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794

FIELD BOOK

No. 403 T.

EUGENE DIETZGEN CO.,

Drawing Materials and Surveying Instruments.

NEW YORK. CHICAGO. SAN FRANCISCO.

TABLES FOR EXCAVATIONS AND EMBANKMENTS.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 20 FEET WIDE. SIDE SLOPES 1 TO 1.

FOR SINGLE TRACK EXCAVATION.

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	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	0
1	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	1
2	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	2
3	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	3
4	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	4
5	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	5
6	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	6
7	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	7
8	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	8
9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	9
10	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	10
11	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	11
12	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	12
13	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	13
14	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	14
15	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	15
16	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	16
17	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	17
18	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	18
19	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	19
20	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	20
21	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	21
22	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	22
23	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	23
24	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	24
25	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	25
26	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	26
27	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	27
28	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	28
29	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	29
30	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	30
31	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	31
32	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	32
33	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	33
34	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	34
35	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	35
36	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	36
37	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	37
38	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	38
39	49.0	49.1	49.2	49.3	49.4	49.5	49.6	49.7	49.8	49.9	39
40	50.0	50.1	50.2	50.3	50.4	50.5	50.6	50.7	50.8	50.9	40

Calculated by F. E. Paradis, C. E.

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Sta	Dist	No	interm Dist
			260
			290
	604		54 R
		250	
			184 R
	454.2		300 R
		249	
			90 R
			164 R
			300 R
		248	
	10		
		PJ	
	10		
		247	
	661		
		246	
			97 R
	397		300 R
		245	
			119 R
	419		300 R
		244	

x 344 to telephone line.

Sta	Dis	No	Interdis	
		259		
			52h	
	245h		193h	
				+65' to fence
		258		
				+4c
			263h	
			177h	
	841h		300	
			101h	
		257		
			336s	
			97h	
			300h	
		256		
	346s			
		255		
	341s			
		254		
	60s			
				+10' to PI
		253		+14' to angle pole
	140s			
		252		
			166c	
			183c	
			234h	
				+158' to road crossing
		251		+234 to fence line

Sta.	Dist.	Ins.	Int. Dist.	
		267		
98h				
		266		
25h				
		265		+10' to P.I.
347h			47h	
			300h	
		264		
			88h	
			300s	
		263		
			198h	
			300s	
		262		
			75s	hub
			162s	hub
		261		
			81h	
			300h	
			300h	+10s to fence
			190s	
			42h	
		260		
901h			134	
			67'	

Sta.	Dist.	Ht.	Int. Dist.	
		279	In fence	+ 3' to fence + 312' to "
	392 h			
		278		+ 145 to fence
	484 h			
		277		
	412 h			
		276		+ 36' to fence
	733 h			
		275		+ 35' to fence
			Ct.	
		274		
			Ct.	
			28 h Started Sept 4th.	
		273		
	42 h			
		272		+ 19' to P.I.
			615	
	528 s		300 s	
			159 s	
		271		
	169 h			
		270		
	201 h			
		269		
	40 h			
		268		

Dta.	Dist.	No	Int. Dist
381h			
		287	
			62h
			171h
634h			41h
			360h
		286	
618s			
		285	
			61h
			90h
			300h
		284	
			300h
400h			100h
		283	
			298h
399h			101h
		282	
			170s
			300s
			395h
		281	
244s			
		280	
693h			

Sta.	Dist	No.	Int. Dist.	
	196h			
		298	in fence	
	650			
		297		
	600h			
		296		
	585h			
		295		+436 to fence
			100s	
			787h	
		294		
	741h			
		293		+605' to fence
	321h			
		292		+290 to fence
	600h			
		291		
	610h			
		290	in fence	
			38h	
			300h	
			300s	
			69h	+176'5 to fence
		289		
	685h			
		288		

Started Sept. 6. (Mon)

Sta.	Dist.	Tp.	Int. Dist.	
	500 s			
		310		
	340 s			
		309		
	230 s			
		308		
			161 s	
			300 s	
			300 l	
		307		
	617 s			
		306		
	371 s			
		305		
	630 s			
		304		
	543 h			
		303		
	201			
		302		+10 to P.I.
	365 h			
		301		+66 to fence
	592 h			
		300		
	625 h			
		299		

Sta.	Dist	No.	Int Dist
		323	
	20h		
		322	Started Sept 7. (Wed)
	215s		
		321	
			362s
			600h
		320	
	122h		
		319	
	374s		
		318	
	595s		
		317	
	577h		
		316	
	552s		
		315	
	369s		
		314	
	574s		
		313	
	300s		
		312	
	529h		
		311	

+ 10 to P.I.

Sta	Dist	No.	Sub Dist
		335	
	555h		
		334	
	753h		
		333	
	392h		
		332	
	601h		
		331	
	600h		
		330	
	522h		
		329	
	554h		
		328	
	543h		
		327	
	600h		
		326	
	600h		
		325	
	243s		
		324	
			375s
			157h

Sta.	Dist.	No.	Int. Dist.
			End
		345	
257h			267 to angle
		344	
373h			
		343	
379h			
		342	
600s			
		341	
600s			
		340	
800h			
		339	
600s			
		338	
600s			
		337	
547h			
		336	
560			

+10' to P.I.

Sta.	Dist.	No.	Cut	Dist
		208		
620s				
		207		
572h				
		206		
335h				
		205		
900h				
		204		
		203		
		203		
		202		
		201		
571h				
		200		
337s				
		199		
24				
		198		
		197		

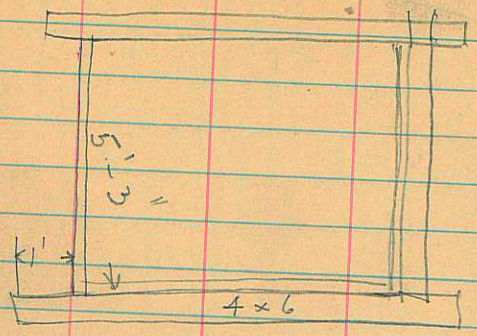
Started Sept 9 (Thur)

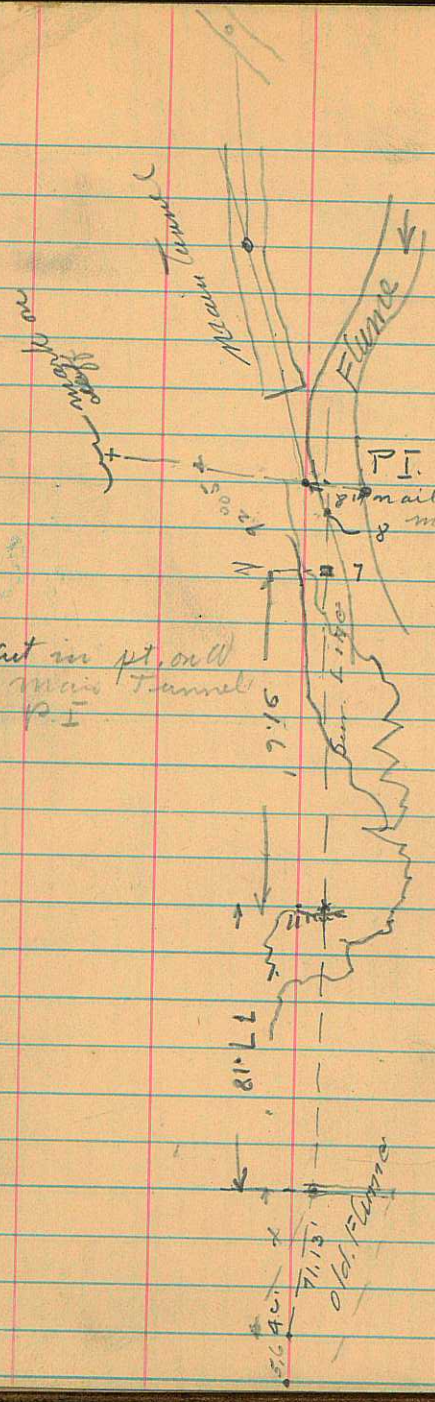
+12' to P.I.

Sta	Dist	No.	Int Dist
			End
		218	
	166		176h to angle pole
		217	
	242h		
		216	
		215	
	600s		
		214	
	985s		
		213	
	686s		
		212	
	146h		
		211	
	257s		
		210	
			Sta
		209	
	914h		183
			731

+10' to P.I.

10.5
6
63.0





Note cut in pt. on W side Main Tunnel 3' E of P.I.

7 - 8 = 63.6

Note from stake 7 to P.I. 81.2'

63.6
17.6
81.2

from P.I. to E to west
connection 114'
stick in tunnel 211'
308' to E. bulk head
410' to E just wdt old flume

Out P 1-2 = -24°34'
" " 1-3 = 27°34'
87.0 feet to top of cap.

$I = 3°52$

$R = \frac{50}{\sin D}$ $\quad \frac{1}{2} = 1°56'$

Log 50 = 1.698970
Log sin 2°30 = $\bar{2}$.639680
3.059290 = Log R
$\bar{2}$.528349
1.587639 = Log Tan

Log 50 = 1.698970
Log cos 1° = $\bar{2}$.241855
3.457114
2° $\bar{2}$.528349
1.985463
96.7 = T.

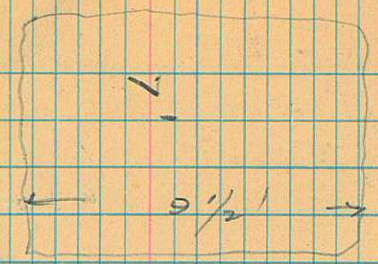
Log 50 = 1.698970
Log 1°30 = $\bar{2}$.417919
3.281051
$\bar{2}$.528349
1.809400
sin 58 $\bar{2}$.227195
1 = 64.50

4 | 3.52
180
4 | 2332
58

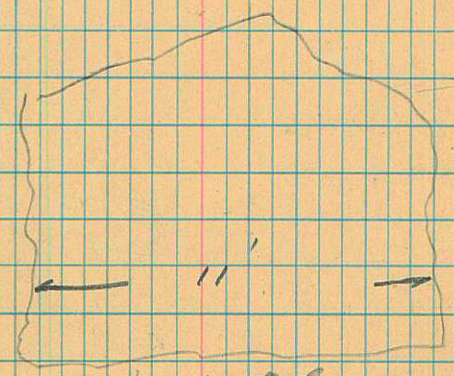
O.K.

Log E = 0.036595 = 1.08

71
91.6
77.2
81.2
410
731.0



East side



West Opening

Log 2.03 = 0.307496
731 $\quad$ 2.863917
$\bar{3}$.443579
307496

Direct Levels from a point West the West Tunnel

No 4	B S.	F S	cm	Ele	H.
	7.030			100.50	107.53
			1.80		
			6.35+	101.18	
			1.12		
		6.652		100.878	
	5.470				106.348
			3.32	103.028	
			4.00	102.348	
			~~4.7~~		
			4.7	101.64	
			4.9	101.45	
a		3.978		102.37	
	8.008				110.378
	20.508	7.85			
	18.48				
	2.028	18.480			

Grade = 0.2777%

7.03
1.8
5.23

By No 4 S. side bottom of flume on top of side by No 4. S. Side flume bottom of flume where juct. shall be made West end of main tunnel on side board on side

on top of paint mark below a figure 5 west Portal

on tunnel floor East entrance mark .05 + H.I. by figure 6 Ele on mark 106.39

midway in tunnel + by stick floor of tunnel West entrance

Bottom of flume E Entrance

7.26
.265
3630
4356
1452
1.92390

2.03.00 7.26
1552 00.265
4780
4356
4240

Check Levels

BS	FS	Int	Ele	HI	
4.52			102.370	106.89	on T.P. a
		0.50	106.390		on top mark E. Entrance by 6
		3.866	103.024		on " " W " by 5
	6.01				
6.76					
11.28	1.93				
	7.94				
	5.23				
	13.17				

4.C			100.00	Grade at 4.C.
Sta.O.	4.64 ~~1.48~~		100.66	floor of flume
			105.89 110.53	on side of flume
			105.	5 above grade
.15.5		5.49	105.04	mark on E side flume
71		5.34	105.19	
107		2.25	108.28	by cliff

105.89 / 4.64 / 110.53 / 105.04 / 5.49

100.66 / 5.23 / 105.89 / 1.48 / 107.37

4.05

4.55 / 4.05 / .50

34

.26

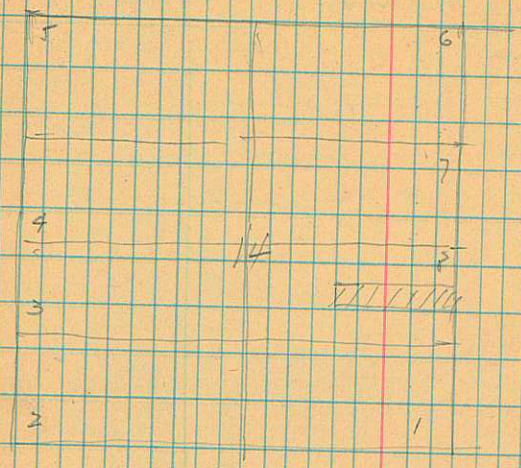
20.508 / 8.008 / 12.500 / 10.63 / 1.87

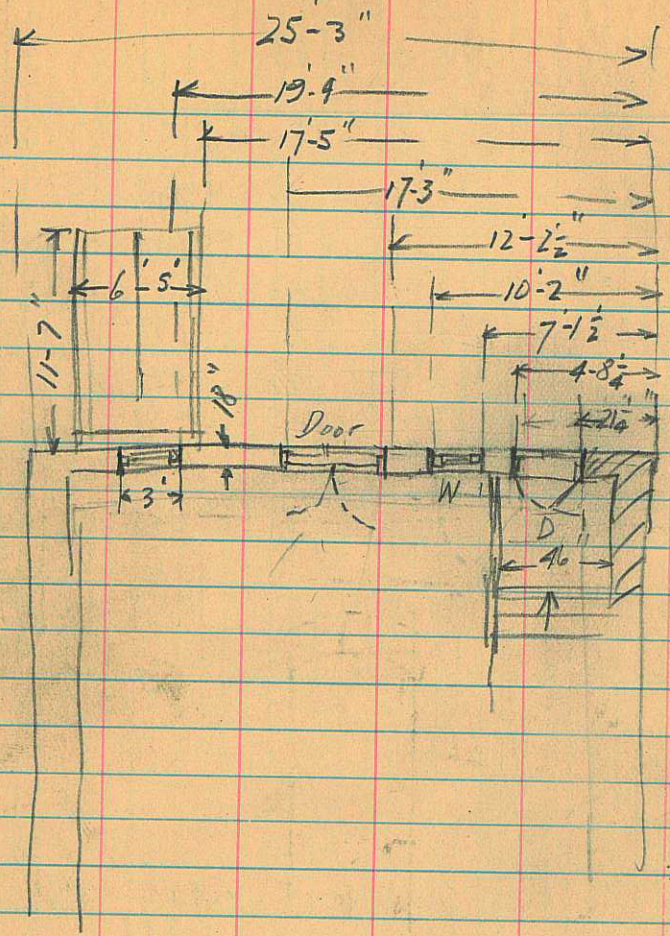
18.48 / 7.85 / 10.63

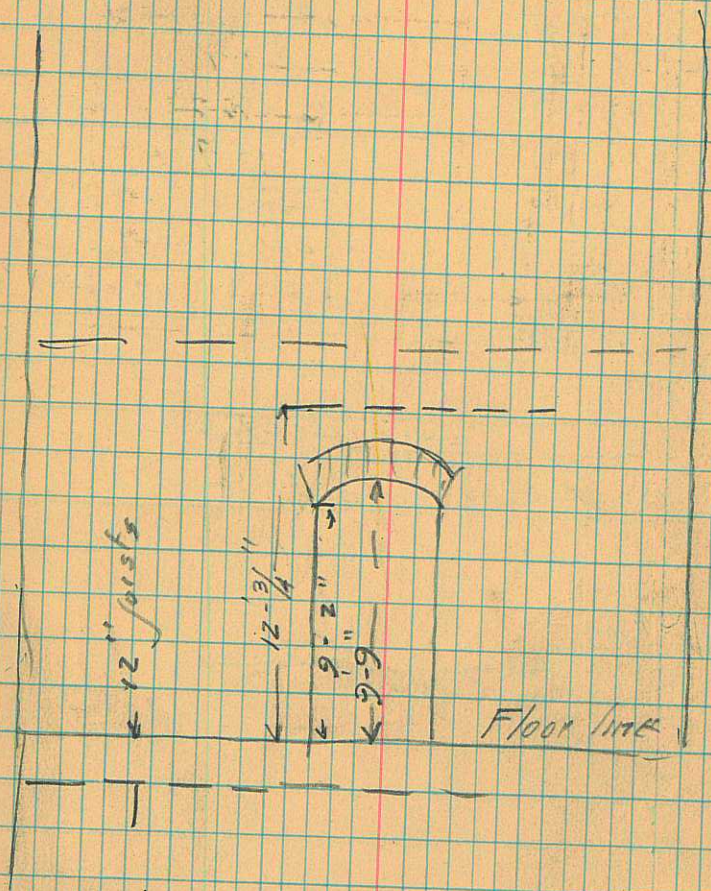
13.17 / 11.28 / 1.89

11.28 / 7.94 / 3.34

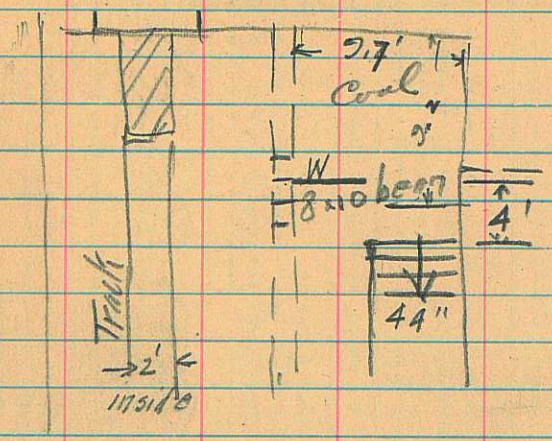
Description Riters Bros Drug Co. in Blk 14. Plat A Logan Beg. at a point 89' South of NE cor lot 8. W 9 rds. S 25 ft. E 9 rods. N 25' to ~~fee~~ beg.

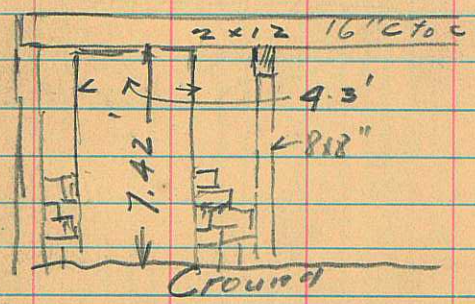



25'-3"
19'-4"
17'-5"
17'-3"
12'-2½"
10'-2"
7'-1½"
4'-8¼"
2¼"
6'-5"
11'-7"
18"
Door
3'
W
D
46"


12' for steps
12'-3¼"
9'-2"
9'-9"
Floor line

Basement


9.7'
Coal
W
8x10 beam
4'
44"
Track
2'
inside


2x12 16" c to c
4.3'
8x8"
7.42
Ground

Levels from monument Center & Main to Riters floor.

B S	F. S.	Eleva.	HI
3.75		4532.92	4536.67
	4.90	4531.77	
		4523.27	
		4521.5	

Dec 11 - 1913. - 42 -

On monument intersection C & Main.

