59

796 796

59

Cross Section Book

375

KEUFFEL & ESSER CO.

DRAWING MATERIALS
AND
SURVEYING INSTRUMENTS.

NEW YORK.

CHICAGO. SAN FRANCISCO. ST. LOUIS.

TABLES FOR EXCAVATIONS AND EMBANKMENTS.

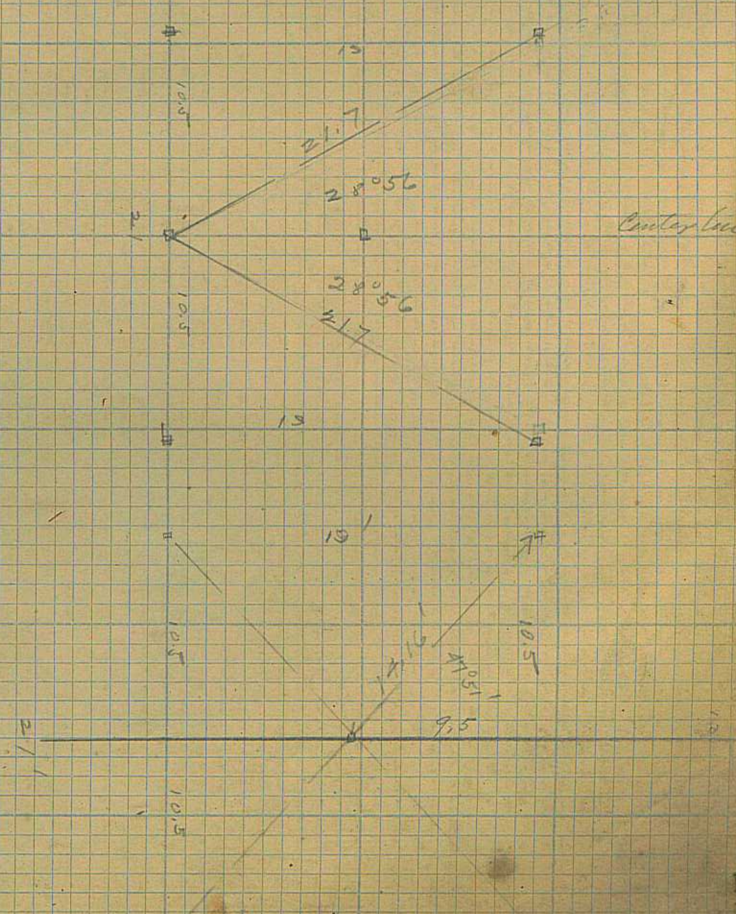
DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.
ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.
FOR SINGLE TRACK EXCAVATION.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	19
		29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	20
		30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	21
			31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	22
			32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	23
				33.3	33.4	33.5	33.6	33.7	33.8	33.9	24
				3	34.4	34.5	34.6	34.7	34.8	34.9	25
					35.4	35.5	35.6	35.7	35.8	35.9	26
					6.4	36.5	36.6	36.7	36.8	36.9	27
						37.5	37.6	37.7	37.8	37.9	28
						38.5	38.6	38.7	38.8	38.9	29
							39.6	39.7	39.8	39.9	30
							8	40.7	40.8	40.9	31
									41.8	41.9	32
									8	42.9	33
										3.9	34
										4.9	35
										9	36

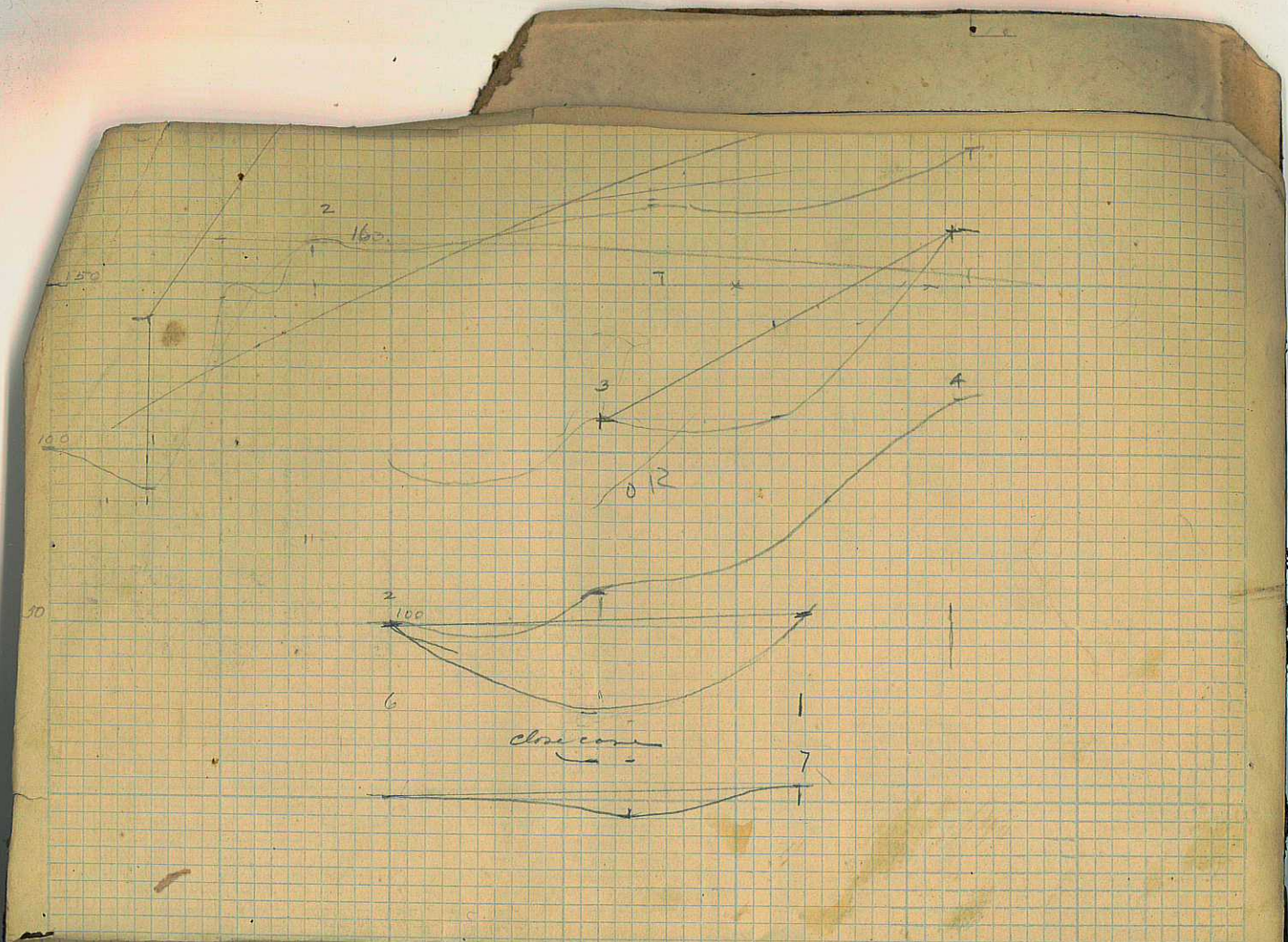
Eugene Schaub
Engr.
Telluride Power Co
2/1/09

4/1/09

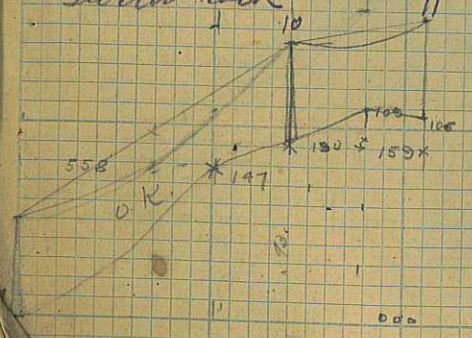
Sketch of Laying stakes for Steel tow



see page 4

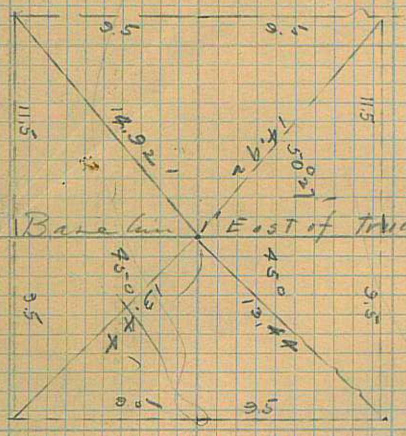


9 East Steel tower
North from Farmington
Switch rock

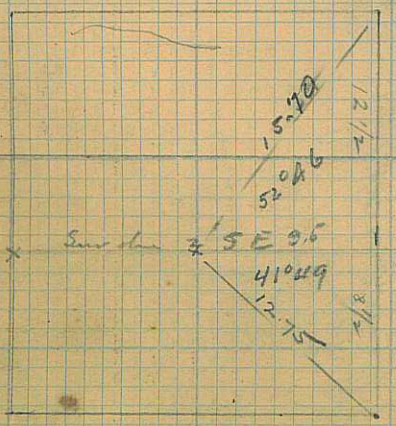


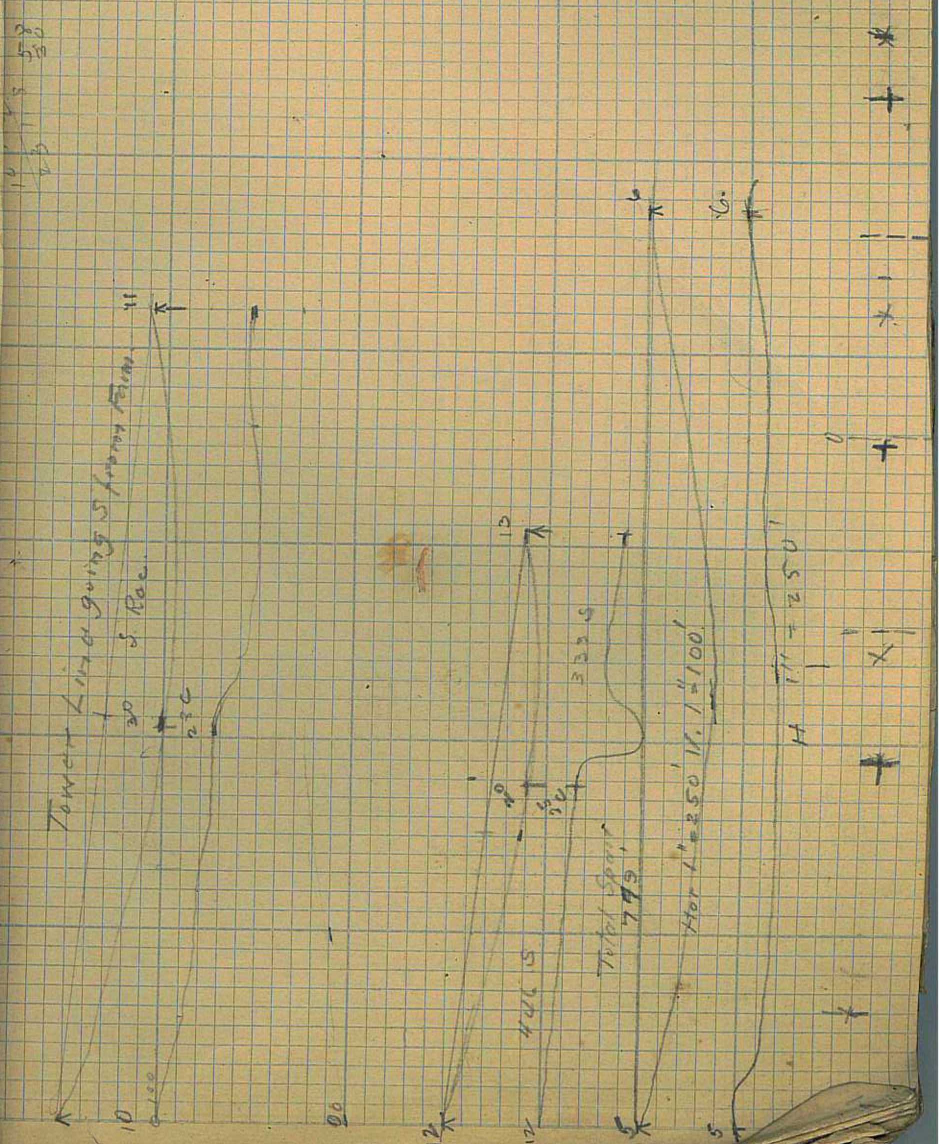
from No 2 going S from Farmington Switch rack, tower line was run 1' East. and in order to avoid moving instrument West one foot each time I calculate a constant as follows.

from No 1



to No 14





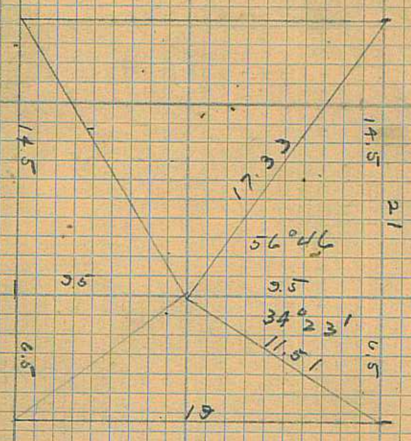
5

Just E of Co. Road

H. 1" = 100'
V. 1" = 100'

Steel towers 4/12/09

Base from No 56



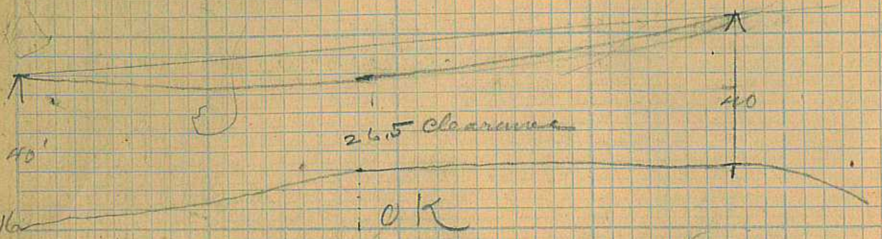
Log 6.5 = 0.812913
9.5 = 0.977724
$\bar{1}$.835189
= 34°23

Log 9.5 = 0.977724
cos 34°23 $\bar{1}$.916600
1.061124
11.51

Log 14.5 = 1.161368
Log 9.5 0.977724
0.183644
56°46

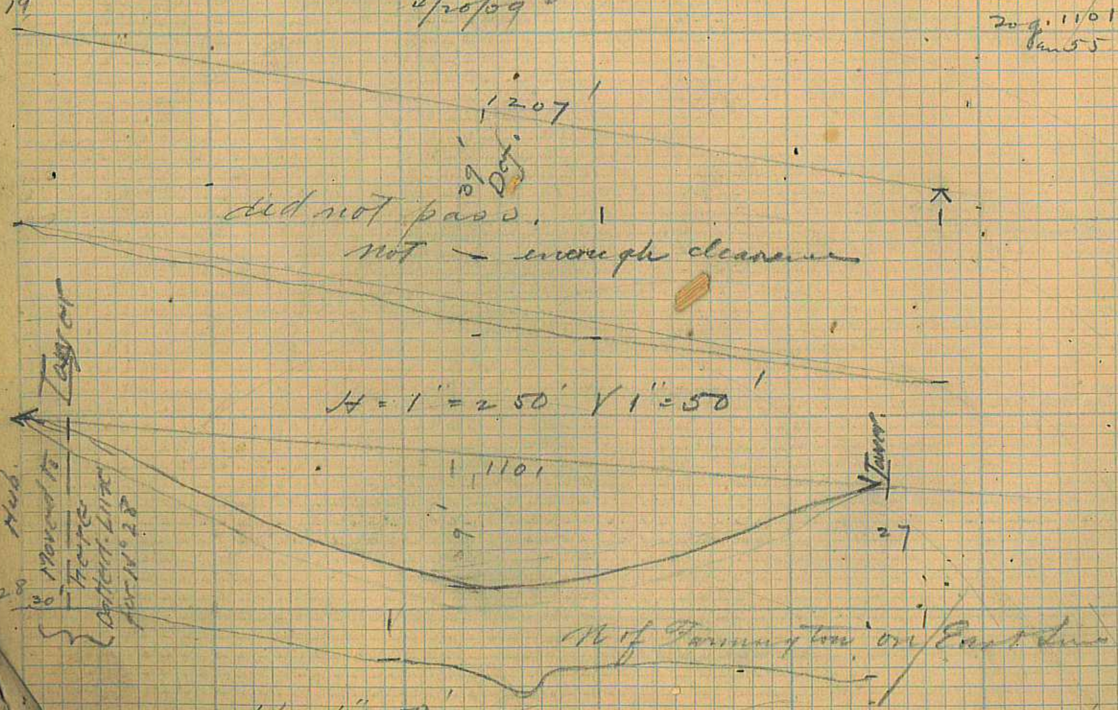
Log 9.5 = 0.977724
$\bar{1}$.738820
1.238890
= 17.33

Profile of Ground from Wood Tower No 16 on W. Line N of Farmington.



