1061

DIETZGEN

ENGINEERS'

FIELD BOOK

No. 403

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

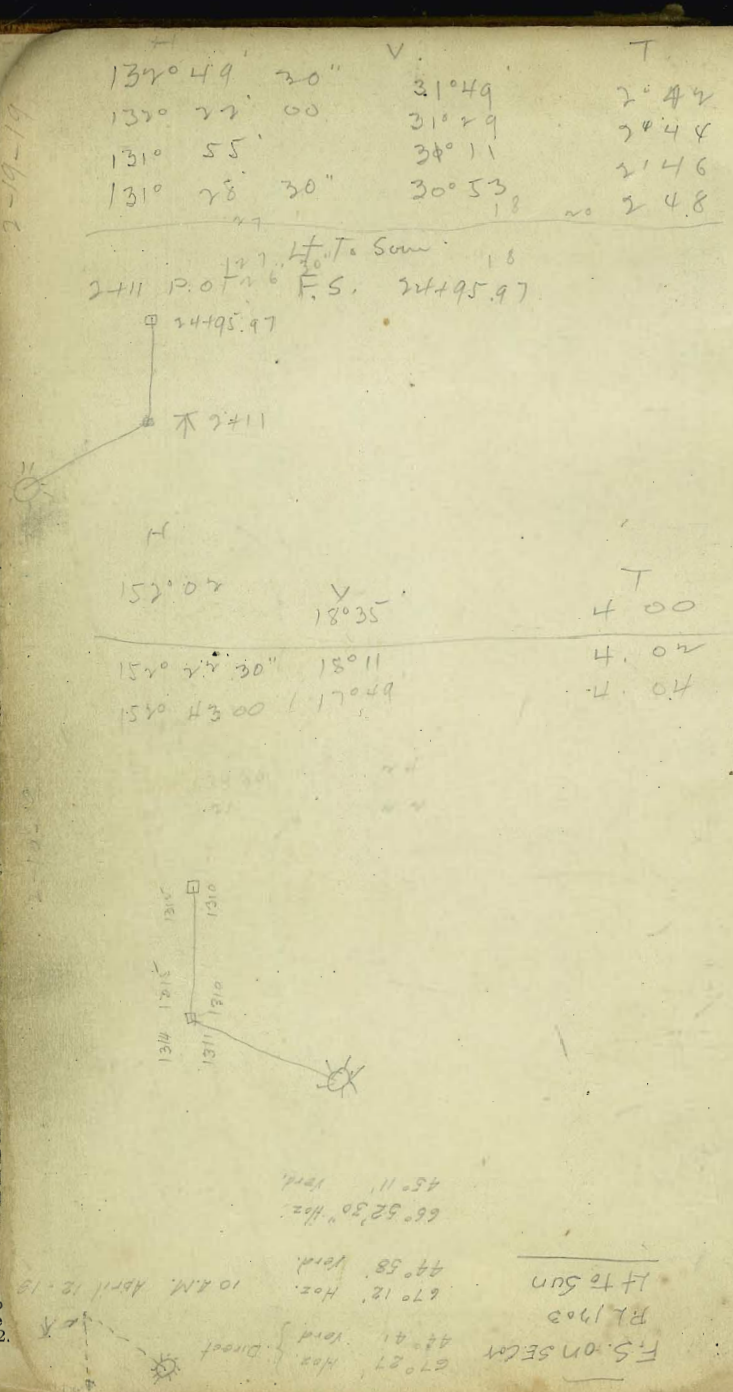
Distances from Center of Roadway for Cross-Sectioning
Roadway 16 feet wide. Side Slopes 1 on 1.
For Single Track Embankment.

H	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	0
1	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	1
2	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	2
3	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	3
4	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	4
5	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	5
6	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	6
7	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	7
8	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	8
9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	9
10	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	10
11	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	11
12	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	12
13	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	13
14	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	14
15	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	15
16	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	16
17	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	17
18	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	18
19	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	19
20	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	20
21	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	21
22	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	22
23	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	23
24	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	24
25	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	25
26	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	26
27	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	27
28	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	28
29	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	29
30	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	30
31	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	31
32	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	32
33	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	33
34	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	34
35	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	35
36	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	36
37	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	37
38	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	38
39	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	39
40	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 30.6. For same slopes but other widths of roadbed, correct above figures by one-half difference in width of roadbed; thus in example above, for 20 ft. roadbed distance will be 30.6+(20—16)÷2 or 2 ft. added to 30.6 =32.6. For slopes of 1 on 1½ see inside of back cover.

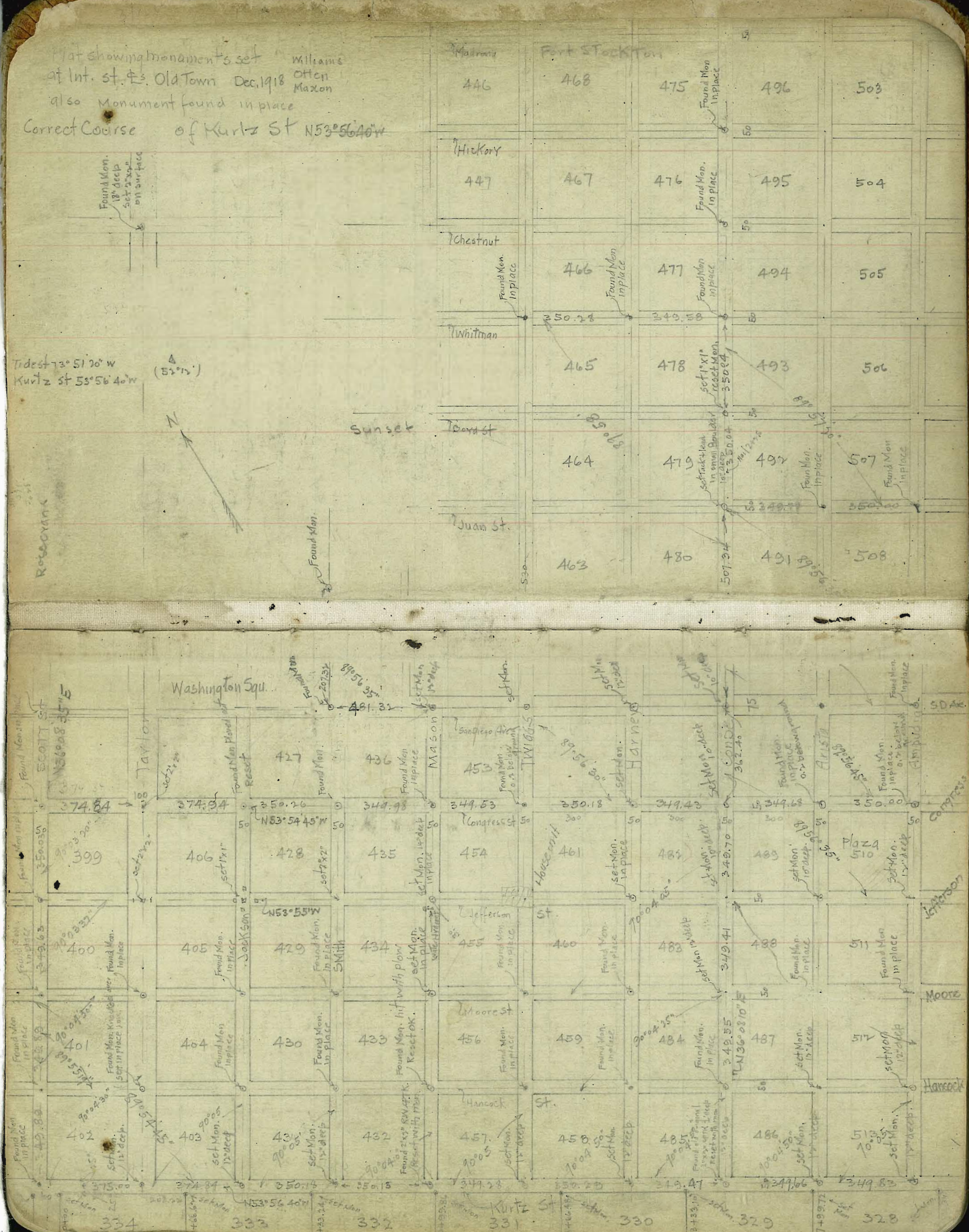
1061

See F.B. 1062 and 1067



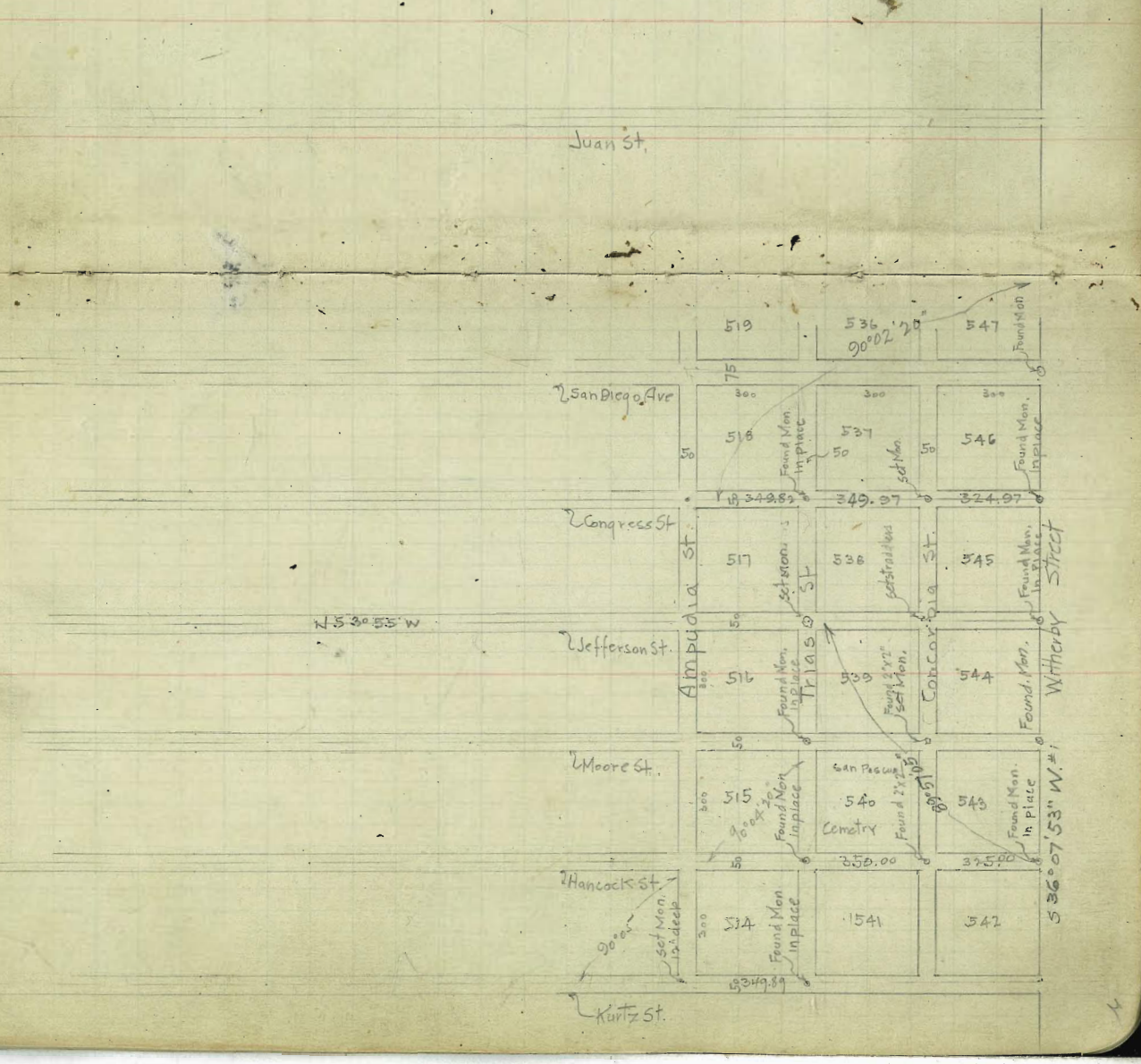
Index

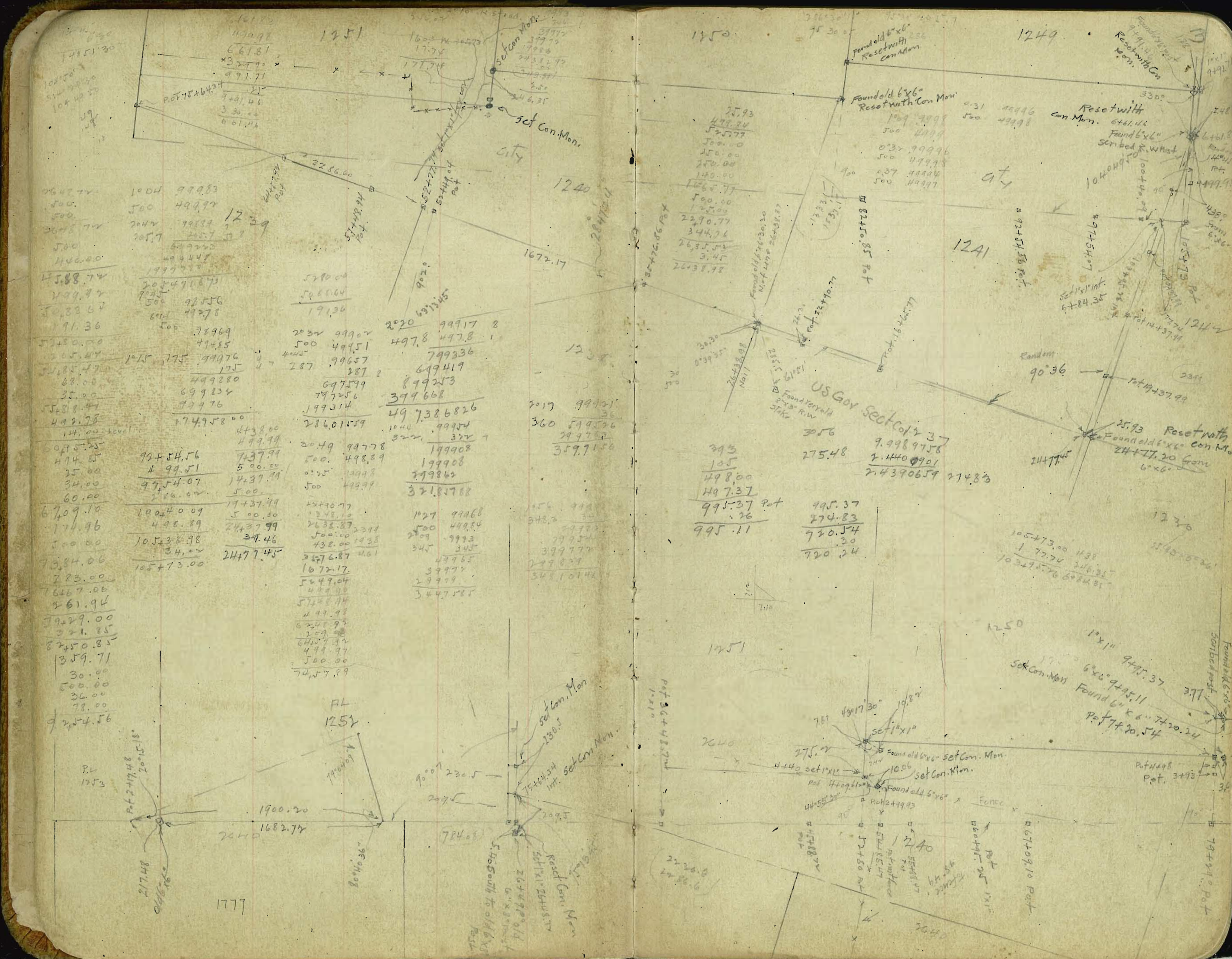
Plat showing Monuments set at Int. St. & Old Town Dec. 1918 — Williams, Otten, Maxon
also Monument found in place
Correct Course of Kurtz St N53°56'40"W



Plat Showing Monuments found and Mon.s set at Int. E. of Sts Old Town. Dec. 1918

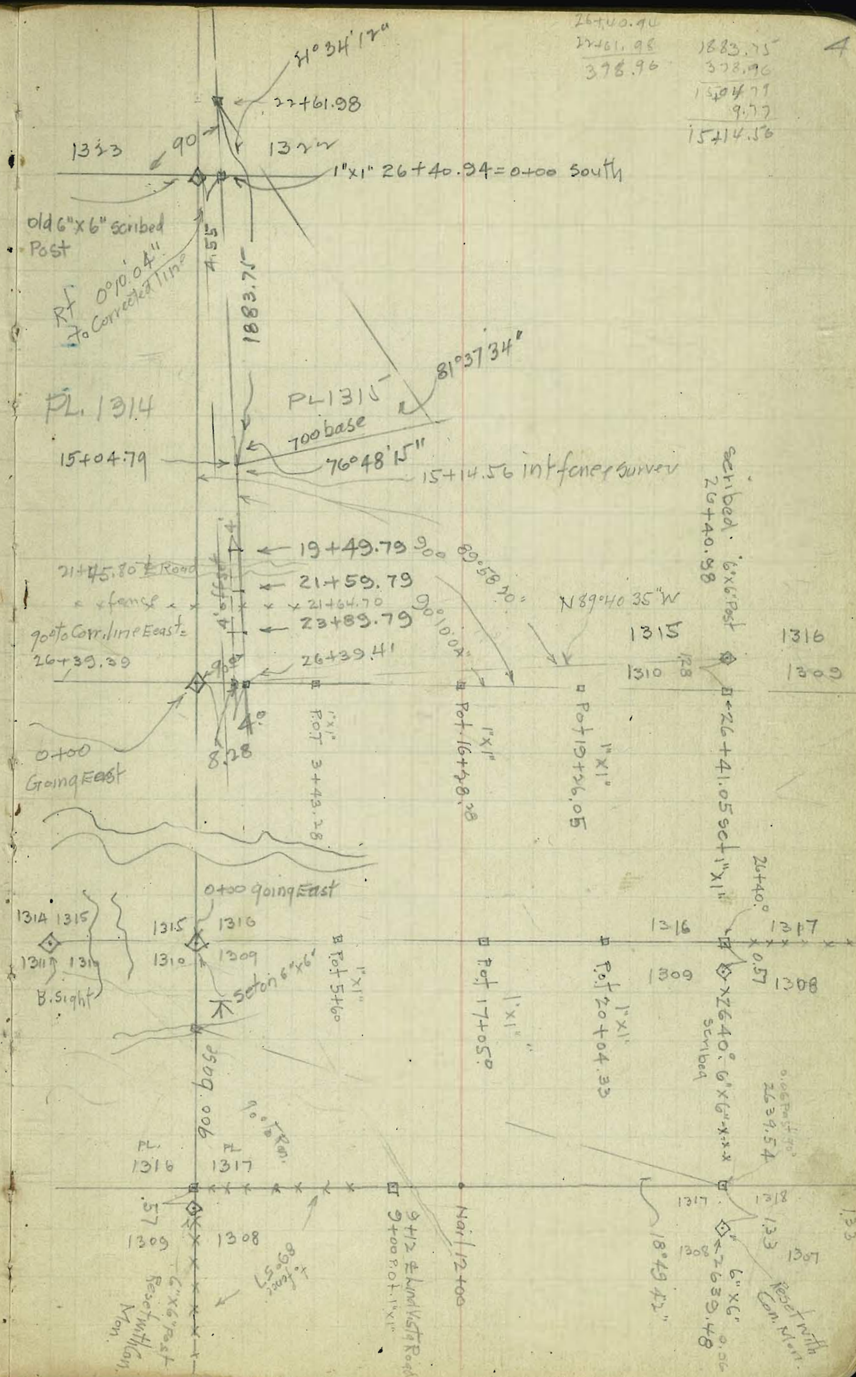
Williams Otem: Maxon




1251
Set Con. Mon.
set Con. Mon.
City
1240
1239
1672.17
1238
92+54.56
24+77.45
105+73.00
1252
P.L.
1253
1900.20
1682.72
set Con. Mon.
Int. set Con. Mon.
Reset Con. Mon.
1777
1250
1249
Found old 6"x6" Reset with Con Mon
Found old 6"x6" Reset with Con. Mon.
Reset with Con. Mon.
Found 6"x6" Scribed R. W. Mst
City
1241
1242
US Gov Sect Cor 12 37
Found old 6"x6" Reset with Con Mon.
24+77.20 from 6"x6"
Random
90°36
995.37 Pot
995.11
995.37
274.83
720.54
720.24
1250
1251
Set Con. Mon.
Found 6"x6"
Pot 77+20.54
Set 1"x1"
Found old 6"x6" Set Con. Mon.
Set Con. Mon.
Found old 6"x6"
Fence
1240
Pot.
67+08.10 Pot

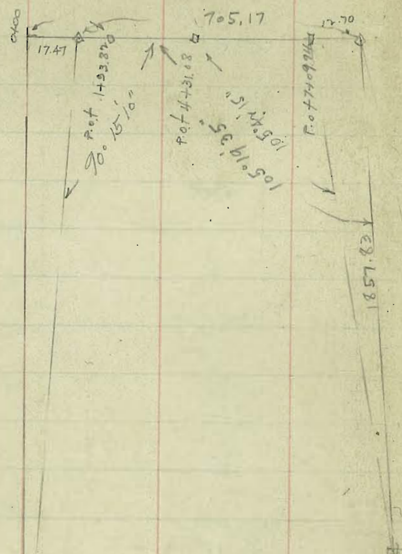
$$\frac{4.55}{2640.94} = 0°5'55"$$

old 6"x6" 1314 1315 1311 1310

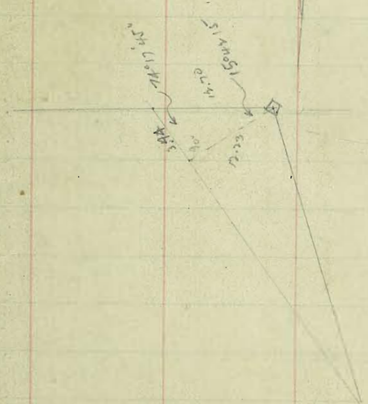


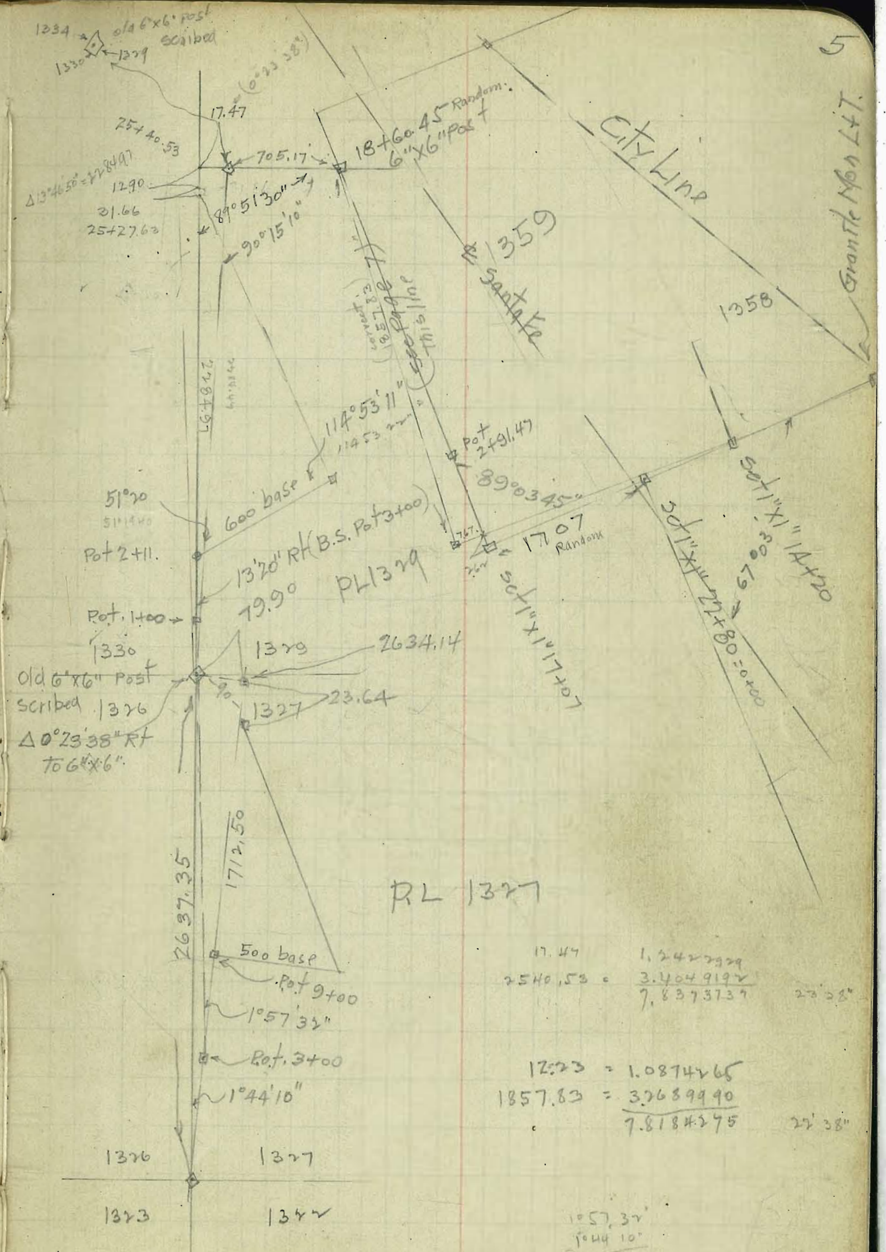
2.3330457	2.4183013	2.4464693
9.9643470	9.9569215	9.9689262
12.2973927	12.3752228	12.4453955
21387	23726	27886

210.40	22°54'	193.82
262.00	25°06'	237.26
299.55	21°25'	278.86
		709.94
		17.47
		692.47
		12.70
		705.17



105°42'
105° 4r 15"





RL 1327

17.47 / 2540.53 = 1.2422929 / 3.4049192 / 7.8373737 — 23'28"

12.23 / 1857.83 = 1.0874265 / 3.2689990 / 7.8184275 — 22'38"

1°57'32"
1°44'10"
13'22"

147° 01' 30"
29 24 15"

51° 46' 30"
258° 51' 35"
51° 46' 15

98 50
494 07 45"
98 49 33

155 - 2.1903317
0.6191177
2.8094294

1039.37
644.84
1684.21

2.1903317
0.6190900
2.8094217

644.24
.48
645.32

91° 22' 45" on 1039.37

17° 00
75° 01 15
17 00 15
59 51
103 08 45
179 60 00

59° 51'
299 13 20
59 50 44"

103° 08' 40"
155 43 45
515 43 45
103 08 45

1321 old 6"x6" scribed

387.10
298.58
685.68

2.4517364
7.4710273
1.2450813?

382.37

389.60
382.37
571.97
22.
593.97

17° 47'

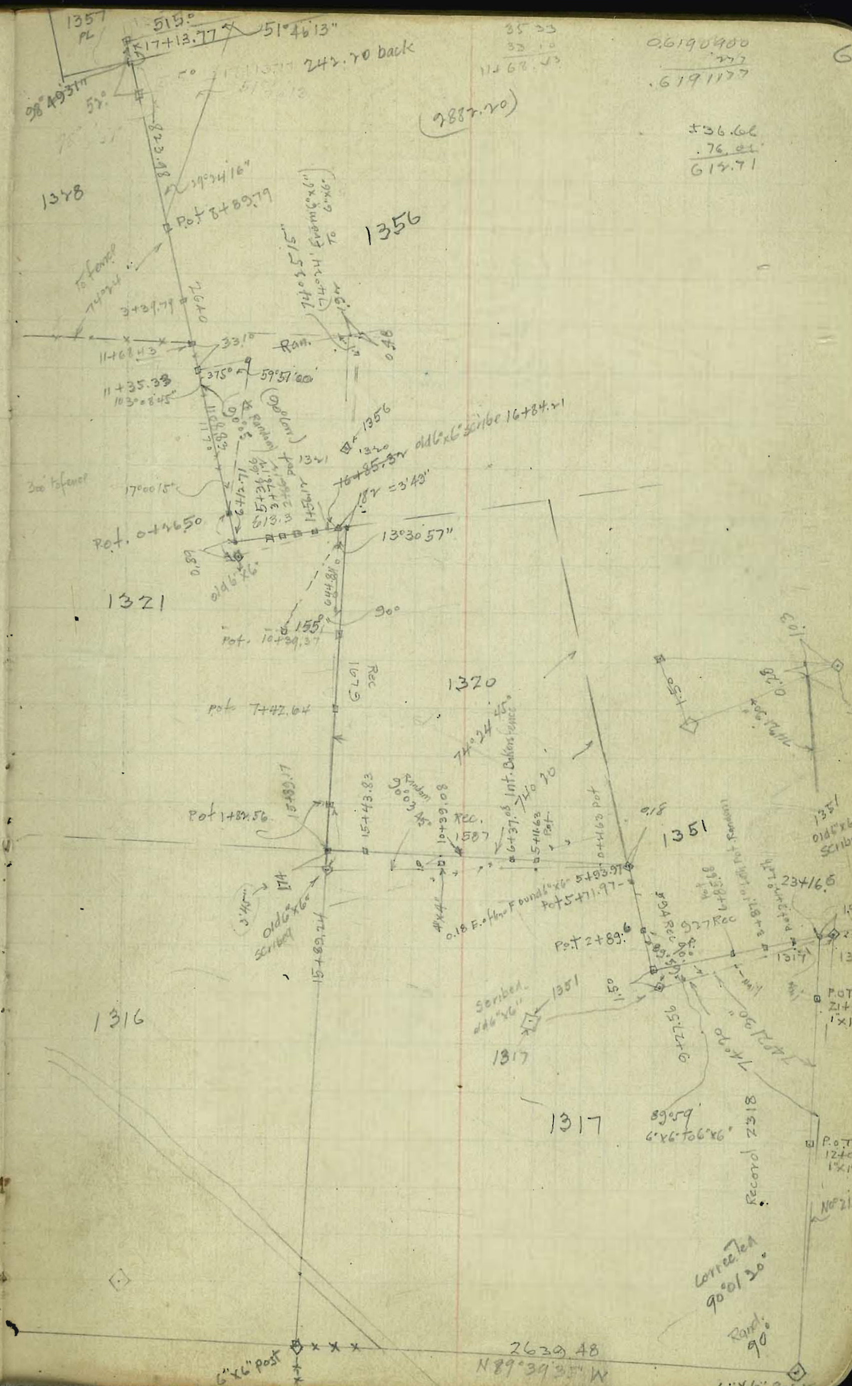
175 47
175 04?
21.4 5 6?

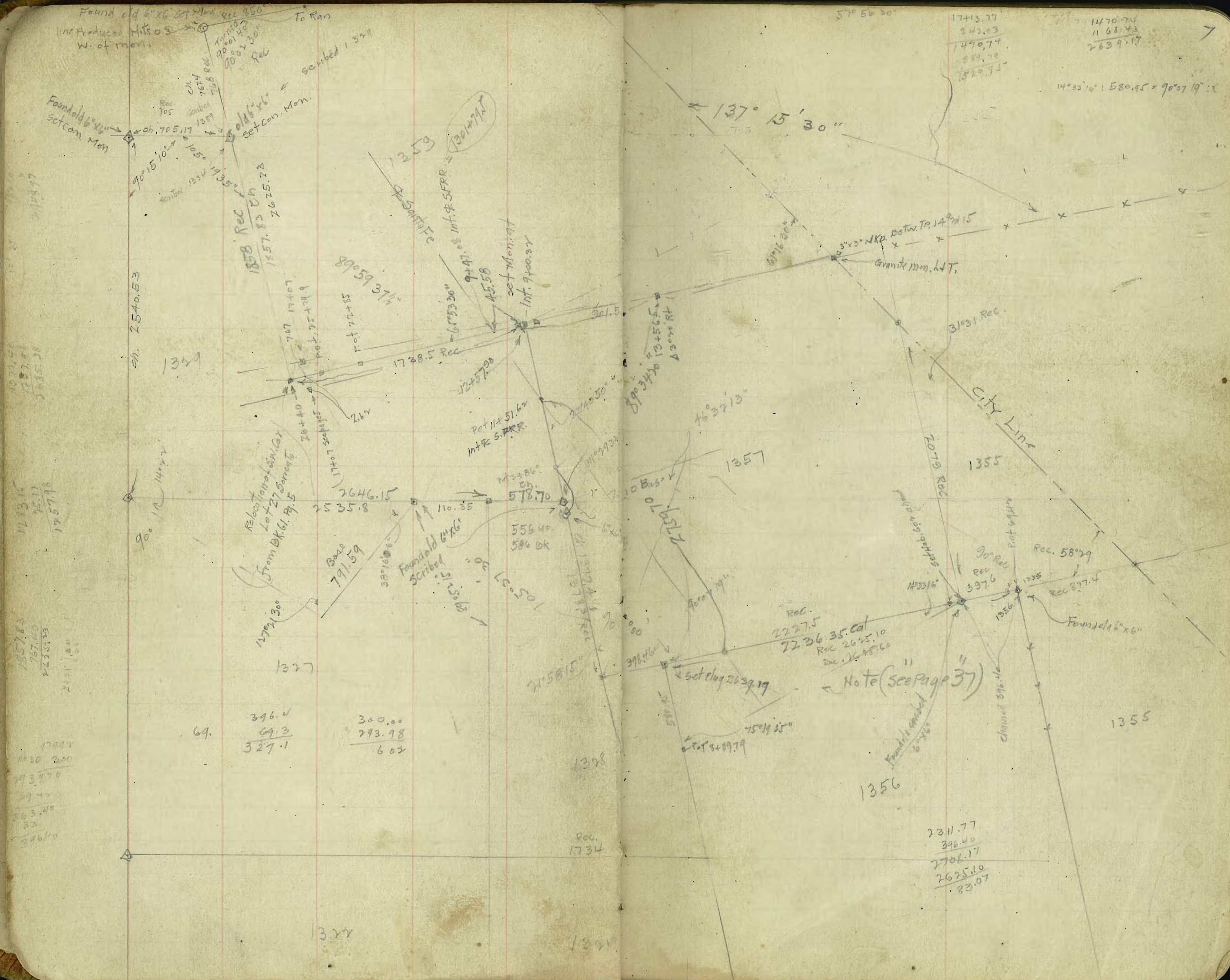
43.83
45.34
89.17

98.91
29 673
747 64
1039.37

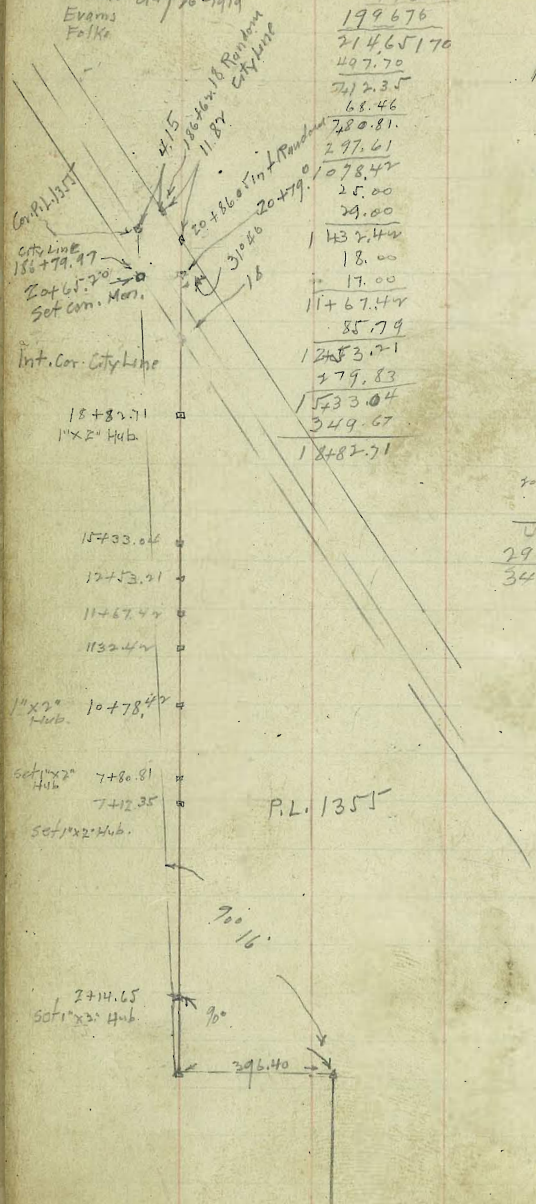
23+17

1.03000.00044
468
1.03?