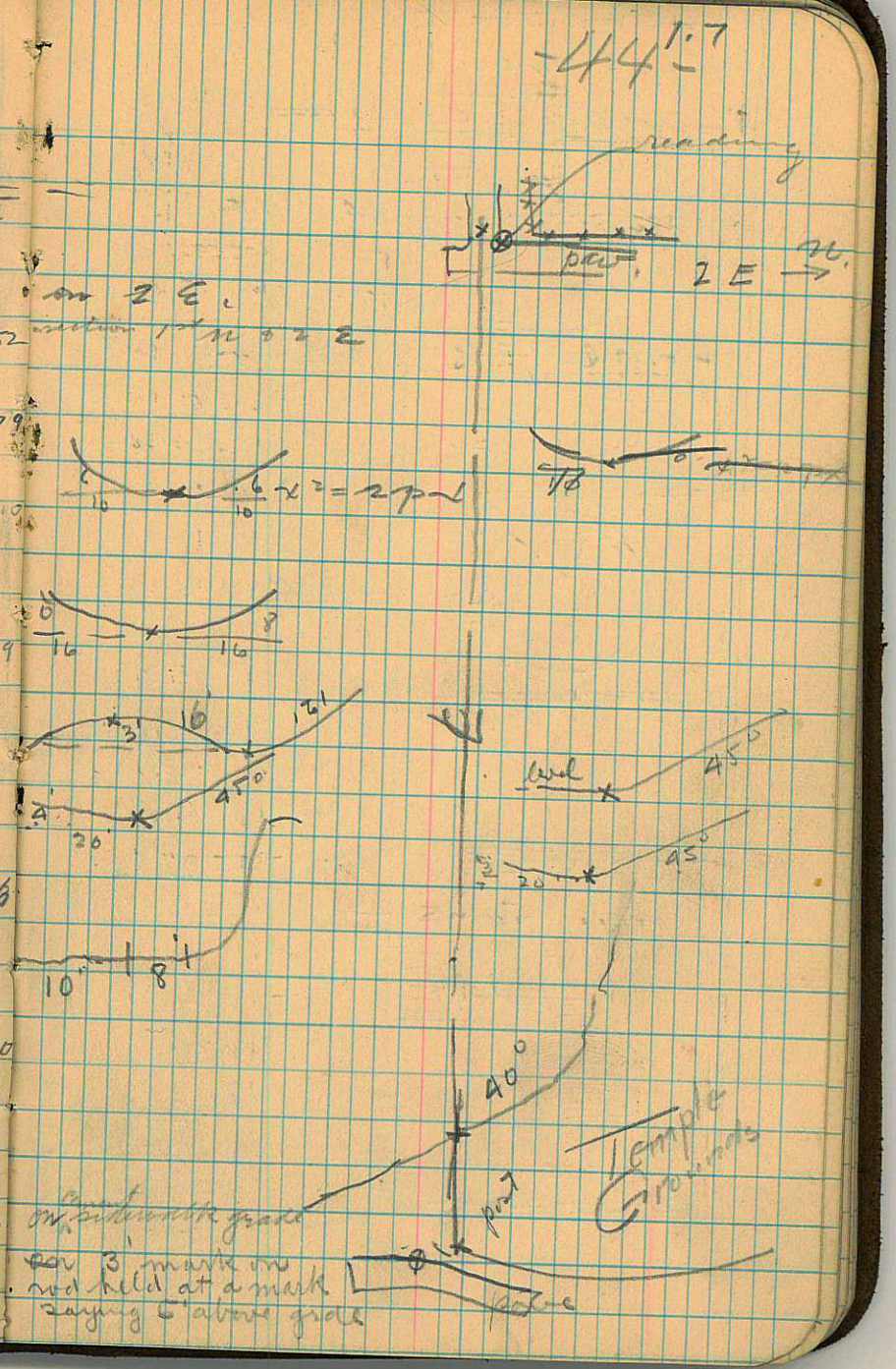
Basement Riters Bros.

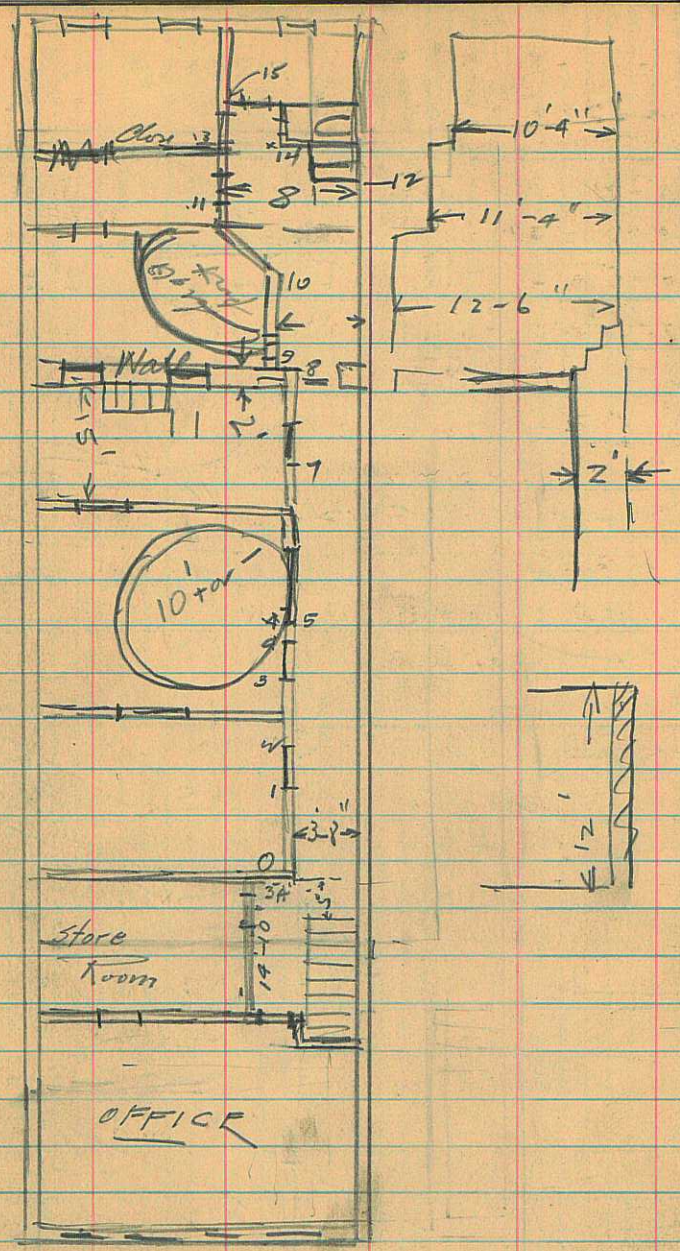
sewer at Riters

Difference is about 1 foot.

Survey at the South side of the Temple, 12/31/13

Sta	B.S	F.S	im	Eleva.	HI
7+02.6			8.42	4559.10	
6+74			4.70	4562.82	
6+50	3.88	11.15	3.800	4563.72 on BM intersection 1st n & 2 E	
6+00				4563.64	4567.52
			10.2	4564.59	
5+50	4.41	11.72		4570.38	4574.79
5+00			7.90	4574.20	
4+75	1.480	12.67		4580.62	4582.10
4+50			10.00	4583.29	
4+00			4.80	4588.49	
	2.09	12.56		4591.20	4593.29
3+50			6.65	4597.11	
3+00			10.75	4593.01	
2+50			6.30	4597.46	
2+00			4.20	4599.56	
	1.71	12.95		4602.05	4603.76
1+50			10.2	4604.80	
1+32			8.00	4607.0	
	1.00	11.78		4614.00	4615.00
1+00			9.9	4615.88	
0+98			4.60	21.18	
0+50			4.36	-21.42	
0			3.88	4621.9	4625.78
	1.70				





0-1 - 6'-9" - door
0-2 - 9'-4" - "
0-3 - 17'-6" - "
0-4 20'-1" - "
0-5 - 22'-9" - Window
0-6 - 26-9" = "
0-7 = 37-7" = door
0-8 - 48'-8" - West edge wall
0-9 - 49-6" = door, E edge
8-10 - 12'-6" = edge or cor.
8-11 - 23-7" = E side door 2-8
8-12 - 27'-9" = E side stair
8-13 - 34-3" = E " door 2-8
8-14 - 37'-3 - to closet
8-15 - 40'-10" - to wall

1/17/14

Levels for Excavations at Thatcher's Corner

Pt	Angle	BS	FS	int	Dist
		3.820			
				~~3.87~~	
			3.810		
		3.980			
				4.580	
			4.22		
		2.470			
				3.34	
				3.33	
			10.75		
		4.71			
A		96.19			
- 1	6.80		91.3	4.9	70.8
- 2	1.95		91.3	4.9	61.0
- 3	0.19		91.3	4.9	67.0
- 4	357.04		91.5	4.7	47.0
- 5	353.24		94.4	1.8	47.6
- 6	326.22		93.6	2.6	53.
- 7	277.52		90.3	5.95	23.8
- A	0		91.1	5.10	0
- 8	196.24		93.8	2.40	40.7
- 9	159.32		93.8	2.40	34.5
- 10	153.20		95.3	0.9	52.6
- 11	139.94		91.4	4.8	53
- 12	106.57		91.4	4.8	69.5
- 13	99.30				

On chiel mark, cast column at Co-op

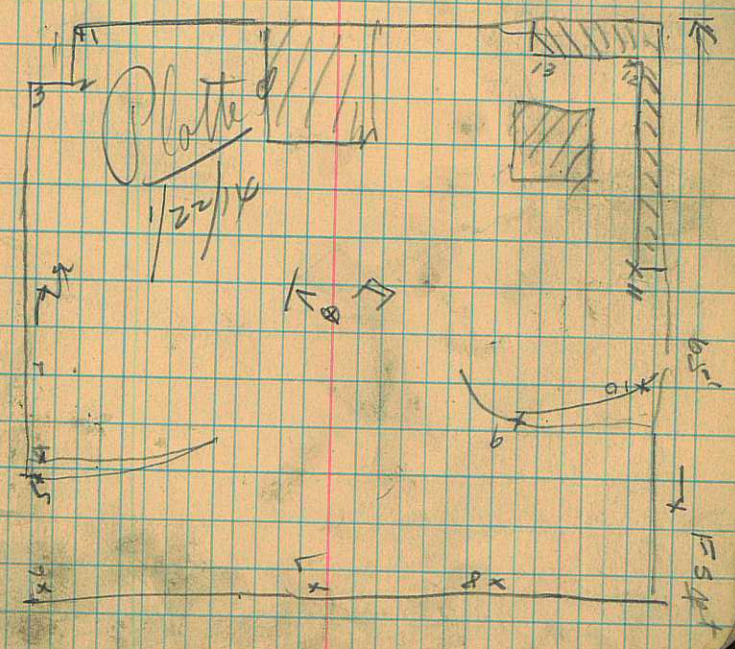
on nail in telephone pole

on edge right of way N

on right of back from property l.

on approx grade NW cor Bldg.

" " " NE " "

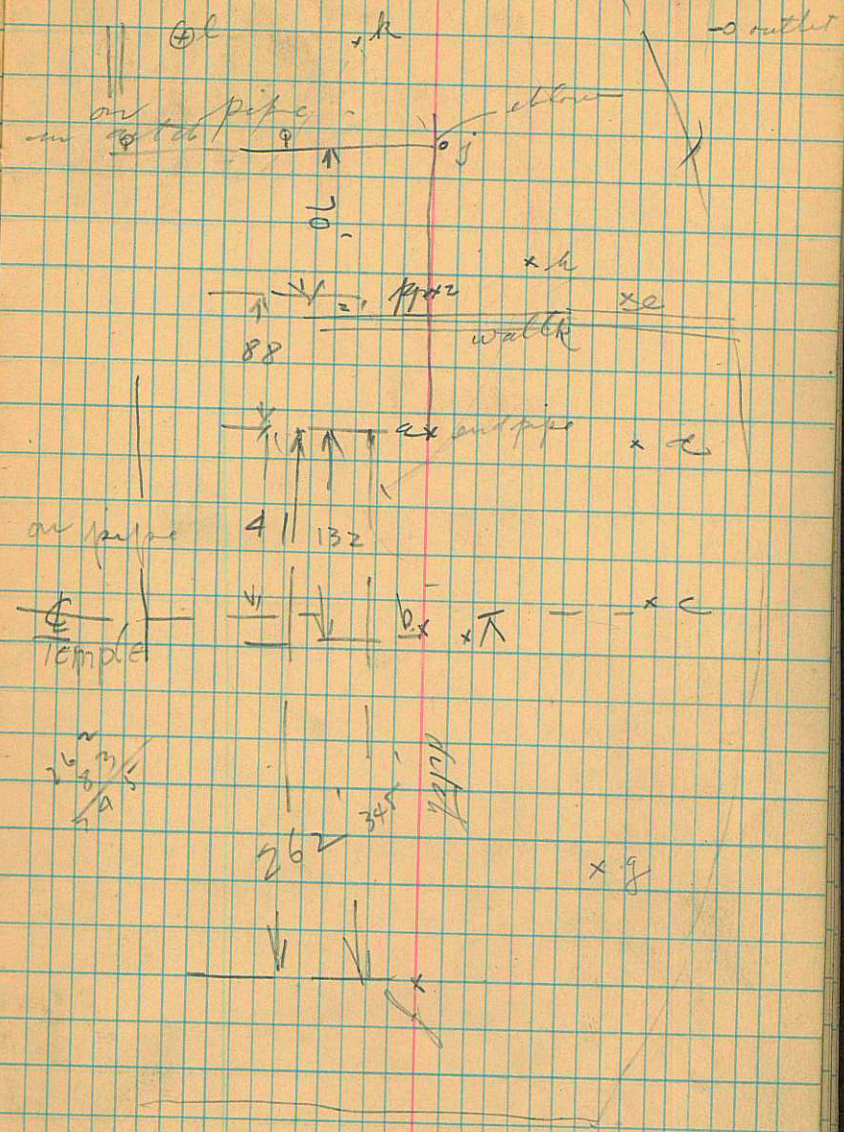


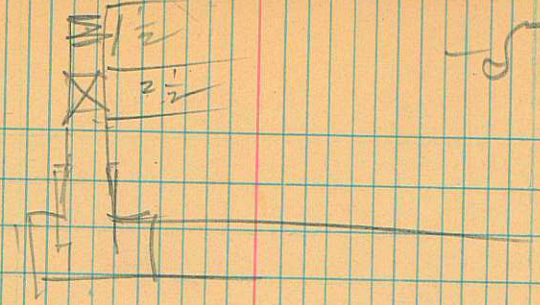
Levels for Temple Association 2/13/14.

	B.S.	F.S.	in
a	5.76		
b			5.76
c			4.95
d			5.32
e			5.60
f			5.30
g			5.00
a	5.00		
h			4.83
i			5.22
j			5.38
k			5.76
l			6.4

Preliminary levels east side Temple

-50-




1 1/2
2 1/2

BS	FS
6.64	
	2.60

6.64
2.60
9.04
5.07
9.11

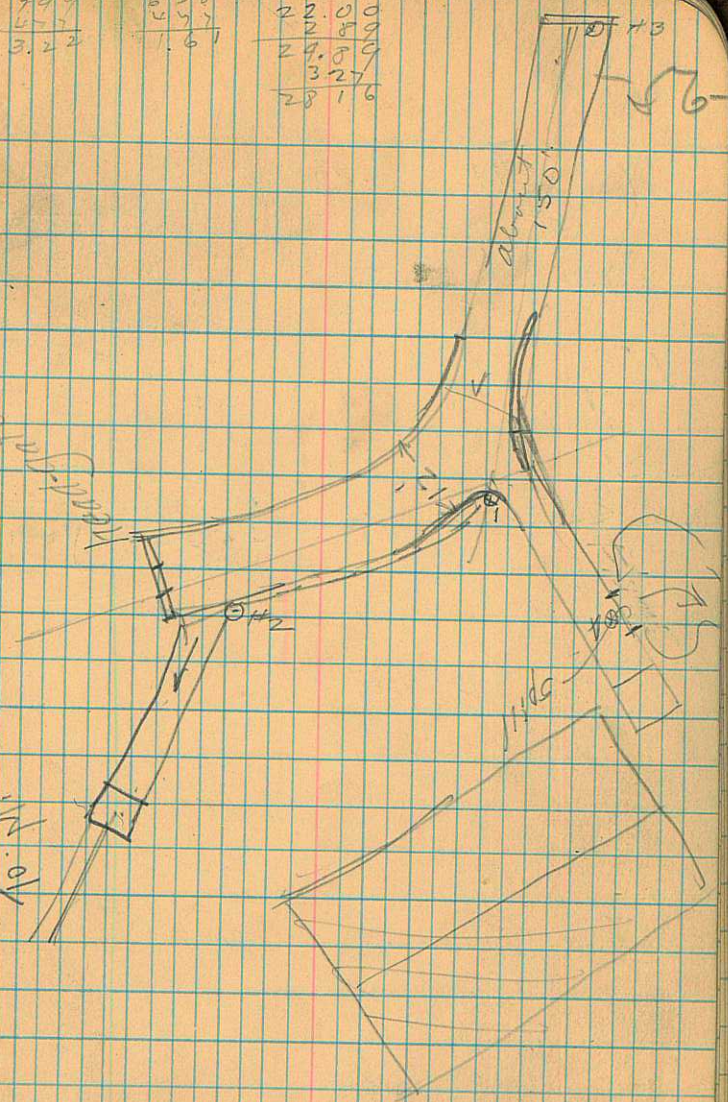
Levels at Desert Mill 2/26/14

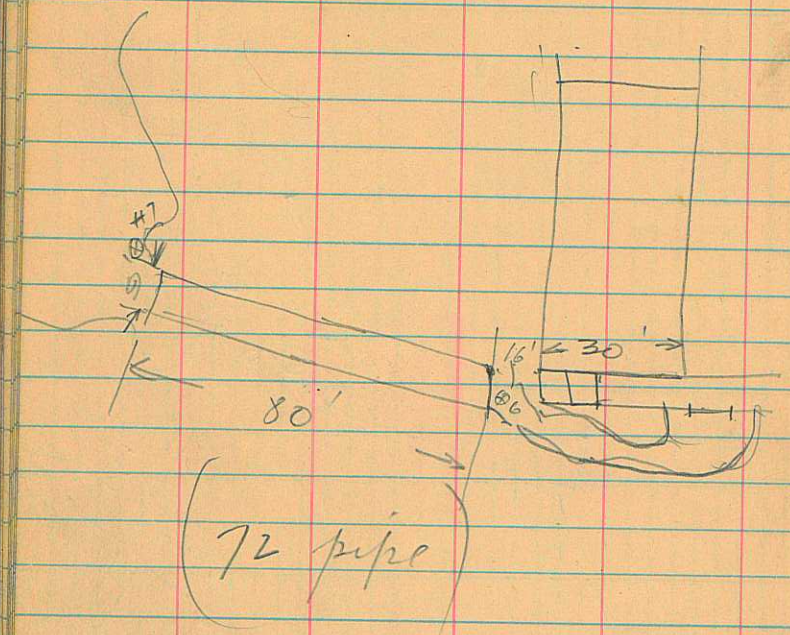
Pt	BS	FS	Im	Elev	HI
BM #1	4.775			100.00	104.775
Water #1			6.38	98.39	
on bottom #1			7.99	96.78	
H_2O Surface #2			6.49	98.28	
floor #2			8.64	96.13	
H_2O Surface #3			5.92	98.85	
bottom Canal #3			7.00	97.77	
on bent #4			3.27	101.50	
H_2O surface #4			6.46	98.31	
n rock #5		28.16		76.615	
+5	3.48				80.09
on H_2O near #5			4.95	75.14	
on H_2O street [illegible] #6			5.55	74.54	
bottom Culvert #6			6.57	73.52	
upper edge Culvert #6			9.32	75.77	
H_2O Surface #7			5.65	74.44	

7.99
4.77
3.22

6.38
4.77
1.61

22.00
2.89
24.89
3.27
28.16





$\begin{array}{r} 6\ 7\ 6 \\ 2.70 \\ \hline 4\ 0\ 6 \end{array}$

$\begin{array}{r} 26 \\ 3 \\ \hline 78 \end{array}$

58

Levels for Thatches 6.69 2/26/14
Milling & E Co

Pt or Sta	BS	FS	IM	Elev.	
	5.66	9.11			
	2.69	7.15			
	2.18	8.25			
	1.13	12.71			
27+09			6.25	101.65 ✓	
20+00			6.76	101.14	
20+00			4.60	103.30	
	12.46				107.90
		11.64		95.44	
15+76 bank			4.00	103.08	
15+76			6.26	100.82	
12+68 H_2O			6.62	100.46	
12+68	3.65	0.92	on bank	103.43	107.08
5+45 bank			2.00	102.35	
5+45			H_2O 4.75	99.60	
	2.37				104.35
		4.71		101.98	
2+23 on H_2O			7.84	98.85	
Sta BM #1	6.69			100.00	106.69

-60-

200
132
68

1400
132
1268

on finishing nail in 2nd pole of Herman Johnson
on H_2O Canal at bridge at clay bank
on H_2O } water 1½ feet deep
on bank } canal 14' wide velocity normal

at wagon bridge

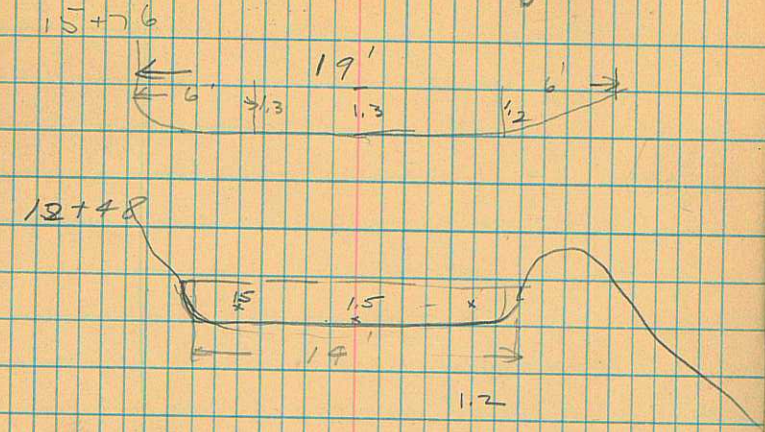
Sta 2+23 foot bridge

Elev on H_2O = 98.39

5.72

BS FS cm

6.475
5.72



at #6 upper edge concrete
on point where one R R was 28.16

Levels from
to Logan & Richmond
Canal 2/28, 1914.