Scales Hor 1" = 100 Vert 1"

Steel Tower line N of Farmington
4/20/09



$$\log 1101 = 3.041787$$
$$\log 55 = 2.204076$$

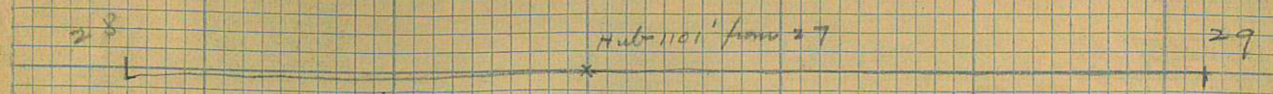
1.245857

17.6

2.62
4.80
20960
1048
12.3760

Hor 1" = 250'
V 1" = 50'

Case did not pass (see over)

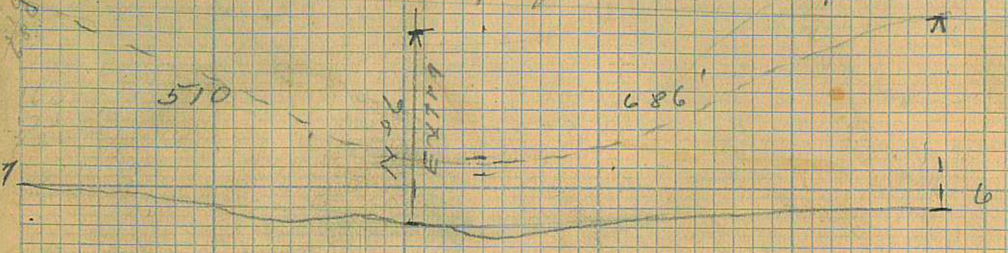


Log 121 = 2.082785
Log 121 = 2.372171
0.454956

H 1" 50'
V 1" 50'

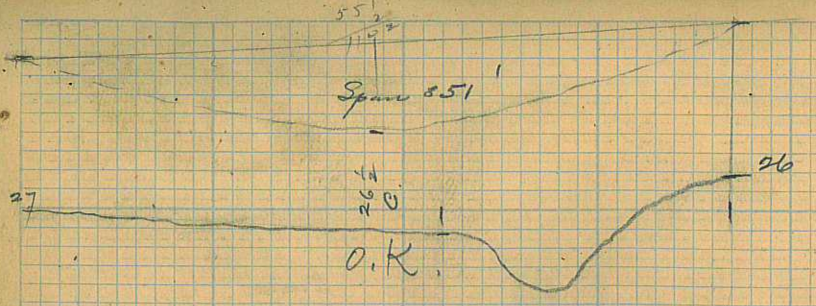
4/22/09

Reconsidering from No 6 to 7 on steel tower N of Farm



Log in 14' = 3.609853
Log 1196 = 3.077731
0.687584
4.8

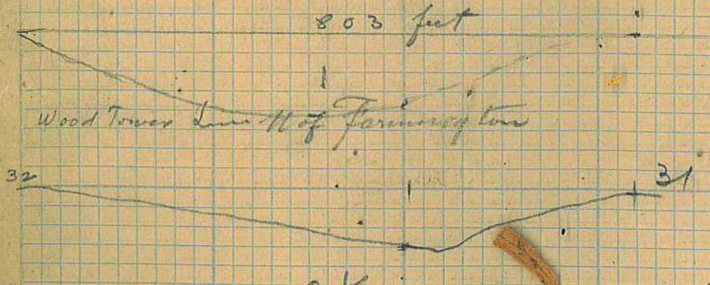
.017425
570
12250
8725
8.30950



851
1702

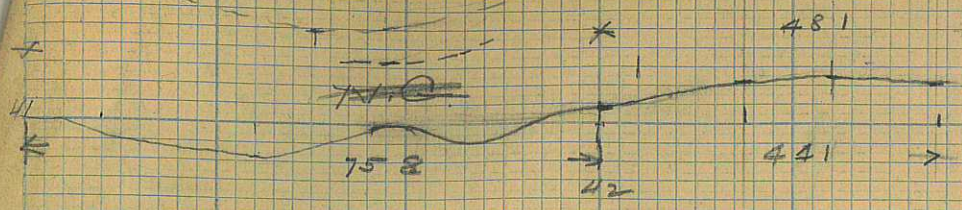
Log 38' = 2.043501
851 = 2.929930
0.973431
9.4

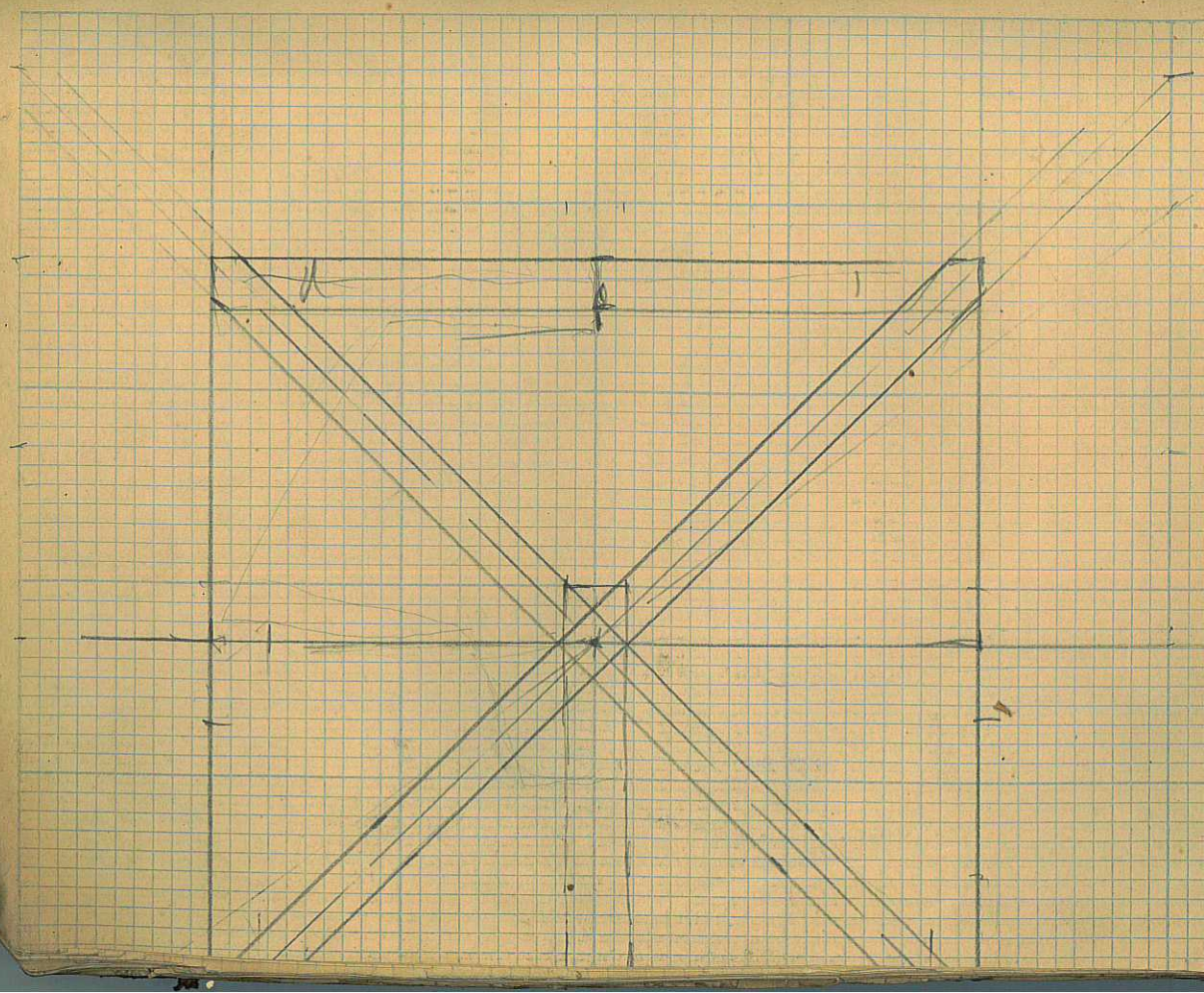
Log in 43 = 2.097183
551 = 2.741152
0.838835
6.9

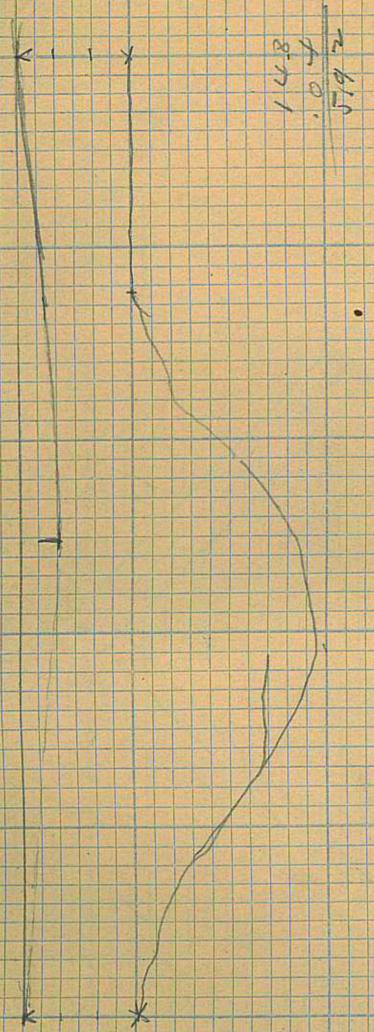


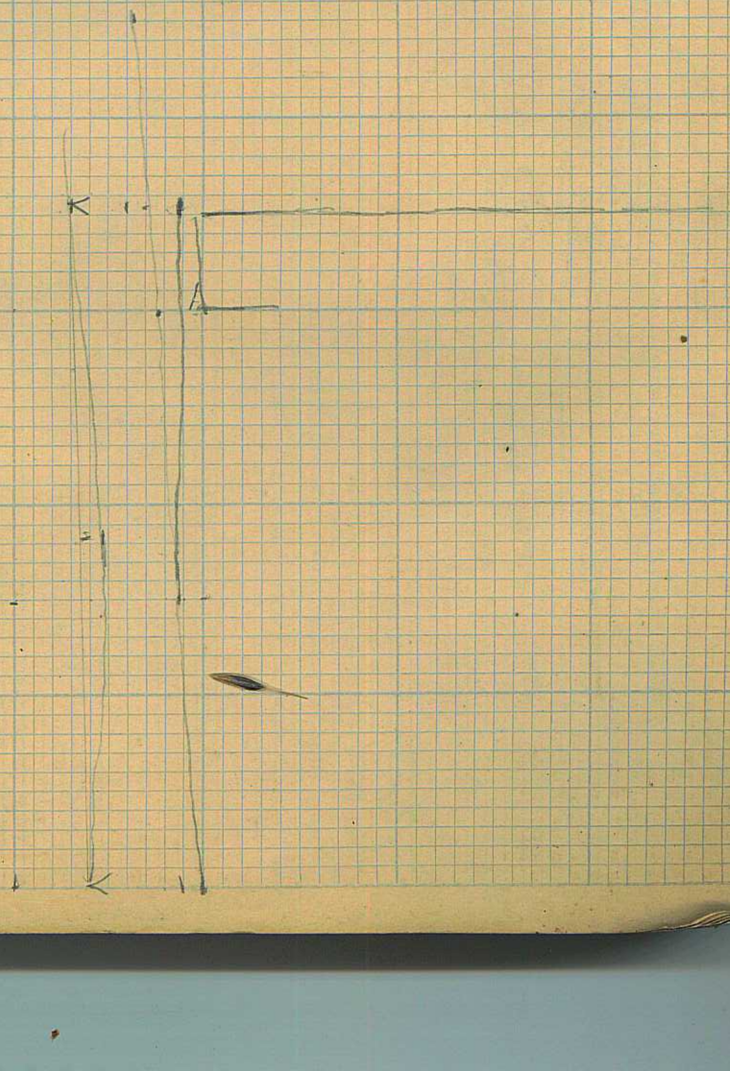
Log .03054
503
9162
15270
15.3616

.00175
800
14000

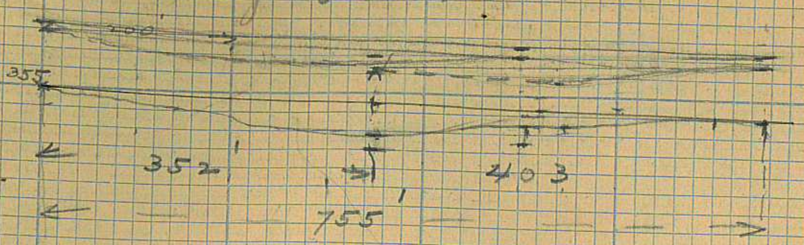

481
411
752
42







Cave East of Franklin in Wrights land



705
352
403

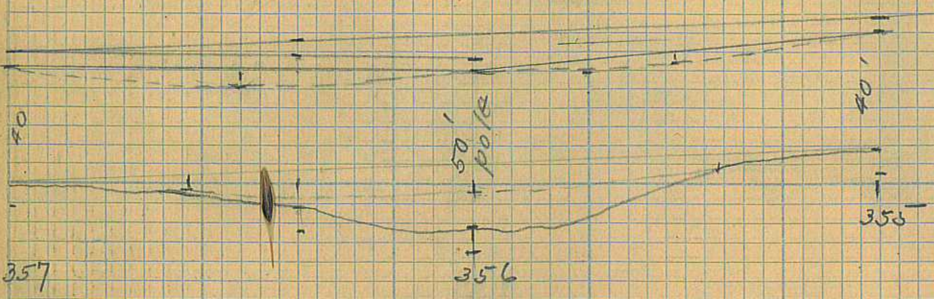
.01255
755
6255
6255
8757
9.44505

9
45
1°28'