Found old 6"x6" Set Mon.
Rec 850
To Ran
line Produced Hits 0.3 W. of Mon.
Found old 6"x6" Set Con. Mon
old 6"x6" Set Con. Mon.
Scribed 1321
Ch. 705.17
90°15'10"
Ch. 2540.53
1329
1358 Rec
1857.83 Ch
2625.23
1359
(1301+74.5)
℄ Santa Fe
89°59'37½"
Int. ℄ S.F.R.R.
Set Mon. at Int.
45.58
1738.5 Rec
Pot 11+51.62 Int ℄ S.F.R.R.
2646.15
2535.8
110.35
578.70
556 HF
586 Bk
Relocation of S.W. Cor. Lot 27
From Bk. 61 Pg. 5
Base 791.59
Found old 6"x6" Scribed
1327
69.
396.4
69.3
327.1
300.00
293.98
6.02
1328
Rec. 1734
1321
137° 15' 30"
3"x3" Mkp. Betw. Tp. 14 & 15
Granite Mon. LWT.
301.5
13+56.5
89°34'30"
46°37'13"
1357
1355
City Line
2079 Rec
Rec. 58.29
Rec 877.4
Found old 6"x6"
397.6
Rec. 2227.5
2236.35 Cal
Rec 2625.10
Set Plug 2639.19
Note (See Page "37")
75°14'25"
1356
2311.77
396.40
2708.17
2625.10
83.07
17+13.77
243.03
1470.74
1470.74
1168.43
2639.17
14°33'10" : 580.85 = 90°07'19" : x
57°56'30"
90° Rec
Pot 34+86° Ch.
1355

Survey P.L. 1355
Williams
Dunkle Aug 26-1919
Evans
Folks



3° 16'
99838
215
499190
99838
199676
21465170
497.70
2412.35
68.46
2480.81
297.61
1078.42
25.00
29.00
1432.42
18.00
17.00
11+67.42
85.79
1253.21
279.83
1533.04
349.67
18+82.71

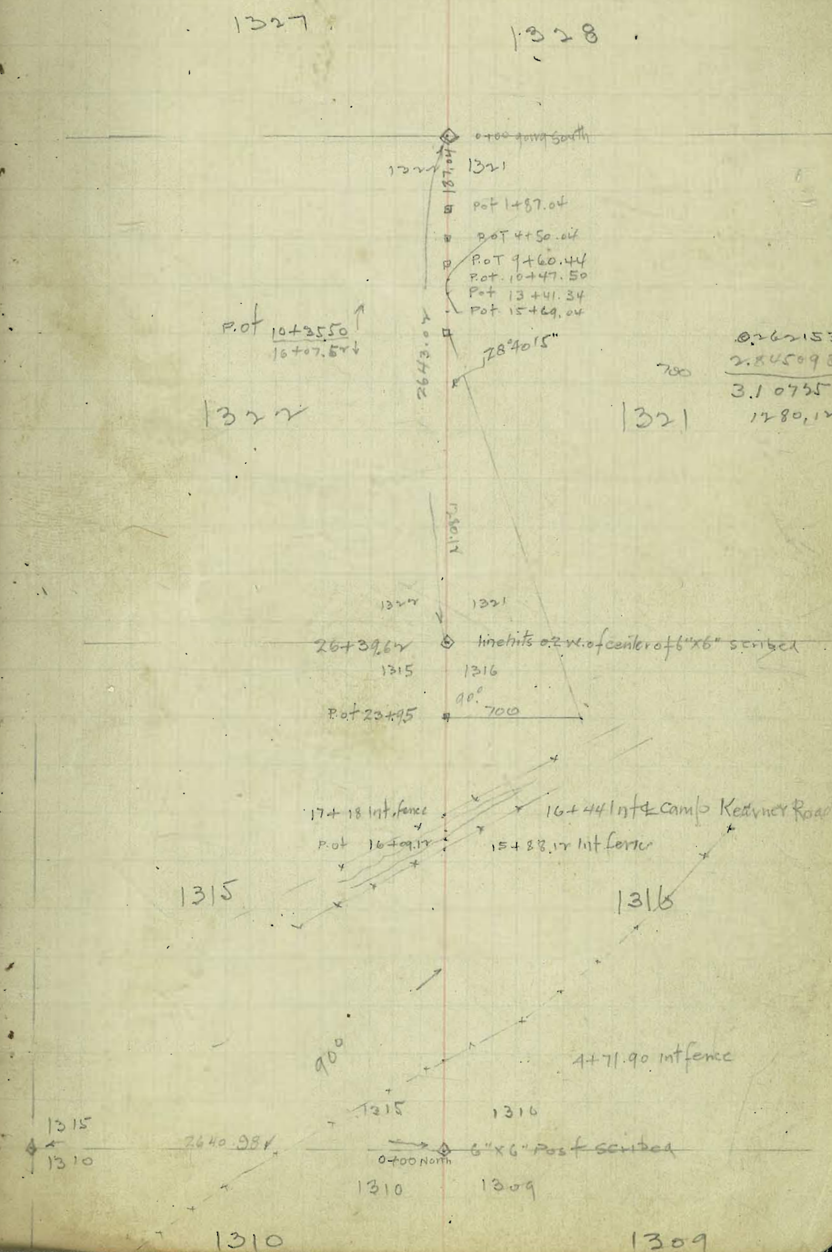
Feb. 20-1919

5° 30' 500 .99540
497.70
31°09' 85582
80
68.46560
17°28' 95389
312
190778
95389
286167
297.61368

30°55' 100 85.79
36°55' 79955
350
399750
23985
279825°

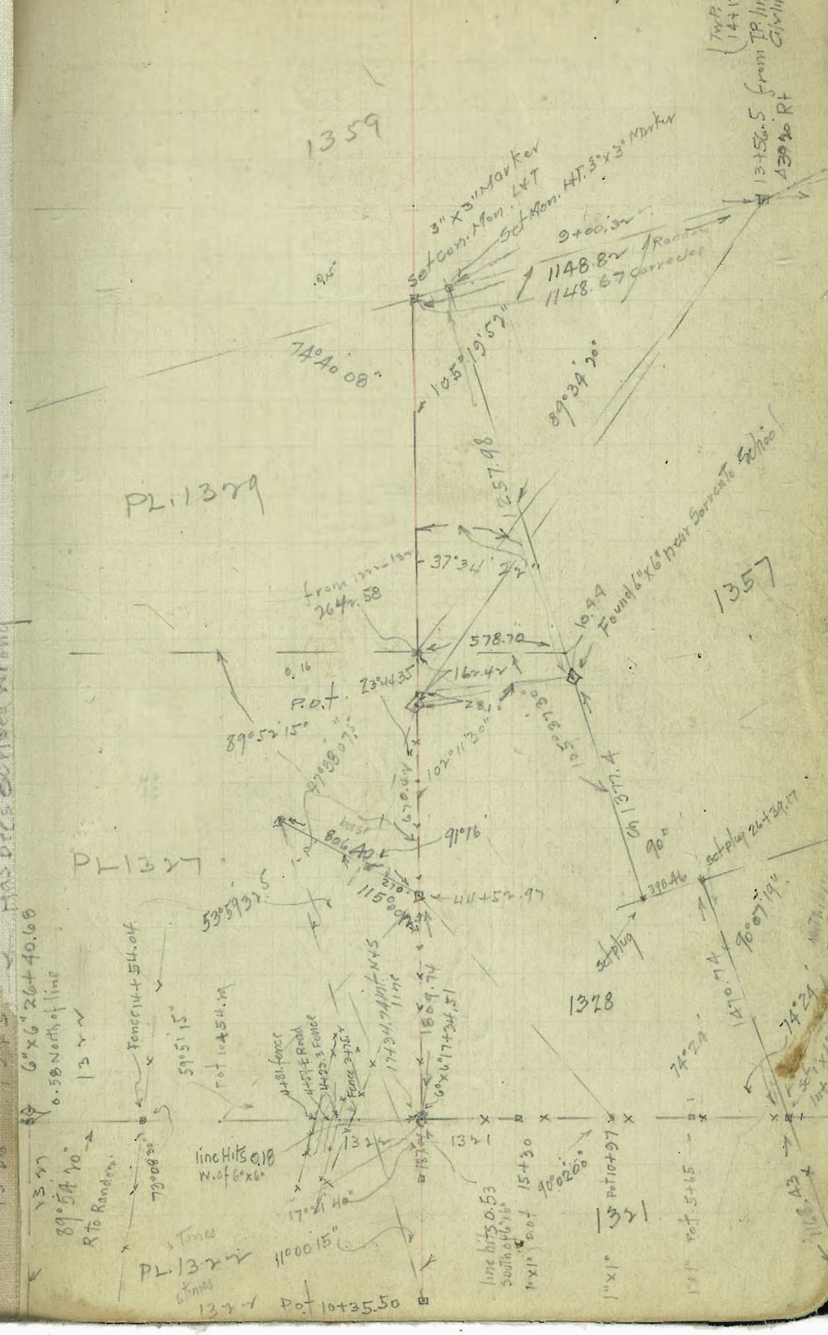
20°28' 99907
3.50
499535°
299721
349.67450

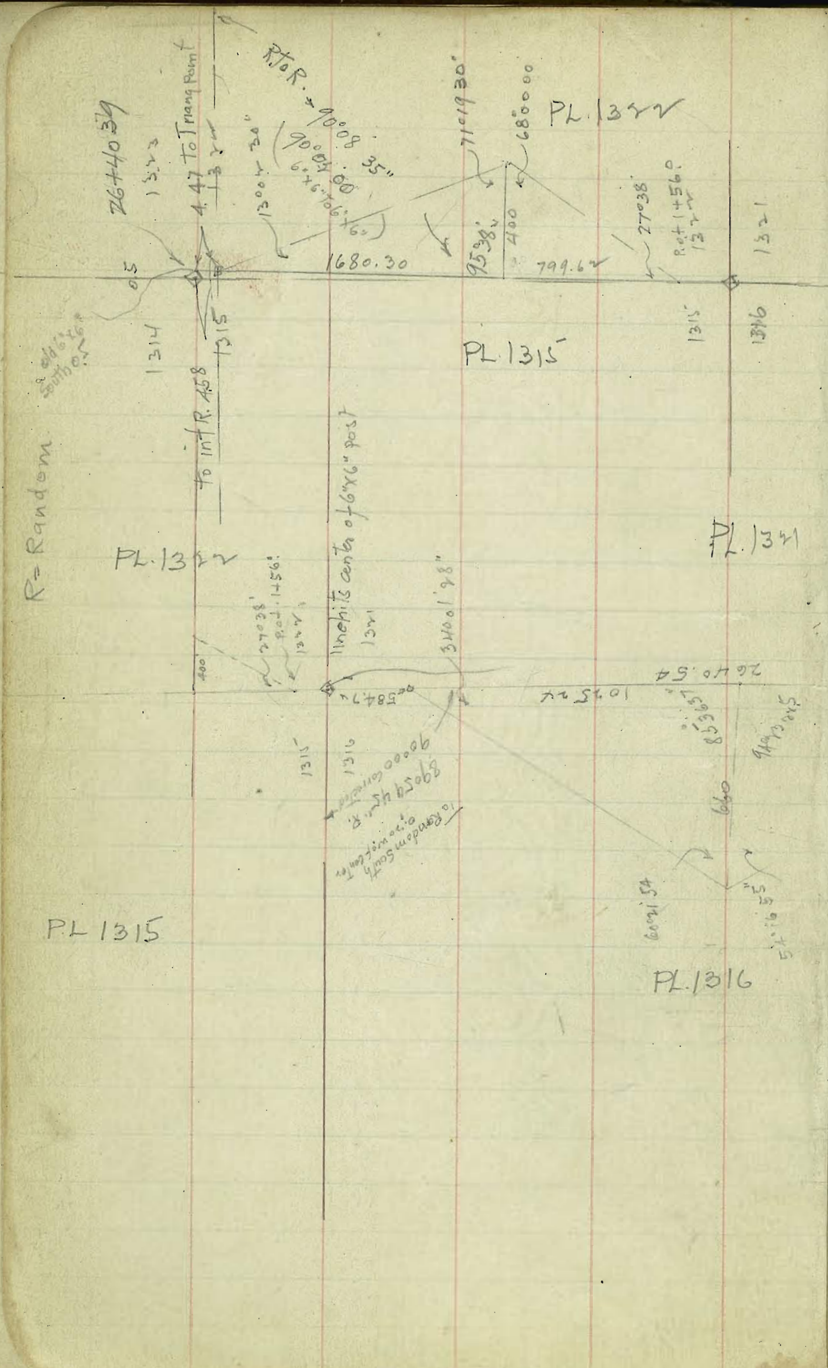
20 79.00
18 82.71
196.29

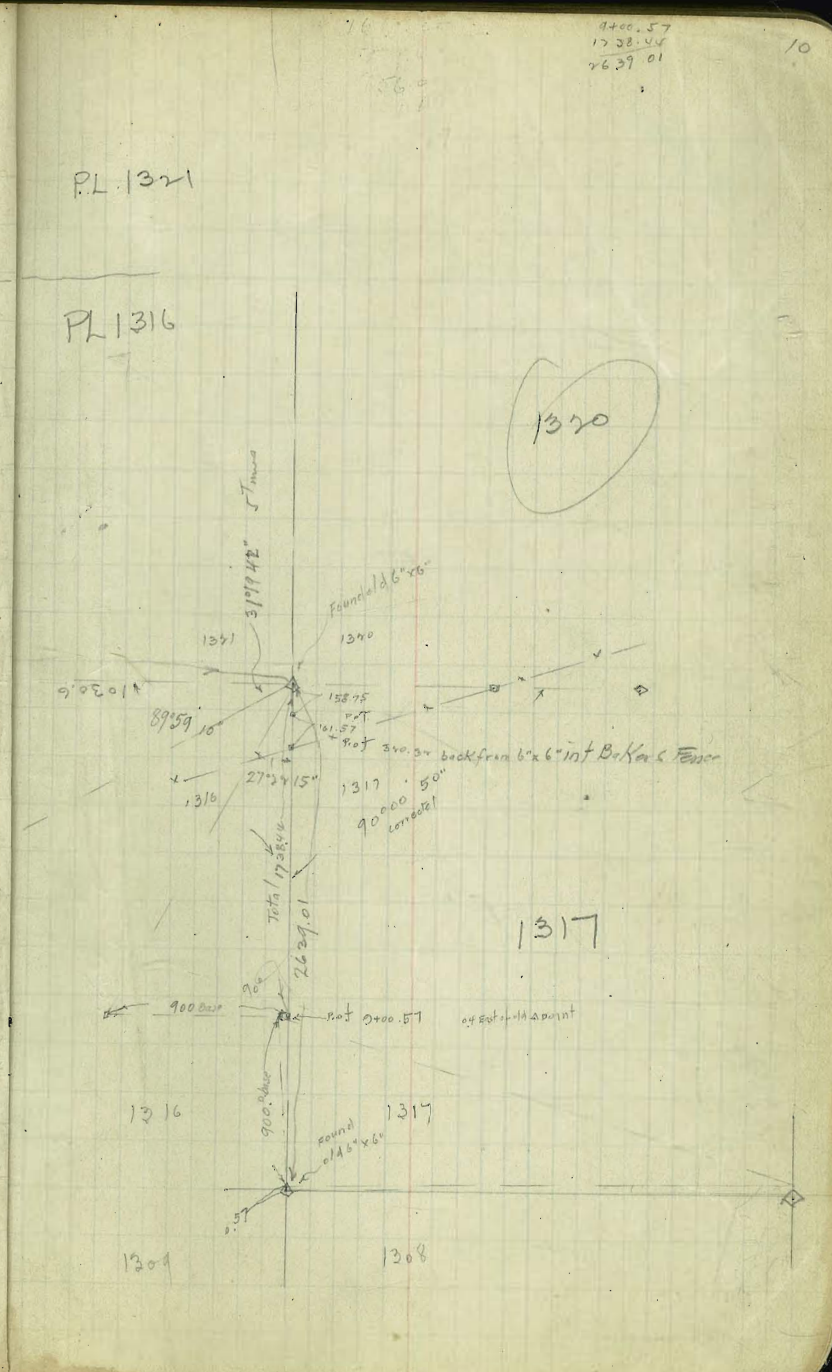


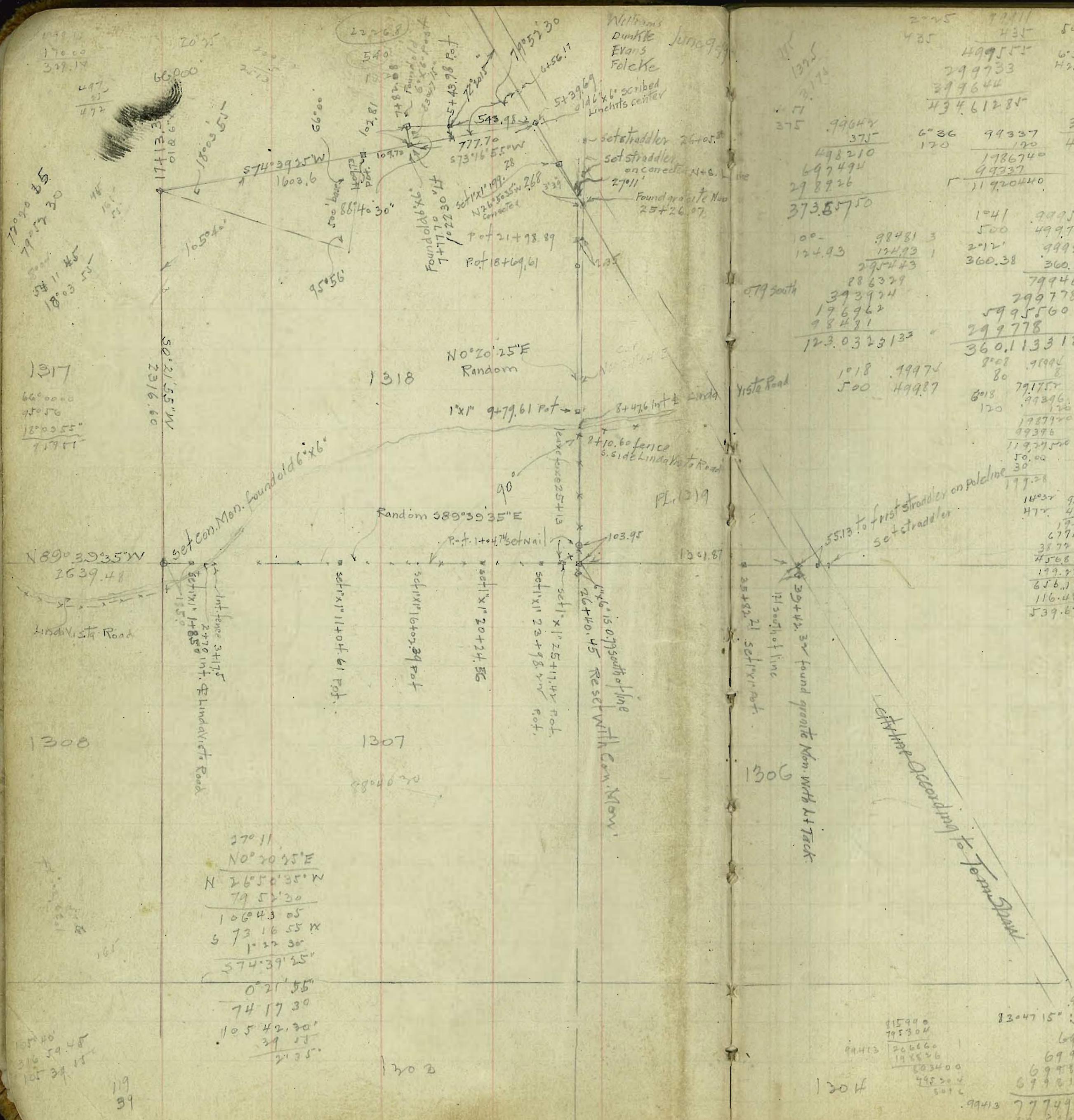
0.2621536
2.8450980
3.1072516
1280.12

7-20-1919


1359
PL.1379
PL 1327
1357
1328
1321
PL.1322
Has been scribed wrong
Set Con. Mon. L+T
3"x3" Marker
Set Mon. HT. 3"x3" Marker
9+00.3
1148.8
1148.67 Corrected
74°40'08"
105°19'52"
89°34'20"
1257.98
37°34'
578.72
10.44
Found 6"x6" near Sorrento School
P.o.t.
89°52'15"
91°16'
411+52.97
53°57'37.5"
6"x6" 26+40.68
0.58 North of line
Fence 14+54.04
line Hits 0.18 W. of 6"x6"
1809.74
1470.74
74°24'
90°07'19"
set plug
13+56.5 from TR line Int. Civil line
P.o.t 10+35.50


R = Random
26+40.39
13.43
4.47 To Triang point
R to R. 90°08'35"
90°04'00"
6"x6" 106'
130°+30"
71°19'30"
68°00'00"
PL.1322
1680.30
95.38'
400
799.62
27.38'
1321
1314
1315
1316
To int R. 458
PL.1315
PL.1322
27.38'
Line is center of 6"x6" post
34°01'48"
2640.54
1025.44
PL.1321
90°00' corrected
89°59'45" R.
PL 1315
PL.1316


9+00.57
17 38.44
26 39 01
P.L.1321
PL1316
1320
31°19'42"
Found old 6"x6"
1341
1340
1030.6
89°59'10"
158.75
161.57
27°34'15"
1317
90°00'50" corrected
back from 6"x6" int Baker's Fence
1316
1317
Total 1738.44
2629.01
900.00
Pot 9+00.57
1316
1317
Found old 6"x6"
1309
1308



27°11
N0°20'25"E
N 26°50'35"W
79 52 30
106 43 05
S 73 16 55 W
1 22 30
S74°39'25"

0°21'55"
74 17 30
105 42 30
39 15
2 35

1603.60
109.73
1213.33

79°52'30"
75 20 15
7 32 15
88 40 30
96 12 45
83 47 15 : 777.7 = 7°32'15"

83°47'15" : 777.7 = 88°40'30"

8+01.61
170.00
9+79.61
1 80.00
4 00.00
3 10.00
1846 9.61
3 29.28
2498.89
327.18
25 26.07
79.73
26+05.80

543.98
233.72
777.70

1404.61
497.78
1602.39
422.17
2024.56
373.66
2398.22
119.20
2517.42
123.03
2640.45

2517.42
499.79
3017.21
500.00
30.00
35.00
3532.21
360.11
3943.32

103.95
404.74
499.87
25.00
1200
8+09.61
38.00
8+47.61

+1° 8+10.61

Survey old two wire fence

10+06.40 Int. w. Line P.L. 1317 x 234.0 530.40 Total S64°00'55"W

263.4

7+43.0 Δ 14°49' Lt x

266.0 S78°49'55"W

4+77.0 Δ 6°56' Rt x

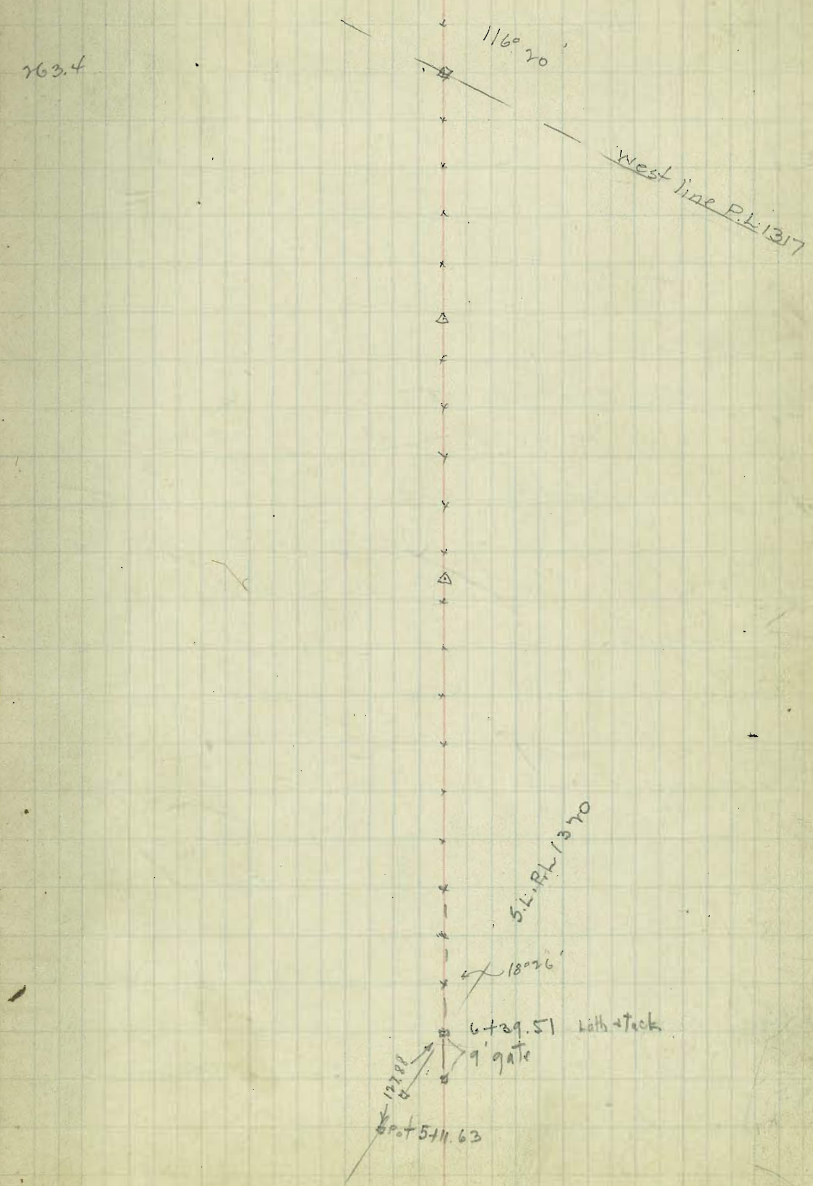
477.0 S71°53'55"W

6+39.51 = S. Line P.L. 1370 on corrected line 18°26' Lt x
0+00 fence Traverse

147.88
511.63
6+39.51

477
266
743

17



743
530.4
1273.4
157.0
1430.4

743
263.4
1006.4
497.4
234.0

743
497.4
1240.4

497.4
263.4 P.L

1273.4
174.1
1447.5

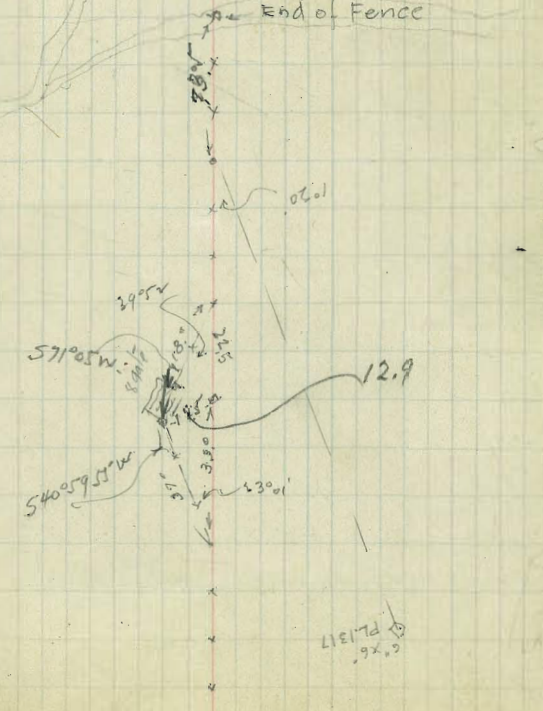
1273.40
743
530.40

44
17
40
101
1273.4
1374.4

Feb 27. 1919

See Book 1069 - Pg. 70

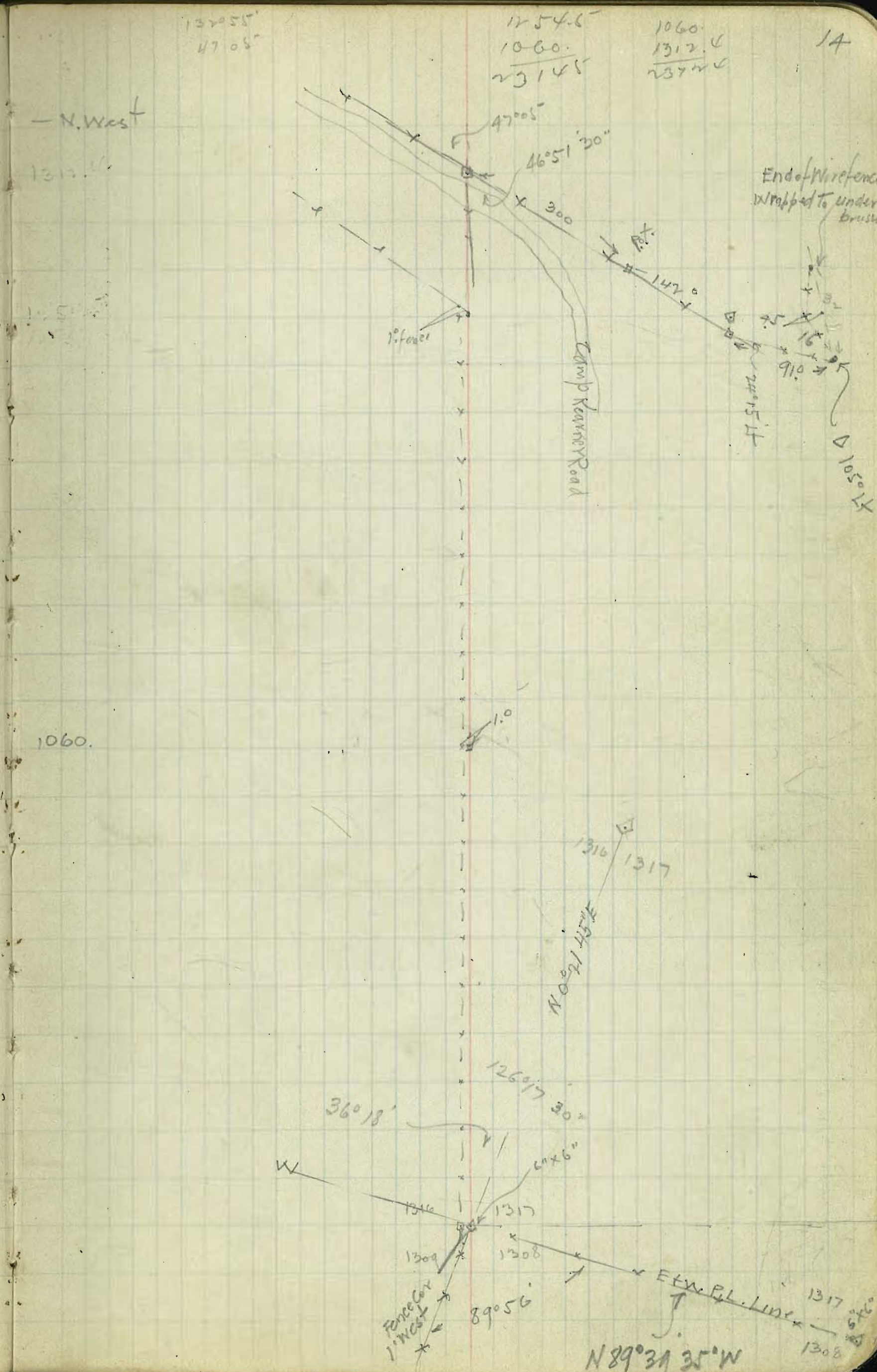
11+~~30.4~~ 49.9	End of fence		~~157.~~ 174.5
13+74.4	P.of.	S31°12' W	101.°
12+95.9			
12+73.4		S32°48' E	530.4
12+40.40	Fence angle	N64°00.55' W	497.4



Feb. 1919

Survey 4 wire fence from P.L 1316|1317 / 1309|1308 — N. West

23+72.4	Int fence N. side Camp Kearney Road	Δ 47°05' Lt	N83°30'15"W	1312.4
23+14.5 23+13.0 Hub	Int. fence S. side Camp Kearney Road			
			1312.4 / 1253.0 / 1254.5	
10+60		Δ0°28' Lt	N36°25'15"W	1060.
			1060	
0+00	6"X6" P.L. Cor Marked 1316 1317 / 1309 1308		N35°57'15"W	



36+54.68 int. P.L. line

133.78

35+70.90 Δ29°45 Lt S47°45'45 W

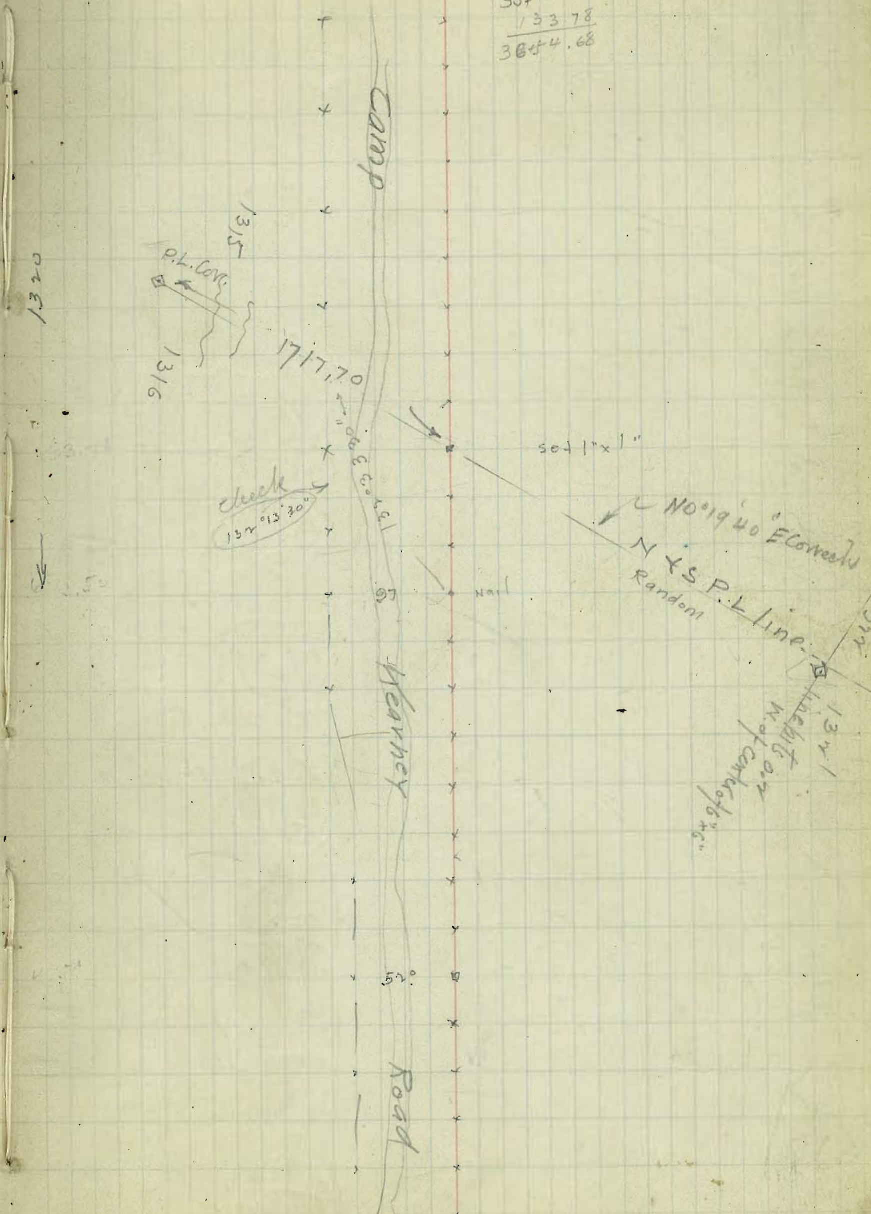
673.50

28+47.40 Δ 18°59 Lt S77°30'45 W

475.0

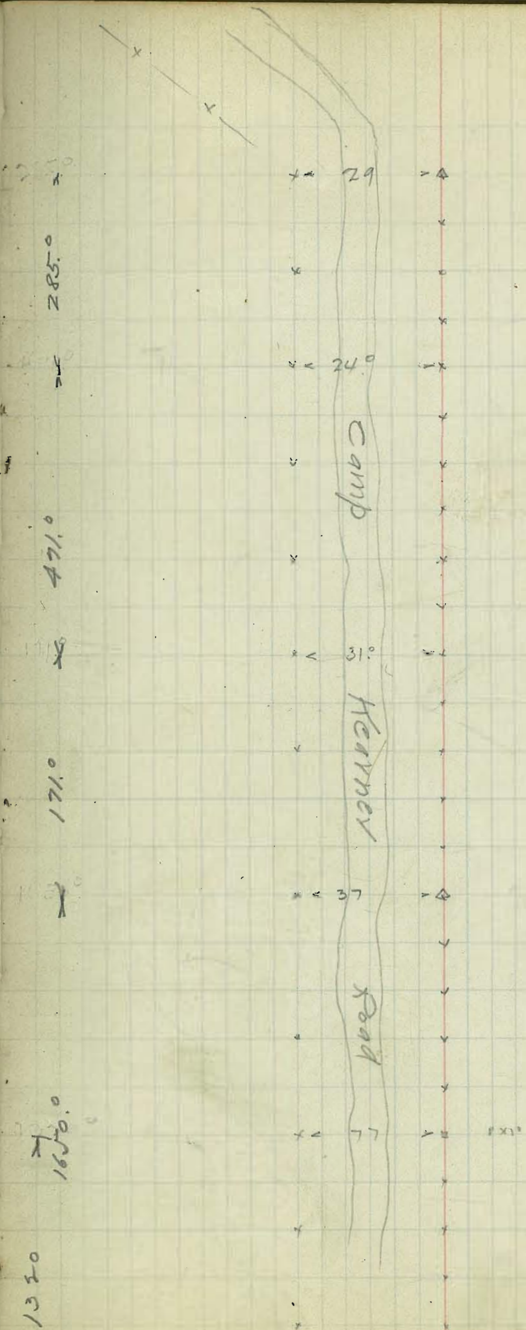
191
109

475	16+09.12
2372.4	108.58
28+47.4	17+17.70
673.5	
35+20.9	
133.78	
36+54.68	



35+70.90
13 20
48+40.90

60+97.90	leave Camp Kearney Road at This point	Δ 46°16'30" Rt	N43°40'45"W
		285.0	
58+12.90		Δ 15°45' Rt	N89°57'15"W
		471.0	
53+41.9		Δ 15°12' Rt	S74°17'45"W
51+70.90		Δ 11°20' Rt	S59°05'45"W
48+40.90	P.o.t.	Total 1650.0	



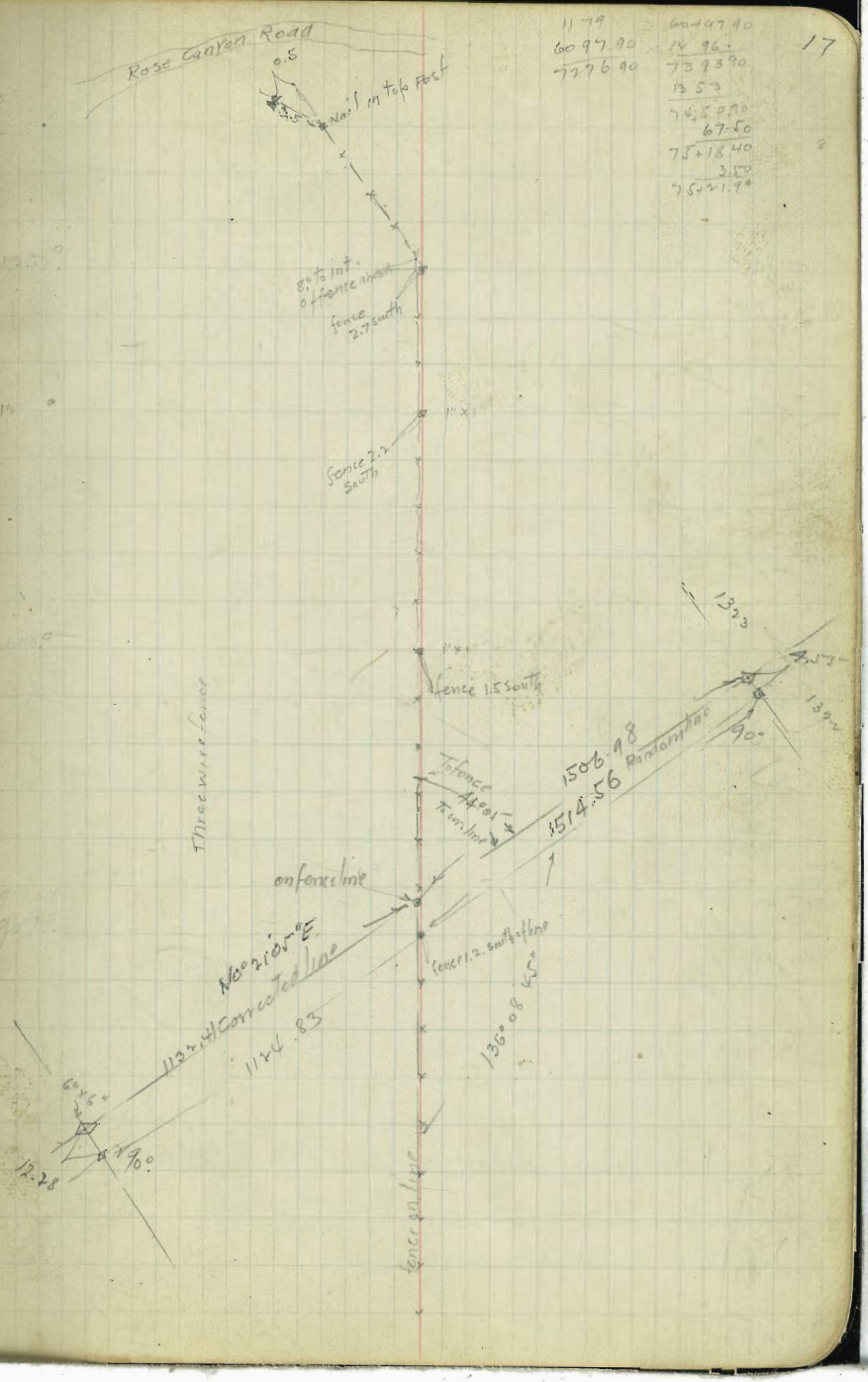
75+21.9 To last fence + Post.
75+18.4

74+50.90

73+93.90 P.O.T.

73+76.90 P.O.T

70+16.57 Int. of fence on Corrected line
70+04.9 Int. P.L. Random.



