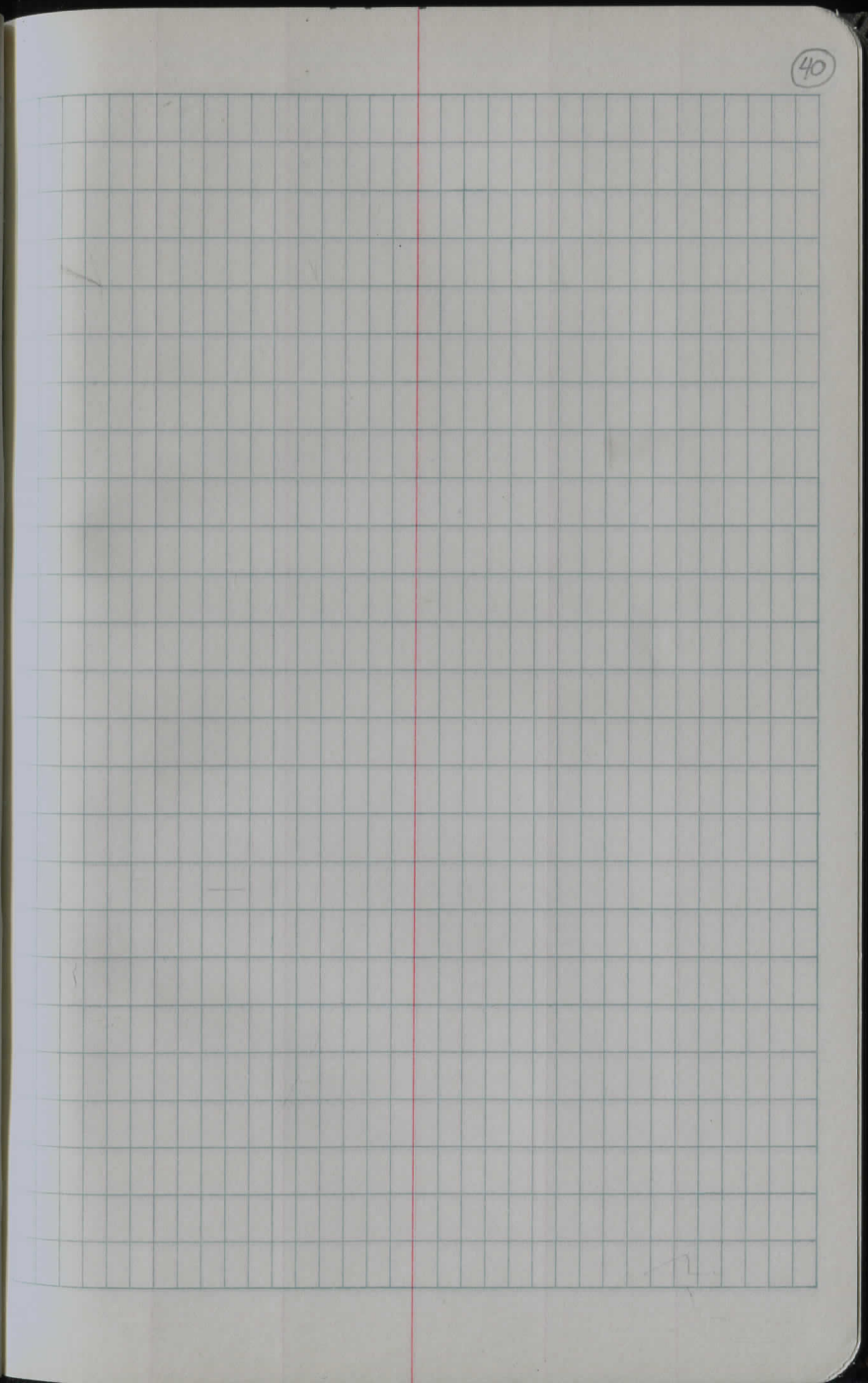
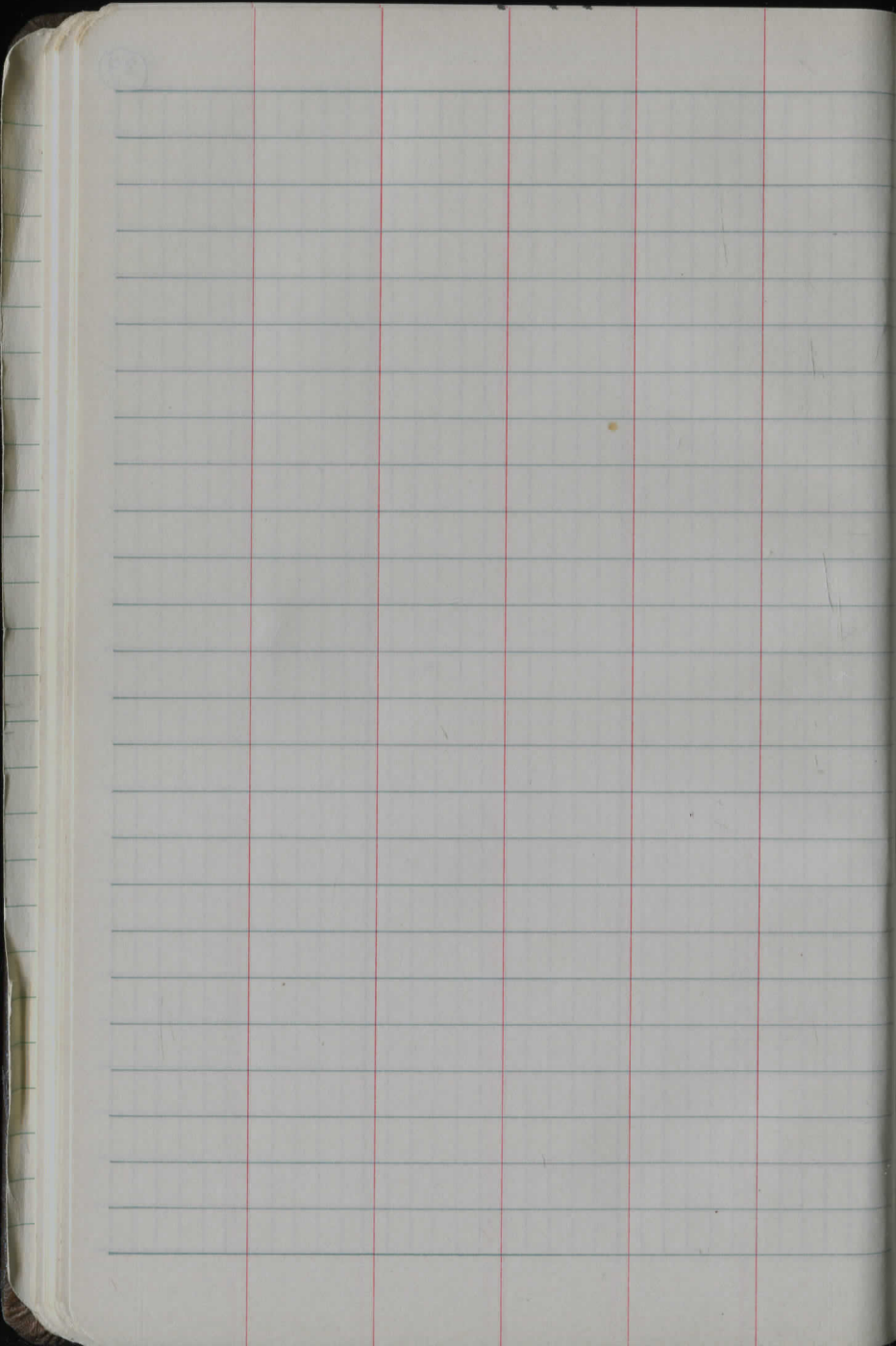


Blank lined page with three vertical red margin lines.

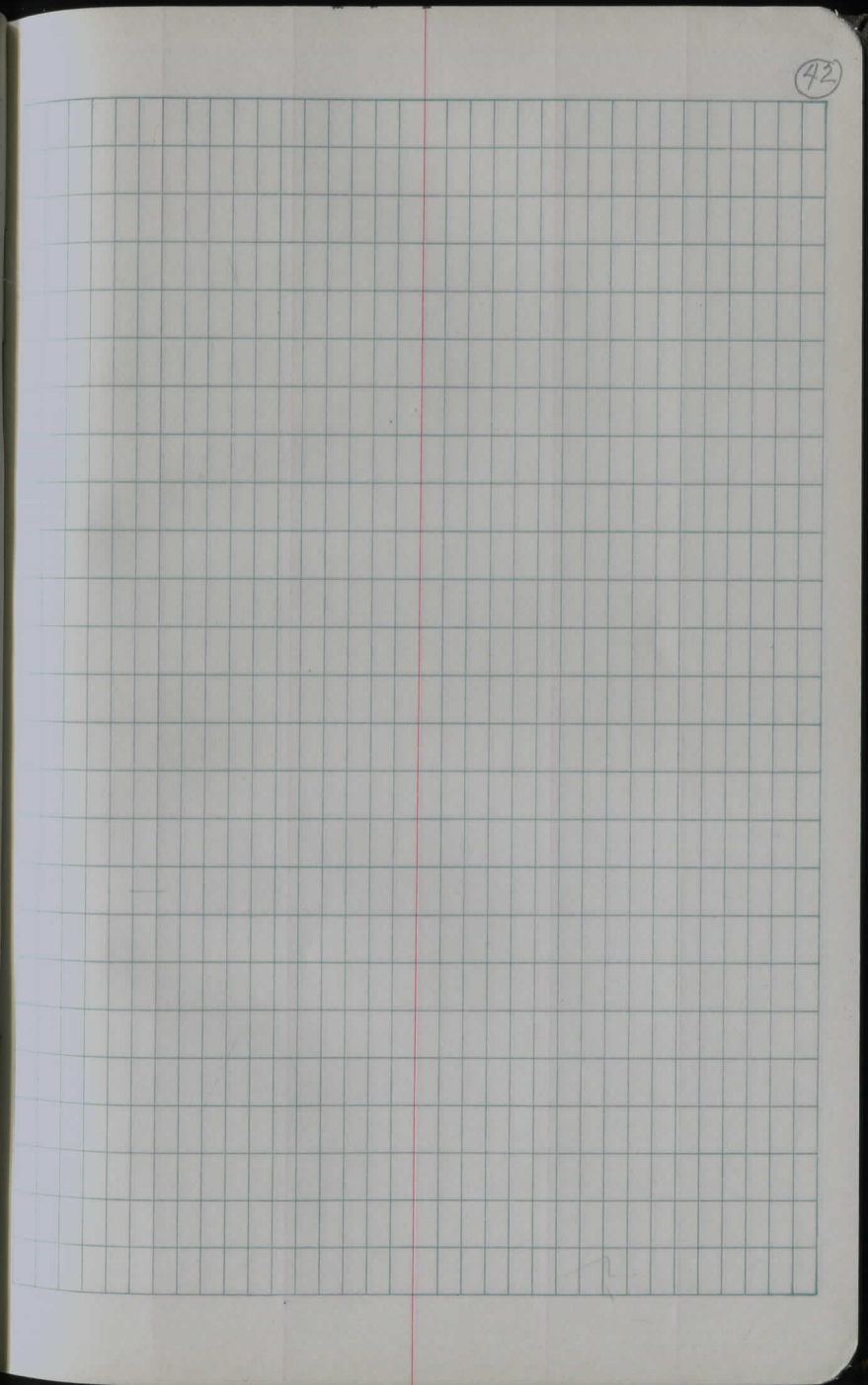
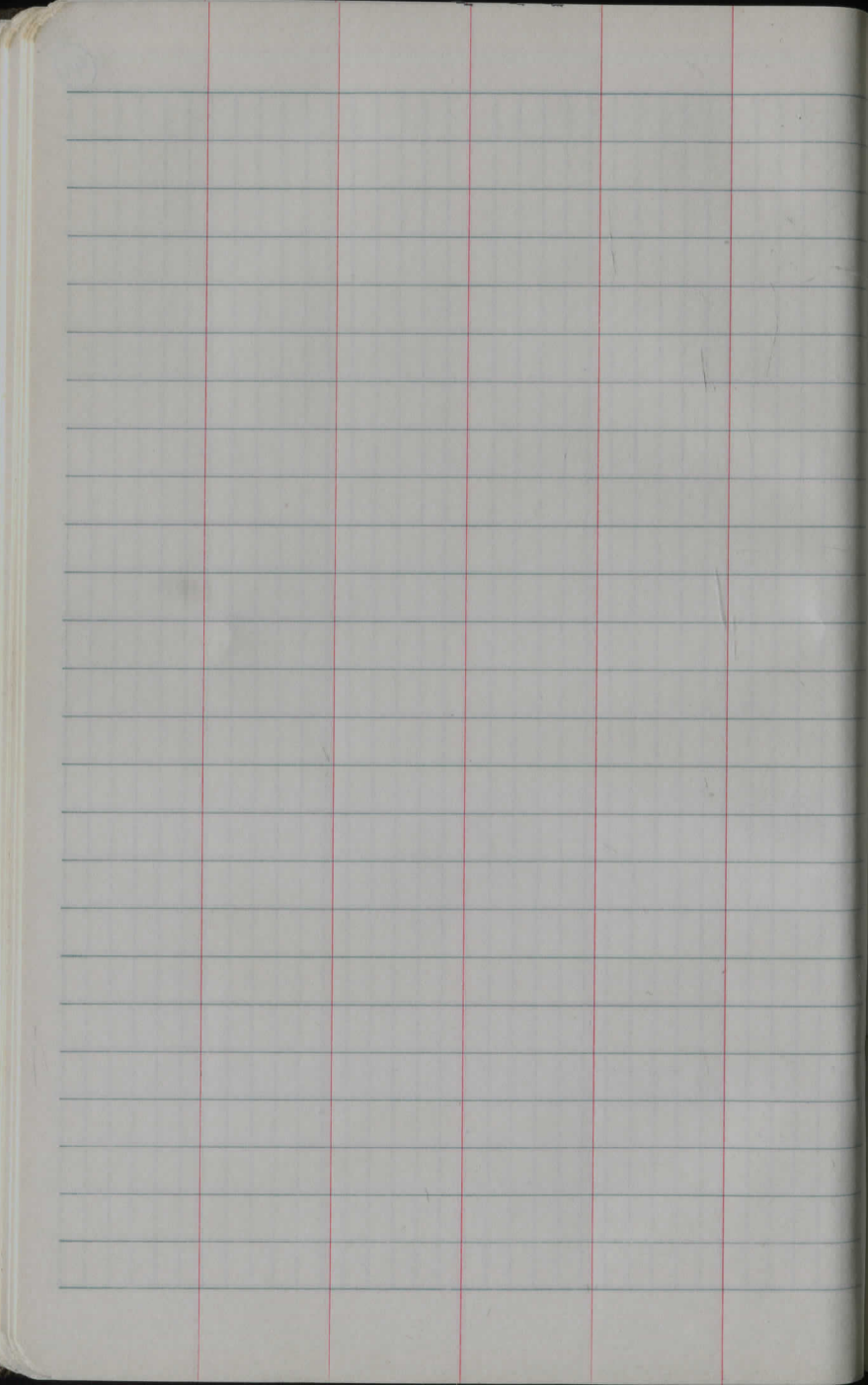
Blank grid page with a vertical red margin line.



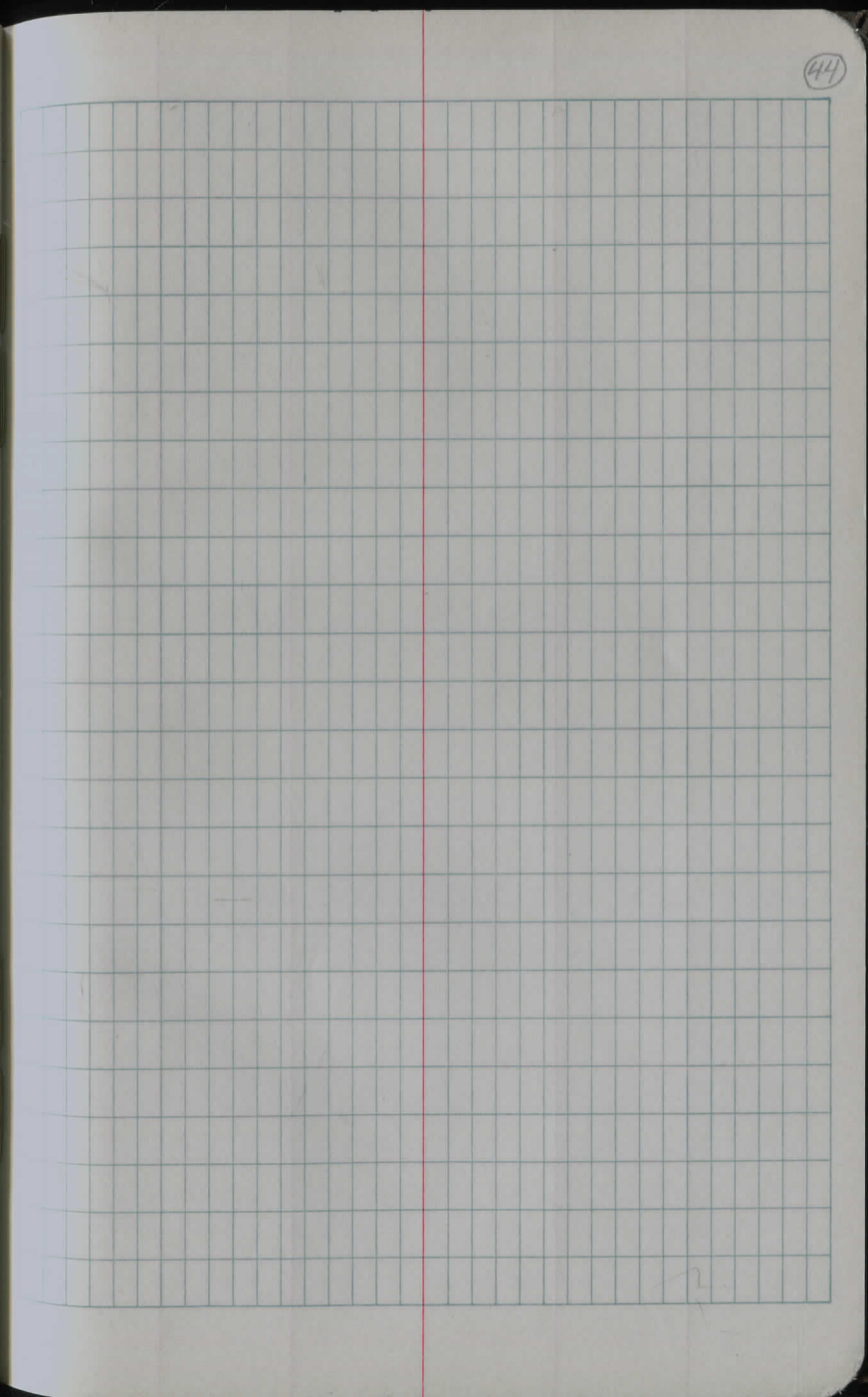












This page is a blank ledger page. It features horizontal blue ruling lines spaced evenly down the page. Three vertical red lines are drawn to create margins: one on the left side, one in the middle, and one on the right side. The page is otherwise empty of any text or markings.