	B.S.	F.S.	im.	Elev.	H.I.	
	9.42			102.66		on.
		2.99				
	2.430					
		~~11.52~~	11.52	100.00		Bm #1 at Deseret Mill
		2.40				
	11.07					
		1.270				
	10.69					
		0.440				
	11.76					
		0.29				
	12.56					
		0.25				
	12.19					
10+00		1.59		163.55		Surge tank
10+00	8.19		(9.23)			
√78.31		~~2.66~~	6.30	165.44	171.74	℄ pave SE cor Temple Block
		2.66		169.08		
	7.23				176.31	
19+20			4.6	171.71		
		0.20		176.11		
	9.90				186.01	

5.09
4.05
1.04

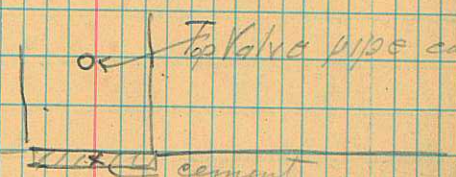
10 12
.08
1

-64-

CHAMPS COR.

Sta	BS	FS		Elev.	HI
21+00			7.00	179.01	186.01
		3.72 15.81		182.29	
	2.60 98.04				184.89
32+00			4.60	180.3	
		5.39		179.50	
	6.43 104.47				185.93
40+00					
41+61			4.39	181.54	
41+75			7.16 28.36	178.77	185.93
			8.75	177.18	
			11.70	174.23	
		6.41			
	5.58				
		2.73			
	3.94				
		12.65			
	1.22				
		7.23			
	3.29				
		5.42			

to valve



{ to S. edge canal
{ reading on cement wall

On water mark

Bottom Canal
{ From this same H.I. I check
{ back to point at S E cor Temple
{ ground

on pavement SE cor of Temple Block

Mar 5 - 1914

Levels on Logan & Richmond Canal

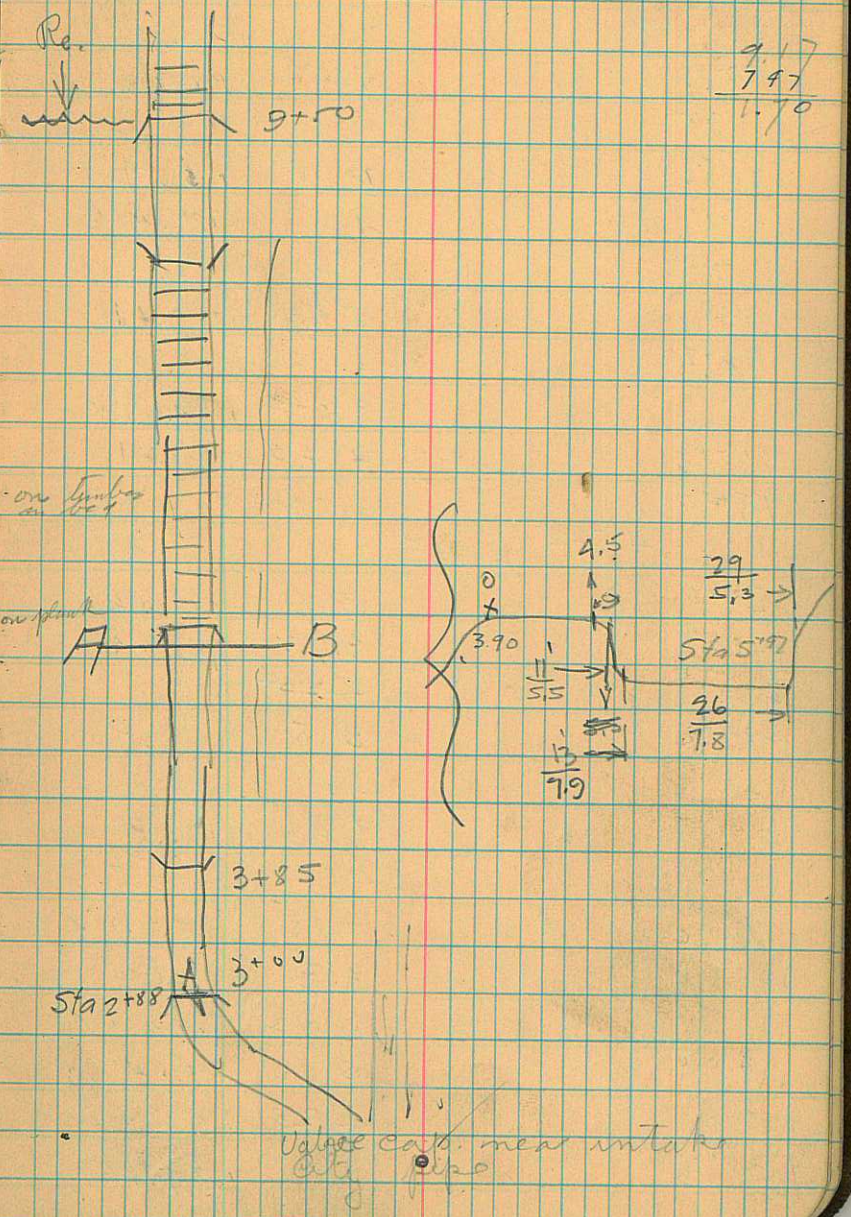
Sta.	BS	FS	cm	Elev.	H.I.
10+04	4.985	2.77			185.52 ~~185.554~~
10+00 c			7.80	180.569	
9+50				175.51 ✓	
9+00 c			7.82	175.49 ✓	
9+00 b			4+00	179.31 ✓	
8+54					
8+00 c			7.83	175.48 ✓	
8+00 b			3.86	179.45 ✓	
7+00 c			8.06	175.25 ✓	
7+00 b			4.10	179.21 ✓	
5+97 c			7.97	175.34 ✓	
~~6+00~~					
6+00 b			4.30	179.01 ✓	
5+97			4.06	179.25 ✓	
5+00 c			8.35	174.96 ✓	
5+00 b			4.10	179.21 ✓	
4+00	3.52 ✓				183.31 ~~183.339~~
4+00 b		9.268 ~~9.170~~		179.819	
3+00 c			13.8	175.29 ✓	
3+00 b			8.2	180.89 ✓	
2+00 b			5.00	184.09 ✓	
1+44 c			14.6	174.49 ✓	
1+00 b			5.70	183.39 ✓	
Bm on	7.547 ~~7.470~~			181.54	189.087

b = bank
c = canal
Re - reinforcing

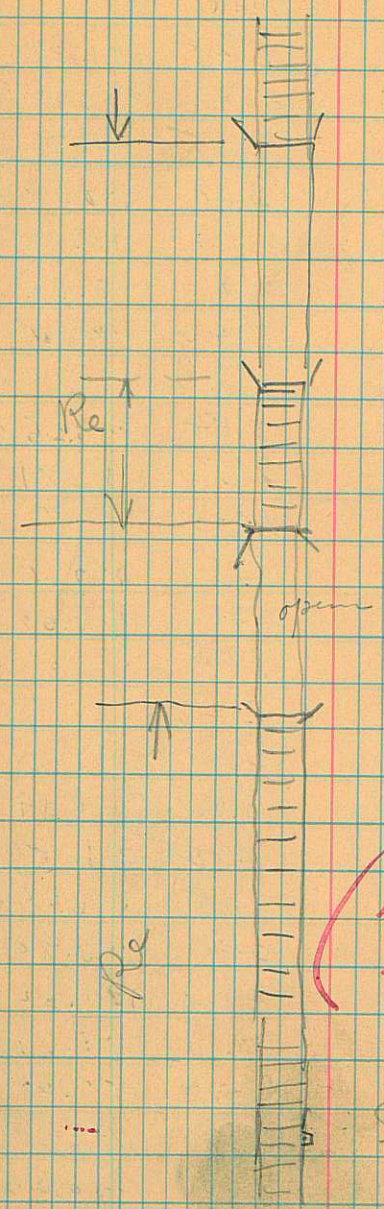
68

9.268
7.547
1.721

9.17
7.47
1.70



Sta	BS	FS	HI		
19+00 c			8.80	176.91	✓
19+00 b			5.30	180.41	✓
18+24					
18+00 c			9.18	176.53	✓
18+00 b			4.80	180.91	✓
17+00 c			9.28	176.43	✓
17+00 b			5.30	180.41	✓
16+34					
16+00 c			9.42	176.29	✓
16+00 b			4.40	181.31	✓
15+43					
	4.542	4.335		181.175 ~~181.219~~	185.707 ~~185.761~~
15+00 b			5.20	180.32	✓
15+00 c			9.18	176.34	✓
14+56			~~5.20~~		
14+00 c			9.15	176.37	✓
14+00 b			4.9	180.62	✓
13+00 c			9.43	176.09	✓
13+00 b			4.6	180.92	✓
12+00 c			9.88	175.74	✓
12+00 b			4.9	180.62	✓
11+00 c			10.02	175.50	✓
11+00 b			5.30	180.22	✓
10+08			5.200	~~180.32~~ 180.334	✓ 185.52
10+00 b			5.60	179.92	✓

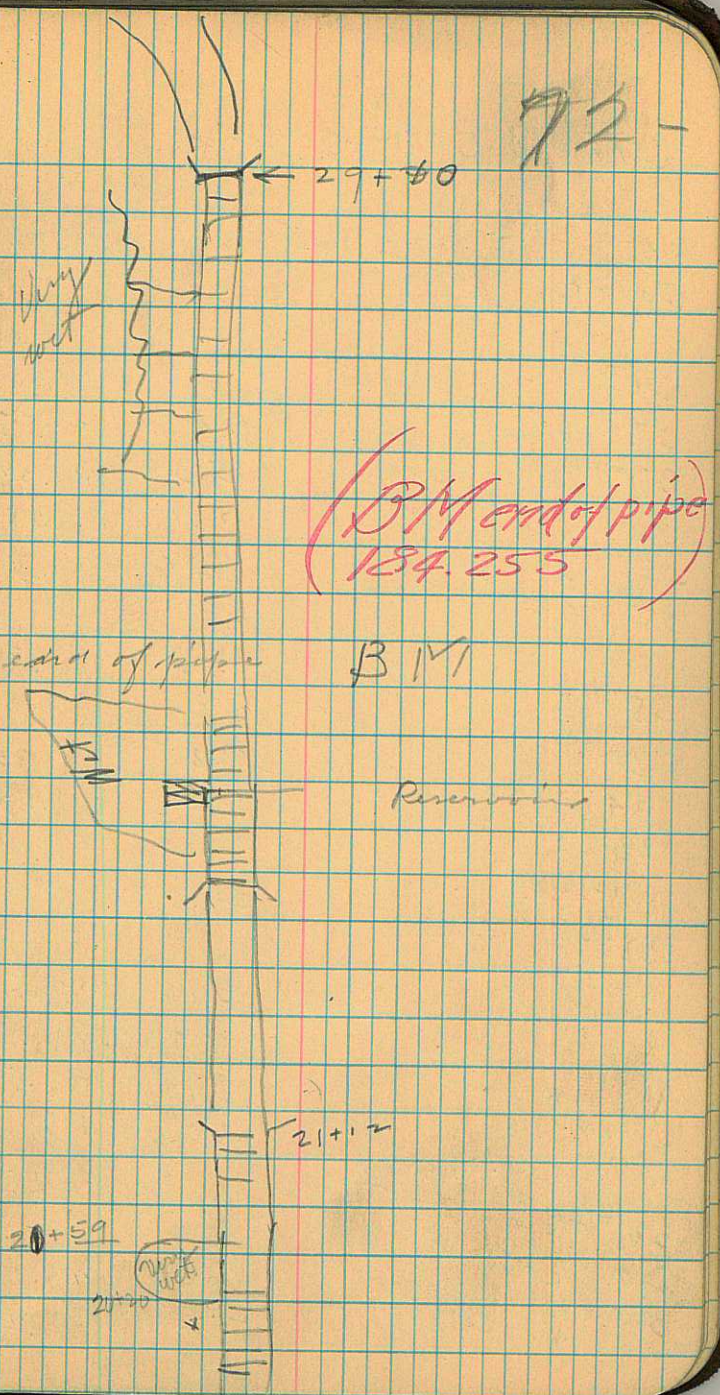


185.534
5.2
180.334

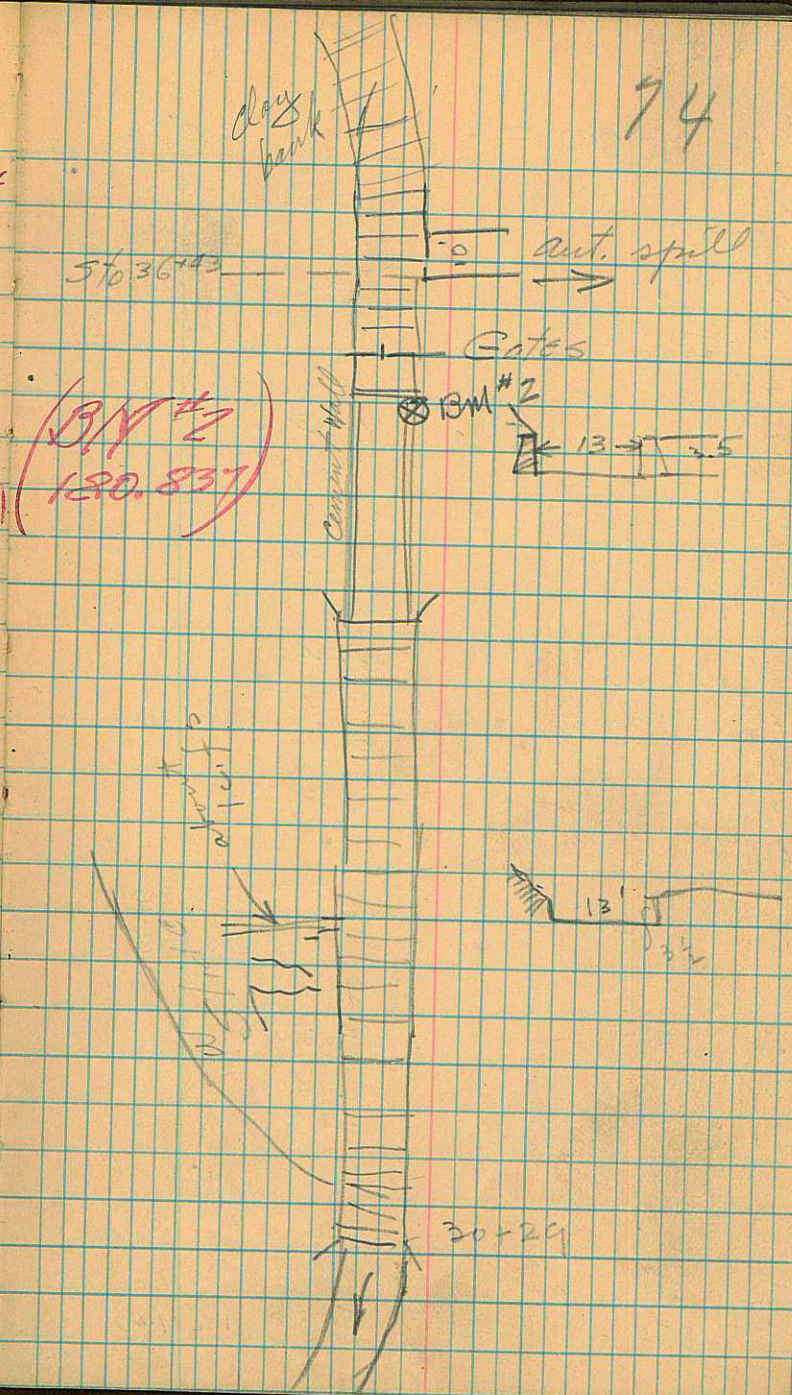
(BM at Sta 10+08
180.32)

BM on main
post

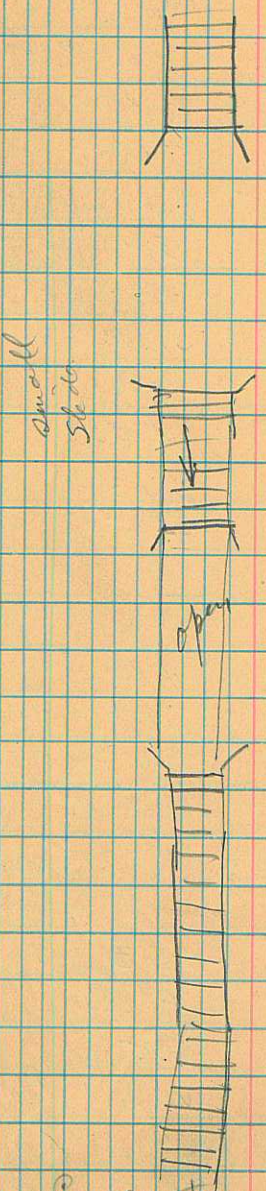
Sta	BS	FS	HI		
29+10					
29+00 c			8.48	177.31 ✓	
29+00			4.30	181.49 ✓	
28+00 c			8.35	177.44 ✓	
28+00 b			3.60	182.19 ✓	
27+00 c			8.06	177.73 ✓	
27+00 b			2.9	182.89 ✓	
26+00 c			8.40	177.39 ✓	
26+00 b			4.10	181.69 ✓	
25+00 c			8.54	177.25 ✓	
25+00 b			4.5	181.29 ✓	
23+40			1.540	~~184.255~~ 184.321	185.79
24+00			8.6	177.19 ✓	
24+00			4.4	181.39 ✓	
23+40					
22+92					
23+00			8.6	177.19 ✓	
23+00			4.2	181.59 ✓	
22+00 c			8.80	176.99 ✓	
22+00			4.8	180.99 ✓	
21+00 c			8.55	177.24 ✓	
21+00 b			5.1	180.69 ✓	
20+00 c			8.75	177.04 ✓	185.79
	4.820	4.720		~~181.044~~ 180.977	~~185.861~~
20+00 b			5.1	180.60 ✓	



Sta	BS	FS	HI		
	4.240	4.265		182.408 / 182.503	186.64 / 186.743
36+43					
36+27					
37+00 c			9.13	177.55 ✓	
37+00 b			5.30	181.38 ✓	
36+00 b			5.90	180.78 ✓	
36+00 c			9.36	177.32 ✓	
35+64					
35+00			9.18	177.50 ✓	
35+00			5.30	181.38 ✓	
34+00 c			9.25	177.43 ✓	
34+00 b			5.2	181.48 ✓	
33+00 c			9.2	177.48 ✓	
33+00 b			4.6	182.08 ✓	
32+65					
32+00 c			9.10	177.58 ✓	
32+00 b			4.70	181.98 ✓	
31+00 c			9.18	177.50 ✓	
31+00			4.70	181.98	
	5.01	4.103		181.679 / 181.758	186.681 / 186.768
30+29					
30+00 c			8.60	177.19 ✓	
30+00 b			4.30	181.49 ✓	