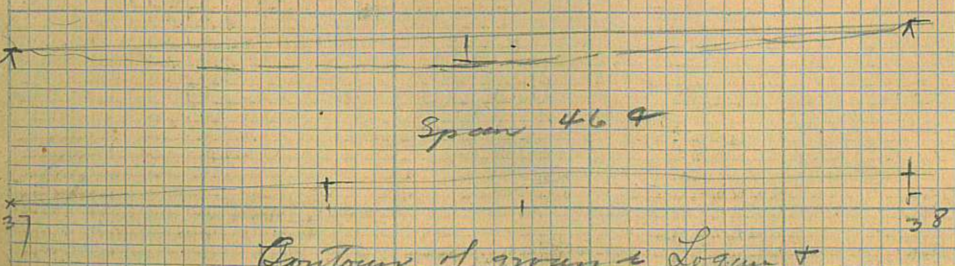
.0256
403
768
1024
10.3168

135
8.5
40.0

Final For Above

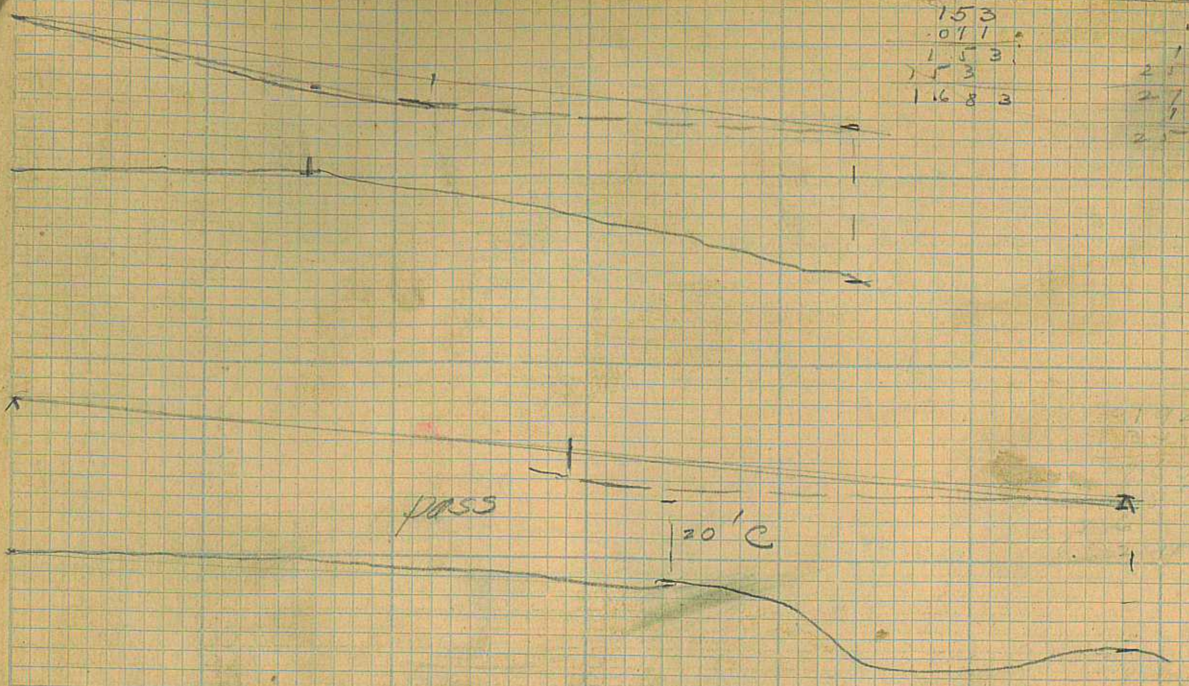


165
.05
6.56
2.76
8.76
.0073
300
2.1900



Span 464

Contour of ground @ Logan &
Salt Lake West South of
Logan

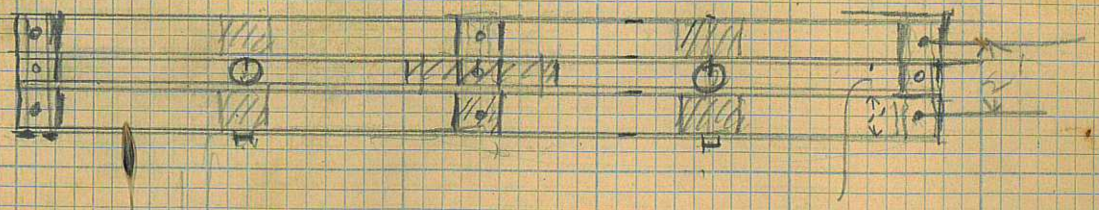


153
.011
153
153
1.683

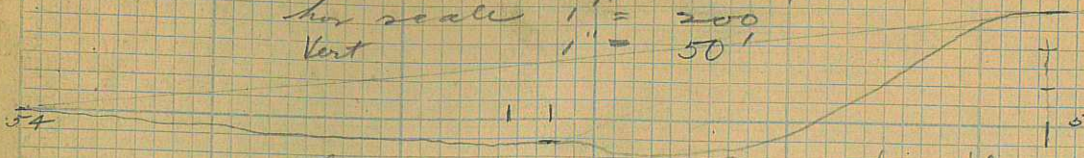
.097
1988
2356
21.548
168
23586

.0192
3.3
960
7.68
576
6.5280
662

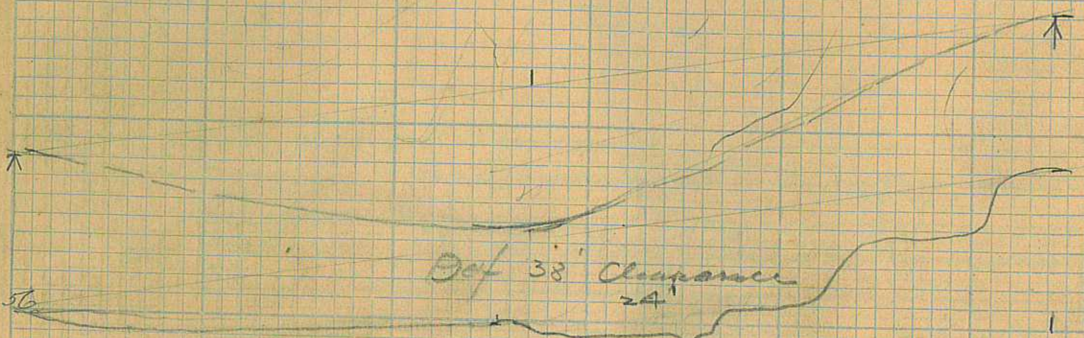
.0697
240
2788.0
1394
16.4280
662
23.34



Hor scale 1" = 200'
Vert 1" = 50'



Logan & Salt Lake West Line
South of Logan rock



Nibley canyon on West
Line

5235
5235
58105

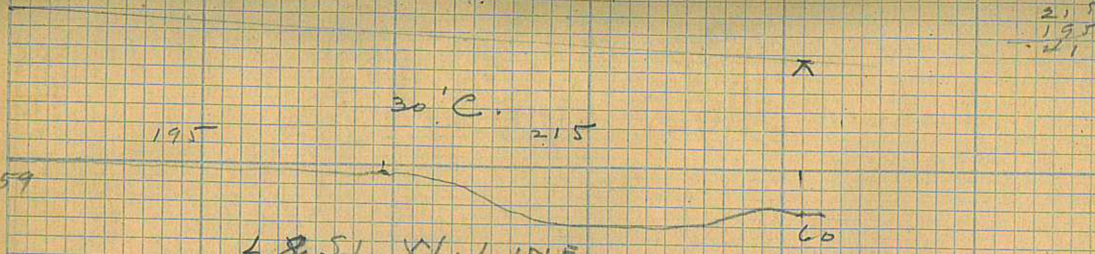
.07168
35840
7168
35840
3691520

.00175
.00350
00175
1050
875
.8855

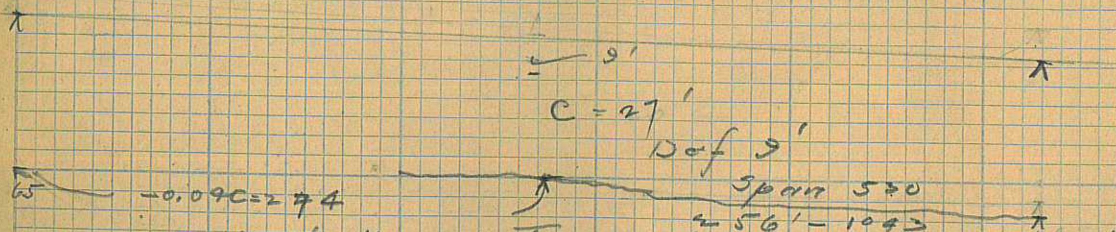
.03929
15716
31432
3929
4259036

42.6
21.3
22.1
6

20
22
62
38
24



L & SL W. LINE



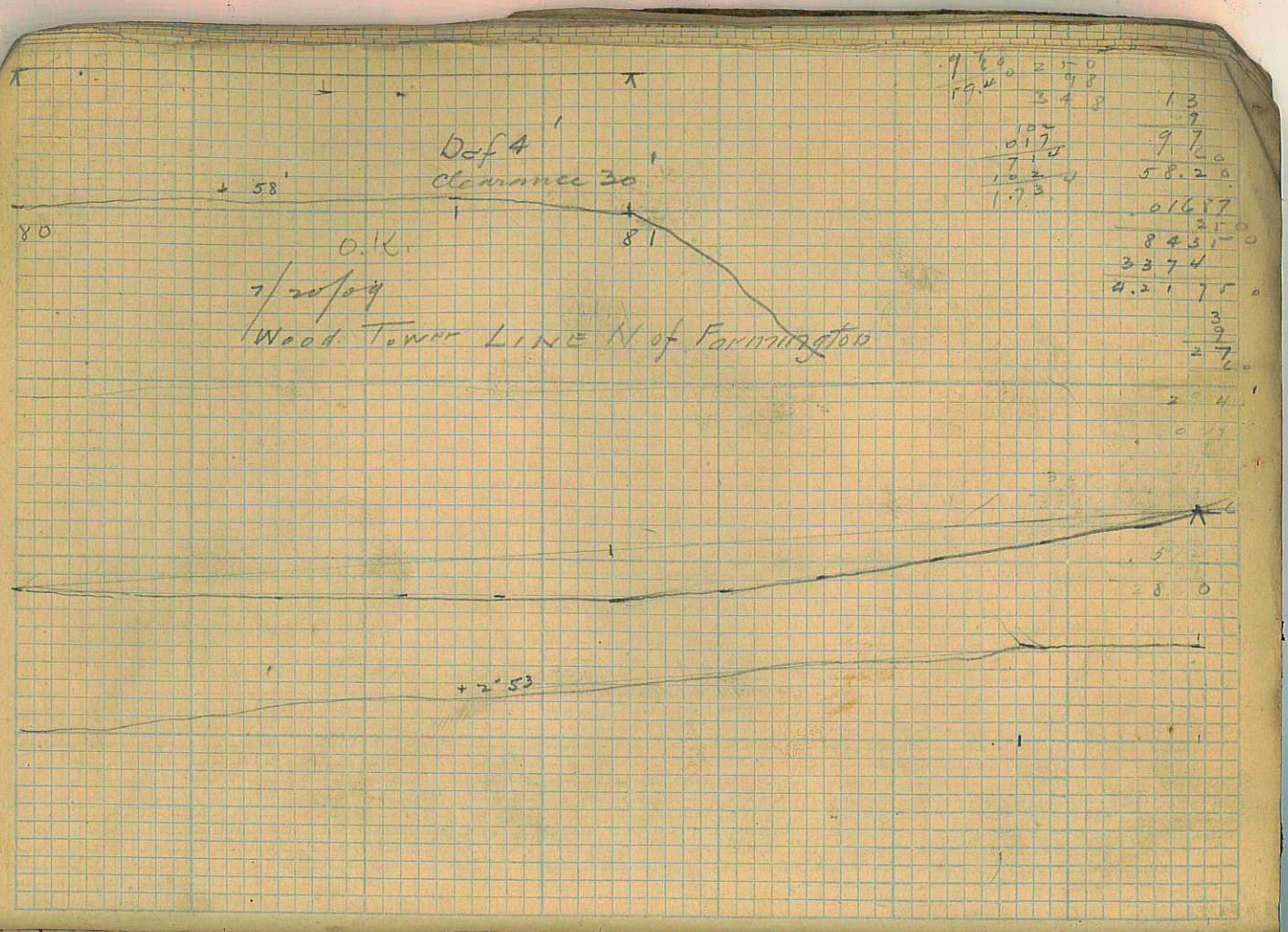
West Wood Tower line N of Farmington
7/7/09

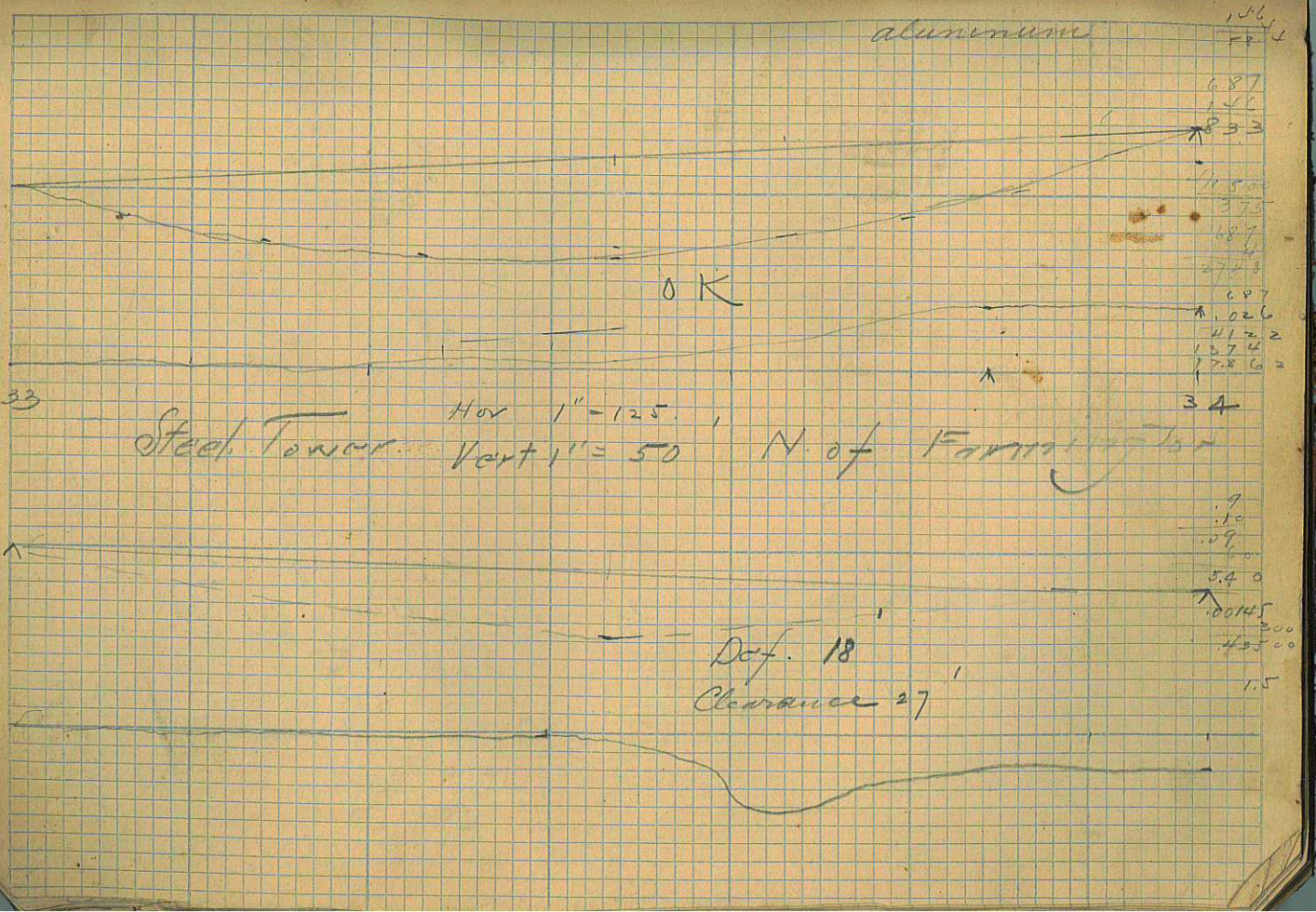
21.5
19.5
21.0

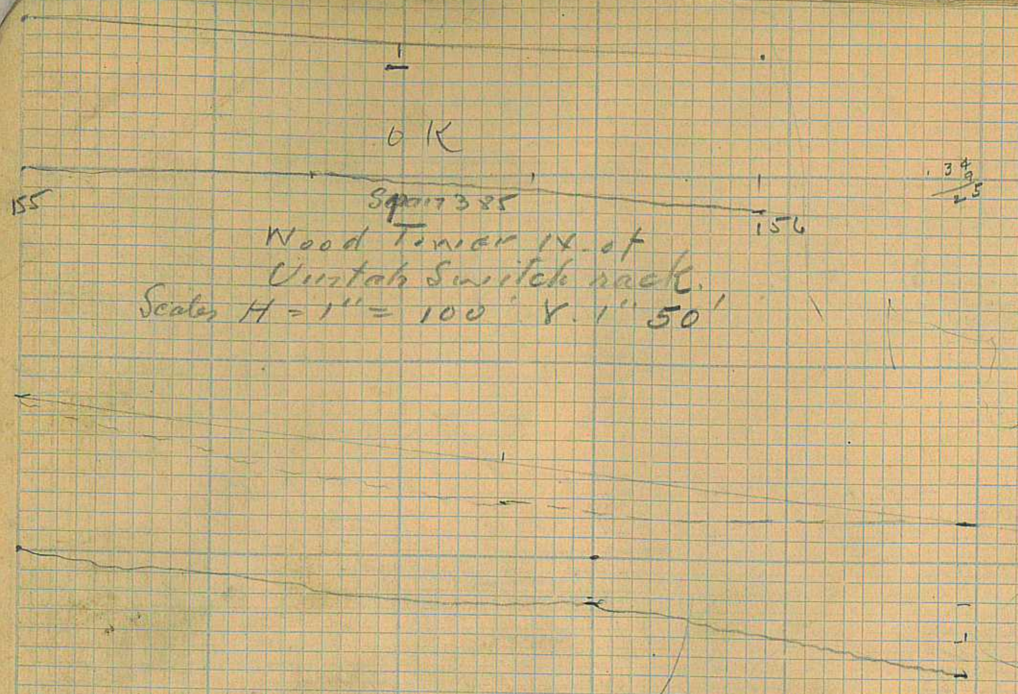
.01309
195
6545
11781
1309
2.55255

.01362
215
21810
7362
8724
2.37830

.0279
256
1794
1495
598
7.6544


Def 4'
Clearance 30'
+ 58'
80
81
O.K.
7/20/09
Wood Tower Line N of Farmington
+2°53


aluminum
O K
33
34
Hor 1" = 125'
Steel Towers
Vert 1" = 50'
N of Farmington
Def. 18'
Clearance 27'

