

PROJ. NO. L-178

WAGNER RD.

E	L	A	N

Field Book
E 64-8x4 S

GRADING

2 MILES

CEDAR WAPSI TO
MARQUIS

50% cotton-content paper
water resistant surface
32 sheets . . . 4 $\frac{5}{8}$ " x 7 $\frac{1}{4}$ "

CURVE FORMULAS

$$T = R \tan \frac{1}{2} I$$

$$T = \frac{50 \tan \frac{1}{2} I}{\sin \frac{1}{2} D}$$

$$\sin \frac{1}{2} D = \frac{50}{R}$$

$$\sin \frac{1}{2} D = \frac{50 \tan \frac{1}{2} I}{T}$$

$$R = T \cot \frac{1}{2} I$$

$$R = \frac{50}{\sin \frac{1}{2} D}$$

$$E = R \text{ ex. sec } \frac{1}{2} I$$

$$E = T \tan \frac{1}{2} I$$

$$\text{Chord def.} = \frac{\text{chord}^2}{R}$$

$$\text{No. chords} = \frac{I}{D}$$

$$\text{Tan. def.} = \frac{1}{2} \text{ chord def.}$$

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.) 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. $10.10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. $25.25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 = \text{Base}$.

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

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

LEVELING. The correction for curvature and refraction, in feet and decimals of feet is equal to $0.574 d^2$, where d is the distance in miles. The correction for curvature alone is closely, $\frac{1}{2} d^2$. The combined correction is negative.

PROBABLE ERROR. If d_1, d_2, d_3 , etc. are the discrepancies of various results from the mean, and if Σd^2 = the sum of the squares of these differences and n = the number of observations, then the probable error of the mean =

$$\pm 0.6745 \sqrt{\frac{\Sigma d^2}{n(n-1)}}$$

MINUTES IN DECIMALS OF A DEGREE

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

INCHES IN DECIMALS OF A FOOT

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

Wagner Rd. Grading

Proj. No. L-

Prime Contractor - Reilly Construction

(Silt Fence)
Sub Contractors - Pauline Construction

(Signing)
Selco Construction

County Inspection Personnel

Index

Final Quantities
Daily Work Records
Diary

Final Quantities

Item #1 Class 10, Excavation, Rdwy + Borrow

Plan Quantity = 59,030 CY

Actual Quantity =

Item #2 Class 20, Excavation, Rdwy Pipe Culvert

Plan Quantity = 242 CY

Actual Quantity =

Item #3 Class 12 Boulders

Plan Quantity = 300 CY

Actual Quantity =

Item #4 Overhaul

Plan Quantity = 320,472 sta. Yd.

Actual Quantity =

Item #5 Clearing & Grubbing

Plan Quantity =

Actual Quantity =

Item #6 Removal of Existing Structures

Plan Quantity = Lump Sum

Item #7 Reclaiming Present Surface Material

Plan Quantity = 2720 CY

Actual Quantity =

Item #8 Culvert, Conc, Rdwy Pipe 24"
F & P

Plan Quantity = 110 LF

Actual Quantity =

Item #9 Culvert, Conc, Rdwy Pipe 30" F&P

Plan Quantity = 30 L.F.

Actual Quantity =

Item #10 Culvert, Conc, Rdwy Pipe 36" F&P

Plan Quantity = 136 L.F.

Actual Quantity =

Item #11 Culvert, Conc, Rdwy Pipe 42" F&P

Plan Quantity = 66 L.F.

Actual Quantity =

Item #12 Culvert, Conc, Rdwy Pipe 30" R&R

Plan Quantity = 30 L.F.

Actual Quantity =

Item #13 Culvert, Corr. Metal Ent. Pipe 18"

Plan Quantity = 998 LF

Actual Quantity =

Item #15 Aprons, Corr Metal F&P 30"

Plan Quantity = 1

Actual Quantity =

Item #14 Aprons, Corr. Metal F&P 18"

Plan Quantity = 38

Actual Quantity =

Item #16 Concrete Aprons, Type I F&P 24"

Plan Quantity = 4

Actual Quantity =

Item #17 Concrete Aprons Type 1 F&P 30"

Plan Quantity = 2

Actual Quantity =

Item #18 Concrete Aprons Type 1 F&P 36"

Plan Quantity = 4

Actual Quantity =

Item #19 Concrete Aprons, Type 1 F&P 42"

Plan Quantity = 2

Actual Quantity =

Item #20 Concrete Pipe Elbow 45° F&P 30"

Plan Quantity = 1

Actual Quantity =

Item #21 Silt Fence For Ditch Checks

Plan Quantity = 300 LF

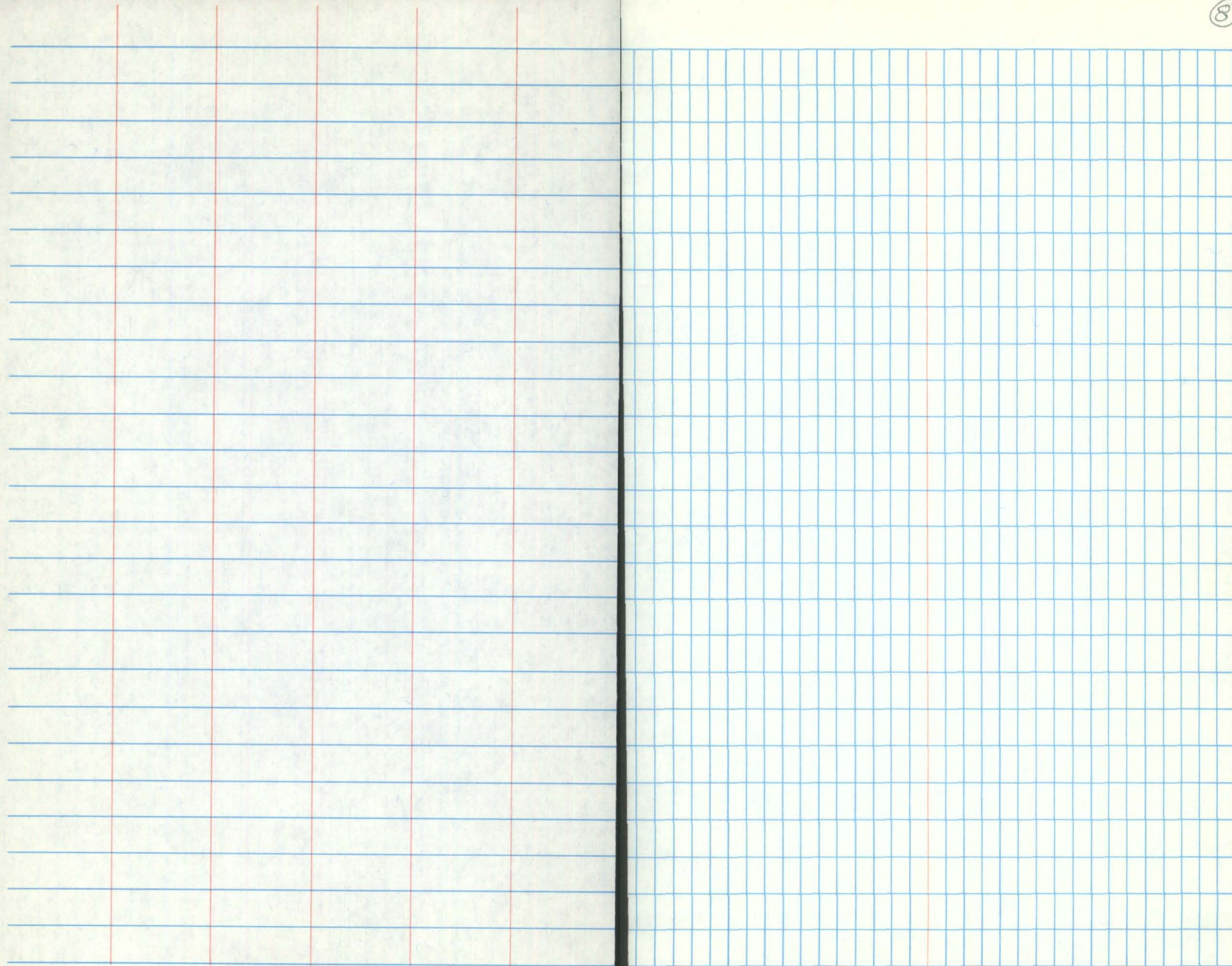
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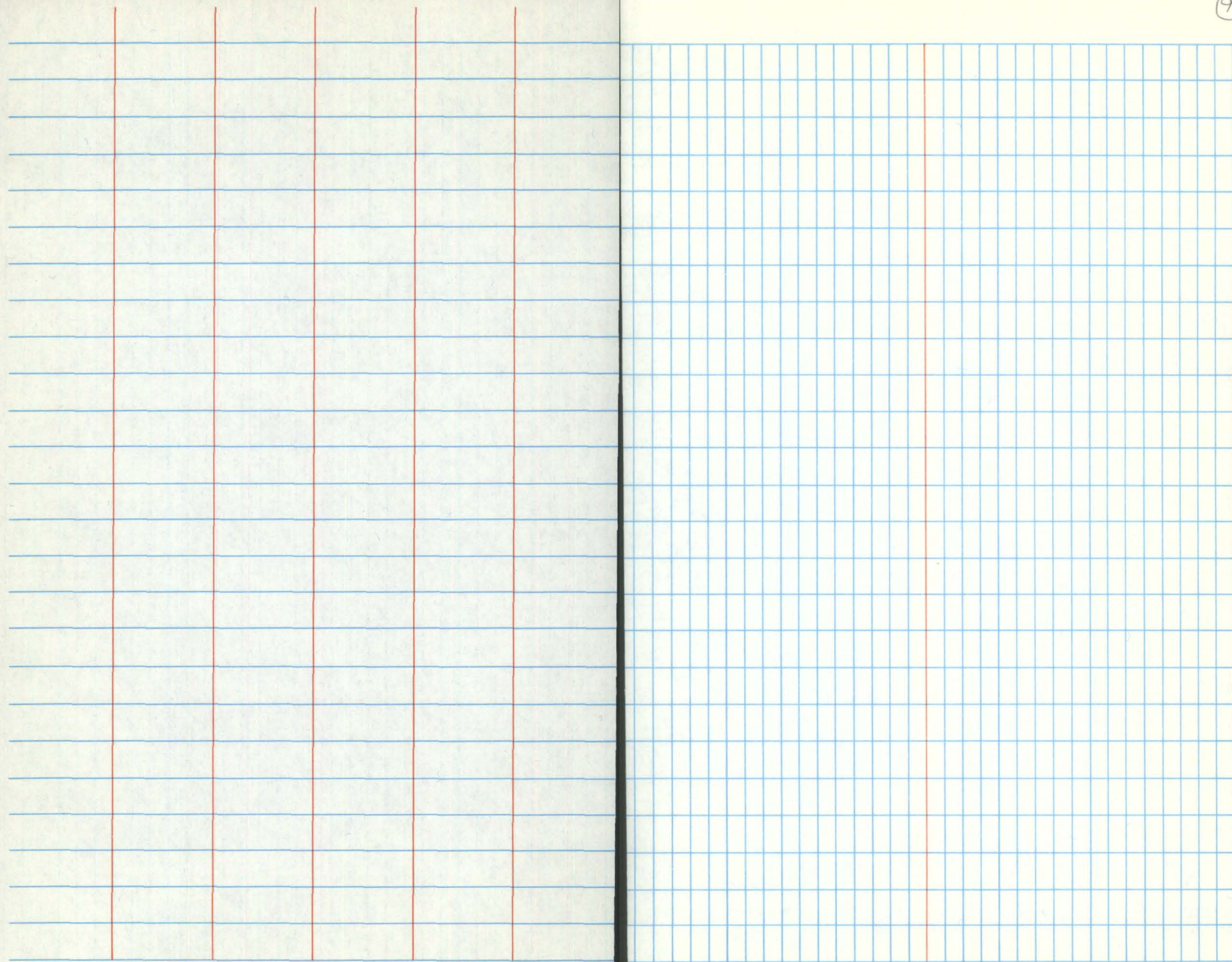
Item #22 Mobilization