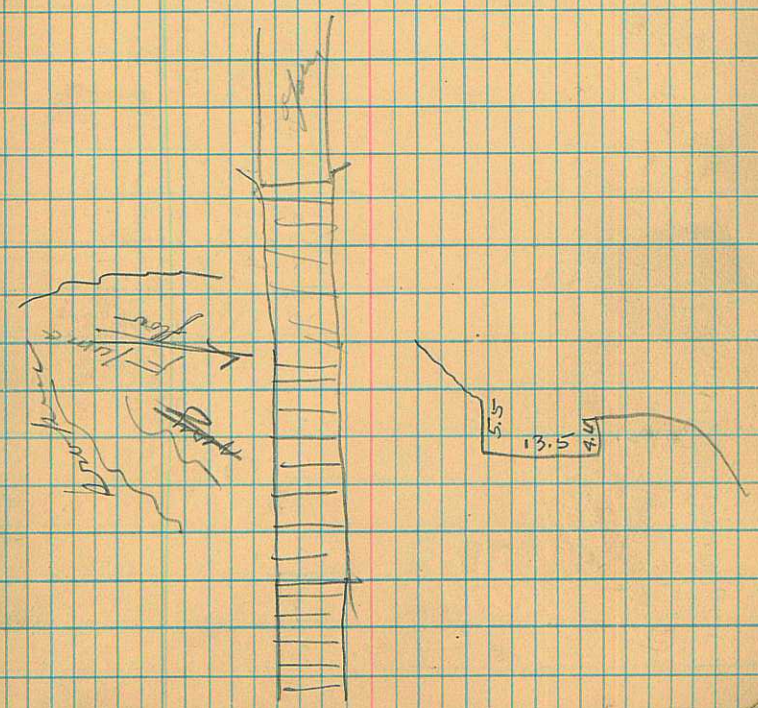
Sta	BS	FS	IM		
~~46+00~~			9.33		
46+00			4.8		
45+93			~~4.8~~		
45+00			9.4		
45+00			4.7		
44+00			9.43		
44+00			5.2		
43+55					
43+00			5.00		
43+00			9.62		
42+21			~~5.00~~		
42+00			5.25		
42+00			9.25		
41+00			4.8		
41+00			9.4		
40+94					
D	5.47	4.94		181.803	187.273
40+00			9.00		
40+00			4.5		
39+00			9.13		
39+00			4.60		
38+00 c			9.14		
38+00 b			4.80		
36+27 BM#2			5.80	~~180.837~~ 180.943	



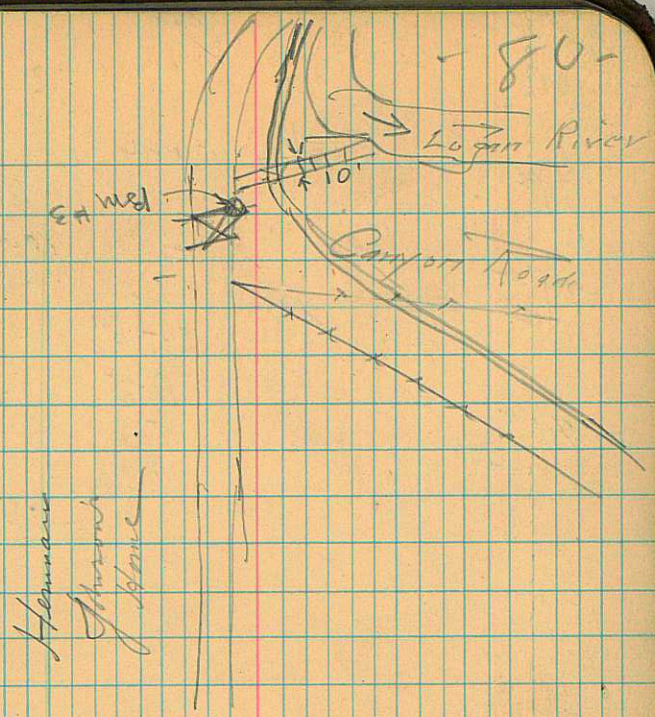
on Concrete wall below spill

6800
3643
3157

Sta.	BS	FS	HI		
56 00 c			9.18		
56 00			5.10		
	5.140	4.965		182.548	187.688
55+00			5.10		
55 00			9.03		
54 00			5.00		
54 00			9.00		
53 00			4.40		
53 00			9.13		
52 00			4.5		
52 00			9.10		
51 00			4.60		
51 00			9.08		
50+45					
50+00 c			9.03		
50+00 b			4.4		
	4.520	4.280		182.993	187.513
49+75					
49+00			8.83		
49+00			4.30		
48+00			8.97		
48 00			4.4		
47+00 c			9.11		
47+00 b			4.700		



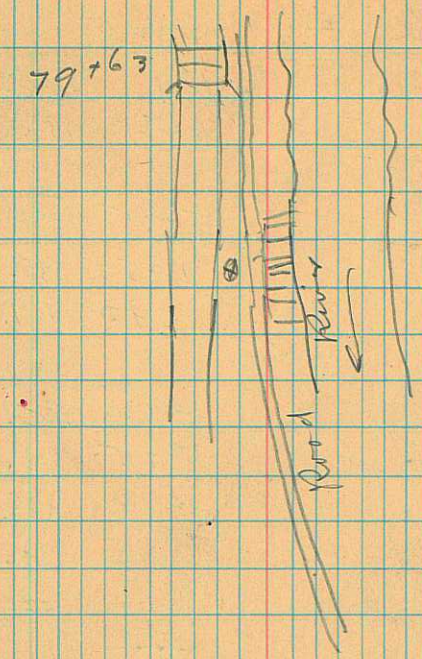
Sta	BS	FS	im		
67+96					
68+00	4.83	4.940		182.748	187.578
67+66					
67+00			8.95		
67+00			4.9		
66+00			4.7		
66+00			8.95		
65+00			8.98		
65+00			4.8		
64+00			8.85		
64+00			4.9		
63+00			3.6		
63+00			9.08		
62+00			4.8		
62+00			9.03		
61+00			4.9		
61+00			8.95		
60+00			4.8		
60+00			8.83		
59+00			4.0		
59+00			9.08		
58+00			4.9		
58+00			9.13		
57+00			9.26		
57+00			5.0		



Sta.	BS	FS	im		
79+63					
79 00			4.6	184.29 ✓	
77 00			9.97	179.42 ✓	
78 00			5.4	183.49 ✓	
78			9.60	179.29 ✓	
77+00			5.90	182.99 ✓	
77+00			9.63	179.26 ✓	188.894
	5.870	5.485		183.03 ~~182.093~~	~~187.963~~
76 00			5.70	182.82 ✓	
75+00			9.82	178.70 ✓	
75 00			5.8	182.72 ✓	
74 00			5.4	183.12 ✓	
74 00			9.57	178.95 ✓	
73 00			4.5	184.02 ✓	
73 00			9.57	178.95 ✓	
72 00			5.6	182.92 ✓	
72 00			9.7	178.82 ✓	
71 00			4.70	183.82 ✓	
71+00 b c			9.85	178.67 ✓	
70 00			5.1	183.42 ✓	
70 00			9.82	178.70 ✓	
69 00			10.50	178.52 ✓	
69+00			5.2	183.32 ✓	188.523
Bm #3			4.92	183.61 ~~182.658~~	
68+00 c			9.92	178.60	

(an underline ——— means controll)

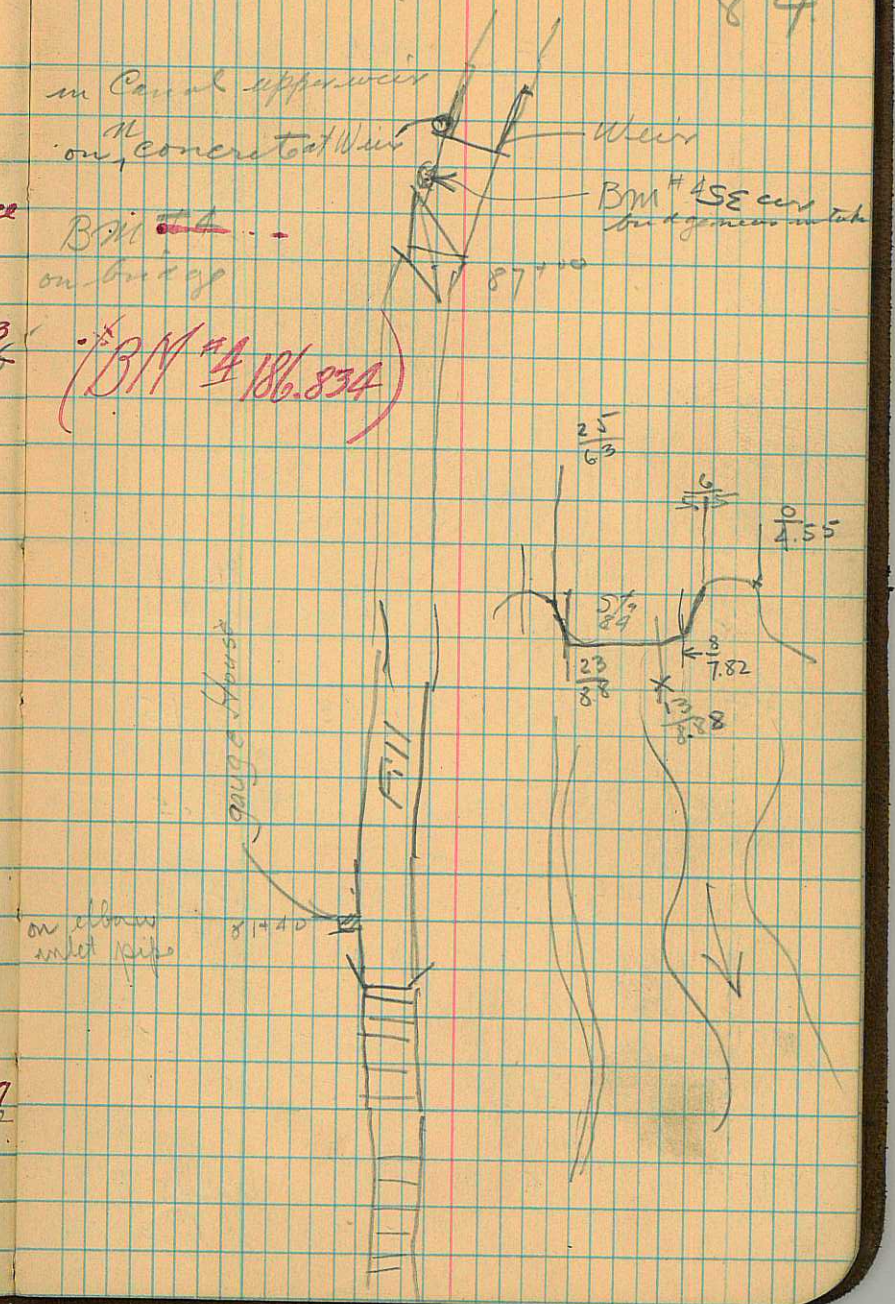
-82-



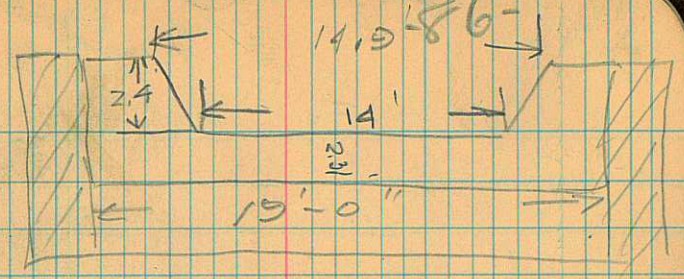
(Bm #3, 183 61)

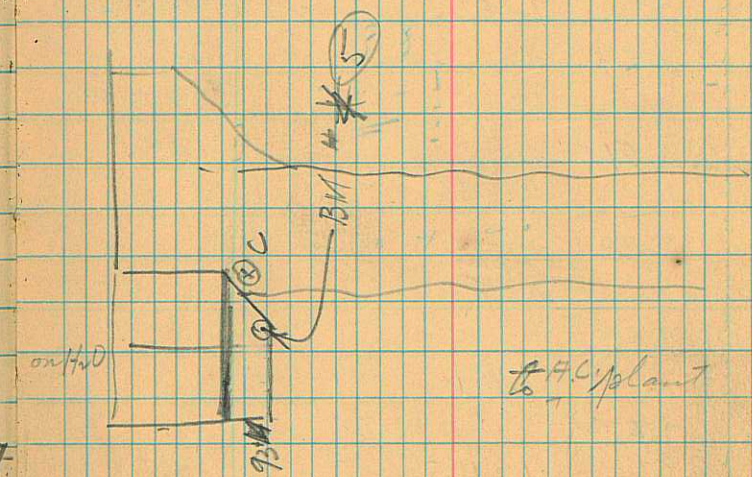
On a large rock SE cor of Herman Johnson bridge over canal

Sta	BS	FS	HI	
87+60			10.1	182.43 ✓
87+60			6.50	186.03 ✓
~~87+60~~				
87+10			5.685	~~186.834~~ ~~185.935~~ controll
87			7.45	185.08 ✓
87+00			10.92	181.61 ✓ 192.53
	6.51	3.890		186.03 ~~141.670~~ ~~185.140~~
86+00			4.60	185.33 ✓
86+00			8.25	181.68 ✓
85+00			4.10	185.83 ✓
85+00			8.88	181.05 ✓
84+00				
			~~4.1~~	
			~~8.88~~	
83+00			4.4	185.53 ✓
83+00			9.28	180.65 ✓
82+00			9.75	180.18 ✓
82+00			5.0	184.93 ✓
81+40			9.49	180.44 ✓
81+24				
81+00			9.8	180.13 ✓
81+00			6.3	183.63 ✓ 189.927
	8.070	7.033		181.85 ~~187.00~~ ~~180.930~~
80+00			5.10	183.79 ✓
80+00			9.21	179.68 ✓



Sta	BS	FS	cm	Elev.	H.I
93+14 BM #5			7.09	193.67	
93+14 C			10.62	190.15	
	1.720	8.64		199.05	200.79
	12.25	0.70		195.43	207.69
89+71			8.40	187.73 ✓	
89+71			11.05	185.08 ✓	
89+50 C			12.00	184.13 ✓	
89+00	7.680	4.080		188.45	196.13
88+00			5.90	186.63 ✓	

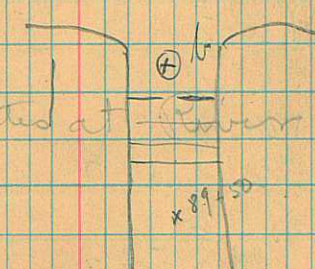




on H2O at b

R.R on floor

at main head gates at River



Check levels back from BM # ~~B~~4

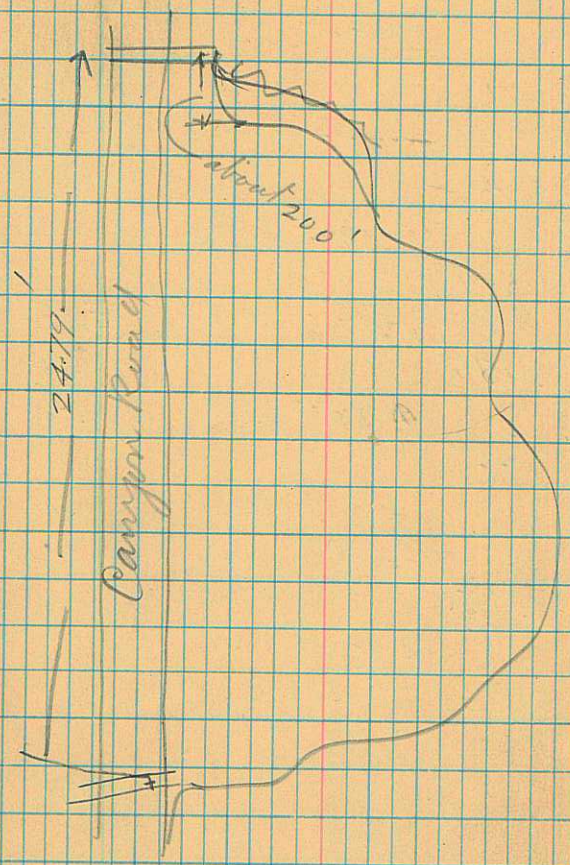
	B.S.	Fs	ml
BM #4	0.42		
		7.067	
	8.268		
		4.960	
	5.082		
		7.470	
	1.810		
		12.96	
	0.010		
		9.895	
	2.380		
		8.100	
	1.690		
		7.946	
	7.476		
		9.245	
	10.260		
		1.722	
	11.945		
		1.050	
	12.38		
		2.17	
	9.82		
		5.62	
	4.745		
		5.44	

8.016
.075
7.941

~~100~~
~~25~~

-88-

.100
.025
.075



186.743

185.861
1.54
184.321

	BS	FS	im		
	9.640				
		7.59			

On water valve cap

(notes down) Levels from Valve at City intake Logan & Richmond Canal 3/6/14

	BS	FS	im	Elev.	H.I.
	7.435			181.540	188.975
		9.465		179.510	
	5.448				184.958
BM near Sta 10			4.64	180.318	~~180.318~~
		4.188		180.770	
	4.965				185.735
		4.752		180.983	
	5.055				186.038
on pipe of reservoir			1.79	184.248	
		4.488		181.550	
	4.795				186.345
			5.520	180.825	
D^o ?		3.960		182.385	
	4.665				187.050
		4.770		182.280	
	5.040				187.32

186.743
580
180.943
~~180.825~~
.118

184.958
464
180.318

186.038
1.79
184.248

186.345
5.52
180.825

Concrete Wall

181.54
7.435
188.975
9.465
179.510
5.448
184.958
4.188
180.770
4.965
185.735
4.752
180.983
5.055
186.038
4.488
181.550
4.795
186.345
3.96
182.385
4.665
187.050
4.77
182.280
5.04
187.32

180.354
.318
.036

184.321
184.248
.073

182.385
181.80
.585

	BS	FS	im	Ele	H.I.
		4.782		182.538	
	5.125				187.663
E		4.82		182.843	
	3.705				186.548
Bm #3		2.96		183.588	
E	5.830			182.843	188.673
		4.902		183.771	
	4.932				188.703
on pipe at gauge			8.285	180.418	
		4.02		184.683	
	3.620				188.303
Bm #4		1.495		186.808	
Bm	10.298				
			12.05		
		1.46			
	10.06				
		~~[illegible]~~6	15.66		
No 5 Bm		12.06			

185.935
182.658
3.277

186.808
183.588
3.220

187.32
4.782
950

187.32
4.782
182.538
5.125
187.663
4.82
182.843
3.705
186.548
2.96
183.588
182.658
.930

182.843
5.83
188.673
4.902
183.771
4.932
188.703
4.02
184.683
3.62
188.303
1.495
186.808

188.703
8.285
180.418

186.808
181.540
5.268

185.935
181.54
4.395
904
5.295
182.803
182.385

12.06
3.6
15.66

187.578
4.92
182.658

182.658
181.803
.855

183.582
182.385
1.203
.855
.348

Bottom box at Headgates

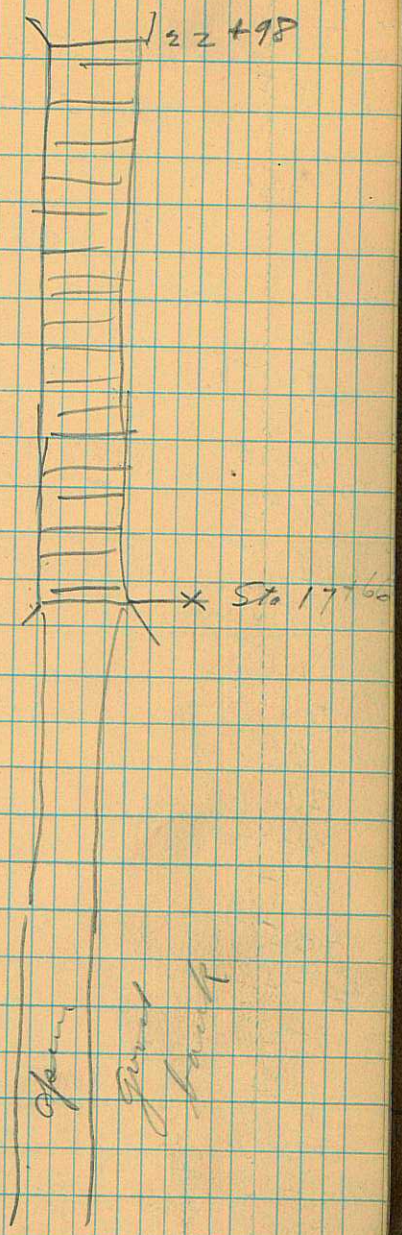
on tail water.

