

1651

ENGINEERS  
FIELD BOOK  
No. 405F



# 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  $30.6 + (20 - 16) \div 2$  or 2 ft. added to 30.6 = 32.6. For slopes of 1 on 1½ see inside of back cover.  
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1651

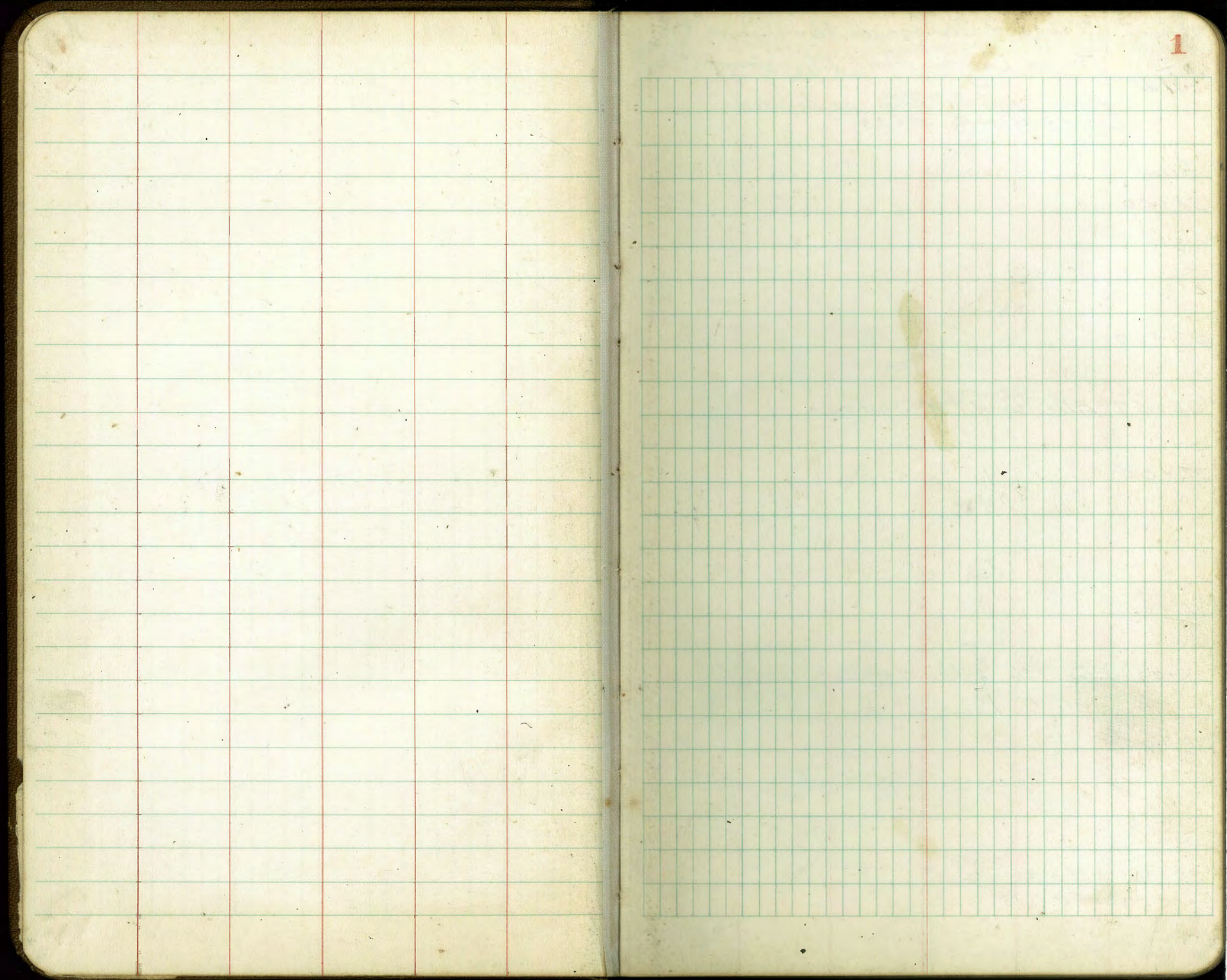
CITY ENGINEER

ENGINEERING DEPARTMENT,  
CITY OF SAN DIEGO,  
CALIFORNIA.

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Made in U. S. A.