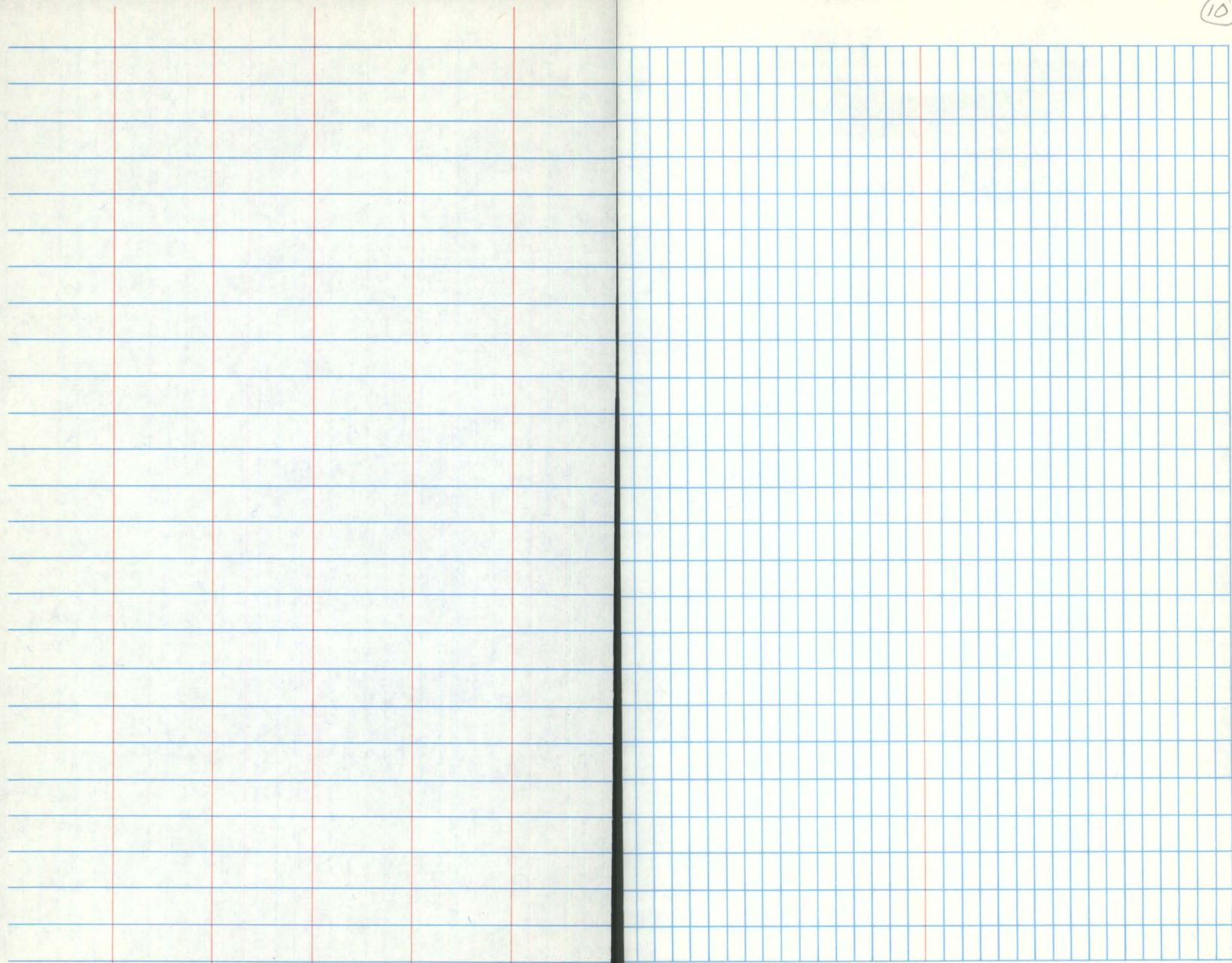
Plan Quantity Lump Sum

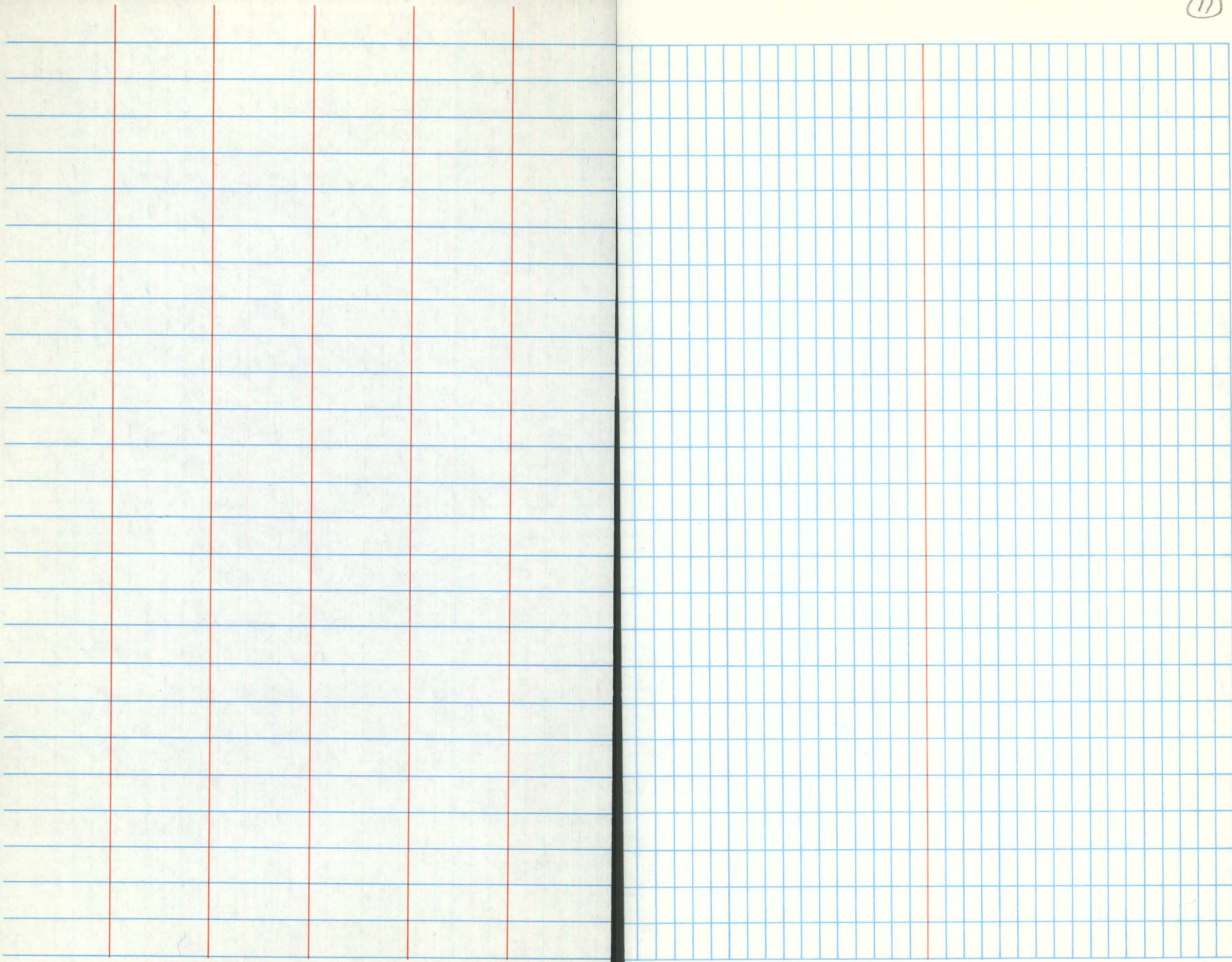
Item #23 Traffic Control

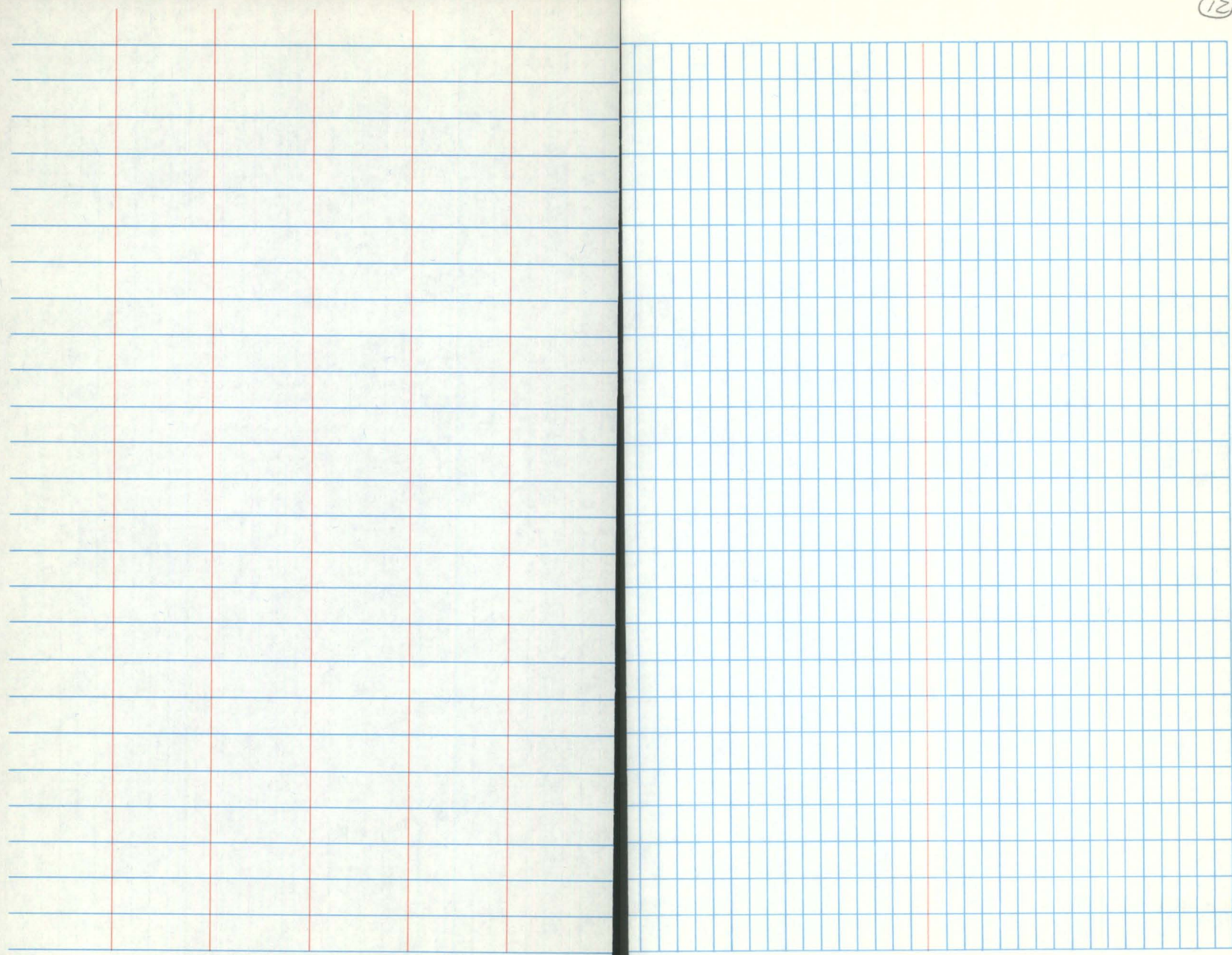
Plan Quantity = Lump Sum