This page is a blank ledger page. It features horizontal blue ruling lines spaced evenly down the page. A single vertical red line is drawn on the right side to create a margin. The main body of the page is filled with a grid of small squares, formed by light blue vertical and horizontal lines. The page is otherwise empty of any text or markings.





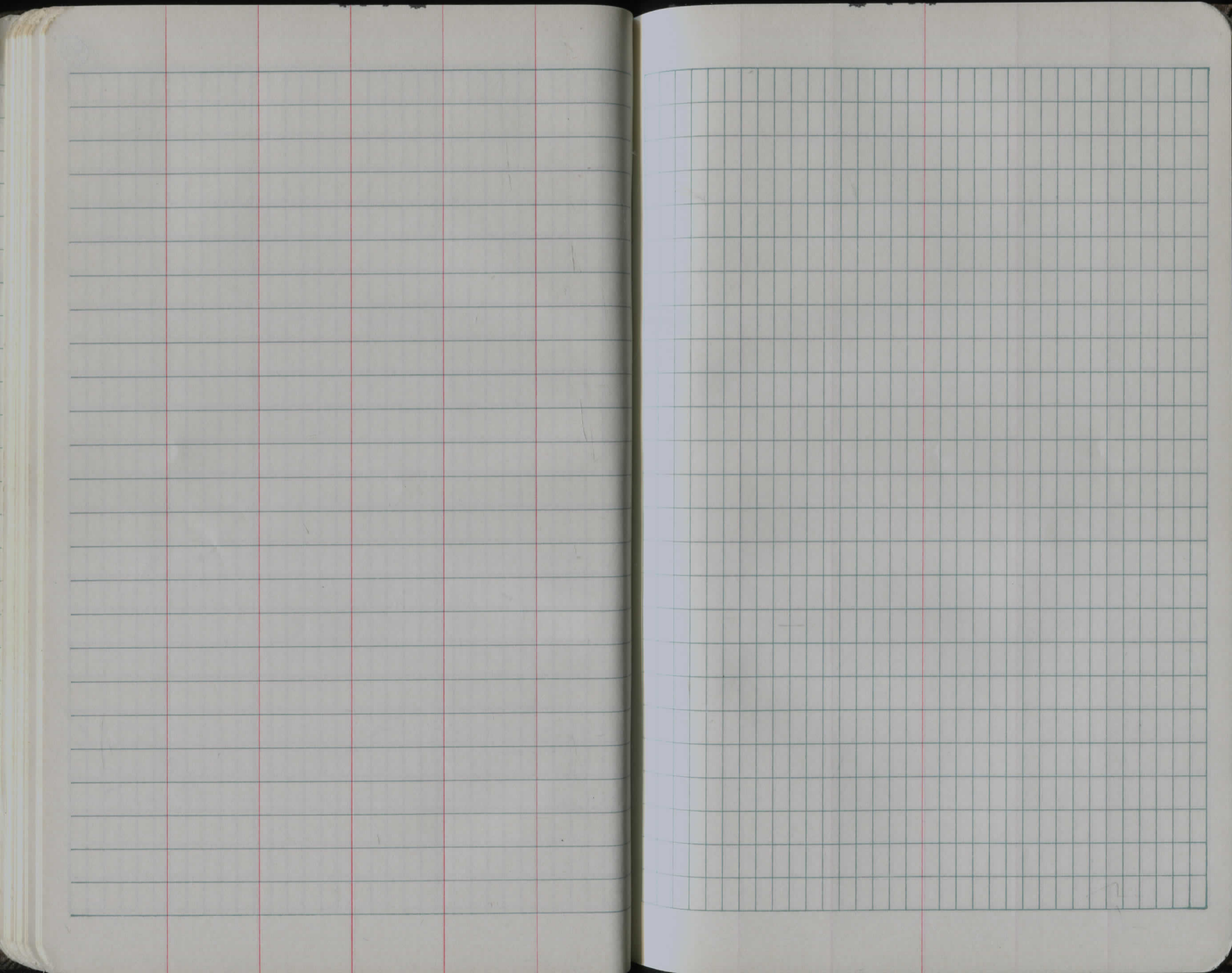


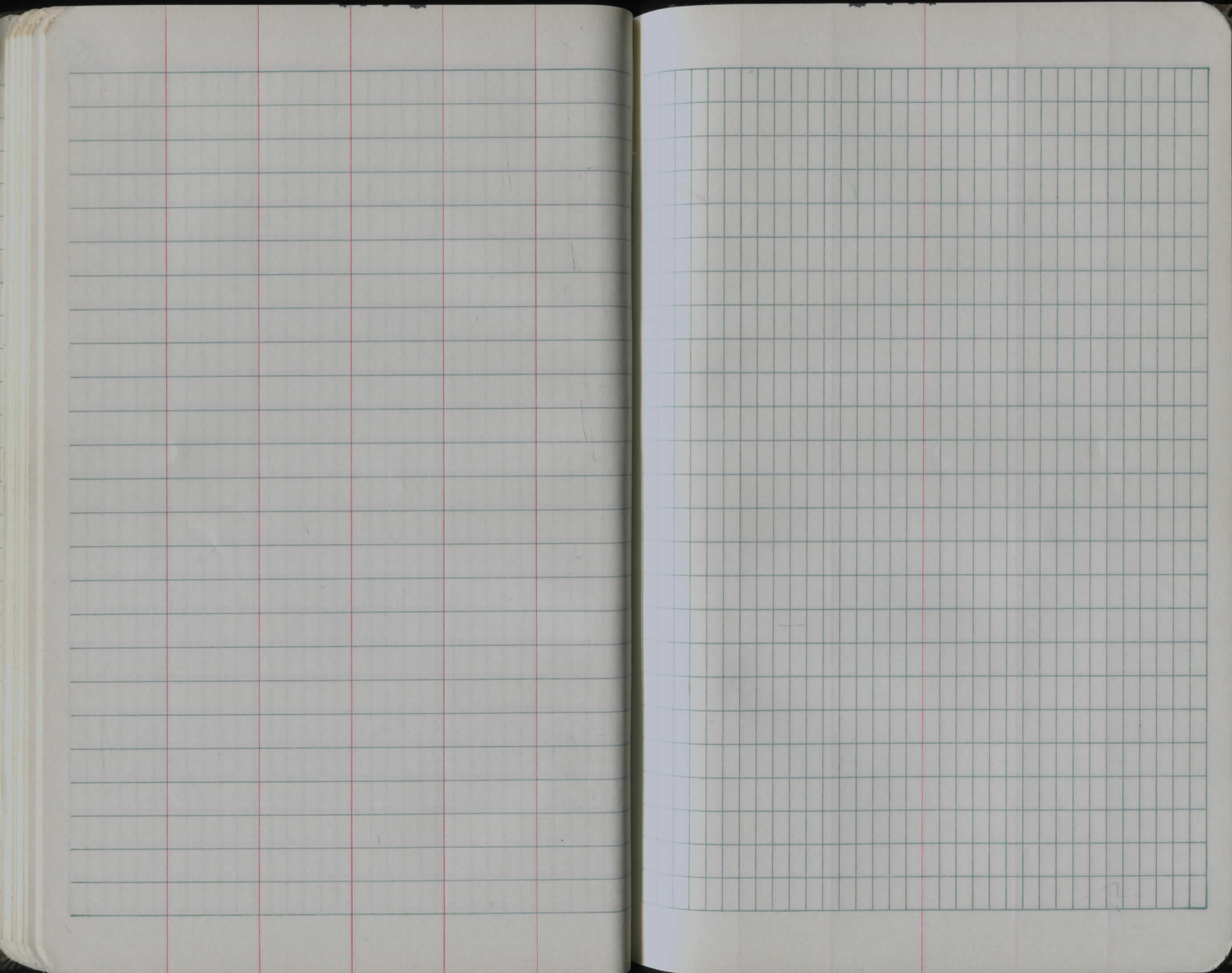


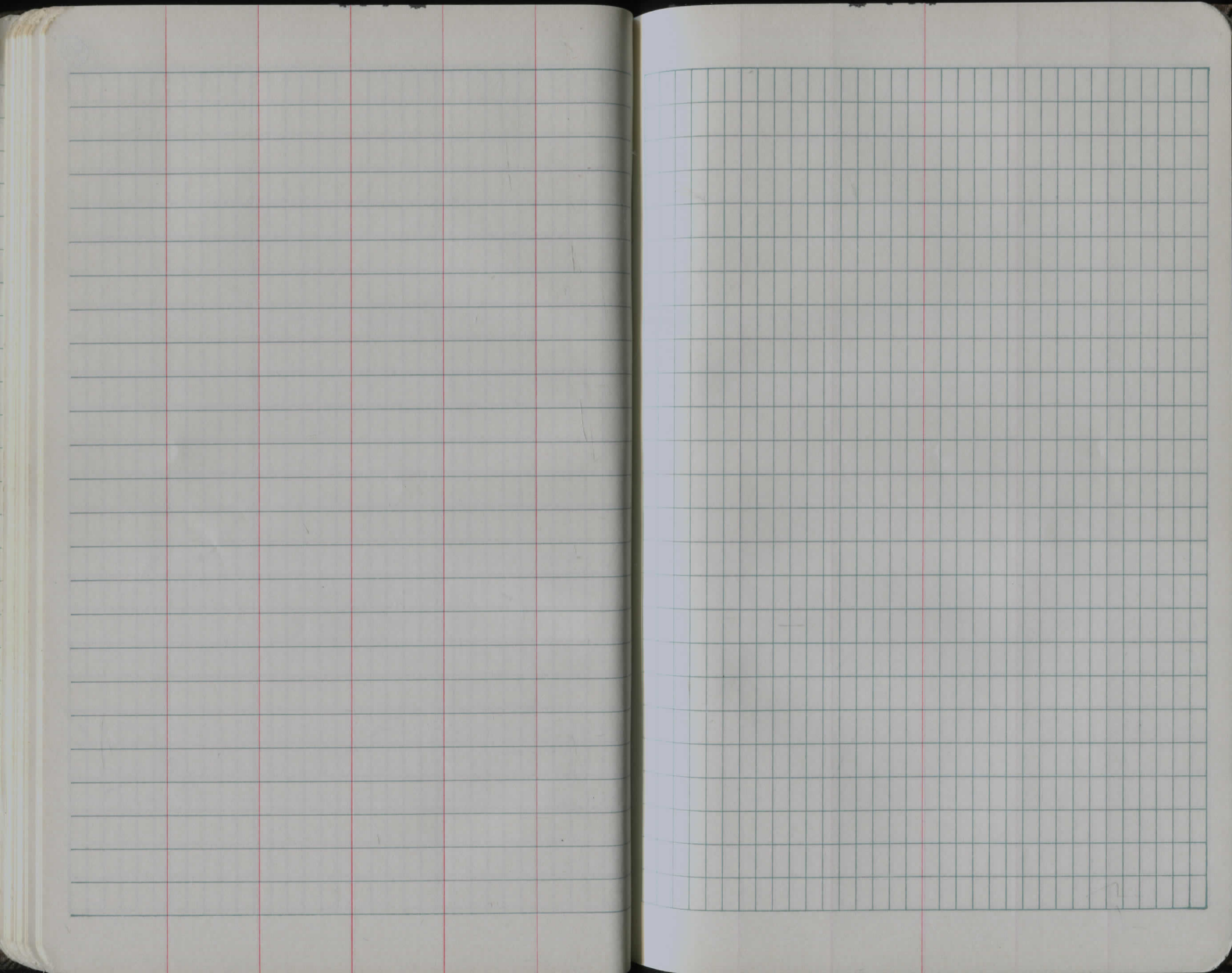
This page is a blank ledger sheet. It features horizontal blue ruling lines spaced evenly down the page. There are four vertical red lines that create five columns of varying widths. The columns are roughly in the proportions of 1:1:1:1:2 from left to right. The page is otherwise empty of any text or markings.

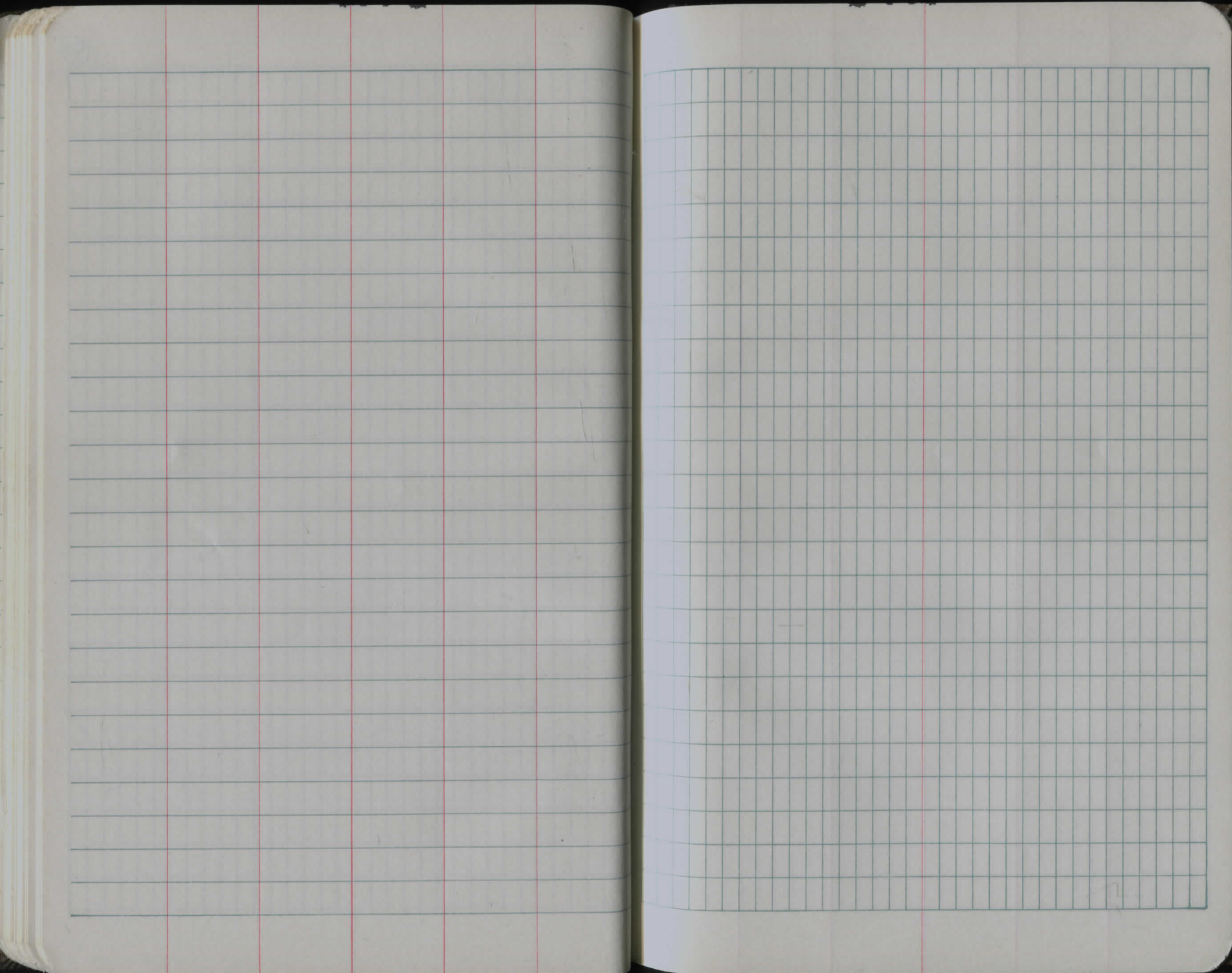
This page is a blank ledger sheet with a grid pattern. It has horizontal blue ruling lines. A single vertical red line is positioned on the right side, creating a narrow margin. The rest of the page is filled with a fine grid of light blue lines, forming a table with many small columns and rows. The page is otherwise empty of any text or markings.