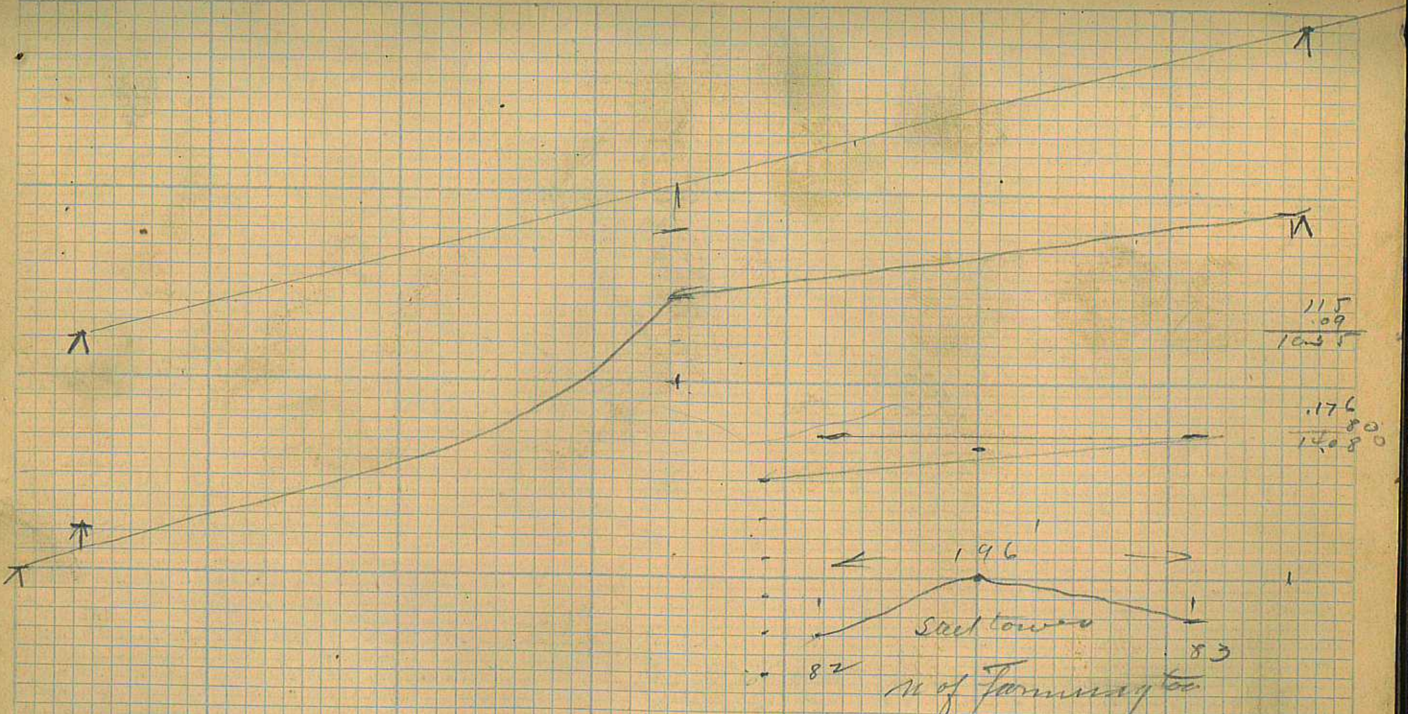


.34
.25

.234
.036
1404
702
8.424

.012
300
12.600

.195
.084
780
1560
16.38
12.6
28.98



.115
.09
10.35

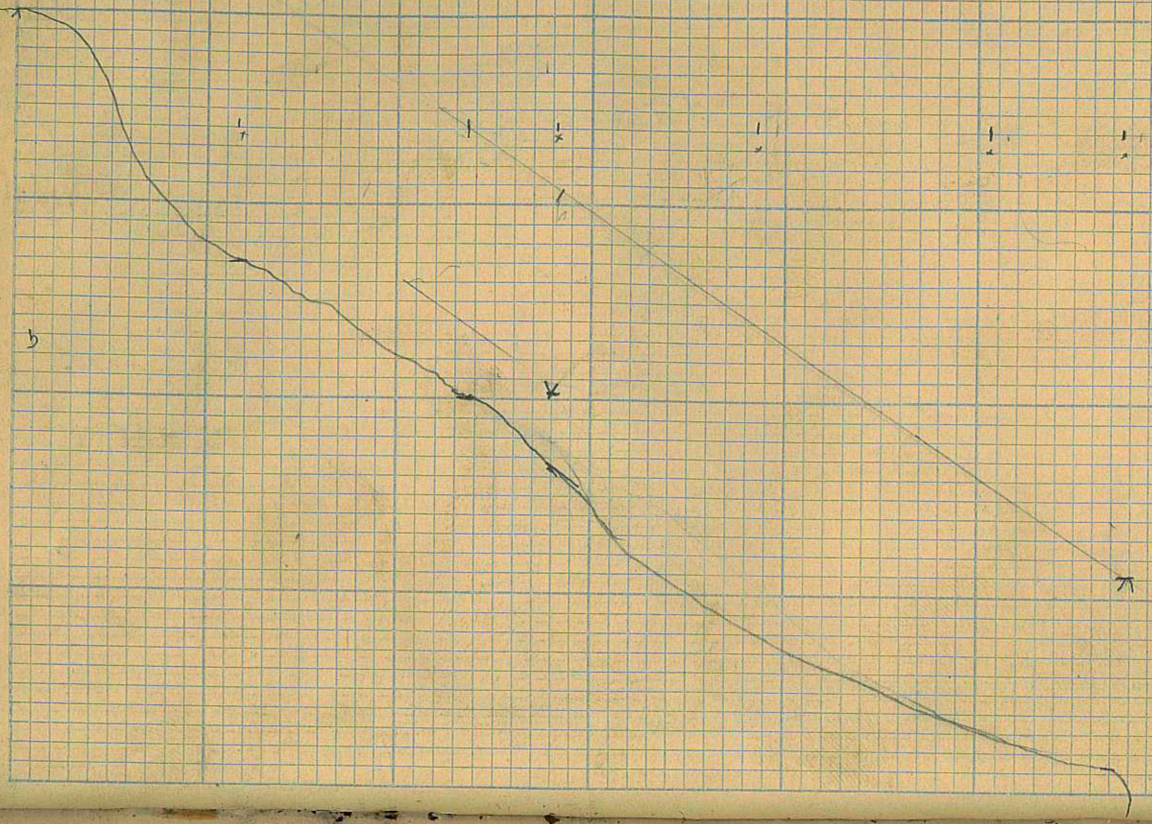
.176
80
14.080

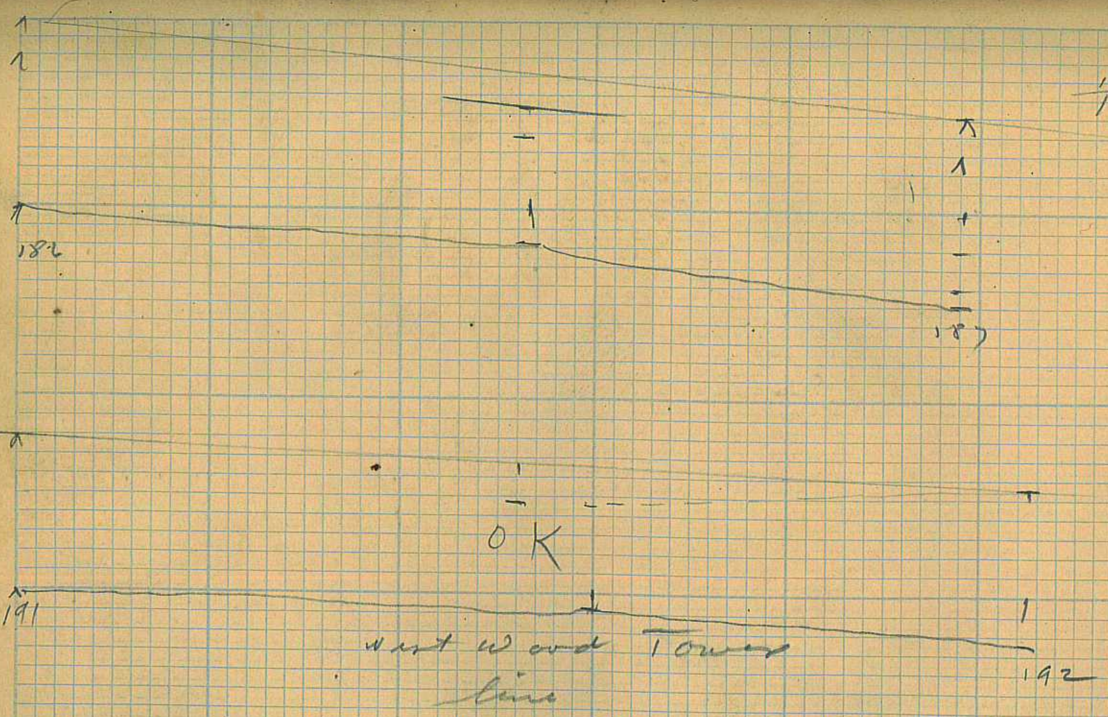
1443
593
850

1694
707
11858
11858
119658

15246
8470
100.4542

.1443
.135
7215
4329
1443
194.805



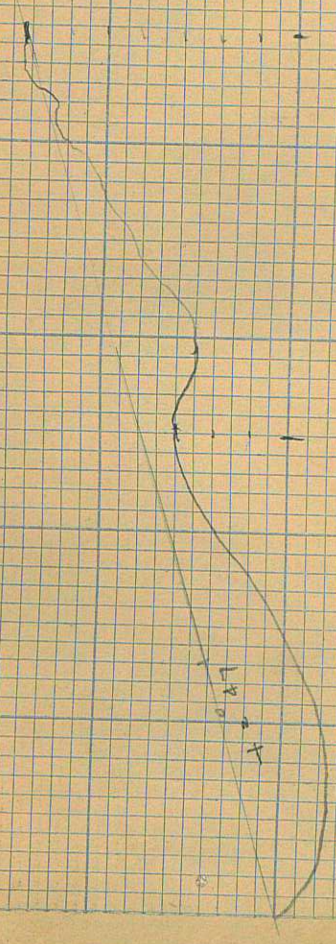


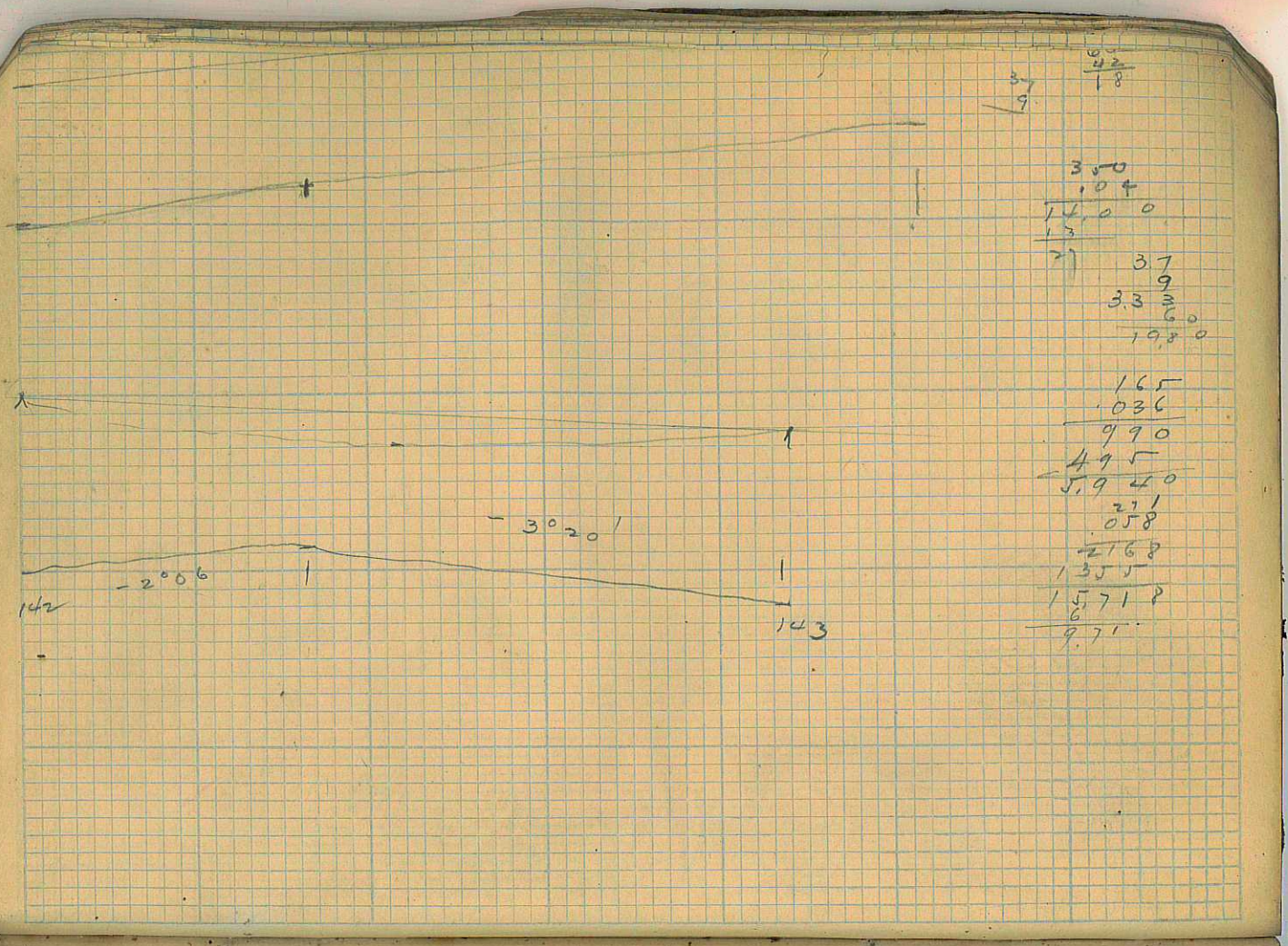
.225
.078
1800
1575
17.550

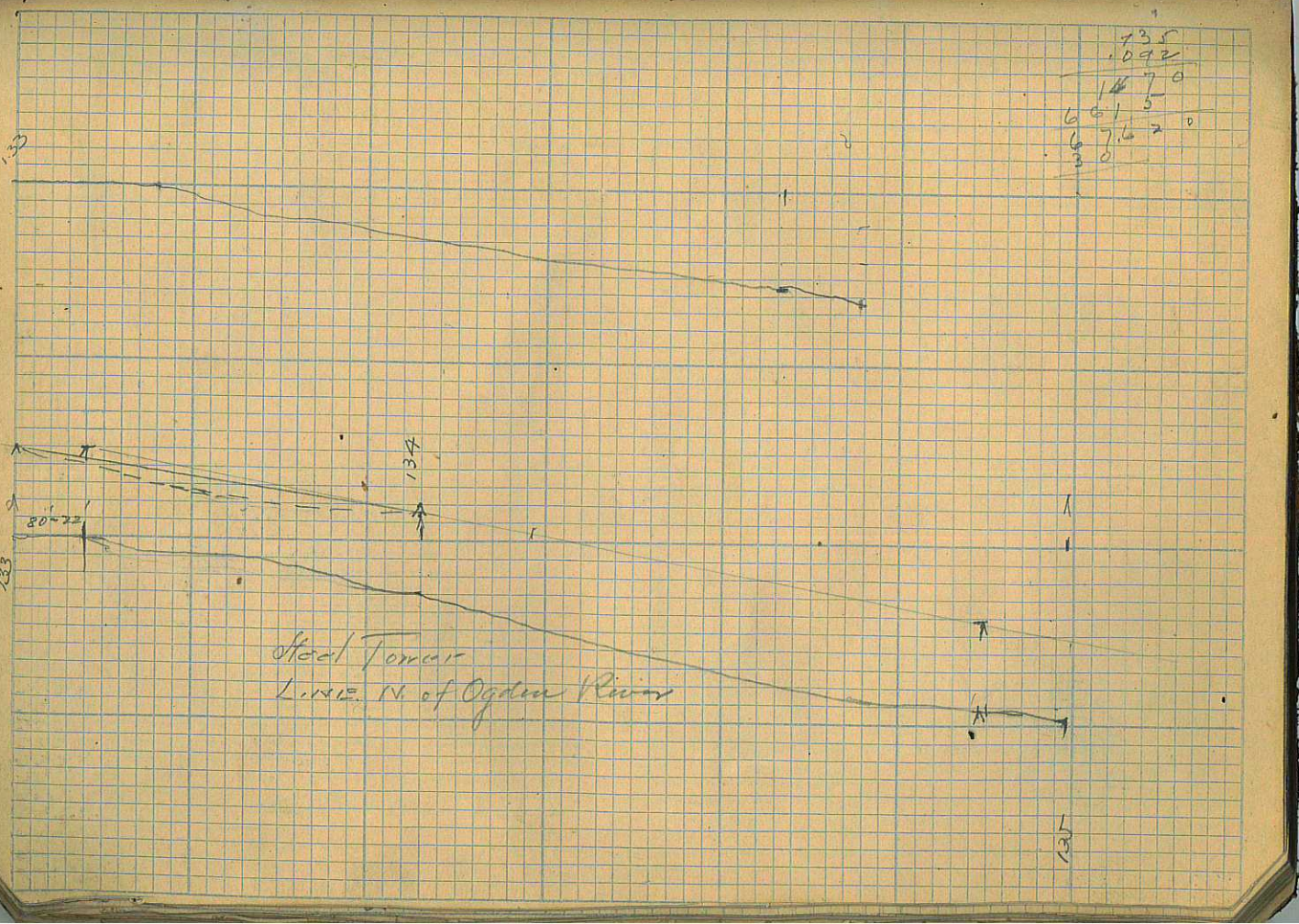
1.76
.9
1584
.35040
266
.027
1862
532
7.182
17.15
24.73