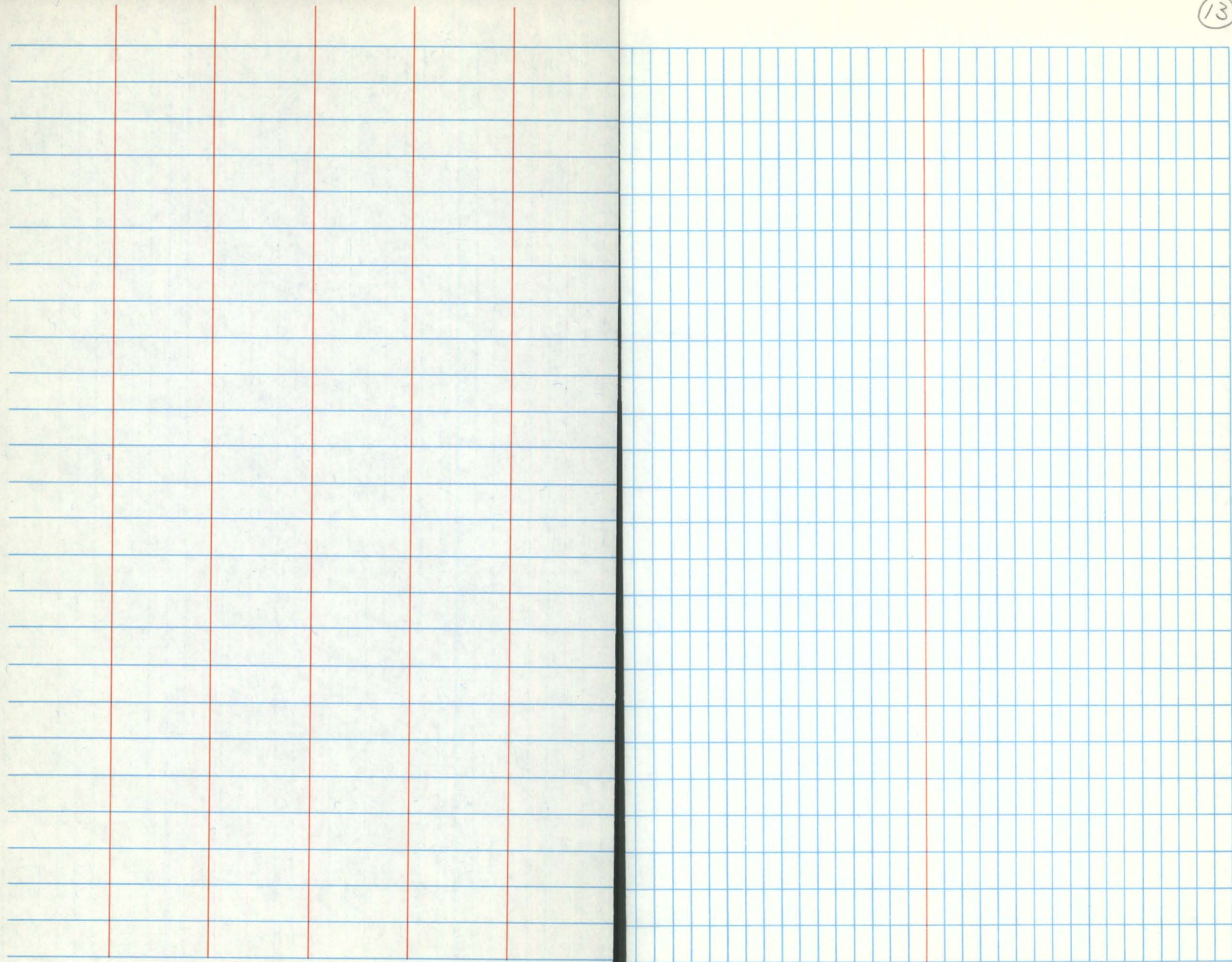


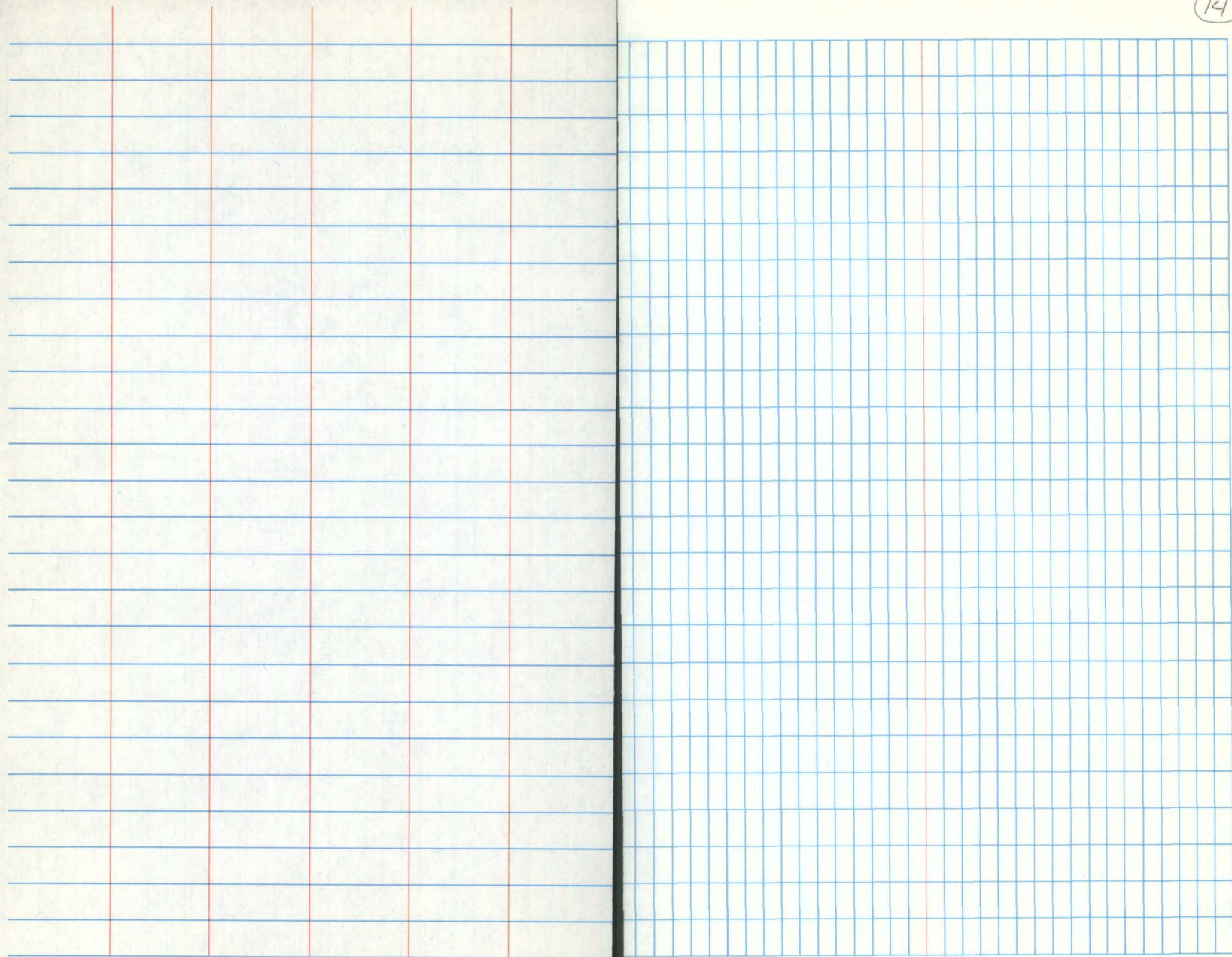


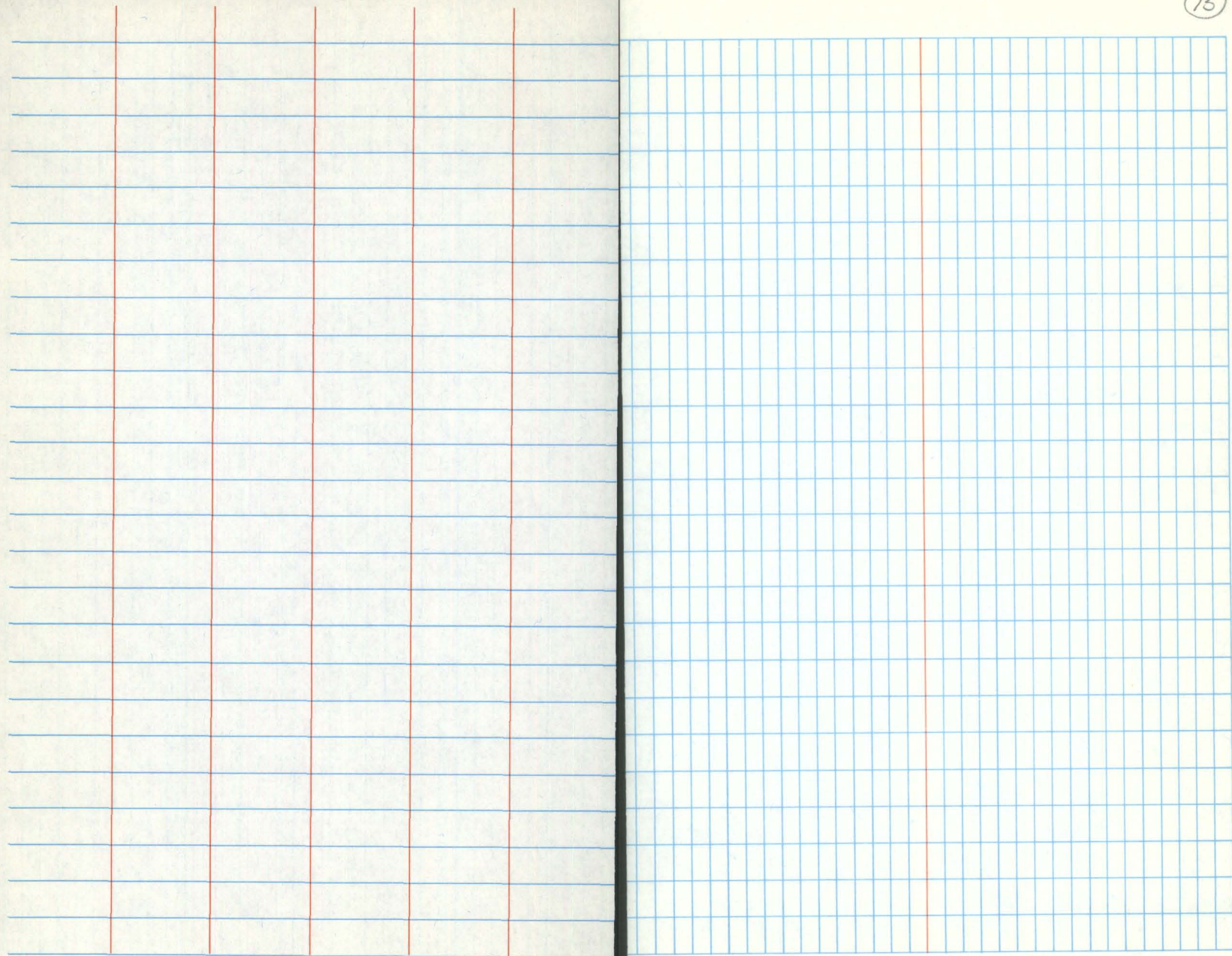


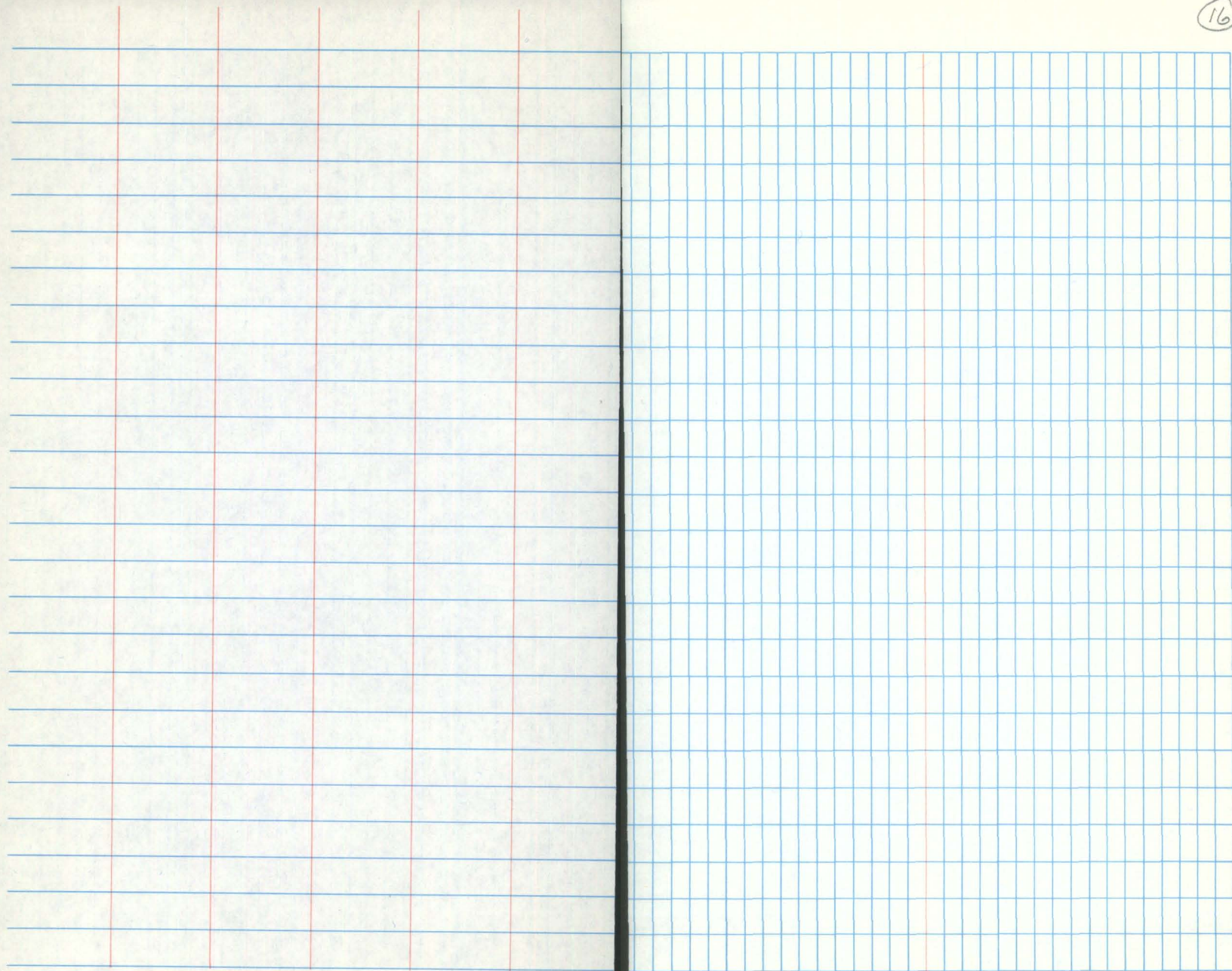


