1618

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.

Moore Osborne Covert 6-19-41

1

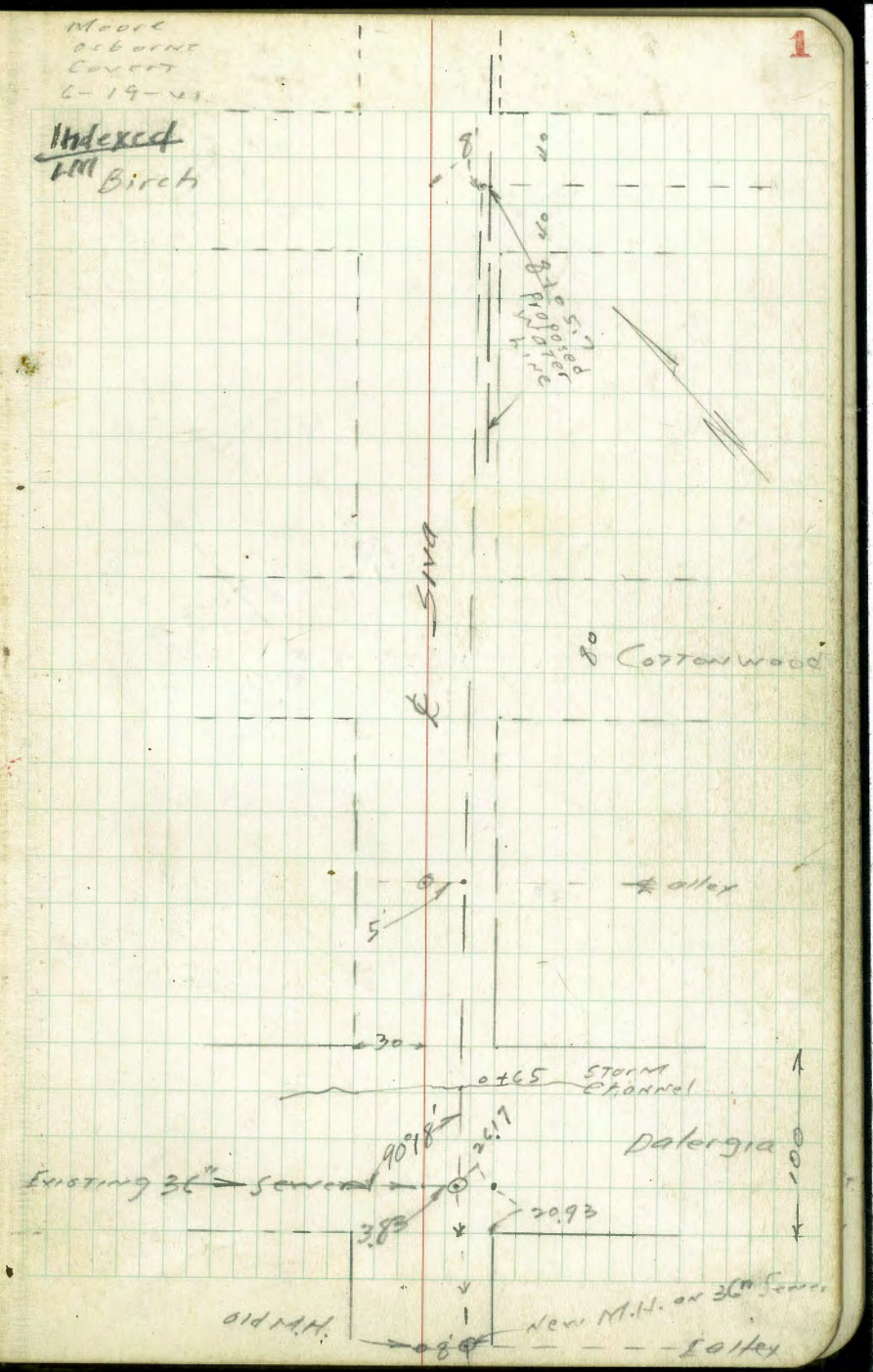
Indexed
Birch

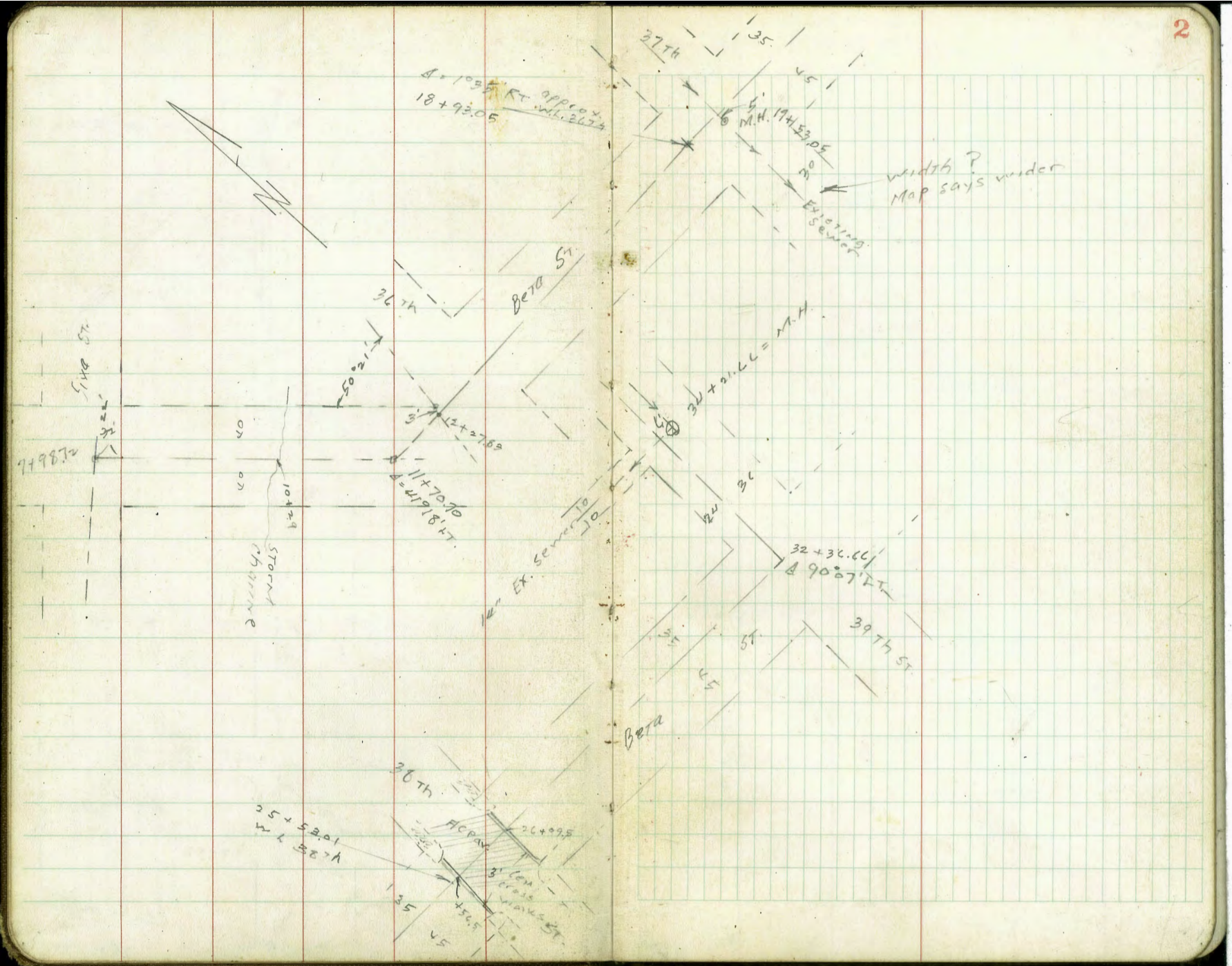
Align. of Encanto Sewer
Beg. at Siva & Dalbergia

7+98.72 = Δ 89°42' RT.

0+29 EXISTING OLD M.H.

EXISTING M.H. 36" Sewer = 0+10




37 TH
35
45
M.H. 19+53.05
30
width ?
Map says wider
Existing sewer
Beta
5'
36 TH
50.21'
3'
12+27.62
11+70.70
Δ=41°18' Rt.
10+79
Storm sewer
Δ=103° Rt. approx.
18+93.05
32+21.66 = M.H.
30
24"
32+36.66'
Δ 90°07' Lt.
39 Th St.
8" Ex. sewer
Beta
38 Th
Acres
26+09.5
35+52.01
V=28.75'
3' Conc. cross walk
+54.5
35
45

40+10.66

39+97.66

Z ST. Δ 90°18'RT.

MH.

39+91.56

39+00 ← STORM channel

39.76

24 C.P.

38+01.66 — 10 — 14" Sewer

14" EXISTING Sewer

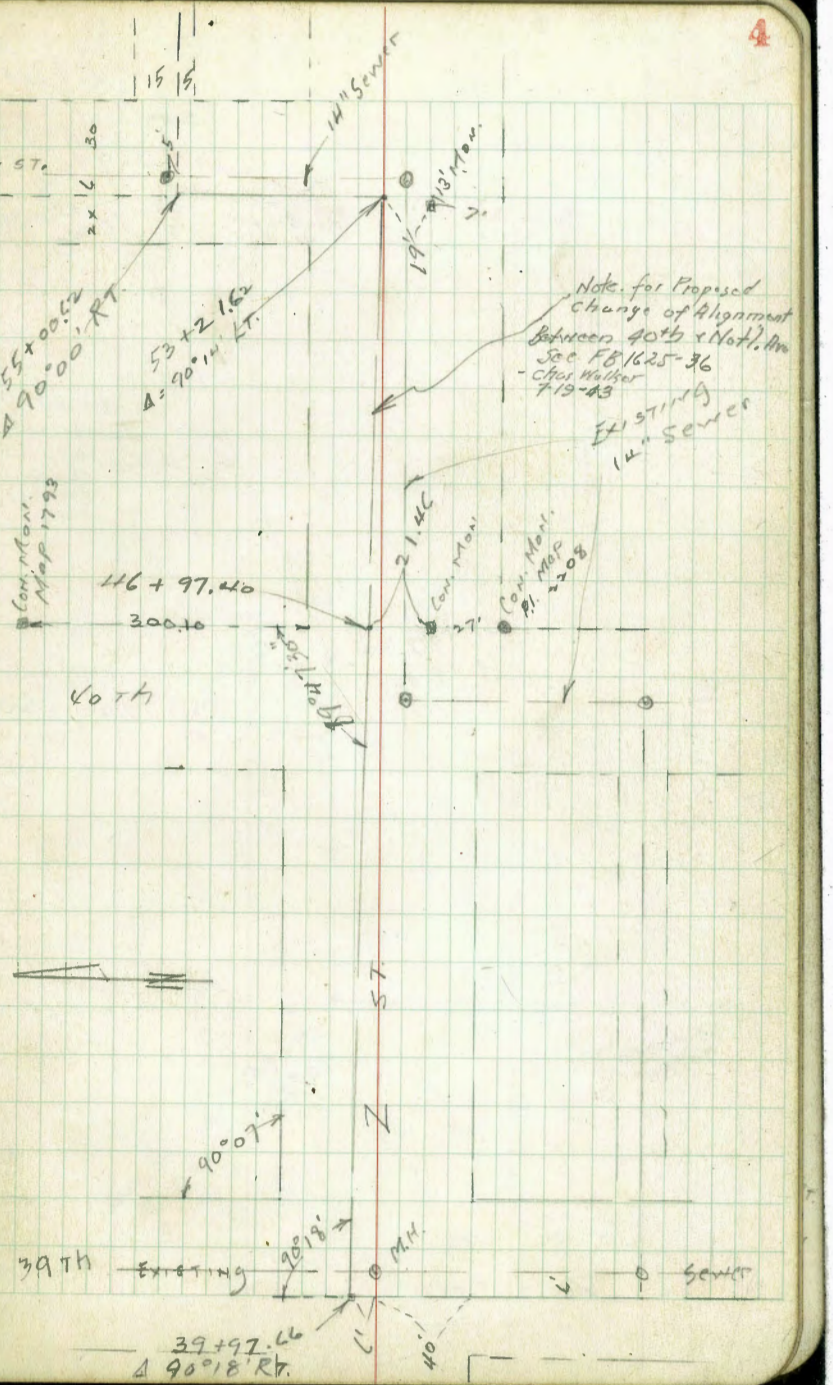
Proposed sewer

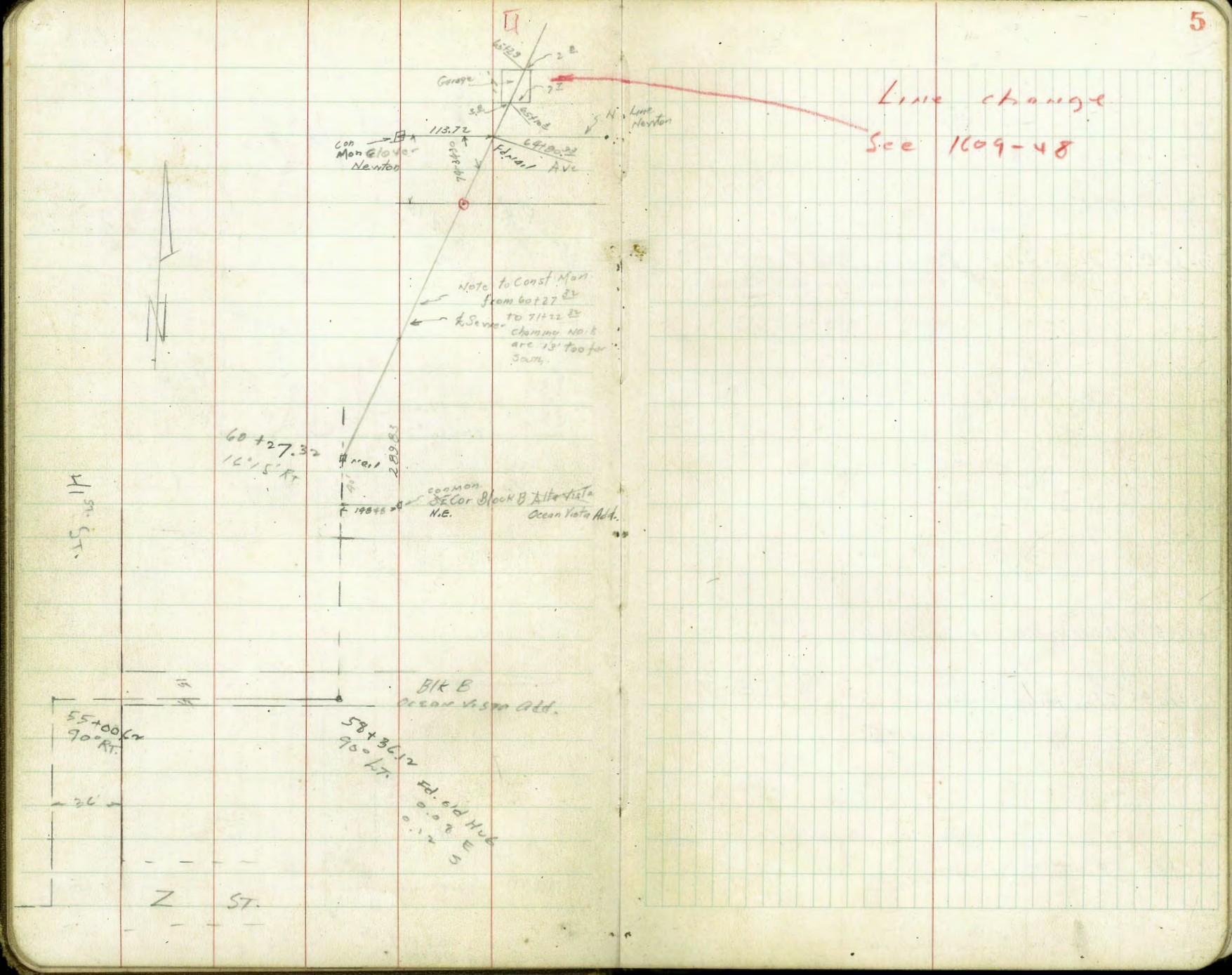
Alpha ST 20

36+11.66

35+71.66

24 C.P. 30


15
15
14" Sewer
41 St.
30
2 x 6
5'
19½ - 4½ Mon.
55+00.62
Δ 90°00' RT.
53+21.62
Δ = 90°00' LT.
Note for Proposed
Change of Alignment
between 40th & Nat'l. Av.
See FB 1625-36
- Chas Walker
7-19-63
Ex. 37' R/W
14" Sewer
Con. Mon.
Map 1793
21.46
Con. Mon.
Con. Mon.
Map 1708
116 + 97.46
300.10
40th
Ex. 24" Hobbs
ST.
90°07'
90°18'
39th
Existing
M.H.
Sewer
39+97.46
Δ 90°18' Rt.
40'

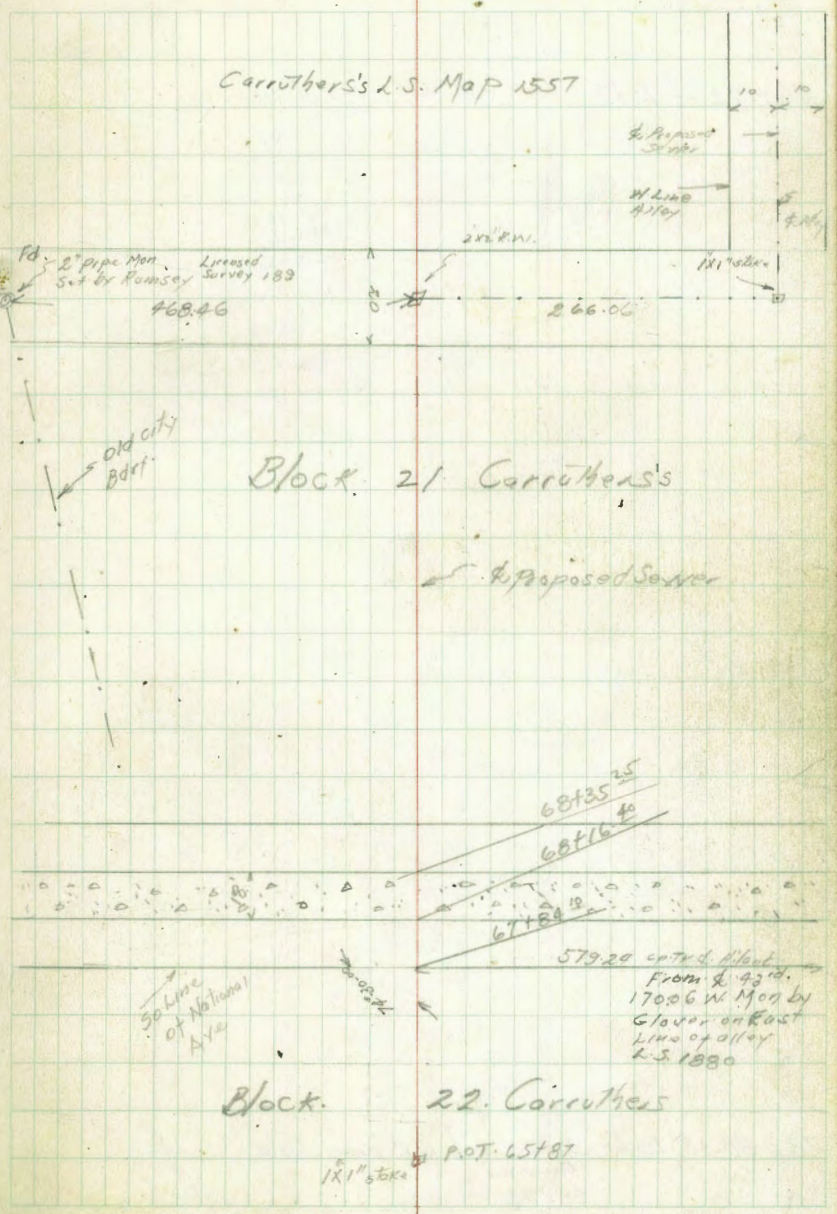

Garage
113.72
Con Mon Flower Newton
Fd. Nail
Ave
N. Line Newton
Line change
See 1609-48
Note to Const. Mon. from 60+27 ℄ to 71+22 ℄ chimney Nos. are 13' too far South.
60+27.3 ℄
16°15' Rt
Fd. Nail
common SE Cor Block B Alta Vista & Ocean Vista Add. N.E.
19848
Blk B
Ocean Vista Add.
58+36.12
90° Lt.
5.5+00.6 ℄
90° Rt.
Fd. Old Hub
Z St.