1179
6097.90
7276.90

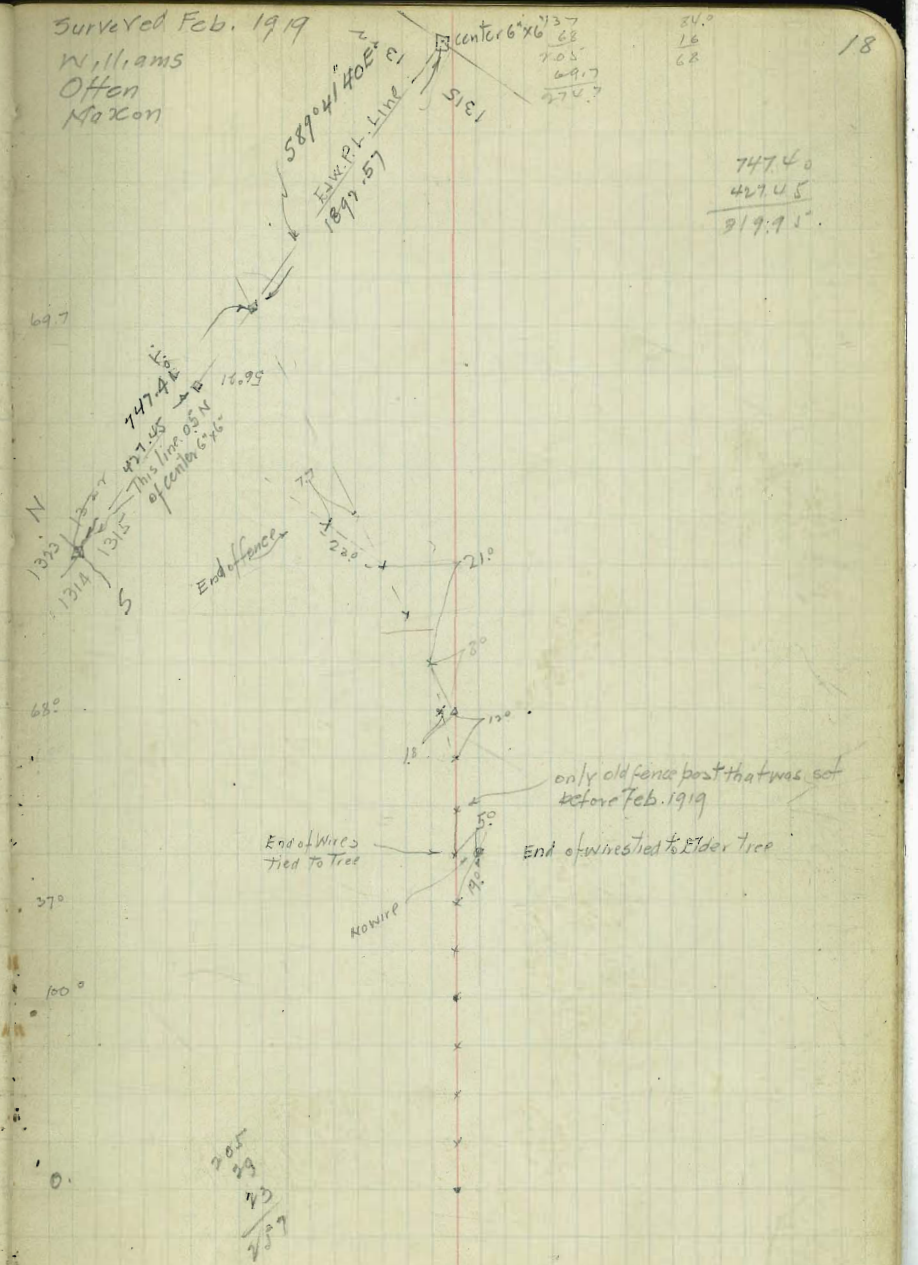
6049.40
14.96
7393.90
13.53
7407.90
67.50
7518.40
3.50
7521.90

17

Rose Canyon fence 3 Wire New Posts set in Feb. 1919
(in P.L. 1315)

	ahead	
27+47 Int. P.L. line	Δ 13°03' Lt	
		N 33° 57' 15" E
2+05	Δ 28° 15½' Lt	
		N 62° 0' 45" E
1+37	Δ 6° 03' Lt	
		N 68° 03' 45" E
1+00	Δ 17° 42' Rt	
		N 50° 30' 45" E
0+00 Beginning of fence new 4"x4" R.W. Posts Set in Feb 1919		

Surveyed Feb. 1919
Williams
Offen
Maxon



18

8+18.51	Δ23°18 Rt	
8+00.14	Δ16°20 Rt	
7+81.19	Δ5°58 Rt	
6+60.81	Δ10°46 Rt	✓
5+78.91	52°50 Lt	
4+94.19	63°08 Rt	

18.37

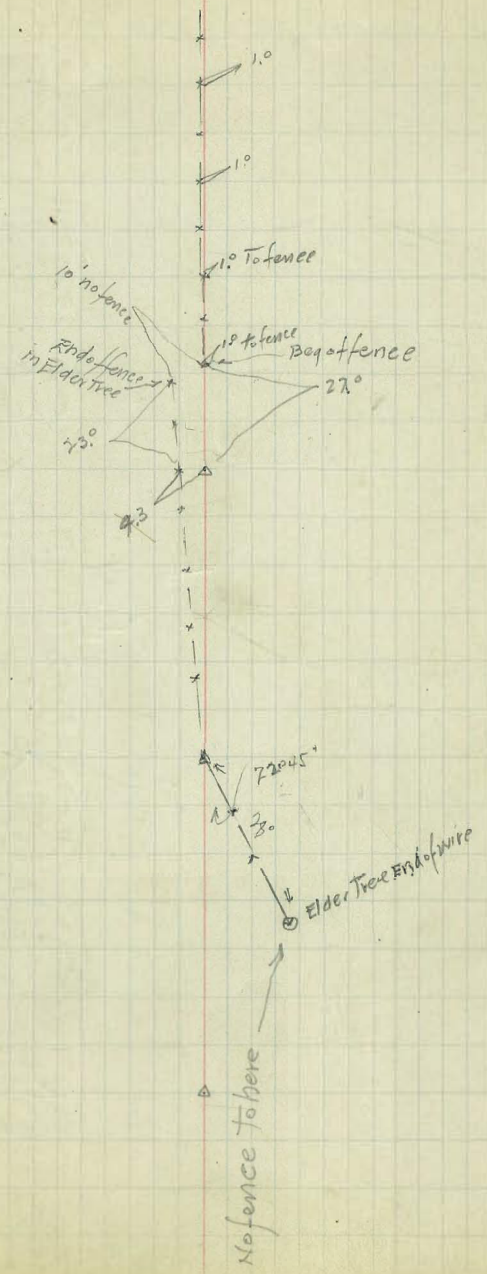
18.95

120.38

81.90

84.77

219.49



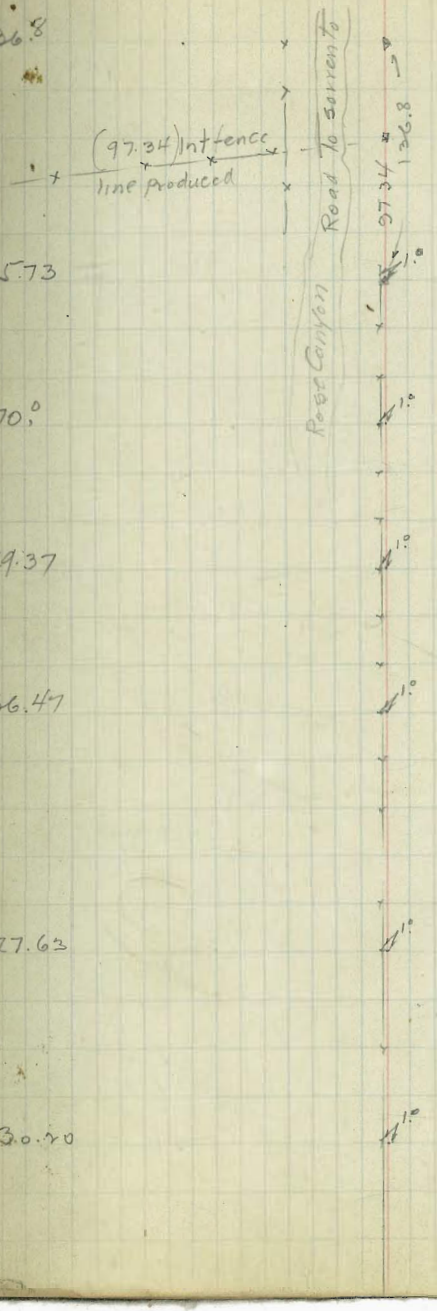
12+68.9 W	Δ 29°40 Rt	44.87
12+24.05	Δ 21°07 Rt	89.5 W
11+34.53	Δ 6°50 Lt	97.11
10+42.4 W	Δ 34°09 Lt	43.50
9+98.9 W	Δ 27°13 Lt	42.28
9+56.64	Δ 17°09 Lt	46.40
9+10.24	Δ 10°07 Rt	91.73

old fence ahead

All new fence up to this point set in Feb 1919 J.W.W.

77+61.60	Δ 18°15' Lt	264.0	1°
19+97.60	Δ 21°27' Lt	100.90	1°
18+96.70	Δ 11°10' Lt	136.90	1°
17+59.80	Δ 21°27' Rt	181.18	1°
15+78.6V	Δ 14°34' Rt	199.70	1°
13+78.9V	Δ 23°02' Lt	110.0	1°

28+57.8	Δ 10°14' Lt	136.8
28+18.3 ↓	P.O.T	
27+21.0	Δ 20°21 Rt	35.73
26+85.27	Δ 40°42 Lt	170.0
25+15.27	Δ 4°46 Rt	29.37
24+85.90	Δ 8°56 Rt	66.47
24+19.43	Δ 12°25 Rt	27.63
23+91.80	Δ 19°52 Lt	130.20



37+41.09

36+06.19 P.O.T.

31+63.5 ℄ 17°38' Rt

30+05.34 ℄ 22° 35' Lt

239.83

577.57 E&W. P.L. line

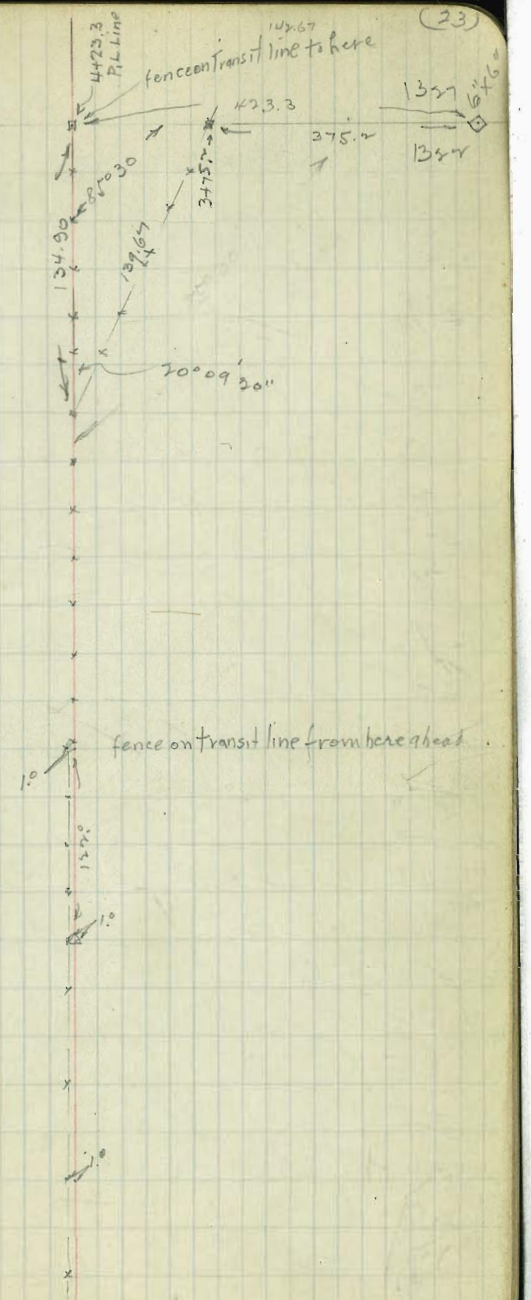
134.90

447.67

447.67

158.18

147.54



47+68.40 Int P.L. Lot line

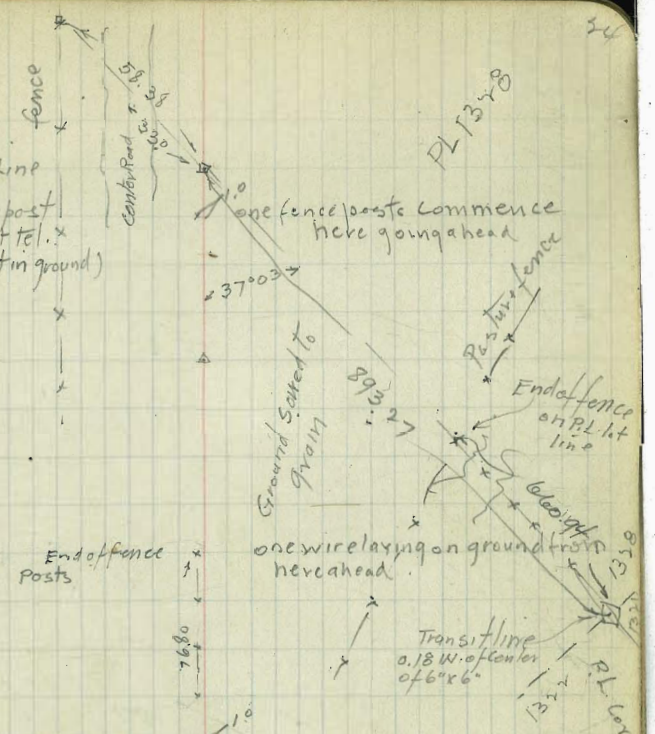
44+74.01 Δ 6°10 Rt to one fence post with two wires Δ 5°03 Rt to Int PL lot line

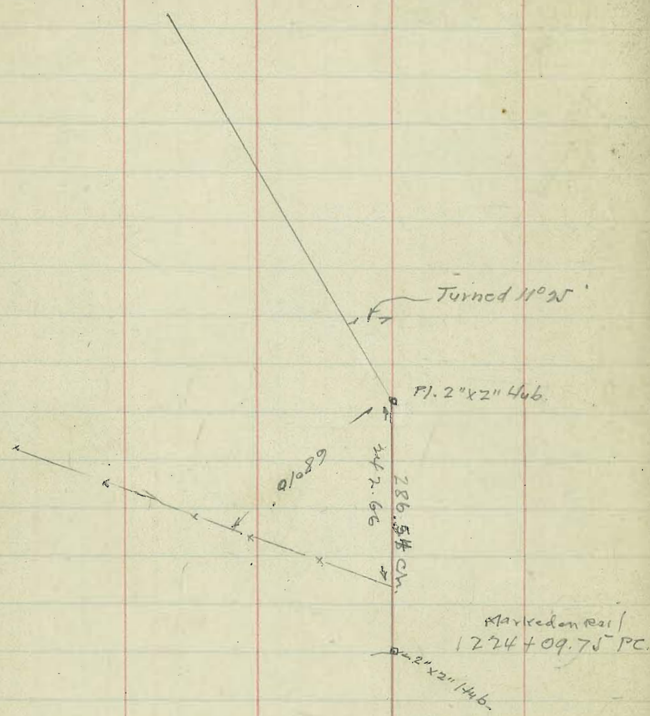
43+15.11 P.O.T

42+38.31 Δ 7°23 Rt

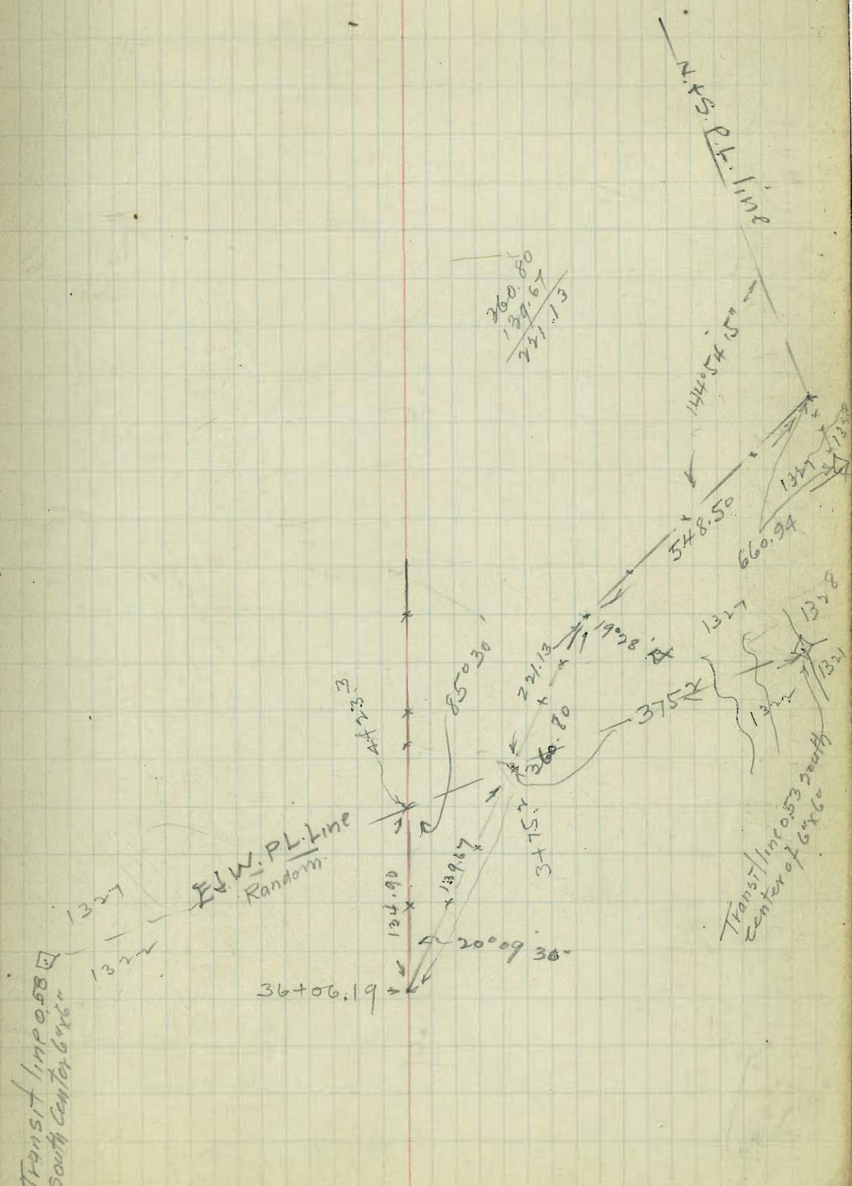
40+63.54 Δ 19°00 Rt

39+80.9W Δ 24°57 Rt





Vert Δ Dist
16°07' 59.00

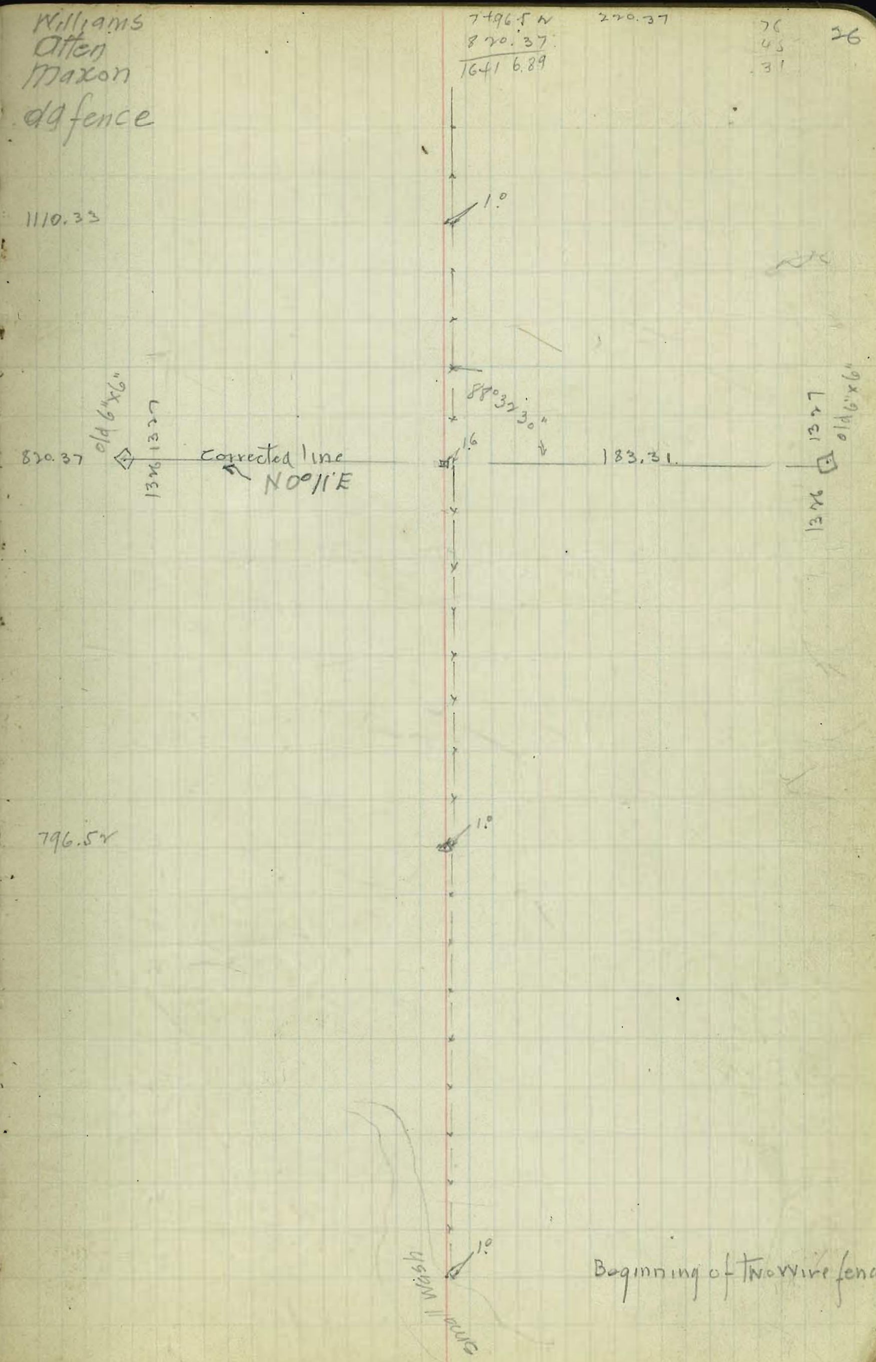


March 4-1919

Fence-line Survey in P.L. 1326-1327-1322

19+06.85		Δ 40°21' 30" Lt
16+16.89	Int. P.L. Lot line P.of.	S88°21'30"E 1110.33
	820.37	
7+96.52		Δ 82°26 Lt
	796.52	S55°55'30"E 796.52
0+00		

Williams
Allen
Maxon



34+41.95

Δ 43°38.30" Lt

597.23

S17°10'W

29+77.17
29+76.60 Int. E+W. P.L line Random
Int E+W P.L line corrected

28+44.77

Δ 100°35 Rt

367.50

S83°25'E

367.50

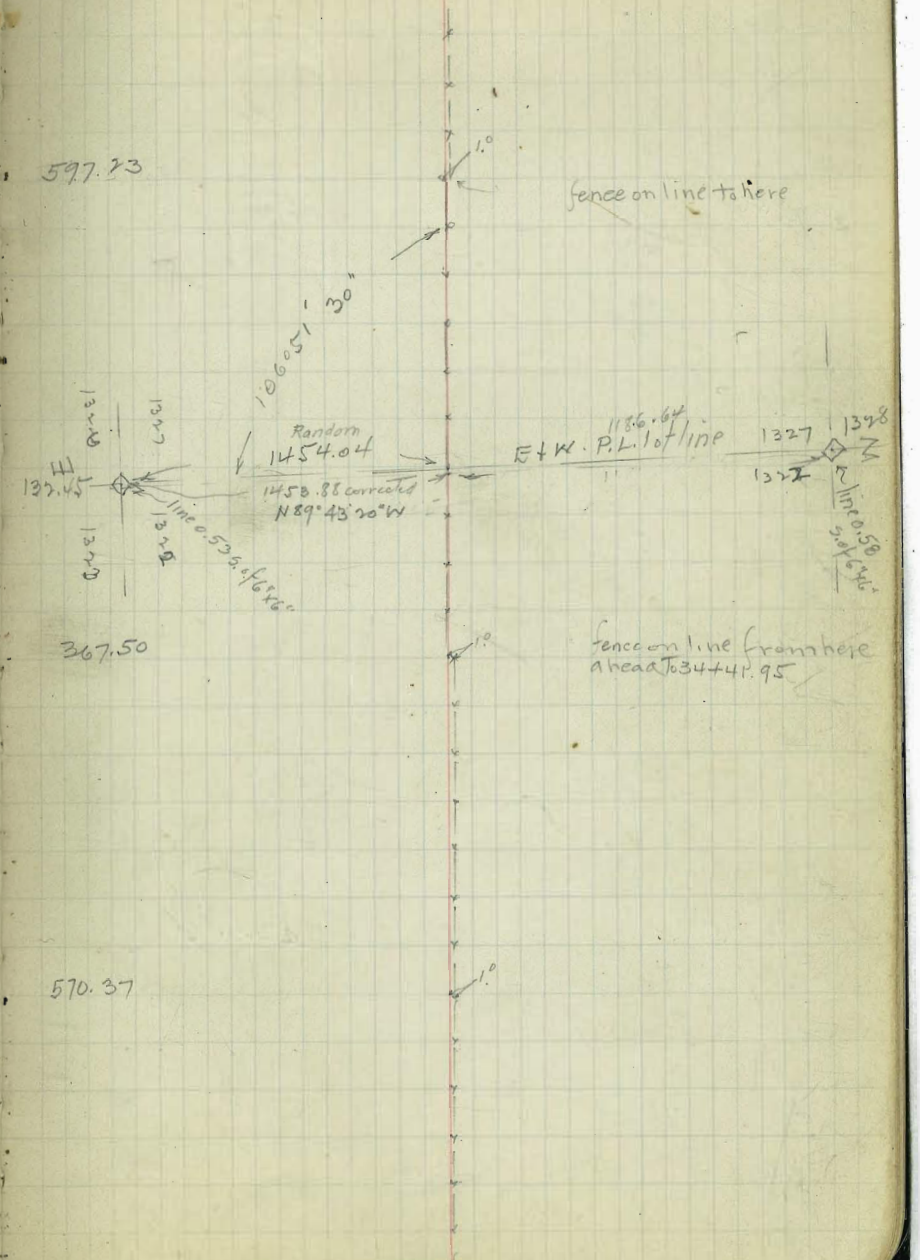
24+77.77

Δ 5°18 Rt

570.37

S88°43'E

570.37



45+37.56 P.O.T

S88°20'30"E

321.08

1.7

43+90.56 P.O.T.

179.08

1°

179.08

179.08

42+11.48 Δ 6°51' Lt

S81°29'30"E

257°

1°

257°

257°

39+59.48 Δ 30°47' Lt

S50°42'30"E

234.73

1°

234.73

234.73

37+24.75 Δ 24°14' Lt

S26°28'30"E

282.80

1°

282.80

282.8

Williams
Otten March 5 1919
Maxon

59+33.98 — Δ 14°09'30" Rt

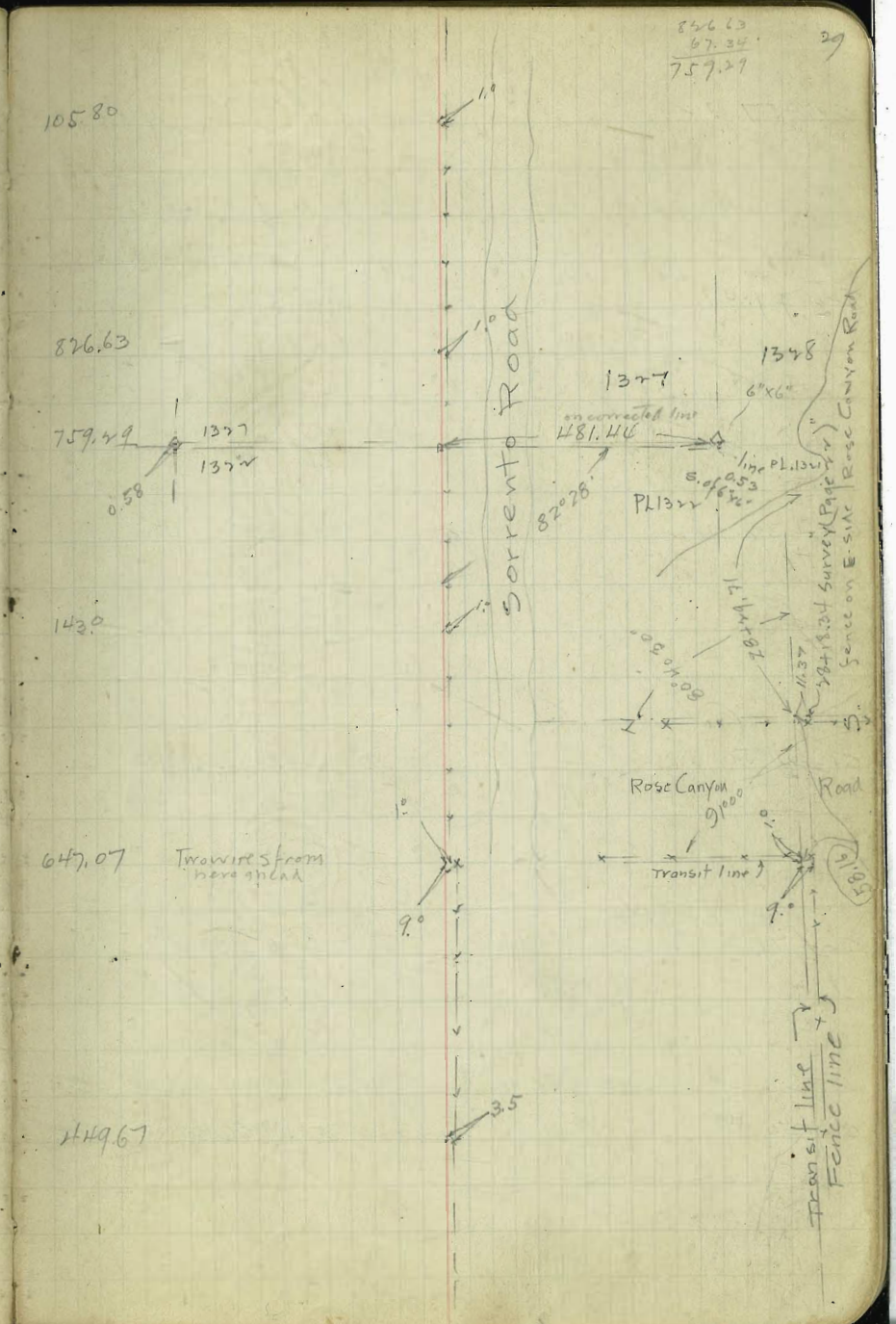
58+78.18 — Δ 8°24 Rt

57+61.38 Int. corrected P. Line
57+60.84 Int P.L. line Random

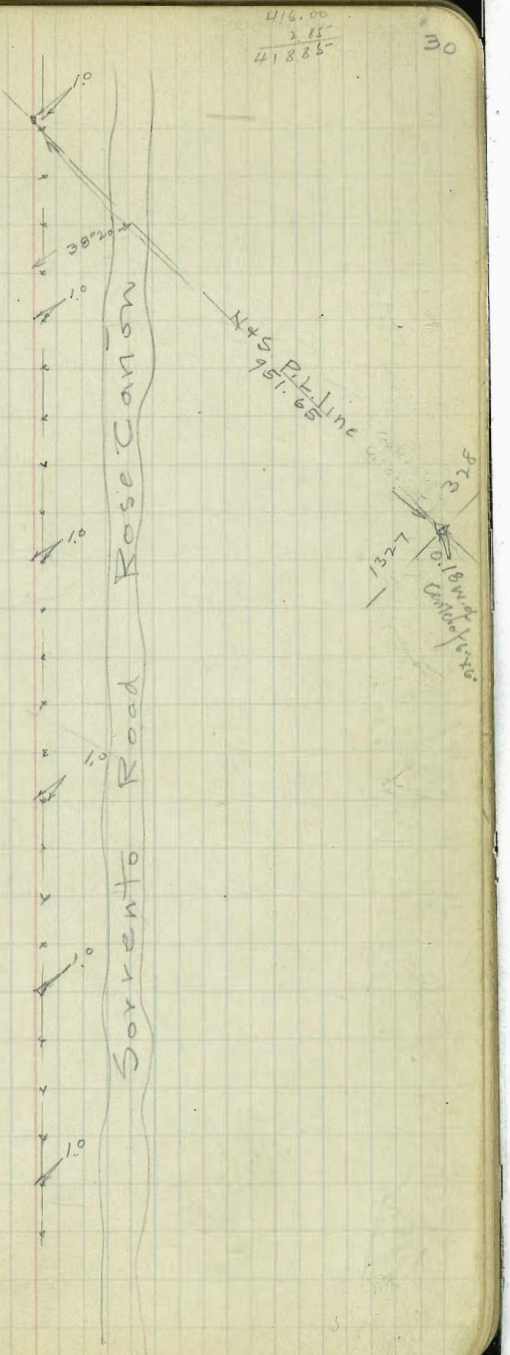
50+01.55 — Δ 7°53 Lt

48+58.55 — Δ 91°00 Lt

46+61.15 — P.O.T.



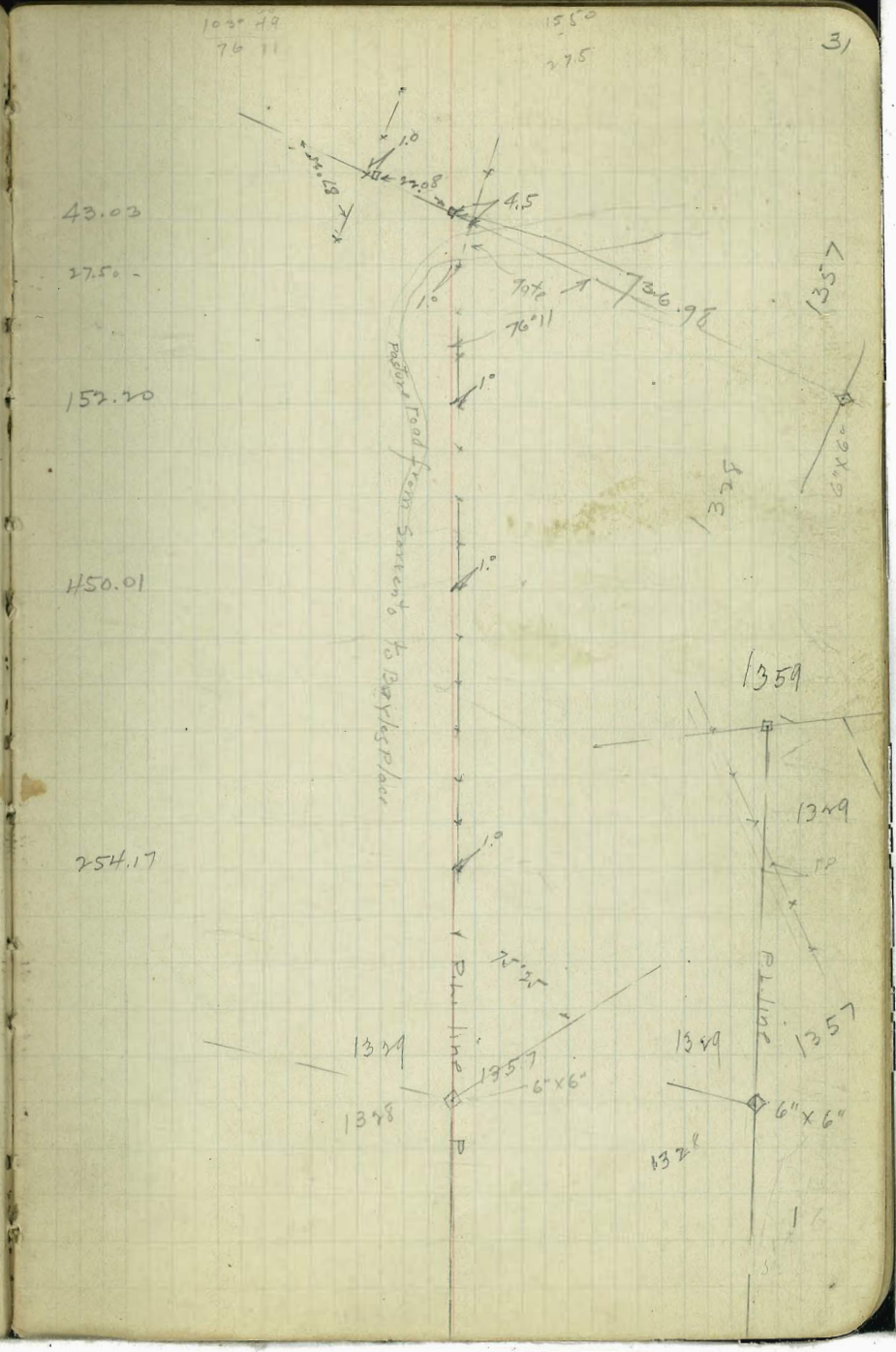
68+57.92	Int. P.I. line	418.85
64+39.07	Δ 10°36' Rt	206.17
62+32.90	Δ 10°27' Lt	131.40
61+01.50	Δ 3°24'30" Rt	23.42
60+79.08	Δ 16°55' Rt	28.60
60+50.48	Δ 2°53'30" Rt	116.50



Williams
Otten
Maxon.

March 5-1919

8+99.41	Int. P.L line	Δ76°11' Lt	along P.L. line
8+83.88	W. end of Gate		
8+56.38		Δ11°00 Rt	
7+04.18		Δ89°55' Rt	
2+54.17	Int of fence line on P.L line	Δ23°44' Lt	1' west of fence
0+00	North. 6"X6" old scribed Cor.	1357 (1379 / 1378)	Near Sorrento School.



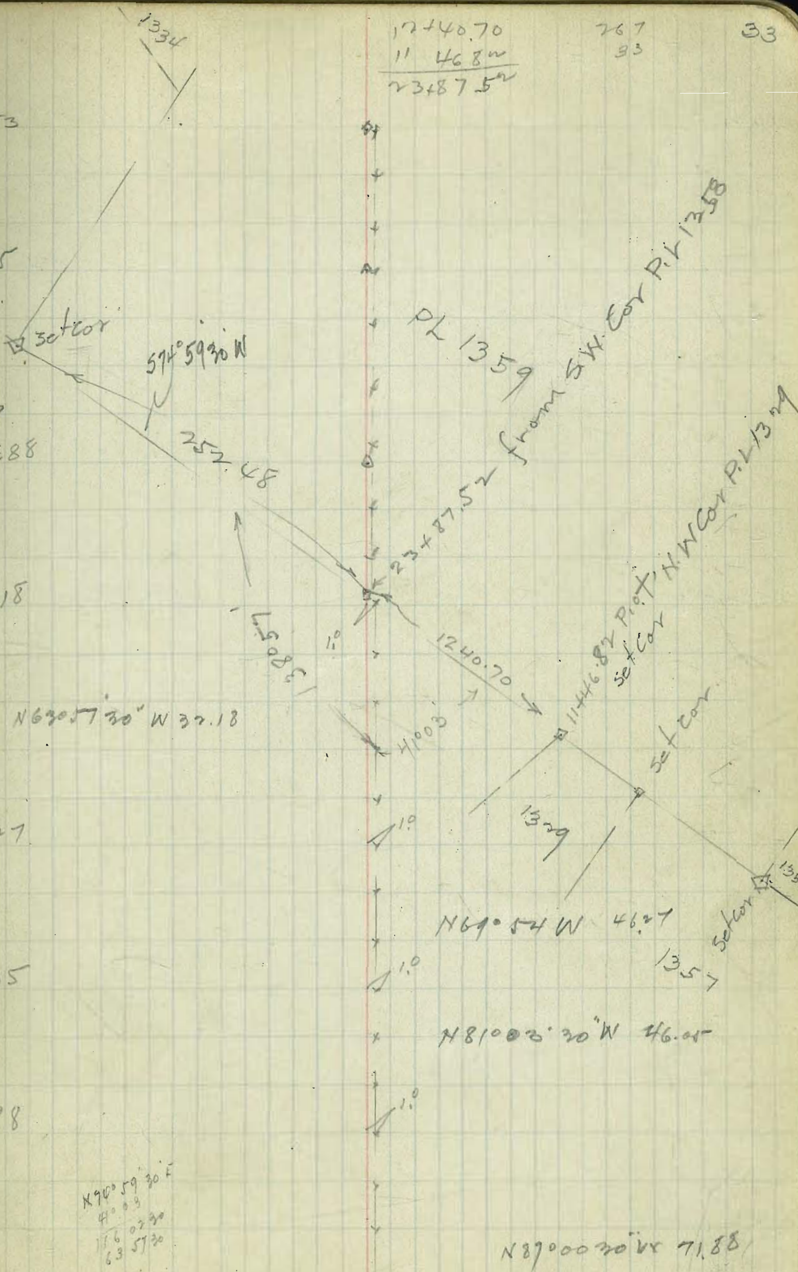
24+38.19	Δ 30°13' Lt	48.66	N 83°47' 30" W 48.66
23+89.53	Δ 120°34 Lt	47.67	N 71°13' 30" W 47.67
23+41.86	Δ 21°10 30" Lt	59.10	N 50°03' W 59.10
22+82.76	Δ 5°57' Lt	121.97	N 44°06 W 121.97
21+60.79	Δ 2°12' Rt	201.70	N 46°18 W 201.70
19+39.09	Δ 56°32' Rt	1037.6	S 79°10' W 1037.6
9+21.49	Δ 87°25' Lt	22.08 along P.L line North to fence	S 15°26'10 E

138°57'
41°03

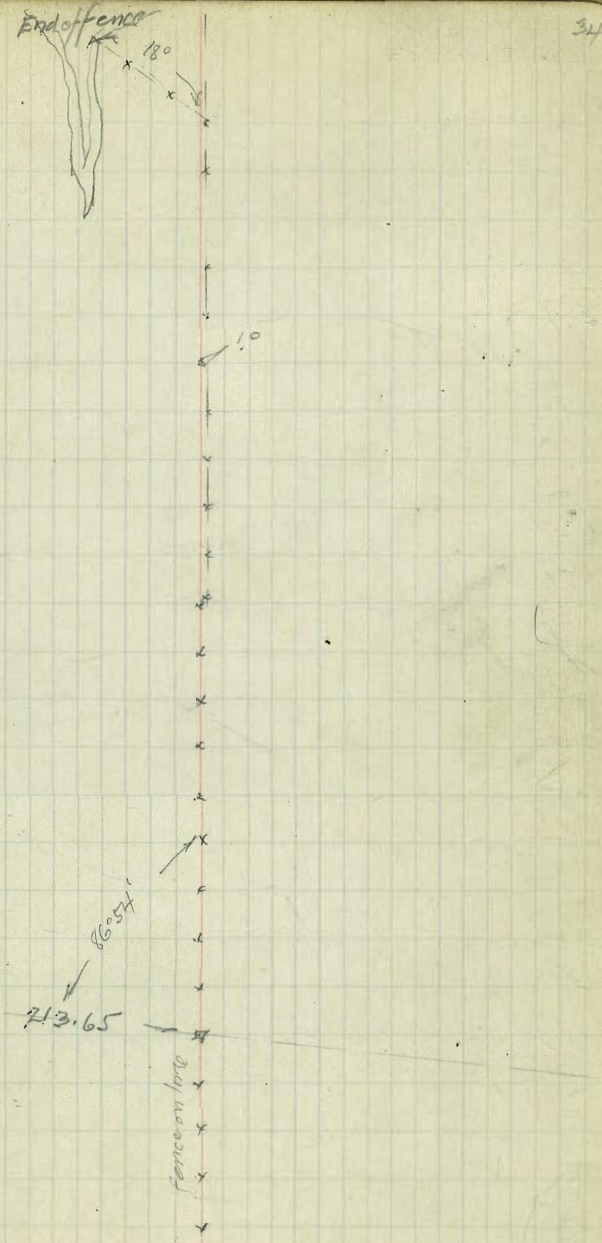
Station	Remarks	Δ	Distance
28+61.73		Δ 11°34' Rt	23.53
28+38.20		Δ 8°24'30" Rt	118.75
27+19.45		Δ 2°45' Rt	84.88
26+34.57	Int P.L. line E+West South line P.L. 1359	ahead Δ 3°51'30" Rt	32.18
26+02.39		Δ 5°56'30" Rt	46.27
25+56.12		Δ 11°09'30" Rt	46.05
25+10.07		Δ 5°57' Rt	71.88

17+40.70
11 468
23+87.52

267
33



40+63.88	End of fence		
40+45.88		Δ35° Lt	117.48
39+33.40		20°35 Lt	554.44
33+78.96		Δ45°09 Rt	464.59
29+93.54	Int P.L. line N+S.		77.17
29+16.37		Δ 70°42 30" Lt	54.64



Williams.
Otten
Maxon.