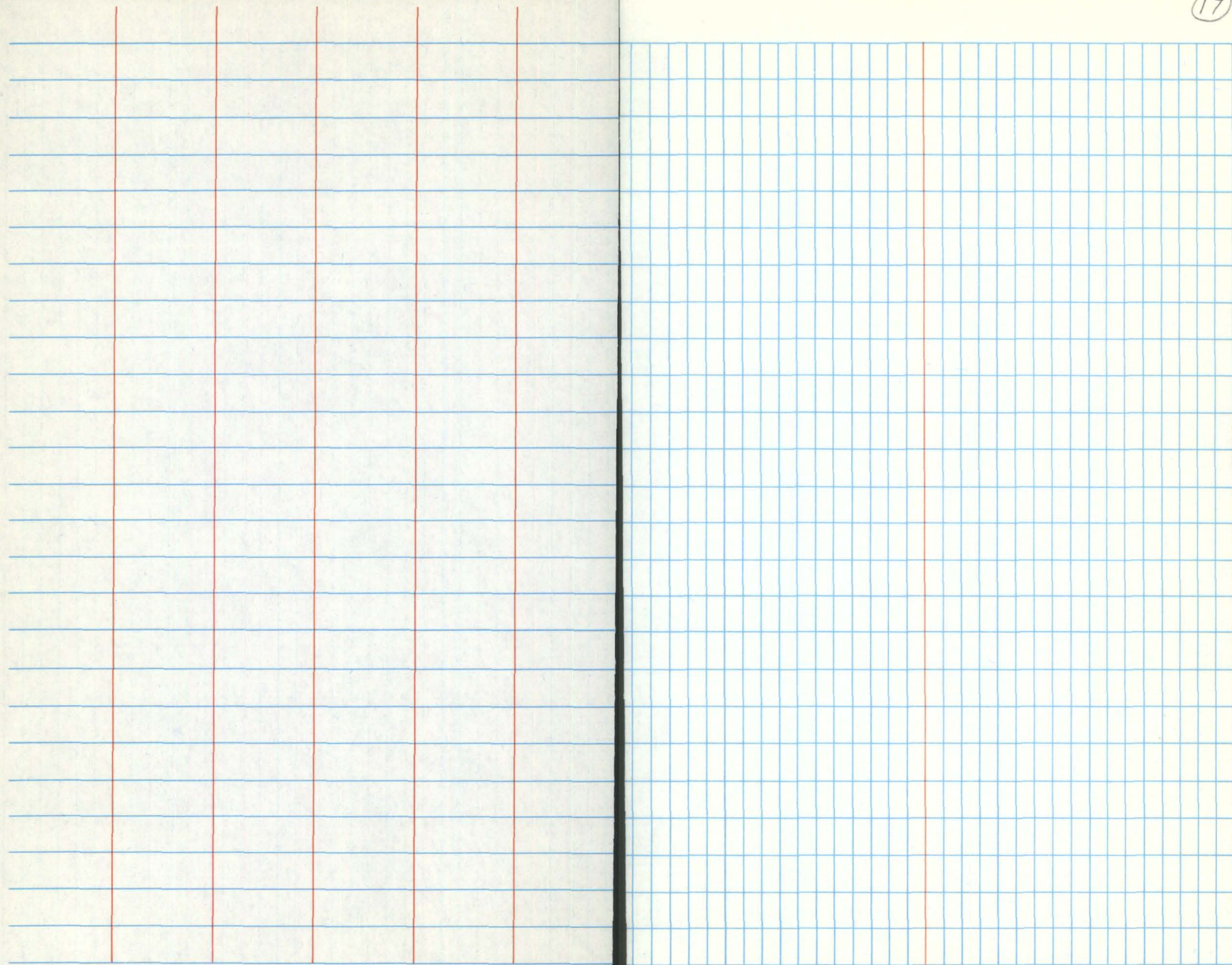


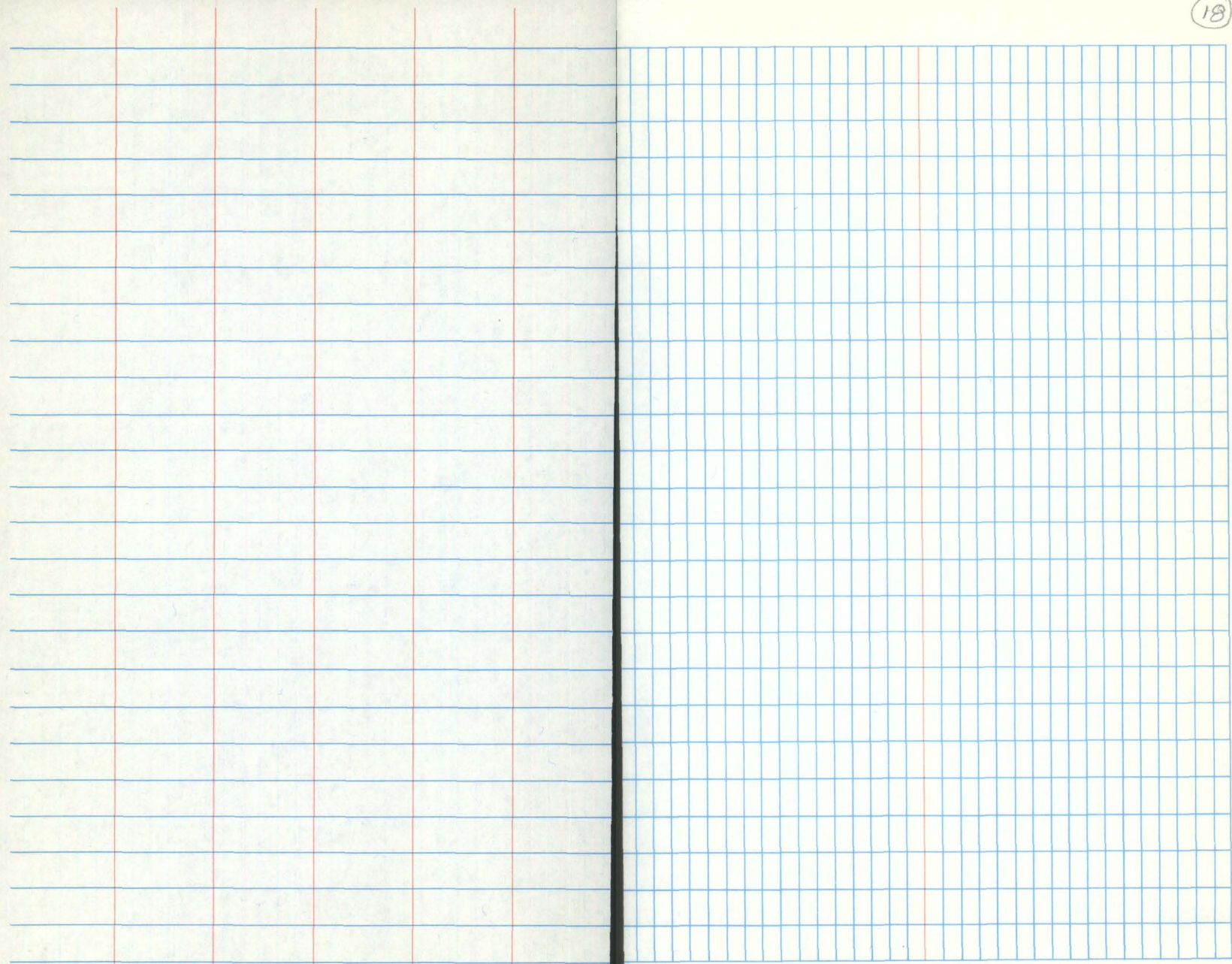












Monday, Sept. 30, 1991

Contractor was clearing and grubbing. Gave Leonard letter from Abel-Lipshultz for handling of saw logs from their property. Measured 322' fence for removal in Abel-Lipshultz trees. Asked Marianne Abel if she wanted to salvage fence material but she said no.