711+22 32 ℄ Rt 79°-28'-00" 2"x2" P.W. Hub Set by Ramsey. Record Same Wm. Ramsey L.S. 189

68+35 3 N. Line Paving on National Ave

68+16 9 S Line paving on National Ave

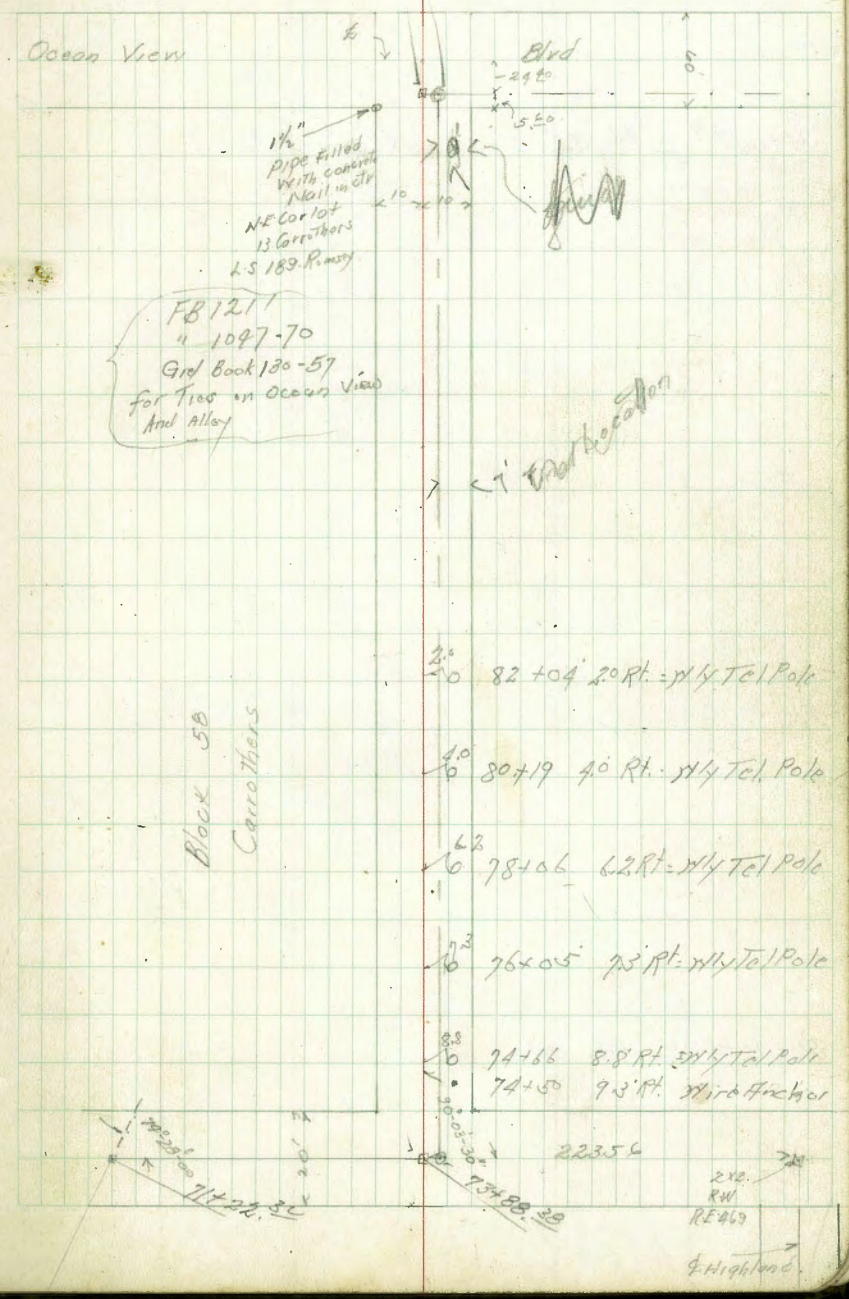
65+87 P.O.T. 1"x1" stake



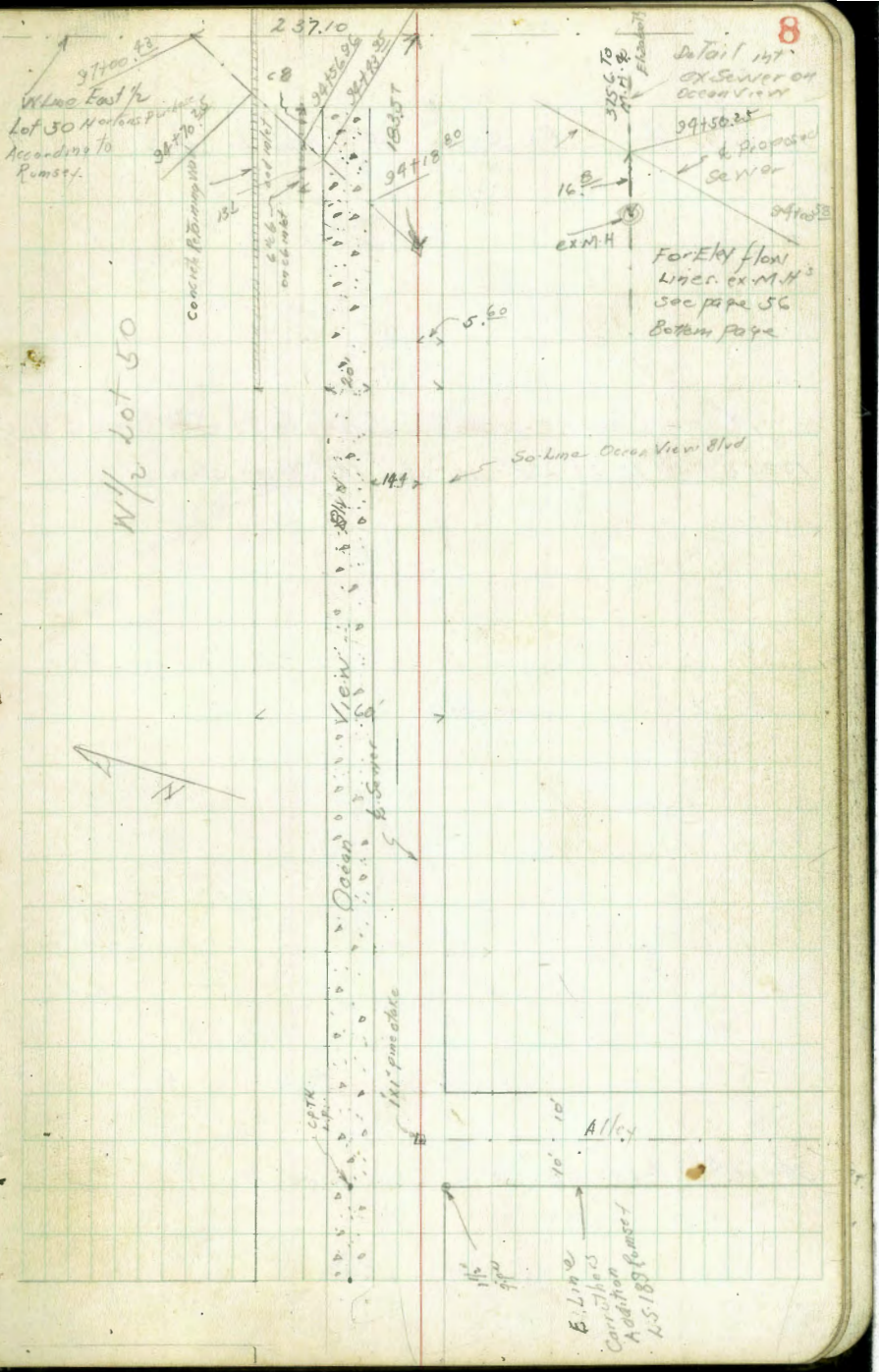
86+93.68 L Rt 90°-02'-30" 1X1 pine stake

80+19
85 03
11.5 22
8.7 1

73+88.38 L Lt 90°-03-30 1"x1" pinestake
Record same
LS 189 Rumsey



94+00.58	L Lt	52°-15'-00"	1X1 pine stake		
86+93.68	L Rt	90°-02'-30"			

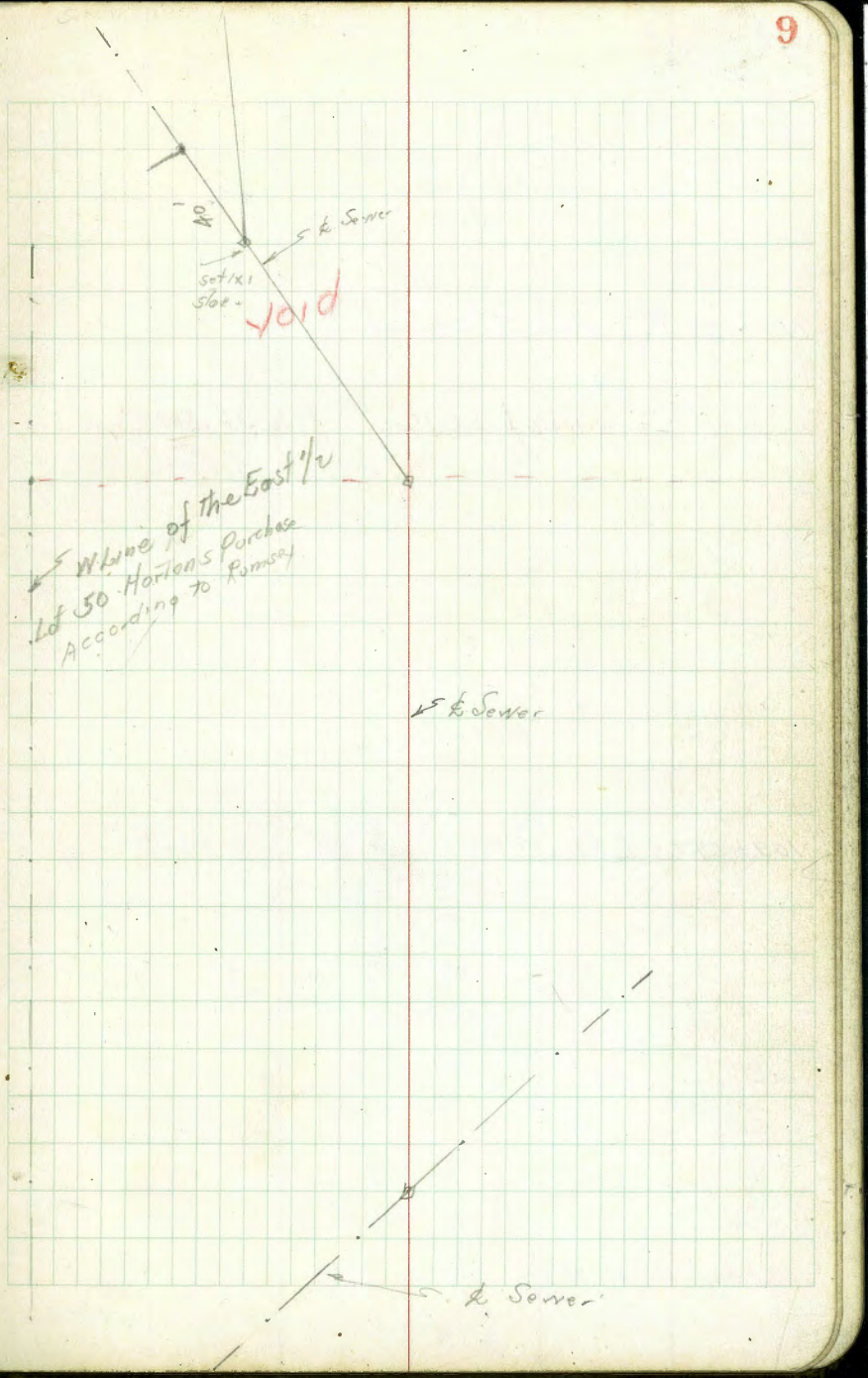


105+92.18 L. Rt. This Angle pt. could not be set & figured
See page 10 - Bottom

℄ Line change from this Angle Pt. See Page 53

102+67.18 L. Lt. 52° 30'-00 1"x1" pine stake

94+00.58 L. Lt. 52° 15'-00 See page 8

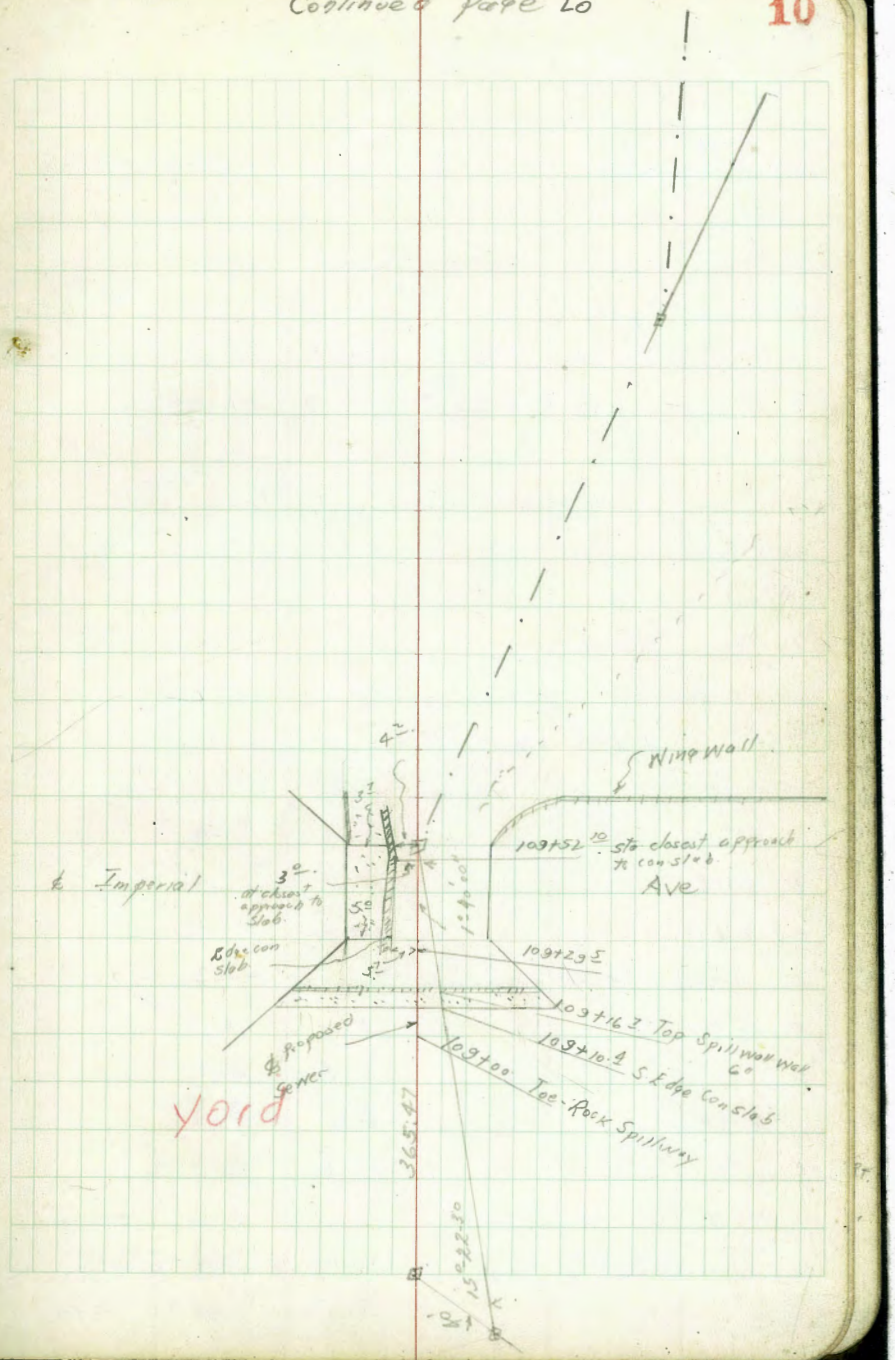


Continued page 20

111+97.65 L. Lt 41°-00-00

109+57.65 L. Rt 49°-28'-00

105+92.18 L. Rt 17°-02-30



Level Notes

Encanto Sewer

Moore Osborne

Common Stand. disc.				13.409	U.S.C.&G.S. Datum
				6.119	
	2.57	9.84		7.790	City Dat.
T.P.	1.01	7.90	2.97	6.89	
T.P.	6.37	4.95	9.27	-1.37	W. 7/26/43.
T.P.	5.405	5.837	4.518	0.432	
T.P.	3.431	7.93	1.338	4.499 4.499	
	0+00 = MH. Sixa y Dalbergia				
ground			5.2	2.7	
R.M.			3.63	4.30	W. edge RIM
36" Sewer			11.61	~~-3.68~~	-7.31
0+25			4.9	3.0	
T.P.	4.738	8.938	3.73	4.20	
0+30			1.9	7.0	
0+35			1.9	7.0	
0+45			7.7	1.2	
0+60			10.2	-1.3	
0+65	Storm channel		10.2	-1.3	
0+81			5.7	3.2	
1			5.8	3.1	
+50			5.4	3.5	
"			5.1	3.8	
+79	Int. of Sewer		5.6	3.3	ground
"	M.H. approx. 5' Lt.		10.13	~~-3.49~~	-6.83 F.L.
"	"		5.45	3.49	R.M.

U.S.C.&G. P57 - 1924 75' E of E.W. 32nd St. Cor. S. Fe & S.D. Ariz. R.R. Tr.

		8.938			
2+50			5.4	3.5	
T.P. 2+29	5.513	8.997	5.454	3.484	NORTH RIM M.H.
3			5.6	3.4	
+50			5.8	3.2	
4			5.6	3.4	
+50			5.3	3.7	
5			4.7	4.3	
+50			4.9	4.1	
6			4.8	4.2	
+50			4.8	4.2	
+67			4.7	4.3	
7			2.8	6.2	
+50			0.0	9.0	
T.P.	4.438	11.927	1.508	7.489	
7+98.72	Δ 89°42' RT.		1.04	10.89	2x2 Hub
8+05.7	Int. Proposed water		1.7	10.2	
+50			3.6	8.3	
9			4.8	7.1	
+50			5.7	6.2	
10			6.1	5.8	
+14			6.4	5.5	
+24	Storm Channel		10.6	1.3	
+29	"	"	11.2	0.7	
+42			9.1	2.8	
+50			7.3	4.6	

(11.927)

+60	6.3	5.6
11	6.0	5.9
+50	6.2	5.7
+70.70 Δ 41°18'27	6.5	5.4
12	6.0	5.9
+27.83	5.8	6.1
T.P. 4.55 (10.195)	6.282	(5.645)
+50	6.2	6.0
13	6.2	6.0
+50	6.5	5.7
14	6.2	6.0
+50	6.4	5.8
15	6.5	5.7
+50	6.1	6.1
16	3.9	6.3
+50	6.6	6.2
17	3.8	6.4
+50	3.7	6.5
T.P. 5.673 (12.096)	3.772	(6.423)
18	5.7	6.4
+50	5.5	6.6
+93.05 Δ 1°35' RT	5.5	6.6
19+23.05	5.88	6.22 RIM M.H. SRT.
"	13.86	−1.76 Sh. " "
+53.65 EL. 377.5	4.9	7.2

		⟨12.096⟩			
20			4.9	7.2	✓
+50			4.9	7.2	✓
21			4.6	7.5	✓
+50			4.6	7.5	✓
22			4.4	7.7	✓
+50			4.2	7.9	✓
23			3.9	8.2	✓
T.P	5.997	⟨14.118⟩	3.95	⟨9.142⟩	✓
+50			5.9	8.2	✓
24			5.9	8.2	✓
+50			5.5	8.6	✓
25			5.1	9.0	✓
+53.0		W.L 38TH	4.9	9.2	✓
+56.5		edge 3' Cross walk	4.97	9.15	✓
+83.0		℄ 38TH Pav.	4.60	9.52	✓
25.6 +09.5		edge 3' cross walk	4.44	9.68	✓
+130		EL 38TH	4.4	9.7	✓
BM. BP. Set S.E. Cor. 6			3.988	10.130	✓ 38TH & Beta St.
26 +50			3.9	10.2	✓
27			3.8	10.9	✓
+50			3.0	11.1	
28			2.7	11.4	✓
T.P	7.526	⟨18.693⟩	2.685	⟨11.433⟩	✓

	⟨18.693⟩			
28 +50		7.0	11.2	✓
29		6.5	12.2	✓
+50		6.1	12.6	✓
30		3.8	14.9	✓
+15		3.6	15.1	✓
+20		0.9	17.8	✓
+50		0.6	18.1	✓
31		1.8	16.9	✓
+50		2.4	16.3	✓
32		3.4	15.3	✓
+36.66 @ 90°07' Rt.		2.4	16.3	✓
T.P	4.818 ⟨19.693⟩	3.818	⟨14.875⟩	
+40		4.6	15.1	✓
33		5.1	14.6	✓
+50		5.1	14.6	✓
34		4.5	15.2	✓
+21.66 = MH. 6' Rt.		17.33	2.36	✓ F.L.
" "		3.93	15.76	R.M.
+50		4.5	15.2	✓
35		5.0	14.7	✓
+50		4.6	15.1	✓
36		4.9	14.8	✓
+11.66 MH. 6' Rt.		16.95	2.74	✓ F.L.
" "		4.59	15.10	✓ R.M.

		(19.693)			
36 + 50			4.7	15.0	
37			4.1	15.6	
+ 50			4.4	15.3	
T.P.	5.467	(20.905)	4.355	15.438	
38 + 01.CC	M.M. C'RT		6.65	14.26	RIM
"			17.65	3.26	F.L. 14"
"	℄ ground		6.3	14.6	
+ 50	"		7.0	13.9	
+ 83			10.1	10.8	
+ 91			12.5	8.4	
39	STORM CHANNEL		13.5	7.4	
+ 12	"	"	13.5	7.4	
+ 17			10.0	10.9	
+ 30.			9.1	11.8	
+ 37			5.7	15.2	
+ 47			3.5	17.4	
+ 50			3.3	17.6	
+ 75			4.3	16.6	
+ 91.66	M.M. C'RT		3.0	17.9	ground
"	"	"	2.74	18.17	RIM
"	"	"	12.30	8.61	F.L.
39 + 97.CC	= Δ 90°	18' RT	4.5	18.4	
B.M. S.W. Cor of 13' Conc. Mon.		4.393 (+1.38)	3.918	(14.987)	39+h+Z

		(21.38)			
40 + 03.CC	Lwr. Ex. Sewer		2.8	18.6	
+ 15			2.1	19.3	
+ 40			2.3	19.1	
+ 60			7.3	14.1	
+ 87			8.0	13.4	
41			5.0	15.4	
+ 40			8.2	13.2	
+ 50			9.4	12.0	
42			8.5	12.9	
+ 30			7.1	14.3	
+ 50			8.1	~~13.7~~ 13.3	
43			10.8	10.6	
+ 30	creek		12.7	9.2	
+ 50			10.4	11.0	
+ 87			6.7	~~13.7~~ 14.7	
+ 95			3.2	18.0	
44			3.3	18.1	
T.P.	5.30	(23.38)	3.30	(18.08)	
+ 50			5.0	18.4	
45			5.7	17.7	
+ 50			6.1	17.3	
46			5.5	17.9	
+ 50			4.6	18.8	
+ 67.2			4.2	19.2	
+ 67.2	8.5 RT		4.46	18.92	M.H. RIM
+ 67.4	"	"	12.55	10.83	F.L.