Walker  
Hardin  
Wirt  
11-17-42

Proposed Change in Alignment  
Powder Canyon Trunk Line Sewer  
from original line as located  
in F.B. 1613-Page 22 & 23

Station

94+00

93+00

92+57 = Elec Pole 4.7 ft = West edge

92+00

91+00

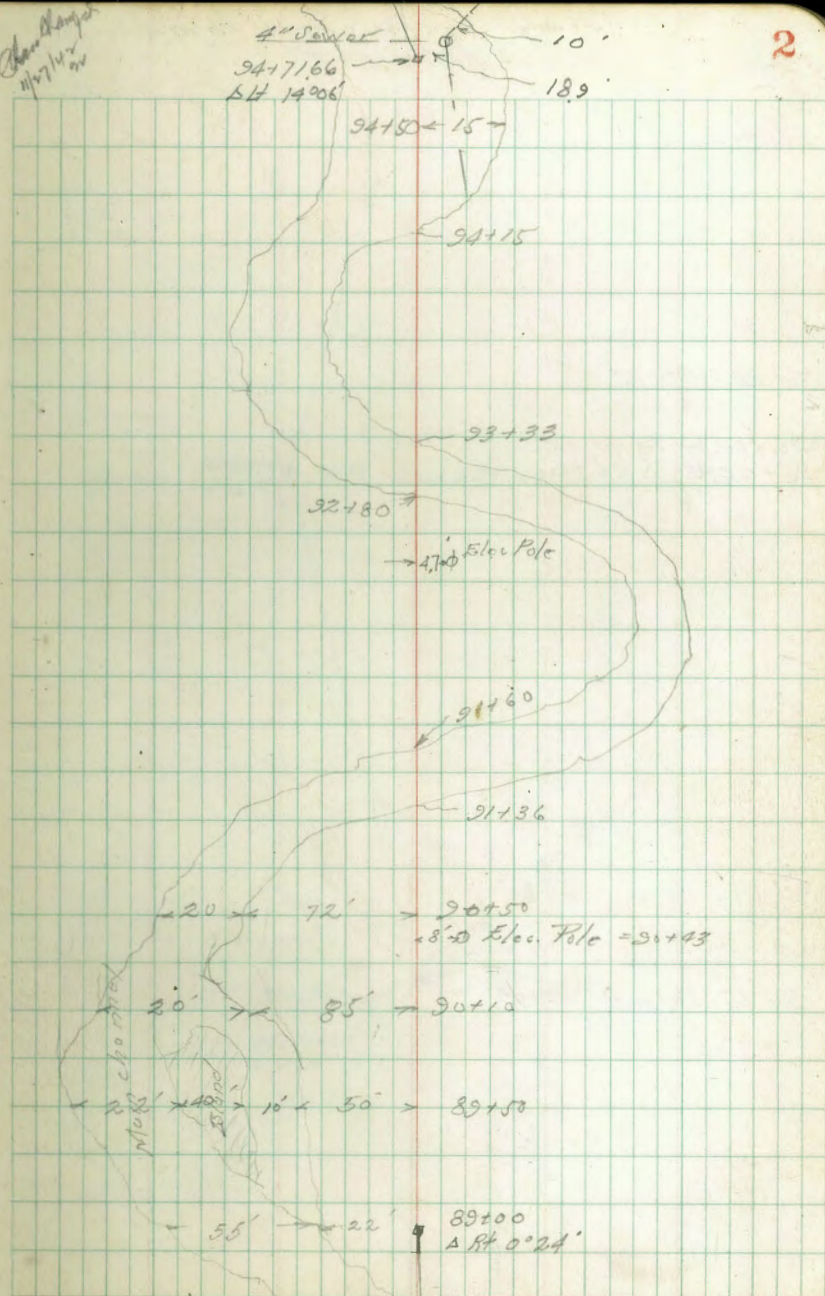
90+43 = Elec. Pole 8' ft. = West edge

90+00

89+00 = A Rt 0° 24'