Reprofiled the Canal (Logan & Richmond) from Sta 68^{00} back to-ward spill near Pherson. I call 68^{00} Sta 0

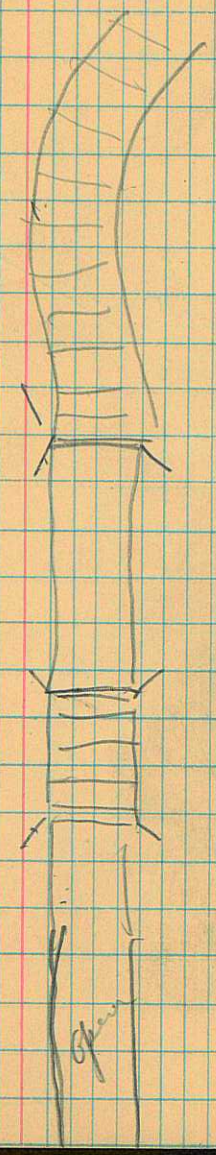
Sta	BS	FS	un	Elev.	H.I
10^{+0} c	5.6		8.8	178.55	
10^{+0}			4.60	182.75	187.359
9 b	3.660	4.885		183.716 ~~182.736~~	~~186.389~~
9			10.0	178.62	
8^{00} b			5.7	182.92	
8^{00} c			9.7	178.92	
7^{00} b			5.7	182.92	
7^{00} c			9.8	178.82	
6^{00}			5.6	183.02	
6^{00}			10.1	178.52	
5^{00}			4.6	184.02	
5^{00}			10.0	178.62	
4^{+00}			4.8	183.82	
4^{00}			9.76	178.86	
3^{00}			5.7	182.92	
3^{00}			10.3	178.32	
2^{+00} b			5.8	182.82	
2^{+00}			9.9	178.72	
1^{+00}			9.9	178.72	
1^{+00} b			5.4	183.22	
0					188.618 ~~189.628~~
E	5.670			182.965	~~182.762~~

Korrection
K = .019

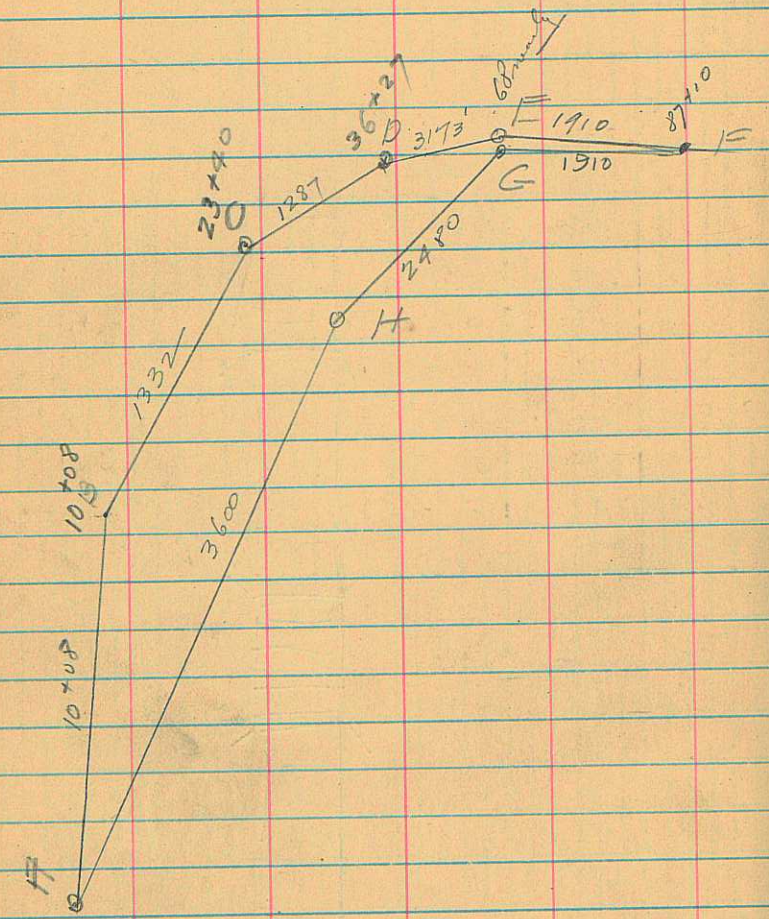
Sta	BS	FS	cm	Ele.	H.I.
22 00			9.47	179.96	
22 00			5.1	182.33	
21 00 c			9.24	178.19	
21 00 b			4.8	182.63	
20 00			9.17	178.26	
20 00			4.5	182.93	
19 00 c			9.18	178.25	
19 00			4.6	182.83	
18 00 c			9.0	178.43	
18 +00			4.4	183.03	
flow 17+66					
17 +00			9.0	178.43	
17 +00 c b			4.8	182.63	187.43
16 00 b	4.440	4.334	≠	183.008 ~~182.481~~ ~~182.048~~	
16 00			8.9	178.45	✓
15 +00			4.2	183.15	✓
15 +00			8.9	178.45	✓
14 00			5 00	182.35	✓
14 00			8.75	178.60	✓
13 00			4.8	182.55	✓
13 00			8.8	178.55	✓
12 00			5.0	182.35	✓
12 +00			8.8	178.55	✓
11 +00			4.7	182.65	✓
11 +00			8.9	178.45	✓



Sta.	BS	FS	un		
BM #2 on con Wall		5.62			
31+57 to spill				182.428	186.477
	4.066	4.58		~~182.528~~	~~185.567~~
				181.508	
30 00					
30 00					
29+00			9.5	177.52	
29+00			5.4	181.62	
28+00			9.36	177.66	
28 00			5.25	181.77	
27+05			$		
27+00			4.7	182.32	
27+00			9.23	177.79	
26			9.08	177.94	
26			5.0	182.02	
25+79					
25			9.3	177.72	
25			4.7	182.32	
24+44					
24 b			5.2	181.82	
24 c			9.22	177.80	
23 c			9.0	178.02	
				182.152	187.025
				~~182.252~~	186.095
23 b	4.890	5.262		181.212	



Adjustment of Polygon on Logan & Richmond Ave



BS	FS
5.670	4.885
3.660	4.334
4.440	5.262
4.890	4.580
4.066	5.620
22.726	24.681
	22.726
	1.955

100

182.863
180.825
7.018
1.955
.063

Table

Side	Length	√Length	Observed +	Observed −	Final +	Final −
A-B	1008	31.90		1.222		1.2177
B-C	1332	36.50	3.930		3.9350	
C-D	1287	35.90		3.423		3.4181
D-E	3173	56.30	2.763		2.7707	
E-F	1910	43.60	3.220		3.226	
F-A	3600	60.00		5.304		5.2960
		264.20	9.913	9.949	9.9313	9.9318

$$K = -\frac{.036}{264.2} = -.000\,1363$$

(A-B) $-1.222 - (-.0043) = 1.2177$

1925

2.257	4.564
.35	1.907
1.907	6.471

Levels for profile on my block mar 14-1914

Beg. at NE cor of my block

Sta	BS	FS	cm	Elev.	H.I.	
	9.520			100.00	109.52	E Mosaic
0			0.0	109.52		E side dug road
+44			2.3	107.22		
+59			6.1	103.42		E boundary of my block
1+00			9.9	99.62		
~~1+93~~						
1+93		12.50		97.02		in front Schwartz's gate
	1.76				98.76	my E. line
2+06.8						
2+12			2.23	96.53		
			3.87	94.89		on my porch floor
2+38			7.2	91.56		on W.
			8.86	89.90		on top my E post
		12.35		86.348	~~86.348~~	
	1.205				87.55	
2+75			2.91	84.64		
3+00			6.80	80.75		
3+22			8.82	78.73		
3+54			10.88	76.67		My west line
		12.13		75.42		
	0.05				75.47	

Sta	BS	FS	HI	Elev.	H.I.	
4+00			1.350	74.12	75.47	
5+03			~~3.72~~			W. line Zempo
5+0			3.72	71.75		
5+31			6.0	69.47		
5+64			9.83	65.64		
~~4~~		12.05		63.42		
~~6+0~~	0.200				63.62	
6+00			1.850	61.87		
6+31			5.00	58.72		
6+54			7.1	56.62		W. line Berge
6+67			7.95	55.67		
6+73			9.60	54.02		
6+95			11.6	52.02		
7+00			12.8	50.82		m road
7+19		11.70		51.92		
	0.21				52.13	
7+52			2.90	49.23		E line Gunnison
8+00			4.9	47.23		
9+00			10.4	41.73		
		12.96		39.17		
	.91				40.08	
10+00			2.5	37.58		
10+54			4.35	35.73		
10+99			7.1	32.98		E bank Canal

399.88

400 00
399 88
12
B11 85
111 97

Sta	BS	FS	m			
			8.35	31.73 ✓		on Wagon bridge over Canal
			8.08	32.00 ✓		on upper cor of pave at foot bridge
						Called Sta 0
1+00			3.30	36.78 ✓		
		0.45		39.630		on pav.
	12.87				52.50	
2+00			11.05	41.45 ✓		on pav
2+70			7.78	44.72 ✓		on pav
2+70			6.35	46.15 ✓		℄ Str opp.
3+00			6.18	46.32 ✓		
3+38.5			4.17	48.33 ✓		pav on Rust's cor
3+38.5			3.4	49.10 ✓		str opp.
3+91			1.73	50.77 ✓		℄ Crossing
4+38		~~0.48~~ 0.48		52.02 ✓		W. [illegible] Kellets
	11.33				63.35	
4+38			9.78	53.57		℄ Str. opp.
4+38			10.39	52.96 ✓		pav
4+50			9.20	54.15 ✓		"
5+00			4.45	58.90 ✓		"
		0.28		63.070		
	10.71				73.78	
5+50			10.35	63.43 ✓		pav
6+00			5.8	67.98 ✓		pav
6+00			3.8	69.98 ✓		str

40.08
45
39.63
12.87
52.50
48
52.02
11.33
63.35
10.39
52.96

Sta	BS	FS	ain			
6+50			2.68	71.18 ✓		
7+00		0.51		73.27		
	11.61				84.88	
7+00			10.00	74.88 ✓		Sta
8+00			6.13	78.75 ✓		pave
8+50		1.61		83.27		
	10.82 ✓				94.09	
8+50			7.40	86.69		Sta
9+00			5.00	89.09 ✓		pave
9+00			2.85	91.24 ✓		Sta
9+50		0.17		93.92 ✓		
	8.81				102.73	
9+50			6.8	95.93 ✓		Sta
10+34						
10+34			0.7	102.03 ✓		Sta
		2.795				

98.76
8.86
89.90

Check levels on previous notes from Mosers cor.

	BS	FS	cm	Ele	HI	
				100.00		
Pav	0.45			100.00	100.45	Mosers cor
		10.49		89.96		on gate post
	0.63				90.59	
			3.92			on my lower door sill
			4.90			on ground ℄ of any large gate
		11.90		78.69		
	1.070				79.76	
		8.41		71.35		
	1.25				72.60	
		12.76		59.84		
	1.33				61.17	
7+19		9.21		51.96	~~51~~	
	.67				52.63	
		10.80		41.83		
	1.265				43.095	
			11.00	32.095		on pave at car stop
		1.88		41.215		on N side Str.
	12.18				53.395	
			5.03			Rust cor
			0.40	52.99		Killers cor.

100.45
10.49
89.96

89.96
.63
90.59
11.90
78.69
1.07
79.76
8.41
71.35
1.25
72.60
12.76
59.84
1.33
61.17
9.21
51.96
.67
52.63
10.80
41.83
1.265
43.095
11.00
32.095

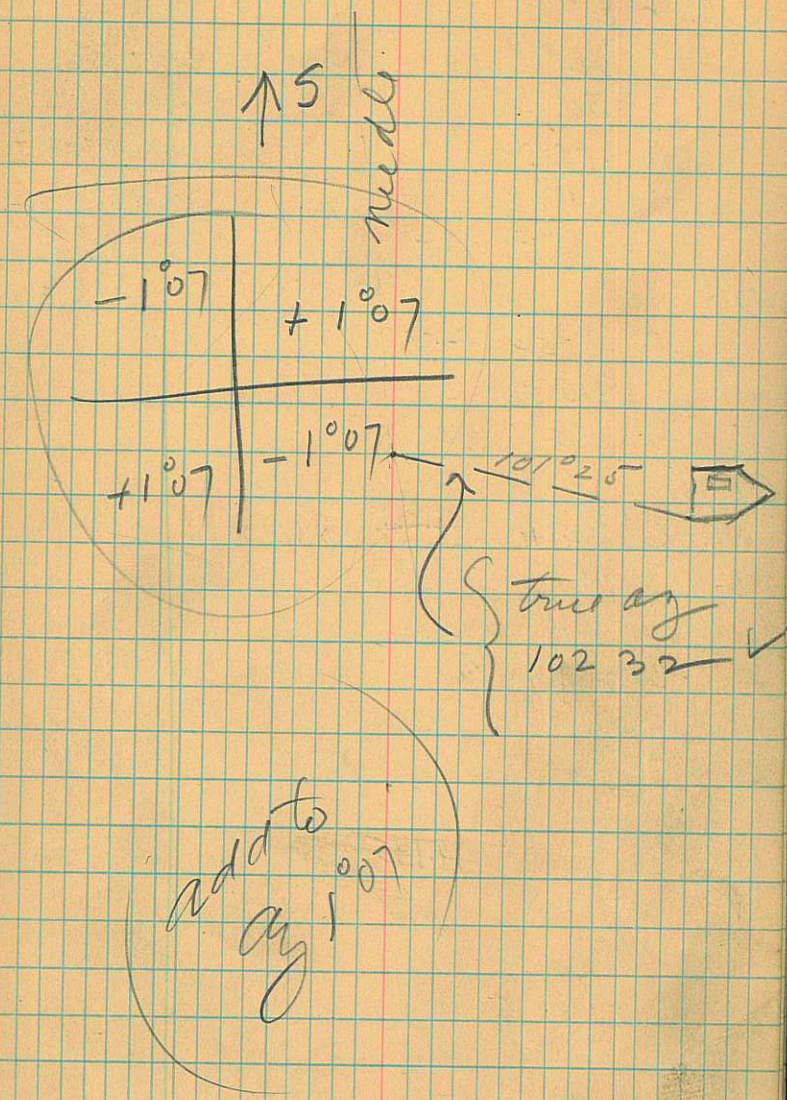
43.095
1.88
41.215
12.18
53.395
5.03
0.40
52.99

51.92

Survey Mar 20-14
for the Simons

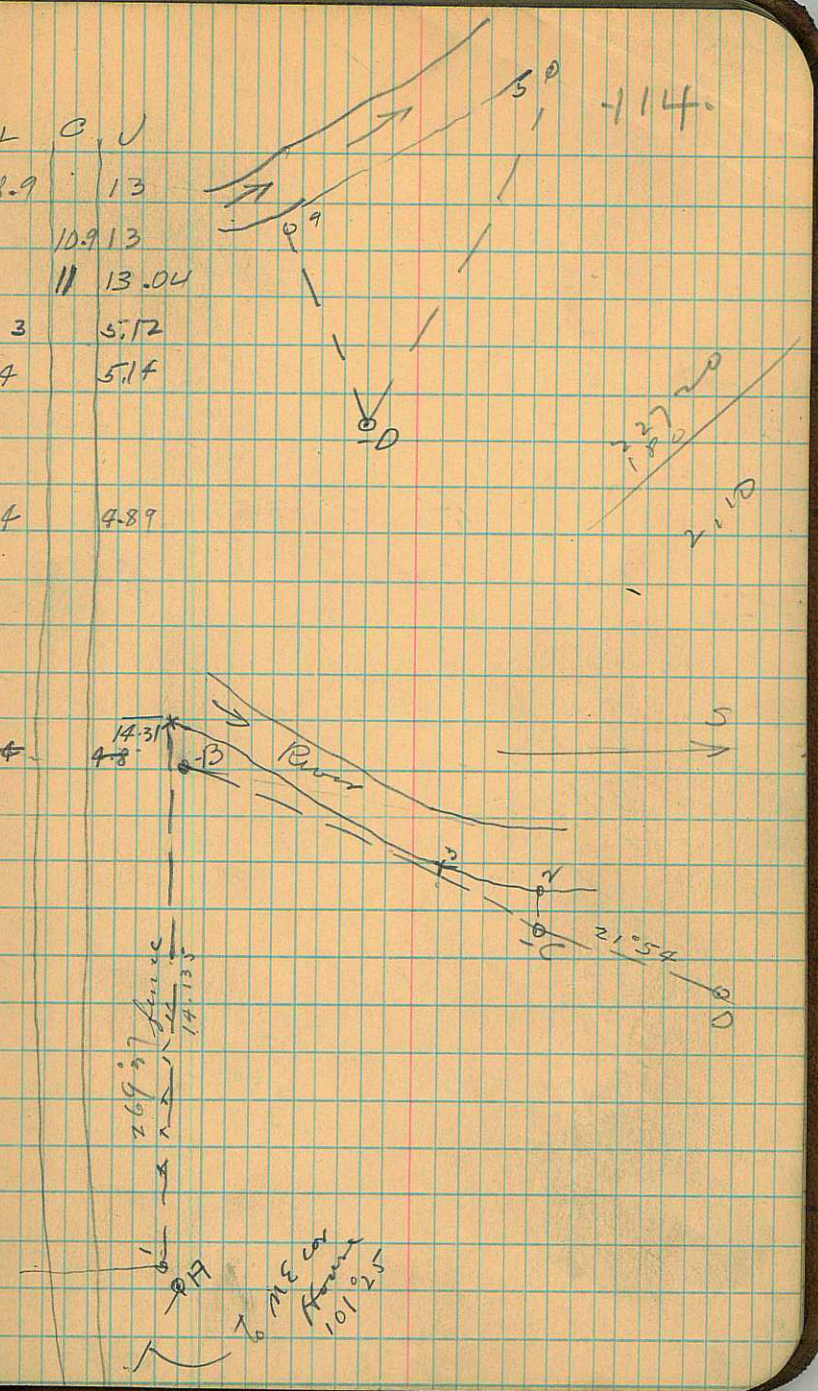
Ob. on SE cor sec 28
Tp 12 n - R 1 W.