		⟨23.38⟩			
HC + 97.4 E.L. 40th			4.4	19.0	Bet. 40th + Nat'l. Ave
Note: See Change in Alignment + Levels FB 1625-36-40					Clough B.M. 18.34
13' Mon. on BM. E.L. 40th ST.			5.19	18.19	
47 + 50			4.3	19.1	
+87			2.8	20.6	
48			2.4	21.0	
+50			1.5	21.9	
49			1.9	21.5	
T.P.	6.56	⟨28.00⟩	1.94	⟨21.44⟩	
+50			5.9	22.1	
50			5.4	22.6	
+50			5.6	22.4	
51			5.2	22.8	
+50			4.8	23.2	
52			4.8	23.2	
+50			4.8	23.2	
53			4.0	24.0	
53 +21.4 ℄ 90° Lt			4.0	24.0	
8.3 S.E. of ℄ = Ex. M.H.			3.4	24.58	R.M.
" " "			14.2	13.78	F.L.
53 + 50			4.4	23.6	
54			4.3	23.7	

		⟨28.00⟩			
54 + 50			4.4	23.6	
55 + 00 ℄ 90° Rt			4.3	23.7	
55 + 04 ℄ Int. Ex. Sewer			4.7	23.3	Ground
" " 5' Lt. M.H.			4.40	23.60	Rim
" " " "			13.40	14.60	F.L.
T.P.	7.91	⟨31.51⟩	4.40	⟨23.60⟩	S. Rim M.H.
55 + 50			7.0	24.5	
56			7.4	24.1	
+50			7.0	24.5	
57			6.8	24.7	
+50			5.5	26.0	
58			3.5	28.0	
+36.1 ℄ 90° Lt.			7.0 ℄	29.47	℄ Rim
Bliss-Notes Schaffer Meyer & Boggs - Rod					
T.P.	4.90	⟨33.87⟩	7.0 ℄	⟨29.47⟩	58 + 36.1 ℄ old ℄ Point
59			4.5	29.4	
+35			5.2	28.7	
+85			4.3	29.6	
60 + 00			5.1	28.8	
127.37 Lt. Pt Stake			5.11	28.76	
+35			5.7	28.2	
+85			6.8	27.1	
61 + 00			7.1	26.8	
+25			7.9	26.0	

		(33.87)			
61+85			8.1	25.8	✓
62+00			8.0	25.9	✓
62+15			7.8	26.1	✓
+35			6.8	27.1	✓
+70			6.6	27.33	✓
+85			7.2	26.7	✓
TP	7.78	(35.65)	6.00	(27.87)	✓
63+00			7.6	28.0	✓
+15			8.8	26.9	✓
+35			8.2	27.5	✓
+85			6.5	29.2	✓
64+00			6.0	29.7	✓
+20			5.3	30.4	✓
+37.76	& Newton +		3.9	31.8	✓
+96			2.8	32.9	✓
+60			2.4	33.3	✓
+68			4.1	31.6	✓
+80.33	N Line Newton		4.5	31.2	✓
65+00			4.5	31.2	✓
Sept 8 M.	Mon 113.72 Lt & N Line Newton		12.64	23.01	✓
+08			4.7	31.0	✓
" "	15' Lt		9.3	26.4	✓
+35			5.1	30.6	✓
" "	9' Lt		9.2	26.5	✓
+50			3.3	32.4	✓
+75			2.0	33.7	✓
66+00			4.0	31.7	✓
+44			7.1	28.6	✓
+50			6.8	28.9	✓

	(35.65)			
TP 9.15	(41.32)	3.48	(32.17)	
67		8.3	33.0	✓
" 30' Lt		14.1	27.2	✓
+25		8.6	32.7	✓
" 30' Lt		13.9	27.4	✓
+50		9.3	32.0	✓
+65		9.5	31.8	✓
+95		8.2	33.1	✓
68+00		7.4	33.9	✓
+16.4	S. Side Con paving Natural	6.60	34.72	✓
+35.3	N Side Con Paving Natural Dye	6.24	35.08	✓
+55		6.7	34.6	✓
+90		5.6	35.7	✓
69+00		5.1	36.2	✓
+40		4.7	36.6	✓
+60		5.3	36.0	✓
70+00		11.1	30.2	✓
+13		13.1	28.2	✓
+19		16.1	25.2	✓
+20		16.1	25.2	✓
+21		13.0	28.3	✓
" 50' Lt Bank		12.9	28.4	✓
" 75 " Bottom Wash		20.7	20.6	✓
+54		11.2	30.1	✓
+80		7.0	34.3	✓
71+00		6.1	35.2	✓

		⟨41.32⟩			
71+22 32	12.25 Lt	⟨48.76⟩	5.51	⟨35.81⟩	
" "	26' Rt Edge Bank		17.1	31.7	
" "	32 " Bottom Ditch		29.6	19.2	
+50			11.4	37.4	
72+00			10.7	38.1	
+50			10.1	38.7	
73+00			8.6	40.2	
+27			7.2	41.6	
+67			4.5	44.3	
+78			1.4	47.4	
+88 38	L. 1x1" Stake		0.79	47.97	
74+00			1.1	47.7	
+10			1.9	46.9	
+40			5.8	43.0	
+70			7.8	41.0	
75+00	# Note Ground on Rt above Lt		9.1	39.7	
" "	75' Lt		10.6	38.2	
+50			10.4	38.4	
76+00			11.1	37.7	
T.P.	on Tel. phone pole = 308.392 H RH Hoit 4.95	⟨43.34⟩	9.77	⟨38.99⟩	
+50			6.9	37.0	
77+00			7.5	36.4	
+65			8.0	35.9	
" "	100 Lt		11.6	37.3	
78+00			7.8	36.1	

	⟨43.94⟩			
78+60		7.5	36.4	
79+00		5.8	38.1	
+30		4.4	39.5	
+80		2.7	41.2	
80+00		2.5	41.4	
T.P. 476	⟨45.69⟩	3.01	⟨40.93⟩	
+50		3.6	42.1	
81+00		3.2	42.5	
" "	50' Lt	5.7	40.0	
" "	120 "	13.4	32.3	
+50		3.2	42.5	
82+00		4.3	41.4	
" "	10' Lt	5.7	40.0	
+45		6.1	39.6	
"	5' Rt	4.4	41.3	
"	5' Lt	7.6	38.1	
+60		8.0	37.7	
"	5' Rt	5.5	40.2	
"	5 Lt	9.0	36.7	
+75		9.6	36.1	
83+00		11.1	34.6	
" "	100' Lt	12.4	33.3	
+30		11.9	33.8	
+56		11.6	34.1	
+56 Tel. phone pole 2' Rt	#4344984			

		[45.69]			
84+00			11.9	33.8	✓
"	125' Lt		12.5	33.2	✓
+50			11.5	34.2	✓
85+00			10.9	34.8	✓
" "	5' Lt		12.2	33.5	✓
" "	150 Lt		11.3	34.4	✓
TP Pole # 434500 on Telephone	6.4 Lt	[41.43] # 434500 RH Nail	10.67	[35.02]	✓
85+63 ± Telephone pole	6.7 Lt	RH & 6" Dia Lt.			✓
+50			6.5	34.9	✓
86+00		2 Note Branches of Tree Trees overhang &	6.2	35.2	✓
+11	14" Dia Olive Tree	3° Rt			
+34	18" " " "	8.5 Rt			
+50			5.4	36.0	✓
+59	18" Dia Olive Tree	8.0 Rt			
+72	Telephone pole	15 Lt 6" Dia # 434497			✓
+83	18" Dia Olive Tree	7.5 Rt			
+86	Anchor for Telephone Pole	2.3 Lt			
86+33.68	L Rt 1x1 stake		4.10	37.3	✓
87+00			3.8	37.6	✓
Set BM on CP 7K	5.92 Lt & Ocean View	[42.97]	4.38	[37.05]	✓
Check BM. 8P	in Wing wall of Bridge	100 E. of Lime San Miguel & Ocean View Blvd	0.59	42.38 4242 0.05 Diff	✓
BM. CP 7K	W Line Alley & Ocean View	6.6 Lt [43.67]		37.05	Not corrected. Smoothwork Miscalculated from USGS BM.
87+00	14.4 Lt on paving		6.66	37.01	✓
+50			5.8	37.9	✓

	[43.67]		
+96 G+L Pole	3.2 Lt		
88+00		5.7	38.0 ✓
+50		5.2	38.5 ✓
89+00		4.9	38.8 ✓
" "	14.4 Lt on paving	5.19	38.48 ✓
+36 G+L Pole	3.2 Lt		
+50		4.5	39.2 ✓
90+00		3.7	40.0 ✓
+50		3.7	40.0 ✓
+86 G+L Pole	3.4 Lt		
91+00		4.3	39.4 ✓
91+00	14.4 Lt on paving	3.77	39.90 ✓
+50		4.1	39.6 ✓
+63	12" Dia Olive Tree	5.3 Rt	
+83	18" " " "	6.6 "	
92+00		2.7	41.0 ✓
TP. 7.48	[48.09]	3.06	[40.61] ✓
+43 G+L Pole	2.4 Lt		
+50		6.5	41.6 ✓
93+00		6.1	42.0 ✓
" "	14.4 Pt. Paving	6.69	41.40 ✓
+50			
+71 G+L Pole	2.6 Lt		
94+00	58 L Lt on 1x1 stake	5.42	42.67 ✓
+18.80	S Side Paving	5.70	42.39 ✓
+37.58	int 18" culvert - 32.8 Rt to/from	10.05	38.04 ✓
" "	Lt. on paving	5.66	42.43 ✓
" "	125' Lt to/from	11.07	37.02 ✓

				⟨48.09⟩
94+43 +58 +70	North Edge Paving / Top Cb Inlet / Top Retaining Wall	5.65 / 5.17 / 4.84	42.44 / 42.82 / 43.25	
" "	Ground. Base of Wall	8.5	39.6	
+83		9.3	38.8	
95+00		7.5	40.6	
+60		6.9	41.2	
96+00		5.9	42.2	
" "	15' Lt in Wash	8.6	39.5	
+10		7.0	41.1	
+40		8.9	39.2	
+60		6.8	41.3	
97+00		6.5	41.6	
T.P.	8.17 ⟨50.47⟩	5.79	⟨42.30⟩	
+20		9.0	41.5	
+60		8.5	42.0	
98+00		7.8	42.7	
+50		8.9	41.6	
+75	S Side Wash	9.6	40.9	
99+00		9.3	41.2	
+70	N Side Wash	9.1	41.4	
+85		7.2	43.3	
100+00		6.8	43.7	
" "	6' Rt Bank	7.0	43.5	
" "	11' Rt Edge Wash	9.0	41.5	
+50		5.9	44.6	

⟨50.47⟩

101+00		5.5	45.0
+50		5.4	45.1
+65		4.1	46.4
T.P. 6.96	⟨51.52⟩	5.91	⟨44.56⟩
102+00		5.4	46.1
+05	Edge Bank	5.4	46.1
+18	" Wash	9.8	41.7
+30		9.8	41.7
+40		8.1	43.4
+67 18	L. Lt 18x14 Stake	6.94	44.58
— — — —	Line change from above ⟵		
103+00		7.0	
+13		7.7	
+18	Void	9.0	
+23		7.3	
+50		7.0	
T.P. 5.99	⟨50.42⟩	7.09	⟨44.43⟩
104+00		6.1	
+50		5.4	
105+00		5.5	
+50		5.5	
+97 18	on Ground	5.5	
106		5.0	
+38		5.4	
+98		4.5	
T.P. 5.00	⟨52.35⟩	3.07	⟨47.35⟩

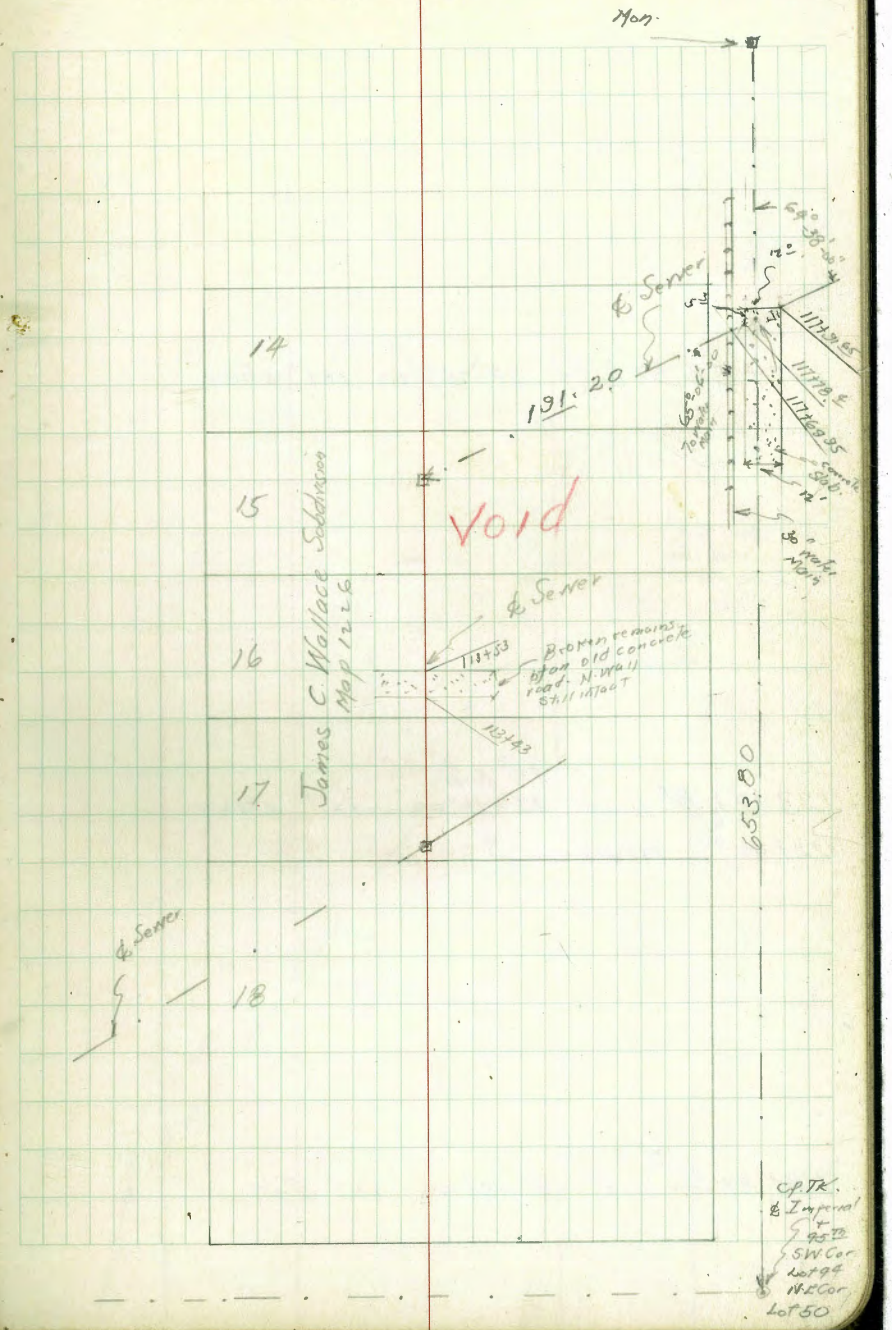
See page 55 for Levels from above ⟵

Continued Page 27

Continued from page 10

115+89 65 L. Pt. 38°-50'-00" Rt.

111+97 65 L. Lt. 41°-00-00



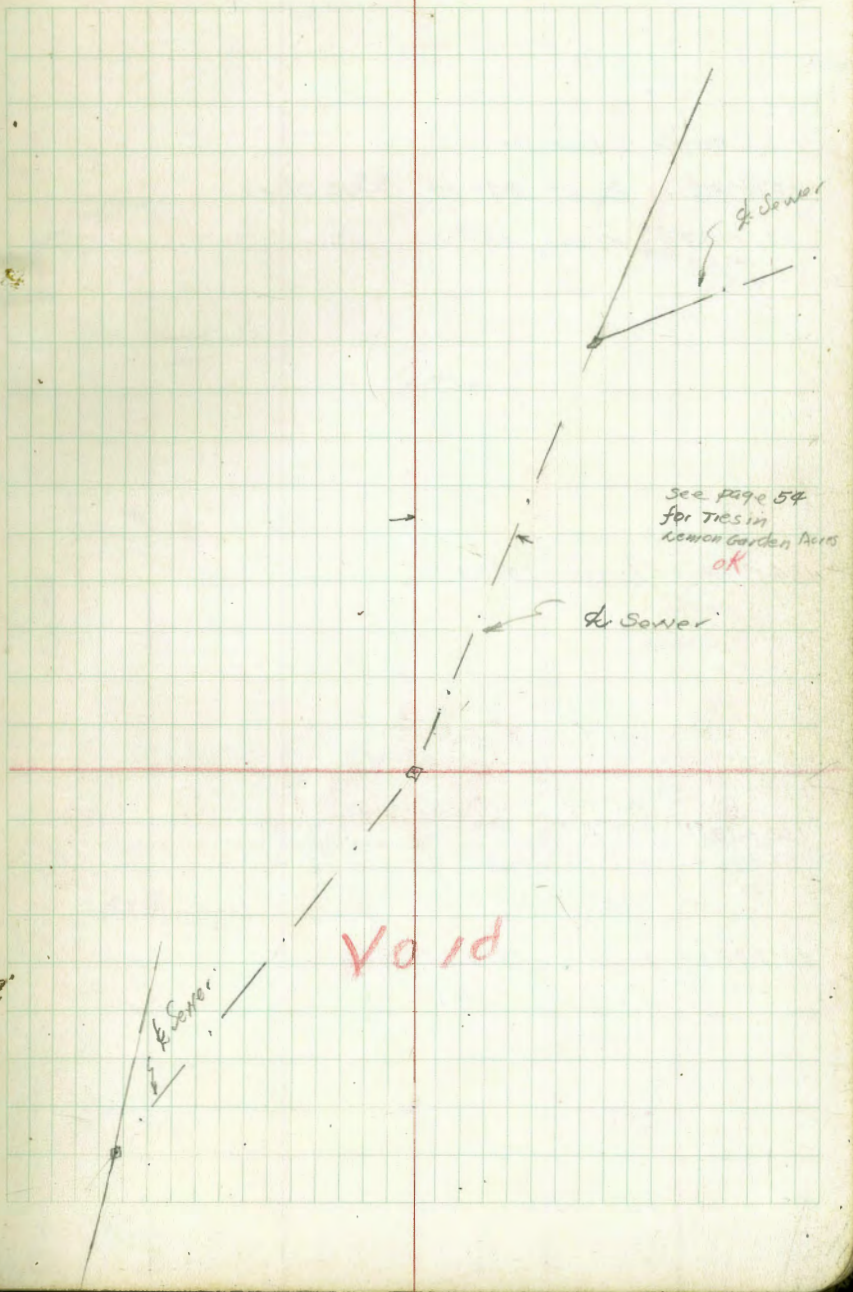
127+58.87 L Rt. 34°-39'-00 1"x1" stake

123+31.81 L Lt ~~25°-11-00~~ 12°25'45" 1"x1" stake

122+42.90 = New Line. See page 54

Void

119+87.45 L Rt 13°-45'-00 1"x1" stake



137+80.70 E Line 48th

137+55.35 L. Lt 27°17' 1"x1" stake

137+39.06 +29.08 W Line 48th

134+78.87 L. Rt 19°54'-00

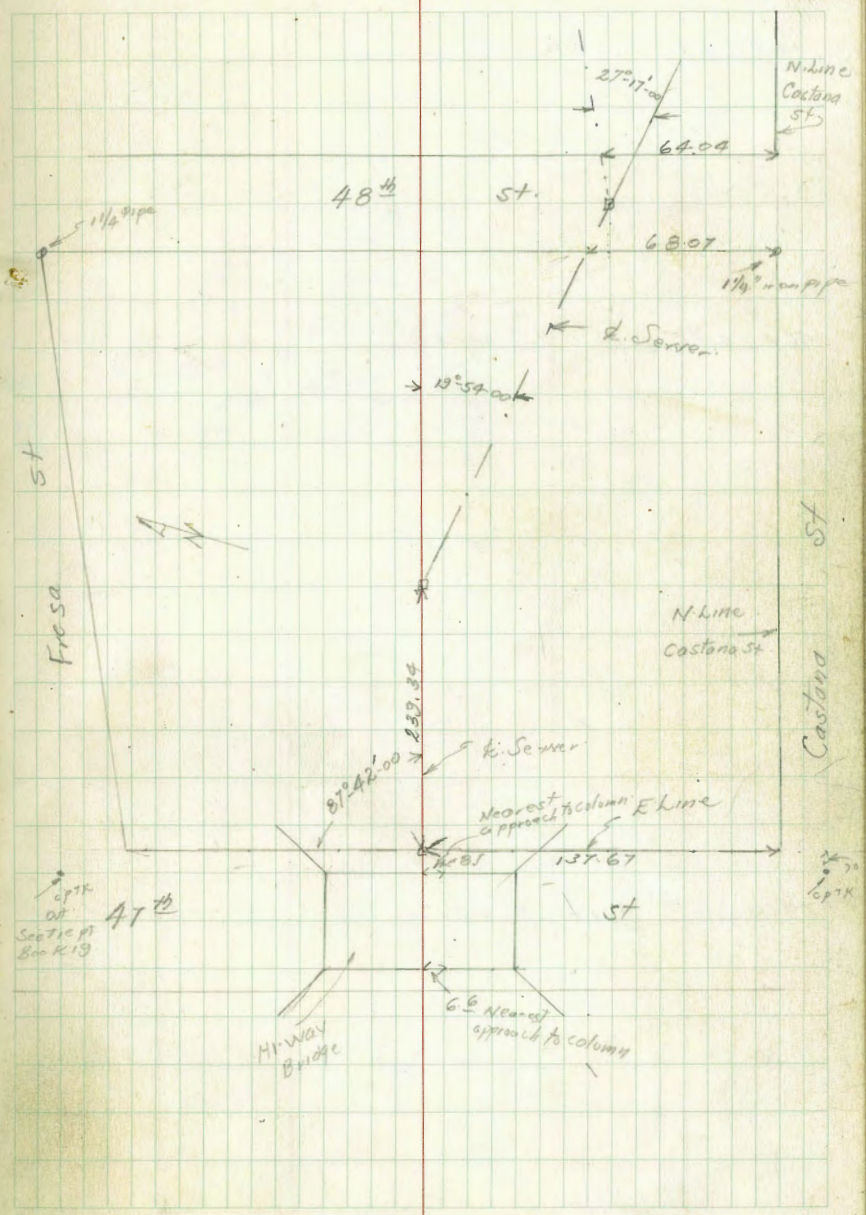
132+39.53 P.O.T. E. Line 47th

132+32 +- E Side Bridge

131+98 +- W Side of Bridge

137+55.35
26.24
29.09

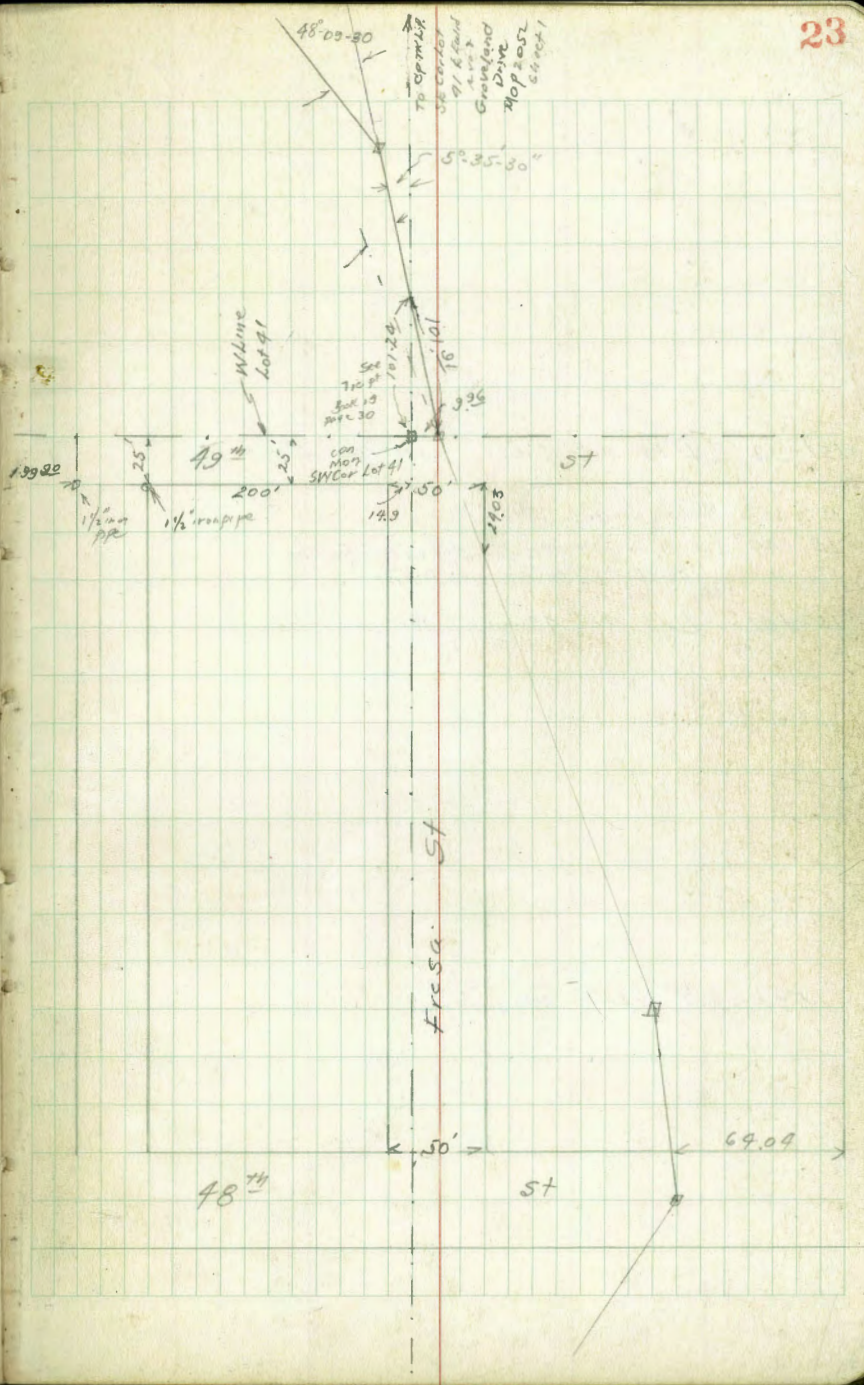
26.24



148+86 78 L. Lt. 48°-09'-30"