Cont. from F.B. 1613 P. 22

Change  
11/17/42



4.05 per F.B. 1613: 22



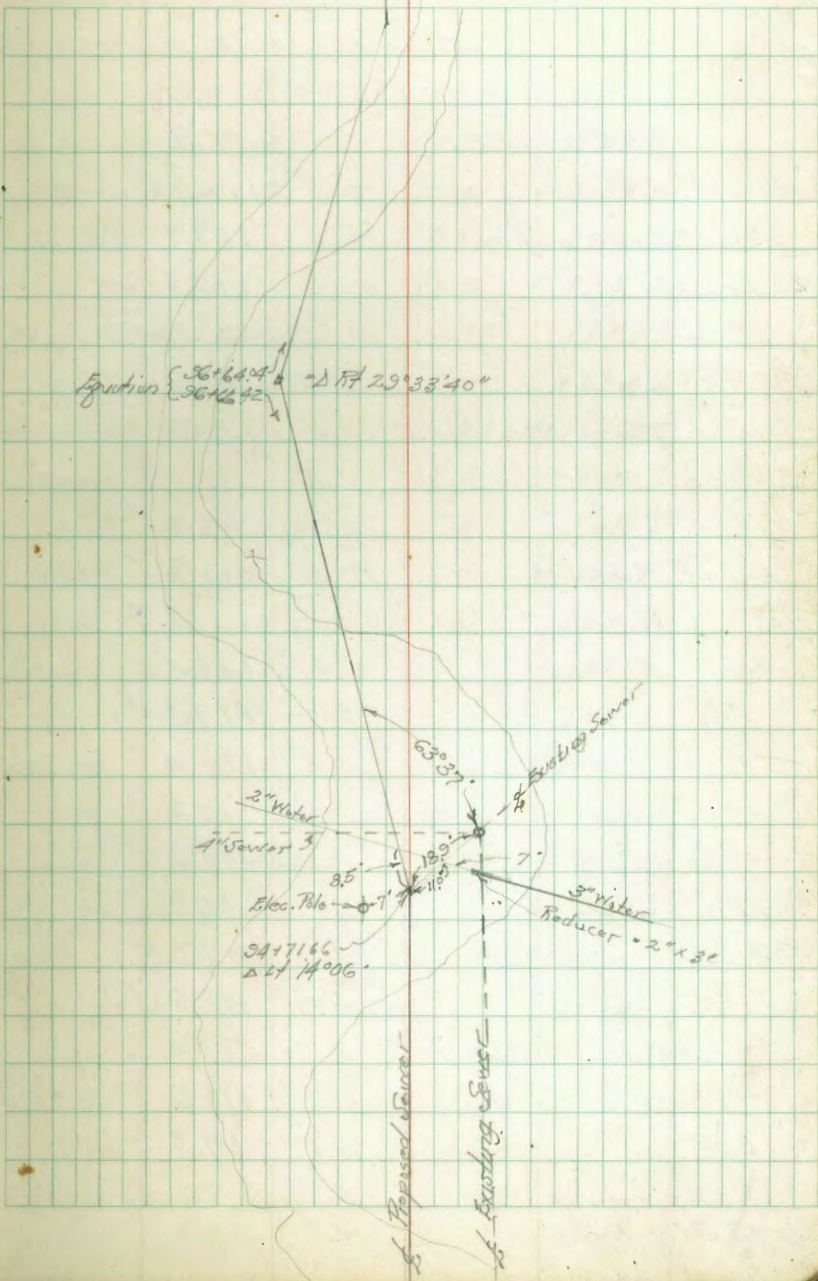
Powder Canyon Sewer Alignment  
 Cont. from P. 2

Station

Cont. FB. 1613-P. 23

96+64.04 Equation  
 96+66.42  $\Delta$  77° 29' 33" 40"

94+71.66  $\Delta$  17° 14' 06"





Walker  
Hurdin  
W.H.T  
11-18-42

Powder Canyon Trunk Sewer  
Profile Levels  
for Proposed Change in Alignment  
as located in this book Page 2, 3.

5.23	123.30	117.37	117.37	117.37	117.37
89+00 = N edge of 24'	10.35	112.95	112.95	112.95	on stake
22' Lt. = E edge in channel	14.4	108.9	108.9	108.9	55' wide base
89+23	11.6	111.7	111.7	111.7	
+27	10.3	113.0	113.0	113.0	
+50	9.5	113.8	113.8	113.8	
100' Lt. = E edge Main channel	12.8	110.5	110.5	110.5	120' wide in channel
90+00	8.2	115.1	115.1	115.1	
+10	8.2	115.1	115.1	115.1	
85' Lt. = E edge Main "	10.0	113.3	113.3	113.3	
105' " = W " " "	12.2	111.1	111.1	111.1	
90+50	6.8	116.5	116.5	116.5	
91+00	6.0	117.3	117.3	117.3	
+36 = S Bank channel	6.9	116.4	116.4	116.4	
+37 " edge "	11.0	112.3	112.3	112.3	
+59 N " "	9.6	113.7	113.7	113.7	
+60 N Bank "	6.4	116.9	116.9	116.9	
92+00	5.6	117.7	117.7	117.7	
+50	4.8	118.5	118.5	118.5	
+80 S Bank channel	4.1	119.2	119.2	119.2	
+81 " edge "	6.7	116.6	116.6	116.6	
93+00 " "	5.6	117.7	117.7	117.7	
+28 - N edge "	6.0	117.3	117.3	117.3	
+33 - N Bank "	4.0	119.3	119.3	119.3	