Title	Angle	Vert ∠	time	middle	Sun
Wir	313°05	38°07	10:25		R
in	314°36 / 134°36	37°57	10:26		a
~~Wir~~	~~315°19~~	~~40°48~~	~~10:32~~		
~~in~~	~~316°53~~ / ~~136°53~~	~~39°01~~	~~10:36~~		
Wir	316°55	39°55	10 38		K
in	318°28	39°43	10°42		
Wir	318°36	40°39	10:47		K10
in	319°58	40 20	10:46		
Mean		40°29'30"			
Wir	320°15	41°19	10:50		
in	321°39	41°00	10 52		
Mean	320 57	41°09'30			
Mean T.	320 07	40°49'30"	10:48		

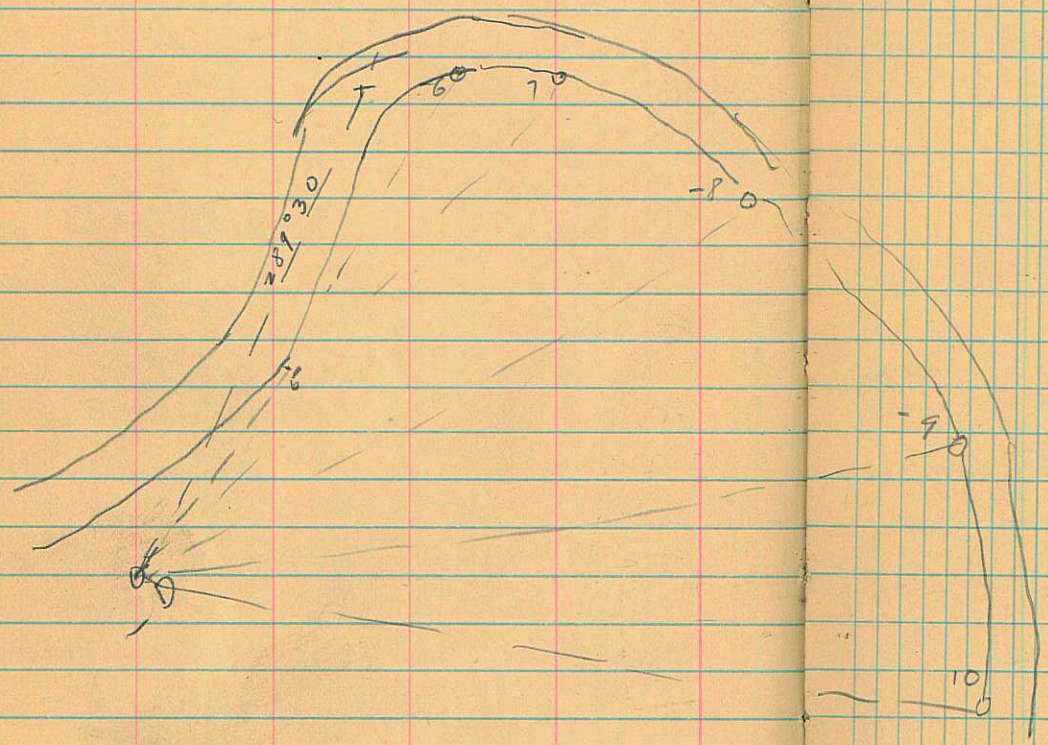


K - Pt	Az. from S. Pt	Ch. Dist	Needle	Bearing	Setting
8	324°25			S35°35'E	
7	306°45			S53°15'E	
6	295°15'			S64°45'E	
-5	298°44	213'		S61°16'E	
-4	260°5'	115'		N80°05'E	
D -					20°54
-D	21°54	2.70			
3	214°50'	91'			
2	274°	0.41 ch			
C -					214°11
-C	34°11'	~~400~~	S35°30W		
B -					89°37
River		14.31			
-B	269°37			N89°37'E	
		14.135			
			N89°45E		
1	226°23	1.9'			
A	269°37				

L	C	U
8.9		13
	10.9	13
	11	13.04
3		5.12
4		5.14
4		4.89
4	4.8	14.31



29 - 2'



Pt	S	Dist	Needle	Bearing	Sett.
-21	47°43'	820'			
-20	26°36'	640'			
-19	10°08'	530'			
-18	1°44'				
G -					203°28'
G	23°28'	5.82 ch		S23°28'W	
17	358°42'	481'			
-16	325°13'	440'			
F -					297°57'
-F	117°57'	12 ch	N62°W	~~N62°03'W~~ N60°56'W	
A -					101-25
House	101°26'				
A -					352°14'
-A	172°14'	6.71 ch		N7°46'W	
15	144°20'	460		N35°40'W	
14	41°30'	840			
13	33°55'	881		S33°55'W	
12	16°34'			S16°34'W	
E					264 36
E	84°36'	10 ch	S86°W	S84°36'W	
-11	67°12'			S67°12'W	
-10	17°	11.20 ch		S17°W	
-9	358°15'			S6°45'E	
D -					

Stade

-118-

82°50

13
48
3.2
2
64

4.40
2
880

.50
100

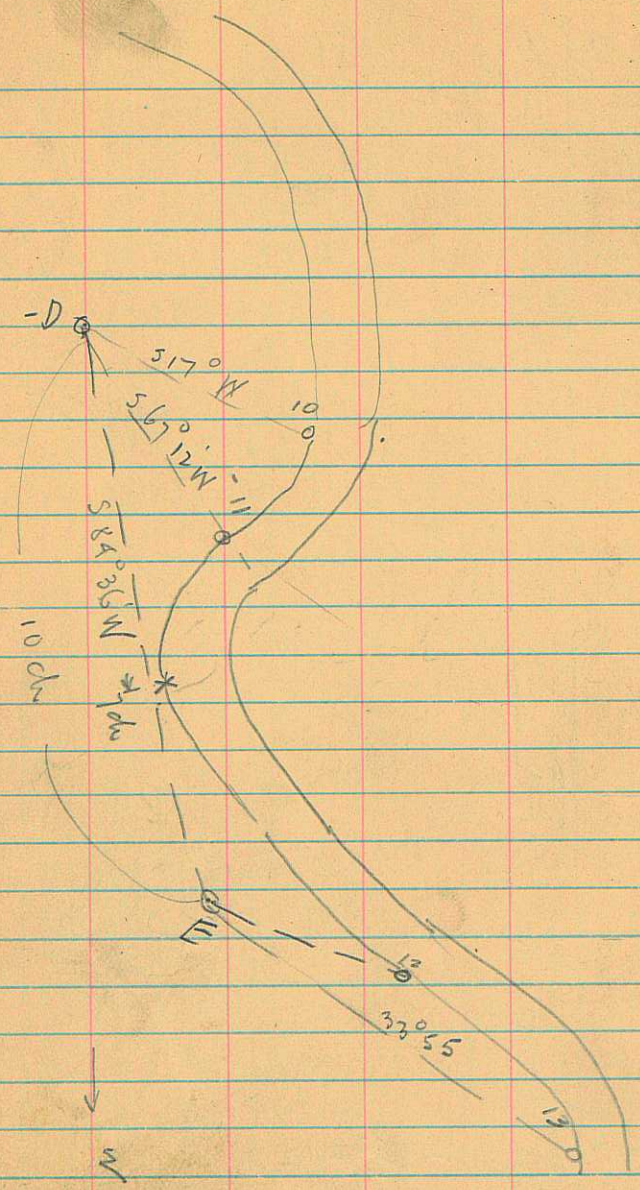
2.20
2
440

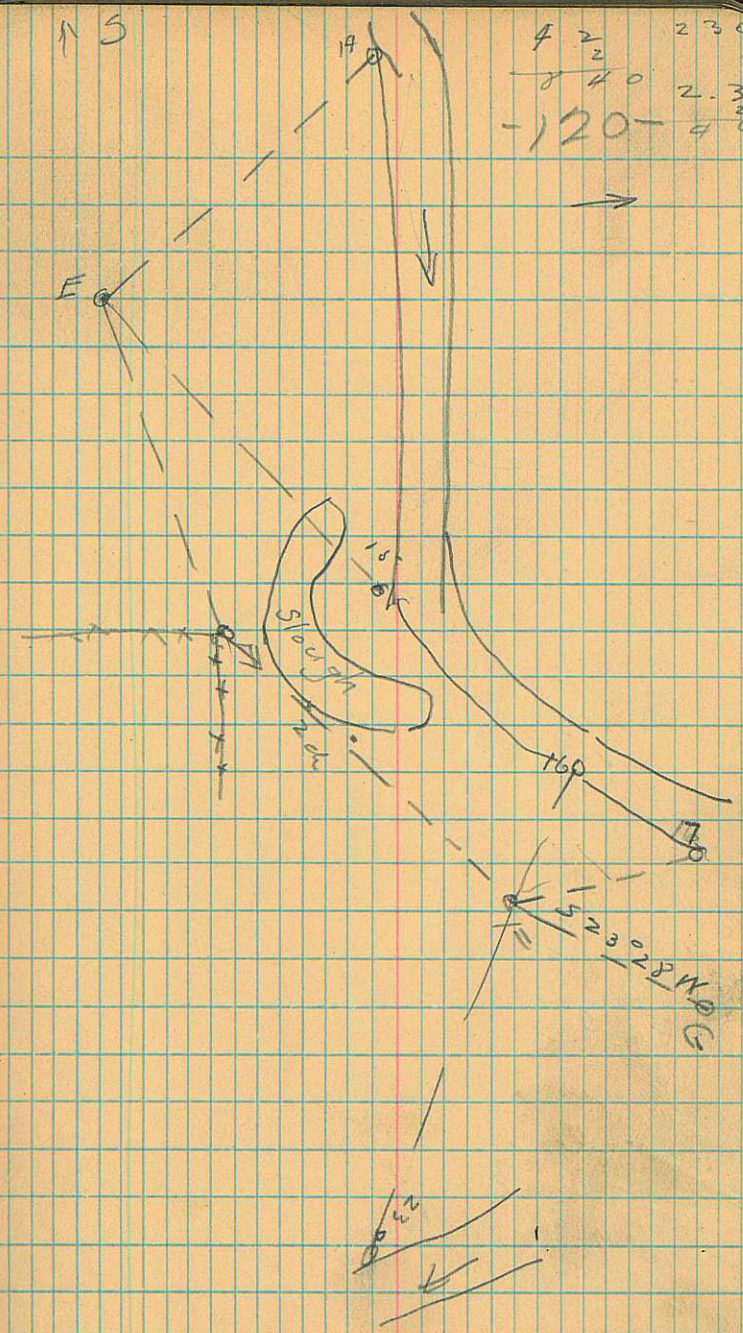
2.40
2
400

2.65
2
530

L	C	V
0	~~4.1~~ 4.1	
0	3.2	
0	2.65	
3		6.35
2		6.45
2		5.75
6.85 a.p.		10.0
	9.8	13.0

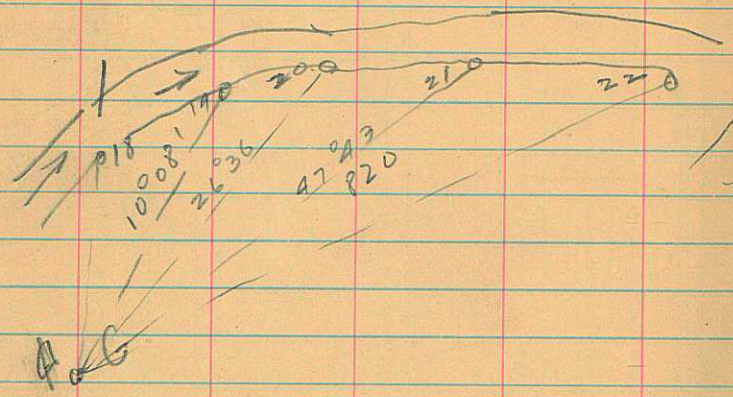
.29 to 2' Grad.



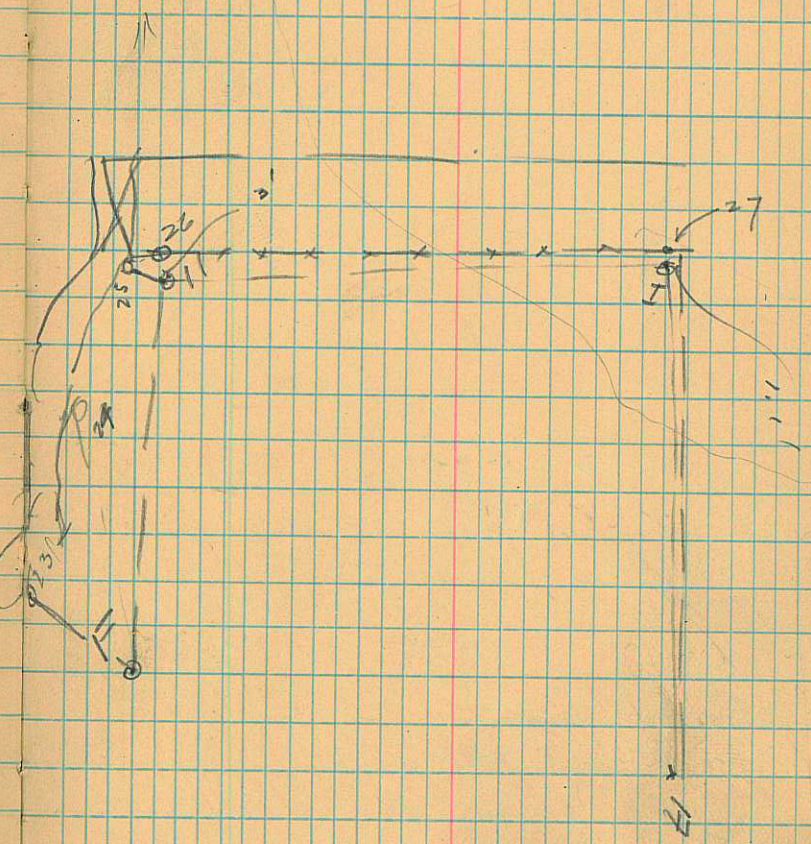


4 2 2
8 4 0
2 3 0
2.3 0
4 2 6

-120-



18
14
20
21
22
10°08'
26°36
47°43
820



3.20
122
26
27
25
24
23

π - Pt	Az from S	Dist	Needle	Bearing	Sett.	Stadia ✓	C	d	
A - F					179°32'				
A	359°32' 30"	15.93 ch		S28 E					
28	270°	1.1'		E					
27	175°45'	1.6'							S side Co road
I -					90°				
I	270°	10.62 ch		E					
-26	198°23'	3'							to fence E + W. S side Co Ro
-25	105°45'	0.11 ch							to River bank
H -					359°16'				B S to F
H	179°16'	10.30 ch	N30 E	N44 W					
-24	156°14'			N23°46' W		0	3.15		
-23	106°25'			N73°35' W		0	4.75		
F -					297°57'				B S to A
-22	59°37'	1300'	S61°15' W	$		0	6.5		
G -									

Mar 20 —

tele	hor angle	Sert ∠	
Dir	66°28	22°55	4:37
m	67°35	21 55	4:40
	670130	22 25	4' 38'30"
Dir	6757	21°37	4:45
m	69°00	2039	4:48
	68°2830	21 08	4 46 30
Mean	67°45	2146°30"	4h 42'30'

correc for R

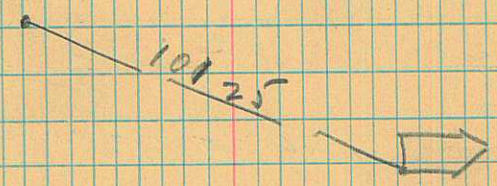
21°44'07"

Decl = 17' 11 − (59.29 × 5.9)

= 11' 21 S = Decl

alt. 21 44

lat 41 45



According to this ob. true az 102° 32'

same as ob in fore-noon

O. K.

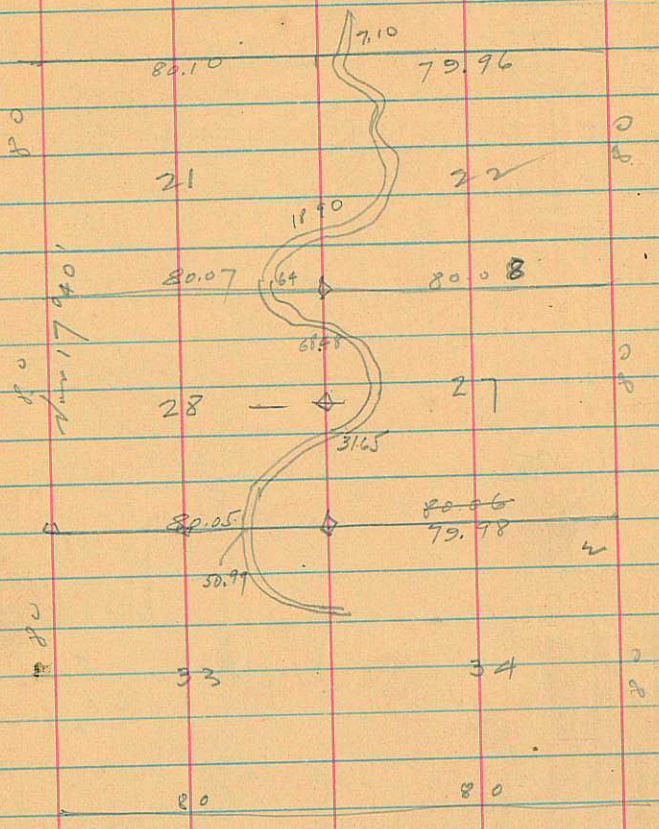
Computations of Kidman Survey

Pt.	Obs Bearing	Corrected Bearing	Correct Dep E	Dep W	Dist	Lat N	Lat S
A							
	N89°37'E	S89°16'E			14.135		
B							
	S34°11'W	S35°18'W					
C							
	S21°54'W	S23°01'W					
D							
	S89°36'W	S85°43'W		.997 ✓	10		.75
E							
	N7°46'W	N16°39'W		.777	6.71	.6665	
A							
A							
	N60°56'W	12 ch			10.49	5.83	
F							
	N 23'E	10.3		.069		10.30	
H						16.13	
	S88°53'E	10.62		10.616			0.21
I							15.922
	S39'W	~~15.93~~ ~~S39~~			.18		16.132
A					10.67		

Correct Lat	
−1.07	+1°07
+1°07	−1°07

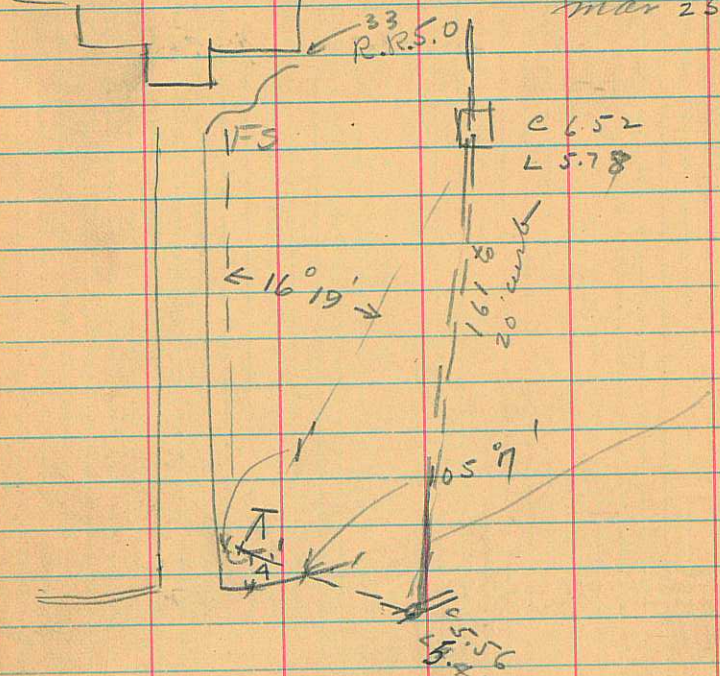
6203
61 63
1 07
60 56

101 25
1 07

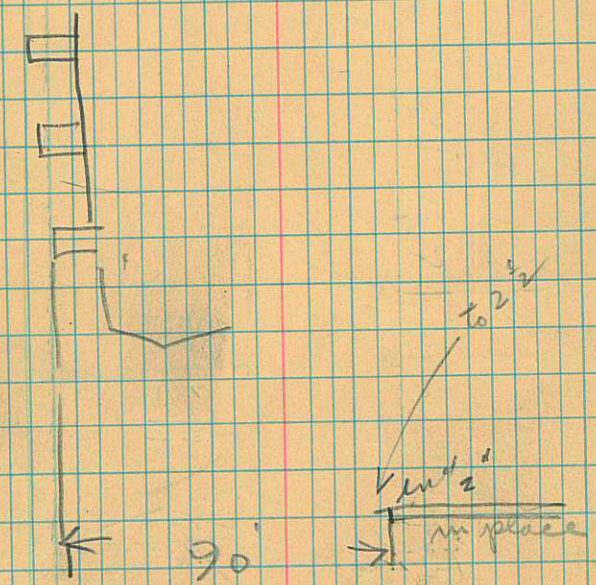

7.10
80.10
79.96
21
22
18.90
80.07
.64
80.08
68.48
28
27
31.65
80.05
~~80.06~~
79.98
50.99
33
34
80
80