146+24. 78 L. Rt 21°-38'-40"

140+56 53 L. Lt 17°-35'-40"



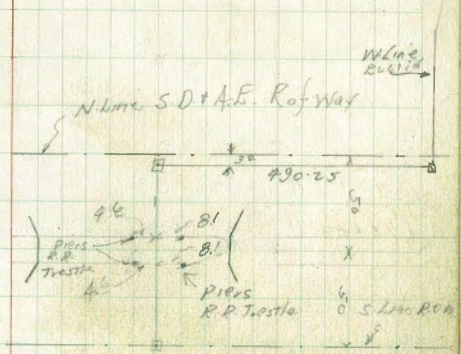
157+99 L. Rt. 90°00'00" 1"x1" pine stake

157+60.3 N. End Wooden Trestle

157+44.5 S End Wooden Trestle. Set on con footing.
Top of concrete footing covered with debris

157+02 L. Lt 48°44'00 1"x1" pine stake

153+23 49 L. Rt. 12°52'00" 1"x1" stake
13°00'00"



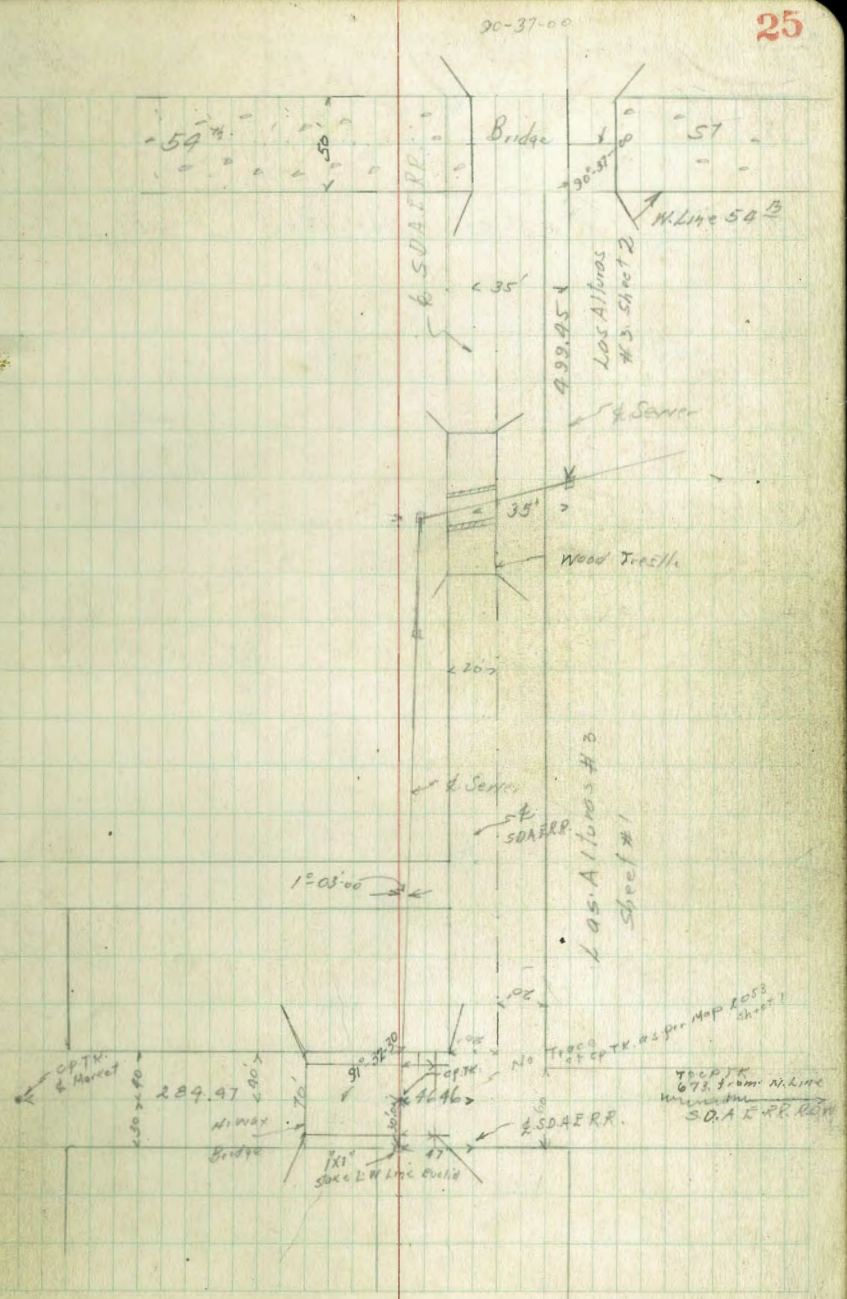
180+00 86 ℄ 54 12 Sec Bottom Page 26

174+76.4 L Lt. 53° 37'-00"

173+93.13 L Rt ~~52° 13'-30"~~ 52° 36'-07" 1"x1" stake

1737.52 ℄ POT 2"x2" R.W. 406

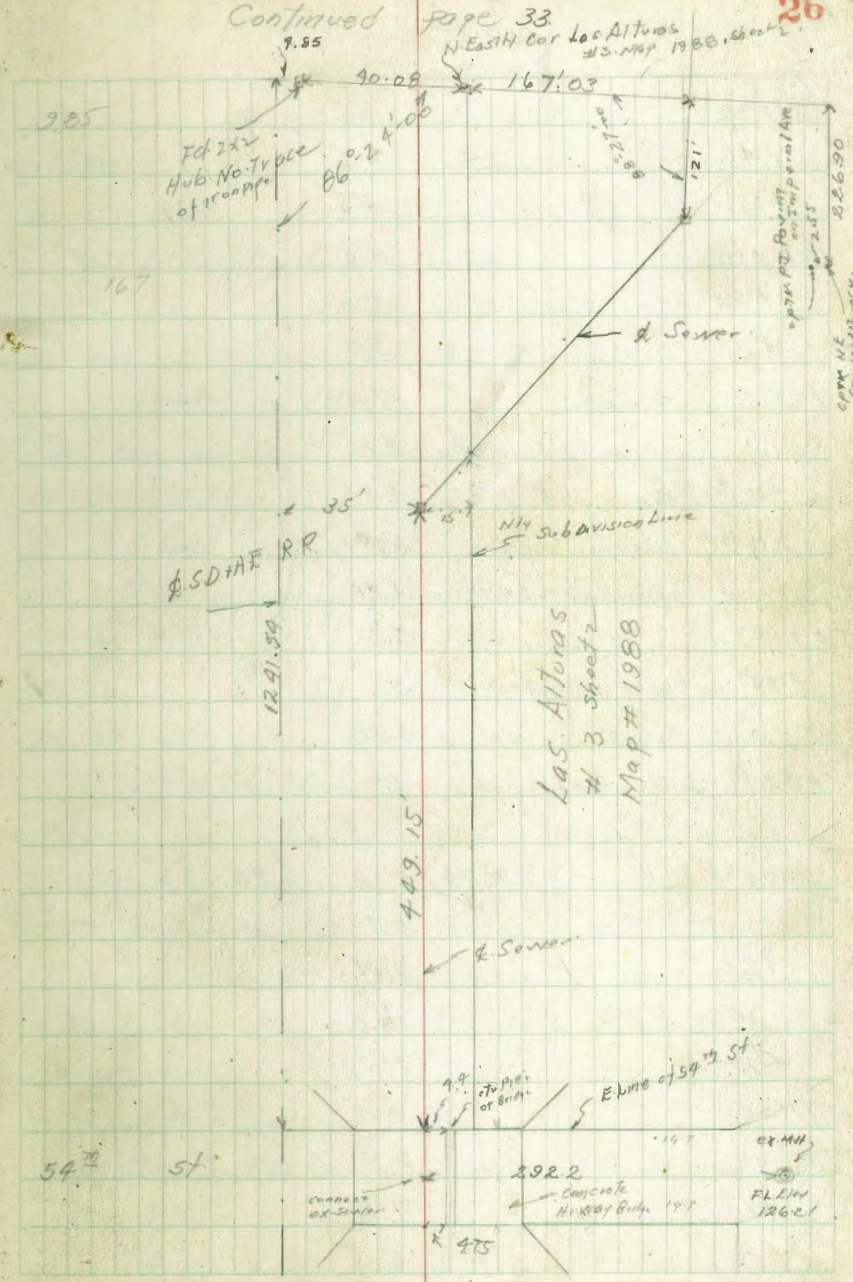
Equation
= 162+89.77
162+89.25 L Rt 1°-03'-00 1"x1" stake W Line Euclid



Continued from page 33

191+55.13 L. 9°-22'-45" Lt 1"x1" stake

189+75.01 L. 14° - 32'-00" Rt



		52.35		
107+00			6.5	
+45			6.6	
+65	Void		5.5	
108+00			5.4	
+90			5.0	
+20			5.9	
109+00	Ground		7.8	
" "	on con lip Spillway		8.35	
+10.9	Brk in slab		5.51	
+14.7	Base Spillway wall		5.47	
" "	Top Spillway wall		3.94	
+18			5.3	
+29.5	on Ground opp. 3/66		5.3	
" "	Concrete " Top		3.92	
+52	to closest approach to S/lab		5.2	
" "	Top S/lab		3.64	
109+57.65	L. Rt 8.37	56.54	4.18	48.17
" " "	5' Rt L		5.7	
+68			8.8	
"	5 Rt		10.0	
+87			10.3	
110+00			9.0	
" "	21 Rt. to Wingwall		9.4	
+10			7.6	
+30			6.5	
" "	18' Rt approx ctr channel		8.8	

		56.54		
+60			5.6	
111+00			5.2	
" "	22' Rt.		5.5	
" "	31 Rt Bottom channel		9.2	
+35			4.8	Void
+50			5.2	
" "	6' Rt		7.2	
+65	Edge Main Channel		7.4	
111+97.65	L. Lt		6.83	
P.O.T. on L: 1143		60.84	6.83	49.71
111+97.65	21 Rt. East Edge channel		11.1	
+15			10.6	
+50			10.8	
113+00			11.2	
" "	3' Rt Bottom channel		12.0	
+30			10.6	
+46			13.3	
+53	Base old con. wall		11.1	
" "	Top old wall		8.4	
+70			8.8	
114+00			8.7	
" "	7' Rt Top Bank		5.0	
+20	Top East Bank		5.0	
" "	2' Lt		9.5	
"	8' Rt		3.5	

		T (60.84) ✓			
125			7.6		
"	5' Lt in channel		9.5		
"	4' Rt Top Bank		4.6		
140			5.4		
" "	3' Lt. to Bank		5.5		
" "	7 " Bottom channel		9.0		
160			4.6		
185			5.7	Void	
115+00			5.5		
108			3.8		
130 S Bank Main channel			4.0		
160			6.7		
175			7.0		
115+89.65 Lt. 658 Rt.		(61.64) ✓	5.78	(55.06) ✓	
" "	3' Lt Rt to for Jong		5.0		
" "	18' Rt. 2 channel		7.2		
116+00			7.2		
50			6.7		
"	36' Lt.		3.9		
"	10' Rt		7.8		
185			7.3		
"	10' Rt		9.0		
117+00			7.0		
" "	30' Rt		4.3		
210			5.8		

		T (61.64) ✓			
150			5.6		
+69.35 Top Gate on 36" water main			6.14		
TP 8.03		(63.53) ✓	6.14	(55.50) ✓	
+69.35 Top 36" water main			9.60		
174 Toe concrete Roadway			8.00		
+ 178.9 W. Edge con 5&6			6.06		
+ 91.65 E " " "			5.98		
118+00			7.2		
12			7.7	Void	
150			6.2		
" " 20' Lt Bottom channel			7.1		
190			5.5		
119+00			4.8		
155			4.5		
" " 10' Lt Edge channel			6.4		
170			6.5		
+87.65 Lt Rt 1x1 Stake			5.68		
" " Lt 2' Lt Edge channel			6.5		
" " 2' Rt. Top Bank			4.1		
T.P. on L. 5.43.		(63.88) ✓	5.08	(58.45) ✓	
120+00			5.0		
" " 2' Lt			5.0		
" " 5 " S Edge wash			8.2		
207			4.4		
210			7.7		

		⟨63.88⟩ ✓		
+23			7.0	
+30			4.9	
+50			5.6	
121+00			4.7	
+50			4.8	Void
122+00			5.3	
+50			4.8	
123+00			3.5	
+21			3.4	
T.P. +31 81' Lt.	6.00	⟨67.60⟩ ✓	2.26 8 ok	61.60 ✓
" "	2' Lt Edge Wash		6.9	60.7 ✓ 7/27/43
" "	2 Rt. Top Bank		5.1	62.5 ✓
+55			6.5	61.1 ✓
" "	7' Rt Toe Bank		5.2	62.43 ✓
124+00	Bottom Channel		8.5	59.1 ✓
+40			5.8	61.8 ✓
+80			6.6	61.0 ✓
125+00			7.0	60.6 ✓
+16			6.6	61.0 ✓
+25			5.1	62.5 ✓
+50			4.6	63.0 ✓
126+00			4.4	63.2 ✓
+50			3.2	64.4 ✓
127+00			1.9	65.7 ✓
+40			1.5	66.1 ✓

		⟨67.60⟩ ✓		
+55			2.6	65.0 ✓
T.P. on L. C.75 +58 81' Lt Rt		⟨70.49⟩ ✓	3.86	63.74 ✓
+70			7.1	63.4 ✓
128+00			6.9	63.6 ✓
+25			7.0	63.5 ✓
+50			6.5	64.0 ✓
129+00			5.6	64.9 ✓
+50			5.4	65.1 ✓
130+00			5.2	65.3 ✓
+70			5.4	65.1 ✓
131+00			4.2	66.3 ✓
+50			4.4	66.1 ✓
132+00			5.7	64.8 ✓
+30			4.8	65.7 ✓
+39.53 got E line 47.13			3.99	66.50 ✓
T.P. on Pot. 500		⟨71.50⟩ ✓	3.99	⟨66.50⟩ ✓
+70			5.6	65.9 ✓
133+00			5.8	65.7 ✓
+58			5.6	65.9 ✓
134+00			4.9	66.6 ✓
+30			4.9	66.6 ✓
+74 81' Lt Rt			3.06	68.44 ✓
T.P. on L. 863		⟨77.07⟩ ✓	3.06	⟨68.44⟩ ✓
BM. NW 1" pt 88 ft Castano 5.87		⟨81.71⟩ ✓	1.12	⟨75.95⟩ ✓ corrected 75.84 +0.11 error
135+00			14.7 − 67.0 ✓	

		(81.71)			
135+50			14.8	66.9	✓
136+00			12.0	69.7	✓
+25			11.0	70.7	✓
+50			11.2	70.5	✓
137+00			11.1	70.6	✓
+55 35	L Lt on 1"x1" stake		10.59	71.12	✓
+75			10.6	71.1	✓
138+00			9.2	72.5	✓
+50			8.4	73.3	✓
139+00			8.5	73.2	✓
+50			8.2	73.5	✓
140+00			7.9	73.8	✓
T Pon L +56 55	L Lt 10.37	(85.34)	6.74	(74.97)	✓
141+00			9.1	76.2	✓
+50			7.9	77.4	✓
142+00			8.9	76.4	✓
+25			10.2	75.1	✓
+50			8.2	77.1	✓
+70			8.1	77.2	✓
143+00	Ctr. Main Wash		10.0	75.3	✓
+10			9.1	76.2	✓
+50			7.9	77.4	✓
144+00			7.9	77.4	✓
+60	Bottom Bank		6.1	79.2	✓
+67	Top "		3.5	81.8	✓
145+00			3.0	82.3	✓

	(85.34)			
T.P. 5.79	(88.90)	2.73	(82.61)	✓
+22 Top Bank		5.7	82.7	✓
+25 Bottom "		10.2	78.2	✓
" " 4' Lt Top Bank		5.7	82.7	✓
+50 " Ditch		10.1	78.3	✓
" " 4' " Top Bank		5.8	82.6	✓
+53 Top Bank		6.6	81.8	✓
146+00		6.7	81.7	✓
+24.78 L Rt on 1"x1" stake		6.01	82.39	✓
Set BM on Pueblo Mon SW Cor Lot 41-10'N of 2		5.89	82.51	✓
+50		5.0	83.4	✓
+80		4.6	83.8	✓
" " 2' Lt		4.6	83.8	✓
" " 5' "		6.7	81.7	✓
147+00		6.3	82.1	✓
+50		6.0	82.4	✓
+75		8.2	80.2	✓
" " 1' Rt Base Bank		8.2	80.2	✓
" " 4' Rt Top Bank		2.7	85.7	✓
148+00		7.2	81.2	✓
+10		6.6	81.8	✓
+70		8.6	79.8	✓
+73		7.4	81.0	✓
T.P. on L +86 78	L Lt 8.32	(90.30)	6.42	(81.98)	✓
149		8.0	82.3	✓
+50		7.0	83.3	✓
+80		7.6	82.7	✓
150+00		6.9	83.4	✓
+50		6.1	84.2	✓
151+00		5.5	84.8	✓

		90.30			
151+50			5.3	85.0	✓
152+00			5.6	84.7	✓
+35			5.2	85.1	✓
+60			5.8	84.5	✓
+61			7.4	82.9	✓
+73			7.2	83.1	✓
+80			4.6	85.7	✓
153+00			3.5	86.8	✓
+15			3.6	86.7	✓
T.P. on L. +23.50 Lt. Rt.	9.69	⟨94.85⟩ ✓	5.14	⟨85.16⟩	✓
+53			8.8	86.1	✓
+59			6.8	88.1	✓
154+00			6.2	88.7	✓
+50			5.4	89.5	✓
155+00			4.9	90.0	✓
+38			4.0	90.9	✓
+55			6.0	88.9	✓
+67			5.8	89.1	✓
+70			4.7	90.2	✓
156+00			4.8	90.1	✓
+10			4.7	90.2	✓
+25			5.8	89.1	✓
+60	Bottom Bank		5.9	89.0	✓
+71	Top "		2.4	92.5	✓
157+00			1.0	93.9	✓

94.85 ✓

T.P. on L. 157+02 10 Lt.	5.10	⟨98.97⟩ ✓	0.98	⟨93.87⟩ ✓
+22	5.5 Side R.R. Trestle		5.2	93.8 ✓
"	3.6 Lt on Ground		7.4	91.6 ✓
+39 7	N. Side R.R. Trestle		7.5	91.5 ✓
"	3.6 Rt on Ground		7.7	91.3 ✓
"	4 " Top footing +-		10.6	88.4 ✓
+65			7.9	91.1 ✓
+75			9.3	89.7 ✓
+88	Bottom Bank		9.6	89.4 ✓
+91	Top "		5.8	93.2 ✓
+99 10	Lt on 1X1 Stake on		5.30	93.67 ✓
Set B.M. Top Bolt in Beam	9.1 Rt 157+60	R.R. Trestle	2.73	96.24 ✓
158+00			5.3	93.7 ✓
+18			5.0	94.0 ✓
"	2 Rt		5.2	93.8 ✓
"	4 "		3.0	90.0 ✓
+31			4.2	94.8 ✓
+32			7.4	91.6 ✓
+46			7.7	91.3 ✓
+47			4.6	94.4 ✓
"	1 Rt		4.6	94.4 ✓
"	2 "		8.7	90.3 ✓
+55			3.8	95.2 ✓
"	2 Rt		8.9	90.1 ✓
+57			9.0	90.0 ✓
+85			8.8	90.2 ✓

Note to Construction: This hub lowered 0.05 after levels were taken

Reduced by Mark R. Spade 2 Feet. 9/17-1965.