.013
3.0
3.900

.0384
225
1920
768
768
8.6400

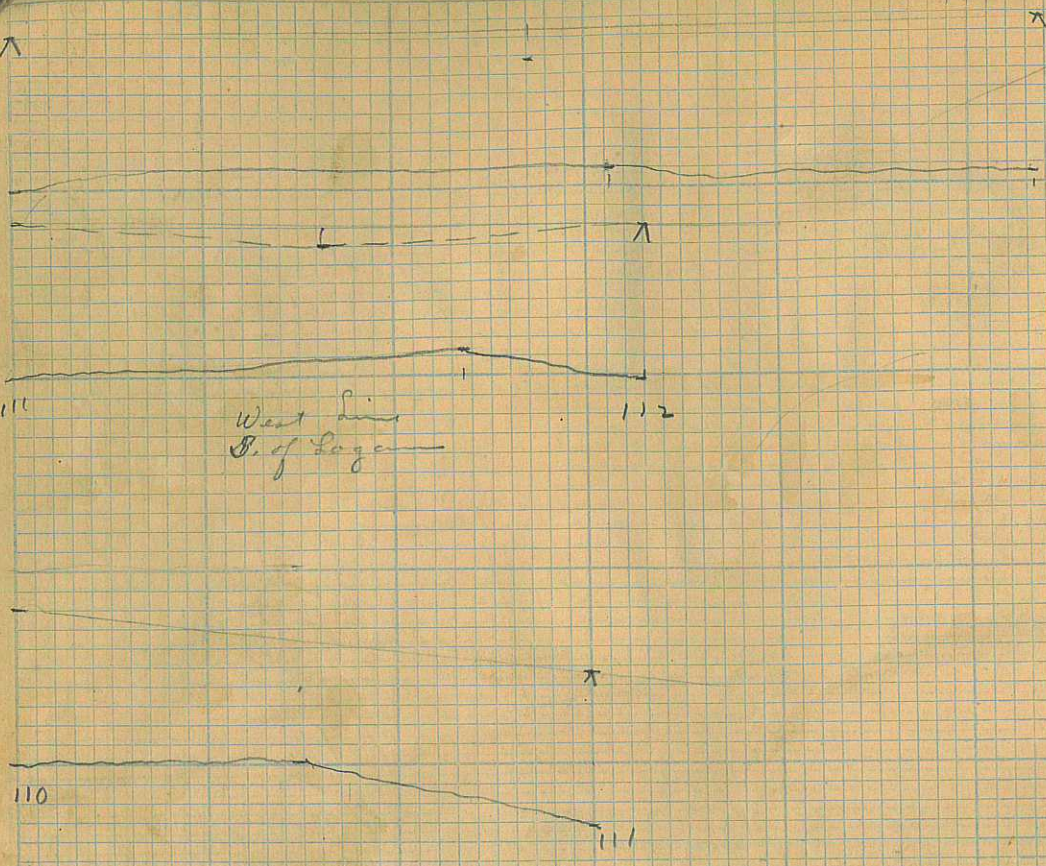


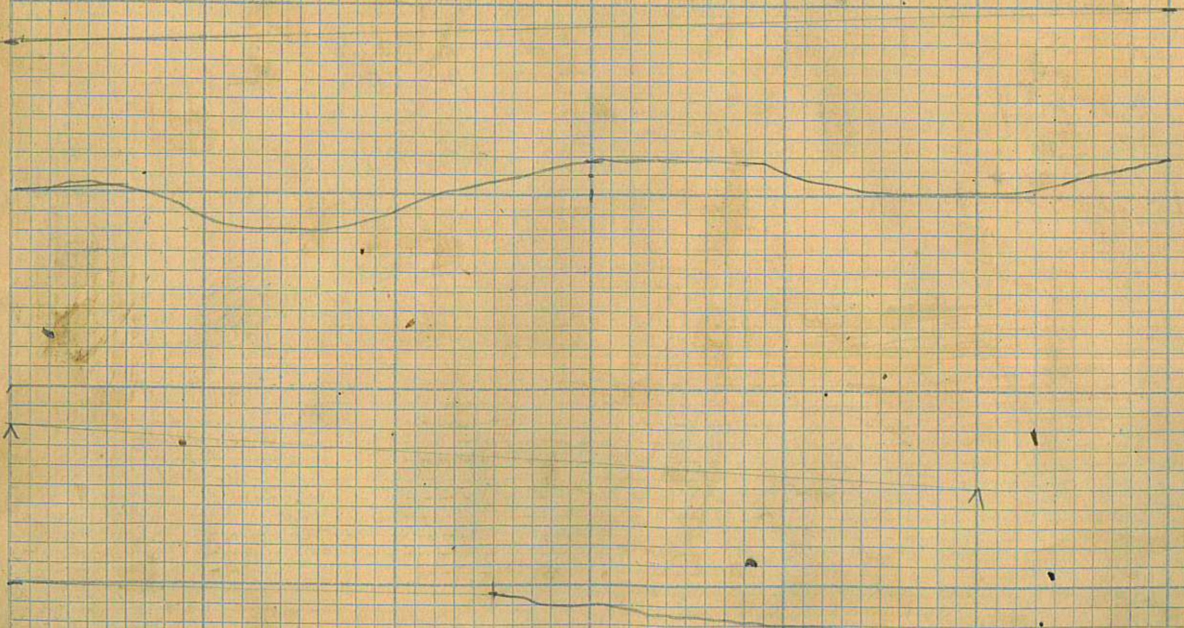

-30°20'
-2°06'
142
143


133
134
80°22'
133
Steel Tower
Line N of Ogden River

1560
312
4.680
222
.011
222
222
2.442

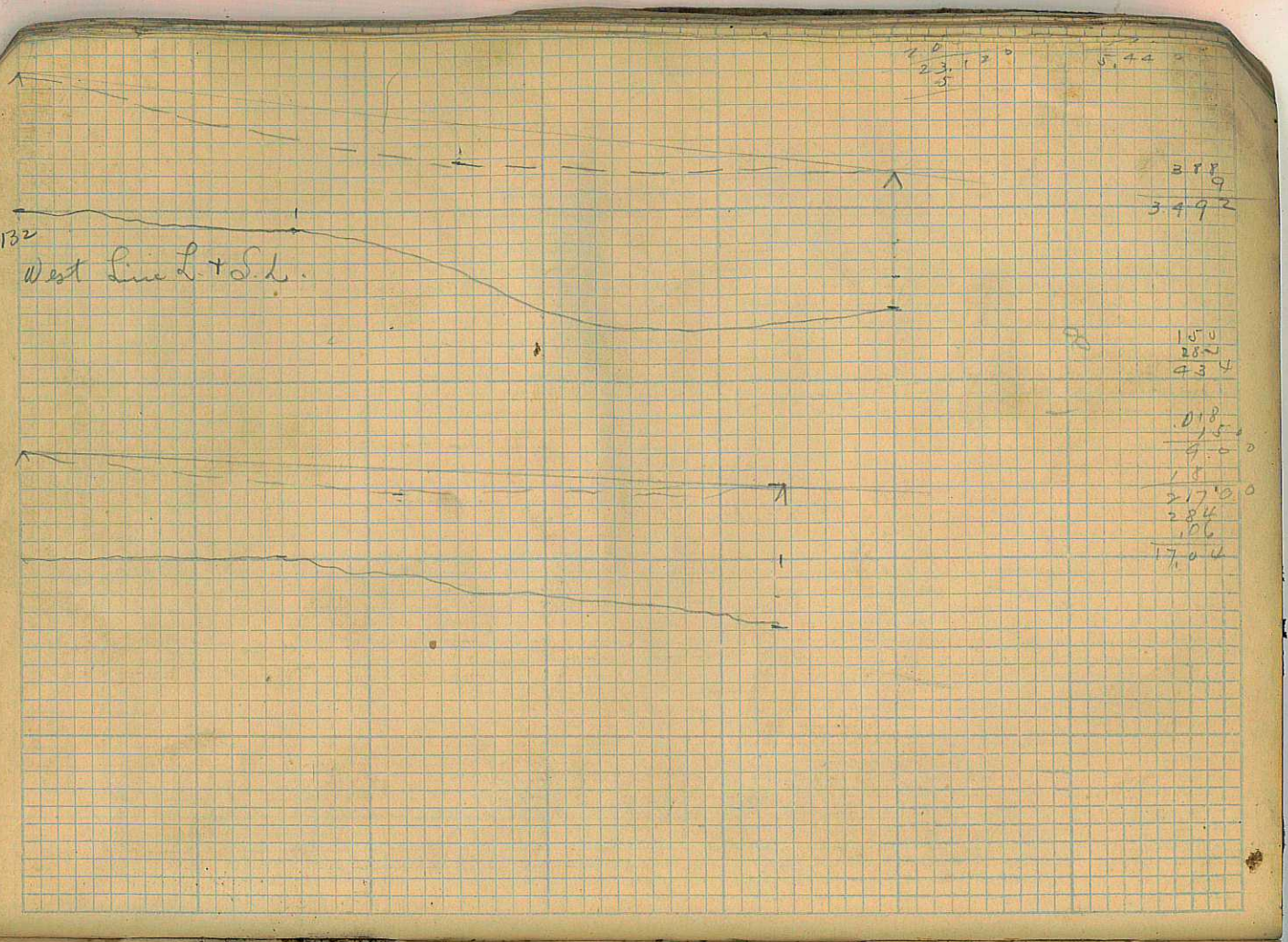
35 00
2 4

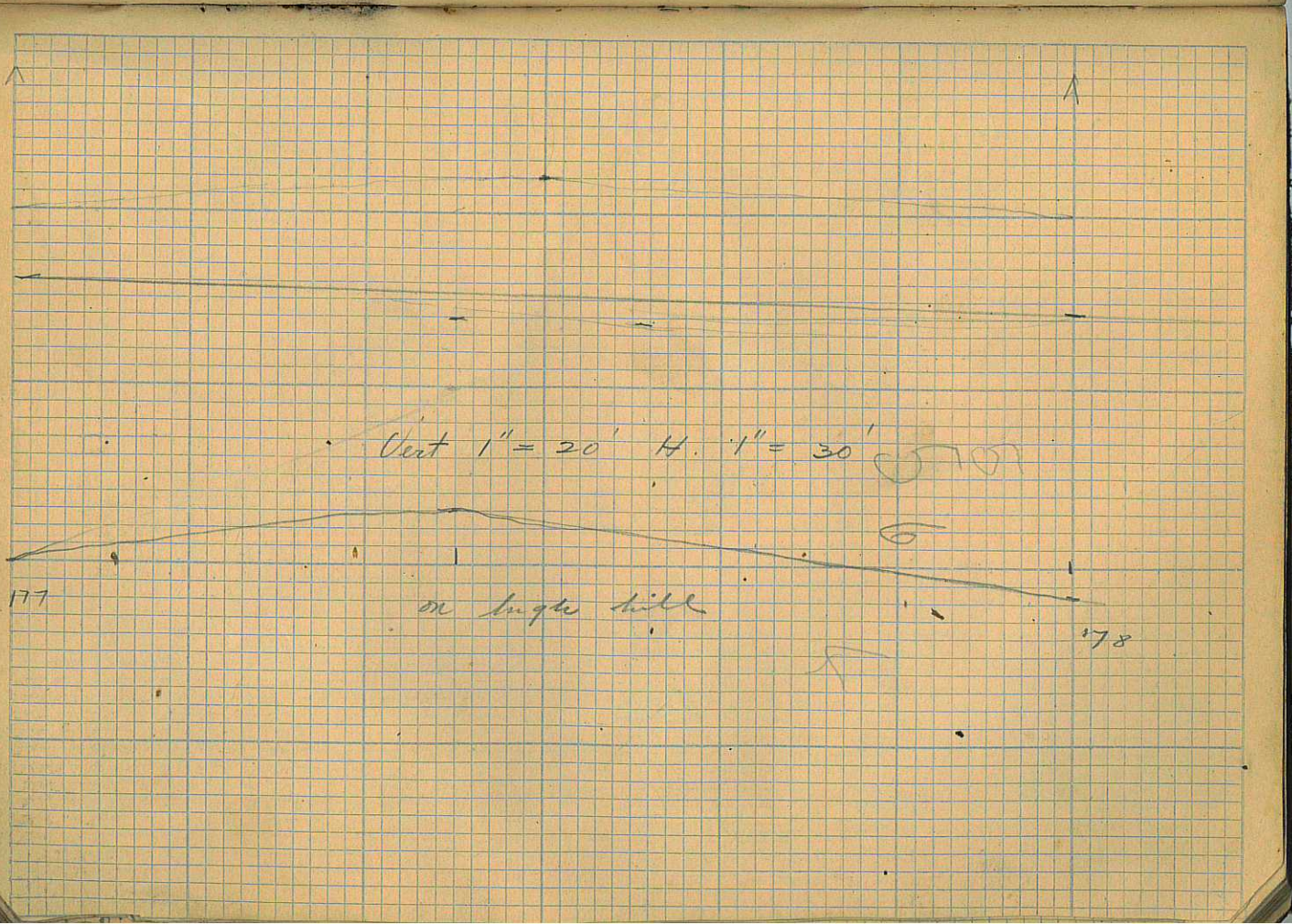




.1050
250
2250
900
11.250
25

.014
250
700
28
3.500


132
West Line L + S. L.

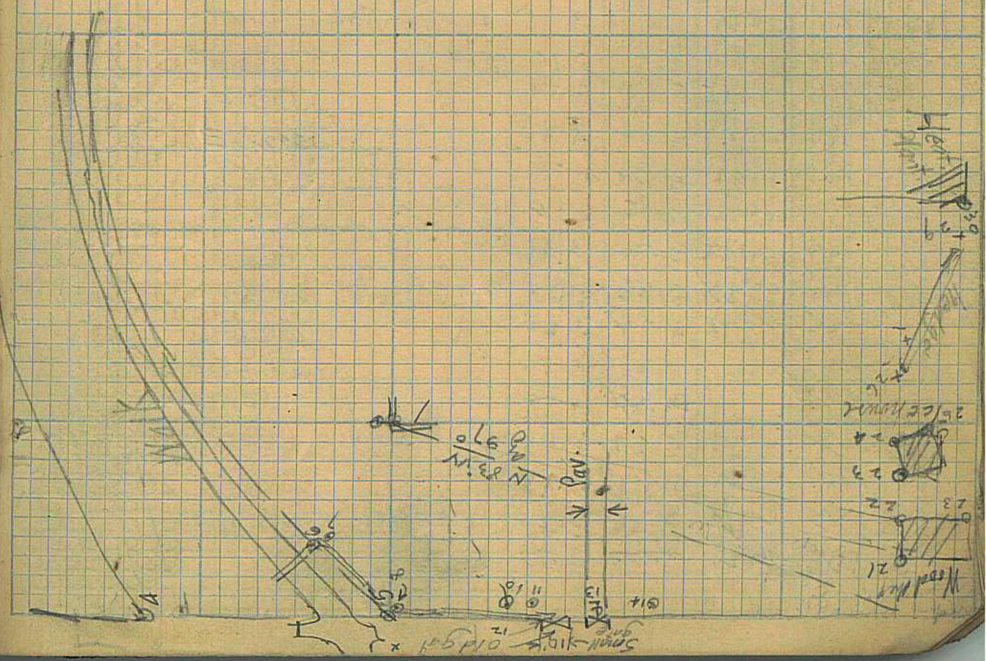

Vert 1" = 20' H. 1" = 30'
177
on high hill
178

ih = ice house hea = heating plant
he = hedge

⊼ — Pt.	Az. from S point	Stadia U	Stadia C	Stadia L	Vert. angle	Elev.	H.I.	
30 hu	74°34'	7.21	6.20			199.23		
29 hu	80°	7.81	6.86			198.57		
28 hu	87°02'	~~5.9~~	6.94	5.9		198.49		
27 hu	91°04'	~~6.16~~	7.19	6.16		198.24		
26	93°04'	~~6.16~~	7.99	6.16		198.24		
25 ih	98°08'	4.14	3		−1°26'	196.71		
24 ih	98°42'	4.06	3.0		−1°14'	197.87		
23 ih	103°	4.08	3					
23 ih	104°02'	6.24	5		−1°21'	194.6		
22 sh	107°24'	~~4~~	3	2	−1°22'	197.67		
21 sh	111°42'	~~1.96~~	3.6	1.96	−1°25'	197.28		
20 g	114°41'	2.70	3.85	5.00	−1°20'	196.22		
19 g	116°53'	~~7.83~~	8.92	7.83		196.51			ditch
18 g	116°32'	~~7.60~~	8.68	7.60		196.75		
—		~~6.93~~	8.01	6.93		197.42		
16 g	120°19'	~~6.51~~	7.47	6.51		197.96		
15 g	120°47'	~~6.78~~	7.72	6.78		197.71		
14 g	126°30'	6.30	7.04	6.30		198.39		
13 p	134°08'	6.53	7.24			199.19		on pav
12 g	139°51'	6.03	6.67			198.76		
11 g	146°28'	6.00	6.58			198.85		
10 g	150°12'	5.605	6.14			199.29		
9 g	178°35'	5.19	5.65			199.78		
8	179°22'	6.17	6.65			198.78		in ditch
7 g	194°44'	5.20	5.53			199.90		
6	196°52'	6.20	6.545			198.9		in ditch
5	179°52'	5.305	5.80			199.63		
4	230°11'	4.75	5.5			199.93		
3	207°02'	4.9	6.00					SW cor adj. block
2	180°30'	5.4	6.37					SE cor bldg
1			5.43			200.00	205.43	

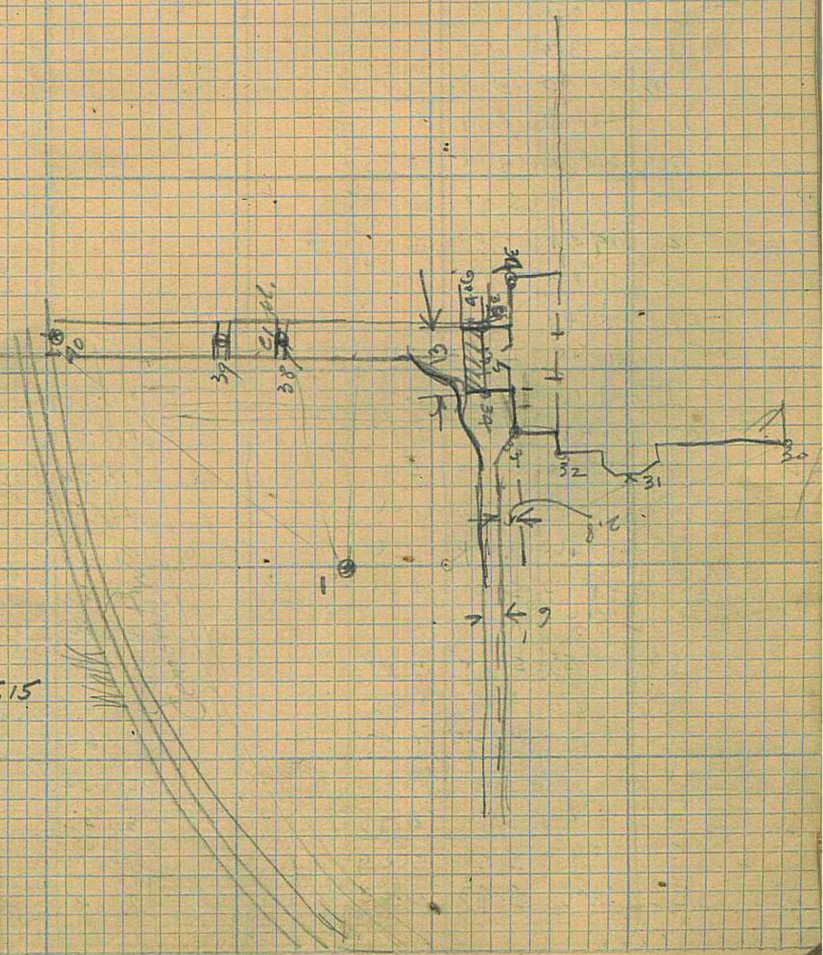
Topography on east side of Temple Block 2/17/14.
Rod: David Christensen
T = hydrant. eg = evergreen
Lo = tap in place

AS



m = entrance building
T = tree
(℄) SR = side road 12 [illegible]

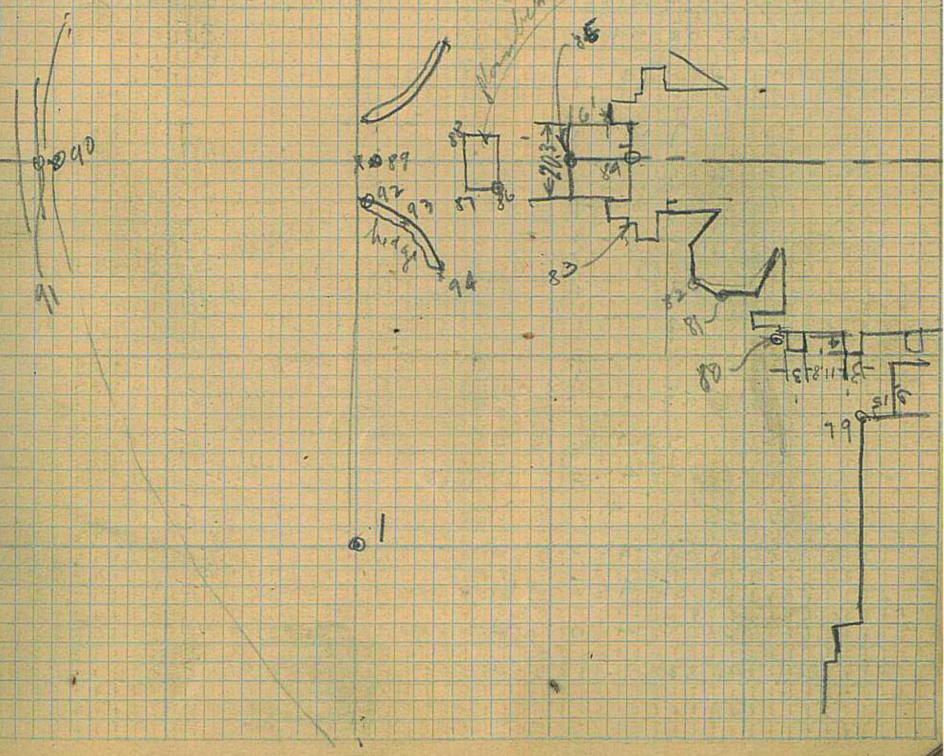
⊼ - Pt	Az from B.S. pt.	Stadia U	C	L	Vert angle	Elev.	B.S	FS
SR 57	71°50	4.68		4.00				
SR 56	52°	4.66		4.0				
SR 55	31°45	4.82		4.00				
SR 54	56°39	5.08		4.00				
SR 53	66°44	4.88		4.00				
SR 52	80°50	4.7		4.0				
SR 51	100°22	4.56		4.0				
SR 50	122°38	4.60		4.0				
SR 49	131°10	4.88		4.0				
SR 48	129°50	6.12		5				
6" T 47		5.00		4.49	-20'			
7" pin T 46	89°50'	5.52	5.					
3" cedar T 45	88°32	5.3 ~~3.5~~		3.5 ~~5.5~~	-35'			
6" pin T 44	103°12		3	2.19	-1°16			
9" pin T 43	108°34		3	2.39	-1°30			