38°49'
116°28
38 49 20

9.6999700
0.0943879
7.7933579 621.38

74°26' 15"
23°36' 34"

65°59' 30"
131°59

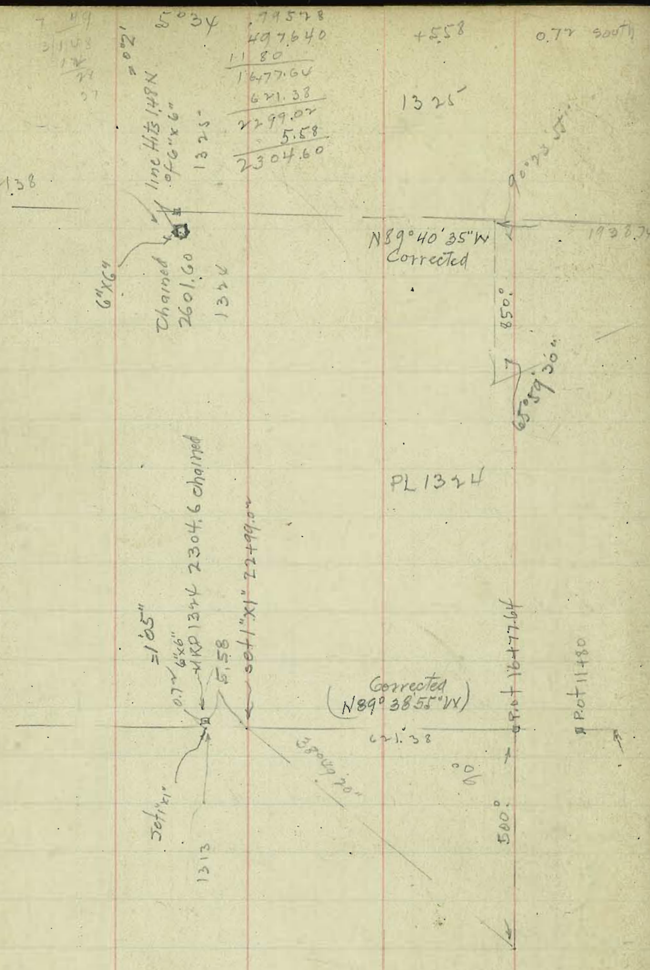
90°24'
80 47 45
90 23 52
23 36 38
89 59 30
9 565

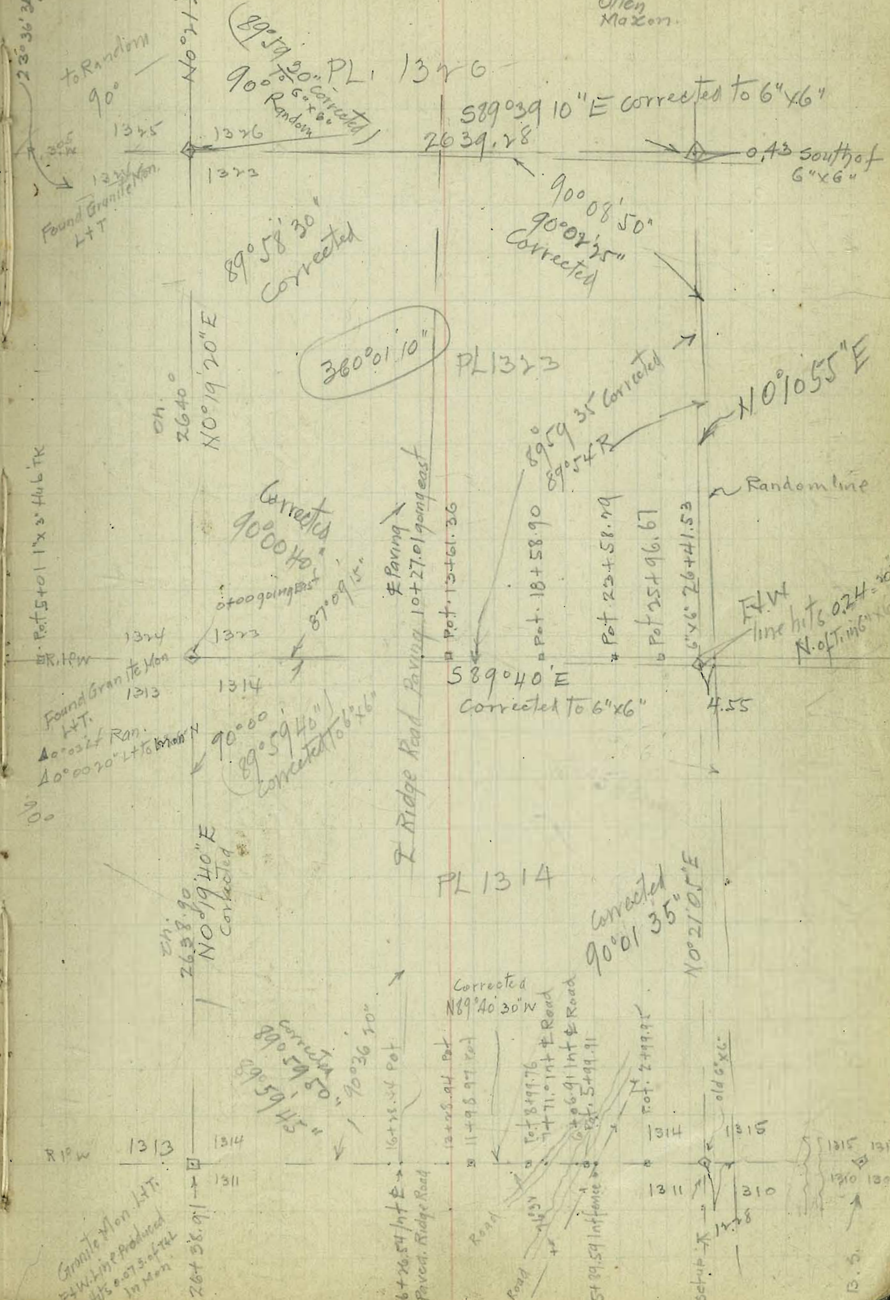
2°50'
4652

7°54'
200

+0.33

7°25
155





38-43-30
116-12-15
38 44 05

0.0957679
216
0.0957463
3.3261518
3.4218978 (2641.8)

38°44'02"

4°30 500
5°10 167.9

9969
498.460

659.45
14.07
645.38

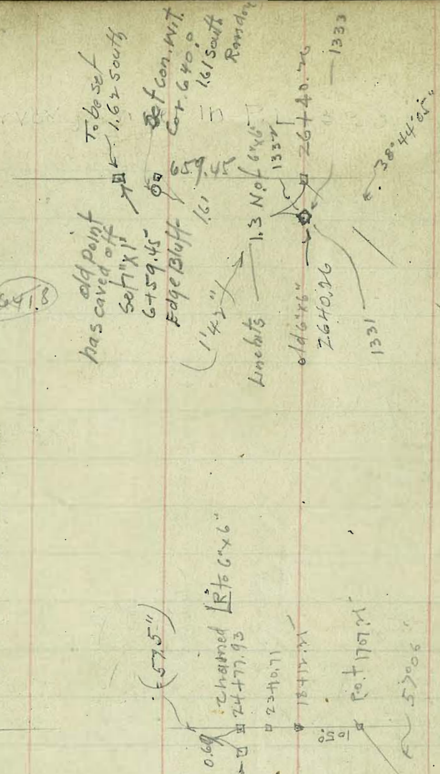
7.25
15.5
10°30
2750
12°18
240.78

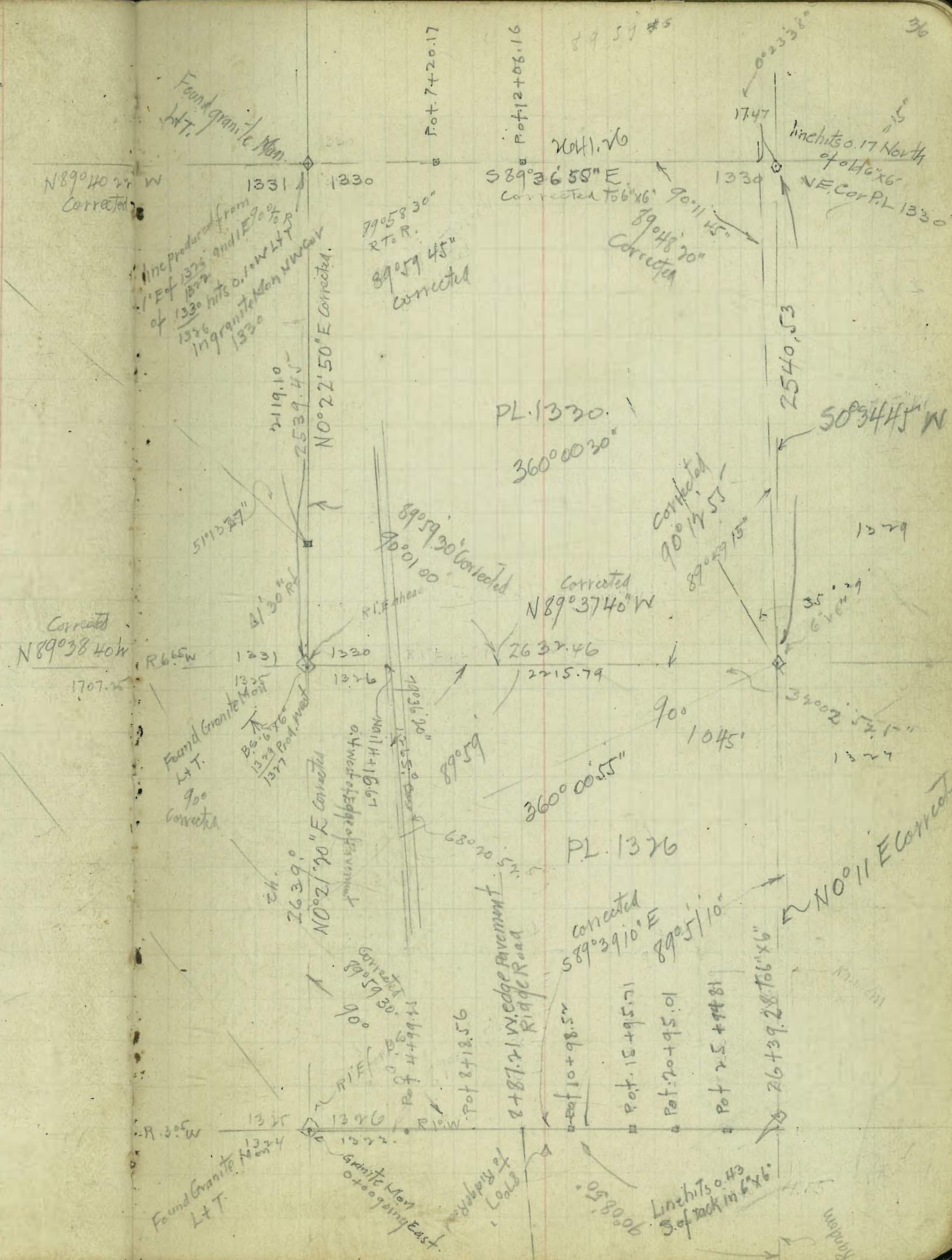
256°07'15"
51 13 27

1.60
1.30
.32 00 (0.0005)
.33 00

660

887.41
8
895.21





9.9 [illegible]
6 [illegible]
16 [illegible]
8 [illegible]

9.9796182
1.6
298
9.9796149

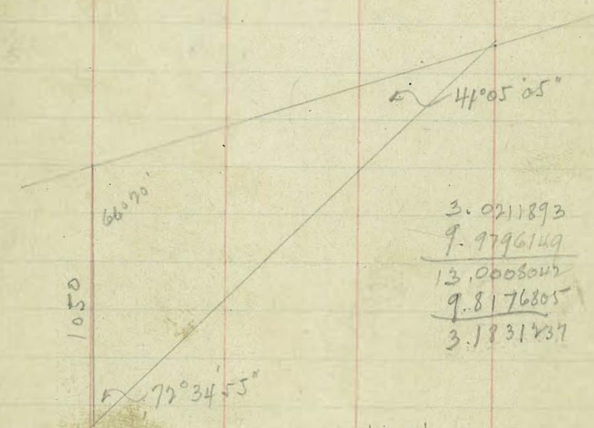
116.58

1301+79.50
1 16.58
1300+62.92

1273+01.80
1 03.80
1274 05.60

1273+01.8
27 59.7
1300+61.5

41° 05' 05" : 1050.0 = 72° 34' 55" : X



3.0211893
9.9796149
13.0008042
9.8176805
3.1831237

1524.50
710.60
2235.10

1274+05.6
27 59.7
1301 65.3
1 03.8
1300 61.5

1257.98
1151.62
107.36

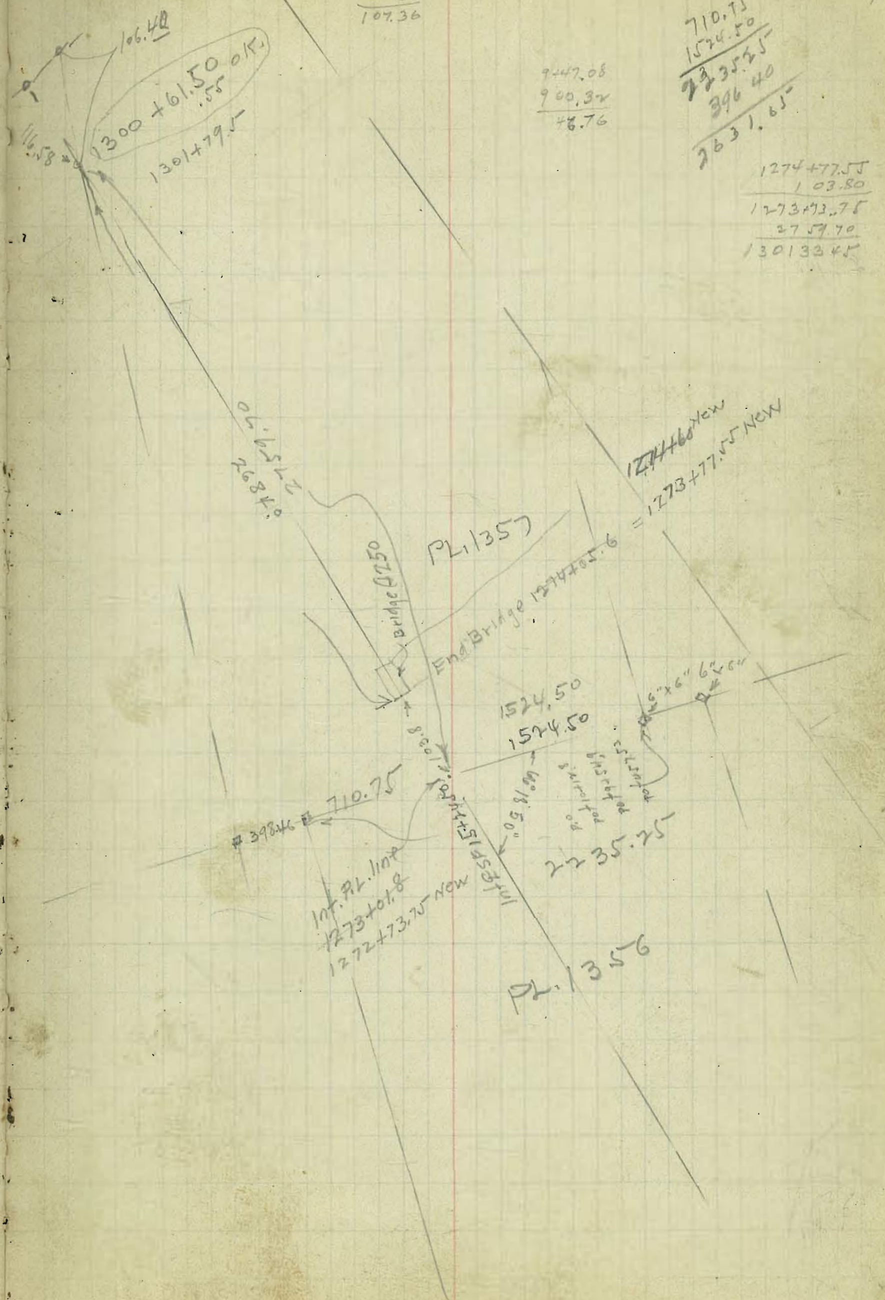
901.50

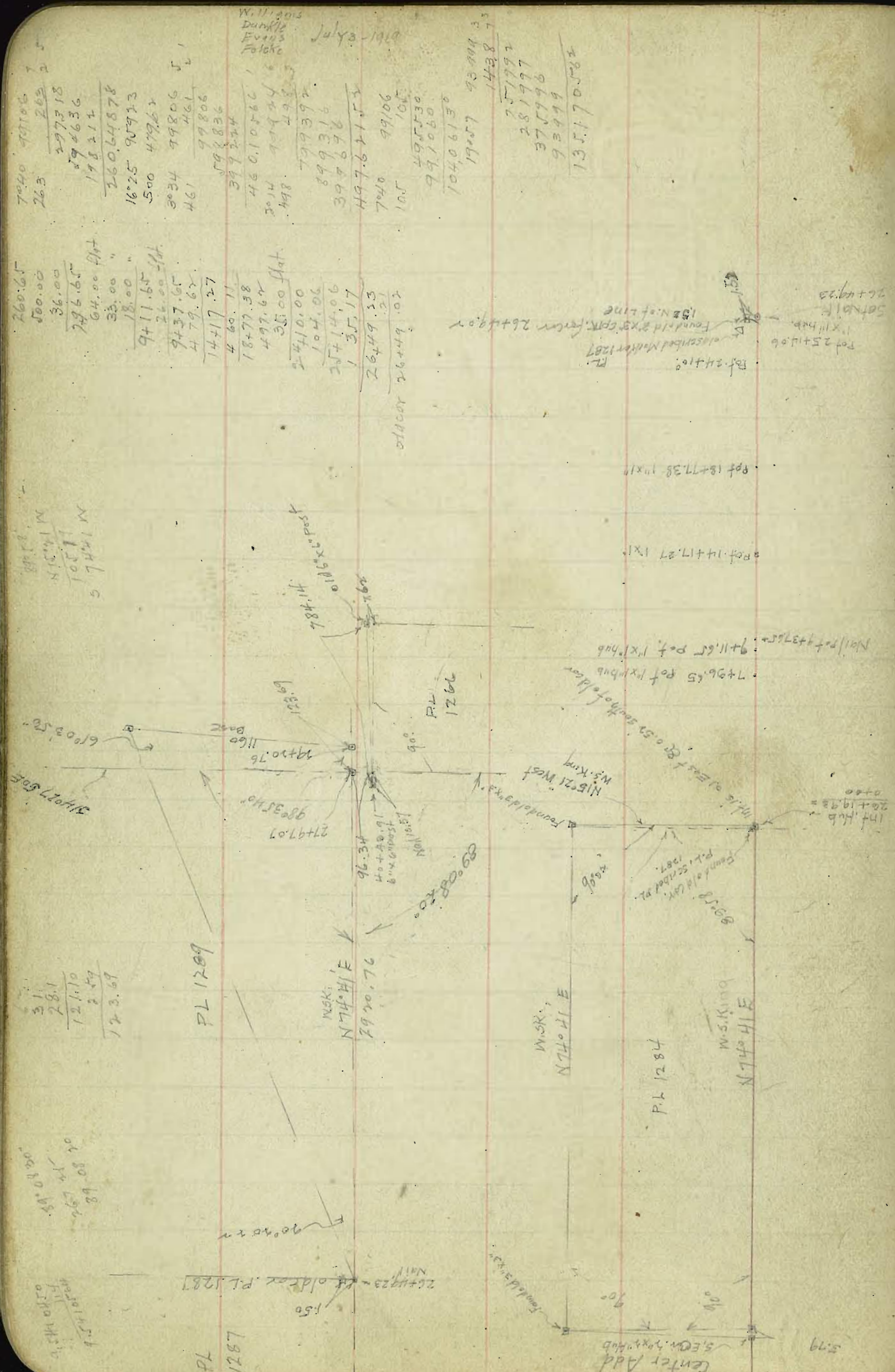
39° 41' 30"

9447.08
9600.32
46.76

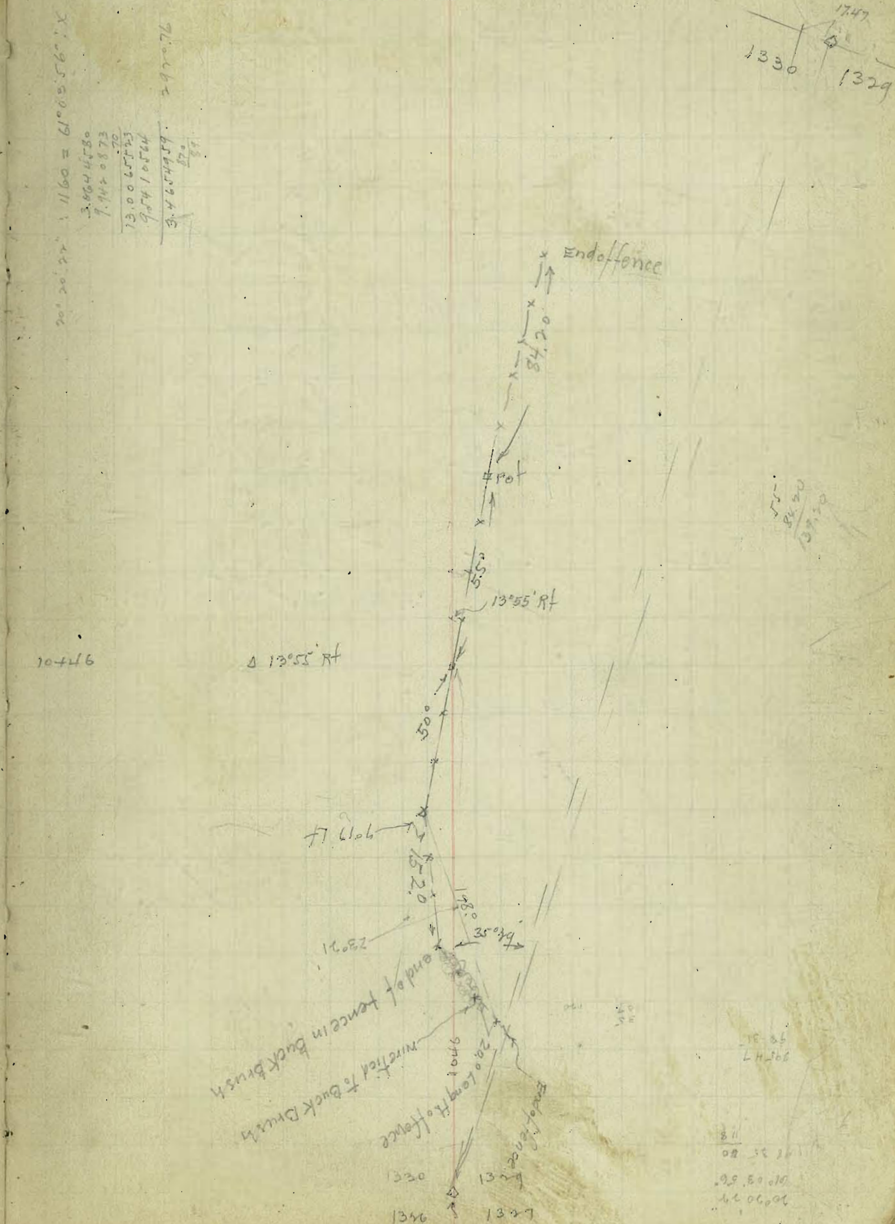
710.75
1524.50
2235.25
396 40
2631.65

1274+77.55
1 03.80
1273+73.75
27 59 70
1301 33 45

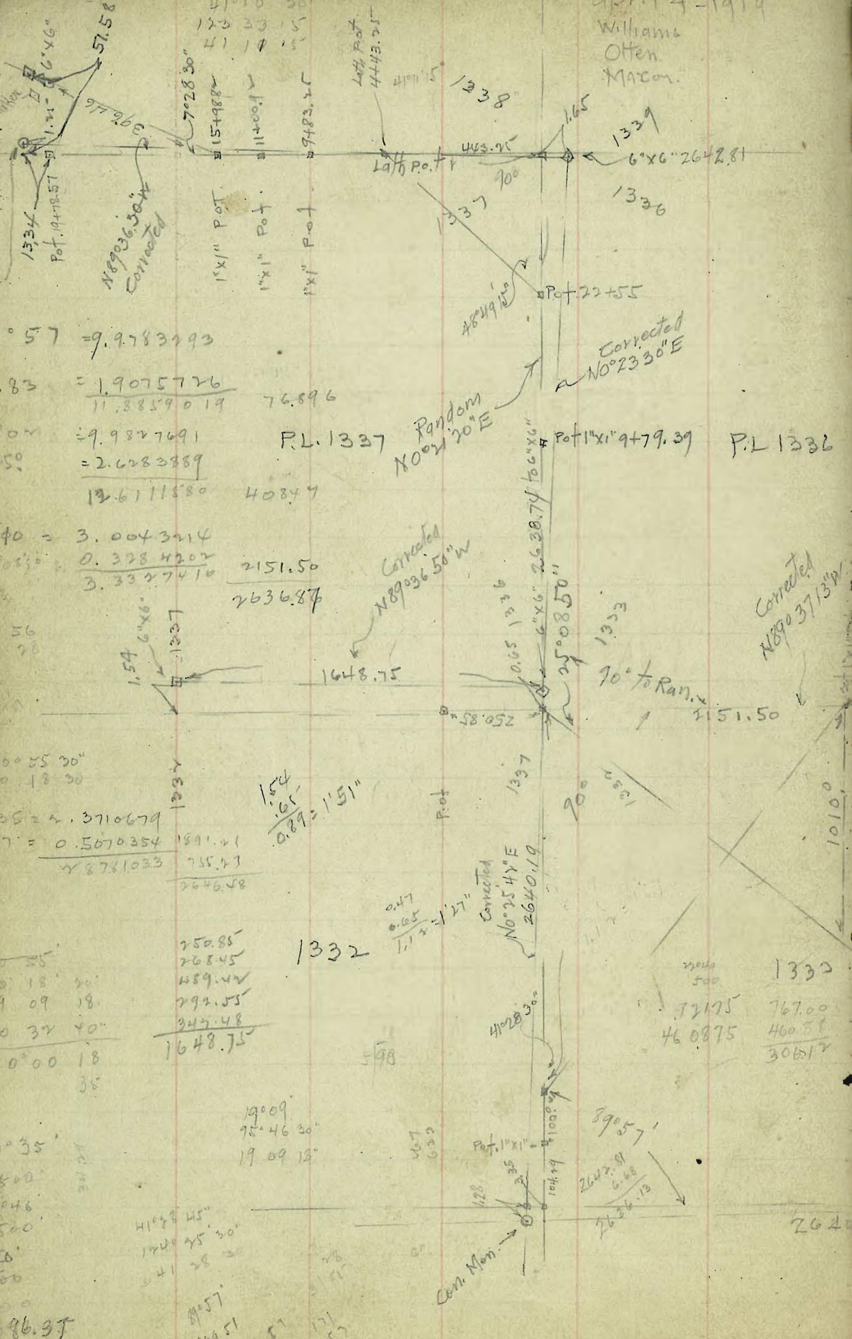




Fence in P.L 1330



april 4-1919
Williams
Otten
Macon.



17°57 = 9.9783293
80.83 = 1.9075726
11.8859019 76.896
160 m = 9.9827691
+ 25° = 2.6283889
12.6111580 40847
1000 = 3.0043214
25°08'30" 0.3284202
3.3327416
2151.50
2636.87

200°55'30"
100 18 30
235 = 2.3710679
17°17' = 0.5070354
2.8781033
1891.21
755.27
2646.48

250.85
268.45
459.42
292.55
347.48
1648.75

200 55
100 18 30
19 09 18
60 32 40
180°00 18
35

19°09'
95°46'30"
19 09 18

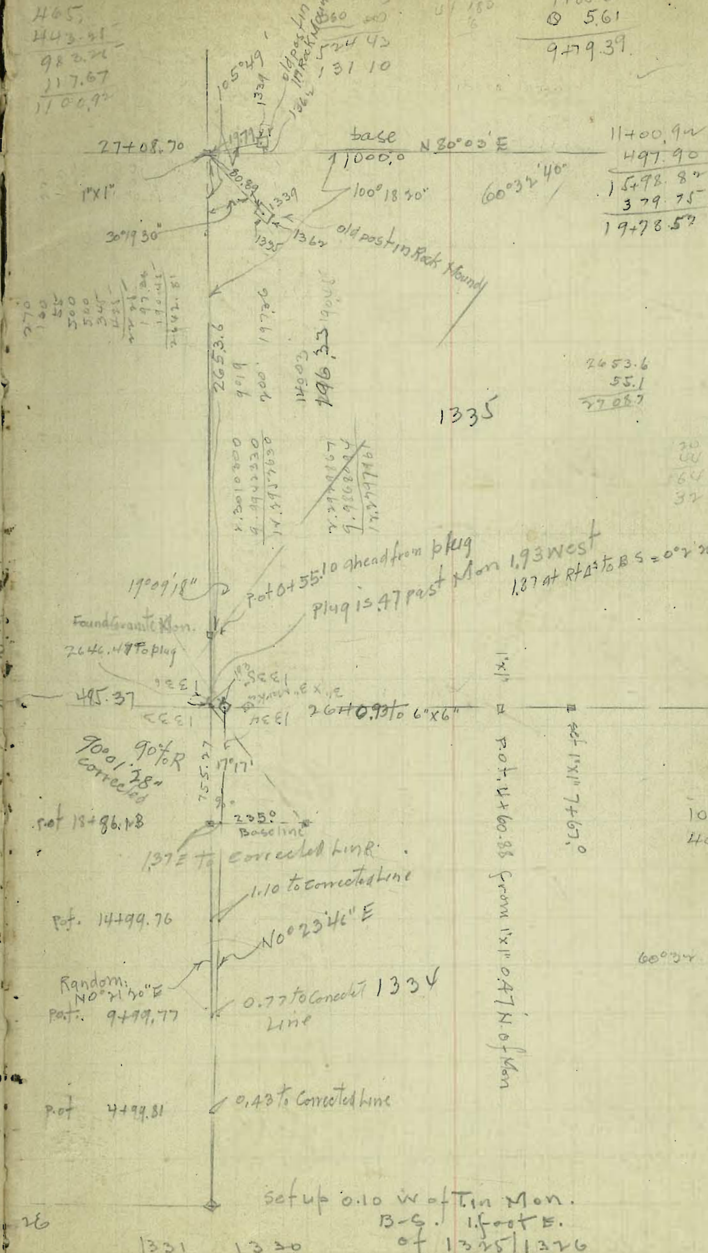
1°35'
500
0°46
500
0°30'
500
386.35

41°38'45"
174°35'30"
41 38 30
89°57'
269 51
89 57
171 57

22175
460875
767.00
460.51
306.12

5|98

175°
465
443.21
983.21
117.67
1100.92



1+85.00
5.61
9+79.39

9737
340
379.75 - 39

1583°

11+00.92
497.90
15+98.82
379.75
19+78.57

Base 235°

11°18' .98061
120 120
1961220
98061
.11767320

5°56'
500.58
9.9976677
2.6994735
12.6971407
497.90

2653.6
55.1
2708.7

60°33'
302°44'
60°34'40"

7°28'30"

10°05 9.9932396
402.68 2.6049601
12.5981997
39646

60°34'35"

391.21
.24
391.45

386.37

1886.13
755.27
2641.40
.47
2640.93

Williams
Otten
Maxon.

March 1919

Survey of City line from Cor. #2 Del Mar: to Angle Point near Sorrento.

2040	99344	171.00	2040	3018	4007	3057
300	297,972	297.97	300	300	300	300
		468.97	99892	99834	99742	.99762
			299,676	299502	299,226	299,286
				1197.69		

40

10 +65.0 P.o.t. 1"x1" set Con. Mon. 3"x3' post

0.805
set 1x1" set Con. Mon on Corrected City line

9

8

6.905863
3.940765
10.846628

7021

7

' 469
8
.3752

6

5 +68.97 P.o.t.

set 1"x1"

4

3

2 +71 P.o.t.

Nail

1

0+00 = 12"x12" Cem. Mon. on Bluff near Del Mar. Know as cor. # 2. Pueblo San Diego (Random S47°05'40"E) S47°02'54"E Corrected

Con. Monument 12"x12" sq. 12" High Cor. #2, on Bluff of Pacific Ocean Near Del Mar.

Log. of Correction to Δ at Sorrento =
= 6.9058638 = 2'46" = .080513 pr 100'

Set Con. Mon 993.56 from 1"x1" and 1.25 N. W. of R. line

22

21

20

19

18

47.23 1"x1" N. of Paved Highway

17

16

15

14

13

12

11

70+15

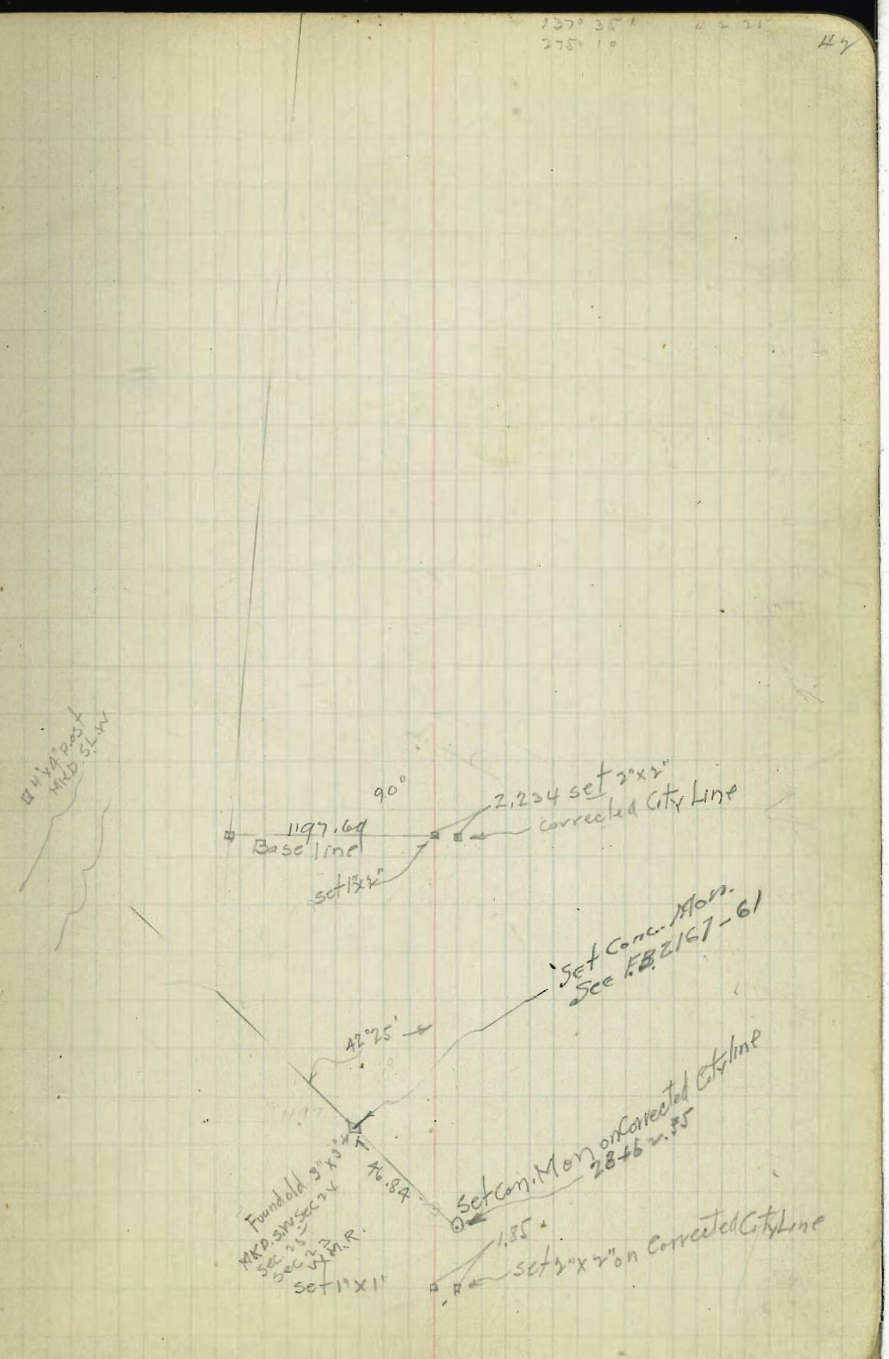
17+47.2
9.5
17+56.7

203+01.1

To San Diego Paved Highway
Set 1"x1"

City Line Del Mar to Sorrento

34		
33		
32		
31		
30		
29		
28	+75	Pot Triang. Point Baseline 90° Lt
27		
26		
25		
24	+62.55	Int. Sec. line
23		1" x 1" Pot



46

45

44

43

42

41

40

39

38

37

36

35

170 | 55.54 | 389.21 | 161
3 164 | 7742 | 129.47 | 12
54 | 25 | 50.13

City Line Del Mar to Sorrento

58

57

56

55

54

53

+68.80 Int. S. Line P.L 1340 Found Granite Mon. on line

52

51

50

49

48

47

20: 3.3 25

10+20.27

95+23.42
53+67.50
42 55.92
17+95 00
1460.92

1460.00
38
(1459.62 Rt Δ ti
Cor.) 44

50° 13 00
103° 53 30"
25° 54
180 00 30

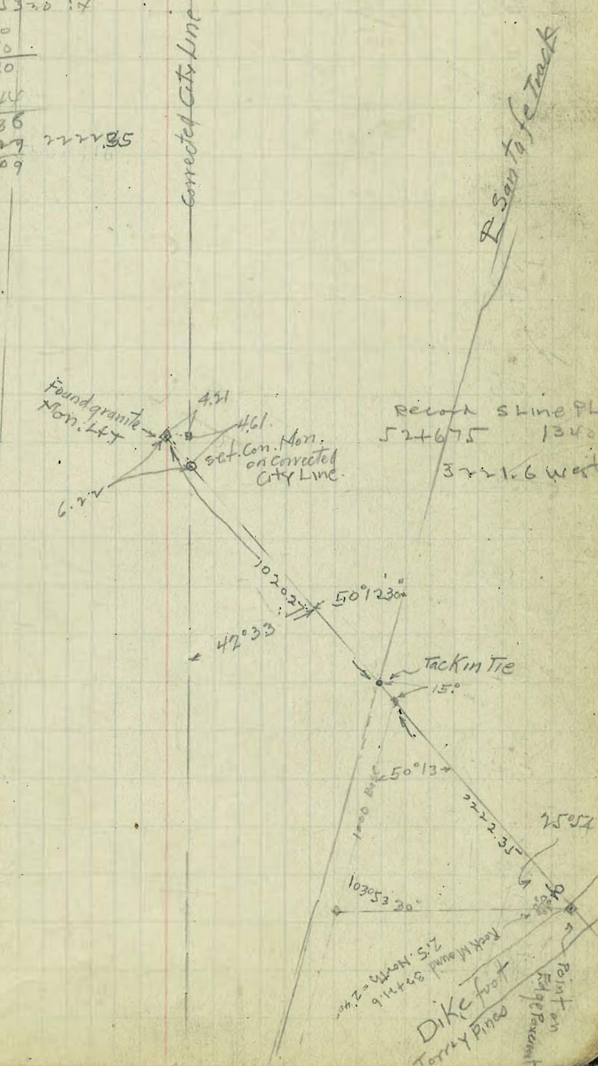
179 = 59 - 60
103 53 30
76° 0 6" 30

95+23.42
14 59.62
80 63.80
27 95.00
5268.80

25° 54 ! 1000 = 103° 53' 30' : x
3.0000000
9.9871080
12.9871080
9.6402844
3.3468136
027 2222.35
109

1020.27
15.
2222.35
3257.62
3221.60
36.02

52+64.19 Corrected int.