		⟨98.97⟩			
159+00			7.9	91.1	✓
+50			6.6	92.4	✓
160+00			6.0	93.0	✓
+50			5.9	93.1	✓
161+00			5.7	93.3	✓
T.P.	6.21	⟨99.42⟩	5.76	⟨93.21⟩	✓
+50			5.0	94.4	✓
+70			5.0	94.4	✓
" "	3' Rt		3.4	96.0	✓
162+00			4.5	94.9	✓
+20			5.2	94.2	✓
"	3 Rt		3.8	95.6	✓
+50	(25)		5.2	94.2	✓
equation 162+89.35 = 162+89.77	L Rt on 1"x1" stake		4.61	94.81	✓
163+00			4.7	94.7	✓
		9.9 Rt			
+05	Westend Bridge to Abutment				
+25			5.0	94.4	✓
		8.9 Rt to Abutment			
+33	End End Euclid St Bridge				
+50			4.7	94.7	✓
T.P.	11.96	⟨107.00⟩	4.38	⟨95.04⟩	✓
Set BM. B.P. in Bridge Curb		200' S of Manhole at Euclid	2.78	104.22	✓
T.P.	9.39	⟨104.43⟩	11.96	⟨95.04⟩	✓
164+00			8.8	95.6	✓
+50			7.6	96.8	✓
165+00			7.1	97.3	✓

		⟨104.93⟩			
165+50			6.7	97.7	✓
+70			6.3	98.1	✓
+75			5.1	99.3	✓
+75	2' Lt		5.1	99.3	✓
"	5"		7.1	97.3	✓
166+00			5.7	98.7	✓
"	3' Lt		5.7	98.7	✓
"	5"		6.2	98.2	✓
+10			4.4	100.0	✓
+50			3.7	100.7	✓
"	4 Lt		3.7	100.7	✓
"	5"		5.9	98.5	✓
167+00			2.9	102.0	✓
+05			2.4	102.0	✓
+25			5.0	99.4	✓
"	5' Lt		1.0	103.4	✓
+50			4.8	99.6	✓
T.P.	5.97	⟨106.19⟩	4.21	⟨100.22⟩	✓
168+00			6.3	99.9	✓
+50			5.4	100.8	✓
+75			5.1	101.1	✓
169+00			4.9	101.3	✓
+30			4.7	101.5	✓
+60			5.5	100.7	✓
" "	2 Rt	B. Tom Bank	5.5	100.7	✓
" "	3'	Top "	2.5	103.7	✓

Continued Page 39

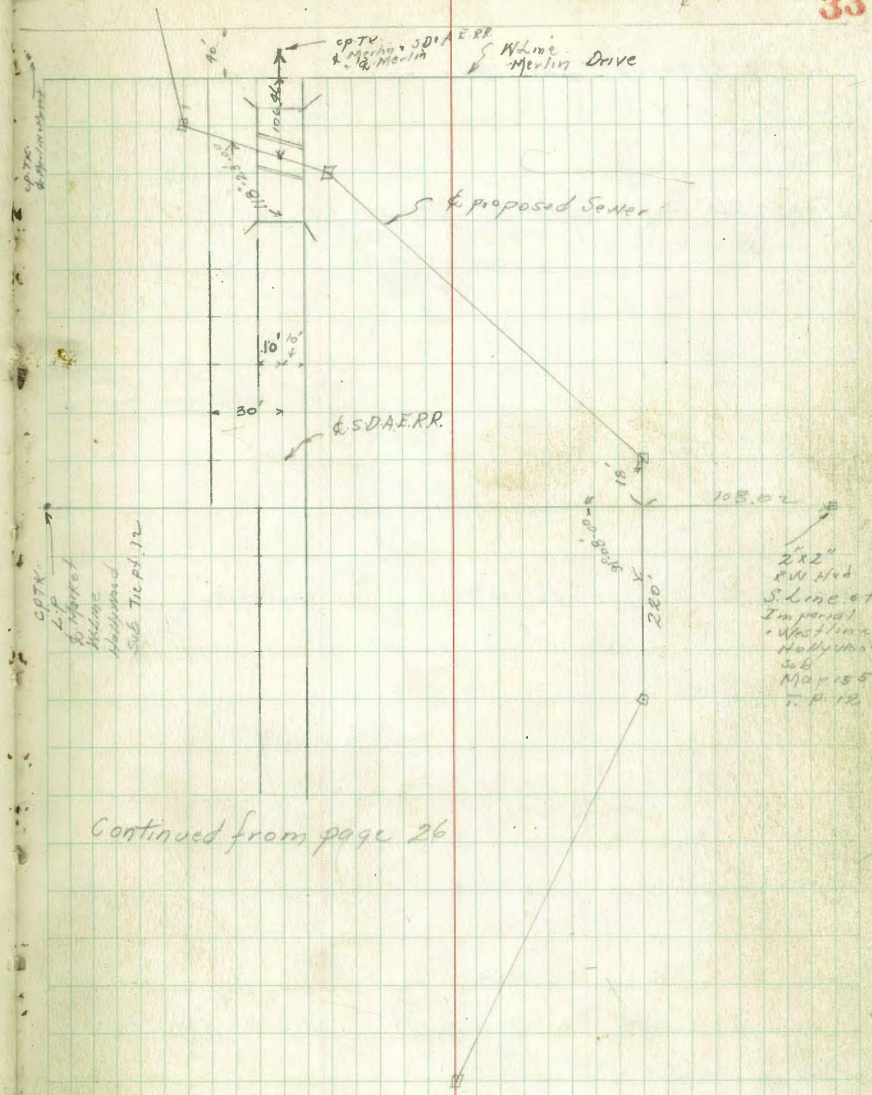
208+35.29 L. Rt. 58°-27'-30"

208+11.88 L. Lt. ~~41°-52'-00"~~ 13°-55'-20"

202+33.87 L. Lt. 46°-34'-20"

199+95.87 Lt 45°-15'-20"

197+03.12 L. Rt 38°-53'-90" 1"x1" Stake



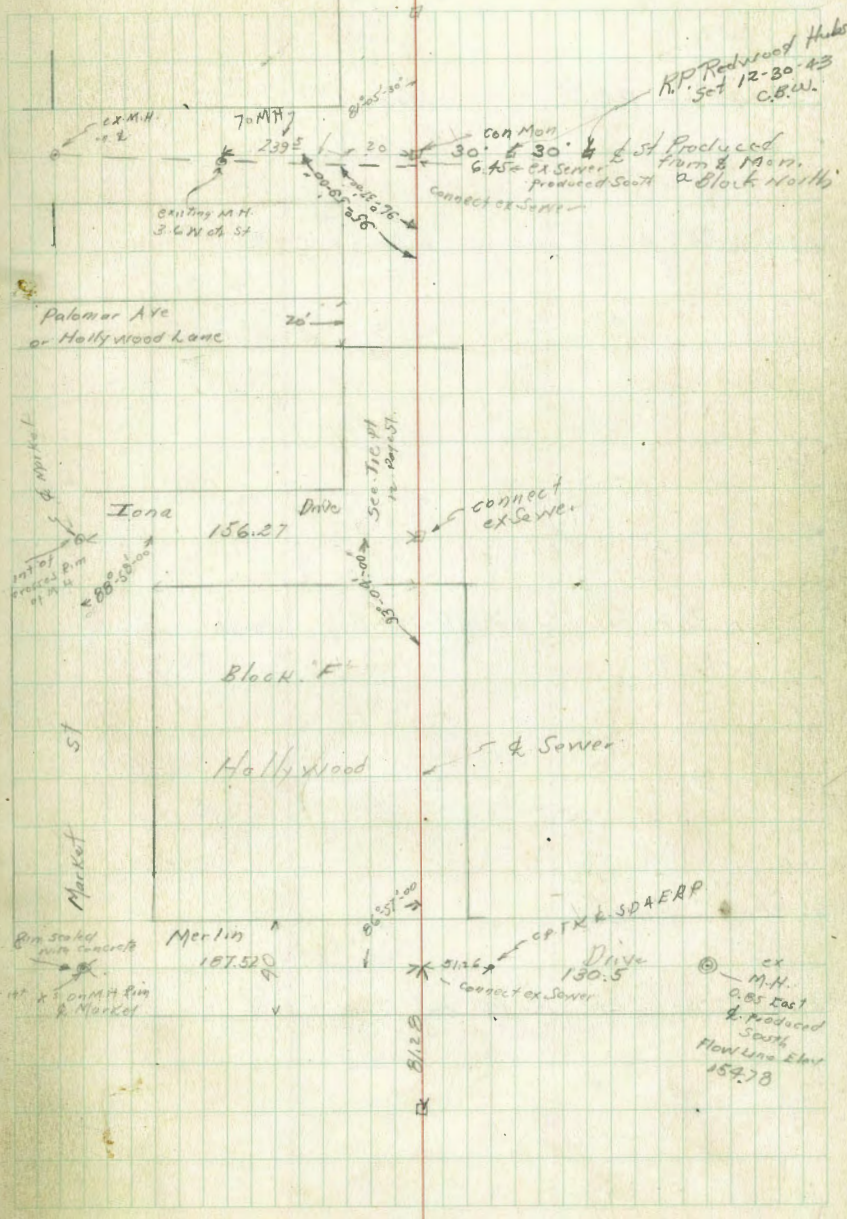
Continued from page 26

221+36.55+- P.O.T. 1"x1" stake

219+27.01 Mon L:Lt 2°-55'-00"

215+62.30 L:Lt 2°-42'-30" 1"x1" pine stake

208+25.29 L:Rt 58°-27'-30" 1"x1" stake



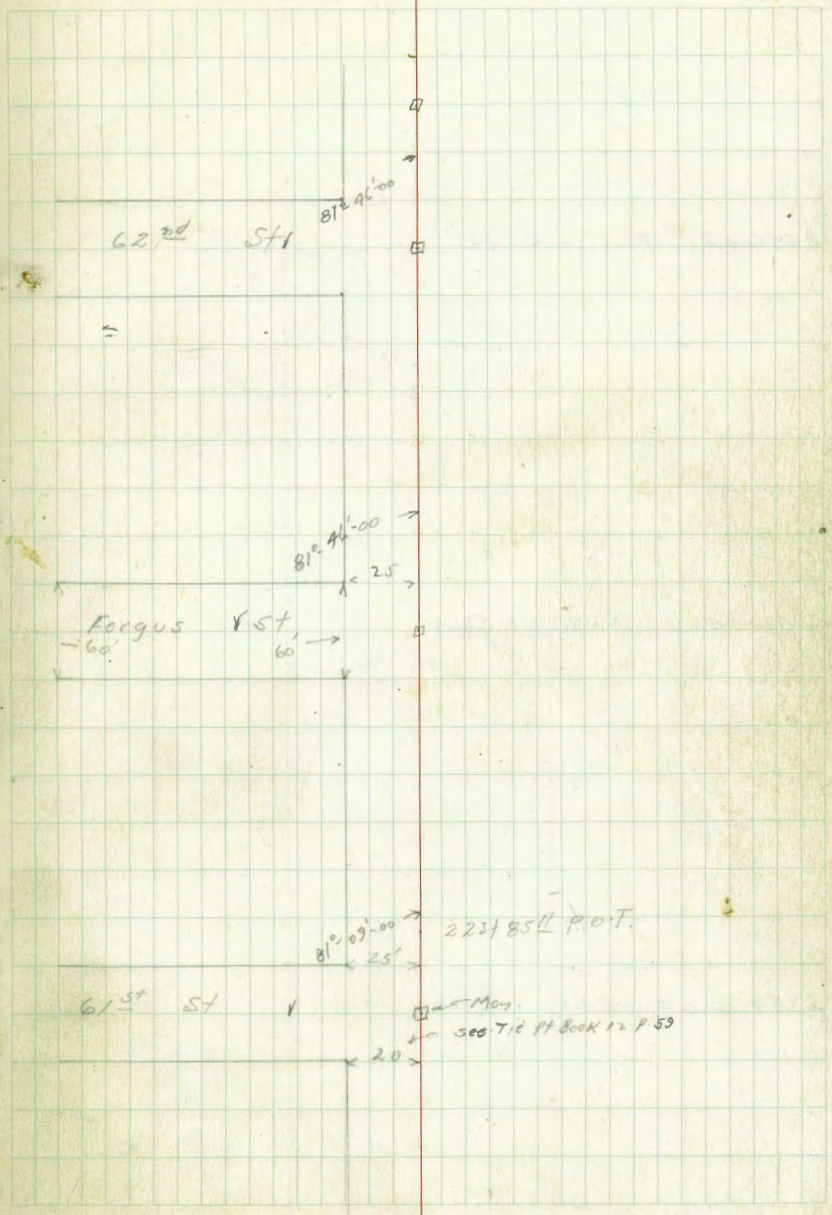
233+40+- P.O.T. 1X1 Stake

231+78 02 P.O.T Granite Mon & Akins + 62 nd

227+12 37 L. Rt 0°-43'-30" & Fergus + Akins

223+83 11 P.O.T.

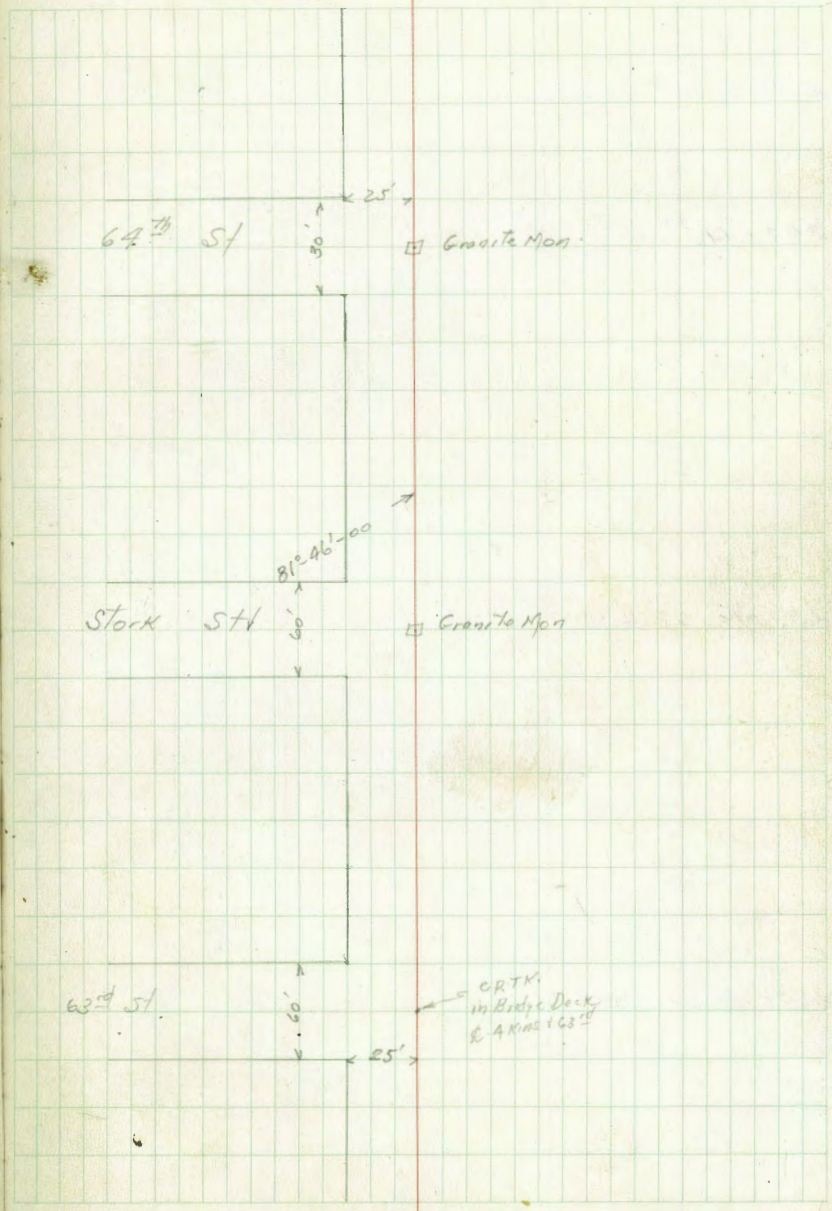
223+21 41 L. Lt 0°-58'-20" Akins + 61 st



245+00.27 P.O.T. & 64TH

240+49.23 P.O.T. & Stork

236+18.04 P.O.T. & 63RD

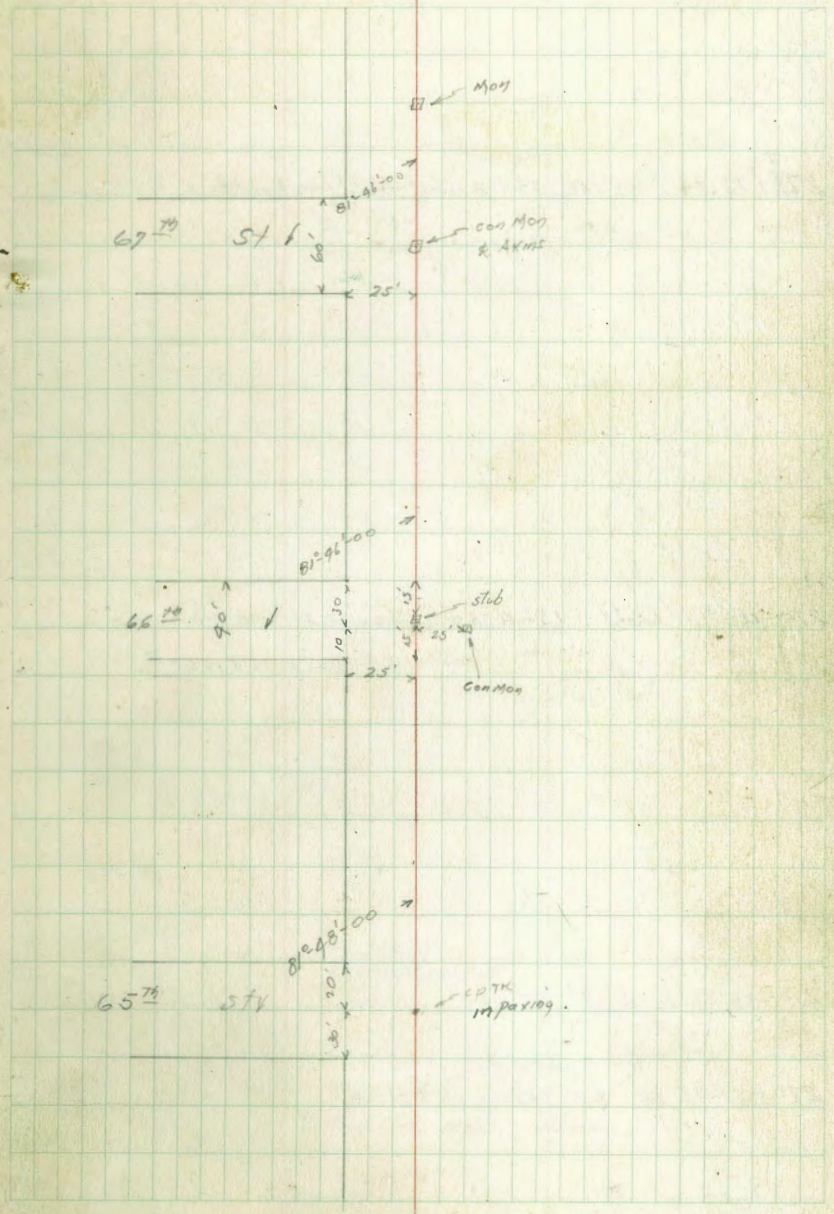


264+41.36 Mon. P.O.T.

262+01.14 L.Rt 00°-01'-00" Rt

257+10.58 L. Lt 0°-02'-30" 1x1" stob & tag 90' St.

250+13.35 P.O.T.



277+73.74. set "1x1" stob & 30' St and 75' from ℄ of RR.

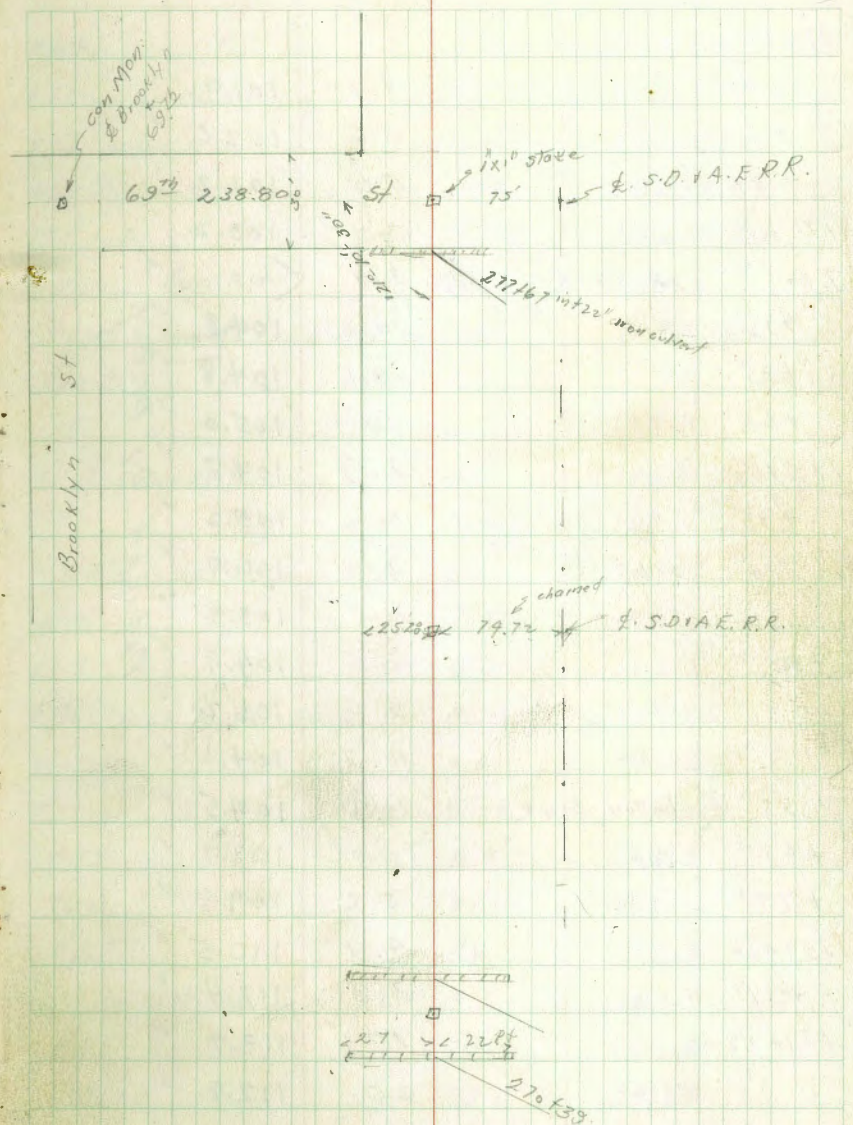
274+12.58 L. Lt 15°-11'-30 This L is set on center of curve. B.C. 5.05 Vt. of ℄ of 68th.

270+56.90 L. Lt 7°-47'-00

℄ R. 1354.40

270+51.35 B.C. Δ 30°-39'-00 to ℄ of 69th

Long Chord 715.91 Figured



Continued from page 32

		(106.19)		
170+00				
+40			4.3	101.9
+65			3.6	102.6
+80			5.0	101.2
171+00			3.0	103.2
T.P.	12.39	(115.39)	3.19	(103.00)
+15			10.6	104.8
+35			10.6	104.8
+60			10.4	105.0
172+00			10.9	104.5
+15			10.2	105.2
" "	5 Lt		8.7	106.7
" "	5 Rt		11.5	103.9
+30			10.5	104.9
"	5 Lt		9.2	106.2
"	5 Rt		11.3	104.1
+55	Bottom Bank		10.9	104.5
+65	Top "		6.7	108.7
+77			5.6	109.8
173+00			4.9	110.5
+37			3.0	112.4
173+52			1.7	113.7
" "	5 Lt		2.6	112.8
" "	5 Rt		2.4	113.0
TP on Pot 173+52	2.28	(115.98)	1.69	(113.70)

Reduced by M.R.G.