12330

4

Check  
1 point  
11-27-42

93+50	3.4	119.9	119.9	119.9	
94+00. 7.69	129.25	1.73	121.57	121.57	
+15 = S. Bank ch.	7.5	121.8	121.8	121.8	
+16 S edge "	10.3	119.0	119.0	119.0	
+50	8.8	120.5	120.5	120.5	
15' Ft. = E edge ch	10.4	118.9	118.9	118.9	
94+71.66 = Lt 14006	10.31	118.95	118.95	118.95	in ch.
18.9' Ft. on Perm M.H.	5.82	123.44	123.44	123.44	
" " on Floor 4" Line	11.83	117.43	117.43	117.43	to West
95+00	7.2	122.1	122.1	122.1	
29' Ft. = E edge ch.	7.6	121.7	121.7	121.7	
35' Ft on Bank	6.0	123.3	123.3	123.3	
10' Lt. in ch.	8.6	120.7	120.7	120.7	
95+40 = N edge ch.	7.1	122.2	122.2	122.2	
+41 = N Bank "	6.1	123.2	123.2	123.2	
96+00	5.1	124.2	124.2	124.2	
+50	4.0	125.3	125.3	125.3	
96+66.42 } E edge of 1011 = 96+64.06 } = 2 Ft 29°33'40"	3.54	125.73	125.73	125.73	on stake
		125.71	125.71	125.71	-FB 1614-29
					0.01 diff.
Walker Hurdin Hurdin	3-21-44	Profile to M.H. from 94+71.66	to Hand Level		
(94+71.66)	3.2	126.64	126.64	126.64	123.4 = Perm M.H.
5' Rt on diag.	5.5	121.1	121.1	121.1	
9' Rt "	5.2	121.4	121.4	121.4	
11' Rt	5.9	120.7	120.7	120.7	
17' Rt = N edge Brick M.H.	6.1	120.5	120.5	120.5	



(166.63)

Walker Hazard Harkin 3-21-44 Levels on Powder Canyon Sewer over Portion of Line Where Channel Was Changed Since Original Levels Were Taken as shown in FB 1614-92 Location FB 1613-P-27

BM on Rim MH FB 1614-32	4.83	(166.63)	161.80	117+58.60 16.52' RT on Rim w/2/4/44
115+75 in Branch ch.	9.2	157.4		
30' Lt. = 1/2 Main ch	11.2	155.4	15' Wide	
115+93	10.7	155.9		
795	9.2	157.4		
116+00	8.3	158.3		
+25	7.2	158.7		
25' Lt. = 1/2 M ch. 15' Wide	10.4	156.2		
750	7.7	158.9		
775	7.3	159.3		
30' Lt. = 1/2 M ch. 15' W	9.5	157.1		
117+00	6.9	159.8		
20' Lt. = 1/2 " " 20' W	8.3	158.3		
48' R. = 1/2 Branch ch	7.6	159.0	old M ch.	
117+29	6.3	160.3		
+30 = S Edge M ch.	8.0	158.6		
117+58.60 = Δ RT 7°09'	8.2	158.4		
7' Lt. = W edge M ch.	7.7	158.9		
8' Lt. on W Bank " "	5.3	161.3		
13' RT on diag. toward Existing MH	7.8	158.8	E edge M ch	
26' RT on Gravel Bank.	1.5	165.1	on natural Ground	
40' RT. " Too " "	5.1	161.5		
45' RT. on Ground	5.4	161.2		
47.5' RT. = 1/2 Existing MH	161.8	see top sheet.		

118+00 in M ch.	7.4	159.2	
4' Lt. = W edge M ch	7.1	159.5	
6' Lt. on W Bank	5.2	161.4	
15' RT " E edge ch	7.2	159.4	
118+58	7.1	159.5	
3' Lt. = W edge M ch.	6.8	159.8	Bank Not 3' Above
13' RT = E " " "	6.8	159.8	"
118+78 = opp W end 36" Conc. Culvert	6.6	160.0	in M ch
42' RT. on Ground	4.4	162.2	
" " " Flow 36" Pipe	6.4	160.2	Pipe Approx RT to Road
119+63.4 = 10th 8" Sewer	5.6	160.0	on Top of Pipe
Above Pipe has 4" x 2.5' wide 12' long slab conc. over same.			
7.8 1285 (174.08)	5.40	(161.23)	width no change
120+00 in ch.	12.6	161.5	
121+00 " "	11.0	163.1	"
122+00 " "	9.7	164.4	"
722	8.5	165.6	✓

ok from here - on Main line  
Levels for Lateral to MH from 134+32.07-26

5.7	10A.20'	188.50	at 49
0+06 = E Bank Main ch.	6.2	188.0	✓
+10 = E Edge " "	9.3	184.9	✓
+28 = W " " "	9.6	184.6	✓
+30 = " Bank " "	6.4	187.8	✓
+40	4.5	189.7	✓
7.55	4.5	189.7	✓
75625 on Rim MH.	3.5	190.7	✓

Top has been Rebuilt  
11750 0519 Levels FB 1614



Proposed Change in Alignment  
 Powder Canyon Trunk Sewer  
 Between Station 130+00 And  
 Myrtle St.  
 Original Location FB 1613 - P 60