Contractor began removing cedars from Abel-Lipshultz property @ 11:00. Trees were topped and trimmed and stumps removed. Saw logs were placed across the road behind R.O.W line as requested by landowner.

WL

Tuesday Oct 1, 1991

Contractor continued clearing and grubbing on Abel-Lipshultz property. US West arrived to start work on cable. Contel completed work on their cable @ North end of project. Completed clearing on Abel-Lipshultz property. Logs stacked on west side

of road. Quit work @ 6:00 B.S.

Wed Oct 2, 1991

Contractor began excavating for pipe at station 367+10. Survey crew started measuring pits for payment on Class 12.

First pile @ Sta 381+00 = 4 Second one @ Sta 374+50 = 22 cu yds Third one @ Sta. 370+00 = 5 Fourth one @ Sta. 366+20 = 32 cu yds Fifth one 358+00 = 45 cu yds Sixth pile @ Sta 353+00 = 44 cu yds Seventh pile @ Sta 351+00 = 33 cu yds eighth pile @ Sta 349+00 = 1.5 cu yds ninth pile @ Sta 346+00 = 3 cu yds tenth pile @ Sta. 338+00 = 50 cu yds eleventh pile @ Sta 329+00 = 3 cu yds twelfth pile @ Sta 324+00 = 2 cu yds

No 13 pile @ Sta 322+00 = 2 cu yds

No 14 pile @ Sta 318+00 = 42 cu yds

No 15 pile @ Sta 298+75 = 3 cu yds

No 16 pile @ Sta 292+00 = 4 cu yds

Finished laying Rdwy Pipe @ Sta. 367+10

Quit work @ 6:00

Total Class 12 = 595.9

B.S.

CU
Yds

Thursday Oct 3, 1991

Contractor started excavating for rdwy pipe @ Sta. 357+58. IPS continuing to move poles at a very slow pace. Survey crew set ditch cuts for US West. Completed laying pipe @ Sta 357+58. Quit work @ 6:00.

B.S.

Friday Oct 4, 1991

Rain No Work

B.S.

Saturday

No Work

B.S.

Sunday

No Work

B.S.

Monday Oct 7, 1991

Contractor excavated for Rdwy pipe @ Sta 345+33. Worked on pipe all day. Completed work on pipe @ 6:00. No other work done B.S.

Tuesday Oct 8, 1991

Contractor began clearing & grubbing near box culvert @ Sta 313+68. Called Sign man to come and get signs out of way. Continued clearing & grubbing on east side of road by box culvert. Quit work @ 6:00

B.S.

Wed Oct 9, 1991

Contractor arrived on project @ 7:00. Contractor continued clearing & grubbing on South mile of project. Moving dirt on North mile. Farmer on north mile west side of road unclear where he wants fld. entrances. Suppose to contact Dennis Clarke to let him know where. Finished up clearing and grubbing on the project. One more pile of Class 12 measured 10 cu yds. Total Class 12 to date = 305.9 cu yds

Thursday Oct 10, 1991

Contractor arrived on project @ 7:00. Began working on Rdwy Pipe @ Sta 337+72. Continued moving dirt on North end. May be ready

for Blue Tops on North end of Sunday Oct 13, 1991

project by Friday Rdwy Pipe & No Work

Sta. 337+72 completed. Decided to B.S.

put fld drives @ Sta 376+12 on

both sides of road. Needed additional Monday Oct 14, 1991

100' metal pipe with aprons. Contractor

agreed on contract price for additional

pipe. Quit work @ 6:00

B.S.

Friday Oct 11, 1991

Contractor arrived on the project @

7:00 am. Contractor having equipment

problems. Will not be ready for Blue

Tops on North end. Pipe crew

working on Rdwy Pipe @ Sta.

313+66. Removed existing 24"x24"

R.C.B. Completed pipe @ Sta 313+66.

Quit work @ 6:00

B.S.

Saturday Oct 12, 1991

No Work.

B.S.

Sunday Oct 13, 1991

No Work

B.S.

Monday Oct 14, 1991

Contractor arrived on the job @ 7:00.

Continued moving dirt on north end. Measured

pile of Class 12. Pile = 11 cu yds

Laying fld entrance pipe on north end

Started working on Rdwy pipe @ Sta 291+88.

Quit work @ 6:00

B.S.

Tuesday Oct 15, 1991

Contractor continued working on Rdwy

pipe @ Sta 291+88. Still working on grade

@ north side of Gresham Rd. Continued

laying entrance pipe. Quit work @ 6:00

B.S.

Wednesday Oct 16, 1991

Contractor continued working on north

side of Gresham Rd. Finished pipe @

Sta. 291+88. Started cutting grade

on south side of Gresham Rd. Quit work

@ 6:00 B.S.

Thursday Oct 17, 1991

Contractor continued cutting grade on South side of Gresham,

Began rock north end from Sta 392+50 to Sta 377+58, Continue moving dirt, Quit work @ 6:00

B.S,

Monday Oct 21, 1991

Contractor arrived on the project @ 7:00. Continued moving dirt. Still finding boulders all along project. Contractor requested additional measurement. Survey crew measured up additional boulders came to 15 cu yds, Quit work @ 6:00

B.S

Friday Oct 18, 1991

Contractor continued moving dirt, Contractor ready for Blue tops on next 2000 ft, Continued laying fld ent. pipe. Quit work @ 6:00

B.S,

Tuesday Oct 22 1991

Contractor advised survey crew some stakes were missing on south end. Contractor also had problems with driveway pipe @ Sta 321+84. Septic tile to be covered by pipe. Continued moving dirt, Quit work @ 6:00

B.S

Saturday Oct 19

No Work

B.S.

Sunday Oct 20

No Work

Wed. Oct 23, 1991

Contractor hauling dirt in on Gresham Rd going east. Survey crew Blue topped another 1800 feet on north end. Continued laying fld ent pipe. @ Worked on Rdwy pipe @ Sta 291+88. Quit work @ 6:00

B.S.

Thursday Oct 24, 1991

Contractor arrived @ 7:00. Began
raining @ 7:30 am

No Work B.S.

Friday Oct 25, 1991

Too Wet

No Work

B.S.

Saturday

No Work

B.S.

Sunday

No Work

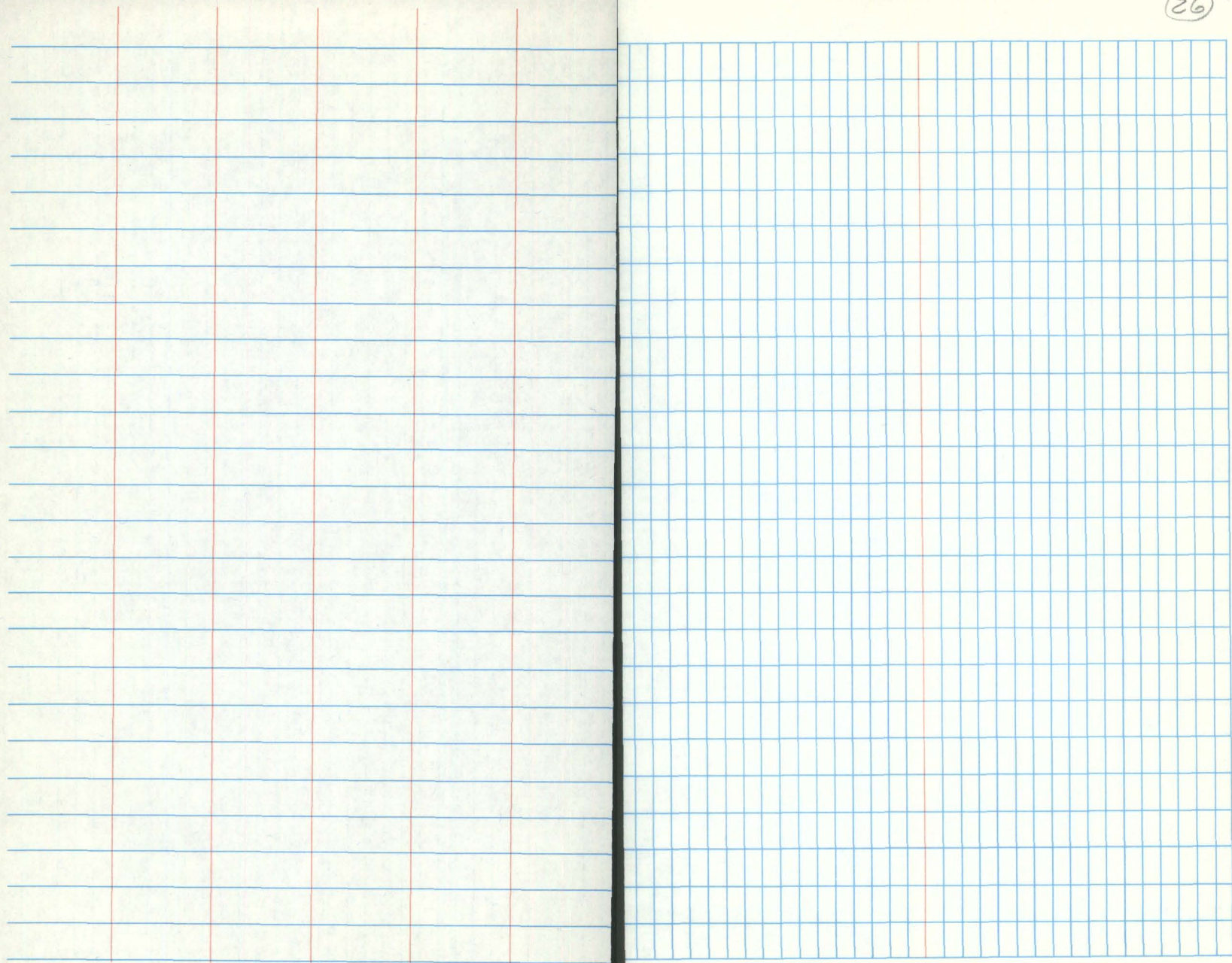
B.S.