8" pin T 42	109°17		5.91	5.48		199.24		
10" ash T 41	145°25	5.87	5.51			199.64		
40	312°49	4.74	4.41			200.74		
39	0°41'	4.94	4.58			200.57		
38	26°20	5.15	4.74			200.41		
37	51°52	5.13	4.46			200.69		
36	53°23	5.25	4.62			200.53		
35	55°44	4.82	4.22			200.73		℄ door
33 [illegible]						200.45	4.70	
		~~4.82~~	~~4.22~~				~~4.70~~	
34	58°19	5.52	4.93			200.50		m [illegible]
33 [illegible]	63°41	5.57	4.98			200.45		on pav. 4.98
32 [illegible]	67°24	5.88	5.22			200.21		
31 [illegible]	72°	~~4.83~~	5.59	4.83		199.84		



HI = 205.15

-0 tape

Λ – pt.	az from S pt.	Stadia U	Stadia C	Stadia L	Vert. angle	Elev.	Needle Bearing
3" ash	12°2'	5.31	4.6			200.55	✓
6" P. T	36°38	4.64	3.78			201.37	✓
12" Pine	41°16	4.74	3.94			201.21	✓
10" Willowtree	46°31	4.98	4.23			200.92	✓
7" Willowtree	30°52	5.06	4.42		0	200.93	✓
hyd.	30°04'	5.18	4.65		0	200.50	✓
—o	92°45	5.48		5			
78 g	273°34	5.18	4.8			200.35	✓
77 g	274°43	5.03	4.76			200.39	✓
on 1 3/4" pipe 1	0-0		4.5 / 5.15			200.00	✓
76 g	110°18	4.95	4.88			200.27	✓
75 g	97°50	5.32	5.085			200.07	✓
74 g	99°42	5.21	4.905	#		200.25	✓
73 g	97°42	5.88	5.55			199.60	✓
—o	91°45	5.98		5.0	ang 6		
El. pav. 72 g	96°10	6.33	5.84			199.31	
71 g	96°10'	6.5	5.90			199.25	
—o 70 g	91°47'	7.44	6.67			198.48	✓
69 g	95°14	6.99	6.21			198.94	✓
68 g	95°46	7.46	6.56			198.59	✓
67 g	95°46	8.43	7.36			197.79	✓
at fence 66 g	298°03	5.01	4.63			200.52	✓
65 g	56°	4.99	4.69			200.46	✓
64 g	80°55	5.04	4.69			200.46	✓
63 g	58°30	4.95	4.63			200.52	✓
62 g	63°12	4.825	4.47			200.68	✓
61 g	63°12	5.21	4.83			200.32	✓
60 g	66°48	5.16	4.73			200.42	✓
59 g	68°62	5.56	5.09			200.06	✓
center of system 58	74°38	5.43	4.80			200.35	✓



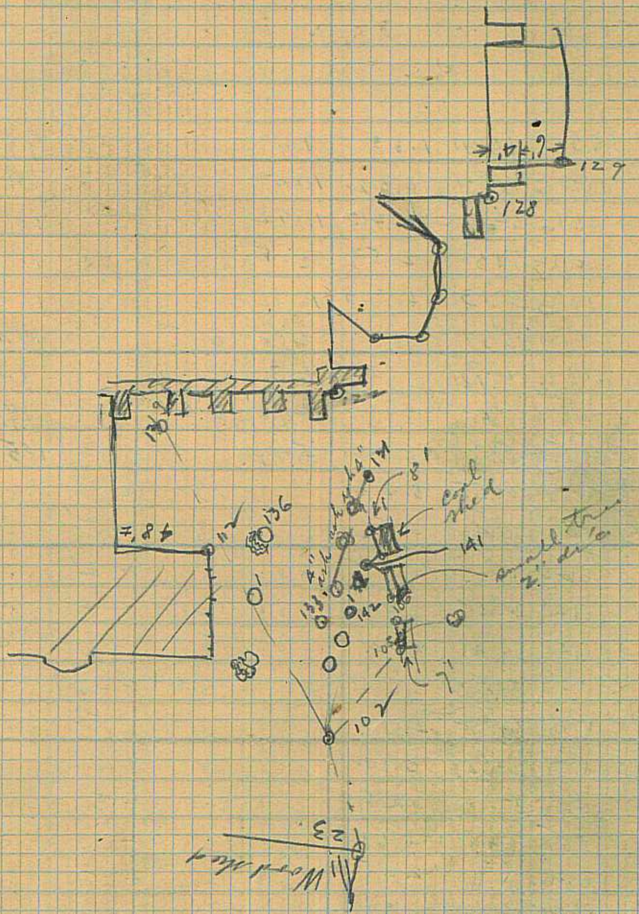
⊼	Pt	Az from 5 pt	Stadia O	Stadia C	L	Vert angle	Bearing	BS	FS
	102						N83°W		8.95
	33							4.81	
1–									
w.e. pav	101	323°23	4.48	3.7			201.45 ✓		
	100g	324°17	4.62	3.85			201.30 ✓		
base 2" pipe	99	0°32	5.49	4.72			200.43 ✓		
	98g	11°45	4.97	4.35			200.80 ✓		
	97g	16°30	5.40	4.75			200.40 ✓		
	96g	23°59	4.88	4.20			200.95 ✓		
	95g	33°28	4.66	3.9			201.25 ✓		
h	94	14°	4.49		3				
h	93	8°07'	4.68		3				
he	92	2°	4.8		3				
Paved ℄	91	333°24'	4.59	3.50			201.65 ✓		
℄ gate	90g	333°55	4.68	3.60			201.55 ✓		
	89	0°44'	5.20	4.21			200.94 ✓		
	88	8°54'	7.00		4.88	+32'			
	87	10°01	6.7		4.8	—			
	86	15°55	4.57 ✓	3.56			201.59 ✓		
	85	21°13	4.26	3.2			201.95 ✓		
℄ Temple	84	23°37	4.03	2.95			202.25 ✓		
	83	25°19	4.3	3.7			201.85 ✓		
	82	28°51	4.57	3.56			201.59 ✓		
	81	31°35	4.55	3.60			201.55 ✓		
N.E. cor. Temple	80	36°03	4.70	3.74			201.41 ✓		
Cor.	79	41°33	4.74	3.82			201.33 ✓		