134+32.97 =  $\Delta$  Rt.  $25^{\circ}10'$       per page A0

134+00

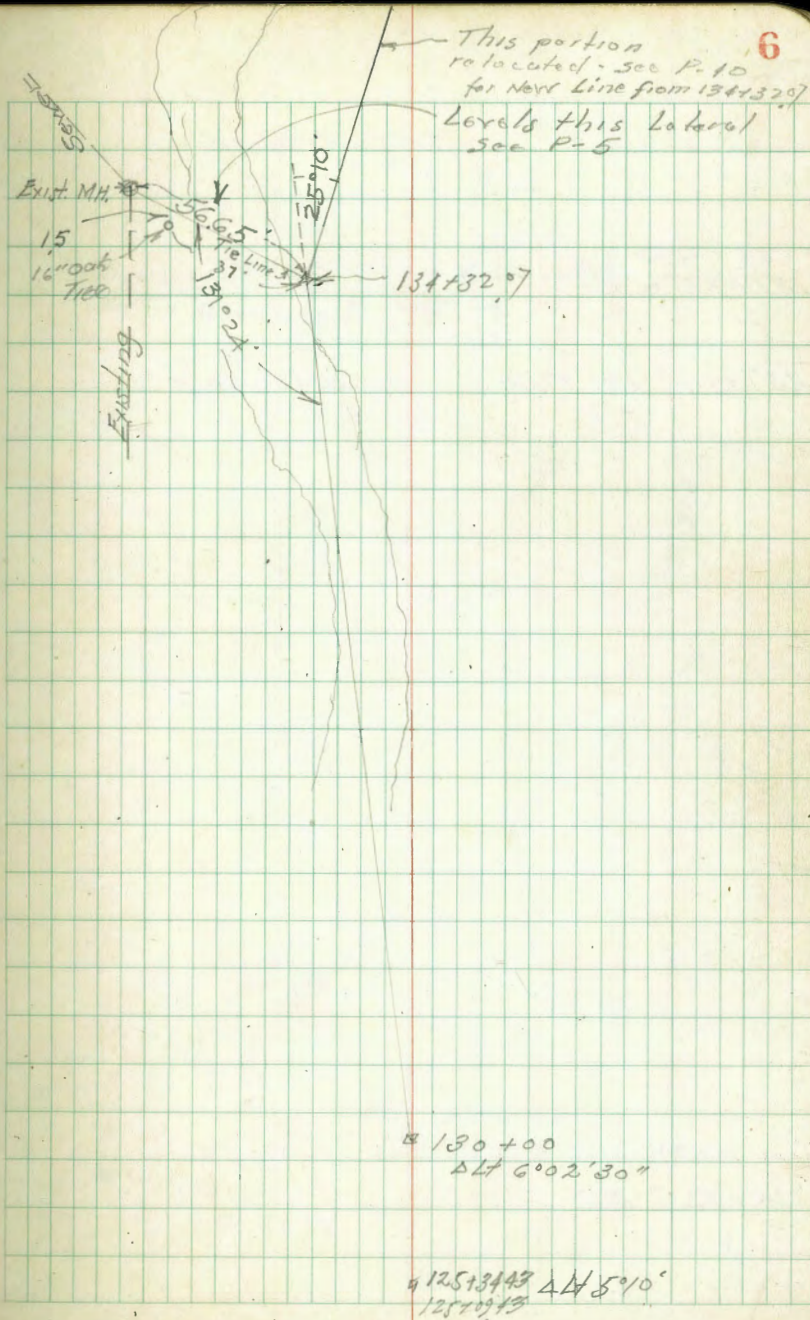
133+00

132+00

131+00

130+00 =  $\Delta$  Lt  $6^{\circ}02'30''$  = Paving Stake

125+34.43 Equation  
 125+09.43       $\Delta$  Lt  $5^{\circ}10'$       FB 1613  
 57