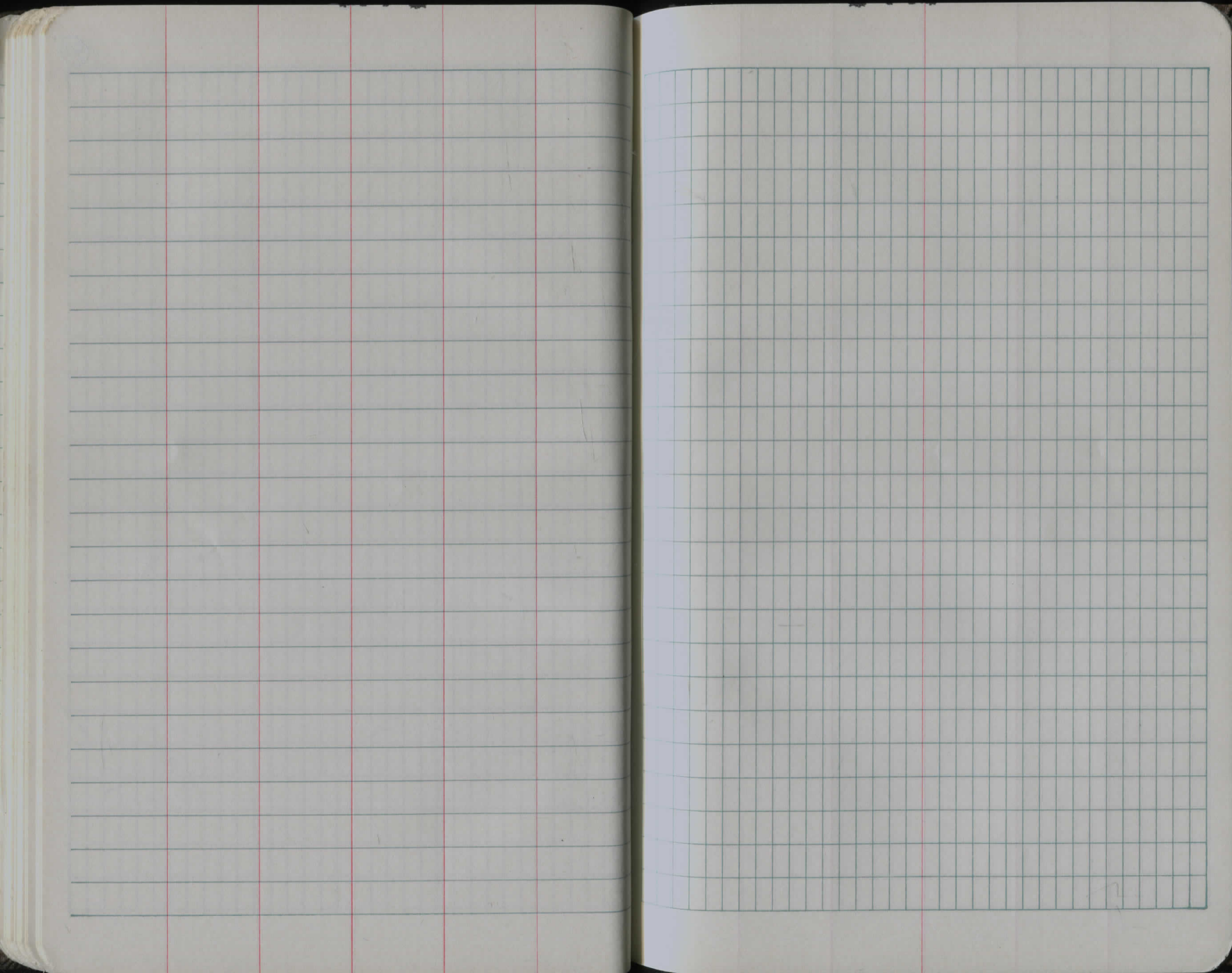


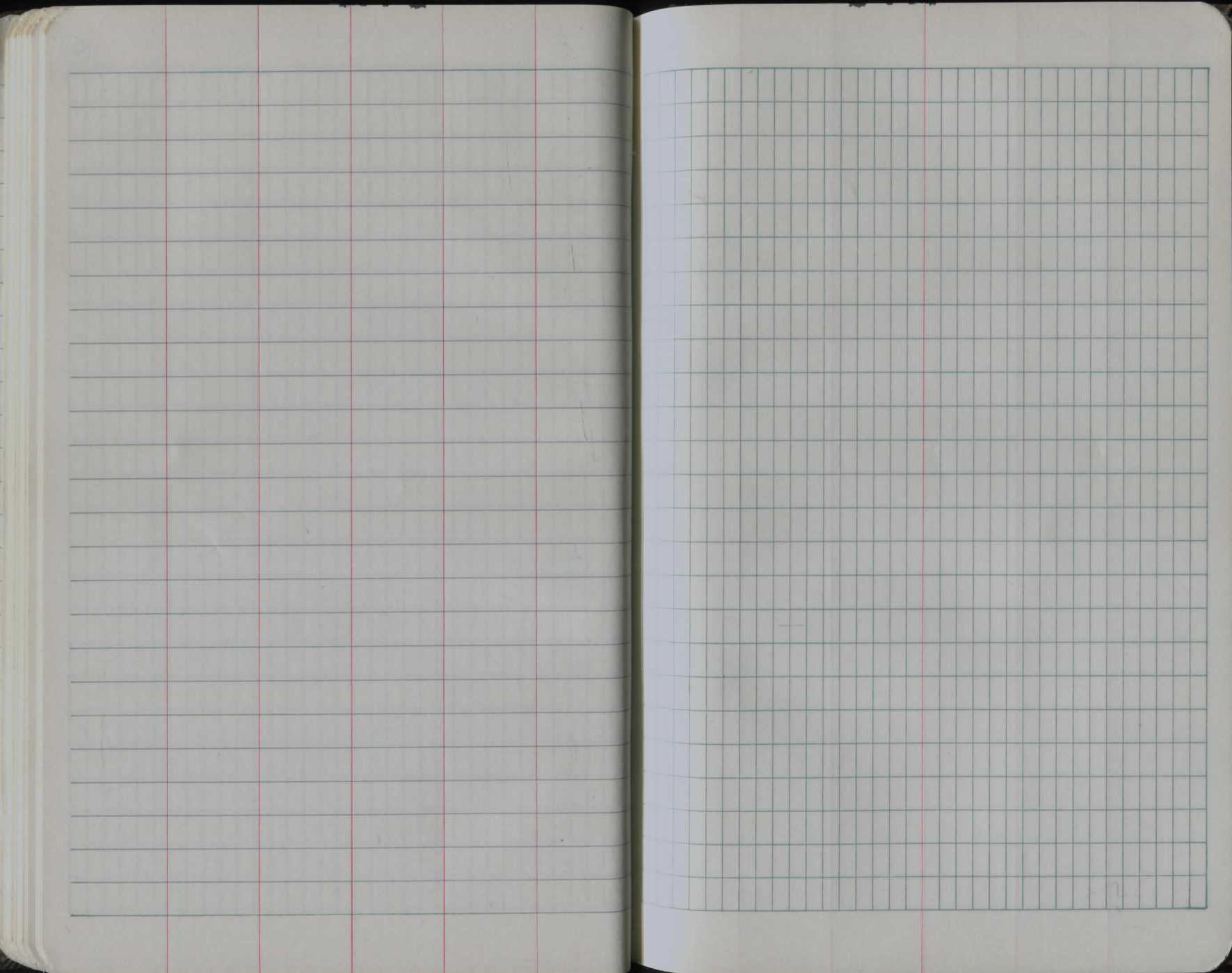


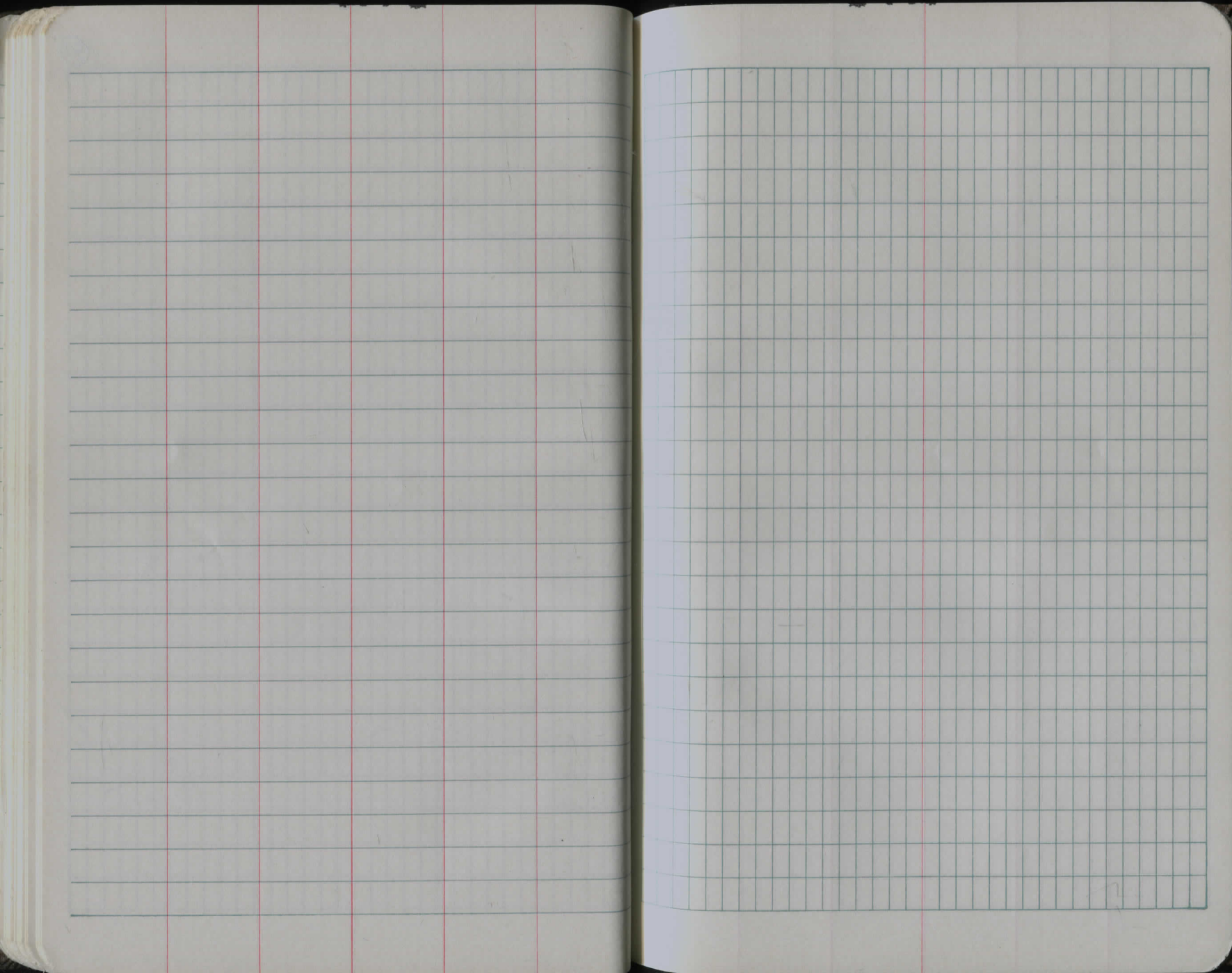


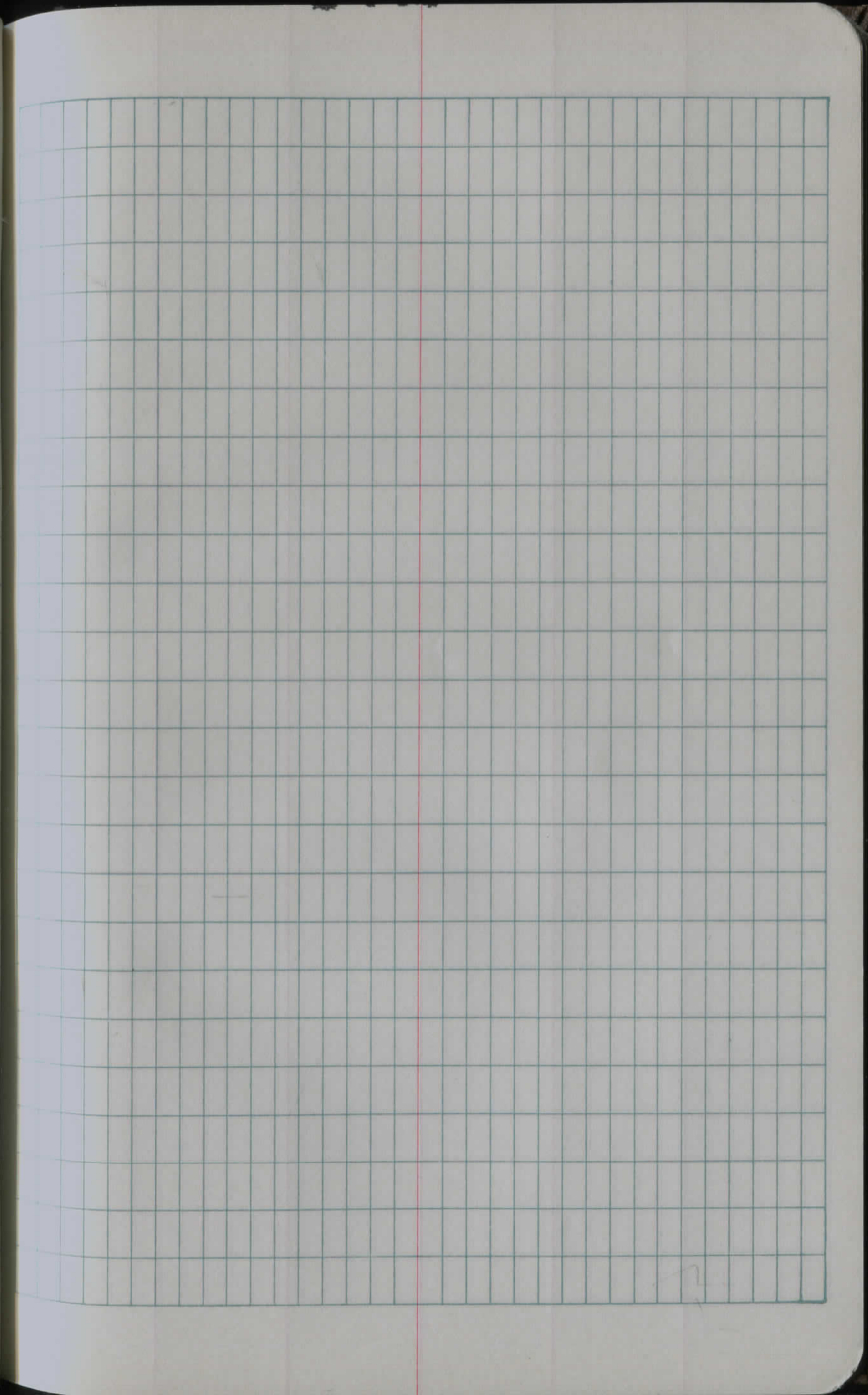


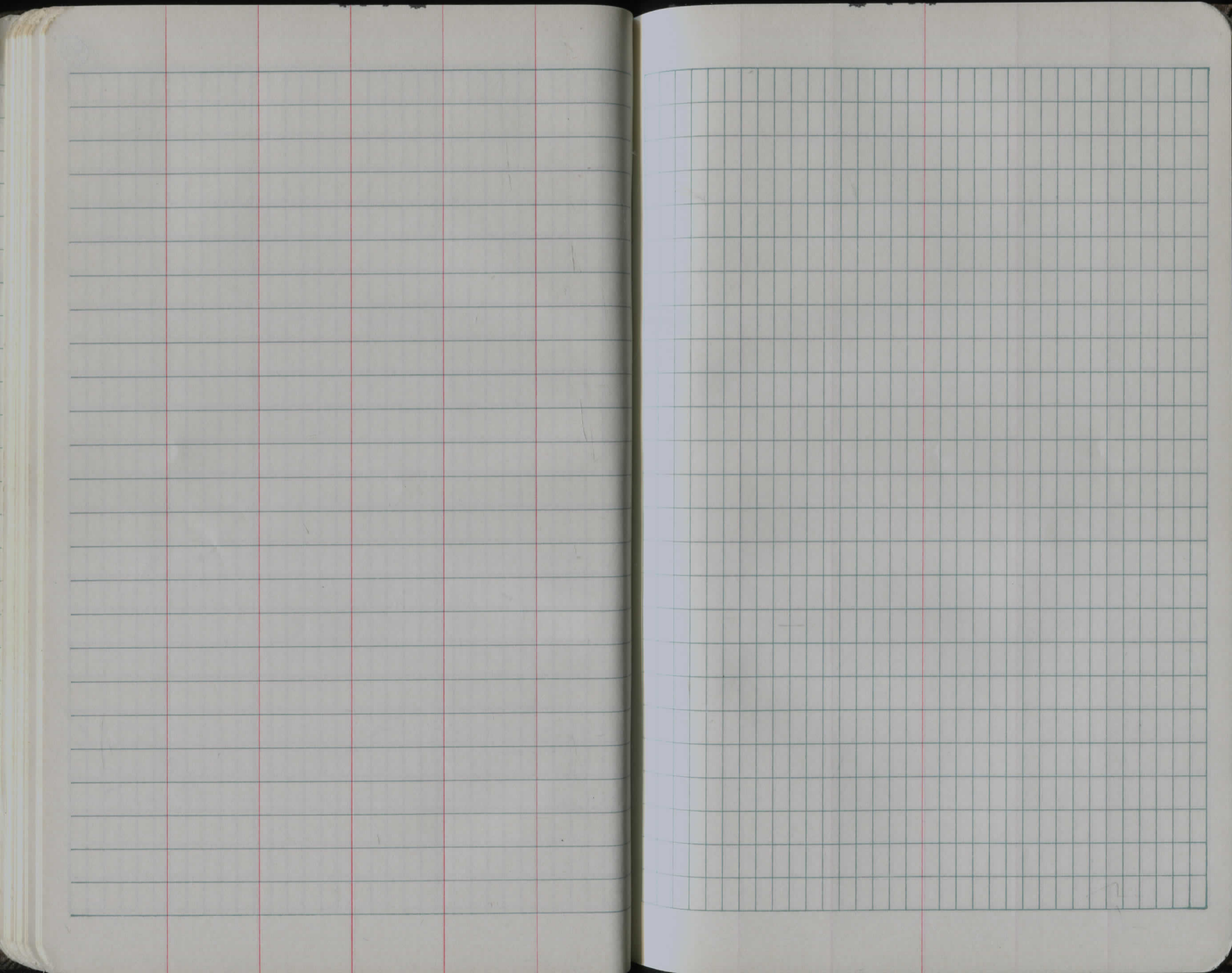