		(115.98)	
+63		3.0	113.0
+72 Top Bank		4.5	111.5
+76 Bottom "		10.0	106.0
+99.3 Lt on 1x1" stake		9.84	106.14
174+00		9.6	106.4
+15		8.8	107.2
+20 N End RR Pierfooting 52 Rt	Top footing	7.6	108.4
+30 & N " " " 53 Lt		8.9	107.1
" " " Topfooting		6.7	109.3
+36.5 S End RR Pierfooting 6.9 Rt	Top footing	7.6	108.4
" "		8.0	108.0
+44 S End RR footing 4° Lt.	Top footing	6.7	109.3
+50		7.5	108.5
+65		8.2	107.8
+76.46 Lt Lt on 1x1" stake		8.54	107.46
175+00		8.4	107.6
T.P. 9.64	(117.60)	8.02	(107.96)
+55		8.3	109.3
176+00		7.0	110.6
+25		5.8	111.8
" 8' Rt to channel		8.3	109.3
+55		5.2	112.4
177+00		5.9	111.7
" " 6.8 Rt		6.8	110.8
" " 10' to channel		9.2	108.4

		(117.60)		
+25		6.0	111.6	
+45		5.8	111.8	
" 4' Lt		3.7	113.9	
" 4 Rt.		6.0	111.6	
" 9 Rt		8.6	109.0	
+70		4.5	113.1	
" " 2 Lt.		3.4	114.2	
" " 5 Rt.		6.6	111.0	
178+00		4.7	112.9	
" " 2'Lt		3.6	114.0	
" " 5 Rt Bottom channel		8.2	109.4	
+18		5.7	111.9	
+18 in channel		7.5	110.1	
+45		7.5	110.1	
" 2'Lt		7.5	110.1	
" 7 Lt		2.4	115.2	
179+00		6.7	110.9	
" " 5' Lt		6.7	110.9	
T.P.	1303	(124.51)	6.12	(111.48)
Set BM. SW B.P.			3.46	121.05
+35			13.5	111.0
+55			14.0	110.5
+83 W. End Bridge			12.9	111.6
" 4.5 Rt to Nearest Abutment				
180+00			12.2	112.3

SW Cor Bridge CL 54th St 400' S Market +-

		(124.51)		
+18 East End bridge			12.1	112.4
" 4.4 Rt to nearest abutment				
+37			12.1	112.4
+50			10.9	113.6
+75			9.8	114.7
181+00			10.2	114.3
+18			10.5	114.0
+20			8.8	115.7
+33			7.2	117.3
+35			5.7	118.8
+70			5.7	118.8
182+00			5.1	119.4
T.P.	7.57	(127.85)	4.23	(120.28)
+45			7.8	120.1
183+00			6.1	121.8
+45			5.6	122.3
184+00			4.9	123.0
" " 3'Lt			5.3	122.6
" " 5 "			6.2	121.7
+50			4.5	123.4
+75 at L. Rt on 1x1 Stake 10'Rt 184+30 +-			3.75	124.10
Set BM.	3.01	(128.57)	2.29	(125.56)
185+00			3.8	124.8
+10 Top Bank			3.3	125.3
+15 " "			5.6	123.0
+25 Bottom Bank			6.5	122.1

Spike in G.E. Elec Pole # 70138

		(128.57)			
+50			5.6	123.0	✓
+70			6.2	122.4	✓
+90			4.8	123.8	✓
186+00			5.2	123.4	✓
+25			5.0	123.6	✓
+35			5.9	122.7	✓
+70			5.9	122.7	✓
187+00			6.6	122.0	✓
+35	Bottom Wash		8.6	120.0	✓
+58			7.0	121.6	✓
+80			7.1	121.5	✓
188+00			7.1	121.5	✓
+07			7.1	121.5	✓
+25			3.3	125.3	✓
T.P.	983	(135.72)	2.68	(125.89)	✓
+55			9.2	126.5	✓
+56			7.2	128.5	✓
189+00			6.2	129.5	✓
+50			5.4	130.3	✓
190+00			4.7	131.0	✓
+50			3.5	132.2	✓
191+00			2.5	133.2	✓
+55 13 Lt			1.30	134.42 ~~135.42~~	✓
+59			1.7	134.0	✓
+65			5.1	130.6	✓

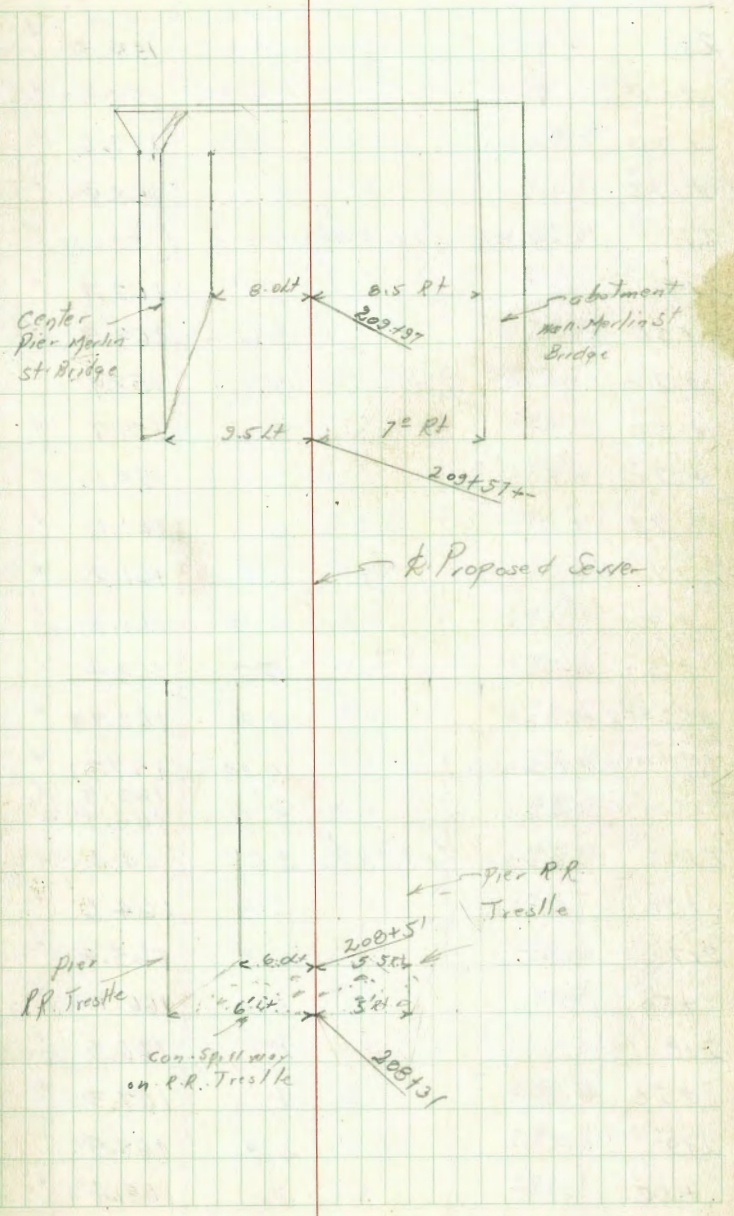
		(135.72)			
+85			6.1	129.6	✓
192+00			7.9	127.8	✓
T.P.	722	(135.25)	7.63	(128.03)	✓
+20			7.3	128.0	✓
+50			6.3	129.0	✓
+93			5.8	129.5	✓
+50			5.3	130.0	✓
194			5.0	130.3	✓
+50			5.0	130.3	✓
195			4.8	130.5	✓
+50			4.1	131.2	✓
196			3.8	131.5	✓
+30			4.4	130.9	✓
+48			5.0	130.3	✓
+60			2.1	133.2	✓
197			0.7	134.6	✓
Tpon C. +03	Lt. Rt.	622 (140.79)	0.68	(134.57)	✓
"	3' Lt		3.6	137.2	✓
"	5 '	Top Bank.	1.2	139.6	✓
"	2 Rt		6.3	134.5	✓
"	5 "		7.8	133.0	✓
+08			6.4	134.4	✓
+17			8.1	132.7	✓
+25			7.8	133.0	✓
+35			6.2	134.6	✓
198			4.6	136.2	✓

		(140.79)			
+50			5.2	135.6	✓
+65			6.2	134.6	✓
+90			4.8	136.0	✓
" 2'Lt			3.4	137.4	✓
199			2.1	138.7	✓
" 3'Rt			4.5	136.3	✓
+20			2.3	138.5	✓
" 4' Rt			4.5	136.3	✓
+50			2.5	138.3	✓
+80			1.4	139.4	✓
+85			3.3	137.5	✓
+95 T.P. on L. 87 L.Lt	8.90	(146.66)	3.03	(137.76)	✓
200+00			9.5	137.2	✓
+12			7.7	139.0	✓
" 4' Rt			9.3	137.4	✓
+50			6.4	140.3	✓
201			5.3	141.4	✓
+42			4.9	141.8	✓
+50	Bottom wash		7.4	139.3	✓
+72			7.0	139.7	✓
+85			5.7	141.0	✓
202			4.9	141.8	✓
+25			5.7	141.0	✓
T.P. on L. 1x1' Iron 733.87 Lt	11.25	(153.63)	4.28	(142.38)	✓
Set BM			5.50	148.13	✓

2"x2" R.H. Hub Sakima Imperial Wilkins Heights Subdivision

		(153.63)			
+50			10.8	142.8	✓
203			10.2	143.4	✓
+40			9.7	143.9	✓
+60			8.8	144.8	✓
204			8.1	145.5	✓
+50			7.2	146.4	✓
205			6.7	146.9	✓
T.P. 5.73		(152.59)	6.77	(146.86)	✓
+55 Toe Imperial Axe f. "			5.3	147.3	✓
" 8' Rt Top fill			+0.2	152.8	✓
+61. 10' Brush protection fence					
+85 int " " "			5.2	147.4	✓
" 4' Lt			7.4	145.2	✓
206			7.3	145.3	✓
" 3' Rt Toe Imp. Axe f. "			5.3	147.3	✓
+60. Bottom wash.			7.7	144.9	✓
+76			5.4	147.2	✓
207			4.8	147.8	✓
+50			4.5	148.1	✓
208			5.1	147.5	✓
+08			6.9	145.7	✓
+11 T.P. on L. 88 L.Lt	8.55	(155.00)	6.14	(146.45)	✓
" 2' Lt			9.3	145.7	✓
" 3' Rt			7.0	148.0	✓
+20			7.5	147.5	✓

		T 155.00 ✓			
+31. on concrete flowline of spillway			6.51	148.49	✓
" 6' Lt. To. RR Pier		See sketch			
" 5 Rt to RR Pier		bottom opp. page			
+51. N. End. Con.			6.28	148.72	✓
5.5 Rt to RR Pier					
6.0 Lt " " "					
+53			5.2	149.8	✓
+95 24 L Rt on 1"x1" stake			4.83	150.17	✓
209			5.3	149.7	✓
+57 W. End. Merlin St Bridge			4.9	150.6	✓
" 7' Rt to Abutment					
" 9.5 Lt to ct. Pier					
+70			4.8	150.2	✓
+97. East End. Merlin St Bridge					
" 8.5 Rt to Abutment					
8.0 Lt to ct. Pier					
210			4.0	151.0	✓
T.P.	11.74	(163.22 corrected 28)	3.52	(151.48)	✓
Check BM.			1.57	161.65 161.71	Nail in 4 Plug NE Merlin + Impair.
Ct. Hdg from corrected T					
Check Flow Line ex MH 181.8		Set Screw cor. Merlin	8.50	153.78	✓
	1.57	(163.28) ✓		161.71 ✓	corrected TO BM
210+50			12.0	151.3	✓
211			11.2	152.1	✓
+50			10.3	153.0	✓
212			9.3	154.0	✓
+50			8.7	154.6	✓



		(163.28)			
213			8.8	154.5	
+10			5.1	158.2	
+70			5.7	157.6	
+95			4.5	158.8	
T.P.	8.98	(168.06)	4.20	(159.08)	
214			5.9	162.7	
+04			4.6	163.5	
+24			9.2	158.9	
+50			8.2	159.9	
+90			9.0	159.1	
+95			6.5	161.6	
215			6.4	161.7	
+40			6.3	161.8	
+52			4.7	163.4	
+63 38 L & Jona.			5.27	162.79	
Flow Line ex M.H. 1562) N & Market & Jona. +68			10.34	157.72	
			4.2	163.9	
216			4.0	164.1	
T.P.	6.92	(171.37)	3.61	(164.45)	
+50			6.8	164.6	
217			6.0	165.4	
+50			5.3	166.1	
218			4.6	166.8	
+50			4.1	167.3	
219			2.9	168.5	
+06			3.0	168.4	
14			1.9	169.5	

	(171.37)		
& See Sketch page 39			
219+27.01 — 2.39 Lt Flow Line ex M.H.		7.07	164.30 Flow M.H.
219+27.01 L to 60 TP & Atkins Grd.		1.4	170.0
TP on Main L.	11.39 (180.67)	2.09	(169.28)
+40		11.3	169.4
220		9.9	170.8
+50		8.4	172.3
221		6.1	174.6
+36 95 p.o.T. 2"x2" P.W.Hub.		5.24	175.43
222		4.6	176.1
+50		5.7	175.0
+83		6.7	174.0
223		9.8	170.9
+21.41 Con Mon. L Lt & 61st.		10.27	170.40
+ " " on Ground & 61st		9.6	171.1
+35		10.1	170.6
+50		8.2	172.5
+60		5.9	175.3
" " 5' Lt		6.8	173.9
" " 5' Rt		6.8	173.9
+70		7.0	173.7
" 5' Rt.		8.1	172.6
" 5' Lt		5.3	175.4
TP on POT 223+85 6.98	(184.38)	3.27	(177.40)
223+85 4' Rt		8.0	176.4
" " 9' "		12.3	172.1
" " 2' Lt		3.8	181.1
" " 12' "		14.0	170.4

T 1843.8 ✓

224		8.0	176.0	✓
"	10' Lt	14.5	169.9	✓
"	3' Rt	6.8	177.6	✓
"	10 "	12.0	172.4	✓
+25		12.4	172.0	✓
"	7' Rt	6.9	177.5	✓
"	5 Lt	14.3	170.1	✓
+50		14.0	170.4	✓
"	5' Rt	12.1	172.3	✓
"	5 Lt	14.5	169.9	✓
+70		14.5	169.9	✓
225		13.4	171.0	✓
+50		12.6	171.8	✓
226		12.3	172.1	✓
+30		11.8	172.6	✓
"	1' Lt Base bank	11.8	172.6	✓
"	7 " Top Bank	6.0	178.4	✓
+55		11.4	173.0	✓
"	1 Lt Base bank	11.4	173.0	✓
"	2 " Top Bank	5.9	178.5	✓
+77		10.6	173.8	✓
+79		5.4	179.0	✓
"	2' Rt	10.6	173.8	✓
227		5.0	179.4	✓
"	3' Rt	5.0	179.4	✓
"	4 "	11.2	173.2	✓

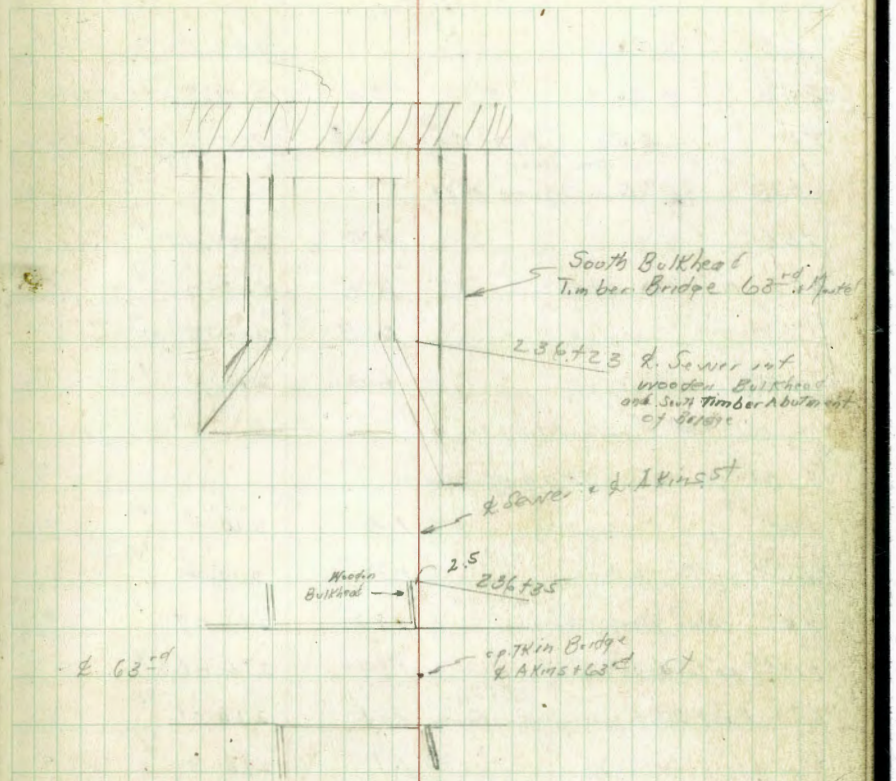
T 1843.8 ✓

+12.27	Morn L & tergas	5.71	178.67 ✓
"	Ground	4.8	179.6 ✓
"	3' Rt	4.8	179.6 ✓
"	4 Rt	11.1	173.3 ✓
+40		4.7	179.7 ✓
"	4' Rt	4.3	180.1 ✓
"	5	11.0	173.4 ✓
+55		3.8	180.6 ✓
"	2' Rt	2.6	181.8 ✓
"	8 "	8.7	175.7 ✓
+70		2.3	182.1 ✓
"	4 Rt	0.4	184.0 ✓
"	9 "	2.4	182.0 ✓
"	4 "	4.6	179.8 ✓
228		3.3	181.1 ✓
"	2' Lt	3.3	181.1 ✓
"	3 "	5.3	179.1 ✓
+10		3.4	181.0 ✓
"	2' Lt	5.9	178.5 ✓
+13		5.9	178.5 ✓
+70		6.5	177.9 ✓
"	5 Rt	7.7	176.7 ✓
+80		7.4	177.0 ✓
"	4 Rt	9.0	175.4 ✓
229		7.2	177.2 ✓

		(184.38)			
+40			6.2	178.2	✓
+70			3.2	181.2	✓
230			1.8	182.6	✓
T.P.	12 22	(193.99)	2.61	(181.77)	✓
+50			10.5	183.5	✓
231			9.6	184.4	✓
+50			8.6	185.4	✓
BM +78 cr	Mon. & 62nd Atkins Pot.		8.39	185 60	✓
	839	(194.07)	18568	185 68 + 0.08 = Corrected	error
232			7.1	187.0	✓
+15			5.7	188.4	✓
+50			4.3	189.8	✓
233			2.6	191.5	✓
Pot 233+40 TP on Pot	10.14	(202.72)	1.49	(192.58)	✓
+19 Top back			9.3	193.4	✓
+90			7.2	188.5	✓
234			17.0	185.7	✓
+02	Int Brush Protection fence Bottom Wash		20.6	182.1	✓
+10			18.9	183.8	✓
+50			17.6	185.1	✓
235			17.3	185.4	✓
+50			16.5	186.2	✓
236			16.4	186.3	✓
+23 in f	Seesketch page 47 Wooden Bulkhead	Steel Bridge	16.9	185.8	✓
+27			5.6	197.1	✓
" 2' Lt			17.1	185.6	✓

	(208.77)			
Seesketch page 47				
+35 End Wooden Bulkhead		8.4	194.3	✓
" 3' Lt		17.0	185.7	✓
+98		12.2	190.5	✓
+65		11.4	191.3	✓
" 3' Rt		9.1	193.6	✓
+71		8.1	1946	✓
" 6' Lt		10.5	192.1	✓
237		4.0	198.7	✓
" 7' Lt		6.5	196.2	✓
+20		2.2	200.5	✓
+50		1.8	200.9	✓
238		0.5	202.2	✓
T.P. 8.85.	(209.67)	1.90	(200.82)	✓
+50		7.6	202.1	✓
239		6.5	203.2	✓
+50		6.6	203.1	✓
240+00		5.8	2039	✓
+03		6.2	203.5	✓
+07.		12.7	197.0	✓
" " 5' Lt		14.2	195.5	✓
" " 4 Rt		6.0	203.7	✓
+33		11.6	198.1	✓
" 6' Lt.		14.9	194.8	✓
" 4 Rt		6.7	203.0	✓
+90. Top Rock		7.4	202.3	✓

		⟨209.67⟩			
T.P.	2.99	⟨207.72⟩	4.94	⟨204.73⟩	
240+49.23 POT	Set BM		5.90	201.82	Granite Mon & Stake + AKIMS
"	Gd		5.6	202.1	
241+00			5.9	201.8	
+50			5.0	202.7	
242			4.5	203.2	
+50			4.1	203.6	
243			3.3	204.4	
+50			3.2	204.5	
244			3.4	204.3	
+50			3.3	204.4	
Mon & Cap POT 27					
245+00	Ground		3.4	204.3	
TP on POT	7.07	⟨210.84⟩	3.95	203.77	Note: As there seems to be a difficulty to Encamp Benches. Did
Mon				203.71	
				− 0.06	error Not corrected
+50			6.1	204.7	
+85			6.0	204.8	
"	3' Lt	Bank of creek Before Nav channel was Dug.	5.7	205.1	
"	10 "	Bottom creek	10.7	200.1	
246			5.8	205.0	
+28	10" cottonwood 4' Lt				
+50			5.2	205.6	
+67			6.3	204.5	
+75			5.0	205.8	
+95	Begin Geranium Hedge				
247			4.3	206.5	



		(210.84)	2+49+87. End fence 2' Et of Ct		
+50			3.8	207.0	
248			3.0	207.8	
T.P.	3.80	(217.40)	3.24	(207.60)	
+27. End geranium Hedge					
+38 = 36" Dia Cypress 7' Lt					
+50			9.0	208.4	
249 Picket Fence 2' Rt			8.2	209.2	
+50			6.9	210.5	
+85			6.3	211.1	
4 " 14" Eucalyptus 15' Lt					
+90 30" Dia " 25' Lt to Ctr of Tree					
+95			1.0	216.4	
250			1.0	216.4	
+02. Edge present Paving		Dirt Rock	1.33	216.07	
+13.35 Cp TK 65' p.o.T.			1.34	216.06	
+23 East Edge present Blackpaving		Dirt + Rock	1.34	216.06	
+30			1.1	216.3	
T.P. on p.o.T. Cp TK 65' to Avina	8.75	(224.81)	1.34	(216.06)	
Check BM			1.19	223.62 / 223.64 / +0.02 error	SW Top Hy. 65' to Top.
BM	1.19	(224.83)		(223.64)	corrected
T.P.	2.65	(218.73)	8.75	(216.08)	
250+40			6.3	212.4	
251			5.3	213.4	
+25			5.3	213.4	
" 6' Lt to Creek Bank			5.3	213.4	

	(218.73)	Ld. of 7 & 65 TK		
7' Lt to Bottom Creek	10.8	207.9	216.06 − .513	
+43 Creek Bank on Rt	48	213.9	= 215.19 − 14.84	
+44 Bottom "	11.2	207.5	= 206.35	
+55	11.2	207.5	Top 36" Water Pipe	
" 4 Rt Bottom Bank	10.6	208.1		
" 5 Rt Top "	9.6	214.1		
+91 int 36" Otay 2nd Main Grd	11.5	207.2	Note Top pipe is approx 5' below Grd	
252. int 1st Otay Main 36" Wooden Line. To be Taken out.	11.2	207.5	according to info given on the Job. Check Elevs with Pyle's office	
" 5' Rt to ex pipe Siphon	11.2	207.5		
+50	9.2	209.5		
253	9.1	209.6		
+50	8.4	210.3		
T.P. 7.30	(217.59)	8.44	(210.29)	
254		7.0	210.6	
+50		6.0	211.6	
255		5.2	212.4	
" 7' Rt To Creek Bank		5.2	212.4	
+50		4.7	212.9	
+85		4.4	213.2	
" " 4 Rt Creek Bank		2.8	214.8	
256		4.4	213.2	
" 2 Rt Creek Bank		3.3	214.3	
" 3 " Top		+2.5	220.1	
T.P. 12.51	(226.08)	4.02	(213.57)	

(226.08)

256+20	Bottom	12.7	213.4	✓
" "	Top	7.0	219.1	✓
+40	"	7.0	219.1	✓
"	1' Lt Bottom	12.6	213.5	✓
+70	1 Lt "	12.7	213.4	✓
"	Top of ℄	6.9	219.2	✓
+95	" " "	6.1	220.0	✓
"	1' Lt	10.5	215.6	✓
"	3 "	12.7	213.4	✓
"	6 " To wingwall			
257		5.1	221.0	✓
+10.58	L.H. & 66" on 12" Stub	9.29	221.79	✓
Set BM	Mon. Stone Akins SW & 66'	6.54	219.54	✓
+22	East Side Bridge	4.0	222.1	✓
+ "	5' Lt Top	4.3	221.8	✓
" "	Bottom	13.8	212.3	✓
+25 left	6" Water Main Top pipe	6.80	219.28	✓
+37		7.2	218.9	✓
+38		10.8	215.3	✓
+50	℄	7.8	218.5	✓
" "	4' Rt Top Bank	3.9	222.2	✓
" "	1 Lt Bottom "	12.8	213.3	✓
+75	℄	9.3	216.8	✓
" 75	5 Lt	12.0	214.1	✓
"	5 Rt	2.8	223.3	✓