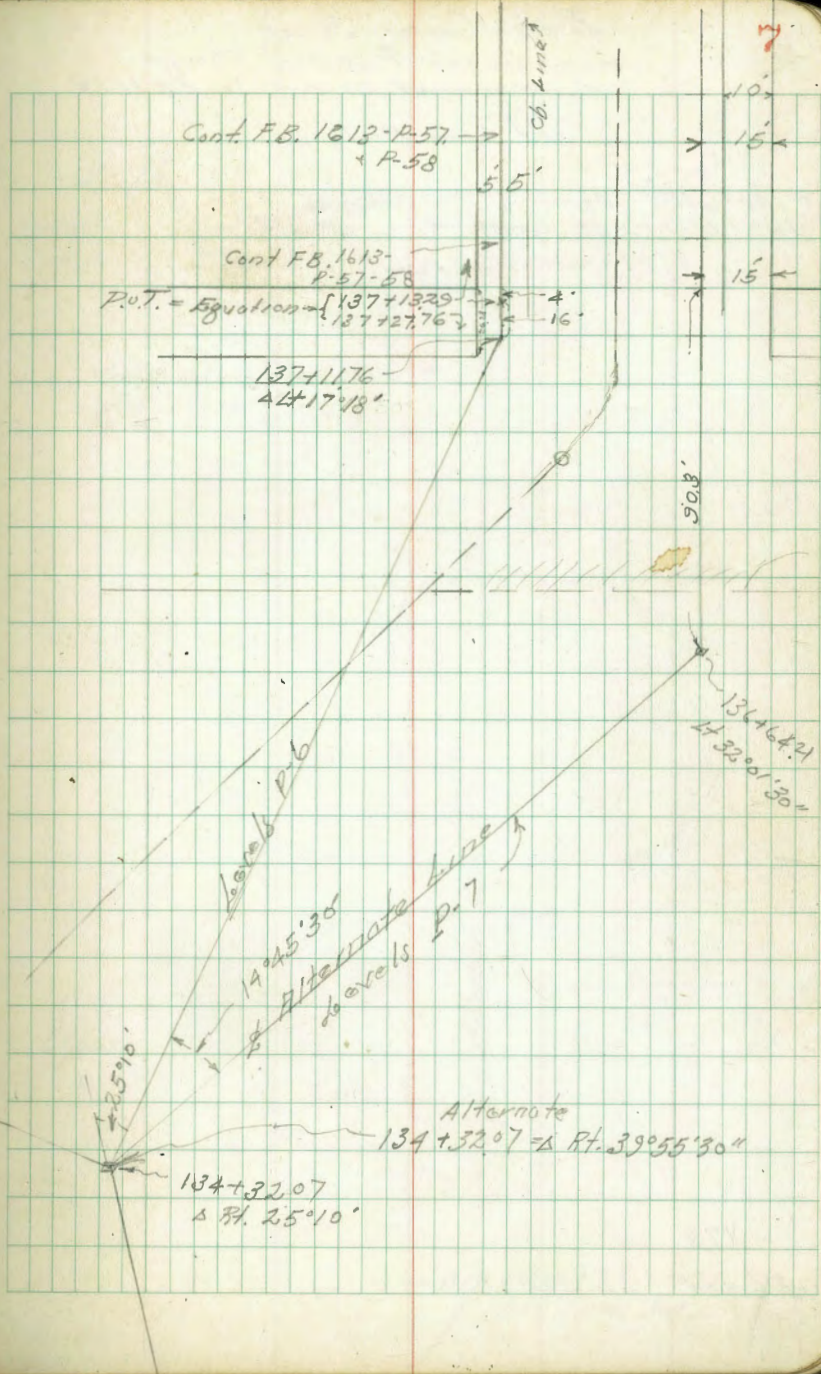




$137+13.29$   
 $137+27.76$  } Equation = P.O.T. F.B. 1613-P.60

$137+11.76 = \Delta Lt. 17^{\circ}18'$  Cross in Walk

$134+32.07 = \Delta Rt. 25^{\circ}10'$





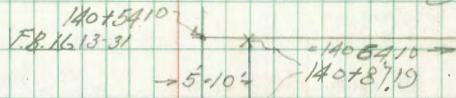
Forster Canyon Sewer  
 Location for Proposed change  
 in Alignment to run in FB 1613

Cont from P-7

= 140+6410<sup>3</sup> Equation  
 140+8719 =  $\Delta$  87° 20' 04"

Myrtle St.

Myrtle



Location as located  
 FB 1613-31

15'

St.

Florida

Alternate Line (Page 11)

15'

Upas

Corr. Par.

St.

179

136+6421 =  $\Delta$  32° 01' 30"

# 136+6421  
 $\Delta$  32° 01' 30"



Mulker Profile Levels  
Hardin Powder Canyon Trunk Sewer  
Wirt

11-18-42 for time charge as per definition

in this book Page 6, 7, 8  
Cross in Hill, Vol. 1, P. 118, Col. 1  
Upper Ext. of Powder Canyon

B.M. #38  
Elev. 1614-17

4.08	(192.63)	(188.55)	
130+00 = Alt 6°02'30"	11.96	180.67	on stake
+50	10.3	182.3	
35' Lt. = E edge ch.	13.4	179.2	
55' " = W " "	13.4	179.2	
130+85	10.0	182.6	
+90 = Bank of	8.9	183.7	
+92 = " "	11.0	181.6	
131+00 Bank of "	8.1	184.5	
+06	9.5	183.1	
+16	9.5	183.1	
+27	5.2	187.4	
+35 = Toe of Berm	5.0	187.6	
+38 = Top "	4.1	188.5	
+41 = " "	4.3	188.3	
+42 = Toe "	5.0	187.6	
+72 = " "	5.2	187.4	N side upar.
+74 = Top "	4.6	188.0	
+81	7.2	185.4	
132+00	7.2	185.4	
(131+38) 48.3' Lt on Top	4.54	(188.09)	8' Box Culvert
" " " Flow	12.44	180.19	"

(192.63)