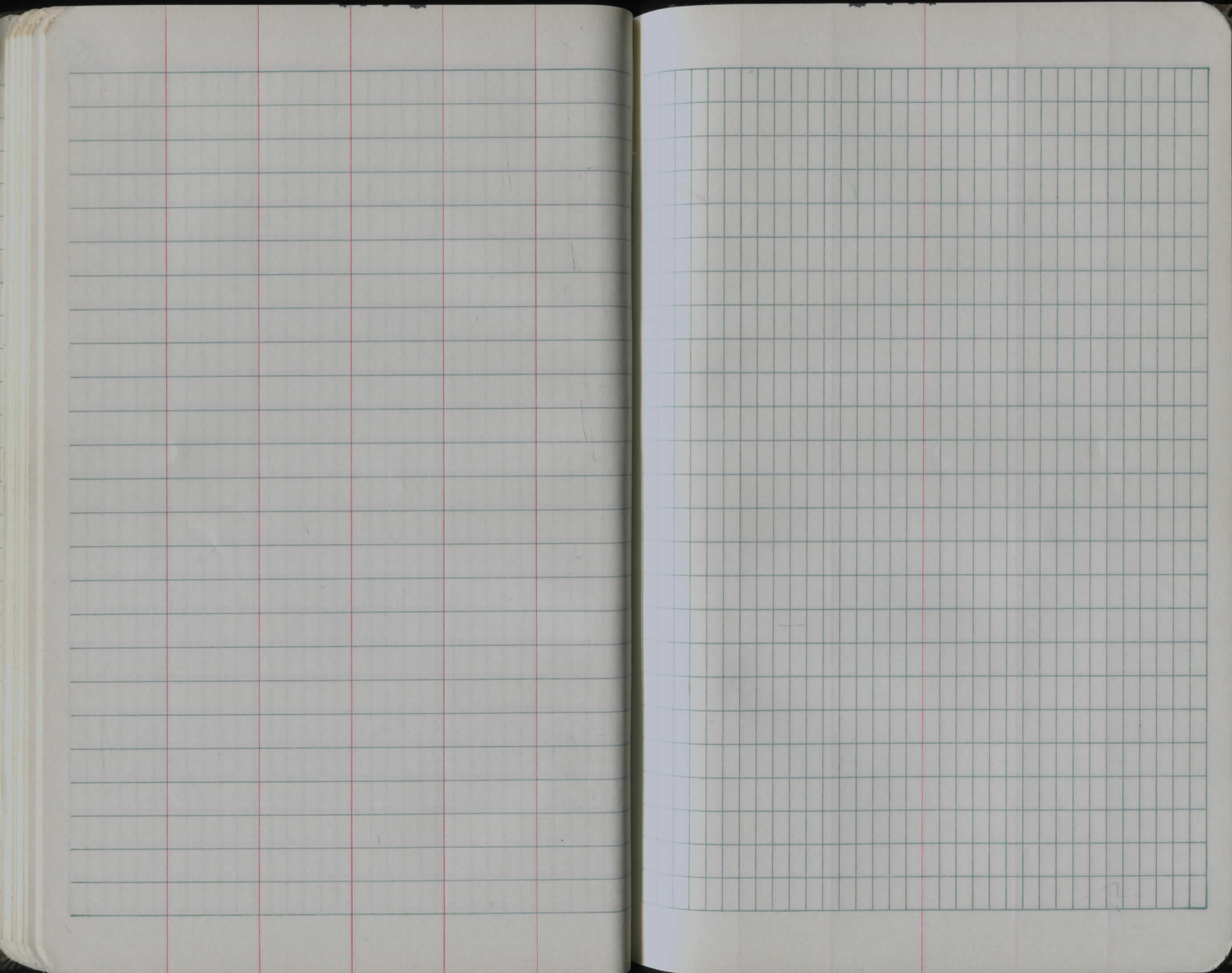


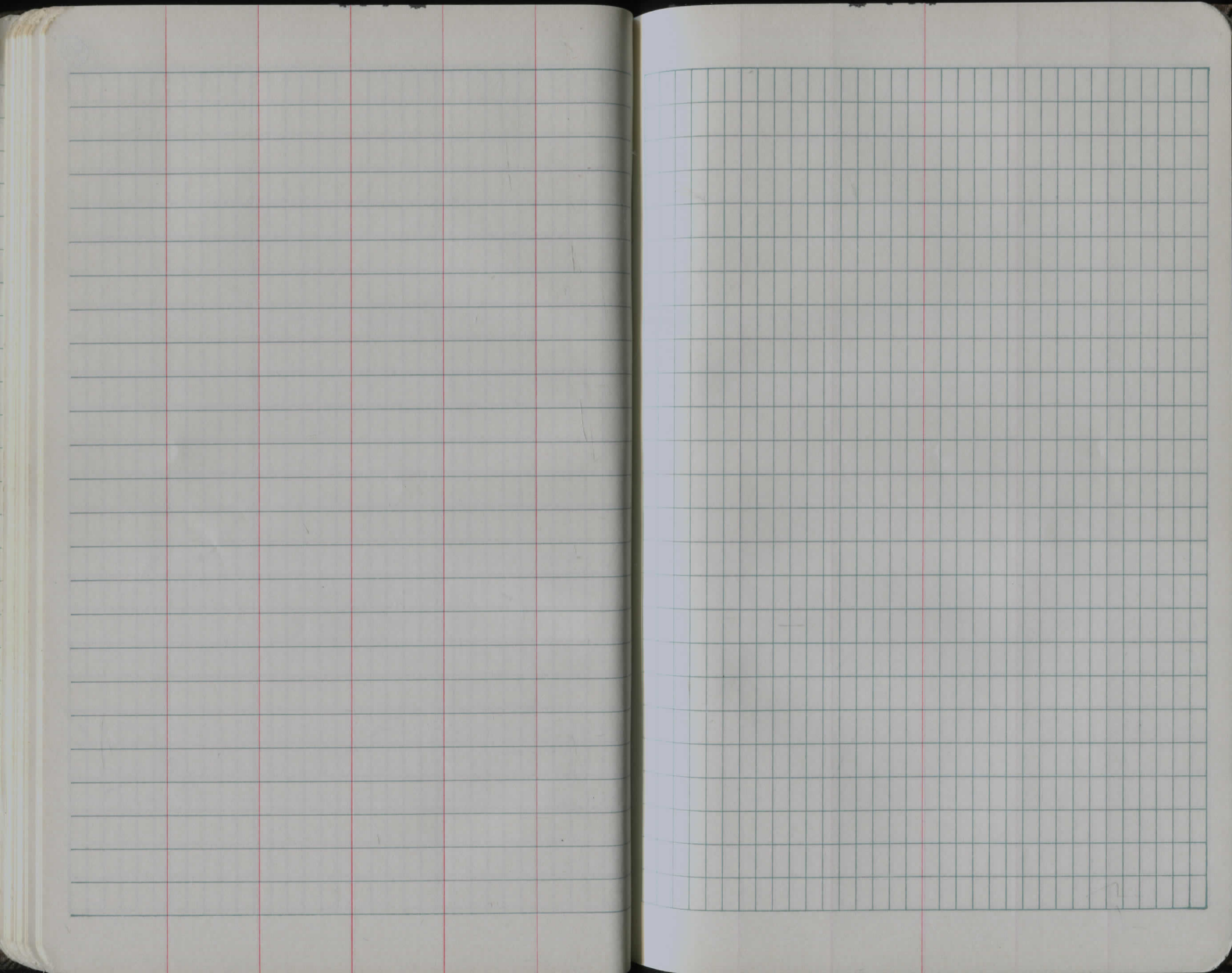


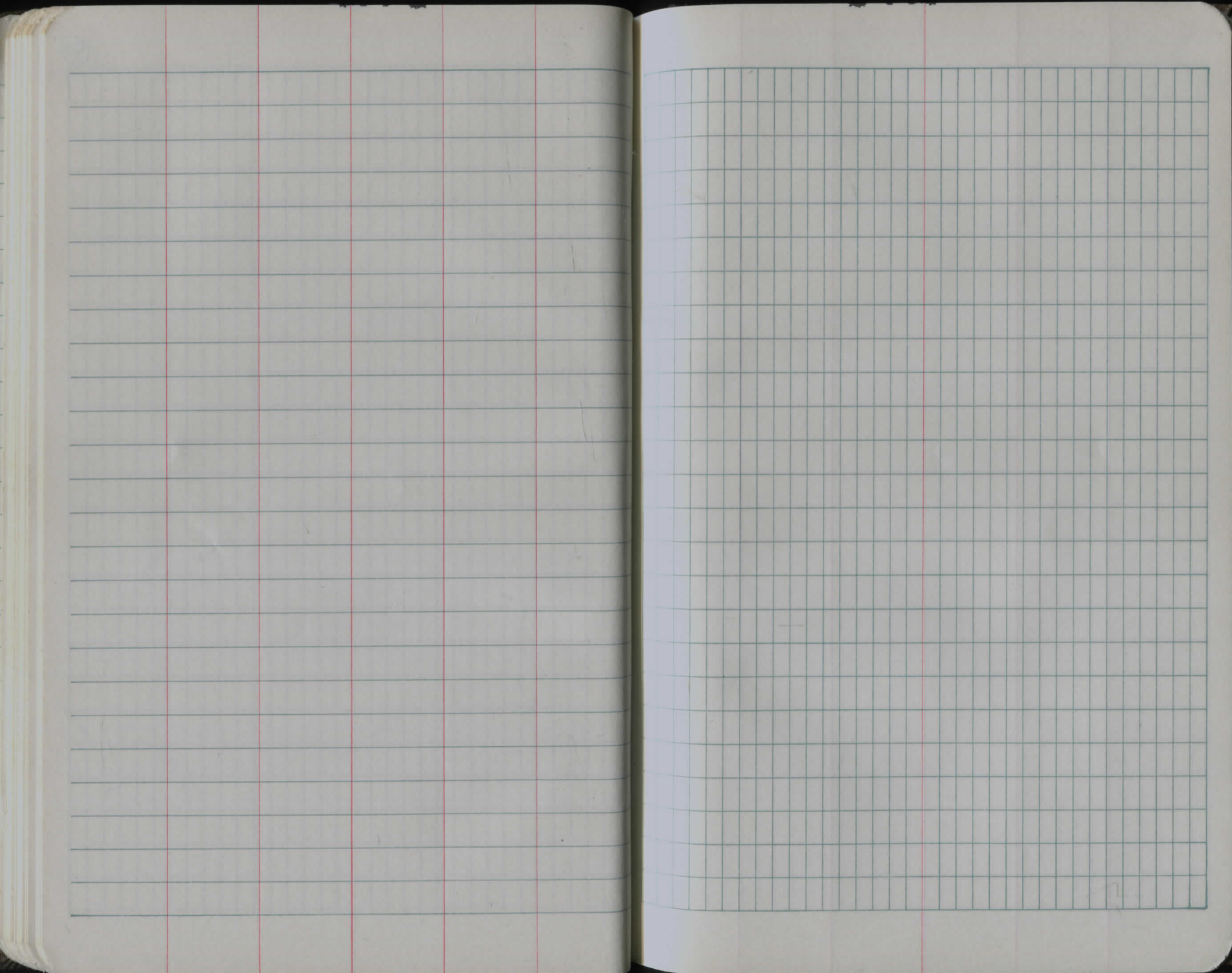




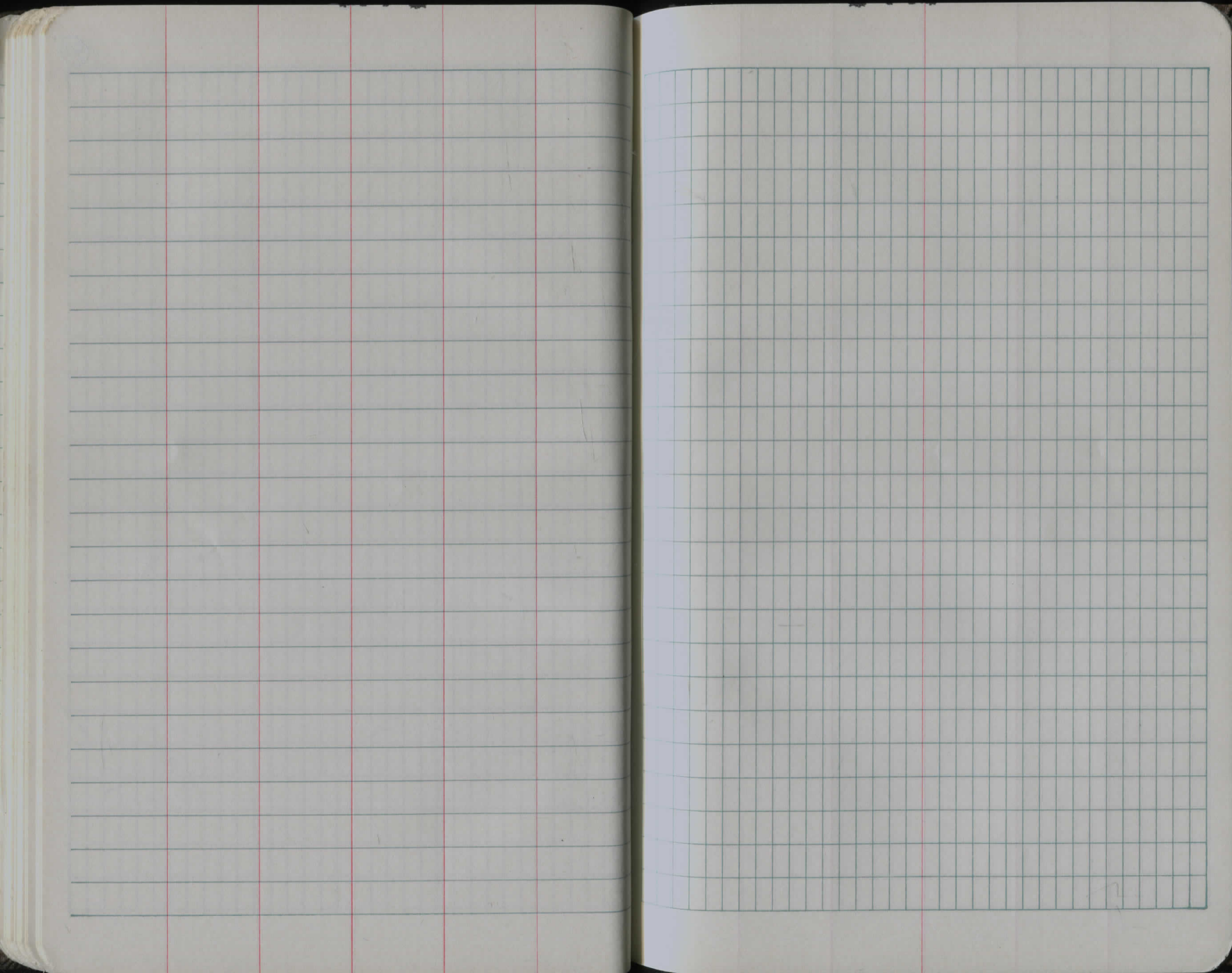


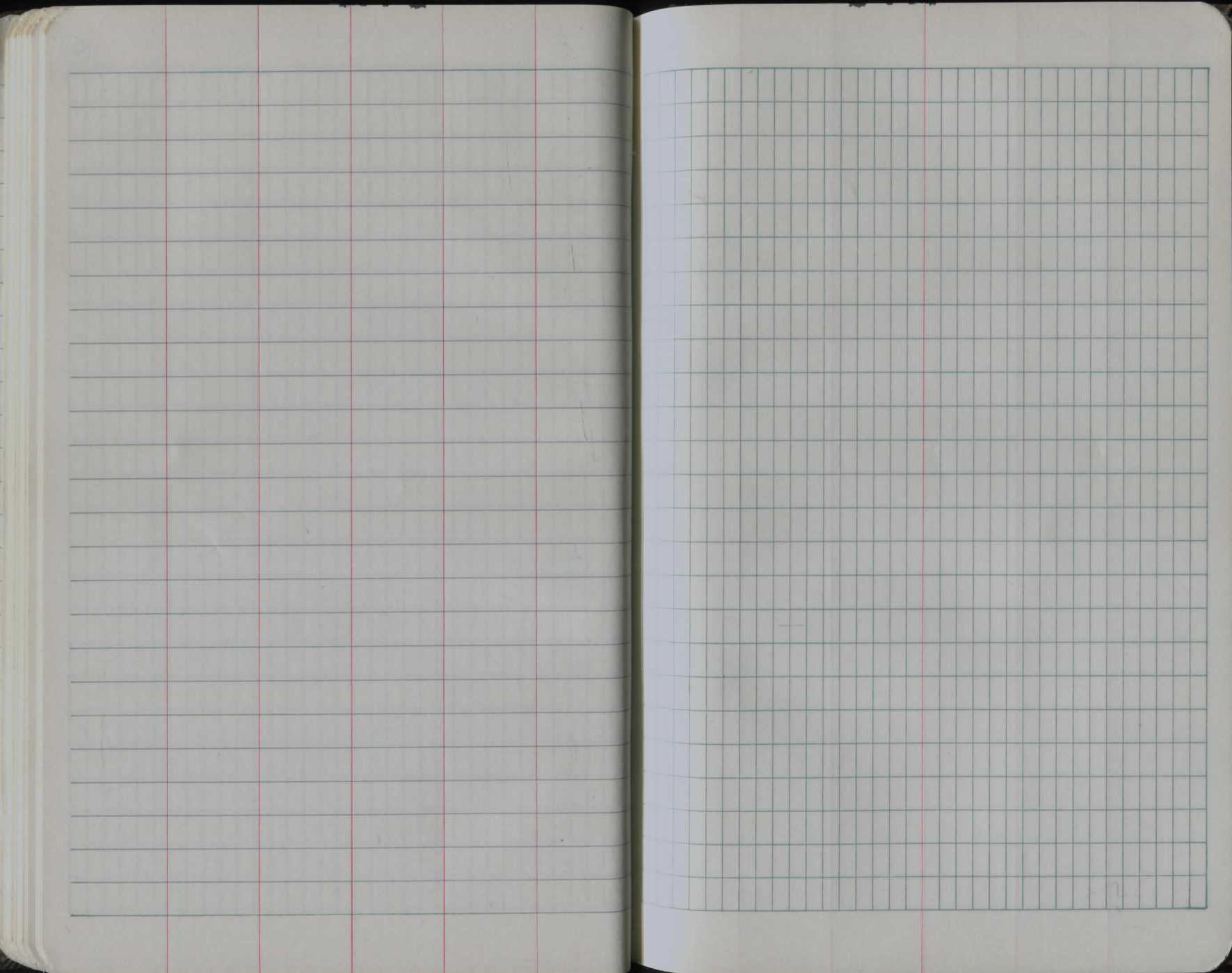