(226.08)

258	8.0	218.1	✓
" 8' Rt Top Sloping Bank	2.4	223.7	✓
" 6 Lt Bottom "	11.6	214.5	✓
+50	7.1	219.0	✓
" 6' Rt Top Sloping Bank	4.4	221.7	✓
" 4 Lt Toe " "	8.5	217.6	✓
+60	5.5	220.6	✓
" 4' Lt Toe Sloping Bank	8.5	217.6	✓
" 5 Rt Top " "	3.0	223.1	✓
259	4.1	222.0	✓
" 4' Rt Top Sloping Bank	2.2	223.9	✓
" Lt	6.5	219.6	✓
8 " Toe	9.2	216.9	✓
+08 Top Bank on ℄	3.2	222.9	✓
" 5 Rt	9.1	217.0	✓
+14 Bottom Bank	8.4	217.7	✓
" 4' Rt Top Bank	+0.4	226.5	✓
+30	8.6	217.5	✓
" 2 Rt Toe Bank	8.7	217.4	✓

		226.08 ✓		
+75	ct. wash	8.6	217.5	✓
260		6.3	219.8	✓
+09		5.8	220.3	✓
+15		1.5	224.6	✓
"	3' Rt	1.7	224.4	✓
"	6 Rt	6.9	219.7	✓
T.P.	9.78 (230.56) ✓	5.30	(220.78)	✓
+20		3.9	226.7	✓
"	6' Rt Top bank	6.6	224.0	✓
"	8' "	11.0	219.6	✓
	4' Lt	6.5	224.1	✓
+40		2.2	228.4	✓
"	6' Rt	3.7	226.9	✓
"	7 Lt	6.7	223.9	✓
+50		6.2	224.4	✓
+75		5.5	225.1	✓
"	10' Rt edg. ditch	5.4	225.2	✓
261		4.9	225.7	✓
"	4' Rt edge ditch	4.7	225.9	✓
"	5 "	11.2	219.4	✓
+35		4.3	226.3	✓
"	5' Rt edge ditch.	4.5	226.1	✓
"	6 " Bottom "	10.9	219.7	✓
+55		4.0	226.6	✓
"	8' Rt edge ditch	4.2	226.4	✓
"	10 " Bottom "	10.8	219.8	✓

		230.56 ✓		
+68		2.1	228.5	✓
+85		3.7	226.9	✓
262		3.3	227.3	✓
+01	14 L. Grav Mon & 67 Tp	4.00	226.56	✓
"	on Ground	3.4	227.2	✓
Road	11.51 (238.07) ✓	4.00	(226.56)	✓
+50		10.6	227.5	✓
263		9.9	228.2	✓
"	18' Rt to Bank drainage Ditch	8.9	229.2	✓
+35		8.3	229.8	✓
+50		7.6	230.5	✓
264		6.1	232.0	✓
+50		4.8	233.3	✓
265		3.6	234.5	✓
+50		2.2	235.9	✓
266		1.1	237.0	✓
"	19' Rt to Bank Drainage ditch	0.4	237.7	✓
"	28 " " Bottom	18.2	219.9	✓
T.P.	10.46 (247.85) ✓	0.68	(237.39)	✓
+50		9.6	238.3	✓
267		8.5	239.4	✓
+50		6.8	241.1	✓
268		5.8	242.1	✓
+50		4.8	243.1	✓
269		2.7	245.2	✓
20' Rt Bank Drainage Ditch		2.4	245.5	✓
31 " Bottom " "		18.0	229.9	✓

		(247.85)			
+50			1.4	246.5	✓
270			0.0	247.9	✓
T.P.	11/06	(258.61)	0.30	(247.55)	✓
270+00	18' Rt to Bank Drainage Ditch		10.2	248.4	✓
" "	24 " Bottom		26.6	232.0	✓
+42 Edge paving	Rock & Oil		9.0	249.6	✓
	on Paving.		8.49	250.12	✓
+63 East Edge Paving			8.57	250.04	✓
271+00			8.2	250.4	✓
Check BM S.W. Top Hy Imperial Co 82			9.38	249.23	✓ Did not Correct Because of very int Erosion Encount
				249.31 + 0.08	
270+39 int	22" Iron Drain	27' Rt to flow line Grad.	11.93	246.68	✓
" "			8.6	250.0	✓
" "	25' Rt to outlet		14.53	244.08	✓
+74	22" iron pipe culvert Grd		8.5	250.1	✓
"	22" 24' Lt Entrance flow		10.99	247.62	✓
"	22" 25' Rt outlet flow		13.97	245.14	✓
271+50			7.2	251.4	✓
+55			5.5	253.1	✓
"	2' Lt		5.1	253.5	✓
"	2 Rt		7.1	251.5	✓
+75			3.6	255.0	✓
"	2' Lt		3.6	255.0	✓
"	2 Rt		6.5	252.1	✓
+95 Tele. Deadman 2' Lt					
272			2.1	256.5	✓
" 3 Rt			5.8	252.8	✓

		(258.61)			
+36			0.9	257.7	✓
" 4 Rt			3.9	254.7	✓
+40			3.5	255.1	✓
+50			2.3	256.3	✓
+55			0.0	258.6	✓
" 5' Rt			4.0	254.6	✓
" 5 Lt			0.0	258.6	✓
273			+0.7	259.3	✓
" 3' Lt			+0.7	259.3	✓
" 3 Rt			2.6	256.0	✓
+20			+0.7	259.3	✓
" 3' Rt			2.0	256.6	✓
+50			1.9	256.7	✓
" 3' Lt			+0.9	259.5	✓
274			1.4	257.2	✓
+12.58 Lt			1.63	256.98	✓
T.P. on Lt	3.14	(260.12)	1.63	(256.98)	✓
274+12.58	19' Rt to Drain Ditch Bank		3.9	256.2	✓
" "	23' to Bottom		17.0	243.1	✓
+62			3.5	256.6	✓
+80			1.9	258.2	✓
" 2' Rt			3.5	256.6	✓
+91 Telephone Pole 1° Lt					
275			2.3	257.8	✓
" 3' Rt			2.3	257.8	✓
" 4 "			3.6	256.5	✓

260.12

+50	3.3	256.8	✓
276	4.2	255.9	✓
+40 Tele pole 1° Rt			
+50	5.7	254.4	✓
+63 Telephone P Man 1° Rt			
+80	7.2	252.9	✓
277+00	7.9	252.7	✓
+15	7.8	252.3	✓
+50	7.2	252.9	✓
+67 Int 22" iron Drain on Ground	6.8	253.3	✓
" 19' Lt entrance flow	9.00	251.12	✓
" 37 Rt to outlet "	10.1	250.0	✓
+73 Zt & 69th on Ground	6.4	253.7	✓
" " on 1"x1" stub	6.60	253.52	✓
Set BM. N.E Top Bolt on fence Corner	2.85	257.27	✓
Check BM	6.66	253.96 / 253.94	✓ S.W 2" Pipe Box culvert Imperial +69th

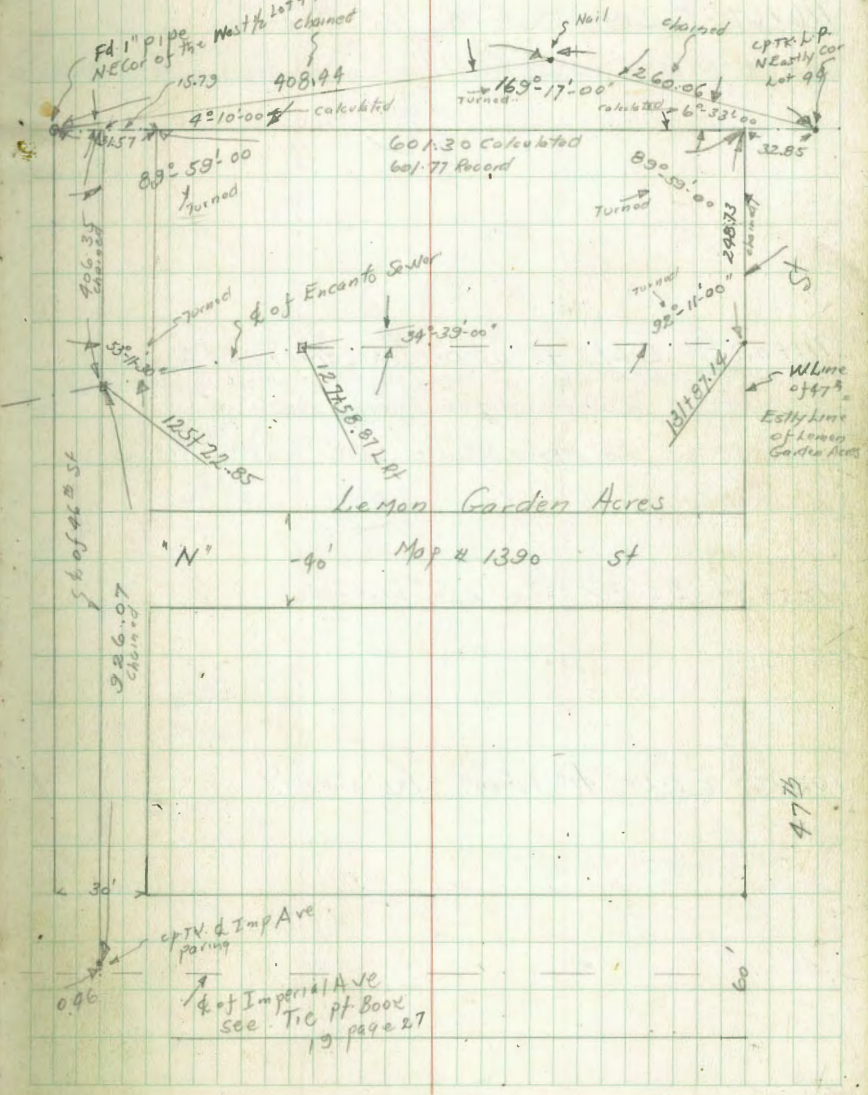
− 0.02 error.

Note this BM has been accepted by Field Men as being correct

Bliss
Sommermyer
Begg
Sinnar

52

Ties through Lemon Garden Acres for Encanto Sewer



116+67.48 LRt 65°-37'-00 1"x1" stake

116+63.08 = ΔRt. 65°37' = New Location See Drawing 1002-D-Sheet 5

111+08.25 L-Lt 46°-05'-00 1"x1" stake = old Location

111 + 01.41 = ΔLt. 46°05'00" = New Location Drawing 1002-D-Sheet 5

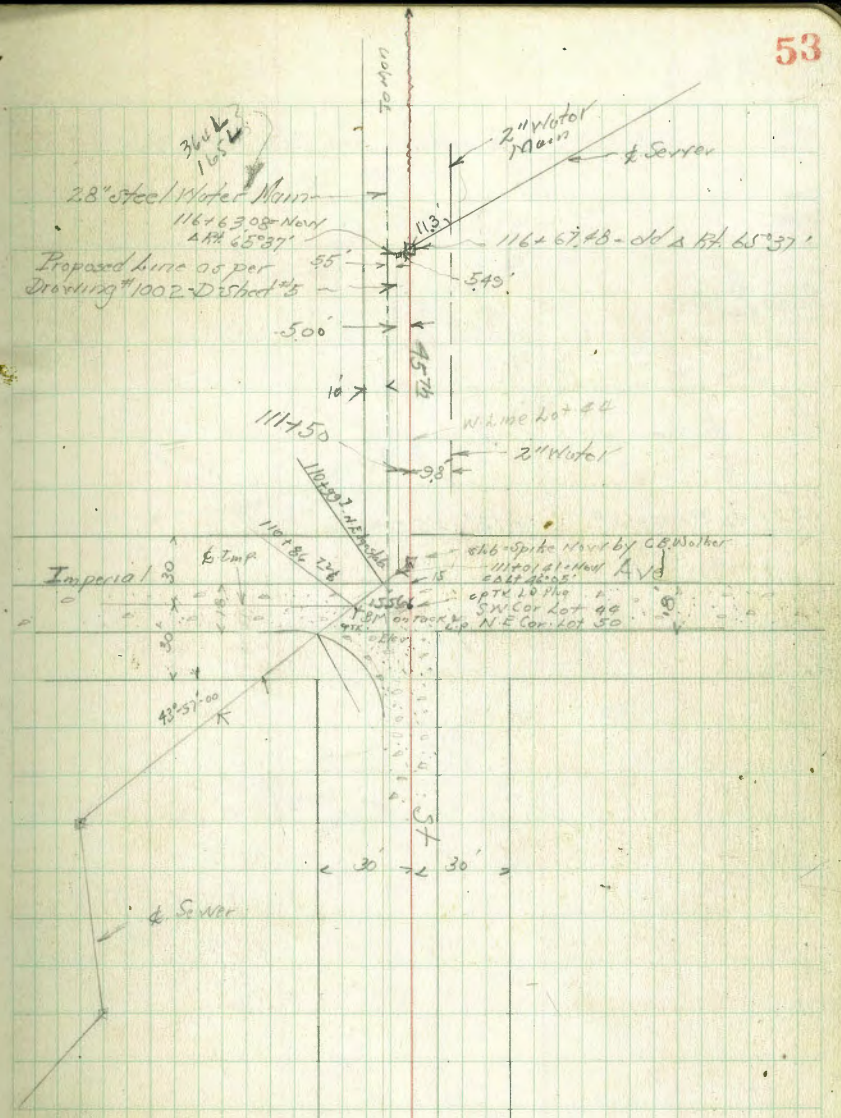
110+98.4 = Int. 6" Water Main Imperial Ave

110+94 = Int. 28" Water Main on 45th See 3364 L.

110+87.7 = Intersection Gas Line on 45th

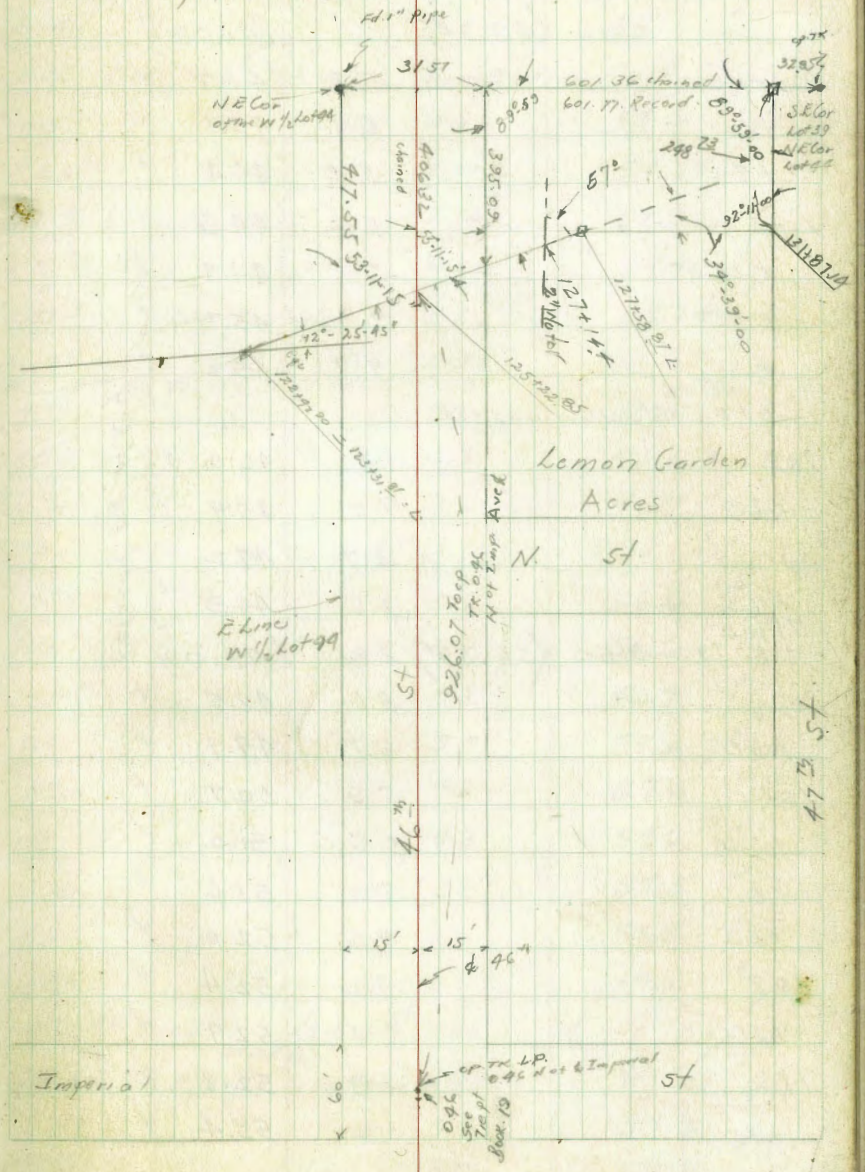
105+87.79 L-Rt 56°-00'-20" 1"x1" stake

102+67.18 L-Lt 47°-43'-00" 1"x1" stake



52.39 1324+53 / 52.39 / 131+87.14

See page 52. for further ties in this Sub.



122+42.90 = 123+31.81 L Lt 12°-25'-45"

Levels for Line Change from 102+67.18

Original line to 122+42.20 = 123+31.81

	5.36	(49.94)		(44.58)	
103+00			5.2	44.7	
+21			6.1	43.8	
+90			5.5	44.4	
104			5.0	44.5	
+35			5.1	44.8	
+50			4.2	45.7	
+65			4.7	45.2	
0+93	18" Willow Tree 25 Lt				
105			3.9	46.0	
+20			4.0	45.9	
+22			2.7	47.2	
+60			3.6	46.3	
TP on L. +87.79	3.50	(56.59)	2.85	(47.09)	Reduced by H.R.S.
106			8.1	48.5	
+50			6.7	49.9	
107			5.9	50.7	
+50			5.6	51.0	
108			5.0	51.6	
+50			4.6	52.0	
109			4.2	52.4	
+50			3.7	52.9	
110			3.8	52.8	
+35			3.2	53.4	

(56.59)

T.P.	8.82	(62.26)	3.15	(53.44)
+45			7.3	55.0
+51 - 6' Lite Pole 3' Lt 15' Dia			Supports Stlamp + 45 Ft + Imp	
+55			2.9	59.4
+64.35			2.37	59.89
+73.8	S.E. Edge Imp slab		2.34	59.92
+86.24	E. Imp		2.30	59.96
+99.1	N. Edge Imp slab		2.62	59.64
111+08.35	L. Lt on Stub		2.96	59.30
Set BM on Tack & Imp + 45 Ft			2.39	59.87 BM
+36			4.8	57.5
+50			5.2	57.1
112			5.6	56.7
TP	5.74	(62.34)	5.66	(56.60)
+50			5.7	56.6
113			5.7	56.6
+50			5.6	56.7
114			5.1	57.2
+50			4.7	57.6
115			4.3	58.0
+50			3.8	58.5
116			3.5	58.8
+50			3.1	59.2
+67.48	5.54	(64.63)	3.25	(59.09)
Set BM. Top Blow off, Standpipe 7 - SW of Manhole			2.62	62.01
+86			5.4	59.2
+87			3.0	59.6

		(64.63) ✓	119+07.5 cross fence		
117			5.3	59.3	✓
+50			5.9	58.7	✓
118			5.1	59.5	✓
+50			4.7	59.9	✓
119			4.3	60.3	✓
+50			4.1	60.5	✓
+75			3.6	61.0	✓
+85			4.4	60.2	✓
+92			6.4	58.2	✓
120			6.6	58.0	✓
+04			4.4	60.2	✓
+20			5.3	59.3	✓
+40			4.2	60.2	✓
121			3.9	60.7	✓
TP	7.46	(65.75) ✓	6.34	(58.29) ✓	
+11			4.9	60.9	✓
+25			3.2	62.6	✓
+35			2.3	63.5	✓
+35	13' Lt Bottom channel				
"	4 Rt		2.3	63.5	✓
"	10 "		4.7	61.1	✓
+50			6.1	59.7	✓
+80			6.2	59.6	✓
122			5.4	60.4	✓
"	4' Rt		4.3	61.5	✓

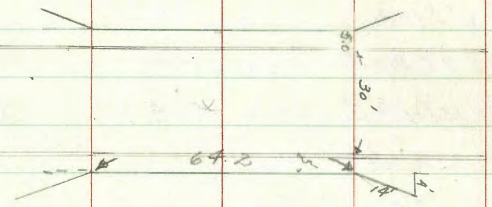
(65.75) ✓

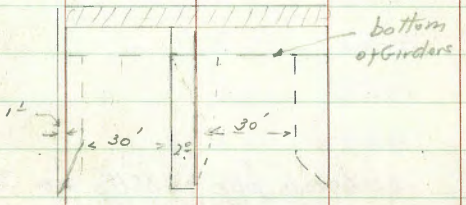
122+25	4.6	61.2 ✓
" " 2' Lt	5.4	60.4 ✓
" " 3 Rf Top Bank	2.7	63.1 ✓
122+42 2° = 123+81 81 Lt	4.14	(61.61) ✓
		61.60
		0.01 error or Diff

Levels for ex M.H's on Ocean View Blvd W of Elizabeth St.