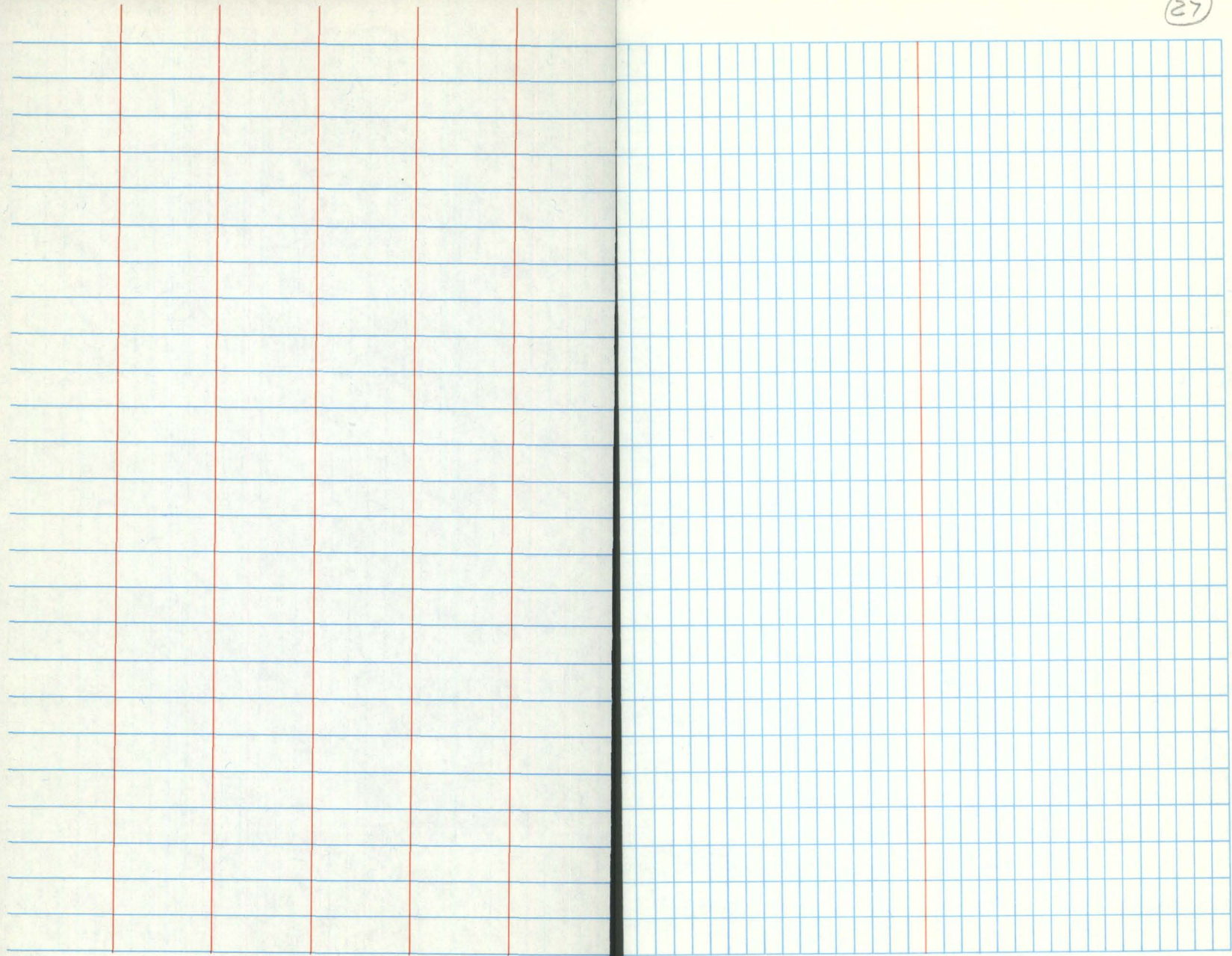
Monday

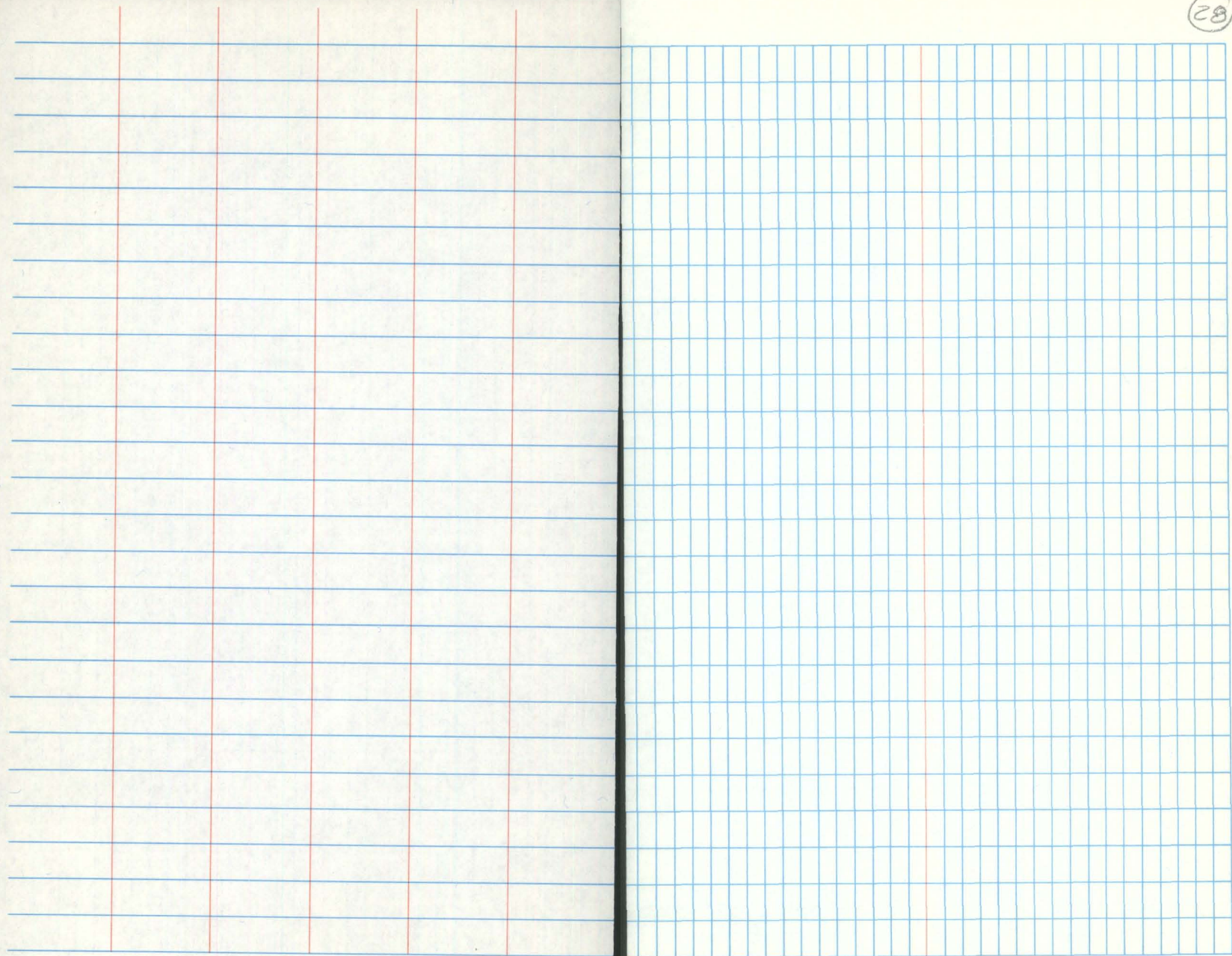
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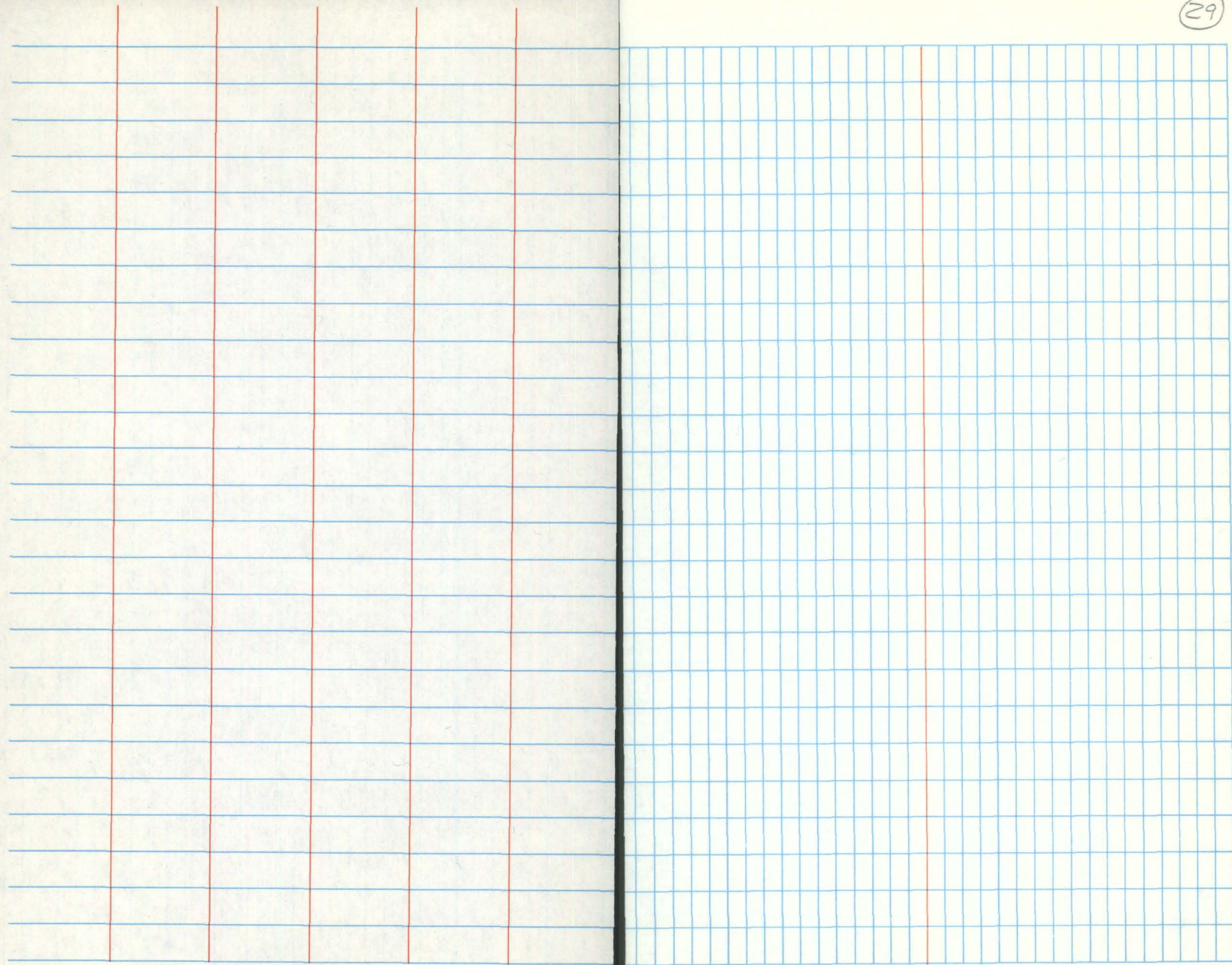
No Work