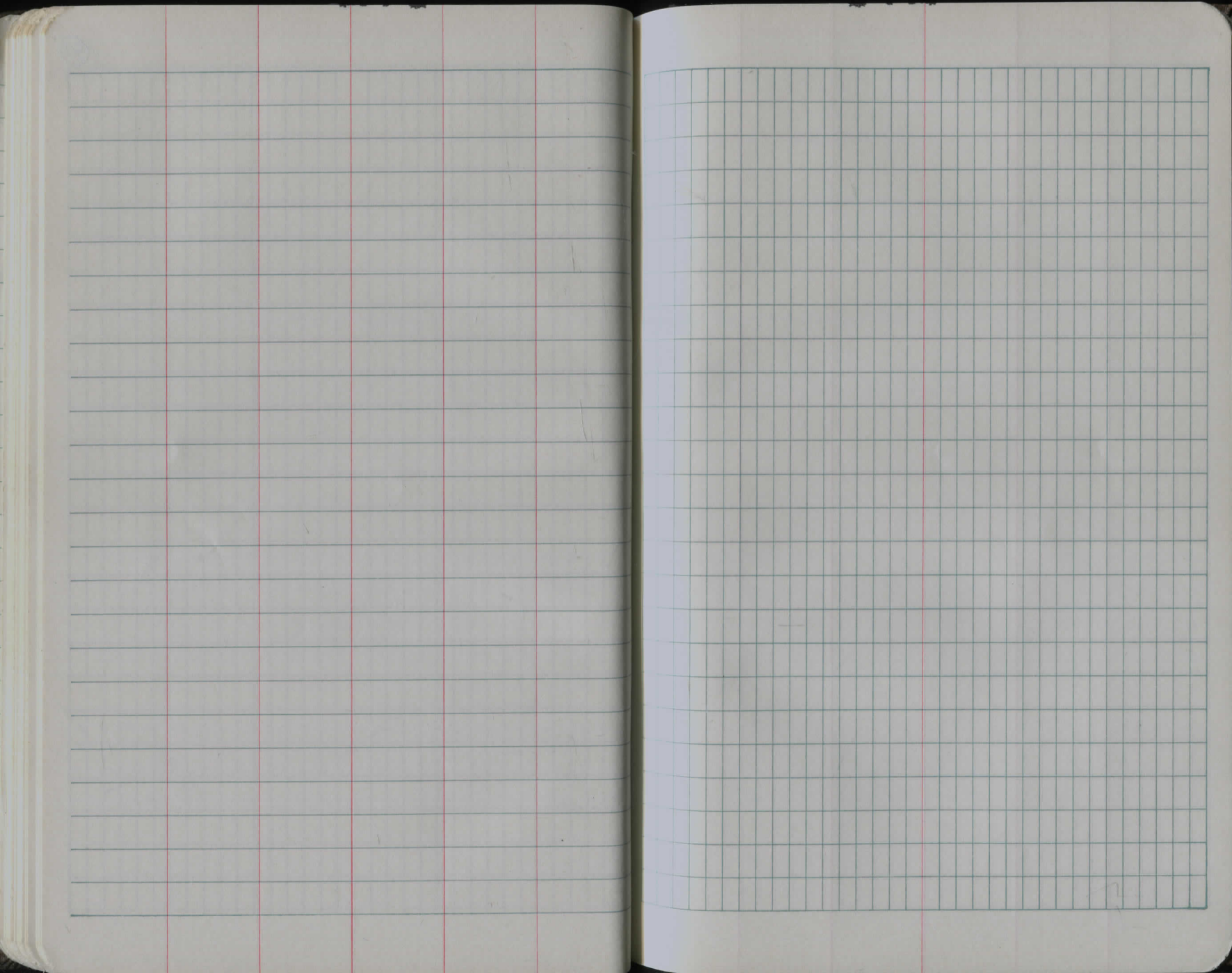


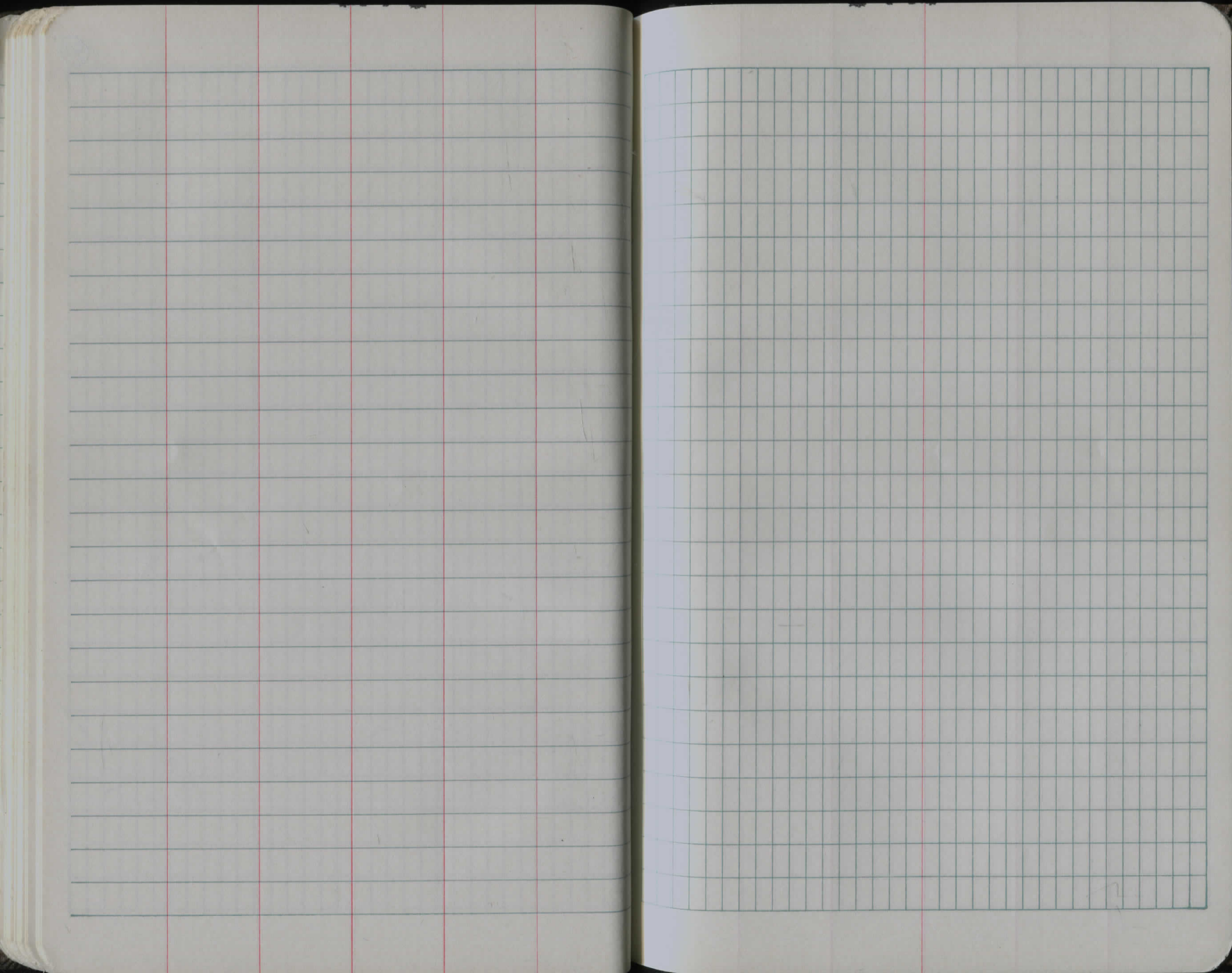


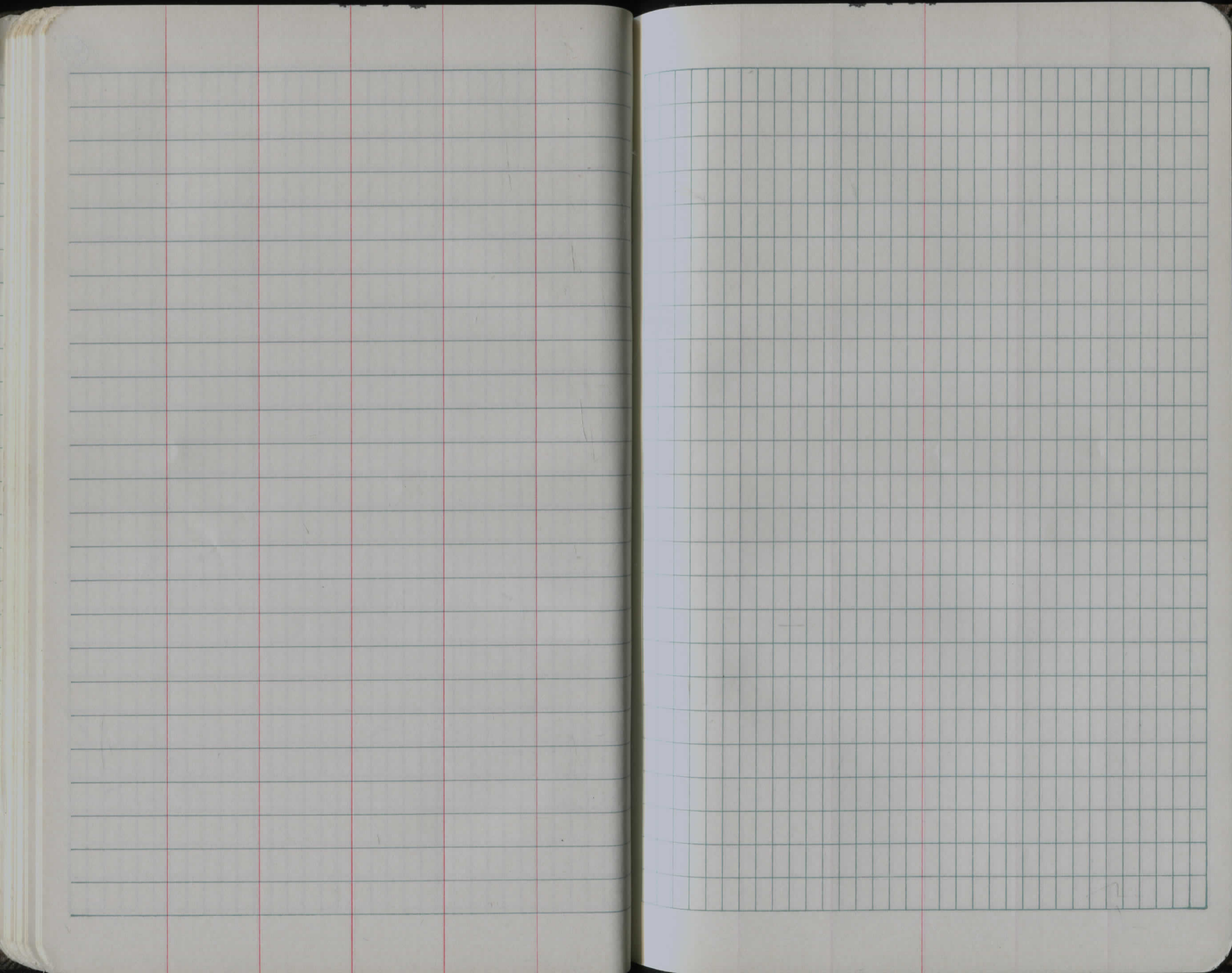


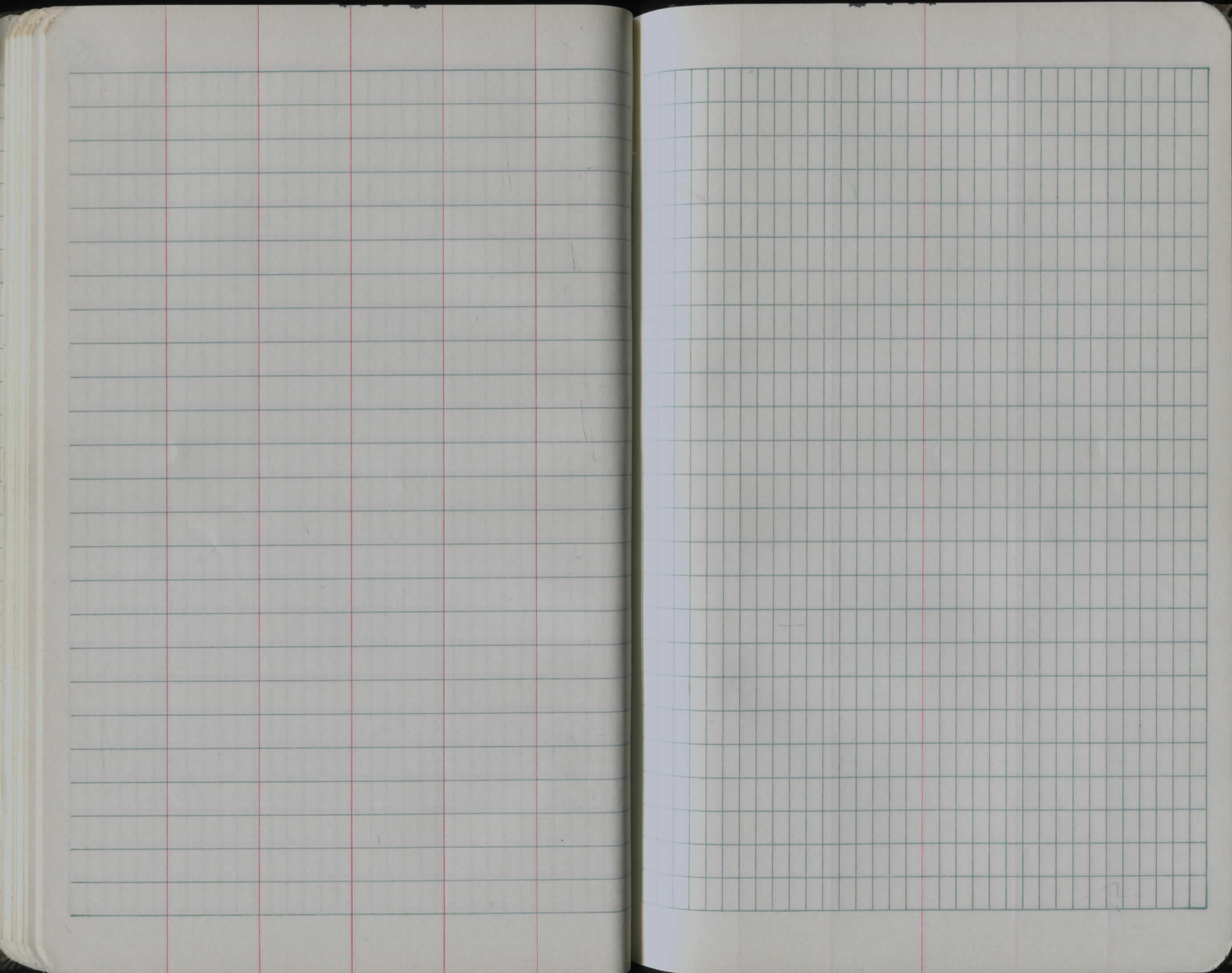


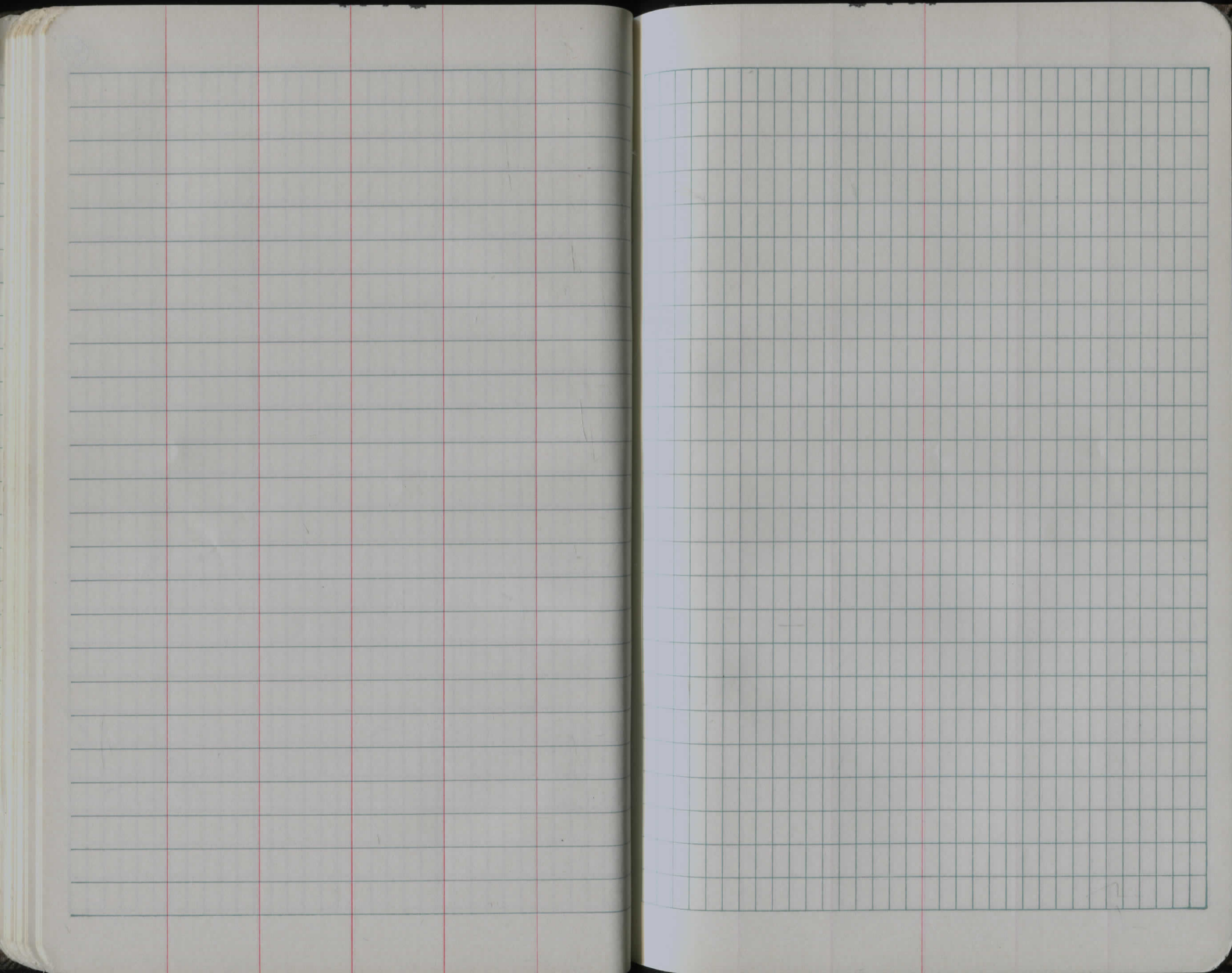