9.31		(51.98) ✓		(42.67) ✓ L on 1 x 1 Stk 99+00.58 Sta T.P. 18
ex MH	16.84 prop Sewer on Rim		9.64	42.34 ✓
" "	" on flow line		16.43	35.49 ✓
T.P.	12.53	(63.58) ✓	0.93	(51.05) ✓
Set BM Top Hy 125' + - L 99+00.58 on S Side Ocean View		East of	11.38	52.20 ✓
T.P.	9.28	(72.78) ✓	0.08	(63.50) ✓
Rim Ex M.H. & Elizabeth & Ocean View			2.81	69.97 ✓
Flow Line ex M.H.			9.76	63.02 ✓
Check Paving N Linden w line of Elizabeth			3.93	68.85 ✓ 68.81 ✓ 0.04 according to Walker F.B. 1047 Page 73

Bridge 47th



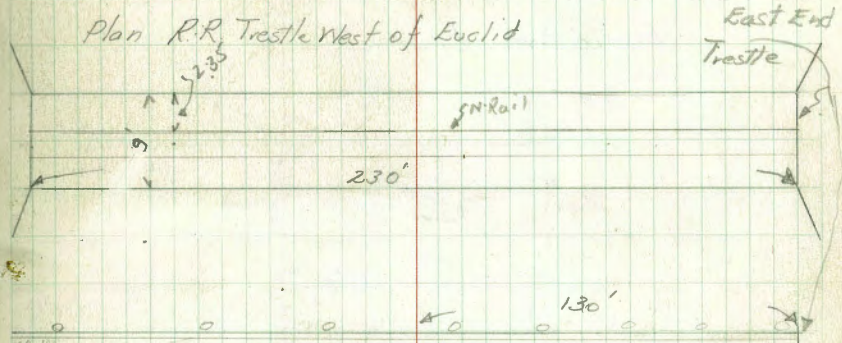


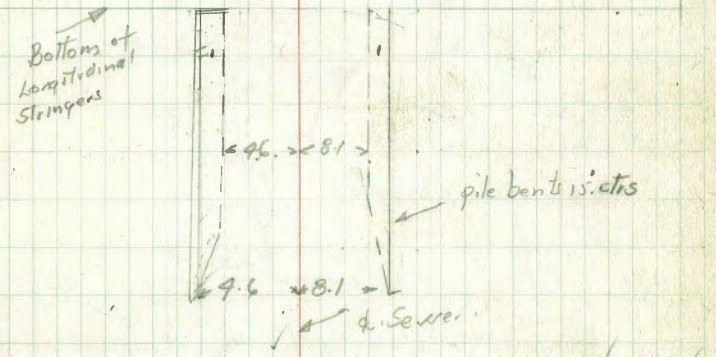
Elevations on Bridge 47th. ✓

BM	2.21	78.05		75.84 ✓
Paving ct. of Bridge ℄ 47th.			3.00	75.05 ✓
Bottom of Deck 566			3.00	75.05 ✓
Bottom of concrete Girders			6.80	71.25 ✓

NW Prop Cor 1" pipe 48" ℄ Castor ℄ mk

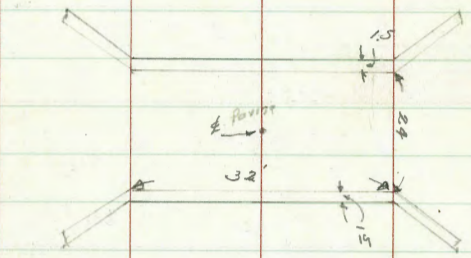
Plan R.R. Trestle West of Euclid

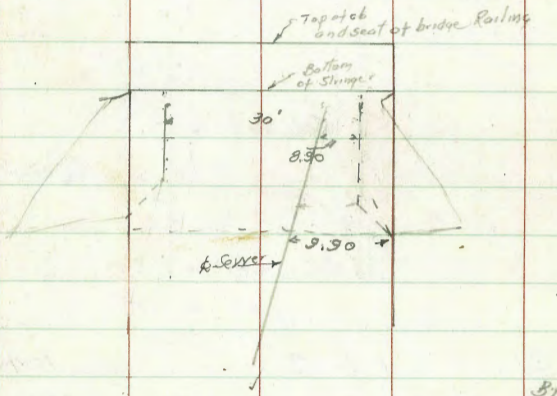




B.M.	312	107.39		104.22 ✓ R.R.
Bottom of Stringer			5.54	101.80 ✓
Top of Ties			3.60	103.74 ✓
Top of Rail			3.24	104.10 ✓

Euclid Ave Bridge

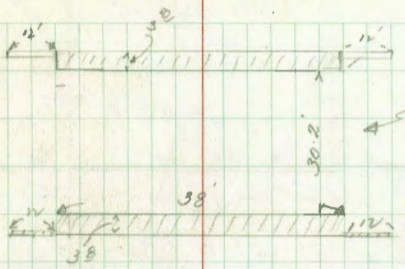


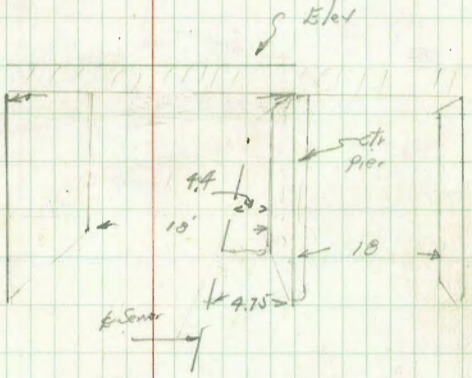


B.M.	3.97	108.19		104.22
Top of bridge cb			3.97	104.22
℄ Paving × ℄ Euclid Ave			4.61	103.58
Bottom of Con Stringer			7.13	101.06

B.P. in North West cb of Bridge

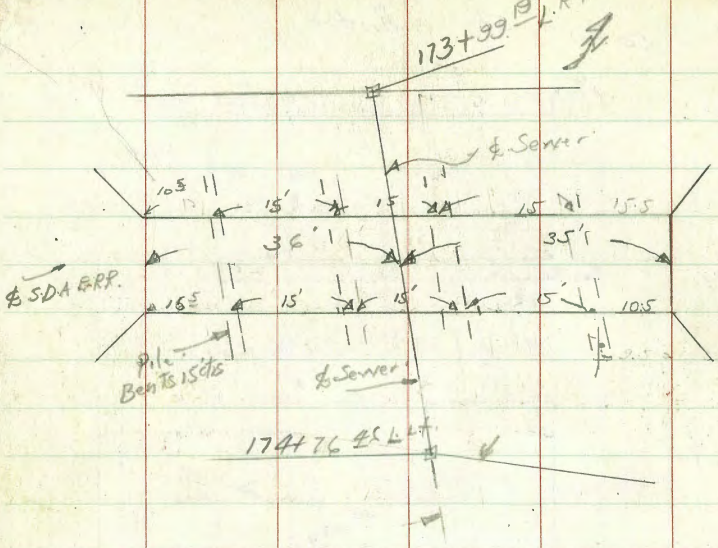
54th St Bridge





B.M.	3.52	124.57	121.05
Top of Paving		4.23	120.34
Top of cb		3.52	121.05
Bottom of Bridge Deck		6.00	118.57

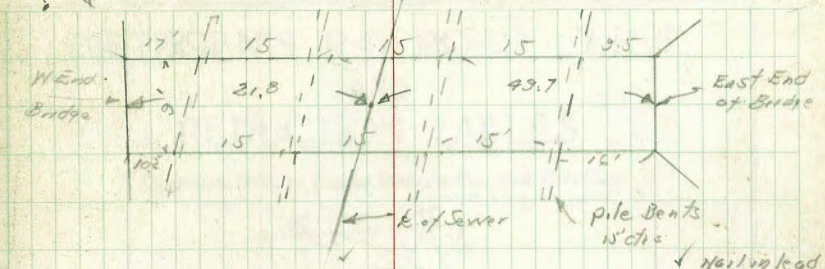
B.P. S.W. cor 54th St Bridge 9.40



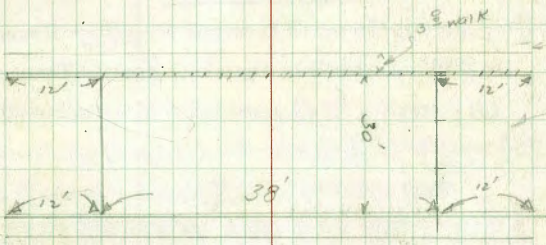
BM	841	115.87		107.96	174+76.4 ℄ L on stake
174+28	Bottom Bridge Stringer N Side		2.90	112.97	
"	Top of Ties		1.12	114.75	
+29	Top of N. Rail		0.76	115.11	
174+37.9	Bottom Bridge Stringer S Side		2.90	112.97	

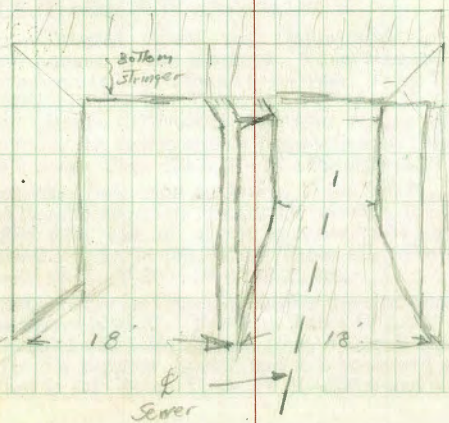
59

R.R. Trestle West of Merlin St



BM	353	165.29	161.71 ✓ Nail in Head Plug N E Merlin Imperial
Bottom Bridge Stringer		7.75	157.49 ✓
Top Tie		5.73	159.51 ✓
Top of Rail		5.30	159.94 ✓





Elev Merlin St Bridge

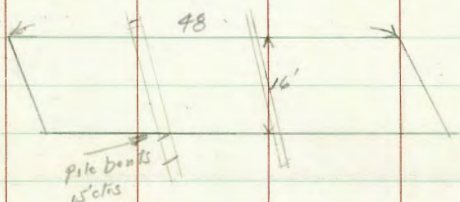
Levels for Merlin St Bridge

3.53	165.24		161.71
Top C6		4.15	161.09
Bottom Bridge Deck		6.20	159.04
C Merlin Top of Piling		4.52	160.72

Nail in Lead Plug NE Merlin & Imperial

P 43

63rd St. Timber Bridge

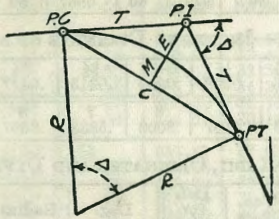


BM	10.89	203.47	192.58	P.O.T. Stub 233+90
Bottom of Stringer		7.82	195.65	P 46
Top of Bridge Deck		6.30	197.17	

415 + 35 = 450

450 + 170 = 620

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



4+25 - Bridge 45 ft from W. St line

CURVE FORMULAS

Radius=R=$\frac{50}{\text{sin. } D/2}$ (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) =Rvers $\frac{\Delta}{2}$ (6)

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

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

EXPLANATION AND USE OF TABLES

Stations.—Given P. I.=Sta. 161+60.35 to find Sta. of P. C. and P. T. Δ=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 Δ=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 IV.—Tangents and Externals to a 1° Curve.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
31°	1589.0	216.3	**41°**	2142.2	387.4	**51°**	2732.9	618.4
10′	1598.0	218.7	10′	2151.7	390.7	10′	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	**42**	2199.4	407.6	**52**	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	**43**	2257.0	428.5	**53**	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	**44**	2314.9	450.0	**54**	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	**45**	2373.3	472.1	**55**	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	**46**	2432.1	494.8	**56**	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	**47**	2491.3	518.2	**57**	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	**48**	2551.0	542.2	**58**	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	**49**	2611.2	566.9	**59**	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	**50**	2671.8	592.3	**60**	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
61°	3375.0	920.2	**71°**	4086.9	1308.2	**81°**	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	**72**	4162.8	1352.6	**82**	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	**73**	4239.7	1398.0	**83**	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	**74**	4317.6	1444.6	**84**	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	**75**	4396.5	1492.4	**85**	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.0	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	**76**	4476.5	1541.4	**86**	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	**77**	4557.6	1591.6	**87**	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	**78**	4639.8	1643.0	**88**	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	**79**	4723.2	1695.8	**89**	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	**80**	4807.7	1749.9	**90**	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

TABLE VI.—CORRECTIONS FOR SUB-CHORDS AND LONG CHORDS.

FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.57
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.57
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

NOTE.—When a chord of less than 100 ft. is used the corrections given in the above table should be added to the nominal length of chord to get the length which should be used in order that the 100 ft. points will check with those obtained by using the standard 100 ft. chord. Thus in locating a 14° curve by 25 ft. chords measure 25′.06 for each chord. Long chords are useful in passing obstacles.

TABLE VII.—MIDDLE ORDINATES FOR RAILS IN FEET.

Deg. of Curve	LENGTH OF RAILS							Deg. of Curve	LENGTH OF RAILS.						
	32	30	28	26	24	22	20		32	30	28	26	24	22	20
1°	.022	.020	.016	.013	.011	.009	.008	16°	.356	.313	.273	.236	.200	.170	.139
2	.045	.038	.034	.029	.025	.021	.017	17	.378	.333	.290	.252	.213	.180	.148
3	.067	.058	.051	.044	.037	.031	.026	18	.400	.351	.306	.265	.225	.190	.156
4	.089	.079	.069	.060	.050	.042	.035	19	.423	.371	.324	.280	.238	.201	.165
5	.112	.099	.086	.074	.063	.053	.044	20	.445	.392	.341	.296	.250	.212	.174
6	.134	.117	.102	.088	.076	.064	.052	21	.466	.410	.357	.309	.262	.222	.182
7	.156	.137	.120	.104	.088	.074	.061	22	.487	.430	.375	.325	.275	.233	.191
8	.179	.158	.137	.119	.100	.085	.070	23	.509	.450	.390	.338	.287	.243	.199
9	.201	.175	.153	.133	.112	.095	.078	24	.531	.469	.408	.354	.299	.253	.208
10	.223	.196	.171	.148	.125	.106	.087	25	.552	.486	.424	.367	.311	.263	.216
11	.245	.216	.188	.163	.139	.117	.096	26	.573	.506	.441	.382	.323	.274	.225
12	.268	.236	.206	.179	.151	.128	.105	27	.594	.524	.457	.396	.335	.284	.233
13	.290	.254	.222	.192	.163	.138	.113	28	.618	.545	.475	.411	.348	.294	.242
14	.312	.275	.239	.207	.175	.148	.122	29	.638	.564	.491	.424	.361	.303	.250
15	.334	.295	.257	.223	.188	.159	.131	30	.660	.583	.508	.438	.374	.313	.259

SLOPE REDUCTIONS.

When distances are measured on a slope they may be reduced to the equivalent horizontal distance by the following approximate rule:—subtract from the slope distance the square of the rise divided by twice the slope distance. Thus for a slope distance of 250.3 ft. and a rise of 15 ft. correction=$15^2 \div 2 \times 250.3$=.45 (by slide rule) or horizontal distance=250.3—.45=249.85. When vertical angle=V. A. is measured horizontal distance=slope distance—slope distance (1—Cos. V. A.). Thus for slope distance of 248.7 ft. and V. A. of 4° 20′ from Table VIII Cos=.99714 and correction=1—.99714=.00286 per foot or total of .286× 2½ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

TRIGONOMETRICAL FORMULAS.

See fig. (a).

sin. $A=\frac{a}{c}$

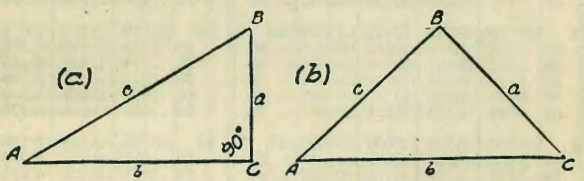
cos. $A=\frac{b}{c}$

tan. $A=\frac{a}{b}$

cot. $A=\frac{b}{a}$

sec. $A=\frac{c}{b}$

cosec. $A=\frac{c}{a}$



FORMULA FOR SOLVING TRIANGLES.

Given	Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A=\frac{a}{c}$, $\cos. B=\frac{a}{c}$, $b=\sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan. A=\frac{a}{b}$, $\cot. B=\frac{a}{b}$, $c=\sqrt{a^2+b^2}$.
A, a	B, b, c	$B=90°-A$, $b=a \cot. A$, $c=\frac{a}{\sin. A}$.
A, b	B, a, c	$B=90°-A$, $a=b \tan. A$, $c=\frac{b}{\cos. A}$.
A, c	B, a, b	$B=90°-A$, $a=c \sin. A$, $b=c \cos. A$
Given	Sought.	Oblique triangles. See fig. (b).
A, B, a	b	$b=\frac{a \sin. B}{\sin. A}$
A, a, b	B	$\sin. B=\frac{b \sin. A}{a}$
a, b, C	$A-B$	$\tan. \frac{1}{2}(A-B)=\frac{(a-b) \tan. \frac{1}{2}(A+B)}{a+b}$
c, b, c	A	If $s=\frac{1}{2}(a+b+c)$, $\sin. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{b c}}$, $\cos. \frac{1}{2}A=\sqrt{\frac{s(s-a)}{b c}}$, $\tan. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$, $\sin. A=\frac{2\sqrt{(s-a)(s-b)(s-c)s}}{b c}$
A, B, C, a	area	$\text{area}=\frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area}=\frac{1}{2} b c \sin. A$
a, b, c	area	$s=\frac{1}{2}(a+b+c)$, $\text{area}=\sqrt{s(s-a)(s-b)(s-c)}$

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.

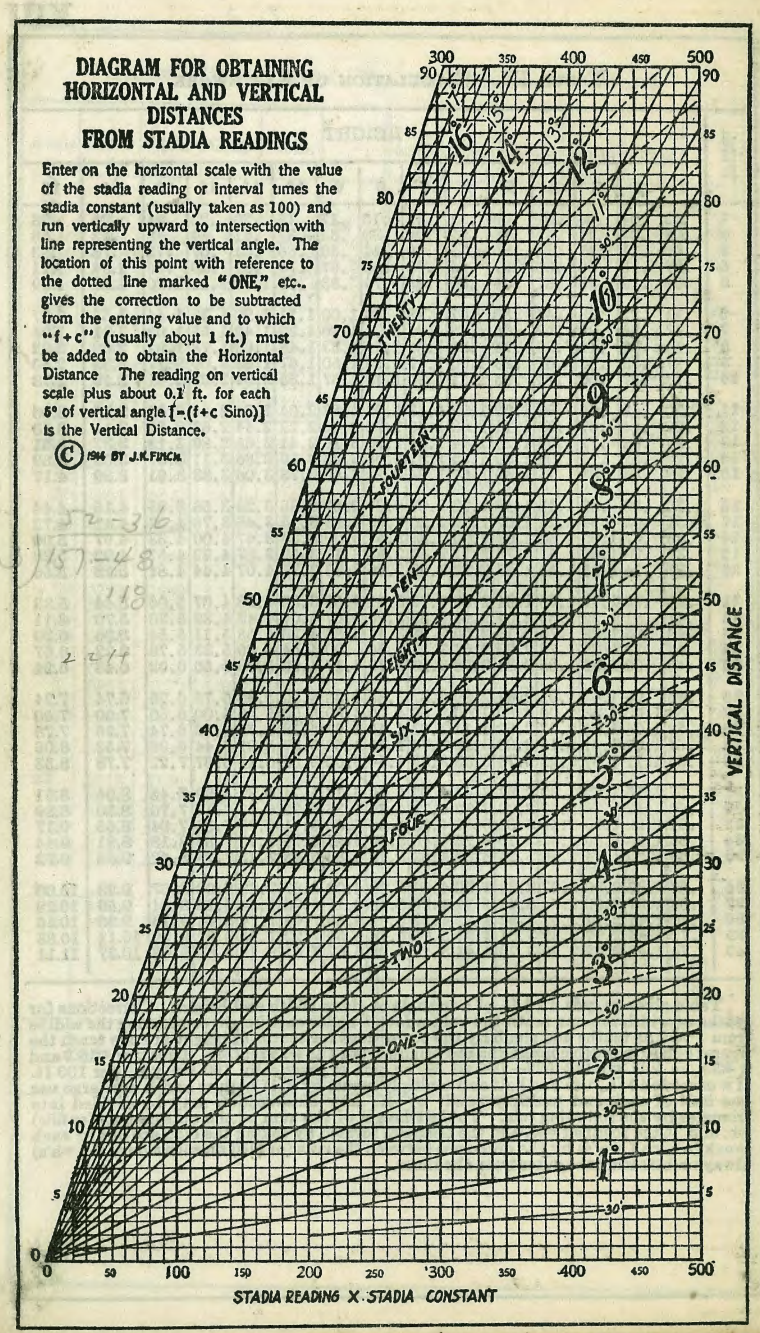
Table IX.—Calculation of Earthwork.

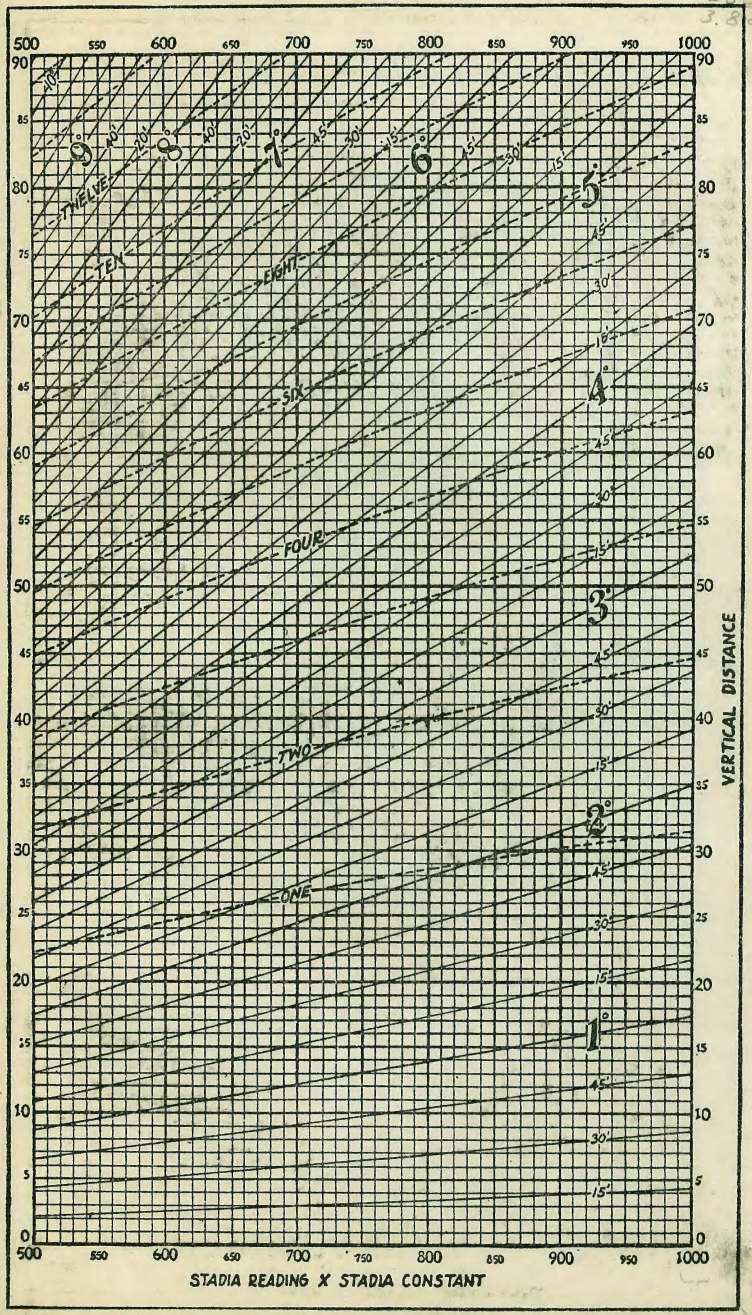
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	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	5.83
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 on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the correction to be subtracted from the entering value and to which "f + c" (usually about 1 ft.) must be added to obtain the Horizontal Distance. The reading on vertical scale plus about 0.1 ft. for each 5° of vertical angle [=(f+c Sino)] is the Vertical Distance.





10 4 22
3 12
107.34 ft

94+25.0
24.4
94+00.6
18.3
94+18.9

94+00.6
43.3
94+43.9

94+00.6
69.3
94+69.9

94+19
+44
+70

264+41.96

2.10

14

67+97.0
32.1
68+29.2

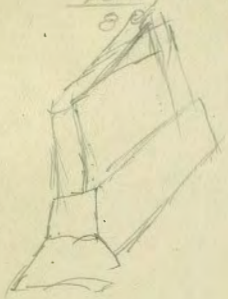
36.2 68+29.2
14
69 15.2

16.8
12.4

68+29.2
13
68+16.2

26.2
36.2
71+22.32
13.9

210 ft of Trestle
130 from EE end
80



68+29.2
16
68+15.2

87° 49' 00"
92.11
1.00

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.