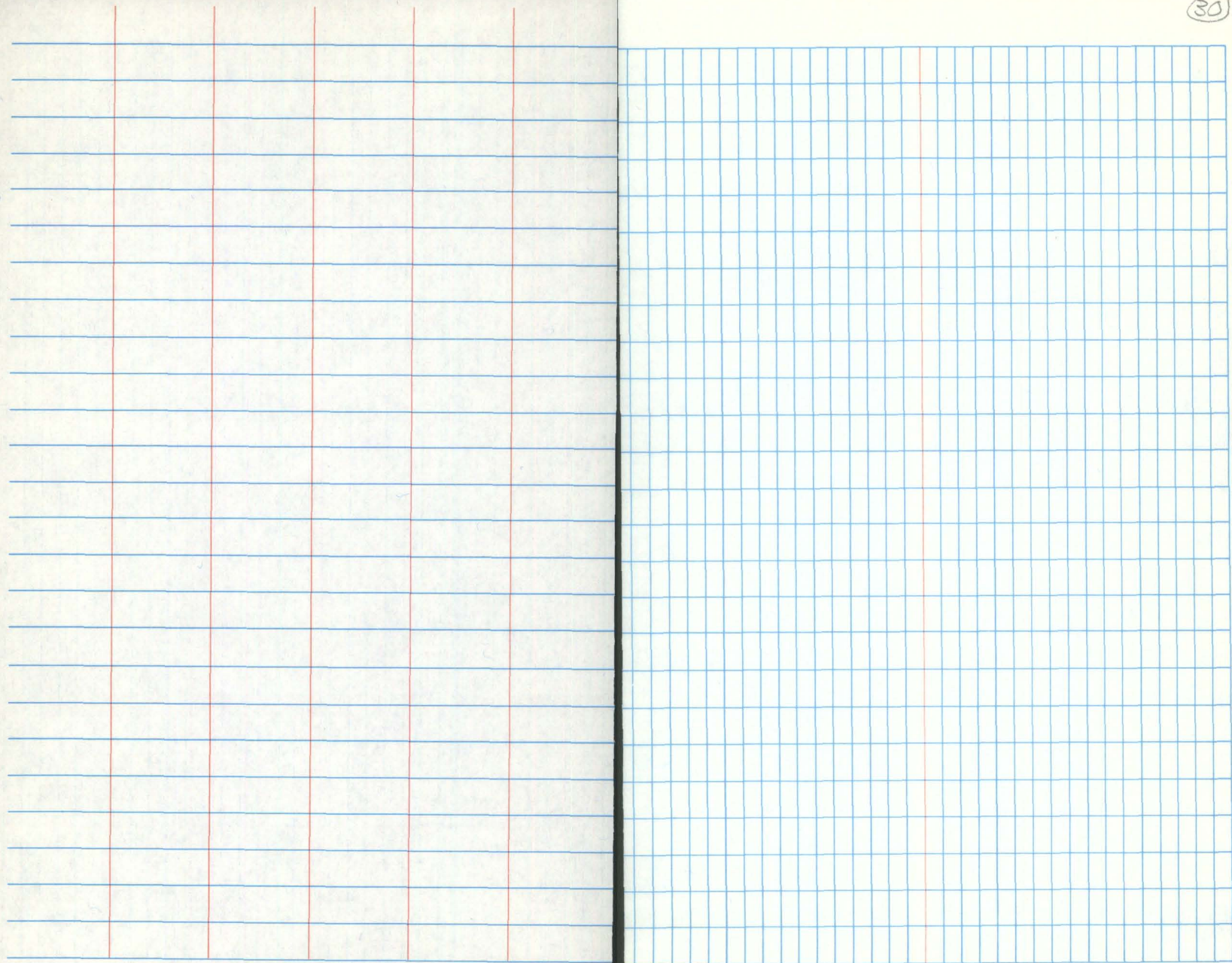
B.S.











Pipe

Sta	Type	Dia	Length	No. Aprons	Sta	Type	Dia	Length	Aprons
291+88	Conc.		22'	1	374+16	Metal	18"	46'	2
292+64		30"	8'	2	376+12	"	18"	50'	2
293+72	Metal	18"	50'	2	376+12	"	18"	50'	2
299+92	"	18"	42'	2	380+79	"	18"	54'	2
304+65	"	18"	54'	2	383+50	"	18"	50'	2
308+11	"	18"	52'	2	392+26	"	18"	58'	2
309+52	"	18"	58'	2					
311+18	"	18"	58'	2					
313+66	Conc.	36"	78'	2					
319+90	Metal	18"	50'	2					
321+84	"	18"	46'	2					
322+13	"	18"	46'	2					
322+90	"	18"	58'	2					
333+34	"	18"	54'	2					
337+16	"	18"	50'	2					
337+72	Conc.	24"	58'	2					
340+80	Metal	18"	66'	2					
340+80	"	18"	50'	2					
345+33	Conc.	24"	52'	2					
348+68	Metal	18"	60'	2					
349+30	"	18"	54'	0					
357+58		36"	58'	2					
364+71	Metal	18"	60'	2					
367+10	Conc.	42"	66'	2					

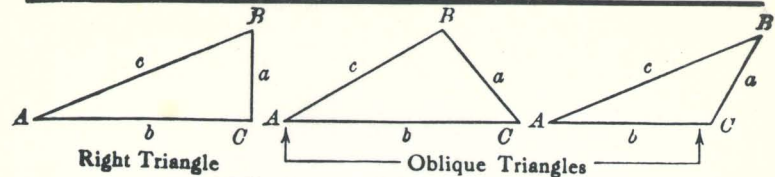
RDWY

RDWY

Rdwy

Rdwy

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

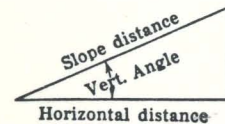
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given a, b	Required 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 A, B, a	Required 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 = $5^\circ 10'$. From the table, $\cos 5^\circ 10' = .9959$. 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. $\cosine 5^\circ 10' = .9959, 1 - .9959 = .0041, 319.4 \times .0041 = 1.31, 319.4 - 1.31 = 318.09$ 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.