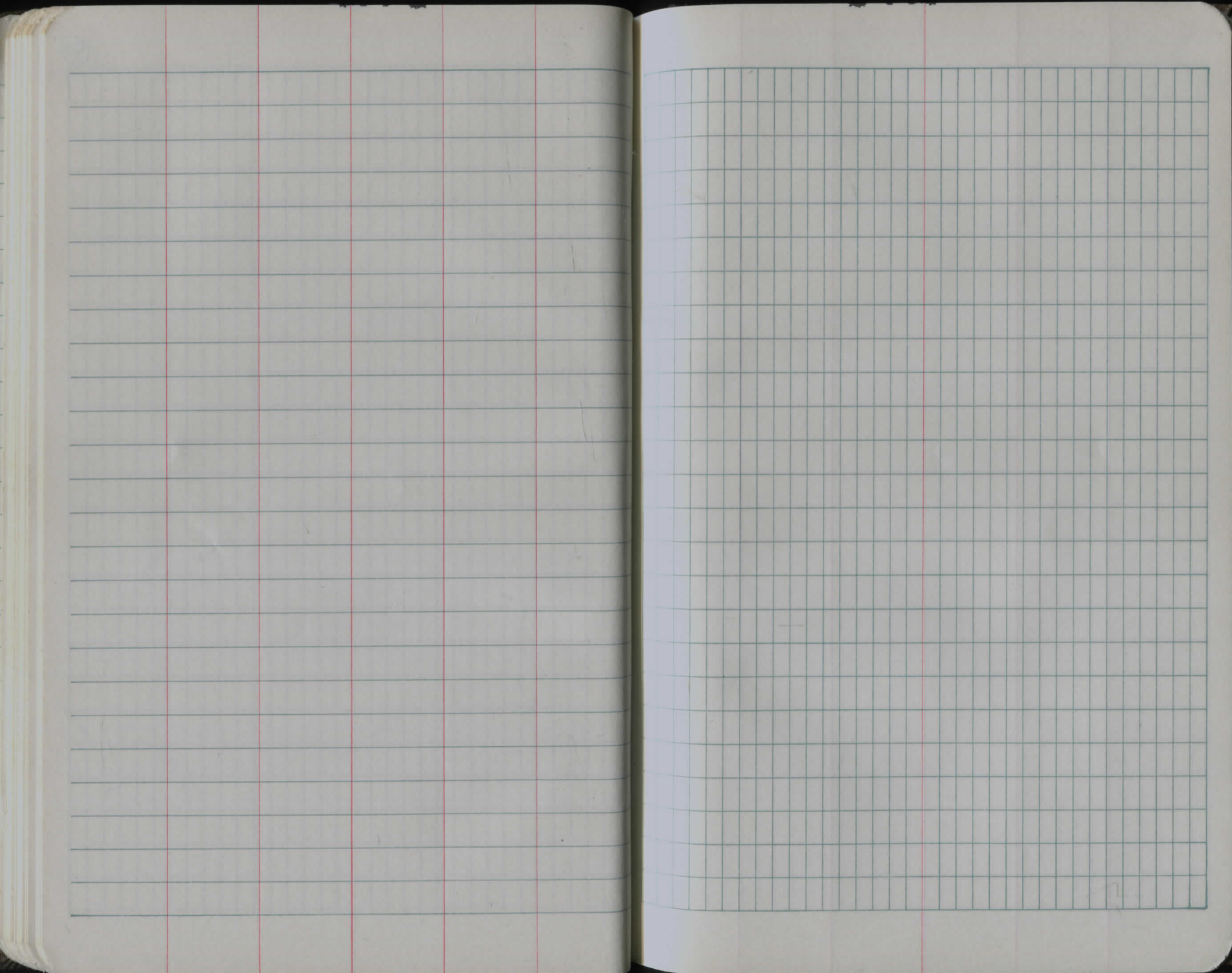




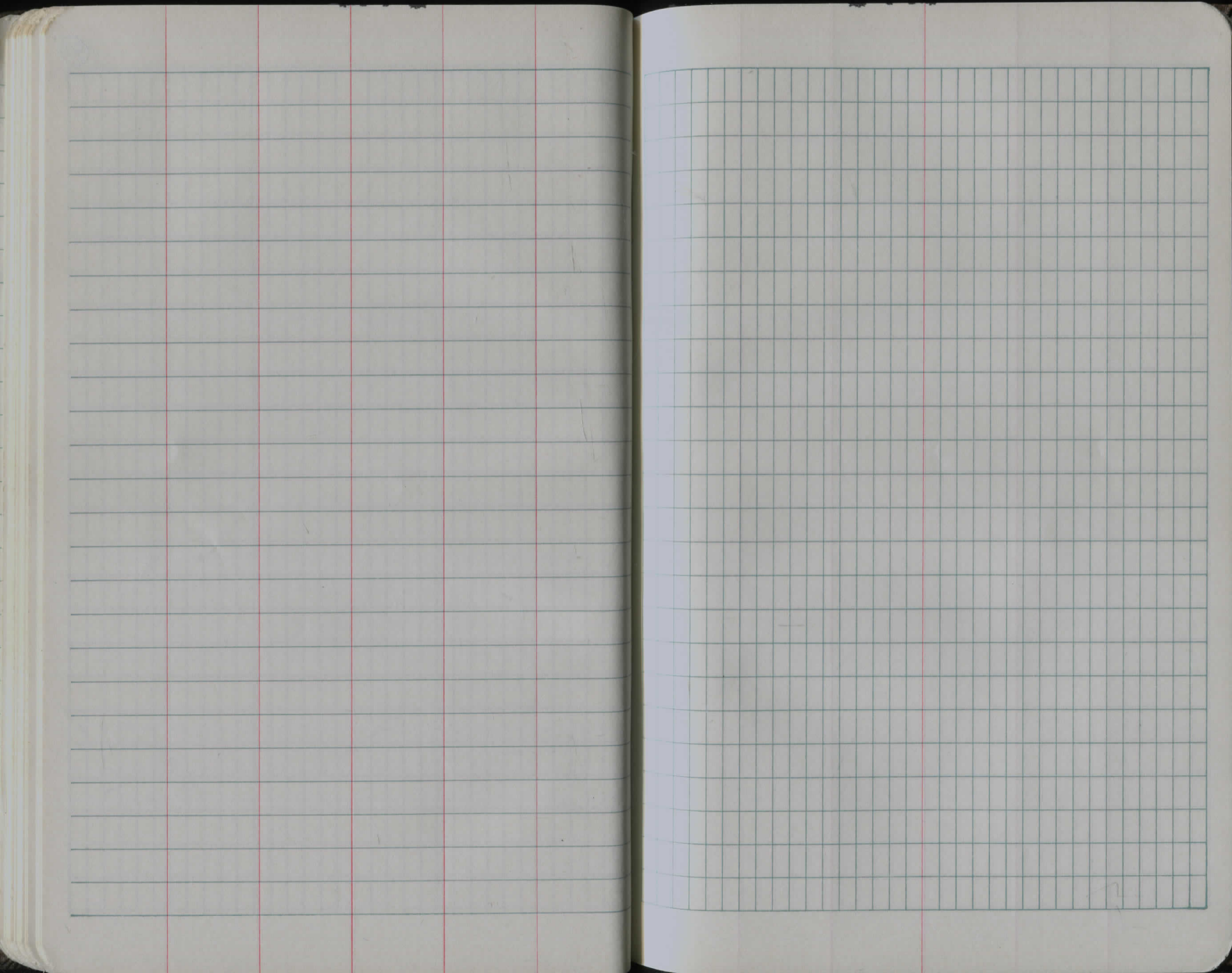


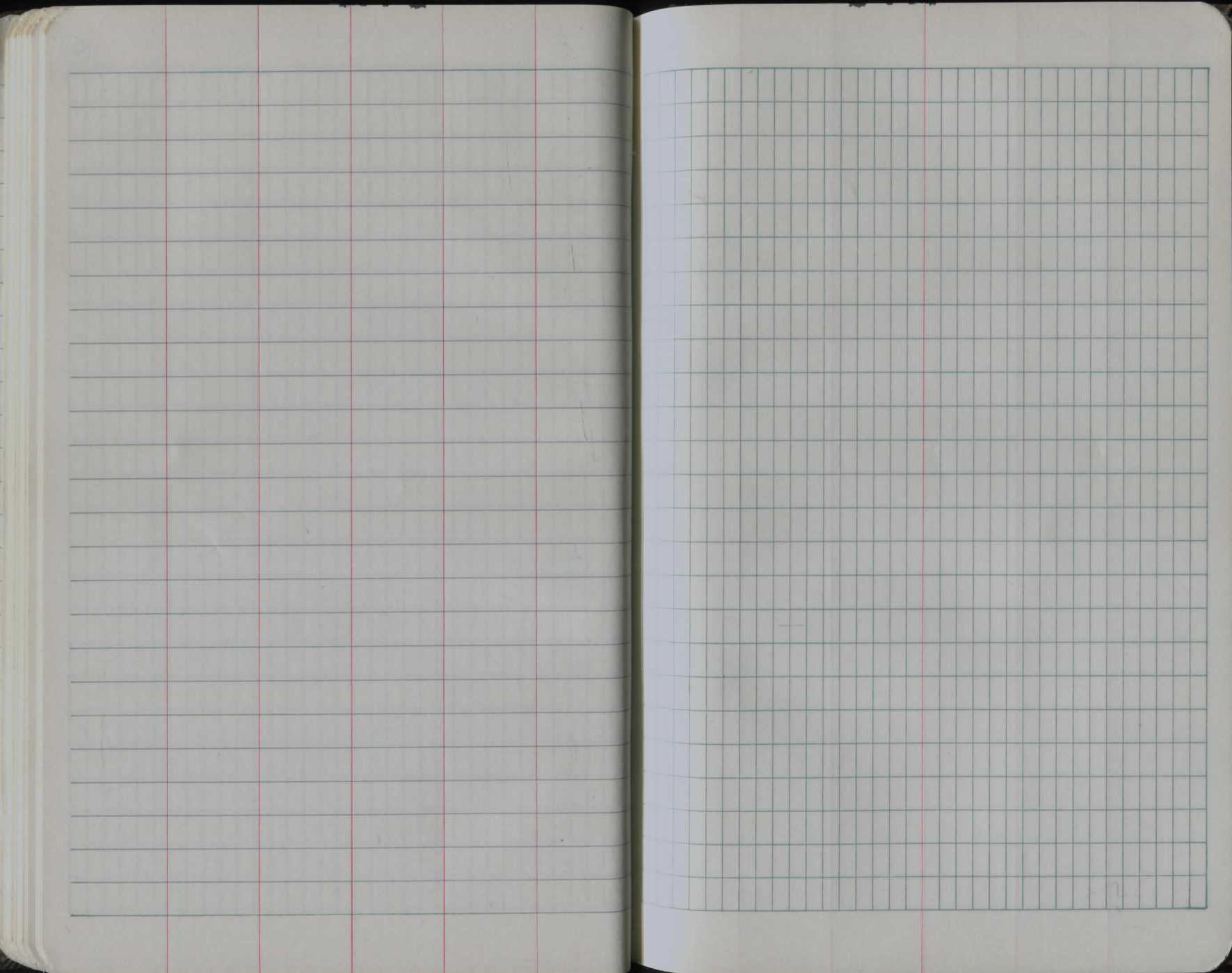


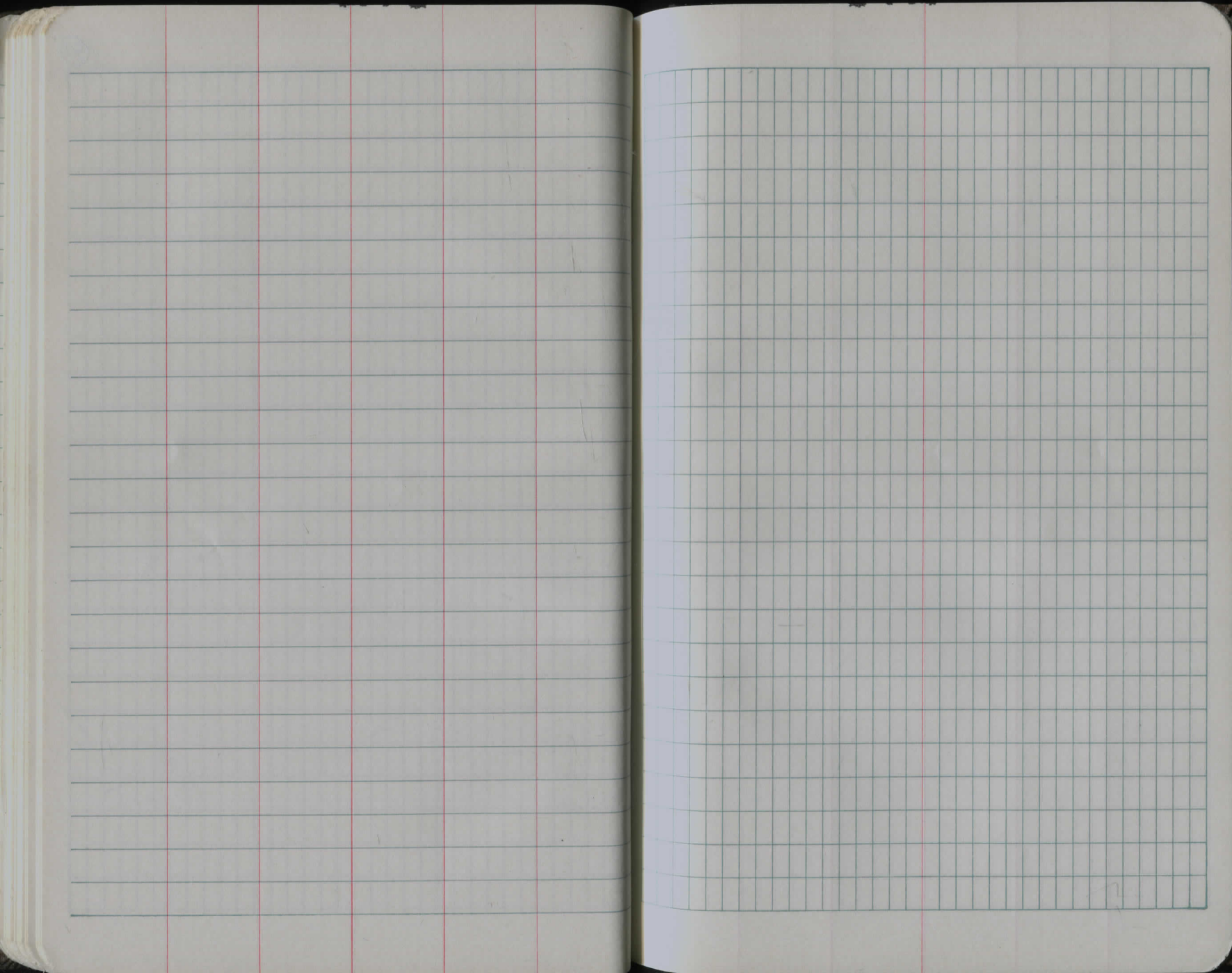