70

69

68

67

66

65

64

63

62

61

60

59

City Line Del Mar to Sorrento

82

81

80

79

78

77

76

75

74

73

72

71

94

93

92

91

90

89

88

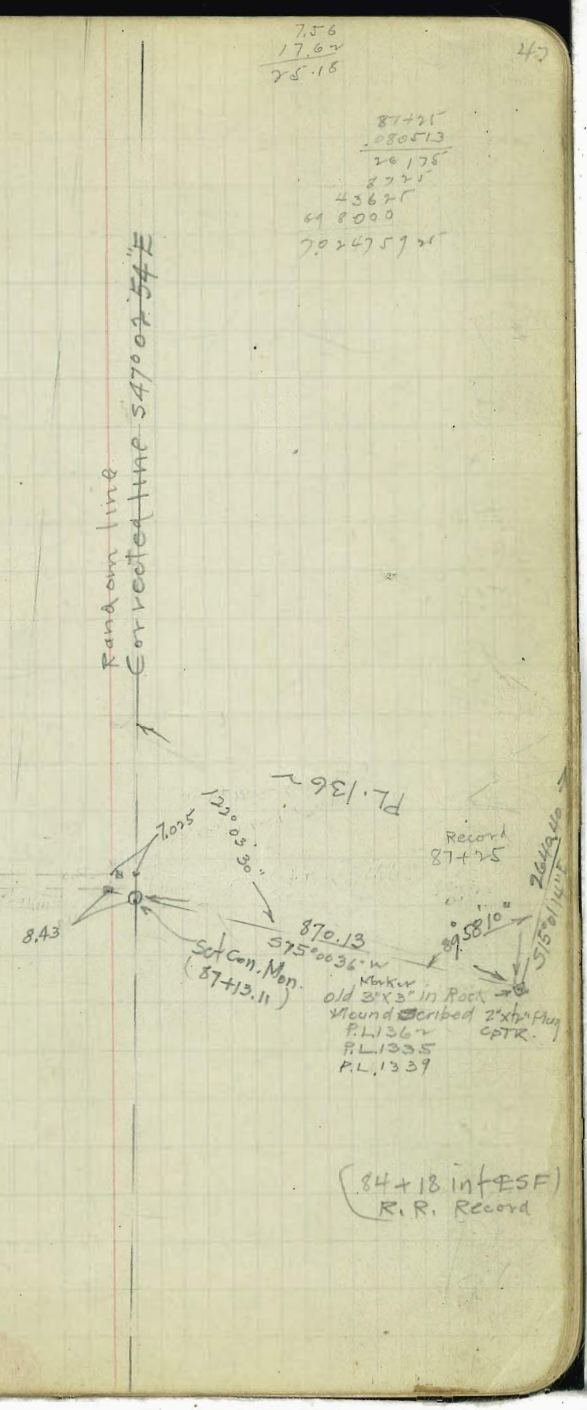
87 +25.18 old 3"x3" in Rock Mound 0.58 W. of Random line
+17.6 ± Inf. P.L. 136 ± 2"x2" R.W Hub & Cp.Tk 0.13 E. of Random line

86

85

84

83



City Line Del Mar to Sorrento

106

105

104

103

102

101

100

+35.95 P.o.t. top Hill

6.9058638
= 3.9972116
10.9030754

99

98

97

96
+69.92 old 4"x4" Marked P.L. on W. S.L.W. on east R.4W on N. R3W on S.
+23.42 to Granite Mon. L+T. int Rangeline and Random line

95

9°30'
47°28' 45"
47°28' 15"

(9°29' 42"
47°28' 30") Top Hill

cot 9°29' 42" = 7160.95

29
51)1 48
10
48
41
3

180
30
51)210
42

48

20°02'
300
93949
281847
130.65
412.521 from granite to pot. 96+35.95

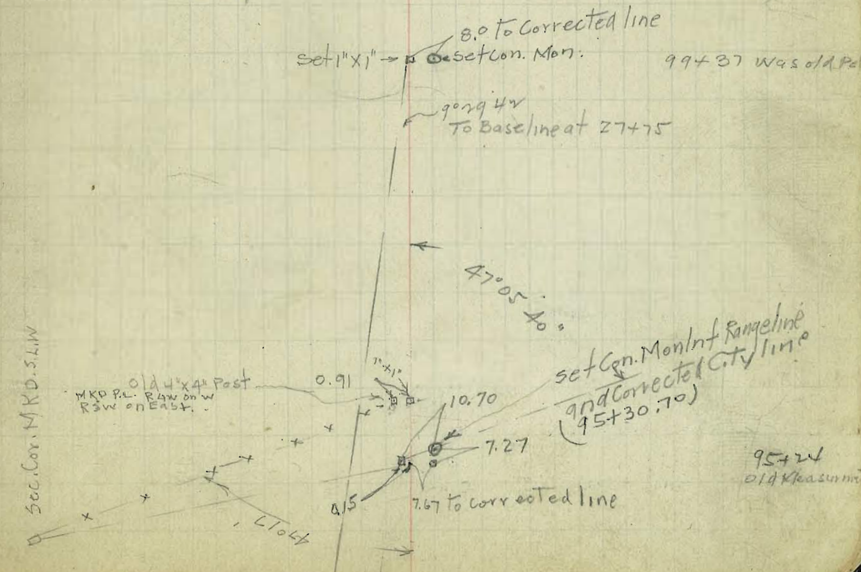
19040
138.77
941.07

9.4738971
2.1422956
12.1161927 130.68

+ 977.00 to put
106+12.95

line hits 0.15 W of L+T
805.80 from granite back to
2"x2" Hub
line hits .13 W. of cp Tik
W.1339
S.1362
N. Plug

46.5 to from granite Mon.
R.4W on north
P.L. on W
S.L.W. on E.
R 3W south

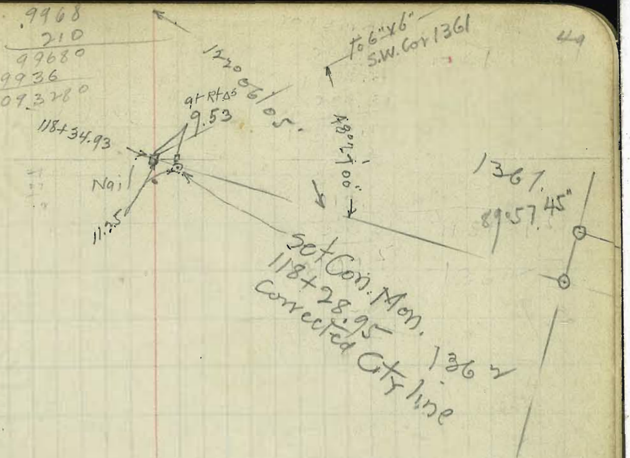


			48°27' 145°21 48 27	3 81 6 21	122° 06' 15" 366 18 15 122° 06' 05"
+34.93 +29.58	1"x1" Nail	Inf.	P.L. 1362. 1361.		
118					
117					
116					
115					
114					
+88.58	Pot	1"x1"			
113					
112					
+79.25	Pot	1"x1"			
111					
110					
+12.95	Set pot 1"x1"				
109					
108					
107					

49

6°28 4°35' .9968
268° 210° 210
.99364 99680
268 19936
794912 209.3280
596184
198728
266.29552

109+12.95
2 66.30
111+79.25
209.33
113+88.58
29
300
112.
300 118+29.58
121+29.58



Set 1"x1"

Set 1"x1" 111+84.0 fence

8.786 W. to Corrected City line

Set 1"x1" Set Con. Mon.

City Line Del Mar to Sorrento

130

129

128

127

126

125

124

123

122

+29.58 P.o.t. 1"x1"

121

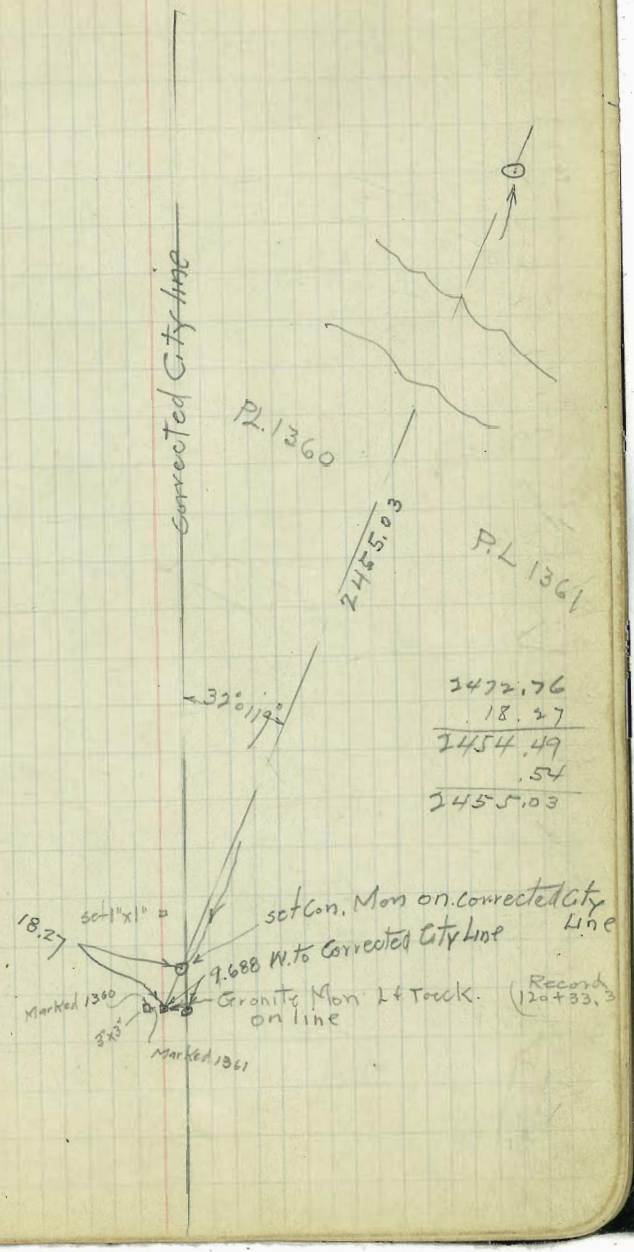
+48.01 New City line Int. P.L. 1360 + 1361 Con. Mon.
+32.53 old Granite Mon.

120

119

32°04.05"
2°46"
32° 01' 19"

50



142

141
+74.61 P.o.t 1"x1"

140
+98.45 P.o.t. 1"x1"

139

138

137
+99.09 P.o.t. 1"x1"

136

135

134 +20.75 P.o.t 1"x1"

+45.75 P.o.t 1"x1"
133

132

131

6°15 .99406
280 280
.7952480
198812
278.33680

3°45 .99786
300 299.358

17°49' .95204
80 80
76.16320

57

set 1"x1" ⌑

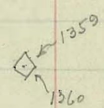
set 1"x1" ⌑

set 1"x1" ⌑

set 1"x1" ⌑

set 1"x1" ⌑

City Line Del Mor to Sorrento

154		
+64.91	P.of. 1"x1"	
153		
152		
151		
150		
+51.75	old 6"x6" Post Scribed	
+44.71	Set Con Mon.	
149		
+85.81	P. of. 1"x1"	
148		
+45.81	P. of. 1"x1".	
147		
146		
145		
144		
143		

160 36' 95832
500 479.160

149+51.75
7.04
149+44.71

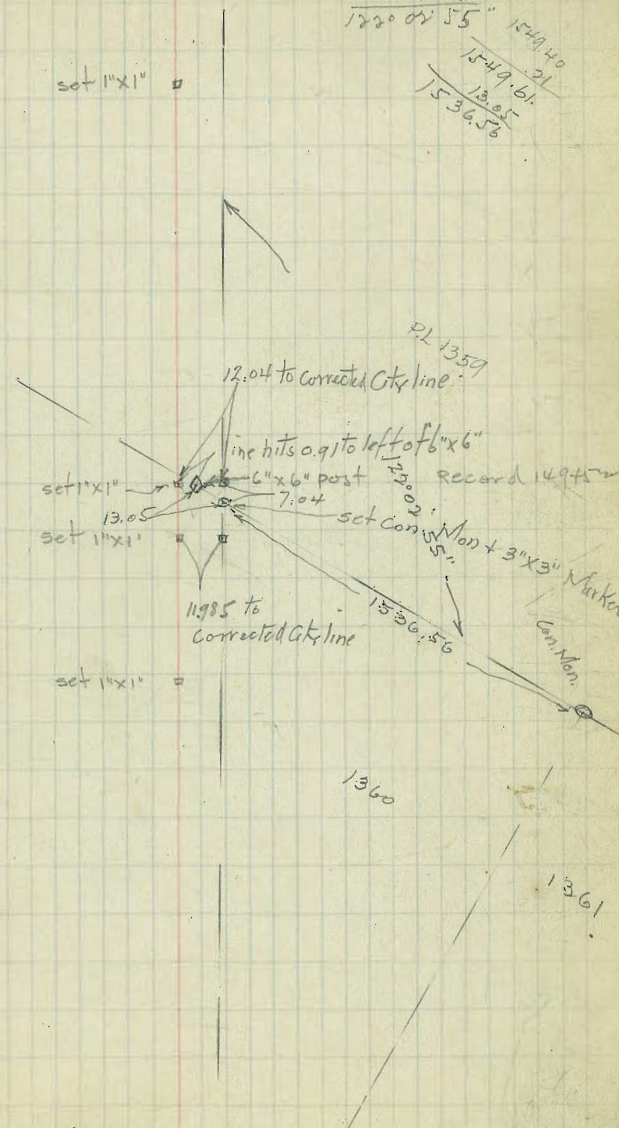
149+51.75
85.81
65.94

140 33' .96793
285.0 285
483965
774344
193586
275.860005

13.05

122° 03' 30"
2' 46"
122° 00 44
2 1.1
122° 02' 55"

1549.40
.21
1549.61
13.05
1536.56



166				
	+59.32	P.o.t. 1"x1"		set 1"x1"
165				
164				
163				
162				
161				
	+80.83	P.o.t. 1"x1"		set 1"x1" 12.95 ← set Con Mon. P.o.t. Corrected City line; 90°
160				
159				
158				
157				
	+40.83	P.o.t. 1"x1"		set 1"x1" 12.59 ← set Mon. on Corrected City line; 90°
156				
155				

160°52' 95698 99°31' 98624
500 478490 500 493120

5° 30 .9954 6°39 .99327 207.52
200 199.08 500 496.635

173+17.46
65.94
172+51.52

City Line Del Mar to Sorrento

178

177 +48.16 P.o.t. 1"x1" — set 1"x1"

176

175

174

173

+51.52 P.o.t 1"x1" — set 1"x1"

172

171

+52.44 P.o.t. 1"x1". — set 1"x1" 13.73 corrected Line

170

169

168

167

186+62.18
6.81
186+55.37

190
+55.68 P.o.t. 1"x1"
189
188
187
+62.18 P.o.t.
186
185
+55.68 P.o.t 1"x1"
184
183
182
181
180
+55.68 Granite Mon Int Twp. 14 + 15.
179

S47°05'40"E

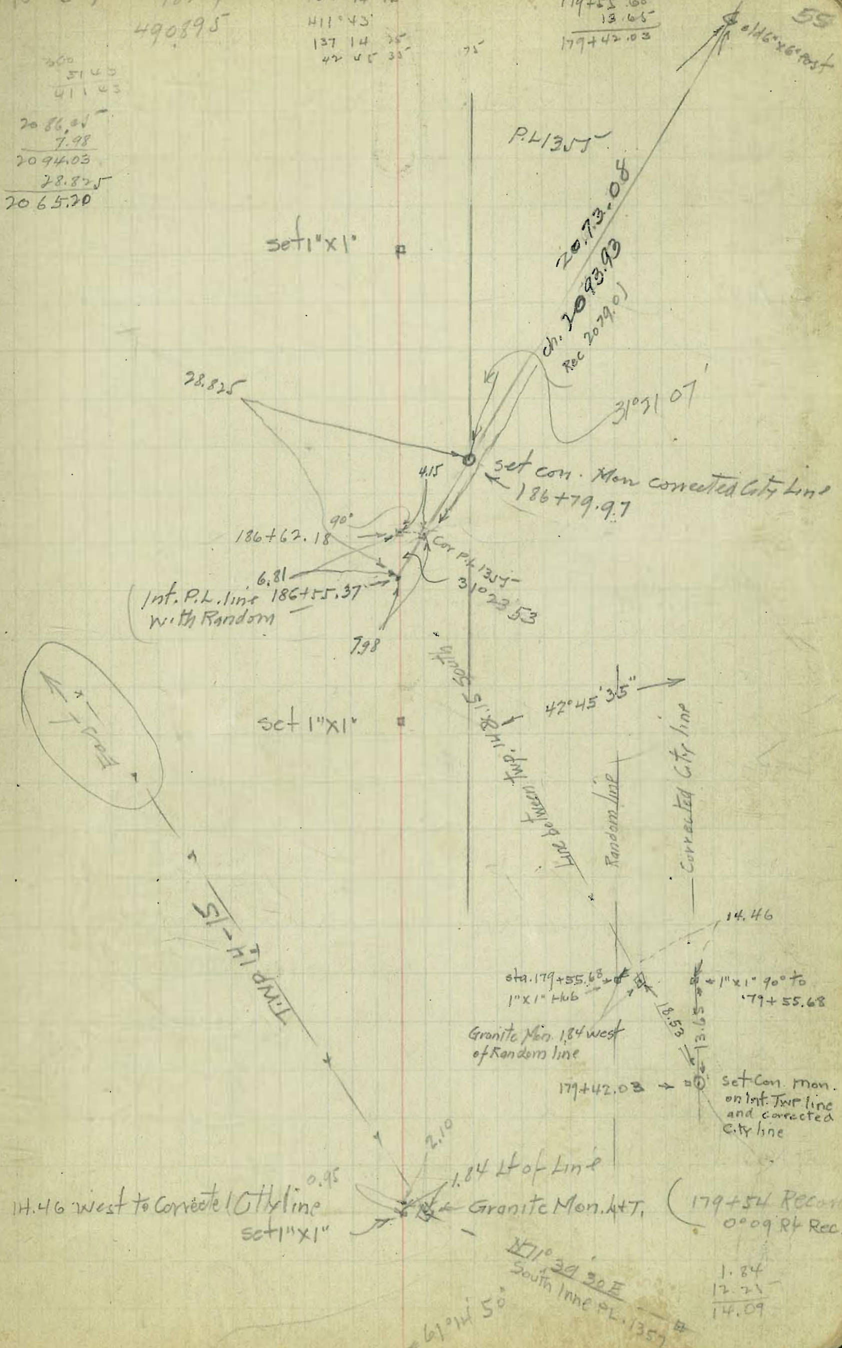
10° 57
98177
490895

137° 14' 15"
411° 43'
137 14 35
42 45 35

360
51 43
411 43

2086.05
7.98
2094.03
28.825
2065.20

179+55.68
13.65
179+42.03



City Line Del Mar To Sorrento

202

201

200

199

198
+92.37 Pof 1"x1"
+86.46 Pof lath + Tack

197

196

195
+46.58 Pof. 1"x1"

194

193

192

191

29°22' 8715
390. 390
7843.50
36141
3398.50

86.46
5.97
92.37

56

15.935

Sof con Mon. Corrected City line 197+92.37

Random Line

Corrected City Line

204+88.46
30.54
205+19.00

214

213 +38.45 P.o.f 1"x1"

212

211 +24.63 Int. N.L.P.L 1356

210 +88.45 P.o.f. 1"x1"

209

208

207

206

205 +19.0 set P.o.t. on Random and Con. Mon. on Corrected City line
+88.46 set 1"x1" P.o.f

204

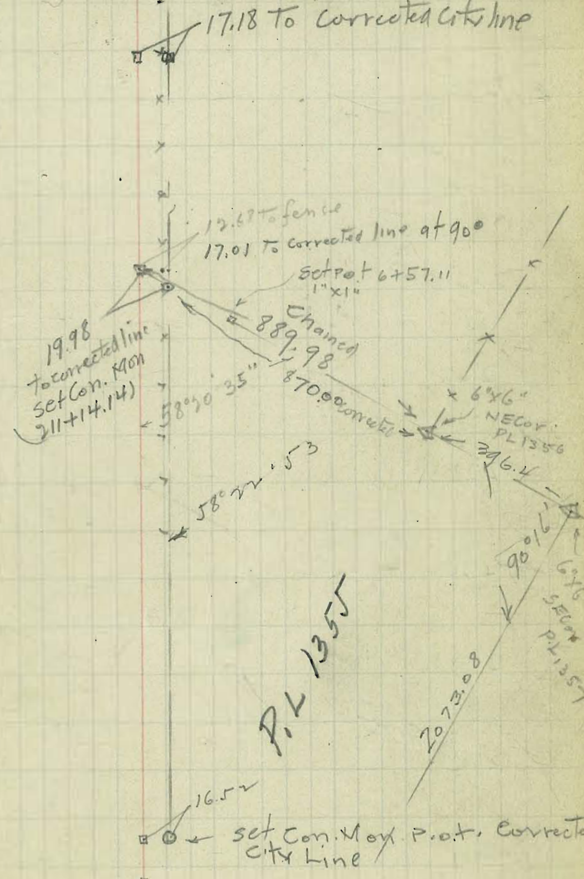
203 +42.37 P.o.f 1"x1"

19°31 ,94254
155 155
471270
471270
94254
146.09370

20 17 99921
500 499.605

889.98
15.17
874.81

211+24.63
10.49
211+14.14



City Line Del Monte Sorrento

+29.83 Post # 3 in Rock Mound (Reset with 8"x8" Granite Post & Lead + Tock.)
226+08.05 Post 1"x1"

225

224

223

222

221

220

219

+38.05 Post 1"x1"
218

217

216

215

29.93
8.01
21.78

479.78
4.78
21.78

226+08.05
21.78
226+29.83

17.13 W. of line
~~18.22~~
Granite Mon.
Set 1"x1"
90°
21.78
(226+33 Post #3 Record

17.13 = 1.233754
226+9.83 = 4.354646
6.879078 2'36"

Williams
Dunkle
Evans
Folcke

June 30-1919

235

234

233

232

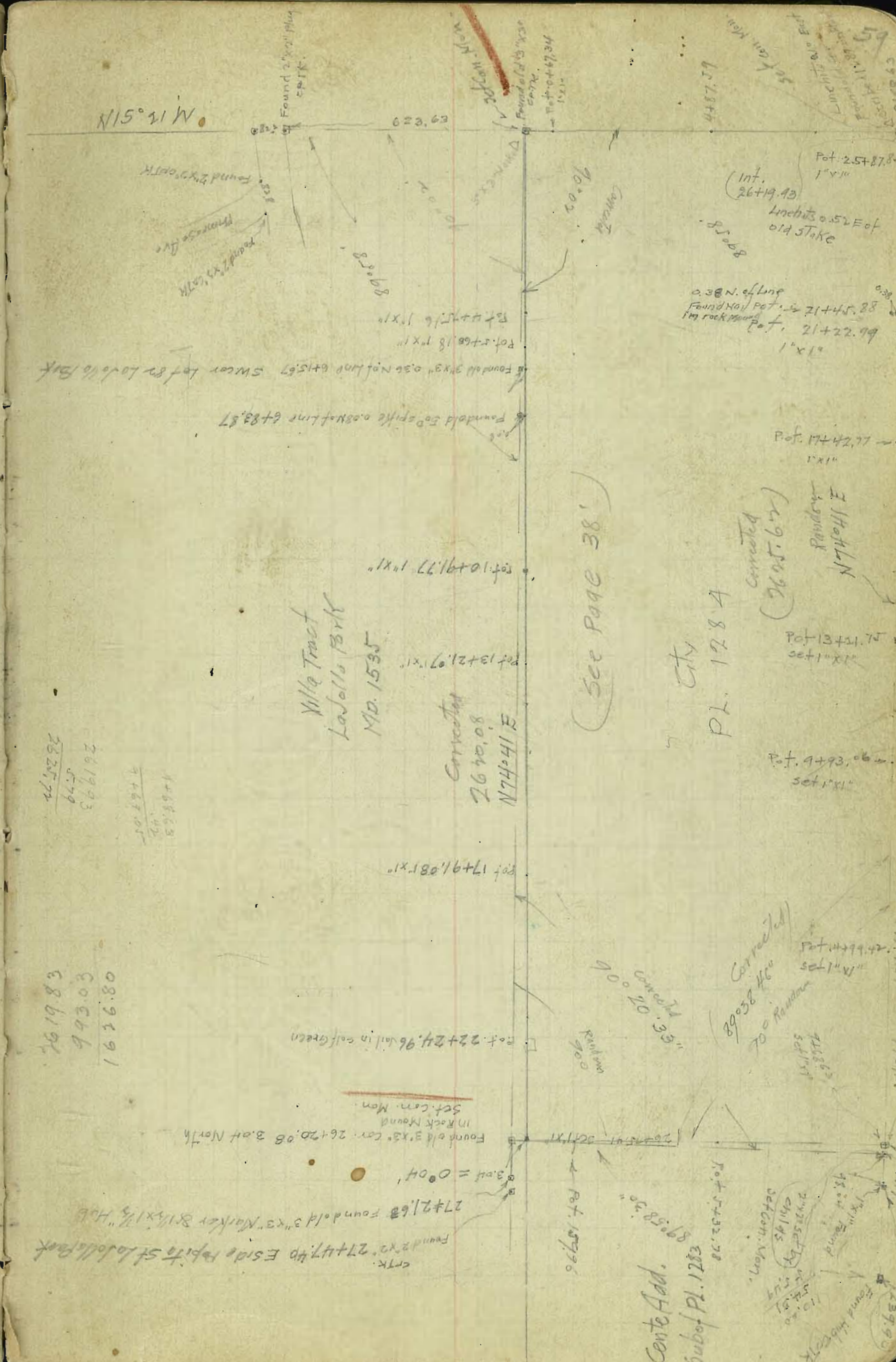
231

230

229

228

227



352 19
117 26 20

366.26
500
866.26

126

179-57-60
100-18-20
79-41-40

April 9 - 1919

N0° 21' 20" E
79 41 40
N 80° 03' 00 E

87+75.18
91.73
88+16.91

3°18

26 40
24 71
169

10°15
135°

98404
125
492020
196808
98404
12300500

57.8
123.0
180.8

180.80
176.47
4.33

11040
205

.97934
205
489670
195868
20076470

336° 55'
112 18 20

57.31

460.88
303.50
764.38

112 23
337 09
112

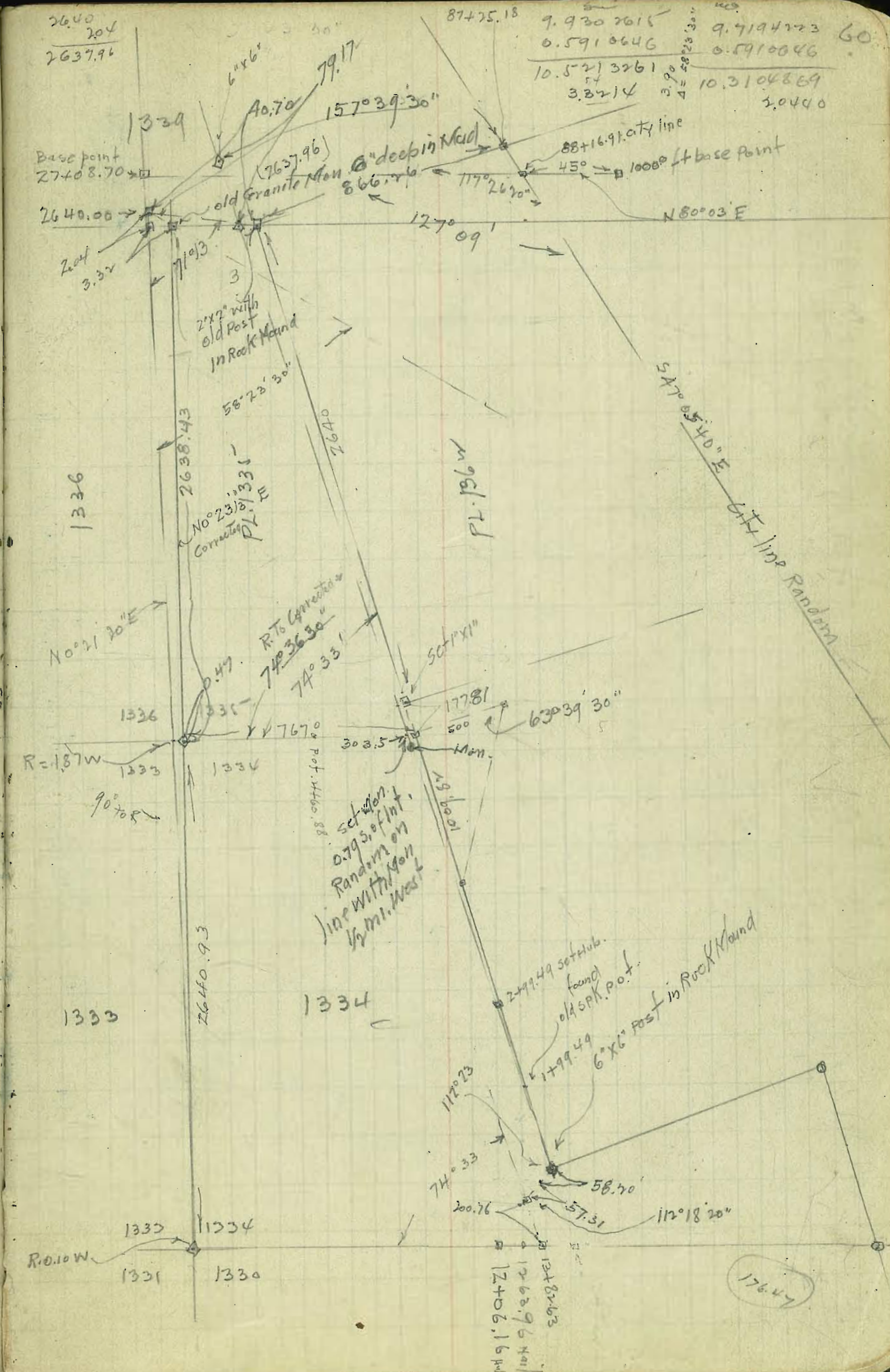
69
23

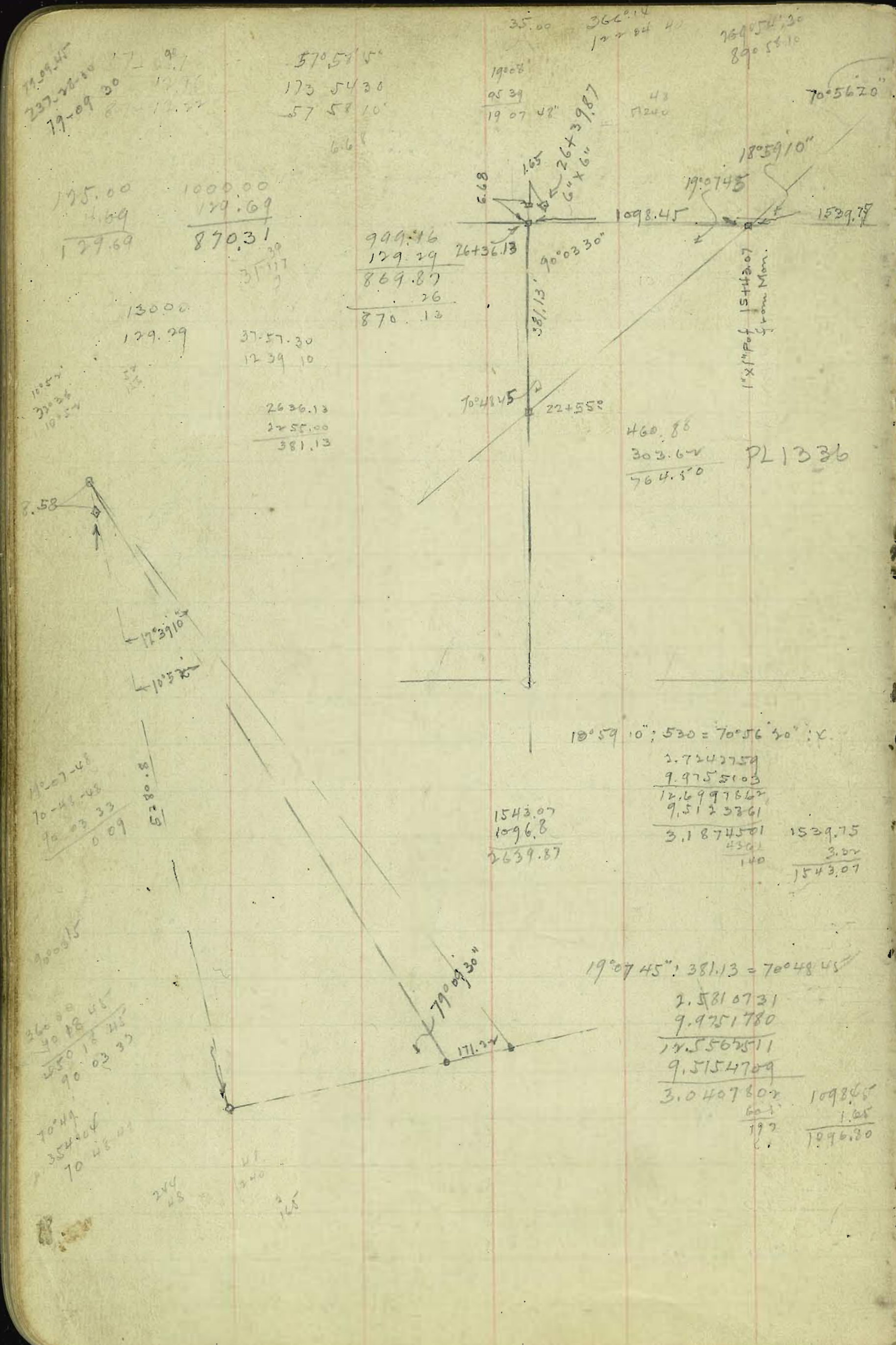
7°39
200

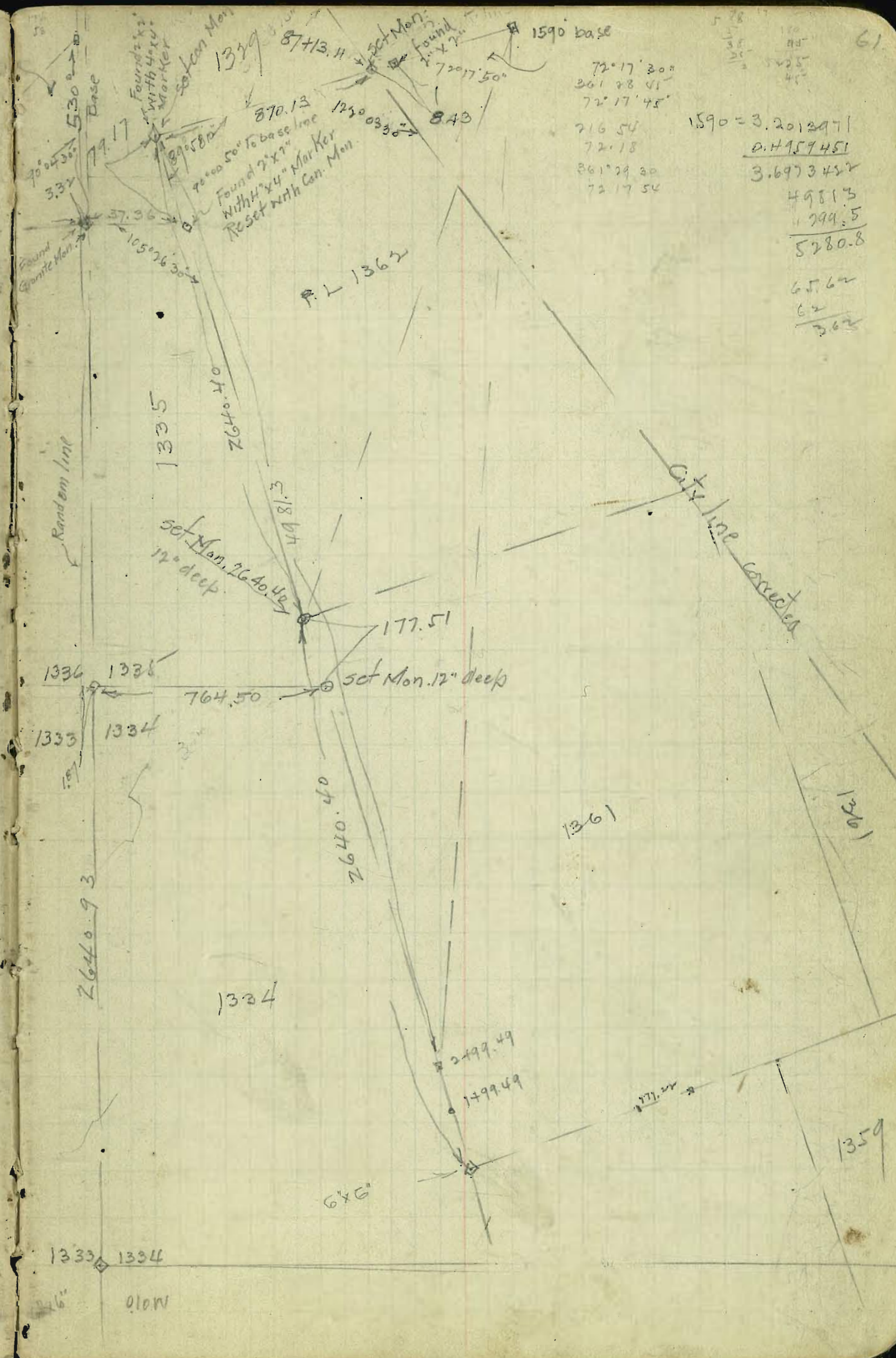
.9911
19822

198.22
+1.27
199.49

1370
60
1430
55
1485
55
1540
50
1590




PL1336
1098.45
1539.75
26+36.13
22+55
381.13
90°03'30"
18°59'10"
19°07'45"
70°56'20"
70°48'45
1"x 5" Post 15+42.07 from Mon.
870.31
870.13
460.86
303.64
764.50
18°59'10"; 530 = 70°56'20" : X.
19°07'45"; 381.13 = 70°48'45
1543.07
1096.8
2639.87
79°09'30"
171.24


1590' base
530 Base
set Con. Mon.
set Mon.
Found 4"x4" with 4"x4" Marker
1339
87+13.11
870.13
843
72°17'50"
89°58'
Found 2"x2" with 4"x4" Marker Reset with Con. Mon.
Found Granite Mon.
37.36
105°26'30"
P. L 1362
Random line
1335
2640.40
4981.3
set Mon. 2640.42 12" deep
177.51
set Mon. 12" deep
764.50
1336
1338
1333
1334
2640.93
2640.40
1361
City line corrected
1334
2499.49
1499.49
6"x6"
1359
1333
1334
010W
1590 = 3.2013971
0.4159451
3.6973422
4981.3
299.5
5280.8

67°43'
203 09 20
67 42 50

11°52' 97863
281° 281
97863
782904
195726
27499503

9.9906180
2.4487063
12.4393243 27750

120+37.53
1 97.60
118+34.93

30'
115
185
3°30

2267171.7
9.999189.2
12.2663609 184.66

365
300
50
40
80
8+35
184.66
1019.66
3.00
13+19.66
229.90
1549.56
16
1549.40

5°03 9.9983109
230.8 2.3632358
12.3615467 229.90

12°13' 9.9900521
183.0 2.2624511
12.2525032 178.86

300.00

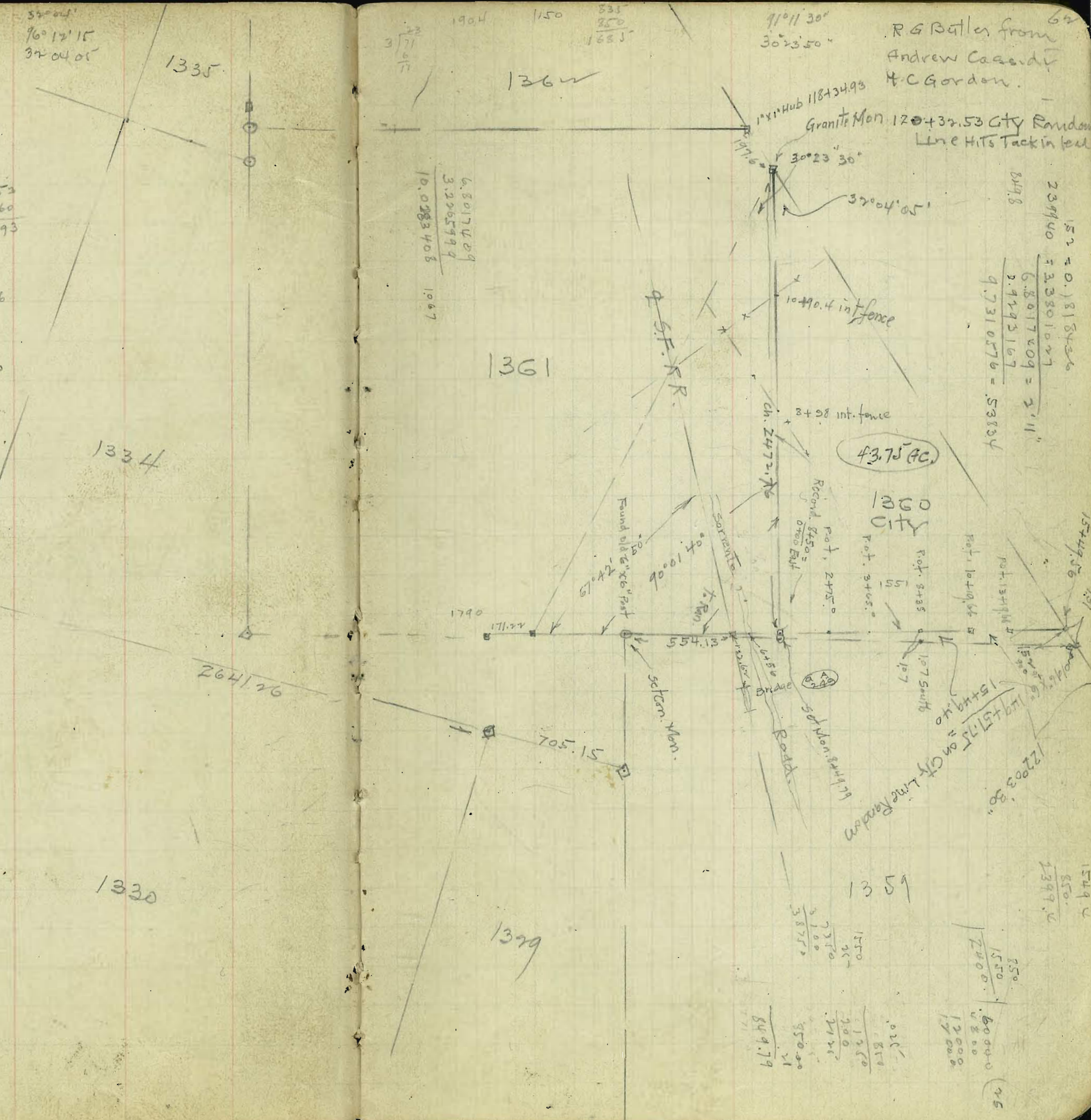
1°33 9.9997653
194.0 2.2878017
12.2875670 193.90