Notes on the
Temple Grounds

Mar 25-1941



5.76 on ed
5.70 on end pipe
~~5.53~~
5.87 in detch
5.62
.15



Pipe on hand

3" 21.4"
19.4
20.7
20.5
17.6
99.6

2½
20.7
19.3
19.5
20.5
20.2
100.2

79
8
622

362.885 | 622
3110
5188
4976
2125
1866
2590
2488
1020

583.4
39.5
5863.6

2 | 39
39.5

583.4
39.5
622.9
79
5939

$$R = \frac{C^2}{8m} + \frac{m}{2}$$

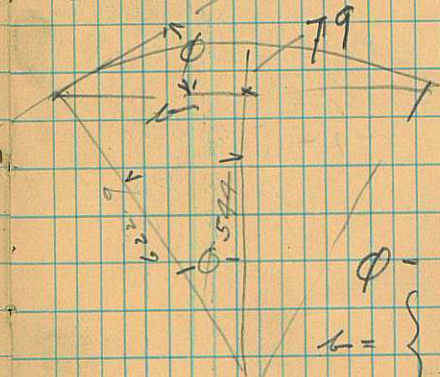
$$R = \frac{50}{\sin D}$$

$$\sin D = \frac{200\,m}{C^2 + 4m^2}$$

~~D = 2°20 curve = 440~~

~~R = 622.9'~~

~~D = 2°58~~



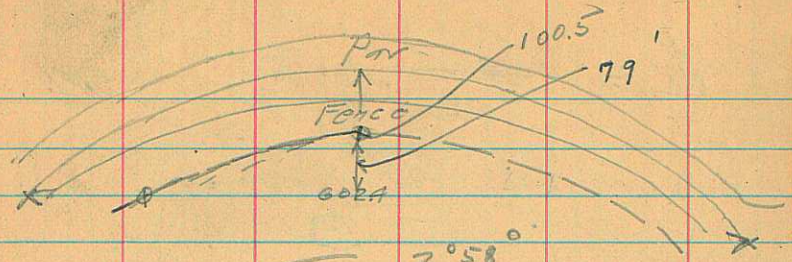
~~log 544 = 2.735599~~
~~log 623 = 2.794418~~
~~$\bar{1}.941181$~~

~~φ = 29°09'~~

~~b = { log 622.9 = 2.794418~~
~~sin 29°09 = $\bar{1}.687616$~~
~~2.482034~~

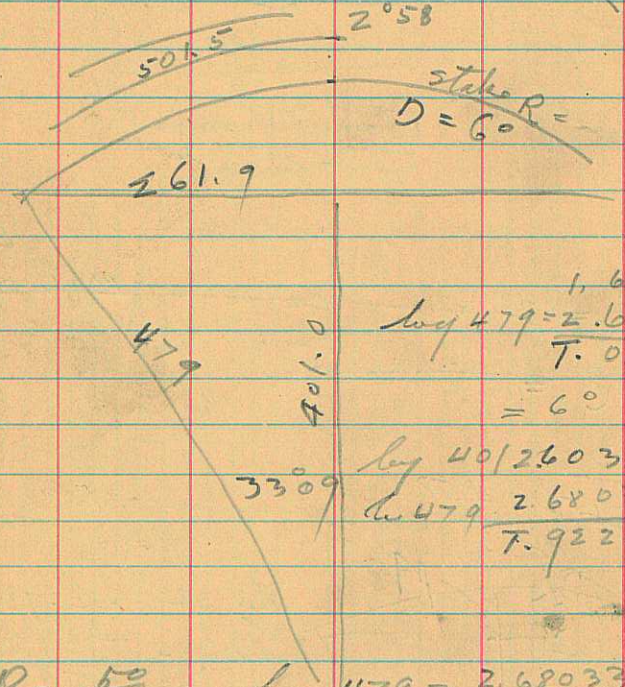
27 $\frac{.7}{40}$ 18 $\frac{.7}{2}$

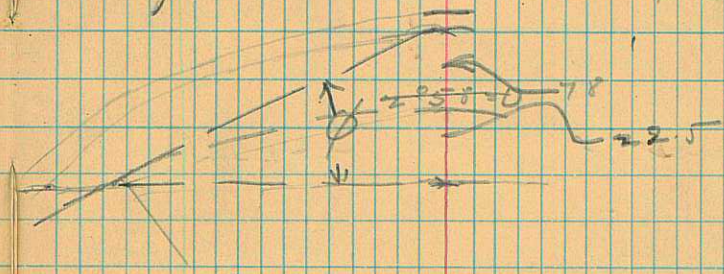
136

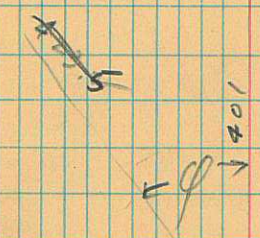


R of Pav west edge = 501.25

R of 423.5 501.50 = −(1.6 + 1.9 + 1.2)







1.698970
log 479 = 2.680336
T. 018634
= 6°

log 401 2.603144
ln 479 2.680336
T. 922808

2.603144
626853
T. 976291

log 401 = 2.603144
log 423.5 = 2.626853
T. 977317
603144

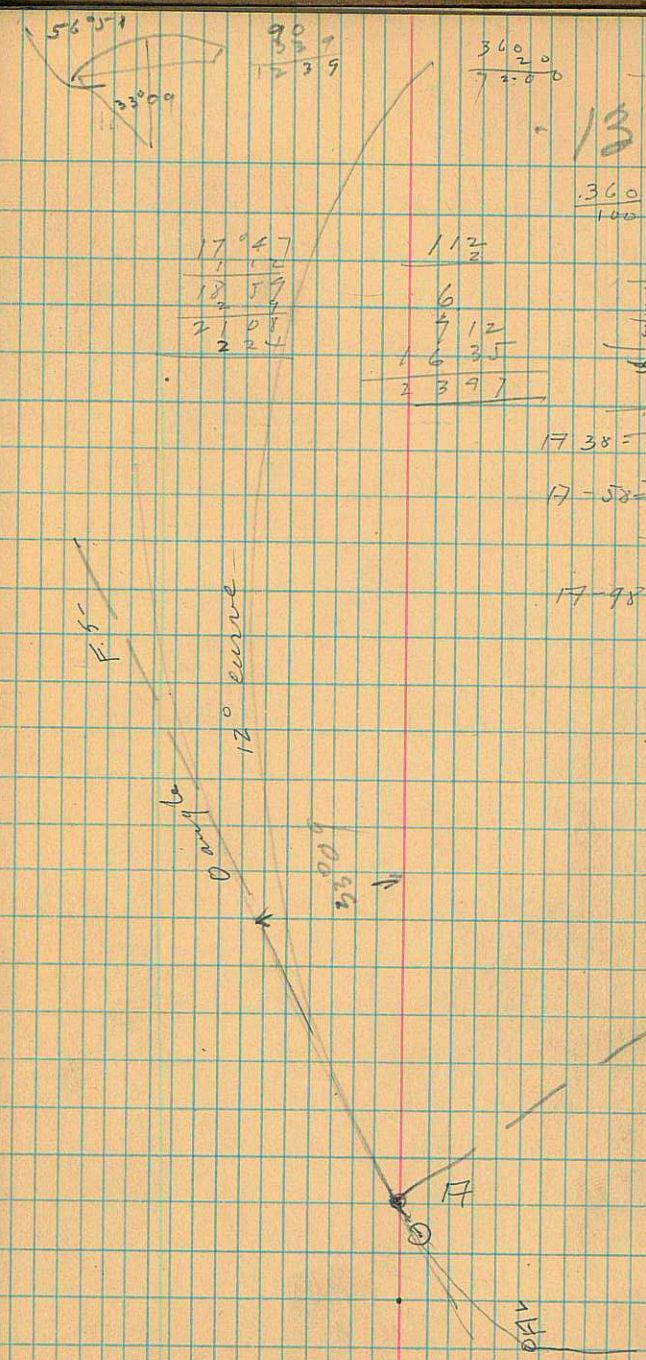
ϕ = 18°21
ϕ = 18°46

R = $\frac{50}{n}$ log 479 = 2.680336
ln 33°09 T. 737855
2.418191

261.9

log 423.5 = 2.626853
log n 18°46 = T. 507471
2.134324

K × P	angle	Dist	
A 398	23 47		Tap A-6
A-354	21 08		
A-318	18°59		A 5 a tap
A-298	17° 47		
A-278	16°35		~~A-4 tap~~
A-258	15°23		
A 238	14°11'		A-4 Tap
A-218	12-59		
A-198	11°47		
A-178	10°35		~~also A-3 a tap~~
A158	9°23		also A-3 Tap
A-138	8°11		
A-118	6°59		
A-98	5°47		
Tap A-78	4°35'		Market A-2 on one side
A-58	3°23'		
A38	2°11'		
A18	59'		
AL	179°01'	18'	
A-1	180°		
A			
A			



Π - Pt	Angle	Dist		
A: 398	23°47			Tap A-6
A 418	24-59			
A 438	26 11			
A-458	27 23			
A-478	28 35			A-7 a tap