9

(131+75) 44' Lt on Top	4.00	188.63	8' Box Culvert
" " " Flow	10.90	181.73	"
(130+90) 28.5' Ft Top Hd Wall	6.46	186.47	6' Conc. Culvert = 24"
" " " Flow	10.89	181.74	"
132+42 = E Bank ch.	6.0	186.6	
+44 = E edge "	9.9	182.7	12' Wide
133+00 in ch	9.2	183.4	
2' Lt. W edge	9.2	183.4	
14' Ft E. "	9.2	183.4	
133+50 in ch	8.0	184.6	
3' Lt. = W edge ch.	8.0	184.6	
10' Ft E. " "	8.0	184.6	
134+00 in ch	8.1	184.5	
7' Lt. = W edge ch	8.0	184.6	
8' Ft = E. " "	8.0	184.6	
134+08 = Int. E. edge ch	7.9	184.7	
+09 = " E. Bank "	6.8	185.8	
+16	5.0	187.6	
134+32.07 = Δ Rt. 25°10'	4.13	(188.50)	on stake
6' Lt. = E. Bank ch	4.6	188.0	
6' Lt. = E. edge ch	8.2	184.4	
16' Lt. = W " "	8.2	184.4	
T.P. 10.58	(99.08)	4.13	(188.50) on stake 134+32.07
134+35	10.6	188.5	
+37	11.5	187.6	



19908

19893

134+50	10.3	188.8	✓
+75 = Nat. Grd.	2.3	189.8	✓
+88 on Fill	7.1	192.0	✓
135+00	8.0	191.2	✓
55' Lt. on Bank ch	8.8	190.3	✓
57' Lt.	12.5	186.6	✓
(134+80) 43' Lt. E edge ch.	12.7	186.4	15' Wide
135+38 Int. 3" Water Main	7.96	191.12	on Top
+50	7.9	191.2	✓
+80	6.2	192.9	✓
83' = E edge ch	12.5	186.6	✓
108' Lt. - W " "	12.5	186.6	✓
F.B. 1814-17			
TR ch 8 M.	4.20	194.88	8 M 4.50 N 5 BP Up in Florida
4.07		194.86	8 M
136+00	3.7	195.2	✓
+30 S Bank ch	4.9	194.5	✓
+31 S edge "	7.9	191.0	✓
+59 in "	8.5	190.4	✓
+75 " "	7.8	191.1	Toe N Bank
+83 = N Bank "	4.2	194.9	✓
+88	5.5	193.4	✓
+98 on Pav. at cb	5.26	193.67	✓
+98 on cb. Return	4.37	194.56	✓
137+11.76 Δ Lt. 1798	4.16	194.77	✓

137+27.76 } Expansion  
 = 137+13.29 } # PGT.  
 3.99                      194.94 ✓



Walker  
Hardin  
Wirt  
11-19-42

Levels for Alternate change  
of line

Powder Canyon Sewer  
as per location this book P-7

$\pi$  P-10  
198.93

134+32.07 = 239°55'30"	10.21	(188.72) on stake	
+34	10.5	188.4	✓
+36	11.5	187.4	✓
+50	10.3	188.6	✓
+66 = Toe Fill	9.4	189.5	✓
+74 on fill 3' deep	6.2	192.7	✓
135+00 on " 2' deep.	6.2	192.7	✓
+50 " " " "	5.3	193.6	✓
+70 Toe Fill	5.9	193.0	✓
+90 = Top Berms	4.0	194.9	✓
136+00	4.2	194.7	✓
+14 = Wedge Powder Canyon Road	4.1	194.8	up Pav.
+62 = E. " " "	4.5	194.4	on Pav.
136+64.21 = Alt. 32°01'30"	4.57	(194.42) on stake	✓
+79 = S edge Conc. Pav.	4.92	(194.01)	✓
137+00 on Conc. Pav.	5.01	193.92	✓
+50 " " "	4.99	193.94	✓
5' Rt. on cb.	1.02	194.91	✓
138+00 on Conc. "	1.48	194.45	✓
139+00 " " "	3.48	195.45	✓
5' Rt. on cb.	2.59	196.34	✓

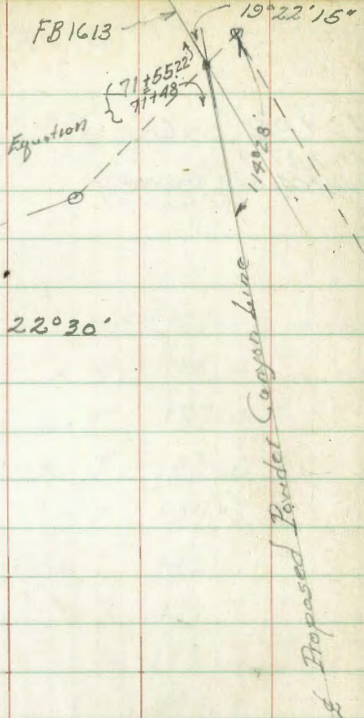
198.93

11

140+00 on Conc. Pav. 2.51 196.42 ✓  
140+87.19 (Equation)  
= 140+64.10 + Rt. 30°01'30"  
FB. 1613-31 1.37 197.56 ✓