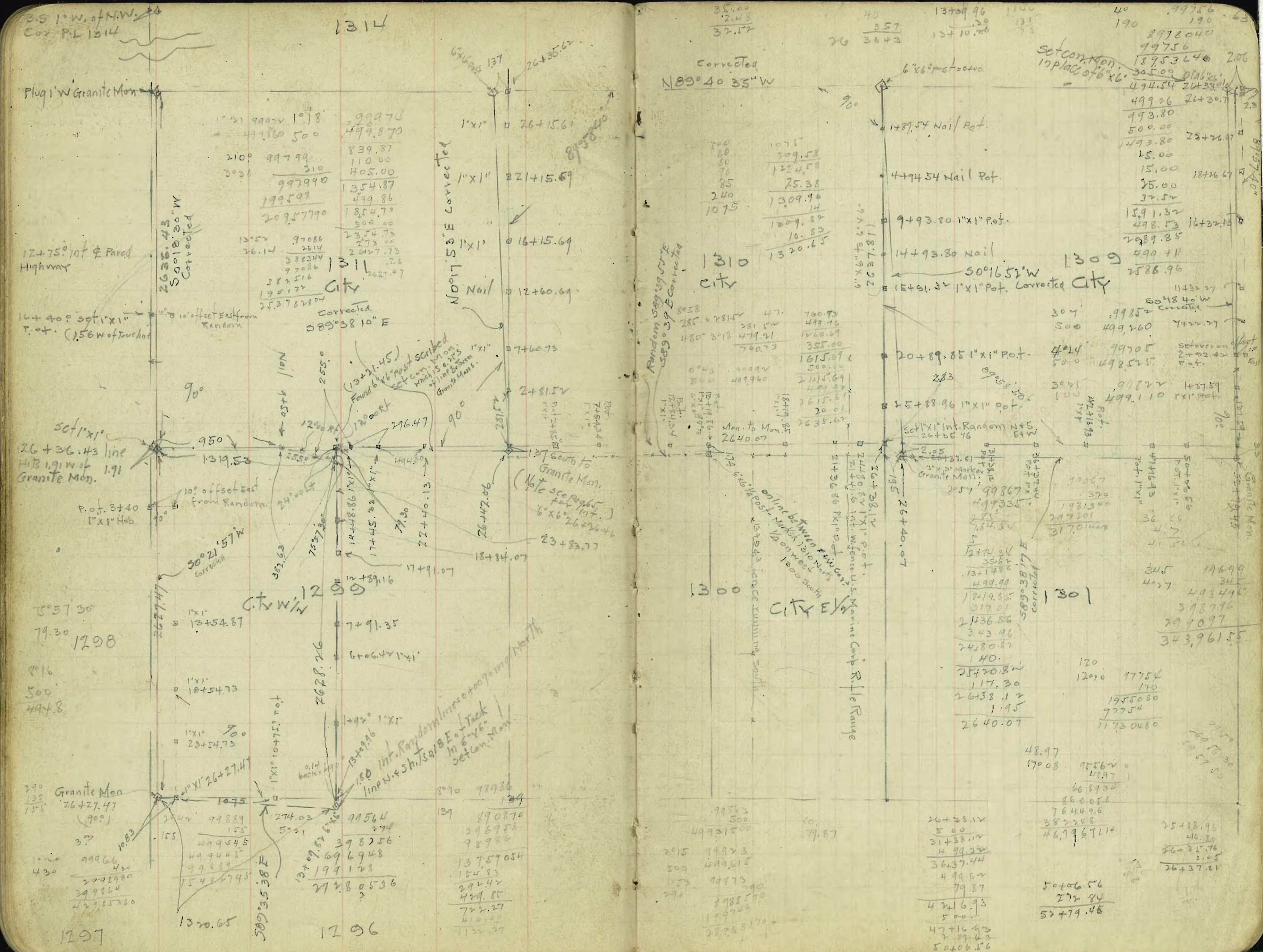
118+29.58
5.51
118+35.09

1800.
178.86
300.00
193.90
2472.76

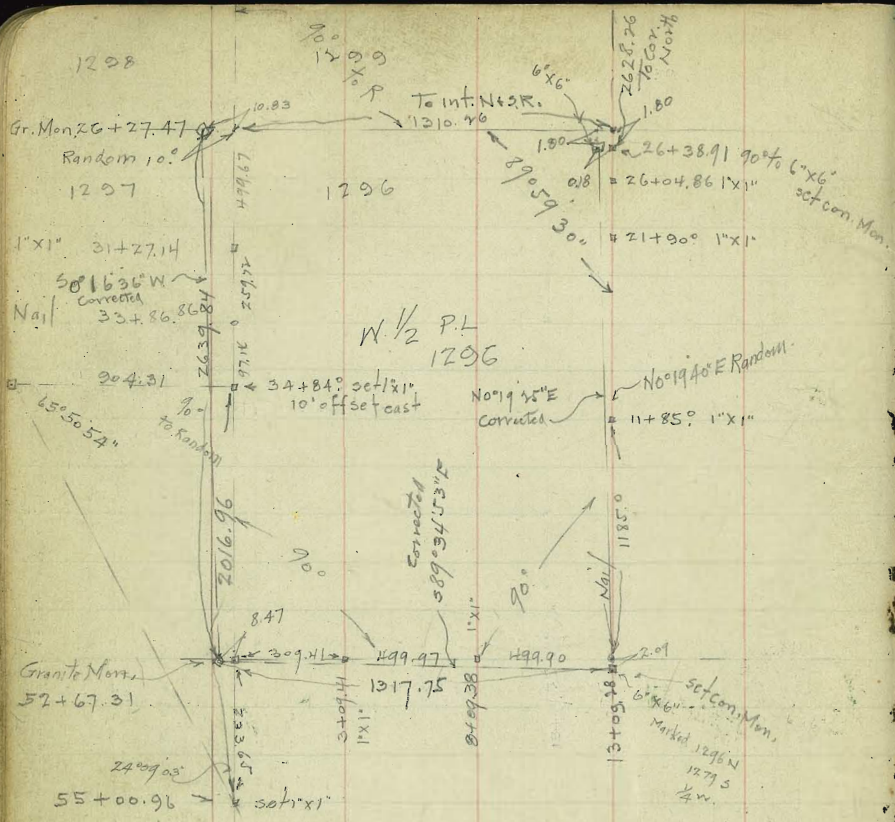
1°54 9.9997695
198 2.2966452
12.2964347
197.9

4.145
.54
4.68





1314
Plug 1"W Granite Mon.
12+75 int. ¢ Paved Highway
1311
City
Corrected
S89°38'10"E
N0°17'53"E Corrected
S0°18'30"W Corrected
S0°21'57"W Corrected
Found 6"x6" post scribed
Set Con. Mon.
26+36.43 line Hits 1.91 W. of Granite Mon.
10' offset East from Random
P.o.t. 3+40 1"x1" Hub
City W½ 1299
1298
Granite Mon. 26+27.47
1297
1296
S89°35'38"E
1320.65
13+09.62 6"x6"
180 int. Random line N+S hits S0°18'E of Tack in 6"x6" Set Con. Mon.
137 South to Granite Mon. (Note see Page 65 for int.)
Corrected
N89°40'35"W
1310
City
Random S89°39'57"E
S89°39' E Corrected
1+87.54 Nail Pot.
4+94.54 Nail Pot.
9+93.80 1"x1" Pot.
14+93.80 Nail
S0°16'52"W
15+91.32 1"x1" Pot. Corrected
1309
City
Set Con. Mon. in place of 6"x6"
20+89.85 1"x1" Pot.
25+88.96 1"x1" Pot.
Set 1"x1" int. Random N+S E+W
Mon. to Mon. 2640.07
Granite Mon.
1300
City E½
on line between E. & W. Cor. 1310 North 1/4 of 1300 South
Int. w/ fence U.S. Marine Corp Rifle Range
26+40.07
1301
S89°38'17"E Corrected
S0°18'40"W Corrected
2640.07
343,961.55



May 5, 1919

Williams
Keeler
Williams
Maxon

1082 410
3.47
2.36
1.18
3.09
3.27

86.86
97.14
34 + 84.00

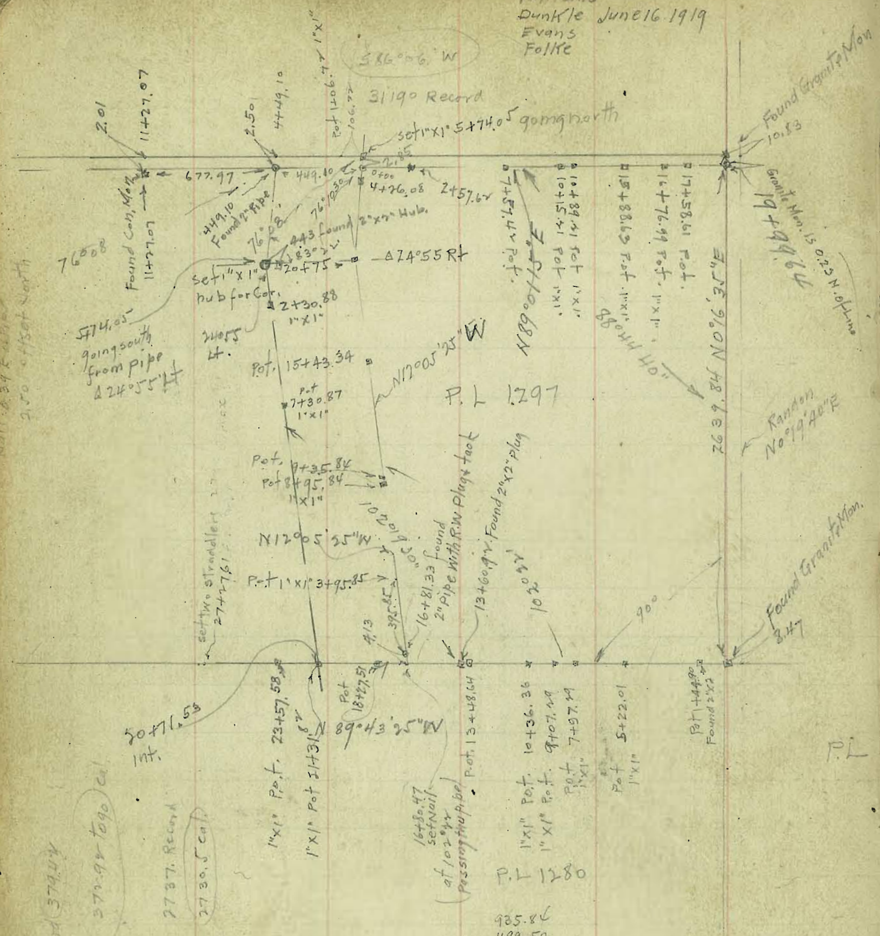
65°50'54"

3.27 : 1317 =
1317 : 3.27 = 1681 1x
[illegible]

1317) 549627 (419

500
500
185
240
500
265
21+90
4 14.86
26+04.86
34.05
26+38.91

Williams
Dunkle
Evans
Folke
June 16 1919



935.86
499.50
108.00
15.43.34
498.58
2041.92

106.72
342.38
449.10
677.97
1127.07

3+39.89
2+34.26
5 74.15

PL 1296

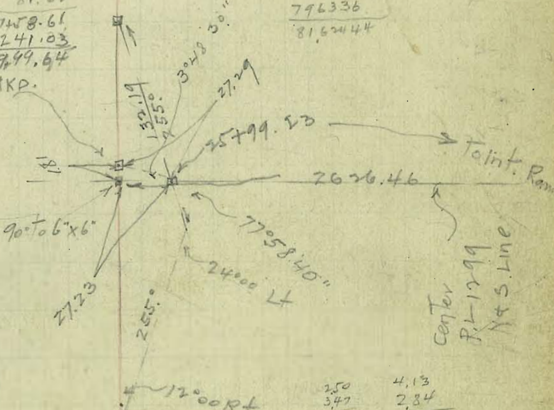
574.05
426.08
147.97

20+75.0
15 43.34
5 31.66

257.62
499.80
757.42
257.79
10+15.41
10+89.21
499.42
15+88.63
16+76.99
17+58.61
241.03
19 44.64

339.8 29 215
1.00
340.83

23½° 56'
77.58 40"



P.L 1279

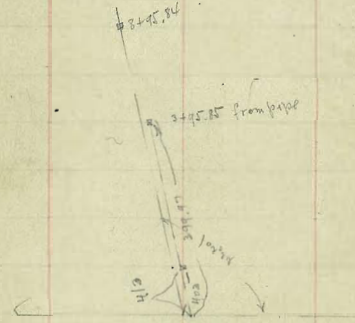
20+75.00
17 30.87
344.13

18+27.51
303.80
.51
21+31.82

20 75.00
3.47
20 71.53

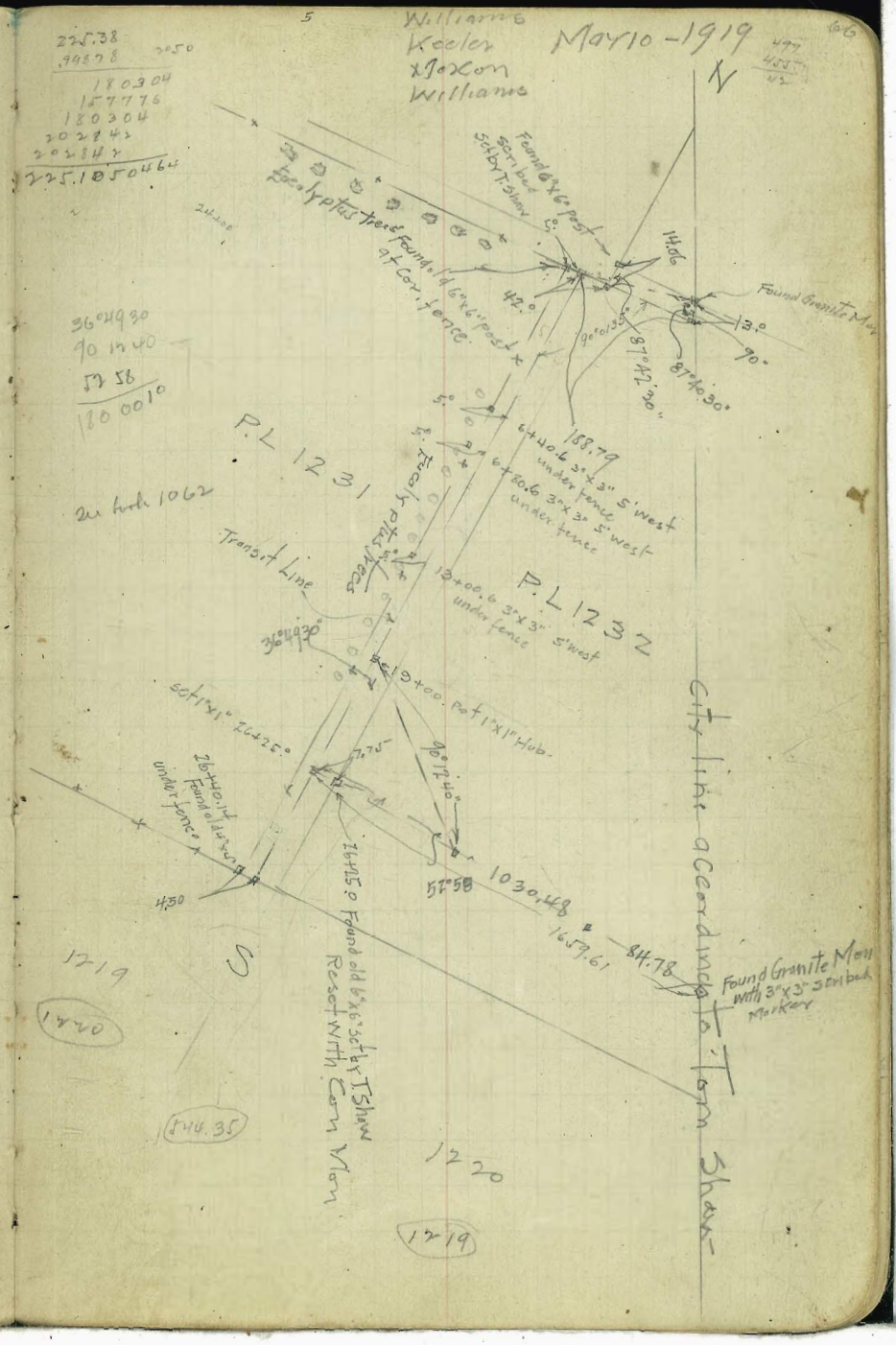
4.13
2.84
1.29

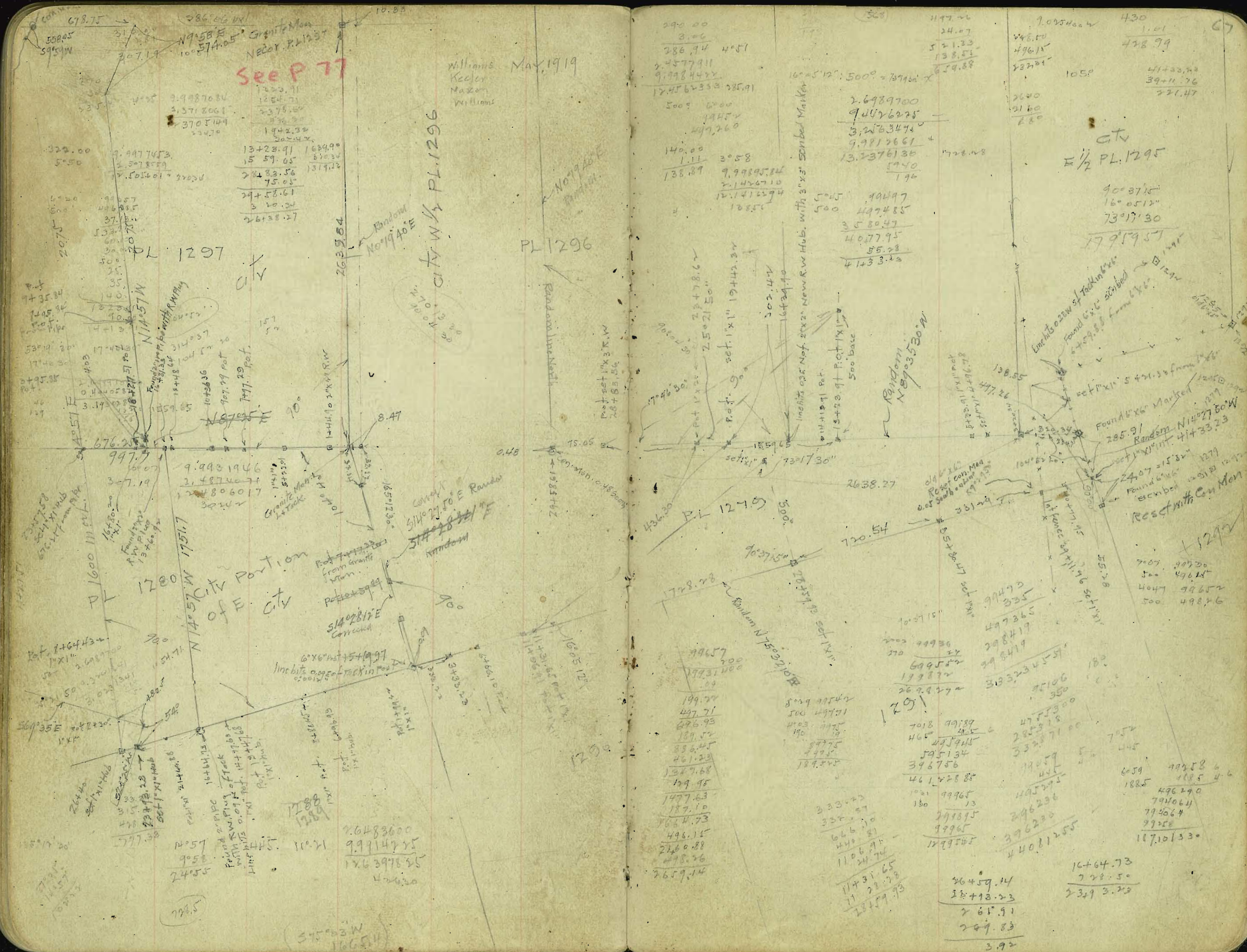
Cal. for Pl. 1297 Page 67



Williams
Keeler
xJoxon
Williams

Mar 10 - 1919




See P 77
Williams
Keeler
Nazon
Williams
May 1919
N 9°58' E
Granite Mon.
NE Cor. PL 1297
PL 1297
City
N 14°57' W
Random N 0°19'40" E
City W½ PL 1296
PL 1296
Random line North
N 0°19'40" E Random
PL 1280
City Portion of E City
PL 1600
S 14°27'50" E Random
S 14°28'17" E Corrected
PL 1279
PL 1288
PL 1289
PL 1290
PL 1291
PL 1292
City
E ½ PL 1295
90°37'15"
16°05'12"
73°17'30"
179°59'57"
Random N 89°35'30" W
Random N 75°31'10" W
Random N 14°27'50" W
Found 6"x6" Marked
Reset with Con. Mon.
Set 1"x1"
2638.27
720.54
285.91
67

Williams
Keeler
Maxon
Williams

Mar 14-1919

320. 99790 / 320 / 19858 / 29787 / 31772 / 317.53

440.0 99875 / 460 / 399500 / 399500 / 43945000 / 499.98 / 9+39.43 / 500.00 / 120.00 / 15+59.43 / 499.84 / 20+59.27 / 150.00 / 22+09.27 / 429.49 / 26+38.76 / 2.08 / 26+40.84 / 15+59.43 / 1081.41

4000 9.9989408 / 335 2.5118834 / 14.5108242 / 324.31

7.26 East of / 98. / 105.26

2473.12 / 3.24.31 / 2497.33

5°59 3438 / 9.9976216 / 2.5363311 / 14.5339527 / 34195

320.00 / 1.61 / 218.39 / 4.26 / 214.13 / 494.84 / 708.97 / 340.95 / 1049.92

59°40 17" / 89 57 46 / 30 21 57

30°21' 57" : 659.88 = 59°40' 17" : x

9.9860744 / 2.8194650 / 12.7555480 / 9.7037377 / 3.0518103

2.6674580 / 9.9998966 / 12.6673496

9.7037176 / 9.7037377

55°57' 30" / 167 51 30 / 3.0329864 / 9.8497593 / 12.8627457 / 73071 / 73797

22°07' 30" / 0.3909990 / 3.0329864 / 3.4249154 / 2660.71 / 7.26 / 26+67.47 / 36+67.47 / 1334.97 / 2640.60

1300

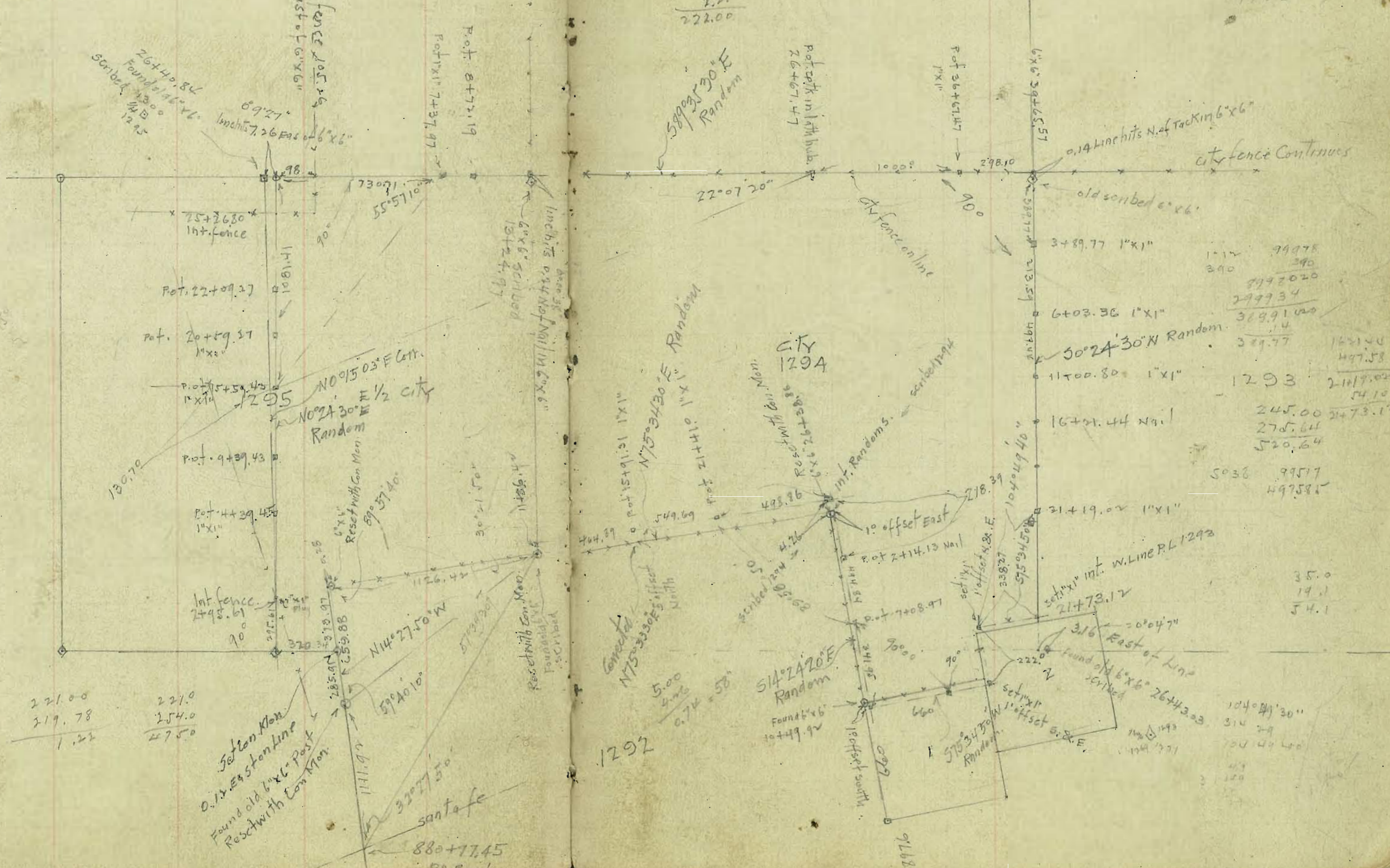
1301

2640.00 / 2173.12 / 466.88

1176.70 / 464 99 / 1591.31 / 549.69 / 2141.00 / 497.86 / 2638.86

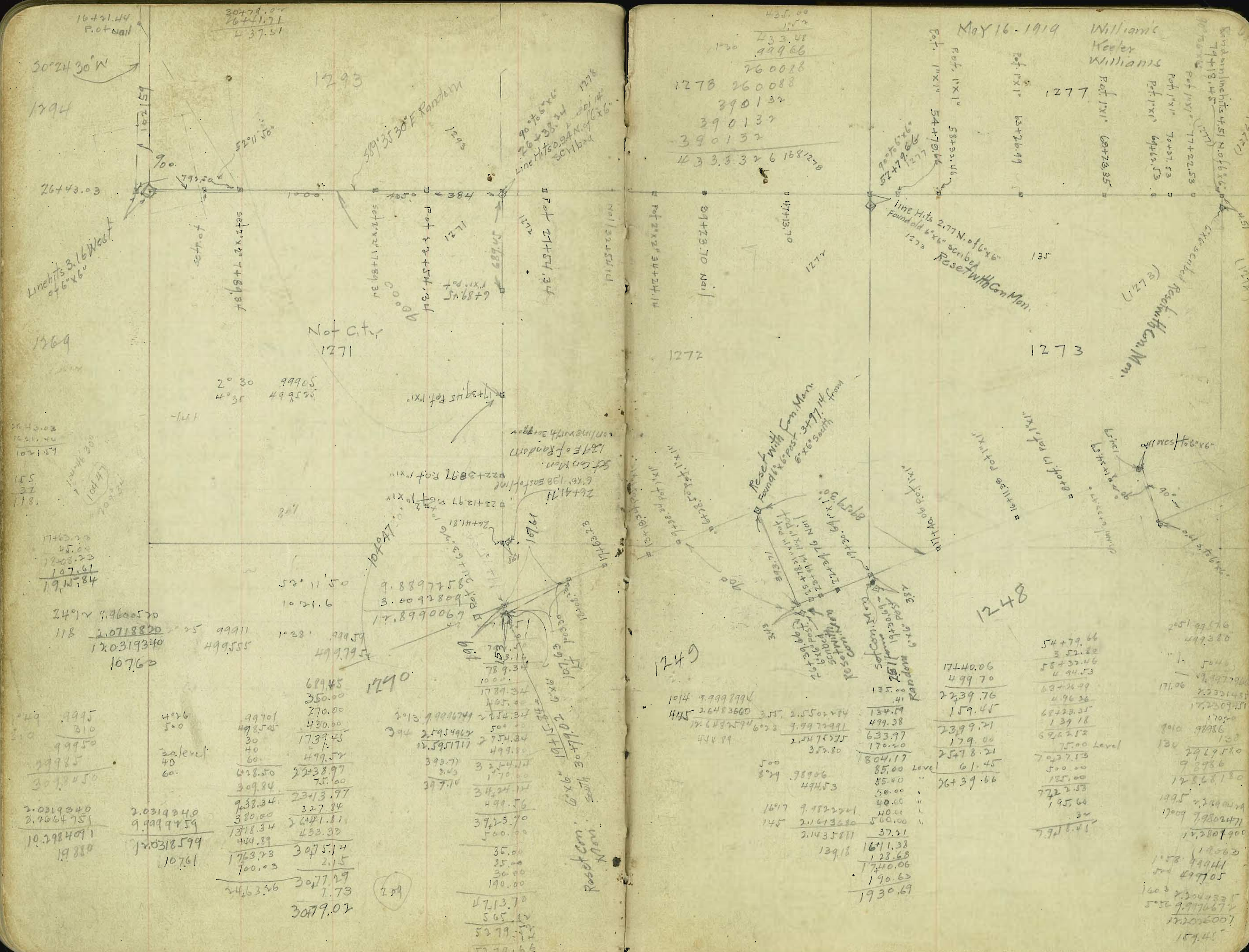
Mar 15. 1919

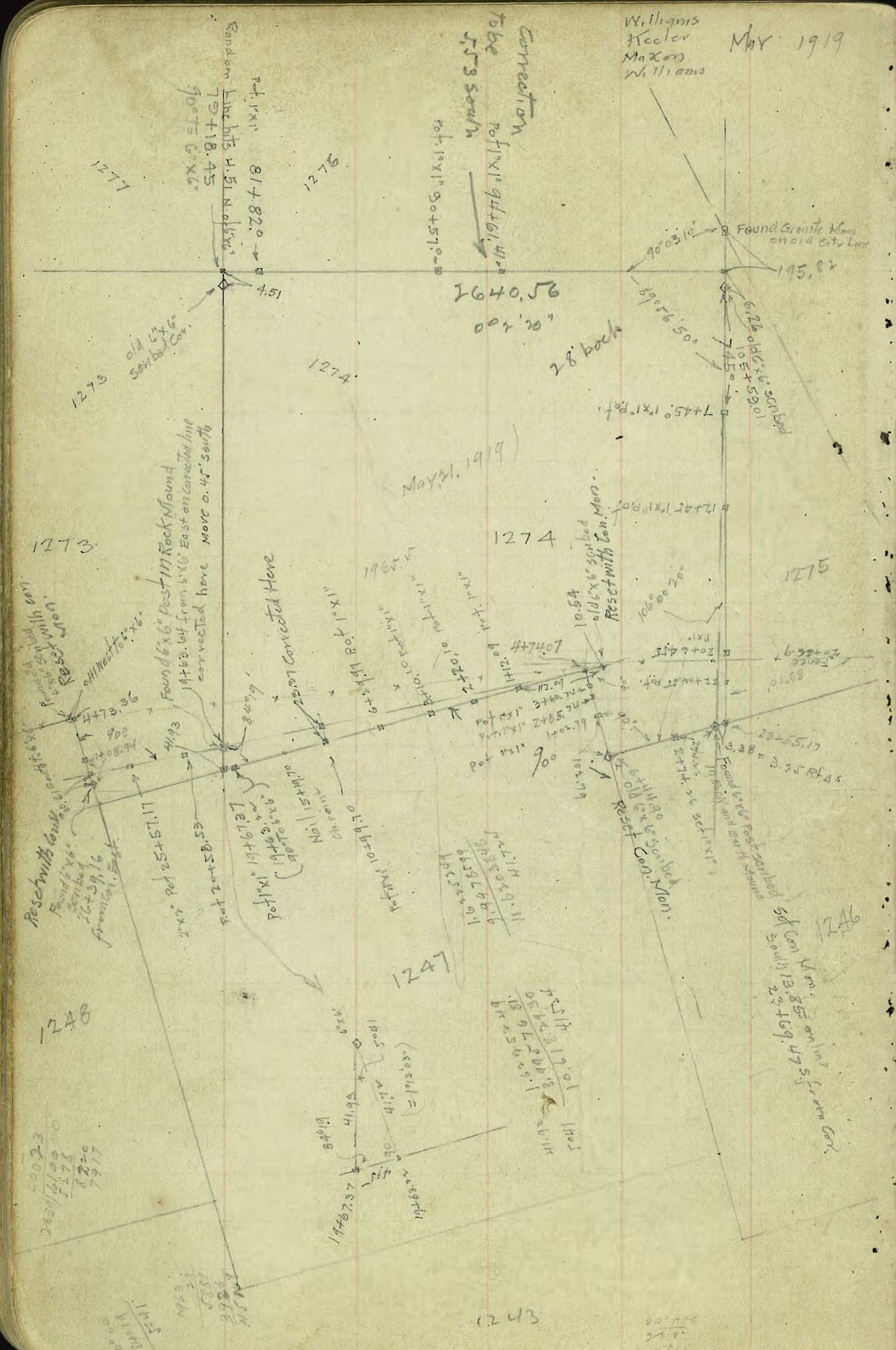
878+55.5



221.00 / 219.78 / 1.22

221.0 / 254.0 / 475.0

 May 16 - 1919
Williams
Keeler
Williams
16+31.44 P.ot Nail
30°24'30"W
1294
1293
1271
1272
1277
1273
1278
1248
1249
1269
26+43.03
89°35'30"E Random
52°11'50"
Line hits 3.16 West of 6"x6"
Not City 1271
line Hits 2.77 N. of 6"x6" Found old 6"x6" scribed 1273 Reset with Con. Mon.
Reset with Con. Mon.
Reset with Con. Mon. Found 6"x6" post 3+97.14 from 6"x6" South
Set Con. Mon. 1.27 E. of Random
Reset Con. Mon.
Set Con. Mon.
Pot 1"x1"
Nail
52° 11' 50
2° 30
Level
3079.02
5379.64
1930.69



81+82.00
80
270
350
175
90.57.00
404.41
9461.41
145.00
500.00
420.00
33.72
10560.13
1.12
10559.01

130°
55
500
15
35
140
7.45
500
12445 Pot.
499.55
35.00
50.00
55.00
190.00
2064.55
140.00
2204.55
149.28
2353.83
1.34
23+55.17

10+99.70
3.0412724
8.3274203
11.3686945
23.37

1+12.09
108.01
2+20.10
90.00
3+10.10
319.87
6+29.97
469.73
1099.70
420.00
1519.70
447.67
1967.37
4.15
19+63.22

3.04
3.35

1.6203848
3.2929645
8.3274203
1°13'03"

465.00
0.58
464.42

South 0.47'

City Line according to Tom Shaw

1963.64
94.89
2058.53
498.64
2557.17
81.99
2639.16

10°
110°
98481
110
984810
98481
10833910
0.61
108.94
364.42
473.36

1240
1241

195.84
6.26
202.08
2026
50.00
99410
500
49955000

110
22036
99271
110
993210
99324
101.553 10
10.54
112.09

110°
10°55'
98190
110
98290
9819
108.009
1°39'
99959
320
1999180
299877
31986880
10°56'
99963
470
6996010
399772
46973210

3.299645
9.9999010
3.2930626
2°06'
95°
99686
95
494430
898974
9489170

195.84
0.10
205.02

3005'
405
99355
405
499295
3974200
40441275

33
6.9

3.38
2°30'
7027
99156
280
7932480
198316
277.64080
3.38
274.26

375.00
3.21
371.79

274.96
370.00
644.90

18.50°
80°32'
2.2631717
9.9951654
2.2628371
182.95

16°51'
172.0
9.9809422
2.0863548
2.0673031
116.76

14°32'
170.4
9.9858764
2.0806265
1.0665027
116.37
116.65
3.30
113.35

1919
9.9298853
7.6510744
17.6509597
447.67

6°26'
42.2
9.9972506
1.6253125
11.6225691
41.934

4°13'
99729
500
49864500

7°35'
82.71
9.9961884
1.9175580
11.9137429
81.97

99886
460
4594756
5°37'
99520
4976000
99520
14928000

290
150
140

4030
9.9986591
3.5702977
3.5689563
3706

11°46'
105.0
97899
105
489495
979790
102.79395
182.95
285.74
75.00
360.74
113.33
474.07

450.00
2.21
447.79

450.00
435
√445.65

745 99300
500 496.0

1444½ .9664
120 120.
193380
9664
116.0280

7°42 99098
121.93 121.93
297294
891882
99098
198196
99098
120.8301914

10°16 98399
312.46
590394
393596
196798
98399
196798
309.0585154

7°56 99043
500 495215

4°50 99644
305
498220
199288
304.27040

30+67.47
445.65
41+13.12
105.00
120.00
60.00
40.00
500.00
95.00
135.00
51+68.12
496.00
56+64.12
116.03
120.83
59+00.98
350.00
62+50.98
70.00
75.00
63+95.98
209.06
66+05.04

5°22 99562
305
497810
298686
199124
303.97070

1+90.00
4.95.22
6+85.22

66+05.04
51+68.12
14 36.92

1436.92
1.1209 : cot 41°44'15"
1293228
2873840
143692
143692
1610.643628
500.00
85.00
276.17
24+71.81
96.33
25+68.14
70.92
26+39.06