Dist. from 1 to 102 - 240.7'   Elev. at 102 = 196.31'

noon - after   HI = 205.26 ✓ at 33

	Pt	Ang. from 90 ft	Stadia U	C	L	Vert angle	Elev.	BS	FS
✓	128	2°50'	3.06	2		+35'	201.46	✓	
✓	127 g	3°6'	3	2		+38'	201.52	✓	
✓ Idex cor	126	1°27	2.99	2		+38	201.49	✓	
✓ Hort cor	125	359°16	3.95	3		+1°	201.62	✓	
✓	124 g	0°3'	1.925	1.0		+25'	201.65	✓	
✓	123 g	357°25	1.89	1.0		+26'	201.65	✓	
✓	122	355°13	4.93	4.00		+1°28	202.06	✓	
	121 g	341°05	4.95	4.0		+1°21'	201.78	✓	
	120 g	24'	2.96	2		+41	201.59	✓	
✓	119 g	356°28	2.92	2		+48'	201.87	✓	
✓	118 g	352°32	1.87	1.0		+23'	201.47	✓	
	117 g	5°44	1.40	0.35			200.96	✓	
✓	116 g	10°45	3.86	3.05			198.26	✓	
	115 g	8°52	3.9	3.12			198.19	✓	
✓	114 g	3°19'	3.63	2.86			198.45	✓	
	113 g	355°17'	2.76	2.06			199.25	✓	
✓	112 g	340°56	2.03	1.41			199.90	✓	
✓ —o	111	352°03	2.97	2.35			198.96	✓	
Coal shed	110	15°53	4.46	3.95			197.36	✓	
Coal shed	109	17°41	4.48		3.48				
Frame fanny	108 g	18°35	4.93	4.0			197.31	✓	
Frame fanny	107 g	22°	4.37	4.00			197.31	✓	
fanny	106 g	27°15	4.51	4.21			197.10	✓	
fanny	105 g	34°31	4.68	4.44			196.87	✓	
	104 g	12'	3.78	3.57			197.74	✓	
end pipe	103 g	50°36	6.36	6.2			195.11	✓	
	23	173°27	6.96		660	0 0	194.53	✓	
	–102			5.00 HE					
102 –				~~5.0~~					

Setting



H I at 102 – 201.31

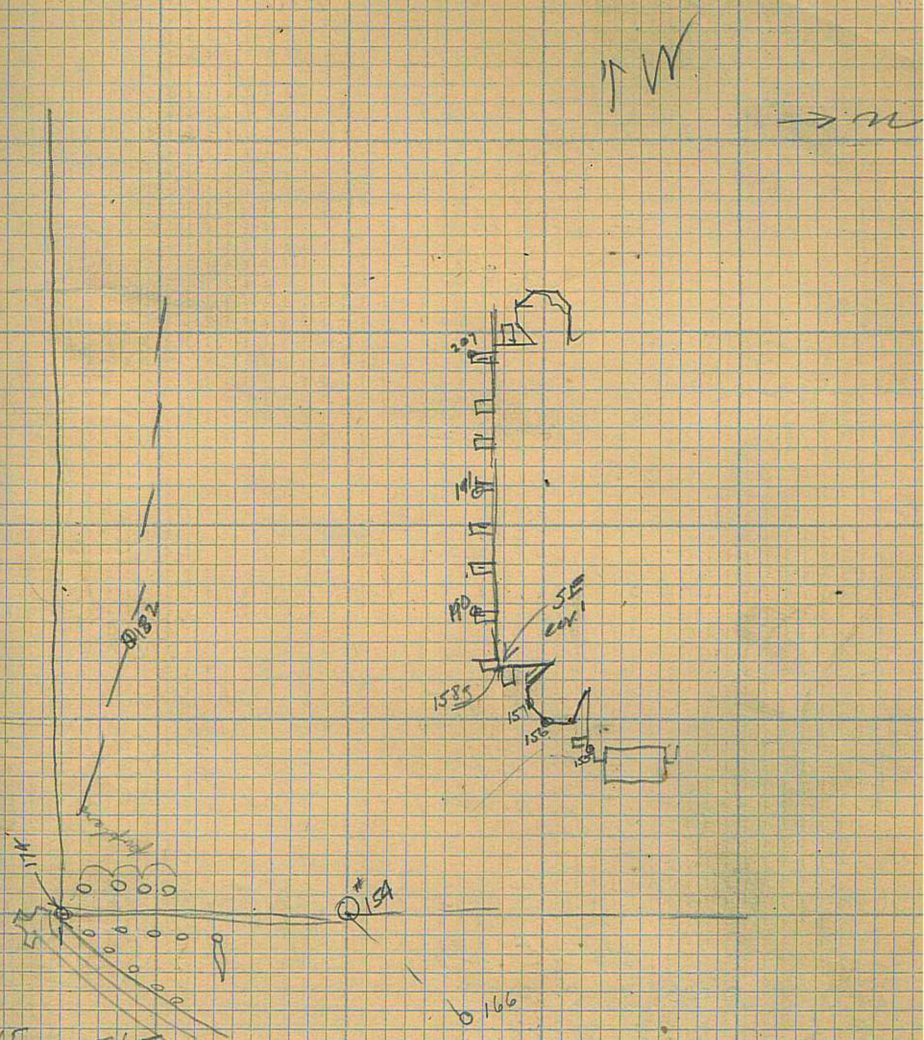
97°

F.S. to 3rd Ward church spire

	⊼ Pt	Az from S. pt.	U	Stadia C	L	Vert ∠	Bearing
⊼							
	153	166°30	11.33	11.0			190.31
	152g	66°51	10.32	10.07			191.24 ✓
	151g	64°11	12.23	11.42			189.39 ✓
	150g	57°35	12.52	12.15			189.16 ✓
	149g	50°13	12.33	11.9			189.41 ✓
	148g	43°39		6.6	6.17		194.71 ✓
	147g	49°21		6.7	6.33		194.61 ✓
	146g	57°45		6.90	6.61	0	194.41 ✓
	145g	56°5'	6.14	5.94		0	195.37 ✓
Box E. 10"	144	6°55	3.46		3	+5'	
12" Box E	143	9°43	3.56		3	-5'	
5" hardwood	142	13°25'	3.72		3	+12'	
4" Box E.	141	19°45	3.87		3.0	+4'	
6" pine	140	348°41	3.79		3	+30'	
12" ash	139	344°53'	6.27		5.29	+2°09'	
10" ash	138	348°05	2.13		1	-15'	
8" pine	137	351°43	3.16		2	0	
10" ash	136	350°30	3.28		2	+15'	
8" maple	135	1°48	4.31		3	+20'	
10" pine	134	6°16'	4.45		3	+25	
	133	1°13'	3.93		3	+20'	
	132	5°01'	4.09		3		
4" T	131	11°09	4.56		3	+15'	
12" T ash	130	356°22	3.58		2.00	+31	
	129	5°24'	3.19		1.0	+40'	201.78

(Continued)

	⊼	Pt	Az from BS	Stadia U	C	L	Vert angle	Leveling	BS
		179g	81°14	5.33	4.86			200.79	✓
		178g	117°	4.4	3.84			201.81	✓
		177g	105°30'	5.37	4.9			200.75	
		176g	67°28	4.97	4.63			201.02	✓
		175g	16°52	4.91	4.37			201.26	✓
old cor post		174g	43'	5.00	4.12			201.53	✓
		173g	0°30'	4.78	3.85			201.80	on fence SE cor where side levels were refer
		172g	320°13'	4.8	4.53			201.12	✓
		171g	125°34	4.16	3.68		0	201.97	✓
		170g	125°35	5.02	4.62		0	201.03	✓
		169g	155°07		4.72		}	200.93	dist. 4'
		168g	284°37	4.66	4.29		}	201.76	✓
pav wedge		167	284°34	4.17	3.76		}	201.89	✓
old 3" hydrant		166g	239°10'	4.76	4.47		}	201.18	✓
W. edge pav		165g	239°10'	4.29	3.73		}	201.92	✓
at fence		164g	238°21'	4.62	4.07			201.58	✓
E side trench		163g	184°40'	4.63	4.38		0	201.33	✓
also end hedge		162g	179°49	5.40	4.9		0	200.75	✓
also end hedg		161g	151°31'	4.91	4.54		0	201.11	✓
		160g	134°50	4.39	3.92✓		0	201.73	✓
		159g	126°05'	4.99	3.90		0	201.75	✓
cor		158g	126°05'	4.13	3.46		0	202.19	✓
cor		157g	132°11'	4.04	3.40		0	202.25	✓
bet cor		156g	136°20	3.96	3.32		0	202.33	✓
cor main		155g	142°24		3.48	2.80	0	202.17	✓
		99		6.03	5.22✓			200.43	5.22✓ on 12" pipe
154.									
		– 154						S0°40W	
1			0°40'					~~S0°40W~~	



HI = 205.65

Setting 180°40' BS to #1.

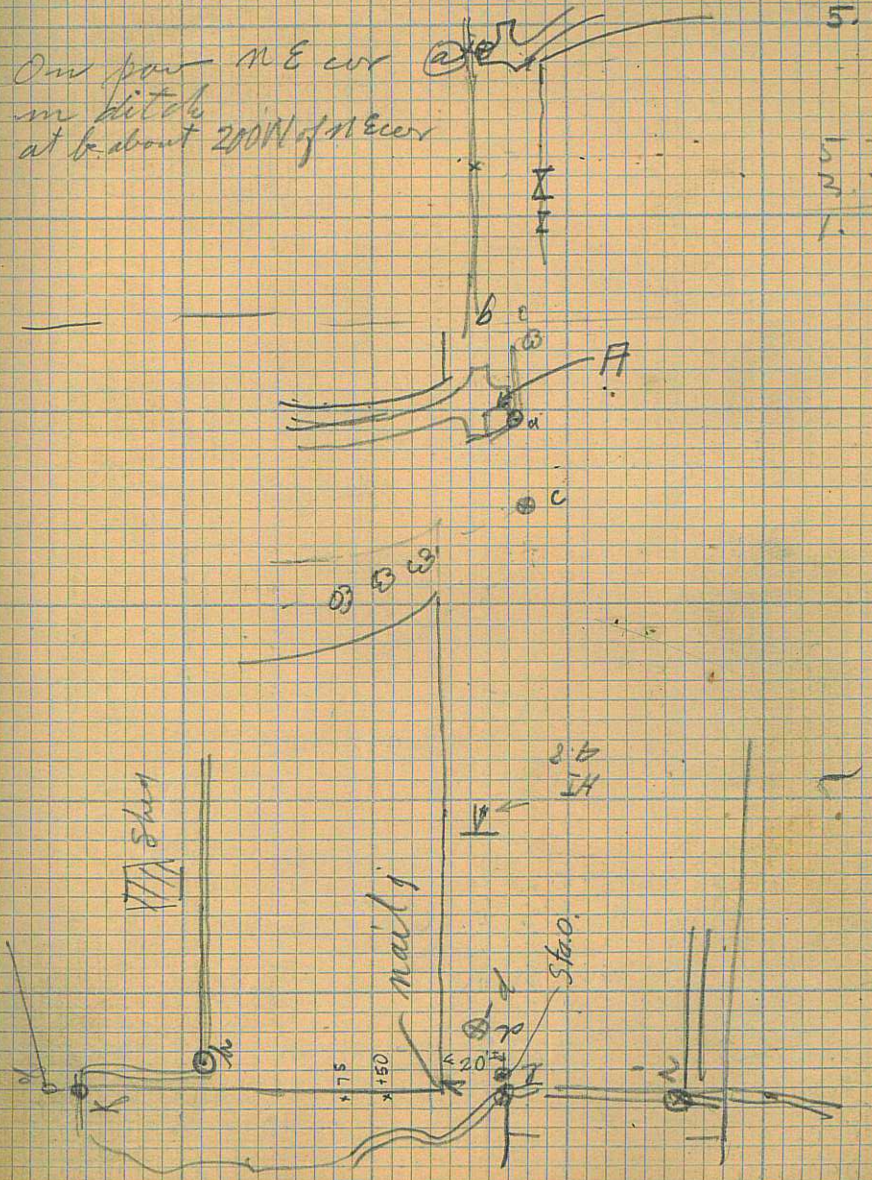
Preliminary levels on S side of Temple Block & ground E.

	BS	FS		in	
A	4.19				
a				5.09	
				7.56	
A	6.72				
a				7.62	
c				6.56	
d		2.83			
d	8.11				
e				4.71	in ditch
f				5.75	in old ditch
g				5.23	on ground at cor
h				6.62	in ditch
i				5.03	Bottom 12" pipe in side 2 ft. in ditch
j		HI	Elev.	5.28	
Sta 0		105.03	101.33	3.70	
+20			98.73	6.30	
+50			98.13	6.90	
+75			98.03	7.00	
1+00			98.23	6.80	
1+50			98.93	6.10	
2+00			99.13	5.90	
2+50			99.93	5.10	in ditch at f
2+65			99.35	5.68	
2+82.3		cor	99.83	5.23	on ground
2+82.3			100.09	4.94	on nail at g

5.6 4.3 3 / 3.
5.23 .8
5.07 4.9 6.2 1.6

6.56 .8 7.36
6.40
5.03

5.28 3.7 1.58

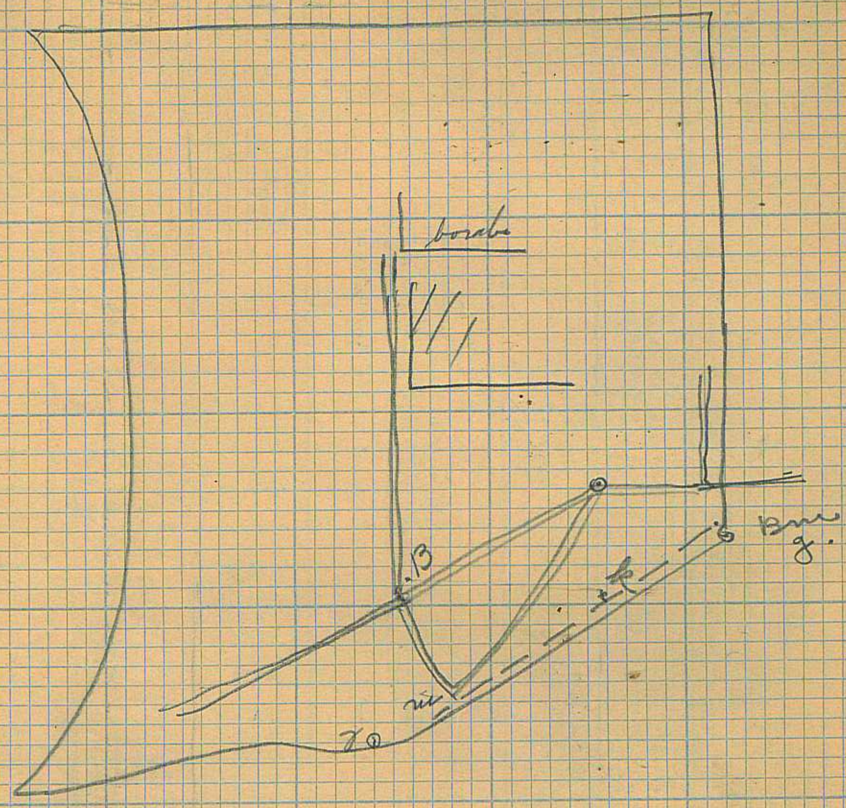


Pt	BS	FS	~~Elev~~	Bearing	Stadia: U	C	L
A		10.22					
B						5.0	
m				S28°E	5.27	4.81	
l				S3°W	6.05	5.45	
k				N81°E	3.95	3.20	
B	3.11		ang. 3.44	N67°E	4.21	3.11	