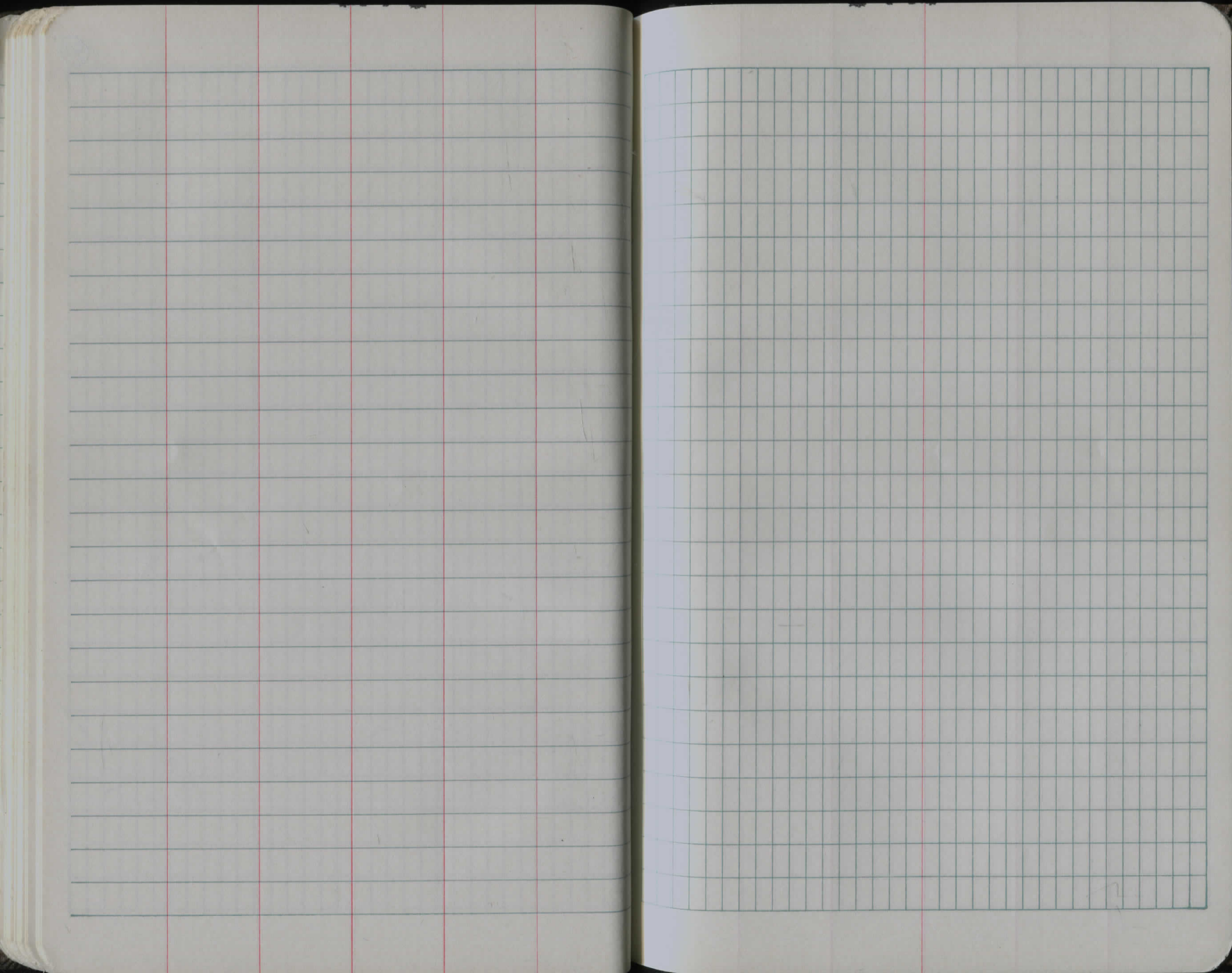


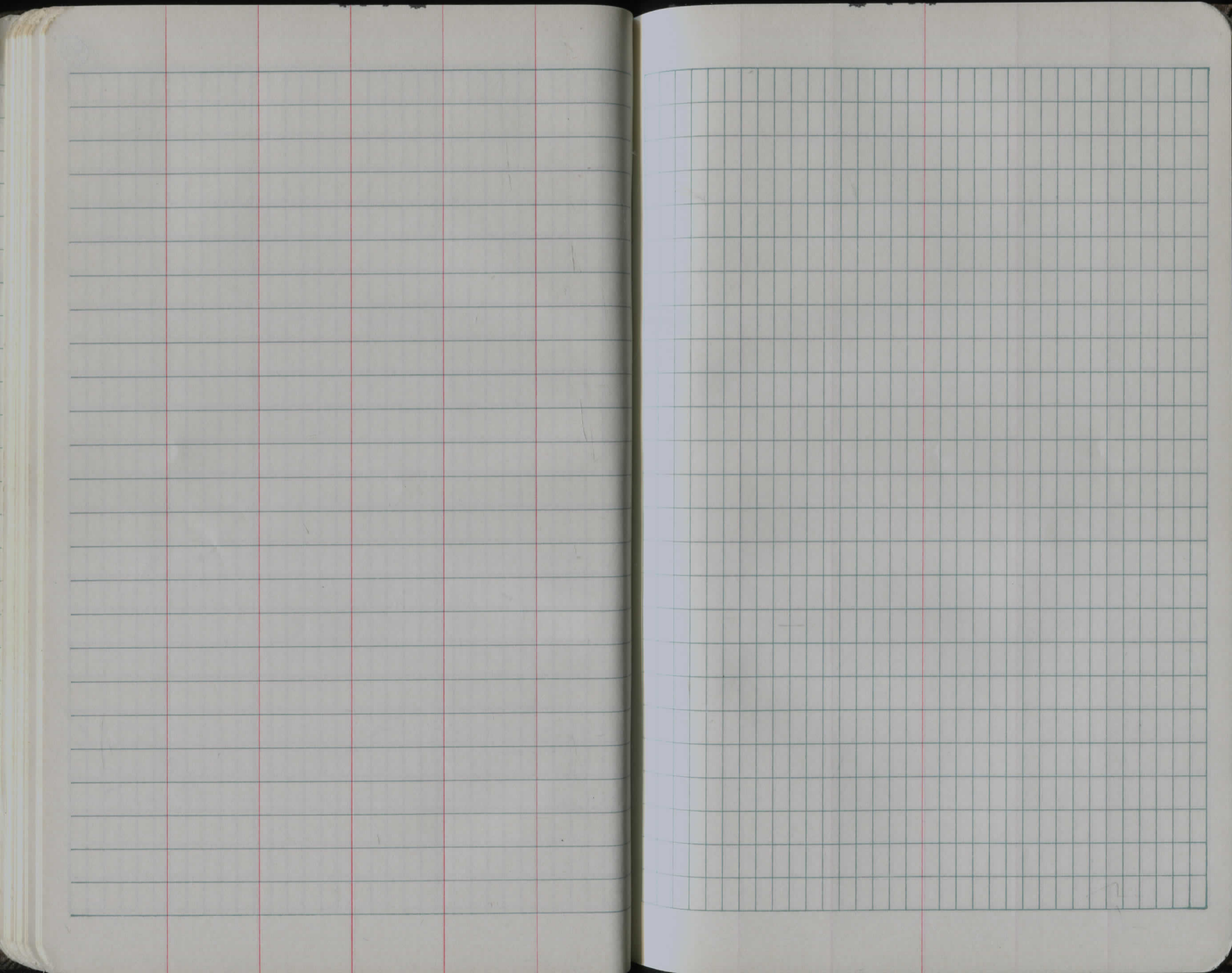


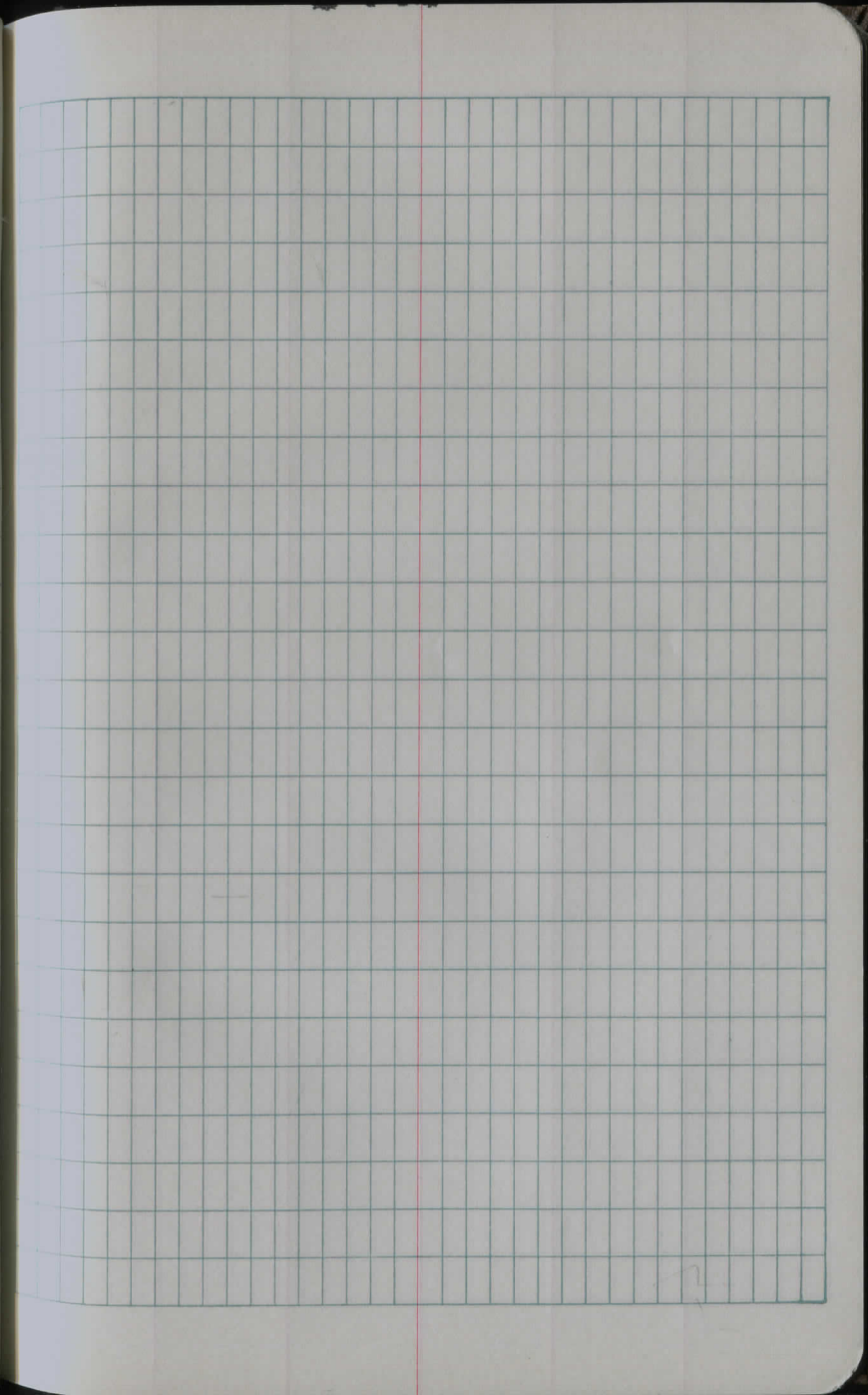


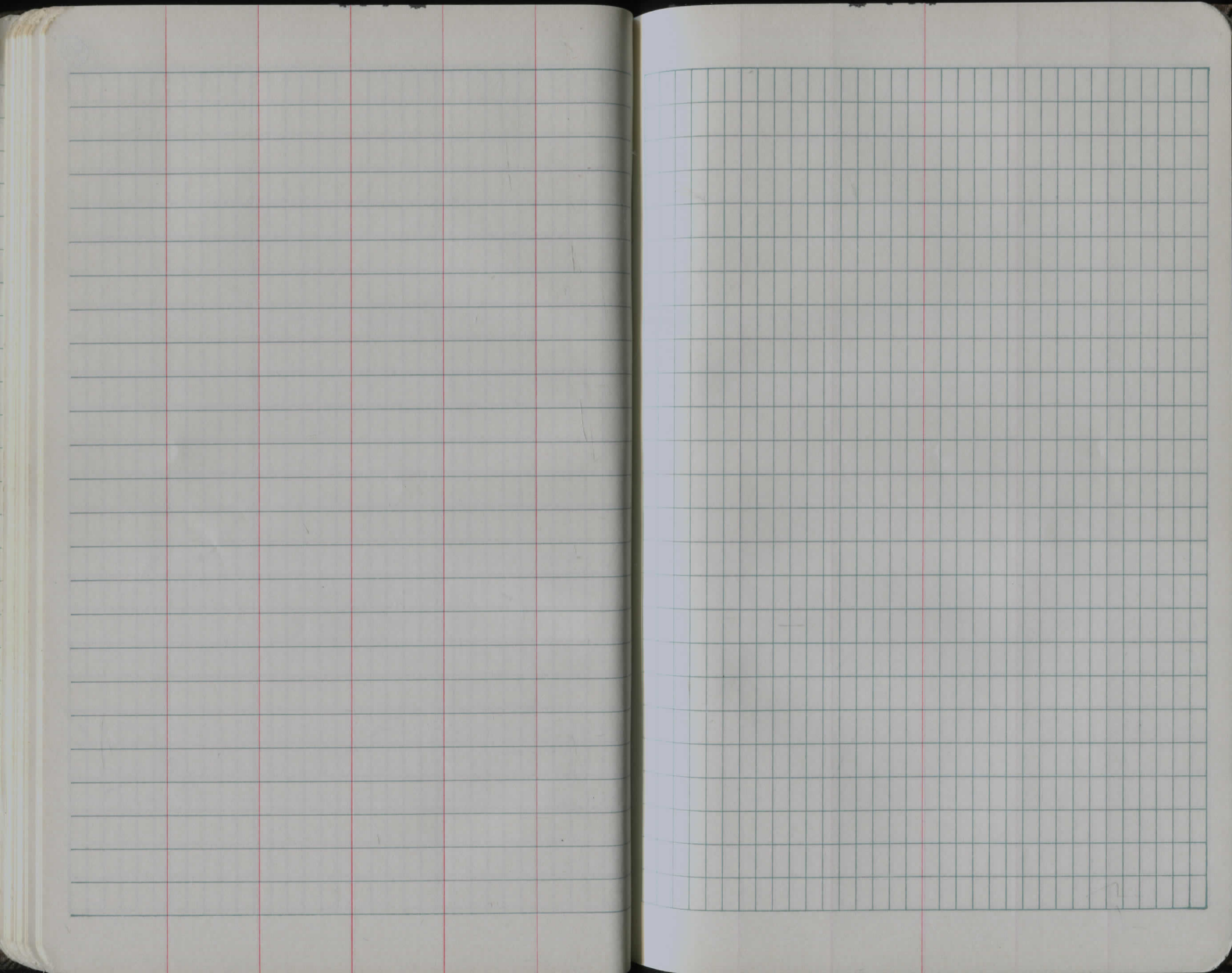












Ditch faucets  
Bayles property Wilson Mills Rd.