B323½ Tap B4

B304

B 79

B 254

B228½

B190

B165

B133½ T

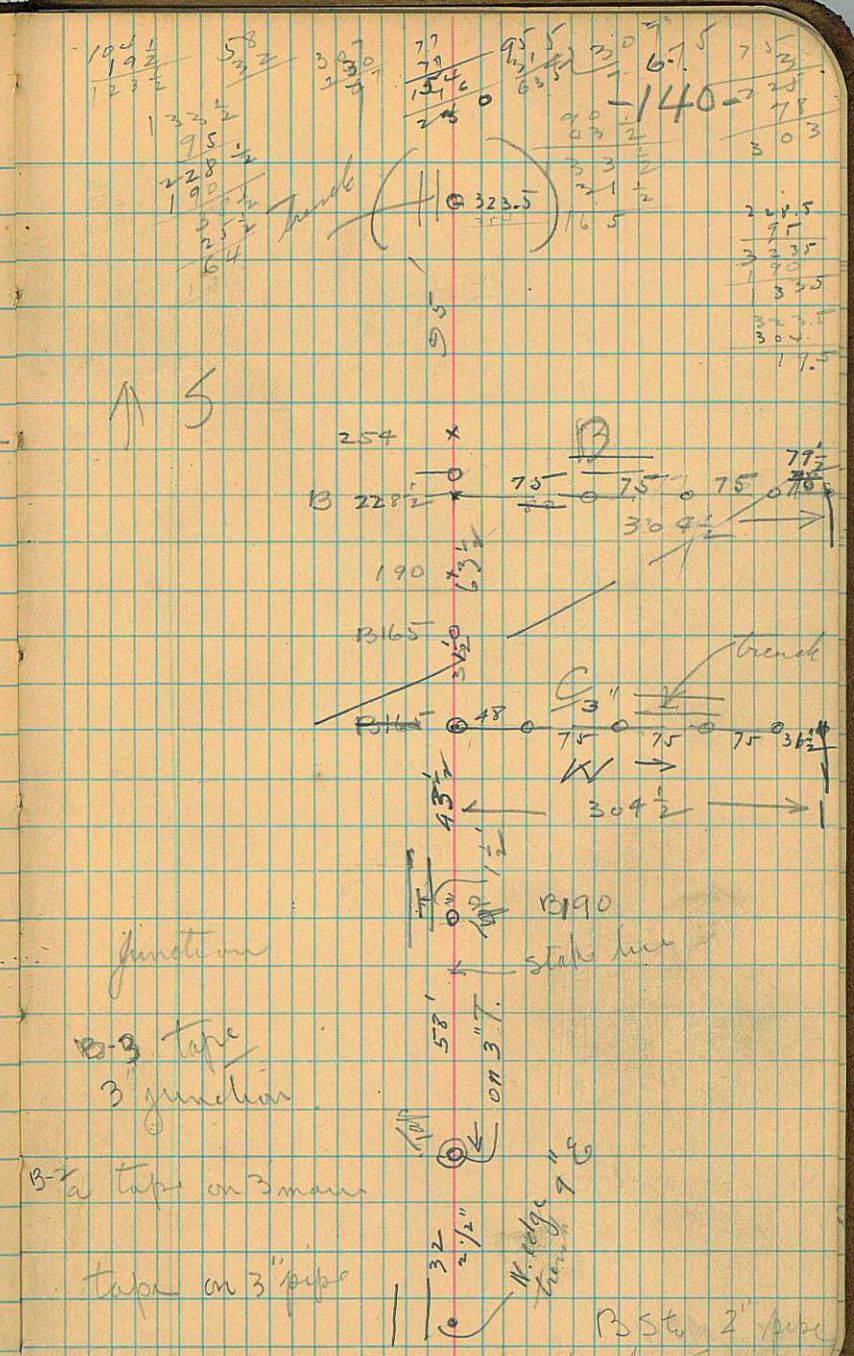
B 115

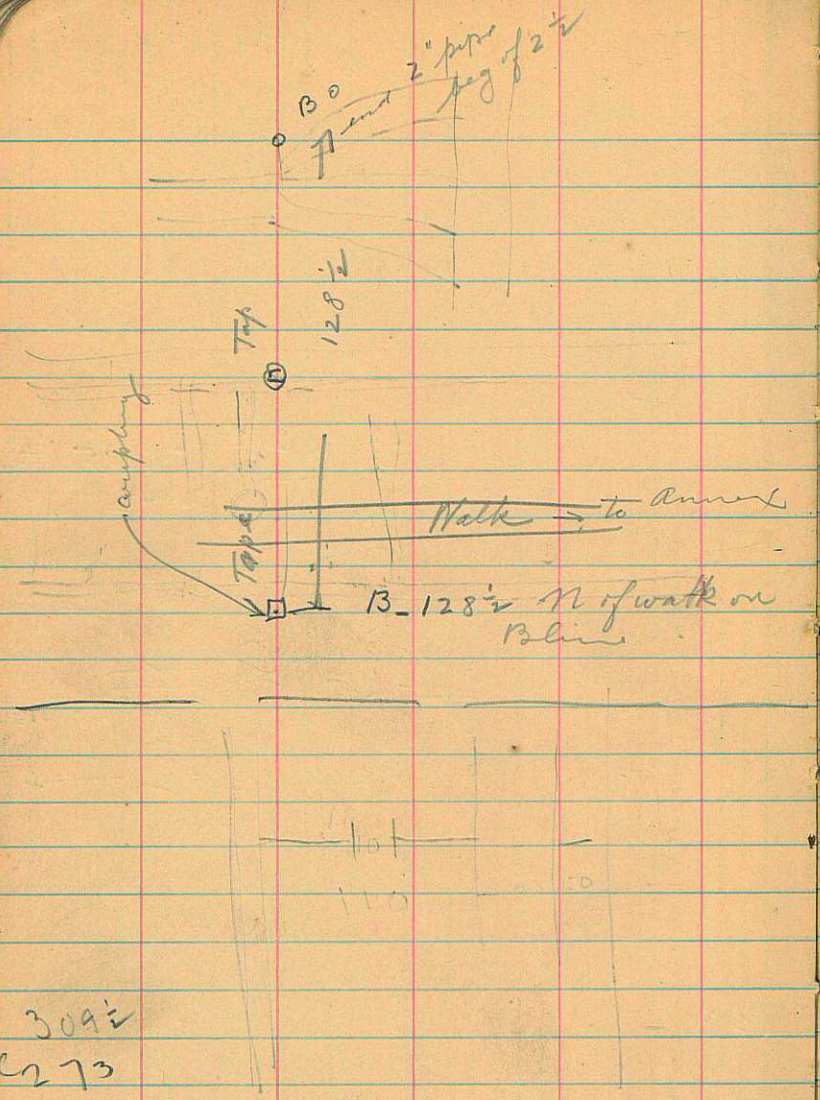
B 90

B57

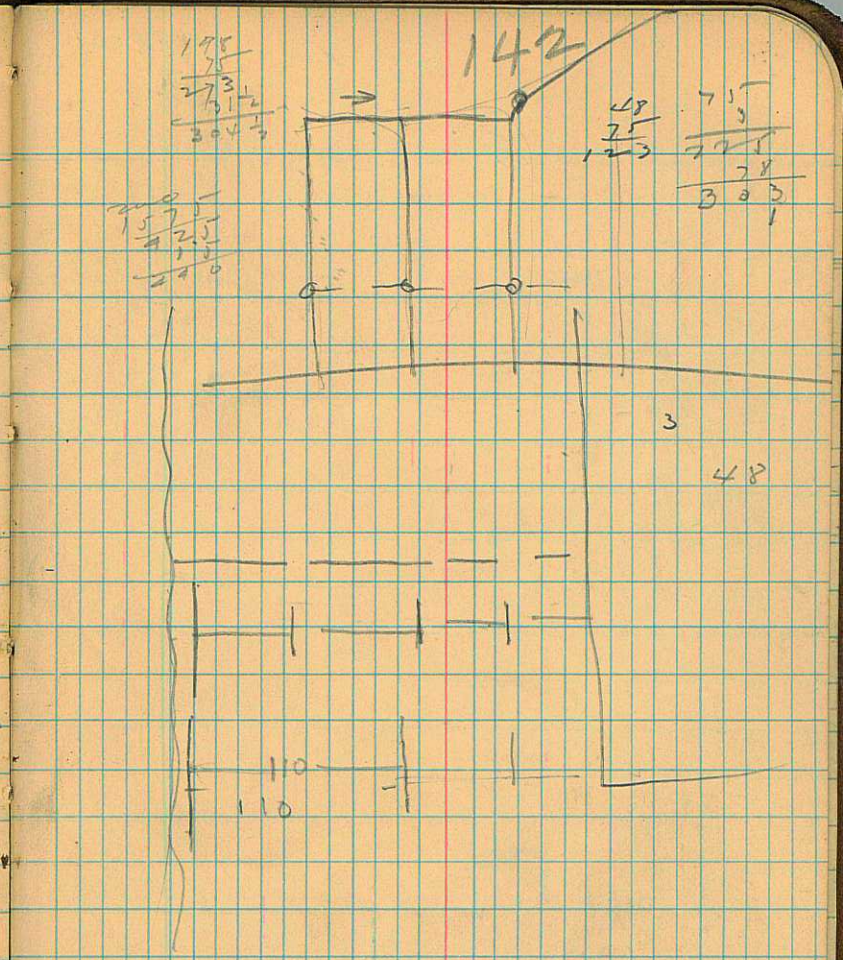
B32

B-0- 179°48' 0

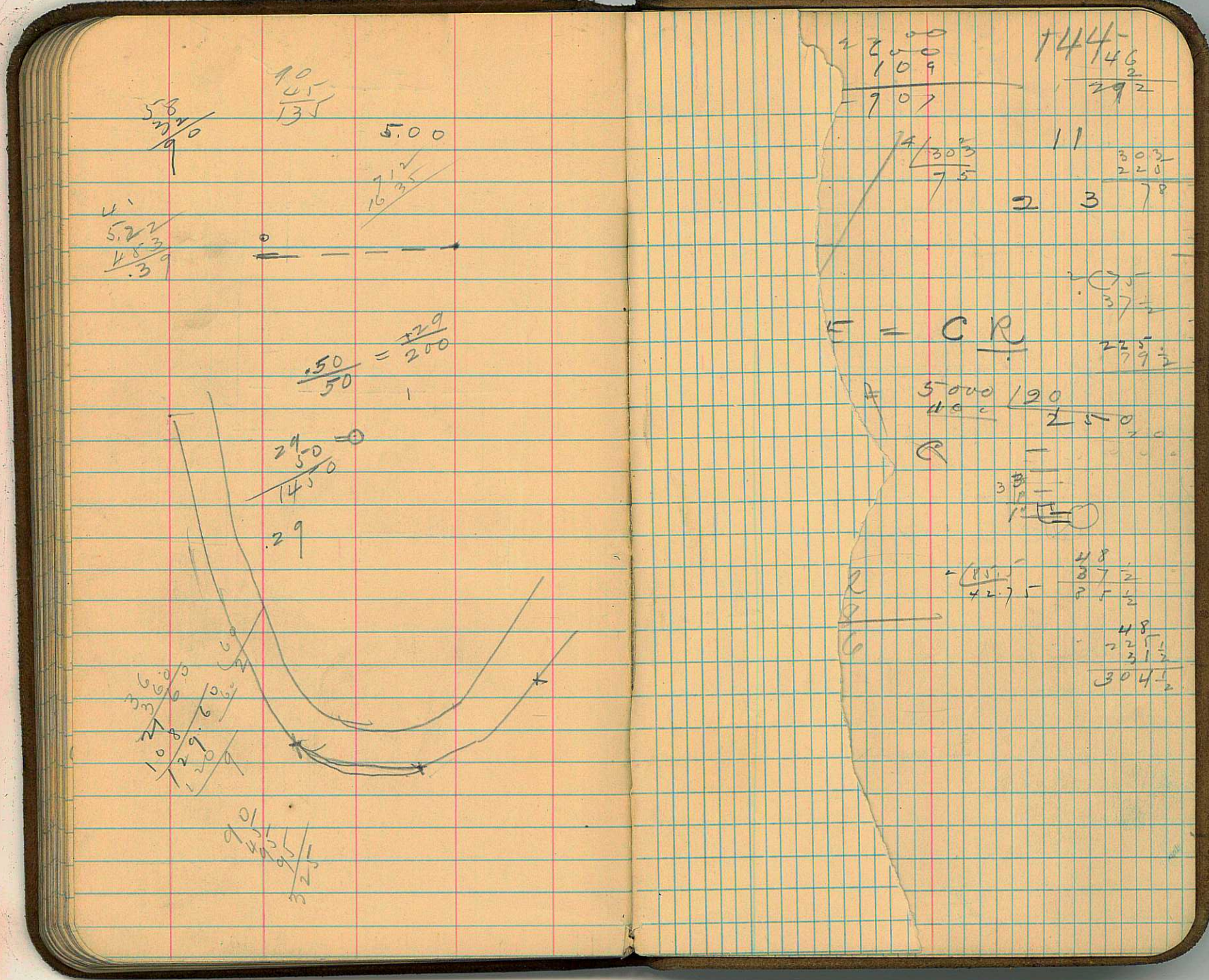




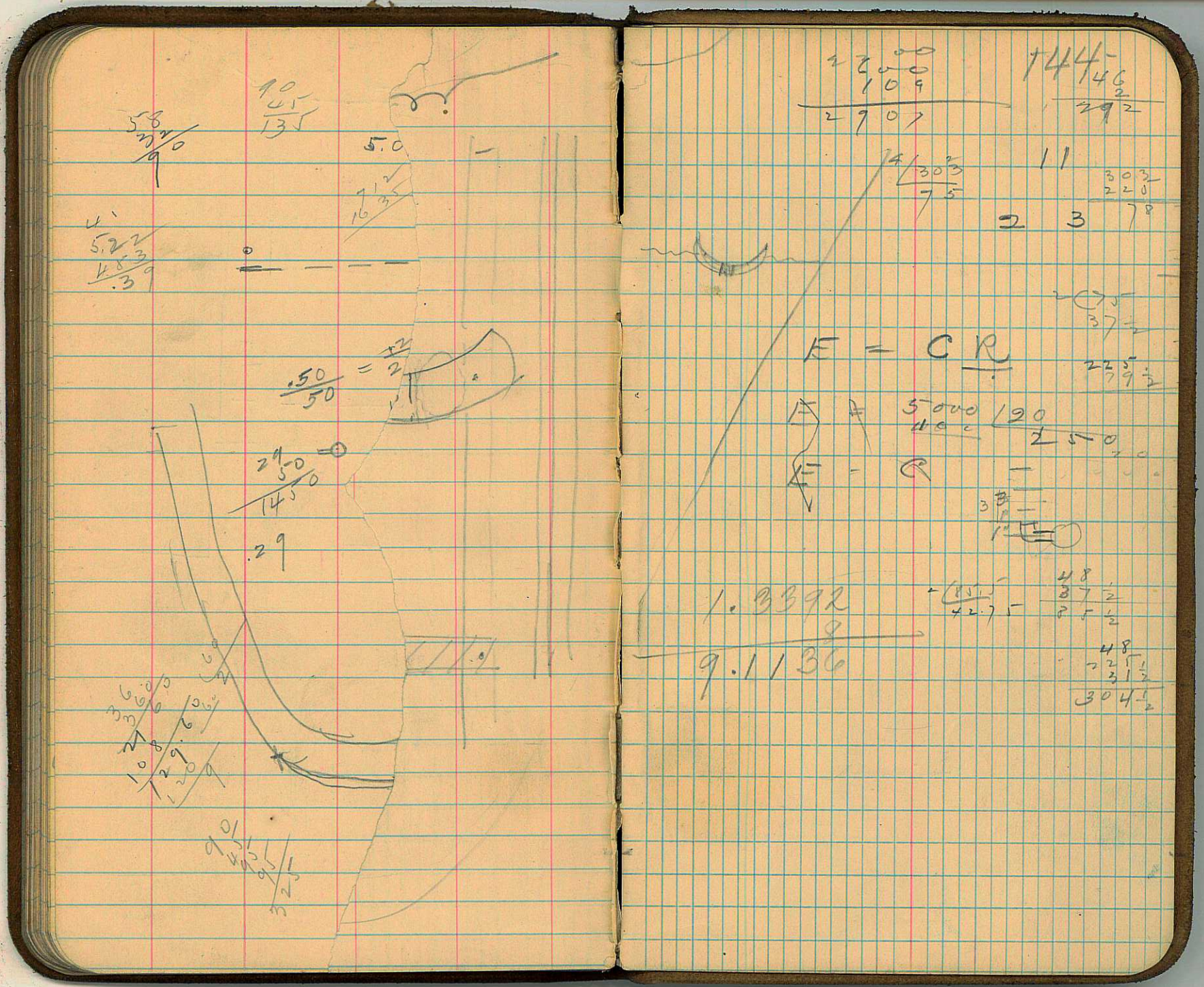
309½
C273
200
C198
C123
C48



Tap + Chorn
Tap
Tap
Tap
Tap



144
E = C R



144
E = CR
1.3392
9.1136

Dam Bill Bill Heart Bill Bill

Dern	Dam	Ed	Bill
120	120	120	120
127	127	99	127
70	140	5	70
57	267	104	57
5	15	16	5
62	252	120	62
8			8
54			54
99			
120	120	120	120
18	36	102	115
102	156	97	14
7	166	90	129
95	12	84	
89	178		

								[illegible]	[illegible]
							[illegible]	16 27	2.80
						4	8.281	16.56	2.85
						10	8.426	16 85	2.90
						83	8.716	17.43	3.00
						92	9.150	18.30	3.15
						2	9.585	19.16	3.30
					99.1	[illegible]	10.02	20.04	3.45
					478.3	2.620	10.45	20.91	3.60
				30	459 3	2.730	10.89	21 77	3.75
			13		441.7	2.839	11.32	22.64	3.90
				30	425.4	2.949	11.75	23.51	4.05
			14		410 3	3.058	12.18	24 37	4.20
		.10		30	396 2	3.168	12.62	25.24	4.35
		1.15	15		383.1	3.277	13.05	26.11	4.50
	80	1.20		30	370 8	3.387	13.49	26.97	4.65
	271	1.25	16		359.3	3.496	13.92	27 84	4.80
	7.561	1.30		30	348.5	3.606	14 35	28 70	4 95
	7.852	1.35	17		338.3	3 716	14.78	29.56	5.10
71	8.143	1.40	18		319 6	3.935	15 64	31.29	5.40
217	8.433	1.45	19		302.9	4.155	16 51	33.01	5 70
362	8.724	1 50	20		287.9	4.374	17.37	34.73	6 00
.507	9.014	1.55	21		274.4	4.594	18.22	36 44	6 30
4.653	9.305	1.60	22		262 0	4.814	19 08	38.16	6.60
4.798	9.596	1.65	23		250.8	5 035	19.94	39 87	6 90
4.943	9.886	1.70	24		240 5	5.255	20 79	41.58	7.20
5.088	10.18	1.75	25		231.0	5.476	21 64	43.28	7.50
5.234	10.47	1.80	26		222.3	5.697	22 50	44.99	7.80
5.379	10.76	1.85	27		214.2	5.918	23.35	46.69	8 10
5.524	11.05	1 90	28		206 7	6.139	24.19	48.38	8 40
5.669	11.34	1 95	29		199 7	6.360	25.04	50.07	8.70
5.814	11.63	2.00	30		193.2	6.583	25.88	51.76	9.00

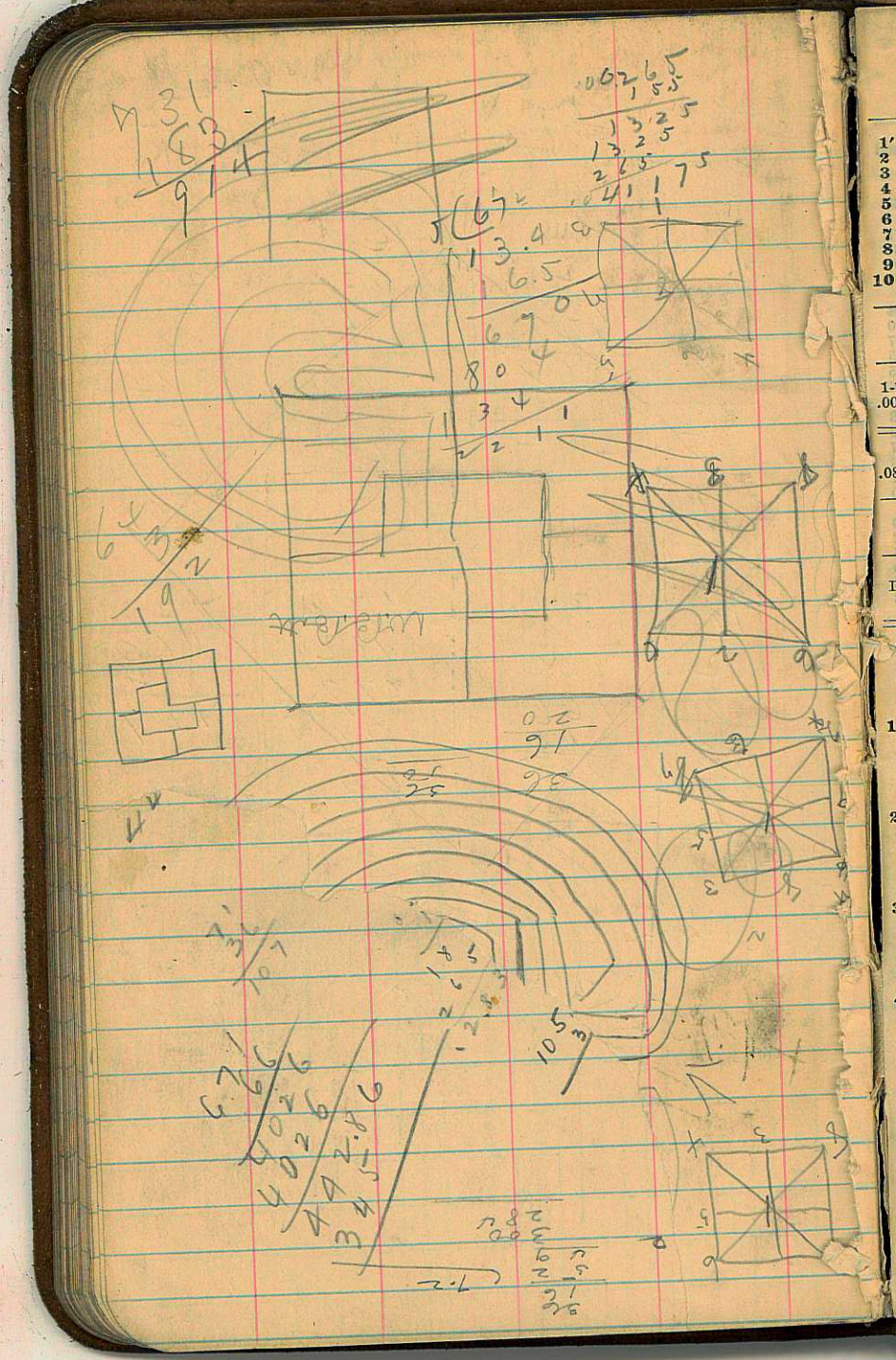


Table IV.—Minutes in Decimals of a Degree.

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

Table V.—Inches in Decimals of a Foot.

1-16 .0052	3-32 .0078	⅛ .0104	3-16 .0156	¼ .0208	5-16 .0260	⅜ .0313	½ .0417	⅝ .0521	¾ .0625	⅞ .0729
1 .0833	2 .1667	3 .2500	4 .3333	5 .4167	6 .5000	7 .5833	8 .6667	9 .7500	10 .8333	11 .9167

Table VI.—Radii, Ordinates and Deflections.

Deg.	Radius	Mid Ord	Tan Def.	Chd. Def.	Def for 1 Foot	Deg.	Radius	Mid. Ord.	Tan Def.	Chd. Def.	Def. for 1 Foot
° 10′	34377.	.036	.145	.291	0.05′	7°	819.0	1.528	6.105	12.21	2.10′
20	17189.	.073	.291	.582	0.10	20′	781.8	1.600	6.395	12.79	2 20
30	11459.	.109	.436	.873	0.15	30	764.5	1.637	6.540	13.08	2.25
40	8594.4	.145	.582	1.164	0.20	40	747.9	1.673	6.685	13.37	2.30
50	6875.5	.182	.727	1.454	0.25	8	716.8	1.746	6.976	13.95	2.40
1	5729.6	.218	.873	1.745	0.30	20	688.2	1.819	7.266	14.53	2.50
10	4911.2	.255	1.018	2.036	0.35	30	674.7	1 855	7.411	14.82	2.55
20	4297 3	.291	1.164	2.327	0.40	40	661.7	1.892	7.556	15.11	2.60
30	3819.8	.327	1.309	2.618	0.45	9	637.3	1.965	7.846	15.69	2.70
40	3437.9	.364	1.454	2.909	0.50	20	614.6	2 037	8.136	16 27	2.80
50	3125 4	.400	1.600	3.200	0.55	30	603.8	2.074	8.281	16.56	2.85
2	2864.9	.436	1.745	3.490	0.60	40	593.4	2.110	8.426	16 85	2.90
10	2644.6	.473	1.891	3.781	0.65	10	573.7	2.183	8.716	17.43	3.00
20	2455.7	.509	2.036	4.072	0.70	30	546.4	2.292	9.150	18.30	3.15
30	2292.0	.545	2.181	4.363	0.75	11	521.7	2.402	9.585	19.16	3.30
40	2148.8	.582	2.327	4.654	0.80	30	499.1	2 511	10.02	20.04	3.45
50	2022.4	.618	2.472	4.945	0.85	12	478.3	2.620	10.45	20.91	3.60
3	1910.1	.655	2.618	5.235	0.90	30	459 3	2.730	10.89	21 77	3.75
10	1809.6	.691	2.763	5.526	0.95	13	441.7	2.839	11.32	22.64	3.90
20	1719.1	.727	2.908	5.817	1.00	30	425.4	2.949	11.75	23.51	4.05
30	1637.3	.764	3.054	6.108	1.05	14	410 3	3.058	12.18	24 37	4.20
40	1562.9	.800	3.199	6.398	1.10	30	396 2	3.168	12.62	25.24	4.35
50	1495.0	.836	3.345	6.689	1.15	15	383.1	3.277	13.05	26.11	4 50
4	1432.7	.873	3.490	6.980	1.20	30	370 8	3.387	13.49	26.97	4.65
10	1375.4	.909	3 635	7.271	1.25	16	359.3	3.496	13.92	27 84	4.80
20	1322.5	.945	3.718	7.561	1.30	30	348.5	3.606	14 35	28 70	4 95
30	1273.6	.982	3.926	7.852	1.35	17	338.3	3 716	14.78	29.56	5 10
40	1228.1	1.018	4.071	8.143	1.40	18	319 6	3.935	15 64	31.29	5.40
50	1185.8	1.055	4.217	8.433	1.45	19	302.9	4.155	16 51	33.01	5 70
5	1146.3	1 091	4.362	8.724	1 50	20	287.9	4.374	17.37	34.73	6 00
10	1109.3	1.127	4.507	9.014	1.55	21	274.4	4.594	18.22	36 44	6 30
20	1074.7	1.164	4.653	9.305	1.60	22	262 0	4.814	19 08	38.16	6.60
30	1042.1	1.200	4.798	9.596	1.65	23	250.8	5 035	19.94	39 87	6 90
40	1011.5	1.237	4.943	9.886	1.70	24	240 5	5.255	20 79	41.58	7.20
50	982.6	1.273	5.088	10.18	1.75	25	231.0	5.476	21 64	43.28	7.50
6	955.4	1.309	5.234	10.47	1.80	26	222.3	5.697	22.50	44.99	7.80
10	929.6	1.346	5.379	10.76	1.85	27	214.2	5.918	23.35	46.69	8 10
20	905.1	1.382	5.524	11.05	1 90	28	206 7	6.139	24.19	48.38	8 40
30	881.9	1.418	5.669	11.34	1 95	29	199 7	6.360	25.04	50.07	8.70
40	859.9	1.455	5.814	11.63	2.00	30	193.2	6.583	25.88	51.76	9.00

Table VIII.—Middle Ordinates for Rails.

Deg. of Curve	Length of Rails							Deg. of Curve	Length of Rails					
	32	30	28	26	24	22	20		32	30	28	26	24	22
1	.022	.020	.018	.017	.015	.013	.012	13°	.286	.248	.213	.181	.150	.120
2	.043	.038	.034	.029	.025	.021	.017	14	.308	.268	.230	.195	.161	.129
3	.065	.058	.051	.044	.037	.031	.026	15	.329	.286	.246	.208	.172	.138
4	.086	.077	.069	.060	.050	.042	.035	16	.351	.305	.262	.222	.183	.147
5	.108	.097	.086	.074	.063	.053	.044	17	.373	.324	.278	.235	.194	.156
6	.129	.117	.103	.089	.076	.064	.052	18	.395	.343	.294	.249	.205	.165
7	.150	.136	.120	.104	.088	.074	.061	19	.417	.362	.311	.263	.217	.174
8	.172	.156	.138	.119	.101	.085	.070	20	.438	.381	.327	.277	.228	.183
9	.193	.175	.155	.134	.114	.095	.078	21	.461	.400	.344	.291	.240	.192
10	.215	.195	.172	.149	.126	.106	.087	22	.483	.419	.360	.305	.251	.201
11	.237	.214	.189	.163	.138	.117	.096	23	.505	.438	.377	.319	.263	.210
12	.258	.233	.206	.178	.151	.128	.105	24	.528	.458	.394	.333	.275	.220
13	.280	.253	.223	.193	.163	.138	.114	25	.550	.477	.411	.347	.287	.229
14	.302	.273	.240	.207	.176	.149	.122	26	.573	.497	.428	.361	.298	.239
15	.324	.293	.257	.222	.188	.159	.131	30	.660	.573	.493	.416	.344	.275

CURVE FORMULÆ.

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

$T = \frac{50 \tan. \frac{1}{2} I}{\text{Sin. } D}$

$\text{Sin. } D = \frac{50}{R}$

$\text{Sin. } D = \frac{50 \tan. \frac{1}{2} I}{T}$

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

$R = \frac{50}{\text{Sin. } D}$

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

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

Chord def. = [illegible]

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

Tan. def. = [illegible]

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

Table 7 contains Tangents and Externals to a 1° curve. For any other radius may be found, nearly enough, by dividing [illegible] Ext. opposite the given central angle by the given degree of curve.

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

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

To find Nat. Tan. and Nat. Ex. Sec. for any angle, by Table [illegible] or Ext. of twice the given angle divided by the radius of a 1° curve [illegible] the Nat. Tan. or Nat. Ex. Sec.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° curve) [illegible] divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product [illegible] the given distance.

To find deflection for a given angle and distance: Multiply the [illegible] by .01745, and the product by the distance.

Right Angle Triangles.—Square the altitude, divide by twice [illegible] base. Add quotient to base for hypothenuse.

(Given Base 100, Alt. 14. $100^2 \div 200 = 5$. $100 + 5 = 105$ hyp.

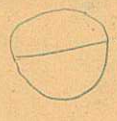
(Given Hyp. 100, Alt. 28. $28^2 \div 200 = 3.135$. $100 - 3.135 = 96.865$ base.

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

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

383
132
515

254
90
164

3.1416
10
31.4160

383
164
543