5.00
3.43
1.57

5.23
4.9
.33

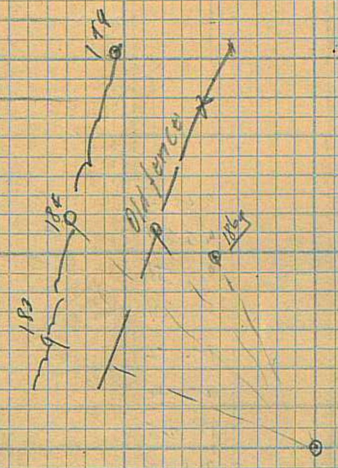
3.11
.37



be = bank edge

	Δ - Pt	Az from B.pt	Stadia ∪	c	∟	Vert ∟	Bearing
	208 g	108°9'	5.66	4.45			201.20 ✓
cor bittres	207 g	109°		2	0.78	-27'	
	206	109°40'	4.95	3.85			201.80 ✓
	205	108°	5.6	4.5			201.15 ✓
	204 g	102°26	6.13	5.05			200.60 ✓
	203 g	94°20		6.6	5.52		199.05 ✓
	202 g	73		6.11	4.93		199.54 ✓
old fence	201	63°26		5.80	4.55		199.85
be	200	57°40		6.65	5.3		199.00
be	199	50°05'	6.95	5.71			199.94
old fence	198	55°02	6.47	5.92			200.23 ✓
	197 g	72°41	6.36	5.49			200.16 ✓
	196 g	95°35	7.06	6.25			199.40 ✓
	195 g	98°19	6.22	5.40			200.25 ✓
	194 g	107°58'	4.98	4.12			201.53 ✓
	193 g	111°44'	4.9	4.0			201.65 ✓
	192 g	112°39	4.48	3.57			202.08 ✓
	191 g	113°46	4.37	3.45			202.20 ✓
	190 g	120°25	4.14	3.4			202.25 ✓
	189 g	112°13	4.50	3.78			201.87 ✓
	188 g	100°11'	6.08	5.40			200.25 ✓
	187 g	70°51	6.17	5.47			200.18 ✓
	186 g	53°45	5.71	4.86			200.79 ✓
old fence	185 g	46°42	5.81	4.88			200.77 ✓
be	184	40°32	6.62	5.56			200.09 ✓
bank edge at old fence	183 g	28°40	5.55	4.50			201.15 ✓
	182 g	32°24	5.72	4.87			200.78 ✓
	181 g	40°31	5.31	4.60			201.05 ✓
~~154~~	180 g	54°49	5.25	4.69			200.96 ✓

154



w.p = white poplar
hw = hardwood

⊼ - Pt	Az from 5 pt	∪	Stadia C	⊥	Vert ang	Elev	
6" Willow	38°53	5		3,15			
6" pine	43°20	6		3.9			
3 ash	49°15	6		3.9			
3" maple	50°43	6		3.74			
6" hw	54°30	6.0		3.76			
10" ash	57°5'	6		3.6			
8" pine	69	7		4			
8" ash	72°	7		3.76			
4" maple	75°45	7		3.56			
4 hw	74 30	7		3.65			
12 ash	72°05	7		3.56			
10" W.P 224	73°20	7		3.5			
223	72 10		11.5	9.54		194.15	
222	81°45		5.	3.16	-24	198.09	
221	83°10		5.	3.2	-30'	197.51	
[illegible] 220	91°34		7.96	6.18		197.69	
219 s	99°11		8.13	6.4		197.52	
218 g	108°04	6.08	4.75			200.90	
217 g	78°		7.4	5.80		198.25	
216 g	85°35'		7.71	6.09		197.94	
215 g	75°30	9.0	7.3			198.35	
be 214	70°18		8.89	7.06		196.76	
be 213	63°08'		6.90	5.35		198.75	
[illegible] 212	64°43		5.9	4.64		199.75	a [illegible] with 3 [illegible]
211	68°20		6.30	4.53		199.35	
210	76°51'		6.23	4.96		199.42	
209	94°		6.44	5.22		199.21	

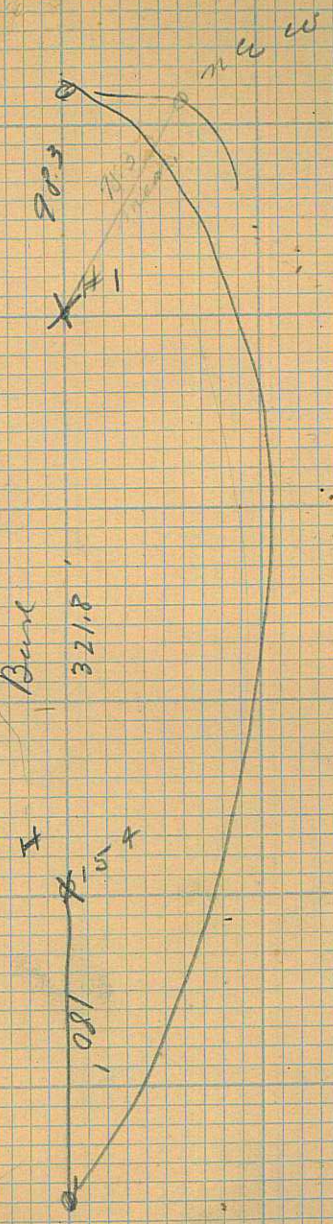
154

HI = 205.65

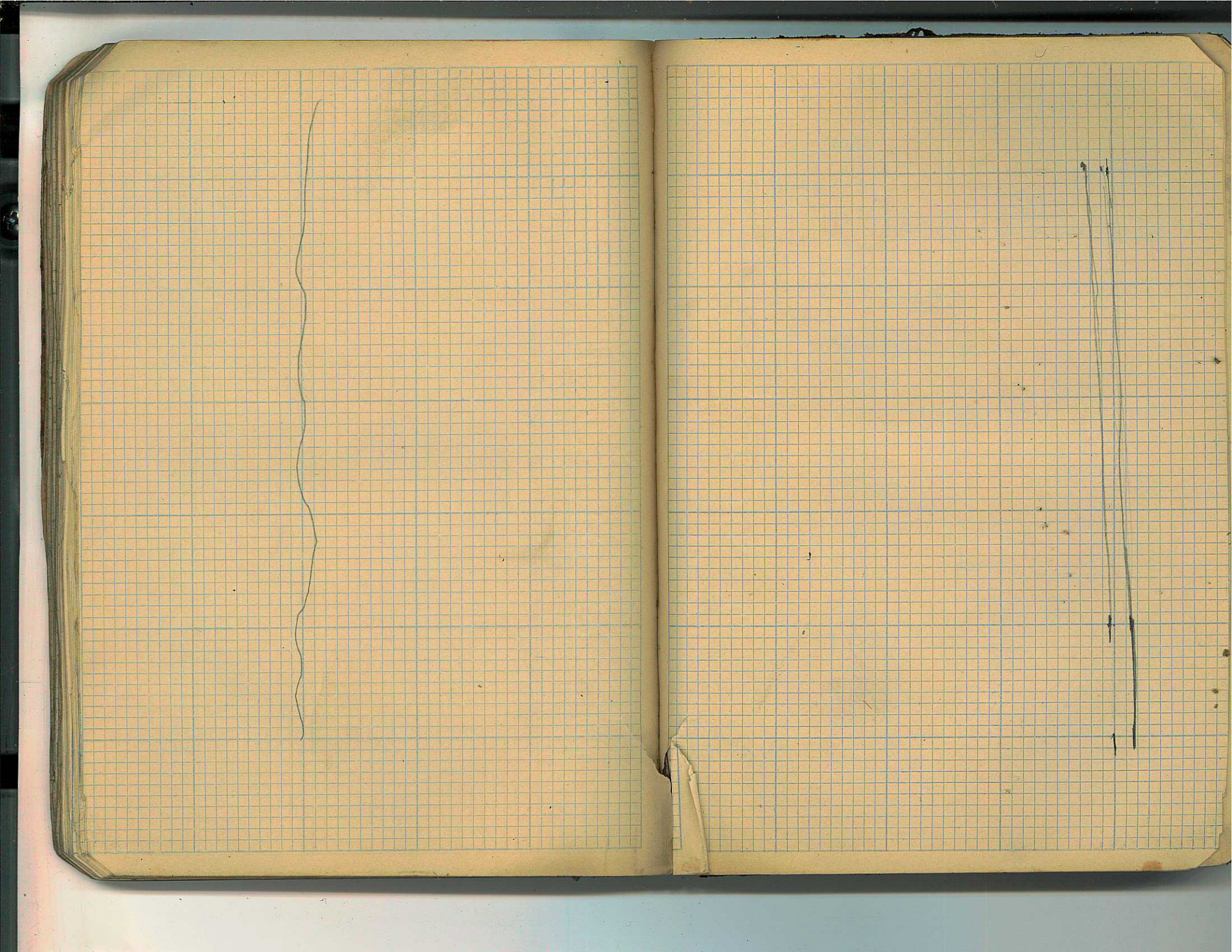
Lilacbush = Lb — down

T-Pt	Az. fr. S	Stadia U	Stadia C	Stadia L	Vert ang.
Lilac Bush	38°6'	5		3.23	
"	32°34'	5		3.24	
8" ash	46°	5		3.11	
Lb	47°22'	5		3.03	
12" pine	60°30'	5		2.75	
12" hem	64°38'	5		2.57	
10 hem	66°25'	5		2.6	
8 ash	74°25'	5		2.0	
4" hem	81°30'	5		1.7	
5 hem	84°30'	6		2.7	
3 ash	86°13'	6		2.6	
3 ash	94°34'		3.7	2	
6" W.P	97°41'	5		1.8	
10" pine	90	5		1.8	
6" hem	83°30'	5		1.83	
8" pine	82°15'	5		2.19	
7" pine	96°06'	5		2.40	
10" pine	89°05'	5		3.10	
9" pine	79°49'	5		2.73	
10 pine	89°45'	5		3.62 ✓	
8" ash	75°10'	4		2.82	
Hydr.	66°52'	4		2.77	
6 hem	59°45'	4		2.64	
4 ash	51°10'	4		2.5	
10 W P	52°38'	4		2.3	
2" ash	47°37'	4		2.22 ✓	
3 ash	47°37'	4		2.43	
6 ash	46°13'	4		2.11	
4 ash	36°45'	4		2.36	

~~Tree~~ ~~Name~~ Pt	Az fr S	Stadia J	C	L	Vert ang
5½ Willow	40°53	4		2.69	
2 ash	36°26'	4		2.60	
8" pine	31°26	4		2.52	
2 ash	27°55	4		2.38	
2" ash	23°	5		3.46	
8" ash	19°15'	5		3.46	
3 ash	19°49'	6		4.60	
Softwood	13°51'	6		4.50	
6" Willow	14°43	6		4.65	
2 ash	18°14	5		3.76	
2 ash	28°40	5		3.75	
2 ash	14°	5		3.92	
3 ash	19°18	5		3.92	
2" ash	28°57	5		3.86	
4" Willow	29°51	5		3.96	
2" ash	23°11	5		4.06	
3 ash	31°15	5		4.13	
3 ash	18°12	5		4.20	
5 ash	27°30	5		4.27	
3 ash	38°48	5		4.30	
3 hu—	36°25'	5		4.47	
12" pine	69°10	5		4.3	
8" Will	107°07'	4		3.66	
10" ash	133°30	4		3.29	



321.8
98.3
180
60 0.1



$v^2 = \sqrt{2gh}$

$h = \frac{v^2}{2g} + f\frac{l}{d}\frac{v^2}{2g} + m\frac{v^2}{2g}$

~~$v^2 2g = dh + flv^2$~~

$h 2g = v^2 + f\frac{l}{d}v^2 + m v^2$

~~$h d 2g = v^2(d + fl + dm$~~

$h 2g = v^2(1.5 + f\frac{l}{d})$

$\frac{Q^2}{a^2} = a^2 v^2 = \frac{h2g}{1.5 + f\frac{l}{d}}$

$d^2 \pi$

$.7854 d^2$

$v^2 =$

$\frac{Q^2}{d^2} = \frac{h2g}{1.5 + f\frac{l}{d}} = \frac{Q^2}{.7854 d^2}$

$h2g = \left(\frac{Q^2}{.7854 d^2}\right) 1.5 + f\frac{l}{d}$

$h2g = \frac{1.5Q^2 + f\frac{l}{d}Q^2}{.7854^2 d^4}$

78
28
62
546
608

637
632
500
2385
20.075

0945
2250
11250
5640
20.085

$d = \sqrt[4]{\frac{Q^2(1.5 + f\frac{l}{d})}{h2g\,.7854^2}}$

32

1. (

64.32
.61
6432
38592
39.2352

80

300
.02
6.00
1.5
7.5 | 39
.2
7.8

.20 | .44
.16
.400

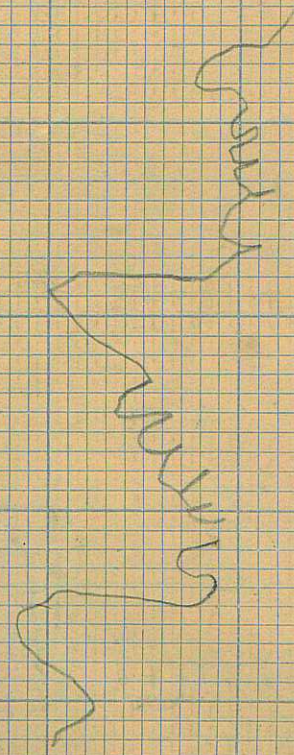
.44 | .7

10"

6.72
8.11
3.11
17.94

300 = 1

2.83
4.94
10.22
17.99



DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.

FOR SINGLE TRACK EMBANKMENT.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	7.0	7.2	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.4	0
1	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.9	1
2	10.0	10.2	10.3	10.5	10.6	10.8	10.9	11.1	11.2	11.4	2
3	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	3
4	13.0	13.2	13.3	13.5	13.6	13.8	13.9	14.1	14.2	14.4	4
5	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.9	5
6	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1	17.2	17.4	6
7	17.5	17.7	17.8	18.0	18.1	18.3	18.4	18.6	18.7	18.9	7
8	19.0	19.2	19.3	19.5	19.6	19.8	19.9	20.1	20.2	20.4	8
9	20.5	20.7	20.8	21.0	21.1	21.3	21.4	21.6	21.7	21.9	9
10	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1	23.2	23.4	10
11	23.5	23.7	23.8	24.0	24.1	24.3	24.4	24.6	24.7	24.9	11
12	25.0	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	12
13	26.5	26.7	26.8	27.0	27.1	27.3	27.4	27.6	27.7	27.9	13
14	28.0	28.2	28.3	28.5	28.6	28.8	28.9	29.1	29.2	29.4	14
15	29.5	29.7	29.8	30.0	30.1	30.3	30.4	30.6	30.7	30.9	15
16	31.0	31.2	31.3	31.5	31.6	31.8	31.9	32.1	32.2	32.4	16
17	32.5	32.7	32.8	33.0	33.1	33.3	33.4	33.6	33.7	33.9	17
18	34.0	34.2	34.3	34.5	34.6	34.8	34.9	35.1	35.2	35.4	18
19	35.5	35.7	35.8	36.0	36.1	36.3	36.4	36.6	36.7	36.9	19
20	37.0	37.2	37.3	37.5	37.6	37.8	37.9	38.1	38.2	38.4	20
21	38.5	38.7	38.8	39.0	39.1	39.3	39.4	39.6	39.7	39.9	21
22	40.0	40.2	40.3	40.5	40.6	40.8	40.9	41.1	41.2	41.4	22
23	41.5	41.7	41.8	42.0	42.1	42.3	42.4	42.6	42.7	42.9	23
24	43.0	43.2	43.3	43.5	43.6	43.8	43.9	44.1	44.2	44.4	24
25	44.5	44.7	44.8	45.0	45.1	45.3	45.4	45.6	45.7	45.9	25
26	46.0	46.2	46.3	46.5	46.6	46.8	46.9	47.1	47.2	47.4	26
27	47.5	47.7	47.8	48.0	48.1	48.3	48.4	48.6	48.7	48.9	27
28	49.0	49.2	49.3	49.5	49.6	49.8	49.9	50.1	50.2	50.4	28
29	50.5	50.7	50.8	51.0	51.1	51.3	51.4	51.6	51.7	51.9	29
30	52.0	52.2	52.3	52.5	52.6	52.8	52.9	53.1	53.2	53.4	30
31	53.5	53.7	53.8	54.0	54.1	54.3	54.4	54.6	54.7	54.9	31
32	55.0	55.2	55.3	55.5	55.6	55.8	55.9	56.1	56.2	56.4	32
33	56.5	56.7	56.8	57.0	57.1	57.3	57.4	57.6	57.7	57.9	33
34	58.0	58.2	58.3	58.5	58.6	58.8	58.9	59.1	59.2	59.4	34
35	59.5	59.7	59.8	60.0	60.1	60.3	60.4	60.6	60.7	60.9	35
36	61.0	61.2	61.3	61.5	61.6	61.8	61.9	62.1	62.2	62.4	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.