076	5.56
+25	5.50
+50	5.37
+75	5.20
2100	5.06
+25	5.12
+50	5.15
+75	5.25
2101	5.43
+25	5.37
+50	5.67
+69	2.04

<sup>S</sup>  
Wend Bayles Dr. p. 13 a

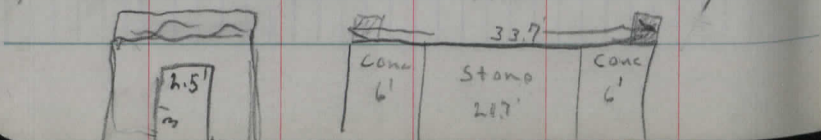
F/A Wend Cross Outlet



	H.I.			
B.M.	12.83	217.03		204.20
✓ P.T.			7.56	209.47
T.P.	7.82	224.41	0.44	216.59
Drs 50'			5.32	219.09
" 75'			4.68	219.93
" 100'			4.28	220.13
Drs 50'			5.22	219.19
" 75'			4.77	219.64
" 100'			4.51	219.90

B.M.	8.06	108.06		100.00
Drs 50'			3.26	104.80
" 75'			1.47	106.59
" 100'			0.56	107.50

T.P.	2.64	99.84	10.86	97.20
± Rd. d. culvt.	79+0		4.26	
INV. S. end, culvt.	19' off E	10.46	89.38	
F/L creek S	29' off E	9.48	90.3	
F/L " S	60' " E	8.40	91.4	
F/L " S	100' " E	6.25	93.5	
INV. N. end culvt.	14' off E	11.78	88.66	
F/L creek N.	50' " E	13.57		



## CURVE TABLES.

Published by KEUFFEL & ESSER CO.

### HOW TO USE CURVE TABLES.

Table I. contains Tangents and External to a 1° curve. Tan. and Ext. to any other radius may be found nearly enough, by dividing the Tan. or Ext. opposite the given Central Angle by the given degree of curve.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Tan. opposite the given Central Angle by the given Tangent.

To find Deg. of Curve, having the Central Angle and External: Divide Ext. opposite the given Central Angle by the given External.

To find Nat. Tan. and Nat. Ex. Sec. for any angle by Table I.: Tan. or Ext. of twice the given angle divided by the radius of a 1° curve will be the Nat. Tan. or Nat. Ex. Sec.

#### EXAMPLE.

Wanted a Curve with an Ext. of about 12 ft. Angle of Intersection or I. P. = 23° 20' to the R. at Station 542+72.

Ext. in Tab. I opposite 23° 20' = 120.87  
120.87 ÷ 12 = 10.07. Say a 10° Curve.

Tan. in Tab. I opp. 23° 20' = 1183.1  
1183.1 ÷ 10 = 118.31.

Correction for A. 23° 20' for a 10° Cur. = 0.16  
118.31 + 0.16 = 118.47 = corrected Tangent.

(If corrected Ext. is required find in same way)  
Ang. 23° 20' = 23.33° ÷ 10 = 2.3333 = L. C.

2° 19½' = def. for sta.	542	I. P. = sta.	542+72
4° 49½' = " " "	+50	Tan. =	118.47
7° 19½' = " " "	543	B. C. = sta.	541+53.53
9° 49½' = " " "	+50	L. C. =	2.3333
11° 40' = " " "	543+	E. C. = Sta.	543+86.86

100 - 53.53 = 46.47 × 3' (def. for 1 ft. of 10° Cur.) = 139.41' =  
2° 19½' = def. for sta. 542.

Def. for 50 ft. = 2° 30' for a 10° Curve.

Def. for 36.86 ft. = 1° 50½' for a 10° Curve.

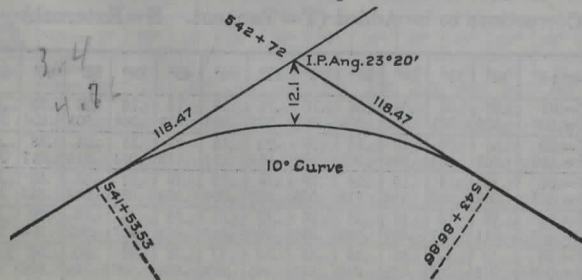


TABLE I. — Tangents and External to a 1° Curve. Chord = 100 ft.

Table with 9 columns: Int. Angle, Tangent, External, Int. Angle, Tangent, External, Int. Angle, Tangent, External. Rows include angles from 1° to 7° in increments of 10'.

Corrections to be Added (T = Tangent. E = External.)

Table with 14 columns: Int. Angle, Curve 5°, 10°, 15°, 20°, 25°, 30°, 35°, 40°, 45°, 50°, 55°, 60°, 65°, 70°. Rows include angles from 5° to 25°.

TABLE I. — Tangents and External to a 1° Curve. Chord = 100 ft.

Table with 9 columns: Int. Angle, Tangent, External, Int. Angle, Tangent, External, Int. Angle, Tangent, External. Rows include angles from 22° to 45° in increments of 10'.

Corrections to be Added (T = Tangent. E = External.)

Table with 14 columns: Int. Angle, Curve 5°, 10°, 15°, 20°, 25°, 30°, 35°, 40°, 45°, 50°, 55°, 60°, 65°, 70°. Rows include angles from 20° to 45°.

TABLE I. — Tangents and External to a 1° Curve. Chord = 100 ft.

Table with 9 columns: Int. Angle, Tangent, External, Int. Angle, Tangent, External, Int. Angle, Tangent, External. Rows range from 43° to 63° with 10' increments.

Corrections to be Added (T = Tangent. E = External.)

Table with 16 columns: Int. Angle, Curve 5°, 10°, 15°, 20°, 25°, 30°, 35°, 40°, 45°, 50°, 55°, 60°, 65°, 70°. Rows range from 40° to 65°.

TABLE I. — Tangents and External to a 1° Curve. Chord = 100 ft. V

Table with 9 columns: Int. Angle, Tangent, External, Int. Angle, Tangent, External, Int. Angle, Tangent, External. Rows range from 64° to 84° with 10' increments.

Corrections to be Added (T = Tangent. E = External.)

Table with 16 columns: Int. Angle, Curve 5°, 10°, 15°, 20°, 25°, 30°, 35°, 40°, 45°, 50°, 55°, 60°, 65°, 70°. Rows range from 60° to 85°.



TABLE II. — Radii, Ordinates and Deflections. Chord = 100 ft.

Table with 11 columns: Deg., Radius, Mid. Ord., Tan. Dist., Def. Dist., Def. for 1 Ft., and a second set of 5 columns with the same headers. The table lists data for angles from 0 to 30 degrees.

The middle ordinate in inches for any cord of length (C) is equal to .0012 C<sup>2</sup> multiplied by the middle ordinate taken from the above table. Thus, if it desired to bend a 30 ft. rail to fit a 10 degree curve, its middle ordinate should be .0012 x 900 x 2.183 or 2.36 inches.

TABLE III. Deflections for Sub Chords for Short Radius Curves. Table with 6 columns: Degree of Curve, Radius 50, 1/2 sub chord R, 12.5 Ft., 15 Ft., 20 Ft., 25 Ft., and Length of arc for 100 ft.

CURVE FORMULAS

Formulas for curves: T = R tan 1/2 I, R = T cot. 1/2 I, Chord def. = chord^2 / R, Sin. 1/2 D = 50 / Sin. 1/2 D, E = R ex. sec 1/2 I, No. chords = I / D, E = T tan 1/4 I, Tan. def. = 1/2 chord def.

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

To find angle for a given distance and deflection. Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft. see Table II.), and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance. To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

GENERAL DATA

RIGHT ANGLE TRIANGLES. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10. 10<sup>2</sup> ÷ 200 = .5. 100 + .5 = 100.5 hyp.

Given Hyp. 100, Alt. 25. 25<sup>2</sup> ÷ 200 = 3.125. 100 - 3.125 = 96.875 = Base.

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by II, and divide by 7.

LEVELING. The correction for curvature and refraction, in feet and decimals of feet is equal to 0.574 d<sup>2</sup>, where d is the distance in miles. The correction for curvature alone is closely, 1/8 d<sup>2</sup>. The combined correction is negative.

PROBABLE ERROR. If d1, d2, d3, etc. are the discrepancies of various results from the mean, and if Σd<sup>2</sup> = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean = ± 0.6745 √(Σd<sup>2</sup> / n(n-1))

SOLAR EPHEMERIS. Attention is called to the Solar Ephemeris for the current year, published by Keuffel & Esser Co., and furnished free of charge upon request, which is 3 1/4 x 5 1/2 in., with about 90 pages of data very useful to the Surveyor; such as the adjustments of transits, levels and solar attachments; directions and tables for determining the meridian and the latitude from observations on the sun and Polaris; stadia measurements; magnetic declination; arithmetic constants; English and Metric conversions; trigonometric formulas; Natural and Logarithmic Functions; and Logarithms of Numbers.

TABLE IV. — Minutes in Decimals of a Degree.

Table with 10 columns: 1', 11', 21', 31', 41', 51', 61', 71', 81', 91', 1000. Rows represent minutes from 1 to 10.

TABLE V. — Inches in Decimals of a Foot.

Table with 9 columns: 1-16, 3-32, 1/8, 3-16, 1/4, 5-16, 3/8, 1/2, 5/8, 3/4, 7/8. Rows represent inches from 1 to 11.

Natural Trigonometrical Functions

Table with columns: Angle, Sin., Tan., Sec., Cosec., Cotg., Cosin. (0-90 degrees). Includes sub-headers for Sin., Tan., Sec., Cosec., Cotg., Cosin. and Cosin., Cotg., Cosec., Sec., Tan., Sin. Angle.

Natural Trigonometrical Functions

Table with columns: Angle, Sin., Tan., Sec., Cosec., Cotg., Cosin. (90-180 degrees). Includes sub-headers for Sin., Tan., Sec., Cosec., Cotg., Cosin. and Cosin., Cotg., Cosec., Sec., Tan., Sin. Angle.

Natural Trigonometrical Functions

Angle. Sin. Tan. Sec. Cosec. Cotg. Cosin.							Angle. Sin. Tan. Sec. Cosec. Cotg. Cosin.							
o /						o /	o /							o /
32	.5299	.6249	1.1792	1.887	1.600	.84805	58	.6293	.8098	1.2868	1.589	1.235	.77715	51
10	.5324	.6289	1.1813	1.878	1.590	.84650	50	10	.6316	.8146	1.2898	1.583	1.228	.77531
20	.5348	.6330	1.1835	1.870	1.580	.84495	40	20	.6338	.8195	1.2929	1.578	1.220	.77347
30	.5373	.6371	1.1857	1.861	1.570	.84339	30	30	.6361	.8243	1.2959	1.572	1.213	.77162
40	.5398	.6412	1.1879	1.853	1.560	.84182	20	40	.6383	.8292	1.2991	1.567	1.206	.76977
50	.5422	.6453	1.1901	1.844	1.550	.84025	10	50	.6406	.8342	1.3022	1.561	1.199	.76791
33	.5446	.6494	1.1924	1.836	1.540	.83867	57	40	.6428	.8391	1.3054	1.556	1.192	.76604
10	.5471	.6536	1.1946	1.828	1.530	.83708	50	10	.6450	.8441	1.3086	1.550	1.185	.76417
20	.5495	.6577	1.1969	1.820	1.520	.83549	40	20	.6472	.8491	1.3118	1.545	1.178	.76229
30	.5519	.6619	1.1992	1.812	1.511	.83389	30	30	.6494	.8541	1.3151	1.540	1.171	.76041
40	.5544	.6661	1.2015	1.804	1.501	.83228	20	40	.6517	.8591	1.3184	1.535	1.164	.75851
50	.5568	.6703	1.2039	1.796	1.492	.83066	10	50	.6539	.8642	1.3217	1.529	1.157	.75661
34	.5592	.6745	1.2062	1.788	1.483	.82904	56	41	.6561	.8693	1.3251	1.524	1.150	.75471
10	.5616	.6787	1.2086	1.781	1.473	.82741	50	10	.6583	.8744	1.3284	1.519	1.144	.75280
20	.5640	.6830	1.2110	1.773	1.464	.82577	40	20	.6604	.8796	1.3318	1.514	1.137	.75088
30	.5664	.6873	1.2134	1.766	1.455	.82413	30	30	.6626	.8847	1.3352	1.509	1.130	.74896
40	.5688	.6916	1.2158	1.758	1.446	.82248	20	40	.6648	.8899	1.3386	1.504	1.124	.74703
50	.5712	.6959	1.2183	1.751	1.437	.82082	10	50	.6670	.8952	1.3421	1.499	1.117	.74509
35	.5736	.7002	1.2208	1.743	1.428	.81915	55	42	.6691	.9004	1.3456	1.494	1.111	.74314
10	.5760	.7046	1.2233	1.736	1.419	.81748	50	10	.6713	.9057	1.3492	1.490	1.104	.74120
20	.5783	.7089	1.2258	1.729	1.411	.81580	40	20	.6734	.9110	1.3527	1.485	1.098	.73924
30	.5807	.7133	1.2283	1.722	1.402	.81412	30	30	.6756	.9163	1.3563	1.480	1.091	.73728
40	.5831	.7177	1.2309	1.715	1.393	.81242	20	40	.6777	.9217	1.3600	1.476	1.085	.73531
50	.5854	.7221	1.2335	1.708	1.385	.81072	10	50	.6799	.9271	1.3636	1.471	1.079	.73333
36	.5878	.7265	1.2361	1.701	1.376	.80902	54	43	.6820	.9325	1.3673	1.466	1.072	.73135
10	.5901	.7310	1.2387	1.695	1.368	.80730	50	10	.6841	.9380	1.3711	1.462	1.066	.72937
20	.5925	.7355	1.2413	1.688	1.360	.80558	40	20	.6862	.9435	1.3748	1.457	1.060	.72737
30	.5948	.7400	1.2440	1.681	1.351	.80386	30	30	.6884	.9490	1.3786	1.453	1.054	.72537
40	.5972	.7445	1.2466	1.675	1.343	.80212	20	40	.6905	.9545	1.3824	1.448	1.048	.72337
50	.5995	.7490	1.2494	1.668	1.335	.80038	10	50	.6926	.9601	1.3863	1.444	1.042	.72136
37	.6018	.7536	1.2521	1.662	1.327	.79864	53	44	.6947	.9657	1.3902	1.440	1.036	.71934
10	.6041	.7581	1.2549	1.655	1.319	.79688	50	10	.6967	.9713	1.3941	1.435	1.030	.71732
20	.6065	.7627	1.2577	1.649	1.311	.79512	40	20	.6988	.9770	1.3980	1.431	1.024	.71529
30	.6088	.7673	1.2605	1.643	1.303	.79335	30	30	.7009	.9827	1.4020	1.427	1.018	.71325
40	.6111	.7720	1.2633	1.636	1.295	.79158	20	40	.7030	.9884	1.4061	1.422	1.012	.71121
50	.6134	.7766	1.2661	1.630	1.288	.78980	10	50	.7050	.9942	1.4101	1.418	1.006	.70916
38	.6157	.7813	1.2690	1.624	1.280	.78801	52		.7071	1.0000	1.4141	1.414	1.000	.70711
10	.6180	.7860	1.2719	1.618	1.272	.78622	50							
20	.6202	.7907	1.2748	1.612	1.265	.78442	40							
30	.6225	.7954	1.2778	1.606	1.257	.78261	30							
40	.6248	.8002	1.2808	1.601	1.250	.78079	20							
50	.6271	.8050	1.2838	1.595	1.242	.77897	10							

Cosin. Cotg. Cosec. Sec. Tan. Sin. Angle

Cosin. Cotg. Cosec. Sec. Tan. Sin. Angle

360  
167-07  
174  
3) 527-03  
2  
17

360  
142-44  
107 34-40  
3) 50244  
16  
22  
2

6.85  
6.44  
13.26  
66 0000  
646965  
130.32

360  
141-25-30  
107 07-30  
3) 501-25-30  
16  
22  
2

Bundysburg  
88 to old state rd

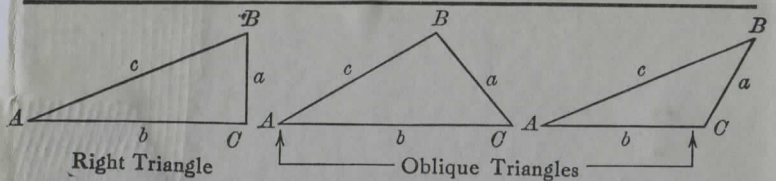
14.31  
14.65  
14.87  
14.59  
14.82  
77.4

175-24  
526-12  
360  
166

200.00  
83.25  
116.25

1031.75  
1012.77  
19.00  
699.05  
718.45

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

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

Given	Required
A, b	A, B, c
a, c	A, B, b
A, a	B, b, c
A, b	B, a, c
A, c	B, a, b

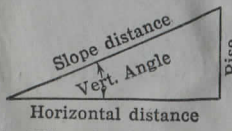
$\tan A = \frac{a}{b} = \cot B$ ,  $c = \sqrt{a^2 + b^2} = a \sqrt{1 + \frac{b^2}{a^2}}$   
 $\sin A = \frac{a}{c} = \cos B$ ,  $b = \sqrt{(c+a)(c-a)} = c \sqrt{1 - \frac{a^2}{c^2}}$   
 $B = 90^\circ - A$ ,  $b = a \cot A$ ,  $c = \frac{a}{\sin A}$   
 $B = 90^\circ - A$ ,  $a = b \tan A$ ,  $c = \frac{b}{\cos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

Solution of Oblique Triangles

Given	Required
A, B, a	b, c, C
A, a, b	B, c, C
a, b, C	A, B, c
a, b, c	A, B, C
a, b, c	Area
A, b, c	Area
A, B, C, a	Area

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

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle =  $5^\circ 10'$ . From Table, Page IX,  $\cos 5^\circ 10' = .9959$ . Horizontal distance =  $319.4 \times .9959 = 318.09$  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.  $\text{Cosine } 5^\circ 10' = .9959$ .  $1 - .9959 = .0041$ .  $319.4 \times .0041 = 1.31$ .  $319.4 - 1.31 = 318.09$  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.