16°35 .95841
74 74
383364
670887
70.92234

6+85.22
3 36.15
10+21.37
99.91
11+21.28

1610.6
7
.112742

240
120

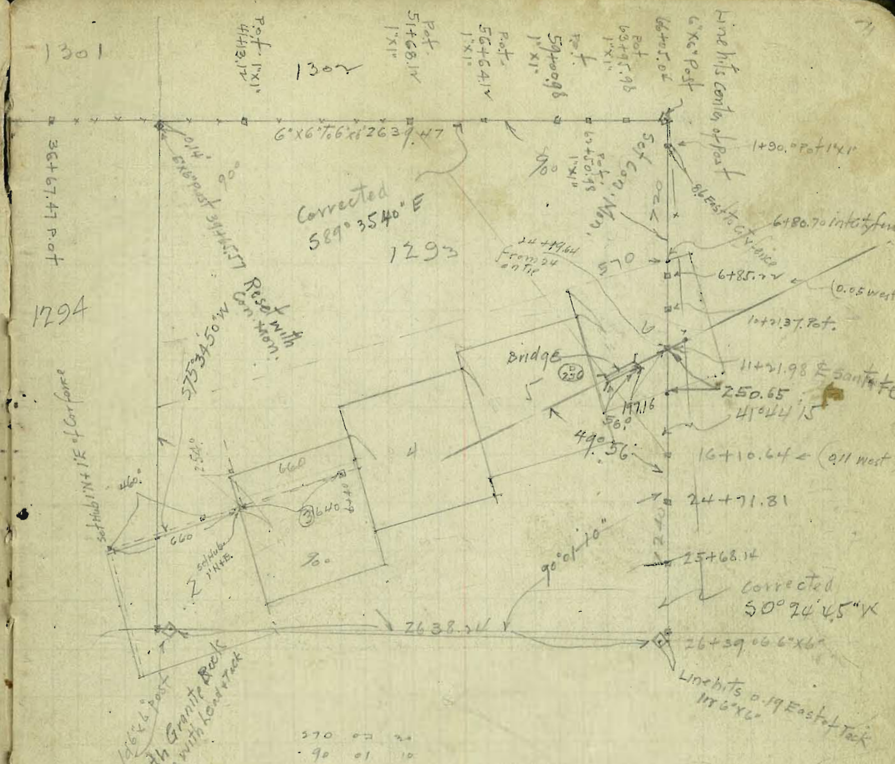
215.00
3 52
212.46

6+85.22
4.50
6+80.72

41°44'15" ; 1436.92 ; 48°15'45"
.74621

.00007
2639/.19000
.18473

681
7
97.29



270 02 20
90 01 10

660.00
517.44
142.56

259.00
20.00
233.00
237.60
4.60

237.60
279.84
517.44

219.78
237.60
457.38

475.00
457.38
17.62

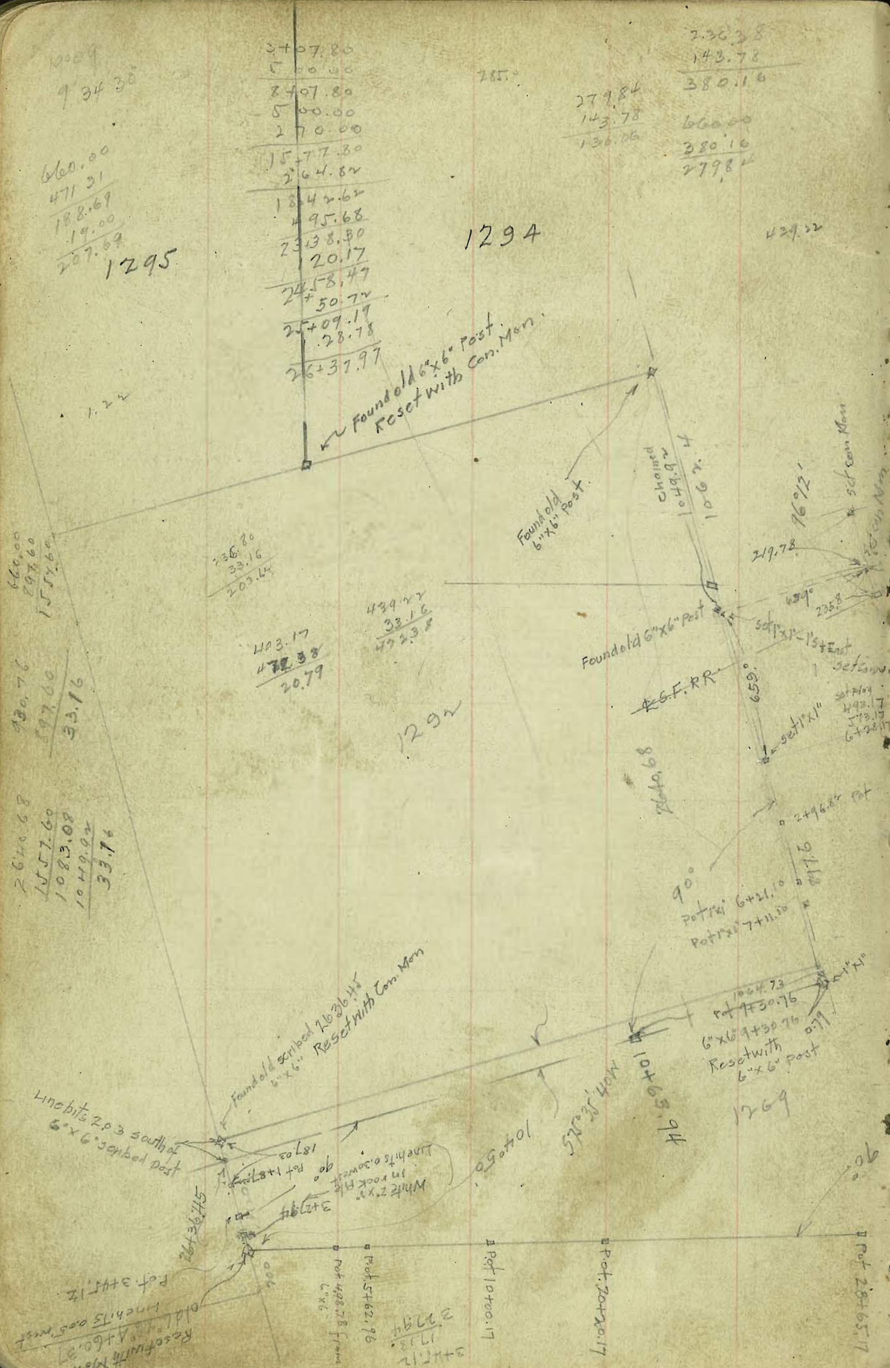
4.5

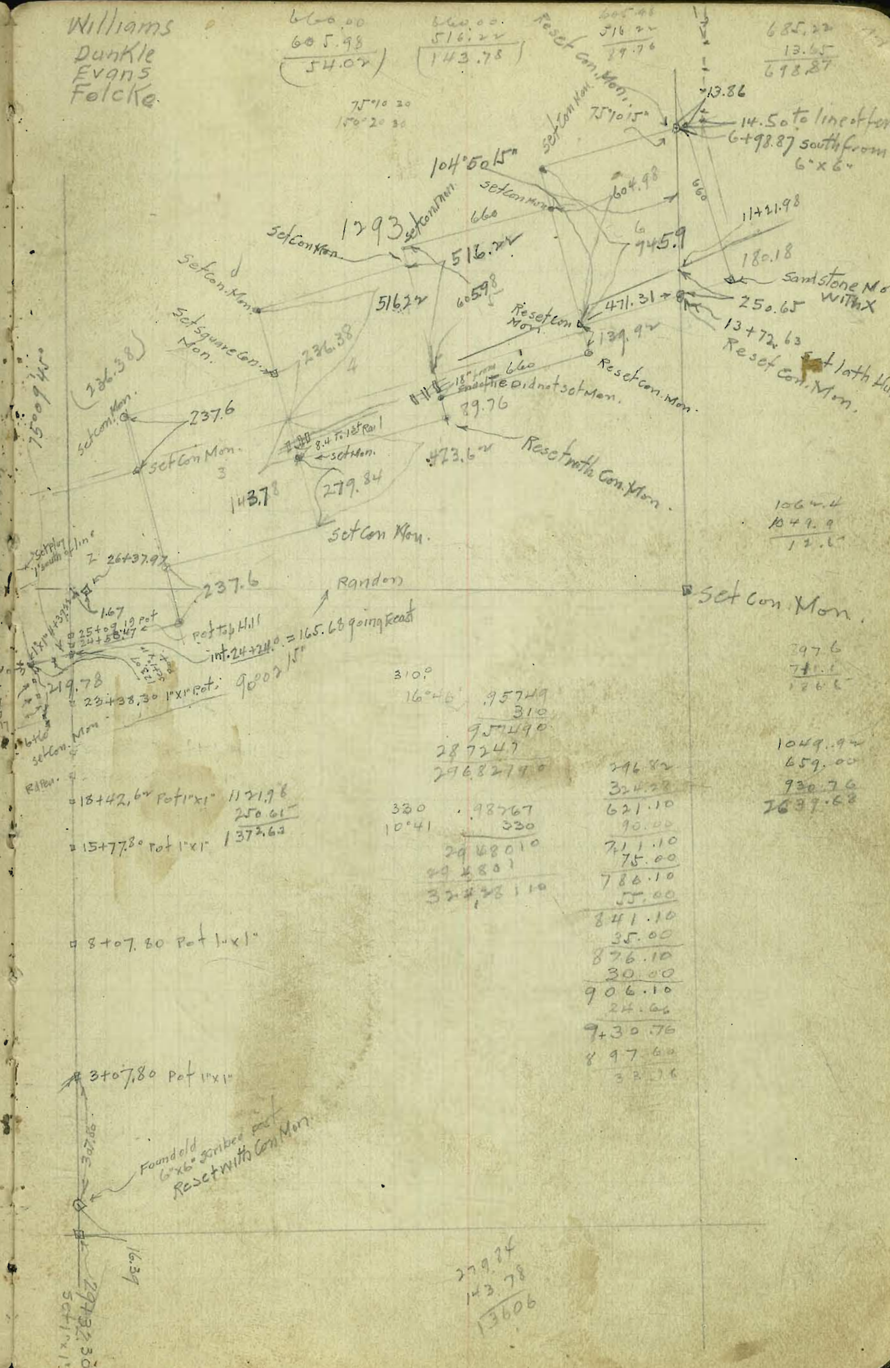
19.94

20.00
17.62
2.38

660
640
1301

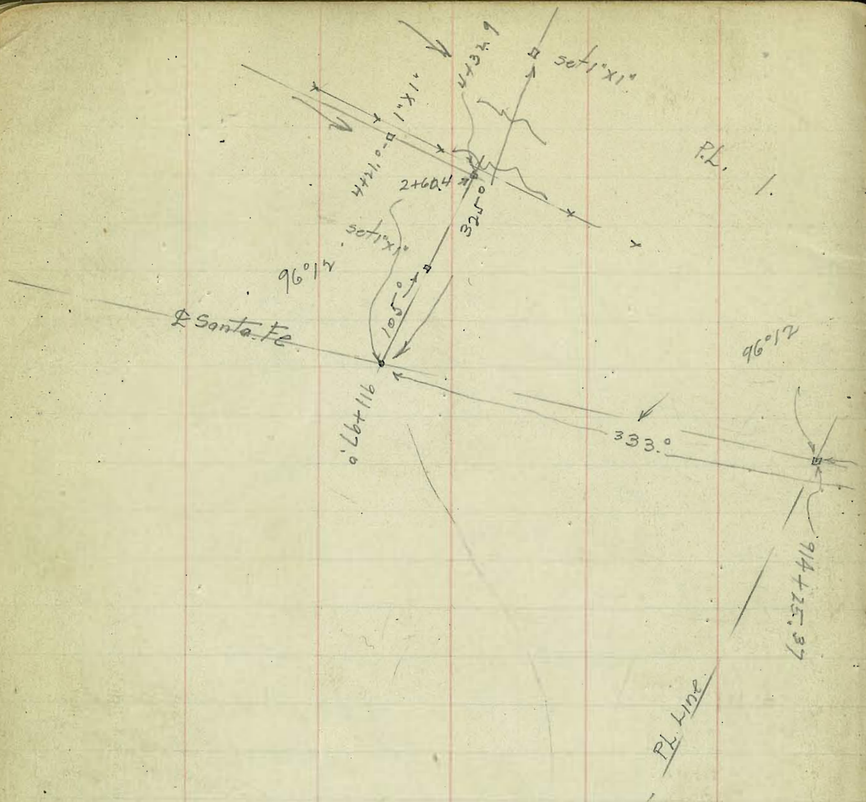
2639.47

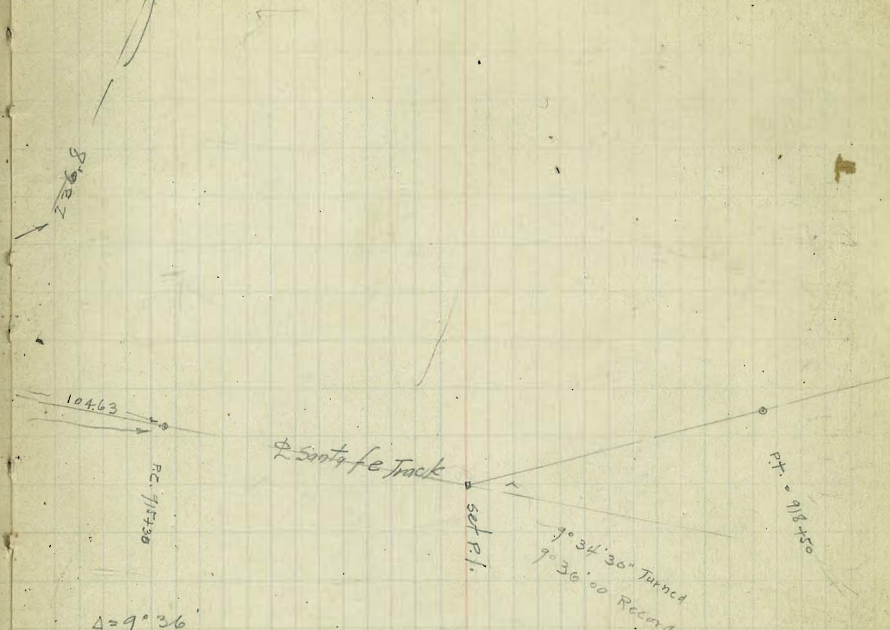

1295
1294
1292
1269
660.00
471.31
188.69
19.00
207.69
2+07.80
8+07.80
15+77.80
18+42.62
23+38.30
24+58.47
25+09.19
26+37.97
Found old 6"x6" Post.
Reset with Con. Mon.
Found old 6"x6" Post
Found old 6"x6" Post
Chained 1049.92
1062.4
96°12'
set Con. Mon.
219.78
659.
S.F. RR
set 1"x1"
403.17
20.79
439.22
Pot 1"x1" 6+21.10
Pot 1"x1" 7+11.30
90°
1004.73
Pot 1+30.76
6"x6" 9+30.76
Reset with 6"x6" Post
10+63.94
Found old scribed 6"x6" Reset with Con Mon
Line bits 2.03 south of 6"x6" scribed Post
Pot 10+00.17
Pot 20+20.17
Pot 28+65.17
Pot 3+41.12
Reset with Mon.


Williams
Dunkle
Evans
Folcke
660.00
605.98
54.02
660.00
516.22
143.78
1293
Set Con. Mon.
Set square Con. Mon.
Reset Con. Mon.
Reset with Con. Mon.
75°10'15"
104°50'15"
14.50 to line of fence
6+98.87 south from 6"x6"
11+21.98
180.18
Sandstone Mon with X
471.31
250.65
13+72.63
Reset Con. Mon.
Set lath Hub
516.22
605.98
945.9
604.98
236.38
237.6
279.84
143.78
139.92
89.76
423.62
Did not set Mon.
237.6
Random
int. 24+24.0 = 165.68 going East
Pot top Hill
22+38.30 1"x1" Pot.
90°02'15"
18+42.62 Pot 1"x1"
1121.98
250.65
1372.63
15+77.80 Pot 1"x1"
8+07.80 Pot 1"x1"
3+07.80 Pot 1"x1"
Found old 6"x6" Scribed post Reset with Con. Mon.
Set Con. Mon.
279.84
143.78
136.06
1062.4
1049.9
12.5
1049.92
659.00
930.76
2639.68
296.82
324.28
621.10
90.00
711.10
75.00
786.10
55.00
841.10
35.00
876.10
30.00
906.10
24.66
9+30.76

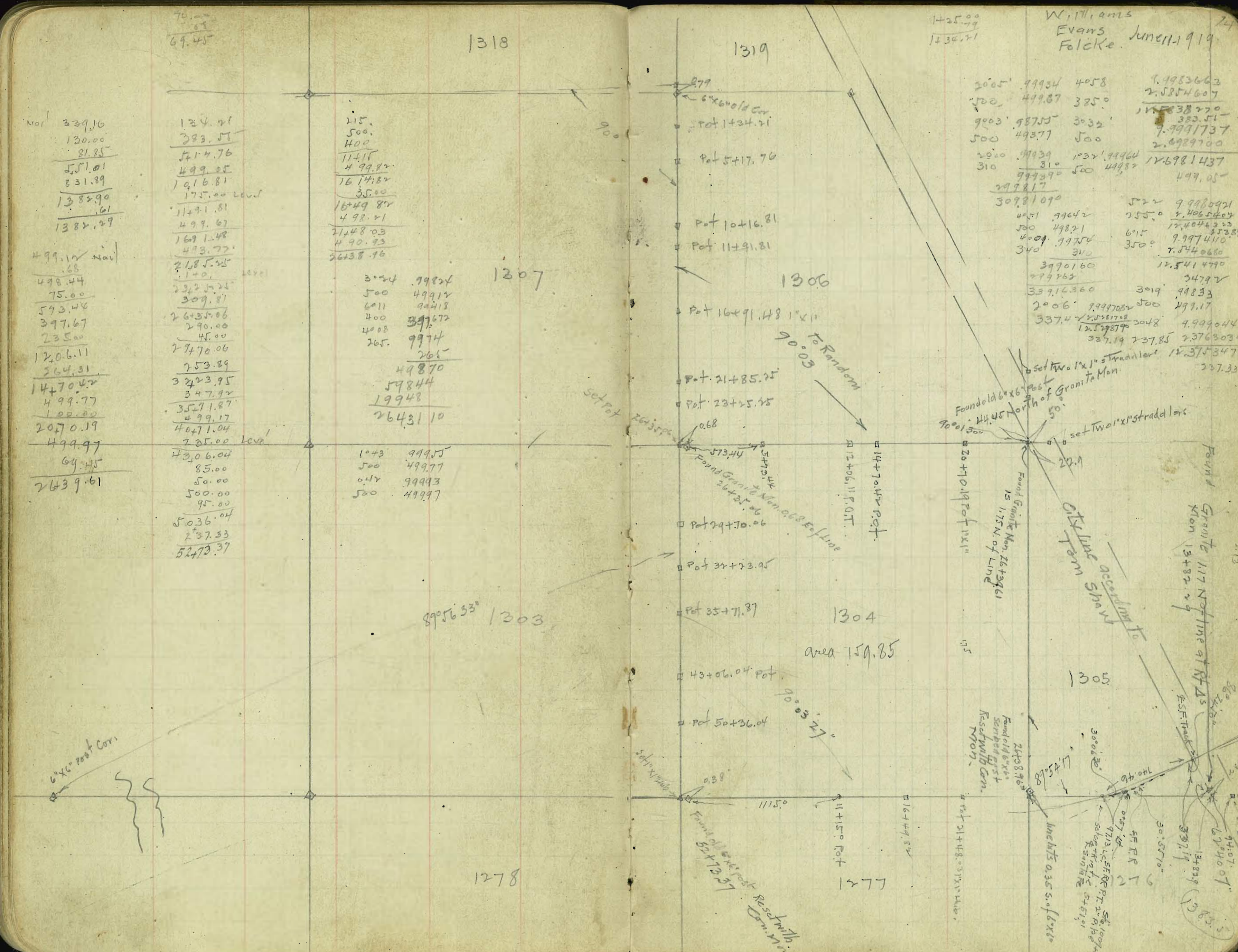
234.70
221.47
456.17
228.09

333.00
104.63
228.37





Δ = 9°36'
Deg = 3°00
R = 1910.08
St. = 160.4
L = 320.0



Williams
Evans
Folcke
June 11-1919
24
1318
1319
1307
1306
1303
1304
1305
1278
1277
1276
area 159.85
6"x6" old Cor
Pot 1+34.21
Pot 5+17.76
Pot 10+16.81
Pot 11+91.81
Pot 16+91.48 1"x1"
Pot 21+85.25
Pot 23+25.25
Pot 29+70.06
Pot 32+23.95
Pot 35+71.87
43+06.04 Pot
Pot 50+36.04
90°03' to Random
90°00'
Set Pot 26+35.06
0.68
573.44
Found Granite Mon. 0.68 S. of Line 26+35.06
12+06.11 P.O.T.
14+70.42 Pot
20+70.19 Pot 1"x1"
Found old 6"x6" Post 14.45 North of Granite Mon.
90°01'30"
Set Two 1"x1" Straddlers
Set Two 1"x1" Straddlers
50'
22.9
Found Granite Mon. 1.75 N. of Line 26+34.61
City line according to Tom Shaw
Found Granite Mon. 1.17 N. of line at R.R. 13+82.29
89°56'33"
90°03'27"
6"x6" Post Cor.
0.38
1115.0
Found old 6"x6" Post 52+73.37 Reset with Con. Mon.
11+15.0 Pot
16+49.82
89°54'17"
Found old 6"x6" Scribed post Reset with Con. Mon.
Line is 0.35 S. of 6"x6"
S.F. R.R.
S.F. Track
30°57'10"
62°40'07"
383.5

1°15' .99976
500 .499.88

1°09 9998
500 499.9

1°43' .99955
345

3#5 499775
399820
199910
244889.75

2°38' .99844
500 499.47

3°46 .98832
431
494160
197664
395328
470.03600

4°17 99721
350 350
49860500
299163
349023350

13.25
1.1223159
9.995 1749
1.1173908
13.104

499.88
90.00
1.16
591.04

499.90
244.89
11.63
756.42

499.47
1.00
500.47

1°36 .99961
330 330
2998830
299883
329.87130

5°21 .99564
315 315
497820
99564
298692
313.62660

2°46' .99883
395 395
499415
898947
299649
394.53785

6°47 .993
350. 350
4965
2979
347.55

7°10 .99319
370 370
694533
297657
367.1103

3°34 .99806
285 285
499030
798448
199612
284.44710

9.1709684
1.1223159
10.2931841
1964

500.47
420.04
920.51
313.63
1234.14
394.40
1628.54

1+25
349.02
4+7402
347.55
360.00
11+81.57
367.11
1548.68
284.45
1833.13

10

340°22'

124-37-30
249 15 30
373 54
124°38
55°22

18+33.13
32.50
18+32.50

25'
post
Old

6°18 .99246
500 496.98

9°21 .98671
300 296.011

129°00 30 | 129°00 50
55°22 | 55°22 30
90 17 08 | 90°17 30
85°19 | 85 19 20
359 58 38 | 360 00 00

; 591.04 = 60°19' : X
2.7716169
9.9389076
12.7105245
9.7516538
2.9588707
90965
102.81
1012.46

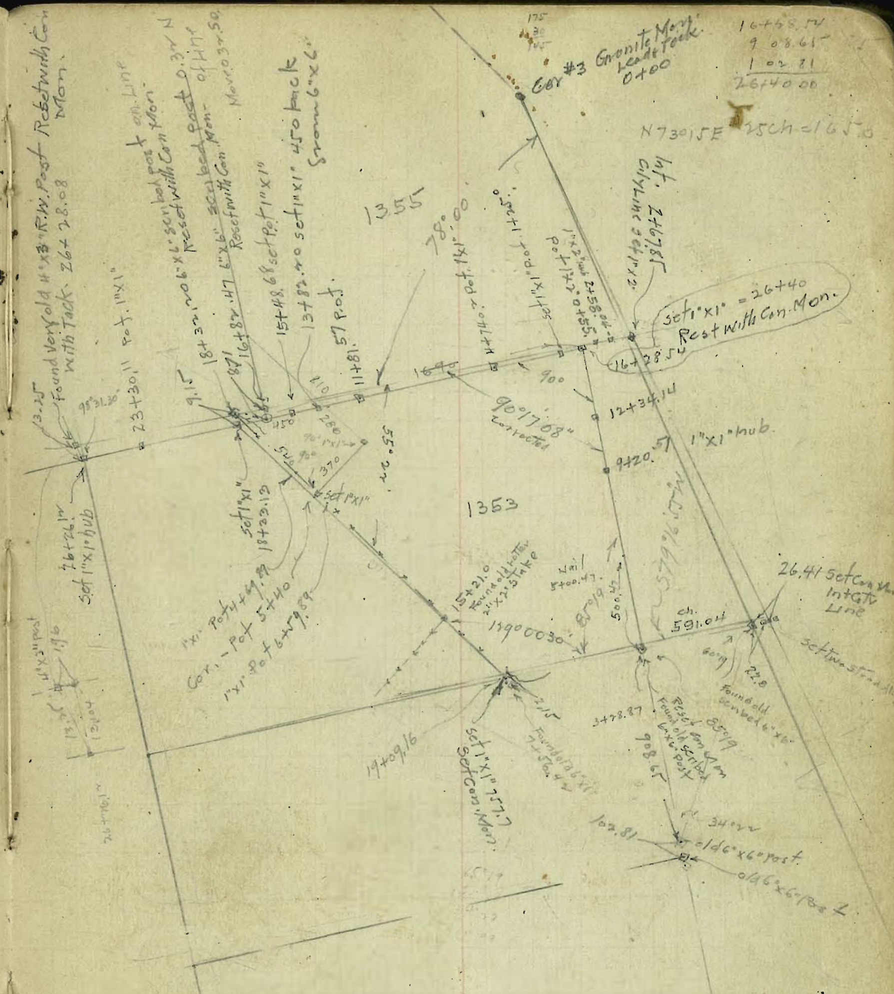
9+08.65
102.81
1011.46

2640.00
1012.46
1627.54

757.70
755.13
2.57

5°38 .99517
375 375
497585
696619
298551
373.18165

26+26.12
1.96
26+28.08



469.89
190.
659.89
499.35
1159.24
355.00
6.70
1520.94

1159.24
375.00
195.00
199.92
1909.16

1°14 .99977
470 470
699839
399908
469.89919
66.78
536.67
3.33

11+00.47
289.75
13+90.22

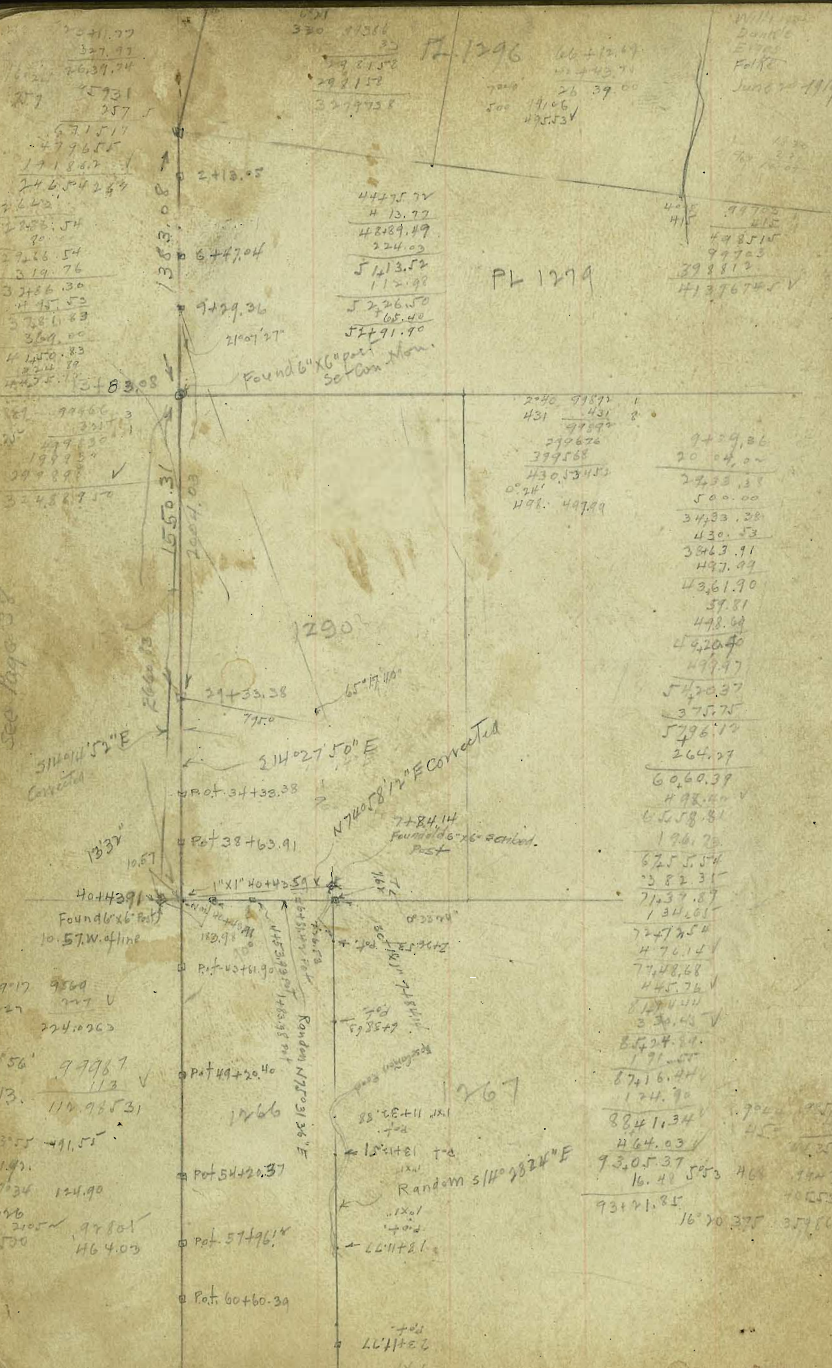
17°27 .95398
70 66.7788

26.0
20.0
9.0
55.0
203.04
258.04
9.57
0.24
267.85

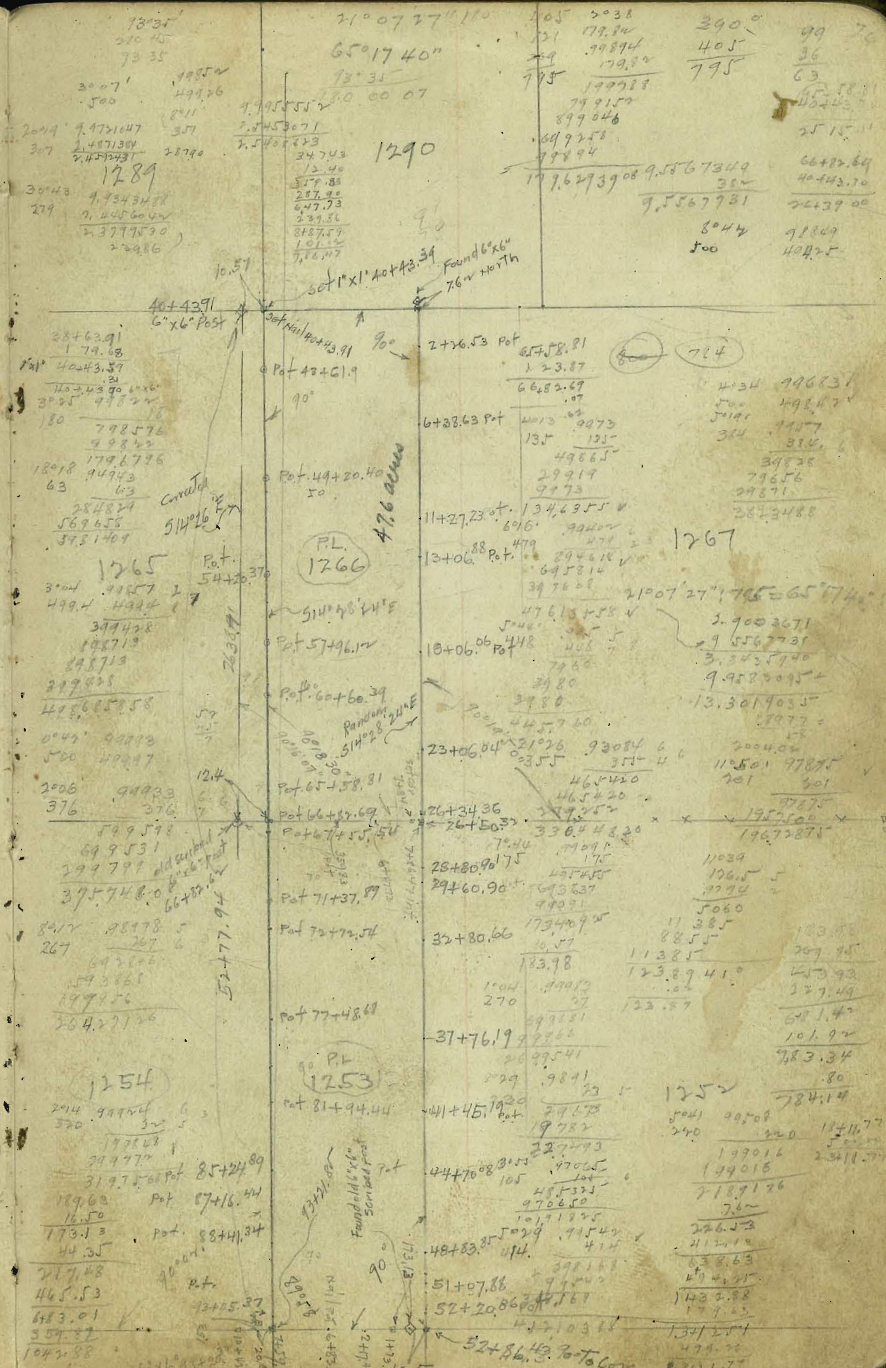
2°50 .99869
500 499.35

19°17 .94438
215
472190
94438
188876
203.04770
180
102°
78

18°32 .94814
305.6
568884
474070
284440
289.751584



PL 1296
66+12.69
40+43.70
26 39.00
495.53
William Dankle Elton Folke June 2nd 1919
44+75.72
4 13.77
48+89.49
224.03
51+13.52
112.98
52+26.50
65.40
52+91.90
PL 1279
2+13.05
6+47.04
9+29.36
13+83.08
1383.08
21°07'27"
Found 6"x6" post Set Con. Mon.
1550.31
2004.03
1290
24+33.38
65°17'40"
795.0
2660.83
S14°14'52"E Corrected
S14°27'50"E
Pot. 34+33.38
N74°58'12"E Corrected
7+84.14 Found old 6"x6" scribed Post
Pot 38+63.91
13'32"
10.57
40+4391
Found 6"x6" Post 10.57 W. of line
1"x1" 40+43.59
183.98
90°
1+83.98 Pot
Random N75°31'36"E
Pot-43+61.90
Pot 49+20.40
1266
1267
11+33.88
15+11.81
Random S14°28'24"E
Pot 54+20.37
Pot. 57+96.12
18+11.77
Pot. 60+60.39
23+11.77
9+29.36
20 04.02
24+33.38
500.00
34+33.38
430.53
38+63.91
497.99
43+61.90
58.81
498.69
54+20.40
499.97
54+20.37
375.75
57+96.12
264.27
60+60.39
498.40
65+58.81
196.73
67+55.54
382.31
71+37.87
134.67
72+72.54
476.14
77+48.68
445.76
81+94.44
330.43
85+24.89
191.55
87+16.44
124.90
88+41.34
464.03
93+05.37
16.48
93+21.85
See Page 38

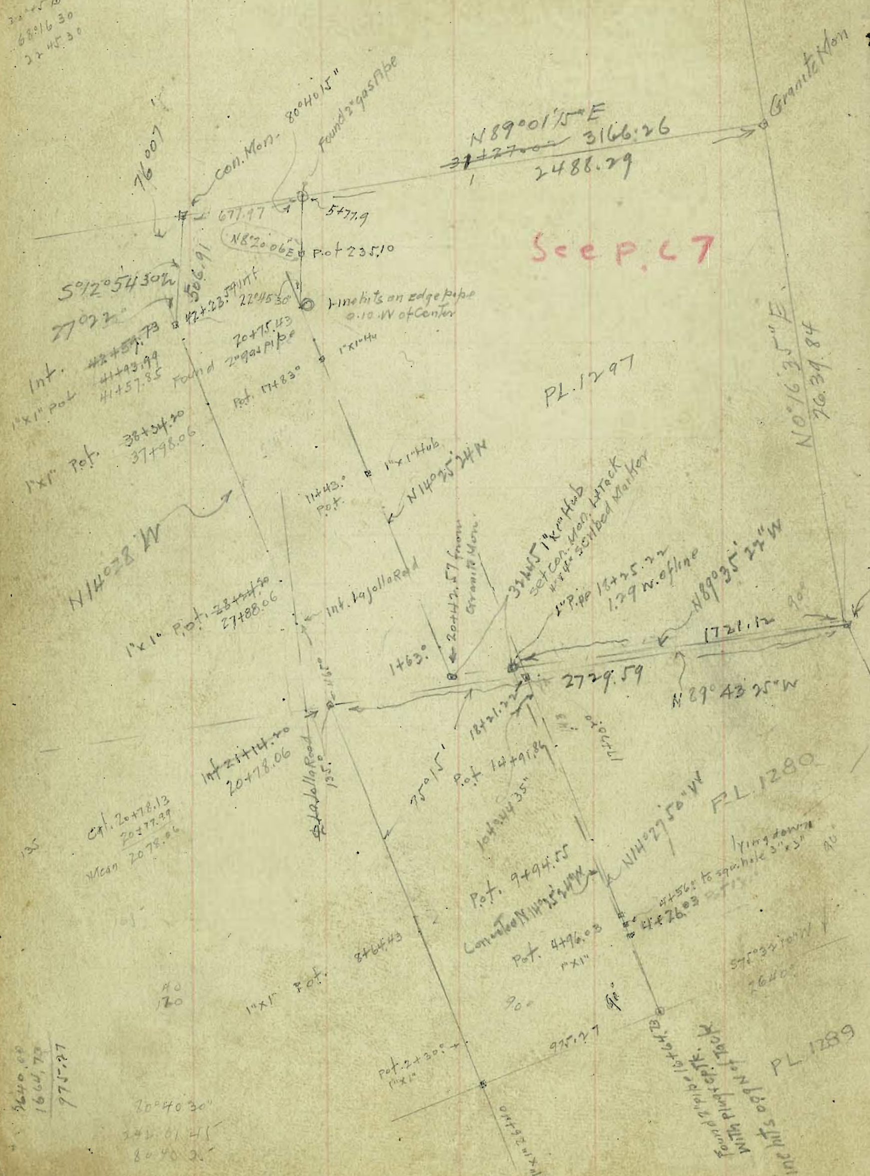


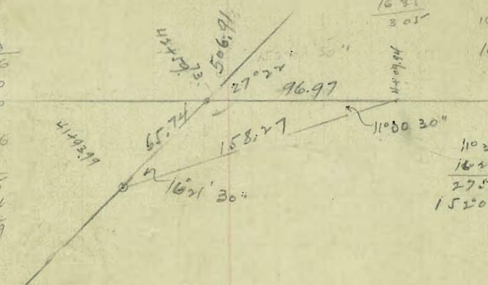
93°35'
320 45
73 35
1289
1290
21°07'27" 180
65°17'40"
93°35'
180 00 07
390°
405
795
9.5567349
9.5567731
66+82.64
40+43.70
26+39.00
Set 1"x1" 40+43.39
Found 6"x6" 7.6 North
40+4391 6"x6" Post
Set Nail 40+43.91
10.57
38+63.91
1 79.68
1"x1" 40+43.57
Pot 43+61.9
90°
2+26.53 Pot
65+58.81
1 23.87
66+82.69
8
724
6+38.63 Pot
Pot. 49+20.40
47.6 acres
Corrected S14°26'E
11+27.23 Pot.
13+06.88 Pot.
PL. 1266
P.o.t. 54+20.37
1265
1267
S14°28'24"E
Pot 57+96.12
18+06.06 Pot
21°07'27" + 795 = 65°17'40"
2638.91
Pot. 60+60.39
Random S14°28'24"E
23+06.04
Pot 65+58.81
12.4
Pot 66+82.69
26+34.36
26+50.37
Pot 67+55.54
old scribed 6"x6" Post 66+82.6
28+80.90
29+60.90
Pot 71+37.87
52+77.94
Pot 72+72.54
32+80.66
Pot 77+48.68
37+76.19
1254
P.L. 1253
1252
Pot 81+94.44
41+45.19
Pot 85+24.89
Pot 87+16.44
44+70.08
Pot 88+41.34
Found old 6"x6" Scribed post
93+21.85
48+83.85
90°
90°
P.t. 93+05.37
51+07.88
52+20.86
52+86.43 90° to Cor
16.5

104°44' 30"
314° 12' 45"
104 44 35

9.4704146
2.9891749
2.4095398
35
10"
756.71

1821.77
256.77
2077.99
2114.20
36.21





cal for PL. 1280 Page 67

Williams
Dunkle
Evans
Feldke
June 19-1919

230	4409.94	27+27.61	2045 99885
449.43	96.97	37.81	500 49943
135.00	506.91	26+89.80	1250 99941
814.43			500 49974
499.74			
500.00			
250.03			

21+14.20
500.00
210.00
28+24.20
500.00
225.00
285.00
38+34.20
359.79
41+73.99
65.74
42+59.73

20+78.06
500.00
210.00
27+88.06
500.00
225.00
285.00
37+98.06
359.79
41+57.85
65.74
42+23.59

165°17' 30"
165°15' 31"
410
99986
399944
409.9426

11°00' 30"
16°21' 30"
27°51' 30"
152°08' 30"

159.00
.37

27°51'30" : 158.27 = 11°30" : X

158.27
140187
110830
140187
406430
373838
325180
280374
456060
420561

11°30'
.19937
338.60
79433
119622
159996
59811
59811
67.5196253

99941
36
599646
299823
359.7876

1058
360

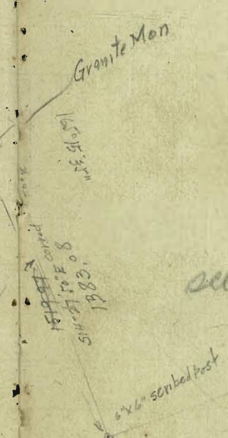
.78164
33849
253476
168984
225312
84492
95.3886576

2075
1783
292

3043
235.6
9979
235.6
59874
49895
29937
19958
235.105244
342.1
577.9

22 45 30
N14°25'24"W
N8°20'06"E

see F.B. 250 P61



7°53
430°
99055
430
2971650
396220
425936.50
426.03
70.00
496.03
498.52
994.55
497.31
1491.86
329.36
1821.22

42+61.5
4035
500
5°57
500
1017
328.24
994
29
8991
1998
289.71

99703
498.52
99461
497.31
9.9998911
2.5161915
2.5160826
3381.6
120
329.36

21+14.20
20+75.00
41+89.20
41+93.99
4.79

1143
500
140
1783.00
289.71
2072.71
272
2075.43

20°40'35"
N 89°00'41.5

2729.96
2729.59
2729.77 Mean

45.00
3.35
48.35

340.00
48.35
291.65

(2640.23)

90°00'
89°58'10
90°
89°59'20
59'30

275° 12°32'	2.4393327 / 9.9895254 / 2.4288581	268.45
49 I 5°52'	2.6919651 / 9.9977194 / 2.6896845	489.4
300.0 12°48'	2.4771213 / 9.9890711 / 2.4661924	292.55
11°18' 354.35	9.9914984 / −2.5494324 / 2.5409308	347.48

25+15.00
−89.28
24+25.72
25+15
1 22.73
26+37.73

500.00
269−54.30
89−58 10

178
59 20

89°59−20
90 00
90 00
89 58.10
359°59'30'

6°08' 145'
99428
145
497140
397712
99428
144170.60
17°27' 287
95 398
287
667786
763184
190796
27399226
24°10' 169
91236
169
821124
547416
91236
154188.84

545.00
144.17
689.17
273.79
406.00
1368.96

91236
169
821124
547416
91236
154188884

164 7°38
99114
164
396456
594684
99114
16254696

8°46 319 98834
319
889488
98834
296496
31527408

0°45 389
99991
899919
799928
299973
388.96479

257.95 11°35 97963
257
783704
489815
195926
25276491

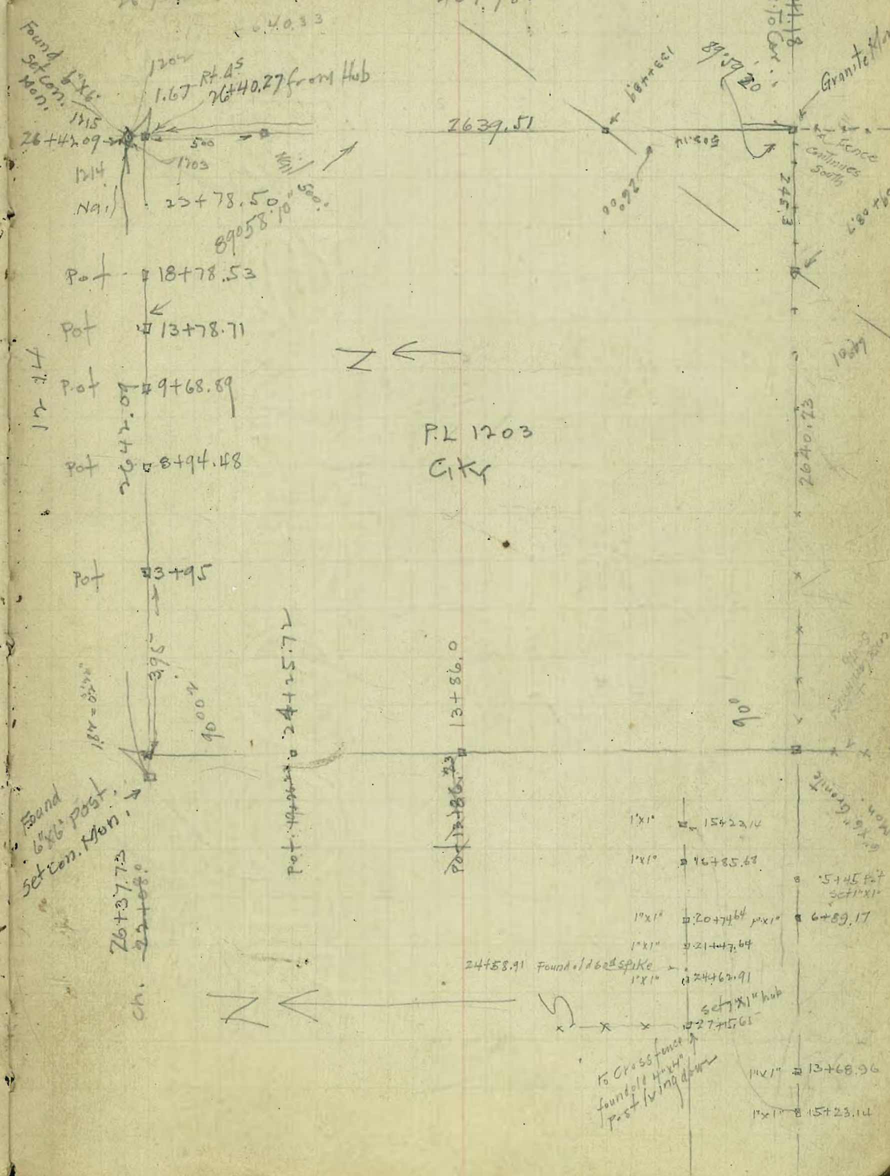
1368.96
154.18
1523.14
162.54
1685.68
388.96
2074.64
73.00 Level
2147.64
315.27
2462.91
252.74
2715.65

500
500
390
391.65
496.60
461.98
2640.23

500
6°41
465
6°32

99342
49660
99351
465
496755
596106
397404
461.98215

340
2639.51
1.67
2641.18



460.92

.33
.35

499.35
145.00
354.35

79

P. of 27+95

10+90.35 ± old S. F RR.

23°46'

0+06.5
95+23.42 TWP. Int.

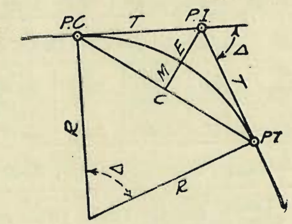
MP. 4509

1340			
1337		1304	East Line to be chained
1336	E½	1300	
1332	W½	1299	
1333	W½	1296	
1334	E½	1295	
1331		1294	
1330		1273 = 1275	
1329		1274	
1327		1273	
1326		1272	
1325		1279	
1324	Portion of	1280	
1323	Portions of	1281	
1322		~~1297~~	Sold
1321	W 784' of	1266	
1319	W 784' of	1252	
1318		1781	
1317	W½	1780	
1316		1232	
1315	E½	1785	
1314		1203	
1311		~~1240~~	Sold
1310		~~1241~~	Sold
1309		1240	
1306			
1305			

219.78
237.60
457.38

457.38
222.00
235.38

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

Radius $= R = \frac{50}{\sin. D/2}$ (1) Degree of Curve $= D$ and $\sin. \frac{D}{2} = \frac{50}{R}$ (2)

Tangent $= T = R\tan\frac{\Delta}{2}$ (3) Length of Curve $= L = 100\frac{\Delta}{D}$ (4)

Middle ordinate $= M = R(1 - \cos. \frac{\Delta}{2})$ (5) $= R\text{vers}\ \frac{\Delta}{2}$ (6)

External $= E = T\tan\frac{\Delta}{4}$ (7) $= R\cos\frac{\Delta}{2}(1 - \cos. \frac{\Delta}{2})$ (8) $= R\text{exsec}\frac{\Delta}{2}$ (9)

Long Chord $= C = 2\ R\ \sin.\frac{\Delta}{2}$ (10) $\Delta =$ Central Angle

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.=Sta. 161 +60.35 to find Sta. of P. C. and P. T. △=62° 10′ D=8° 20′. From Table IV for 1° curve T=3454.1 and ÷8⅓=414.49 ft. From Table V correction=.36 or T=414.85 ft. P. C.=Sta. P.I.—T=157 +45.50. Also from (4) L=746.00 and P. T.=Sta. P. C. +L=164 +91.50.

Offsets.—Tangent offsets vary (approximately) directly with D and with square of the distance. Thus tangent offset for Sta. 158 on above curve is 2.16 ft. found as follows. From Table III tangent offset for 100 ft.=7.27 ft. Distance=158—Sta. P. C.=54.50, hence offset=7.27 (54.50÷100)²=2.16 ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus (54.50)²÷(2 x 688.26)=2.16 ft.

Deflections.—Deflection angle=½ D for 100 ft., ¼ D for 50 ft., etc. For c ft.=(in minutes) .3 x C x D° or=defl. for 1 ft. from Table III x C. For Sta. 158 of above curve=.3 x 54.5 x 8⅓=136.2′ or 2° 16.2′, or=2.50 x 54.5=136.2′ from Table III. For Sta. 159 deflection angle=2° 16.2′ +8° 20′ ÷2=6° 26.2′, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 91.37. For from Table IV for 1° curve E=960.6 for 8° 20′=960.6÷8⅓=91.27 and from Table V correction=.10 or E=91.37 ft. Or suppose △=32° and E is measured and found to be 42 ft. What is D? From Table IV E=230.9 and ÷42=5.5 or D=5° 30′.

Table I.—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 II.—Inches in Decimals of a Foot.

1–16	3–32	⅛	3–16	¼	5–16	⅜	½	⅝	¾	⅞
.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

Table III.—Radii, Ordinates and Deflections.

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan Offset	Def. for 1 Foot
0° 10′	34377.5	.036	.145	0.05′	7°	819.02	1.528	6.105	2.10′
20	17188.8	.073	.291	0.10	20′	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25					
					8	716.78	1.746	6.976	2.40
1	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
10	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
30	3819.83	.327	1.309	0.45					
40	3437.87	.364	1.454	0.50	9	637.28	1.965	7.846	2.70
50	3125.36	.400	1.600	0.55	20	614.56	2.037	8.136	2.80
					30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65					
20	2455.70	.509	2.036	0.70	10	573.69	2.183	8.716	3.00
30	2292.01	.545	2.181	0.75	30	546.44	2.292	9.150	3.15
40	2148.79	.582	2.327	0.80	11	521.67	2.402	9.585	3.30
50	2022.41	.618	2.472	0.85	30	499.06	2.511	10.02	3.45
					12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15					
					15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.64	1.273	5.088	1 75					
					25	231.01	5.476	21.64	7.50
6	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
10	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
20	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
30	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
40	859.92	1.455	5.814	2.00	30	193.18	6.583	25.88	9.00

Note. Chord Deflection=2 times tangent deflection.

Table IV.—Tangents and Externals to a 1° Curve.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10′	58.34	.30	10′	560.11	27.31	10′	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226 6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

Table IV.—Tangents and Externals to a 1° Curve.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
91°	5830.5	2444.9	**101°**	6950.6	3278.1	**111°**	8336.7	4386.1
10′	5847.5	2457.1	10′	6971.3	3294.1	10′	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	**102**	7075.5	3374.9	**112**	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	**103**	7203.2	3474.4	**113**	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	**104**	7333.6	3576.8	**114**	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	**105**	7467.0	3682.3	**115**	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	**106**	7603.5	3791.0	**116**	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	**107**	7743.2	3902.9	**117**	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	**108**	7886.2	4018.2	**118**	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	**109**	8032.7	4137.1	**119**	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	5808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	**110**	8182.8	4259.7	**120**	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

Table V.—Corrections for Tangents and Externals.

These corrections are to be added to the approximate values, found by dividing the tangent, or external, for a 1° curve (Table IV) by the degree of curve, in order to obtain the true tangents, or externals. Intermediate values may be obtained by interpolation.

For Tangents Add

Central Angle	Degree of Curve													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.70	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.40	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34
110°	.51	1.03	1.56	2.08	2.61	3.14	3.67	4.21	4.76	5.31	5.86	6.43	7.01	7.60
120°	.62	1.25	1.93	2.52	3.16	3.81	4.45	5.11	5.77	6.44	7.12	7.80	8.50	9.22

For Externals Add

Central Angle.	Degree of Curve													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.711	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.985	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96
110°	.268	.536	.806	1.08	1.35	1.63	1.91	2.20	2.48	2.76	3.05	3.35	3.66	3.96
120°	.360	.721	1.08	1.45	1.82	2.19	2.57	2.95	3.33	3.72	4.11	4.50	4.91	5.32

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
o′						o′					
0	0	0	00	1	**90**	**8**	.1392	.1405	7.115	.99027	**82**
10	.0029	.0029	343.8	I	50	10	.1421	.1435	6.968	.98986	50
20	.0058	.0058	171.9	.99998	40	20	.1449	.1465	6.827	.98944	40
30	.0087	.0087	114.6	.99996	30	30	.1478	.1495	6.691	.98902	30
40	.0116	.0116	85.94	.99993	20	40	.1507	.1524	6.561	.98858	20
50	.0145	.0145	68.75	.99989	10	50	.1536	.1554	6.435	.98814	10
1	.0175	.0175	57.29	.99985	**89**	**9**	.1564	.1584	6.314	.98769	**81**
10	.0204	.0204	49.10	.99979	50	10	.1593	.1614	6.197	.98723	50
20	.0233	.0233	42.96	.99973	40	20	.1622	.1644	6.084	.98676	40
30	.0262	.0262	38.19	.99966	30	30	.1650	.1673	5.976	.98629	30
40	.0291	.0291	34.37	.99958	20	40	.1679	.1703	5.871	.98580	20
50	.0320	.0320	31.24	.99949	10	50	.1708	.1733	5.769	.98531	10
2	.0349	.0349	28.64	.99939	**88**	**10**	.1736	.1763	5.671	.98481	**80**
10	.0378	.0378	26.43	.99929	50	10	.1765	.1793	5.576	.98430	50
20	.0407	.0407	24.54	.99917	40	20	.1794	.1823	5.485	.98378	40
30	.0436	.0437	22.90	.99905	30	30	.1822	.1853	5.396	.98325	30
40	.0465	.0466	21.47	.99892	20	40	.1851	.1883	5.309	.98272	20
50	.0494	.0495	20.21	.99878	10	50	.1880	.1914	5.226	.98218	10
3	.0523	.0524	19.08	.99863	**87**	**11**	.1908	.1944	5.145	.98163	**79**
10	.0552	.0553	18.07	.99847	50	10	.1937	.1974	5.066	.98107	50
20	.0581	.0582	17.17	.99831	40	20	.1965	.2004	4.989	.98050	40
30	.0610	.0612	16.35	.99813	30	30	.1994	.2035	4.915	.97992	30
40	.0640	.0641	15.60	.99795	20	40	.2022	.2065	4.843	.97934	20
50	.0669	.0670	14.92	.99776	10	50	.2051	.2095	4.773	.97875	10
4	.0698	.0699	14.30	.99756	**86**	**12**	.2079	.2126	4.705	.97815	**78**
10	.0727	.0729	13.73	.99736	50	10	.2108	.2156	4.638	.97754	50
20	.0756	.0758	13.20	.99714	40	20	.2136	.2186	4.574	.97692	40
30	.0785	.0787	12.71	.99692	30	30	.2164	.2217	4.511	.97630	30
40	.0814	.0816	12.25	.99668	20	40	.2193	.2247	4.449	.97566	20
50	.0843	.0846	11.83	.99644	10	50	.2221	.2278	4.390	.97502	10
5	.0872	.0875	11.43	.99619	**85**	**13**	.2250	.2309	4.331	.97437	**77**
10	.0901	.0904	11.06	.99594	50	10	.2278	.2339	4.275	.97371	50
20	.0929	.0934	10.71	.99567	40	20	.2306	.2370	4.219	.97304	40
30	.0958	.0963	10.39	.99540	30	30	.2334	.2401	4.165	.97237	30
40	.0987	.0992	10.08	.99511	20	40	.2363	.2432	4.113	.97169	20
50	.1016	.1022	9.788	.99482	10	50	.2391	.2462	4.061	.97100	10
6	.1045	.1051	9.514	.99452	**84**	**14**	.2419	.2493	4.011	.97030	**76**
10	.1074	.1080	9.255	.99421	50	10	.2447	.2524	3.962	.96959	50
20	.1103	.1110	9.010	.99390	40	20	.2476	.2555	3.914	.96887	40
30	.1132	.1139	8.777	.99357	30	30	.2504	.2586	3.867	.96815	30
40	.1161	.1169	8.556	.99324	20	40	.2532	.2617	3.821	.96742	20
50	.1190	.1198	8.345	.99290	10	50	.2560	.2648	3.776	.96667	10
7	.1219	.1228	8.144	.99255	**83**	**15**	.2588	.2679	3.732	.96593	**75**
10	.1248	.1257	7.953	.99219	50	10	.2616	.2711	3.689	.96517	50
20	.1276	.1287	7.770	.99182	40	20	.2644	.2742	3.647	.96440	40
30	.1305	.1317	7.596	.99144	30	30	.2672	.2773	3.606	.96363	30
40	.1334	.1346	7.429	.99106	20	40	.2700	.2805	3.566	.96285	20
50	.1363	.1376	7.269	.99067	10	50	.2728	.2836	3.526	.96206	10
					82						**74**
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
o′						o′					
16	.2756	.2867	3.487	.96126	**74**	**24**	.4067	.4452	2.246	.91355	**66**
10	.2784	.2899	3.450	.96046	50	10	.4094	.4487	2.229	.91236	50
20	.2812	.2931	3.412	.95964	40	20	.4120	.4522	2.211	.91116	40
30	.2840	.2962	3.376	.95882	30	30	.4147	.4557	2.194	.90996	30
40	.2868	.2994	3.340	.95799	20	40	.4173	.4592	2.177	.90875	20
50	.2896	.3026	3.305	.95715	10	50	.4200	.4628	2.161	.90753	10
17	.2924	.3057	3.271	.95615	**73**	**25**	.4226	.4663	2.145	.90631	**65**
10	.2952	.3089	3.237	.95545	50	10	.4253	.4699	2.128	.90507	50
20	.2979	.3121	3.204	.95459	40	20	.4279	.4734	2.112	.90383	40
30	.3007	.3153	3.172	.95372	30	30	.4305	.4770	2.097	.90259	30
40	.3035	.3185	3.140	.95284	20	40	.4331	.4806	2.081	.90133	20
50	.3062	.3217	3.108	.95195	10	50	.4358	.4841	2.066	.90007	10
18	.3090	.3249	3.078	.95106	**72**	**26**	.4384	.4877	2.050	.89879	**64**
10	.3118	.3281	3.048	.95015	50	10	.4410	.4913	2.035	.89752	50
20	.3145	.3314	3.018	.94924	40	20	.4436	.4950	2.020	.89623	40
30	.3173	.3346	2.989	.94832	30	30	.4462	.4986	2.006	.89493	30
40	.3201	.3378	2.960	.94740	20	40	.4488	.5022	1.991	.89363	20
50	.3228	.3411	2.932	.94646	10	50	.4514	.5059	1.977	.89232	10
19	.3256	.3443	2.904	.94552	**71**	**27**	.4540	.5095	1.963	.89101	**63**
10	.3283	.3476	2.877	.94457	50	10	.4566	.5132	1.949	.88968	50
20	.3311	.3508	2.850	.94361	40	20	.4592	.5169	1.935	.88835	40
30	.3338	.3541	2.824	.94264	30	30	.4617	.5206	1.921	.88701	30
40	.3365	.3574	2.798	.94167	20	40	.4643	.5243	1.907	.88566	20
50	.3393	.3607	2.773	.94068	10	50	.4669	.5280	1.894	.88431	10
20	.3420	.3640	2.747	.93969	**70**	**28**	.4695	.5317	1.881	.88295	**62**
10	.3448	.3673	2.723	.93869	50	10	.4720	.5354	1.868	.88158	50
20	.3475	.3706	2.669	.93769	40	20	.4746	.5392	1.855	.88020	40
30	.3502	.3739	2.675	.93667	30	30	.4772	.5430	1.842	.87882	30
40	.3529	.3772	2.651	.93565	20	40	.4797	.5467	1.829	.87743	20
50	.3557	.3805	2.628	.93462	10	50	.4823	.5505	1.816	.87603	10
21	.3584	.3839	2.605	.93358	**69**	**29**	.4848	.5543	1.804	.87462	**61**
10	.3611	.3872	2.583	.93253	50	10	.4874	.5581	1.792	.87321	50
20	.3638	.3906	2.560	.93148	40	20	.4899	.5619	1.780	.87178	40
30	.3665	.3939	2.539	.93042	30	30	.4924	.5658	1.767	.87036	30
40	.3692	.3973	2.517	.92935	20	40	.4950	.5696	1.756	.86892	20
50	.3719	.4006	2.496	.92827	10	50	.4975	.5735	1.744	.86748	10
22	.3746	.4040	2.475	.92718	**68**	**30**	.5000	.5774	1.732	.86603	**60**
10	.3773	.4074	2.455	.92609	50	10	.5025	.5812	1.720	.86457	50
20	.3800	.4108	2.434	.92499	40	20	.5050	.5851	1.709	.86310	40
30	.3827	.4142	2.414	.92388	30	30	.5075	.5890	1.698	.86163	30
40	.3854	.4176	2.394	.92276	20	40	.5100	.5930	1.686	.86015	20
50	.3881	.4210	2.375	.92164	10	50	.5125	.5969	1.675	.85866	10
23	.3907	.4245	2.356	.92050	**67**	**31**	.5150	.6009	1.664	.85717	**59**
10	.3934	.4279	2.337	.91936	50	10	.5175	.6048	1.653	.85567	50
20	.3961	.4314	2.318	.91822	40	20	.5200	.6088	1.643	.85416	40
30	.3987	.4348	2.300	.91706	30	30	.5225	.6128	1.632	.85264	30
40	.4014	.4383	2.282	.91590	20	40	.5250	.6168	1.621	.85112	20
50	.4041	.4417	2.264	.91472	10	50	.5275	.6208	1.611	.84959	10
					66						**58**
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

26.171
37.224
21.634
80.027

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
° /						° /					
32	.5299	.6249	1.600	.84805	58	30	.6225	.7954	1.257	.78261	30
10	.5324	.6289	1.590	.84650	50	40	.6248	.8002	1.250	.78079	20
20	.5348	.6330	1.580	.84495	40	50	.6271	.8050	1.242	.77897	10
30	.5373	.6371	1.570	.84339	30						
40	.5398	.6412	1.560	.84182	20	39	.6293	.8098	1.235	.77715	51
50	.5422	.6453	1.550	.84025	10	10	.6316	.8146	1.228	.77531	50
						20	.6338	.8195	1.220	.77347	40
33	.5446	.6494	1.540	.83867	57	30	.6361	.8243	1.213	.77162	30
10	.5471	.6536	1.530	.83708	50	40	.6383	.8292	1.206	.76977	20
20	.5495	.6577	1.520	.83549	40	50	.6406	.8342	1.199	.76791	10
30	.5519	.6619	1.511	.83389	30						
40	.5544	.6661	1.501	.83228	20	40	.6428	.8391	1.192	.76604	50
50	.5568	.6703	1.492	.83066	10	10	.6450	.8441	1.185	.76417	50
						20	.6472	.8491	1.178	.76229	40
34	.5592	.6745	1.483	.82904	56	30	.6494	.8541	1.171	.76041	30
10	.5616	.6787	1.473	.82741	50	40	.6517	.8591	1.164	.75851	20
20	.5640	.6830	1.464	.82577	40	50	.6539	.8642	1.157	.75661	10
30	.5664	.6873	1.455	.82413	30						
40	.5688	.6916	1.446	.82248	20	41	.6561	.8693	1.150	.75471	49
50	.5712	.6959	1.437	.82082	10	10	.6583	.8744	1.144	.75280	50
						20	.6604	.8796	1.137	.75088	40
35	.5736	.7002	1.428	.81915	55	30	.6626	.8847	1.130	.74896	30
10	.5760	.7046	1.419	.81748	50	40	.6648	.8899	1.124	.74703	20
20	.5783	.7089	1.411	.81580	40	50	.6670	.8952	1.117	.74509	10
30	.5807	.7133	1.402	.81412	30						
40	.5831	.7177	1.393	.81242	20	42	.6691	.9004	1.111	.74314	48
50	.5854	.7221	1.385	.81072	10	10	.6713	.9057	1.104	.74120	50
						20	.6734	.9110	1.098	.73924	40
36	.5878	.7265	1.376	.80902	54	30	.6756	.9163	1.091	.73728	30
10	.5901	.7310	1.368	.80730	50	40	.6777	.9217	1.085	.73531	20
20	.5925	.7355	1.360	.80558	40	50	.6799	.9271	1.079	.73333	10
30	.5948	.7400	1.351	.80386	30						
40	.5972	.7445	1.343	.80212	20	43	.6820	.9325	1.072	.73135	47
50	.5995	.7490	1.335	.80038	10	10	.6841	.9380	1.066	.72937	50
						20	.6862	.9435	1.060	.72737	40
37	.6018	.7536	1.327	.79864	53	30	.6884	.9490	1.054	.72537	30
10	.6041	.7581	1.319	.79688	50	40	.6905	.9545	1.048	.72337	20
20	.6065	.7627	1.311	.79512	40	50	.6926	.9601	1.042	.72136	10
30	.6088	.7673	1.303	.79335	30						
40	.6111	.7720	1.295	.79158	20	44	.6947	.9657	1.036	.71934	46
50	.6134	.7766	1.288	.78980	10	10	.6967	.6713	1.030	.71732	50
						20	.6988	.9770	1.024	.71529	40
38	.6157	.7813	1.280	.78801	52	30	.7009	.9827	1.018	.71325	30
10	.6180	.7860	1.272	.78622	50	40	.7030	.9884	1.012	.71121	20
20	.6202	.7907	1.265	.78442	40	50	.7050	.9942	1.006	.70916	10
							.7071	1.	1.	.70711	45
											° /
	Cosin.	Cotg.	Tan.	Sine.	Angle.		Cosin.	Cotg.	Tan.	Sine.	Angle.

431.°
471
907

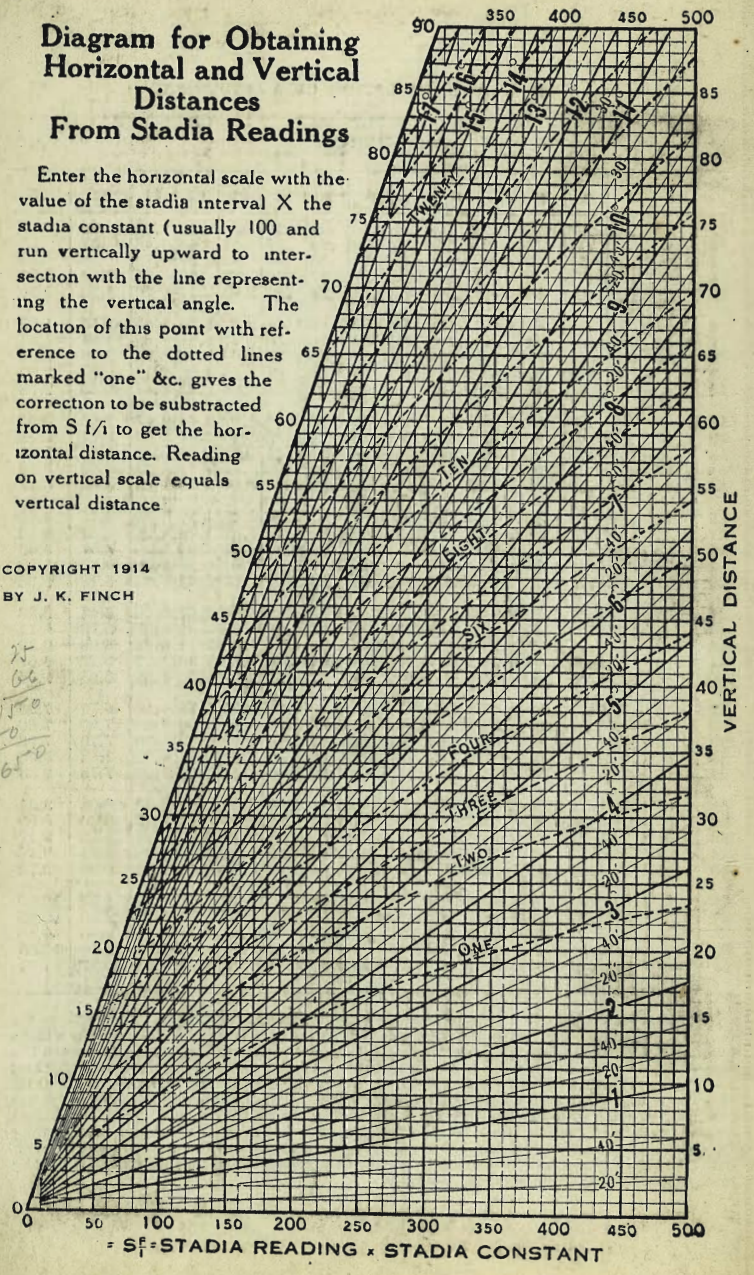
Table IX.—Calculation of Earthwork.

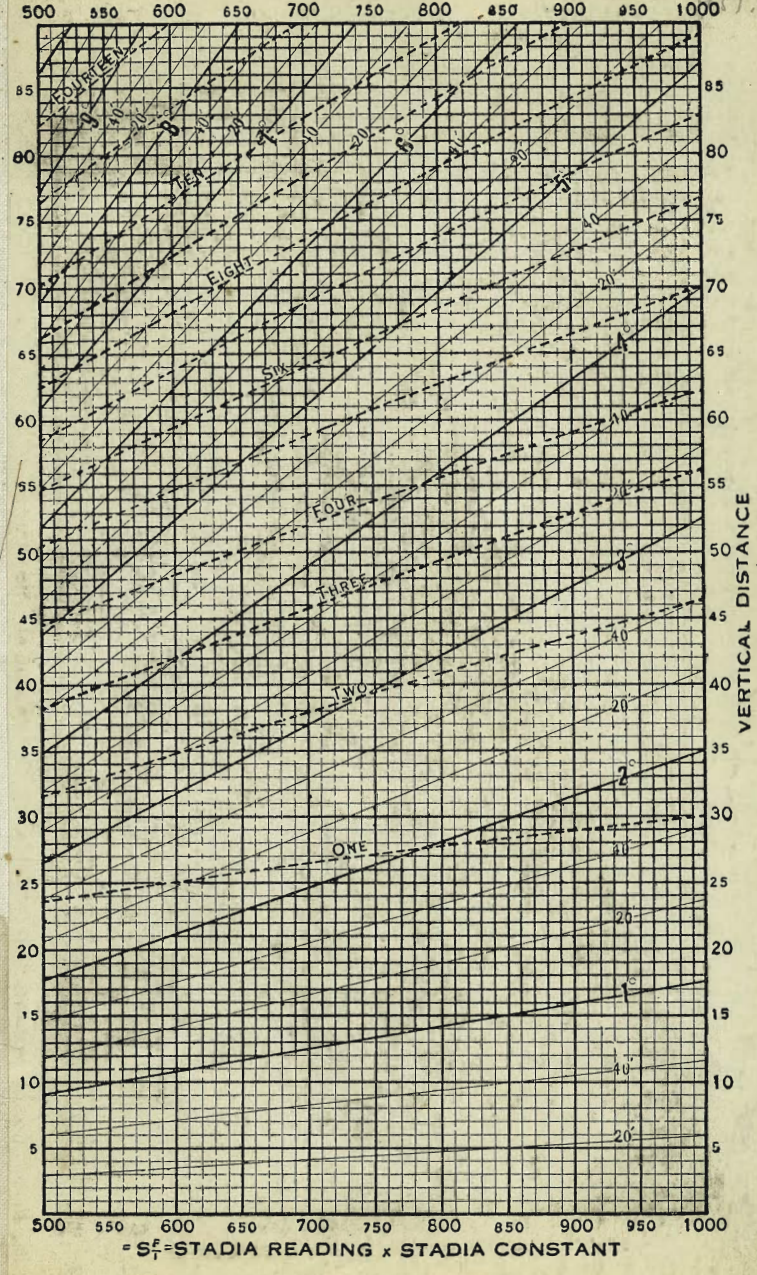
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	1.04	1.11
5	.09	.19	.28	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6	.11	.22	.33	.44	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.55	1.67
7	.13	.26	.39	.52	.65	.78	.91	1.04	1.16	1.30	1.42	1.55	1.68	1.81	1.94
8	.15	.30	.44	.59	.74	.89	1.04	1.19	1.33	1.48	1.63	1.78	1.92	2.08	2.22
9	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50
10	.18	.37	.56	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
11	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.83	2.04	2.24	2.44	2.65	2.85	3.06
12	.22	.44	.67	.89	1.11	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33
13	.24	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.41	2.65	2.89	3.13	3.37	3.61
14	.26	.52	.78	1.04	1.30	1.55	1.81	2.08	2.33	2.59	2.85	3.11	3.37	3.63	3.89
15	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17
16	.30	.59	.89	1.18	1.48	1.78	2.07	2.37	2.67	2.96	3.26	3.56	3.85	4.15	4.44
17	.31	.63	.94	1.26	1.57	1.89	2.20	2.52	2.83	3.15	3.46	3.78	4.09	4.41	4.72
18	.33	.67	1.00	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00	4.33	4.67	5.00
19	.35	.70	1.06	1.41	1.76	2.11	2.46	2.82	3.17	3.52	3.87	4.22	4.57	4.92	5.28
20	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70	4.07	4.44	4.81	5.18	5.56
21	.39	.78	1.17	1.55	1.94	2.33	2.72	3.11	3.50	3.89	4.28	4.67	5.06	5.44	5.33
22	.41	.81	1.22	1.63	2.04	2.44	2.85	3.26	3.67	4.07	4.48	4.89	5.30	5.70	6.11
23	.43	.85	1.28	1.70	2.13	2.56	2.98	3.41	3.83	4.26	4.68	5.11	5.54	5.96	6.39
24	.44	.89	1.33	1.78	2.22	2.67	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67
25	.46	.92	1.39	1.85	2.31	2.78	3.24	3.70	4.17	4.63	5.09	5.56	6.02	6.48	6.94
26	.48	.96	1.44	1.92	2.41	2.89	3.37	3.85	4.33	4.82	5.30	5.78	6.26	6.74	7.24
27	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
28	.52	1.04	1.55	2.07	2.59	3.11	3.63	4.15	4.67	5.18	5.70	6.22	6.74	7.26	7.78
29	.54	1.07	1.61	2.15	2.68	3.22	3.76	4.30	4.83	5.37	5.91	6.44	6.98	7.52	8.06
30	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	5.55	6.11	6.67	7.22	7.78	8.33
31	.57	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.32	6.89	7.46	8.04	8.61
32	.59	1.18	1.78	2.37	2.96	3.56	4.15	4.74	5.33	5.92	6.52	7.11	7.70	8.30	8.89
33	.61	1.22	1.83	2.44	3.05	3.67	4.28	4.89	5.50	6.11	6.72	7.33	7.94	8.55	9.17
34	.63	1.26	1.89	2.52	3.15	3.78	4.40	5.04	5.67	6.29	6.93	7.56	8.18	8.81	9.44
35	.65	1.30	1.94	2.59	3.24	3.89	4.53	5.18	5.83	6.48	7.13	7.78	8.42	9.08	9.72
36	.67	1.33	2.00	2.67	3.33	4.00	4.66	5.33	6.00	6.67	7.33	8.00	8.67	9.33	10.00
37	.68	1.37	2.06	2.74	3.42	4.11	4.79	5.48	6.17	6.85	7.54	8.22	8.91	9.59	10.28
38	.70	1.41	2.11	2.82	3.52	4.22	4.92	5.63	6.33	7.03	7.74	8.44	9.15	9.85	10.56
39	.72	1.44	2.17	2.89	3.61	4.33	5.05	5.78	6.50	7.22	7.95	8.67	9.39	10.11	10.83
40	.74	1.48	2.22	2.96	3.70	4.44	5.18	5.92	6.67	7.41	8.15	8.89	9.63	10.37	11.11

Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering the heights from 1 to 9 as tenths. Thus if w =16.2 and h =5.3, cu. yds. =1.48+.028+.089 =1.597 cu. yds. or practically 160 cu. yds. per 100 ft. If w exceeds 40 ft., use one half and multiply result by 2, if both w and h are large use one half of each and multiply result by 4. Any cross-section may be divided into triangles by the following rule. To the triangle of the sum of the outside cuts (or fills) =h, and ½ the roadbed =w, add the triangles formed by taking the distance out to each break in turn (=w's) by the difference between the cuts (or fills) on each side of it (=h's) always subtracting the outer from the inner.

Diagram for Obtaining Horizontal and Vertical Distances From Stadia Readings

Enter the horizontal scale with the value of the stadia interval X the stadia constant (usually 100 and run vertically upward to intersection with the line representing the vertical angle. The location of this point with reference to the dotted lines marked "one" &c. gives the correction to be substracted from S f/i to get the horizontal distance. Reading on vertical scale equals vertical distance





Picketts Garage
S.S. Market between 14th & 15th

7° 05
47° 38 40"
7 04 46"

61280
46

58

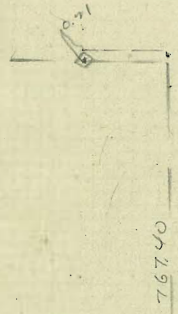
89°57'20"
269 53
89 57 40"

57
173

102°49
205 38

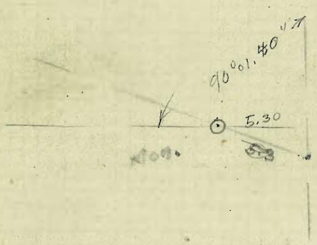
42.16
16
58.16

51
23
75
50
575
340
6719.7
420.7
300.0
720.7
469
767.60
.21
767.39



209°40'30"
104° 50' 15"
49 40
31

270.05
90°01'40



1891
67
13237
11346
1,26697

.00290
2640 | .760000
5280
23200

Mch 12 1938

38°76'
5 · 19° 20 30"

Hor 23760 Vert
60°41' 31°50
61° 04' 31°28
61°27'30" 31°08
61° 50'30" 30°45

Time
3.10 5.180
3.12
3.14
3.16

75
1681.33
997.70
2679.03

21+14.20
20.75
41+89.20
38 34.20
3 55 20

15404.79
6 55
21459.79
4.90
21464.69
14
214 45.79

1311 Rt to Sun.
1314

540.00
469.89
70.11

150 | 1460.92
1350
.00067
2646 | 177000
15876
18240
16522

220
220.78

67
64
402
402
4422

15
67
105
90
1,005

1.00

BK. 999
" 609
" 9
" 608

40.58
75.00
115.58

27+54.34
26+38.24
116.10

.00034
2636 | .9600
7908
11920
10544

2646
67
18522
15876
177,282

1640
34
6560
4920
.55760

H
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

ne to
ns of
mple
43.9.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1½.
For Single Track Embankment.

H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.1	9.2	9.4	0
1	9.5	9.7	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.9	1
2	11.0	11.2	11.3	11.5	11.6	11.8	11.9	12.1	12.2	12.4	2
3	12.5	12.7	12.8	13.0	13.1	13.3	13.4	13.6	13.7	13.9	3
4	14.0	14.2	14.3	14.5	14.6	14.8	14.9	15.1	15.2	15.4	4
5	15.5	15.7	15.8	16.0	16.1	16.3	16.4	16.6	16.7	16.9	5
6	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.1	18.2	18.4	6
7	18.5	18.7	18.8	19.0	19.1	19.3	19.4	19.6	19.7	19.9	7
8	20.0	20.2	20.3	20.5	20.6	20.8	20.9	21.1	21.2	21.4	8
9	21.5	21.7	21.8	22.0	22.1	22.3	22.4	22.6	22.7	22.9	9
10	23.0	23.2	23.3	23.5	23.6	23.8	23.9	24.1	24.2	24.4	10
11	24.5	24.7	24.8	25.0	25.1	25.3	25.4	25.6	25.7	25.9	11
12	26.0	26.2	26.3	26.5	26.6	26.8	26.9	27.1	27.2	27.4	12
13	27.5	27.7	27.8	28.0	28.1	28.3	28.4	28.6	28.7	28.9	13
14	29.0	29.2	29.3	29.5	29.6	29.8	29.9	30.1	30.2	30.4	14
15	30.5	30.7	30.8	31.0	31.1	31.3	31.4	31.6	31.7	31.9	15
16	32.0	32.2	32.3	32.5	32.6	32.8	32.9	33.1	33.2	33.4	16
17	33.5	33.7	33.8	34.0	34.1	34.3	34.4	34.6	34.7	34.9	17
18	35.0	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	18
19	36.5	36.7	36.8	37.0	37.1	37.3	37.4	37.6	37.7	37.9	19
20	38.0	38.2	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.4	20
21	39.5	39.7	39.8	40.0	40.1	40.3	40.4	40.6	40.7	40.9	21
22	41.0	41.2	41.3	41.5	41.6	41.8	41.9	42.1	42.2	42.4	22
23	42.5	42.7	42.8	43.0	43.1	43.3	43.4	43.6	43.7	43.9	23
24	44.0	44.2	44.3	44.5	44.6	44.8	44.9	45.1	45.2	45.4	24
25	45.5	45.7	45.8	46.0	46.1	46.3	46.4	46.6	46.7	46.9	25
26	47.0	47.2	47.3	47.5	47.6	47.8	47.9	48.1	48.2	48.4	26
27	48.5	48.7	48.8	49.0	49.1	49.3	49.4	49.6	49.7	49.9	27
28	50.0	50.2	50.3	50.5	50.6	50.8	50.9	51.1	51.2	51.4	28
29	51.5	51.7	51.8	52.0	52.1	52.3	52.4	52.6	52.7	52.9	29
30	53.0	53.2	53.3	53.5	53.6	53.8	53.9	54.1	54.2	54.4	30
31	54.5	54.7	54.8	55.0	55.1	55.3	55.4	55.6	55.7	55.9	31
32	56.0	56.2	56.3	56.5	56.6	56.8	56.9	57.1	57.2	57.4	32
33	57.5	57.7	57.8	58.0	58.1	58.3	58.4	58.6	58.7	58.9	33
34	59.0	59.2	59.3	59.5	59.6	59.8	59.9	60.1	60.2	60.4	34
35	60.5	60.7	60.8	61.0	61.1	61.3	61.4	61.6	61.7	61.9	35
36	62.0	62.2	62.3	62.5	62.6	62.8	62.9	63.1	63.2	63.4	36
37	63.5	63.7	63.8	64.0	64.1	64.3	64.4	64.6	64.7	64.9	37
38	65.0	65.2	65.3	65.5	65.6	65.8	65.9	66.1	66.2	66.4	38
39	66.5	66.7	66.8	67.0	67.1	67.3	67.4	67.6	67.7	67.9	39
40	68.0	68.2	68.3	68.5	68.6	68.8	68.9	69.1	69.2	69.4	40

Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 41.9. For same slopes but other widths of roadbed correct above figures by one-half difference in width of roadbed—thus in example above for 20 ft. roadbed distance will be 41.9+(20—16)÷2 or 2 ft. added to 41.9 =43.9. For slopes of 1 on 1 see inside of front cover.