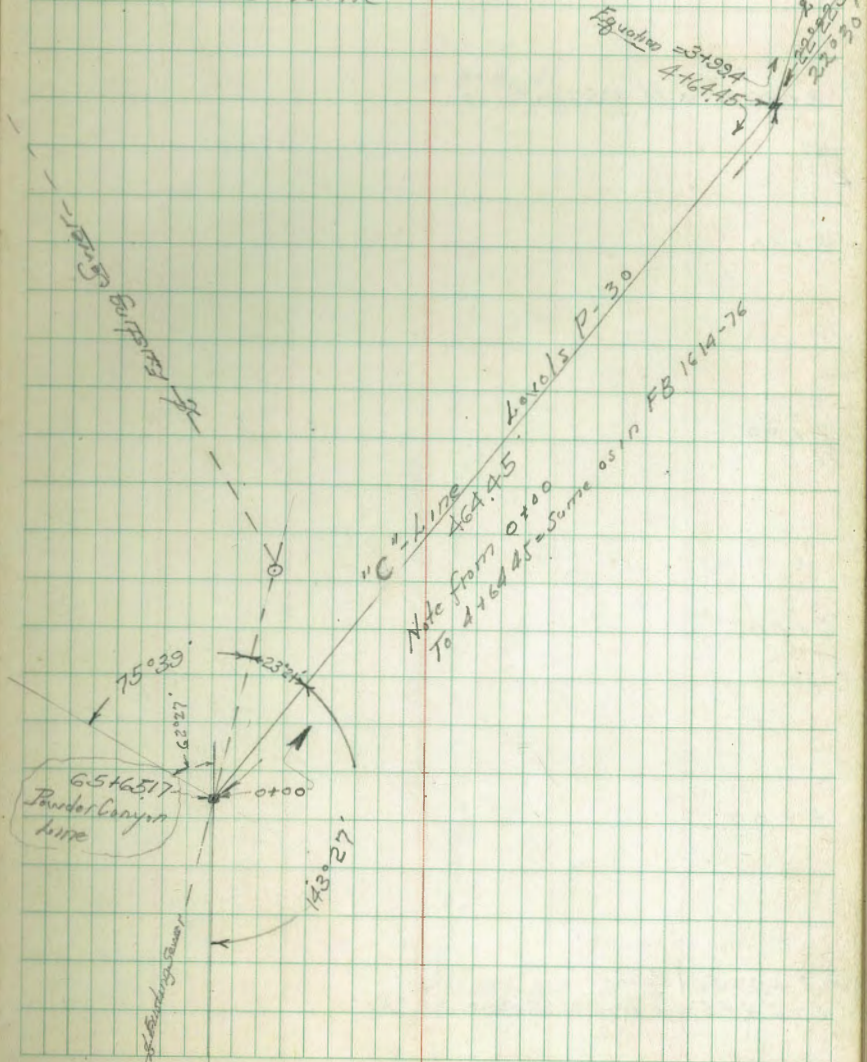
Indexed  
C.S.K.



0+00 = identical point as 65+65.17 of Powder Canyon line

Preliminary location.  
Switzer Canyon Trunk Sewer  
From Powder Canyon line  
To a point north of Redwood St.  
and West of 32nd St.  
"C-Line"

Wulke  
Harden  
Wirt  
12-10-42





Switzer Canyon Line

Cont. from p. 12

"C" Line

9700

8+8641' Alt 8°57'30"

8700

7700

6700

5700

3+9940' Equator  
4+6445' Alt 22°22'30" 22°30"

13

8+8641  
Alt 8°57'30"

Copied from p. 1620-47

22°30"

3+9940' Equator  
4+6445' Alt 22°22'30" 22°30"

843' p. 70  
Raised Line  
Page 70



Switzer Canyon "C" Line

Cont. from P. 13

15 + 4120 = P.O.T. Paving Stake

15 + 00

14 + 00

13 + 00

12 + 00

11 + 6456 = P.O.T. Stake

11 + 00

10 + 00

15 + 4120  
= P.O.T. Paving Stake

"C" Line  
Copied from FB 1620-28

11 + 6456  
P.O.T. Paving Stake



Walker  
Hardin  
Wirt  
12-10-42

Preliminary Location "C" Line  
SWITZER CANYON TRUNK SEWER  
Cont. from P-14

21+11.05 = Δ Lt. 20°35'30" Stake in Roadway

20+00

19+00

18+00

17+00

16+61.48 A B 22°05'

16+00

15+41.20 P.O.T.

15

21+11.05  
Δ Lt. 20°35'30"

"C" Line

16+61.48  
"A B" 22°05'

"C" Line



Switzer Canyon "C" Line  
Cont. from P-15

27+00

26+00

25+01.83  $\Delta H$   $9^{\circ}40'30''$

24+00

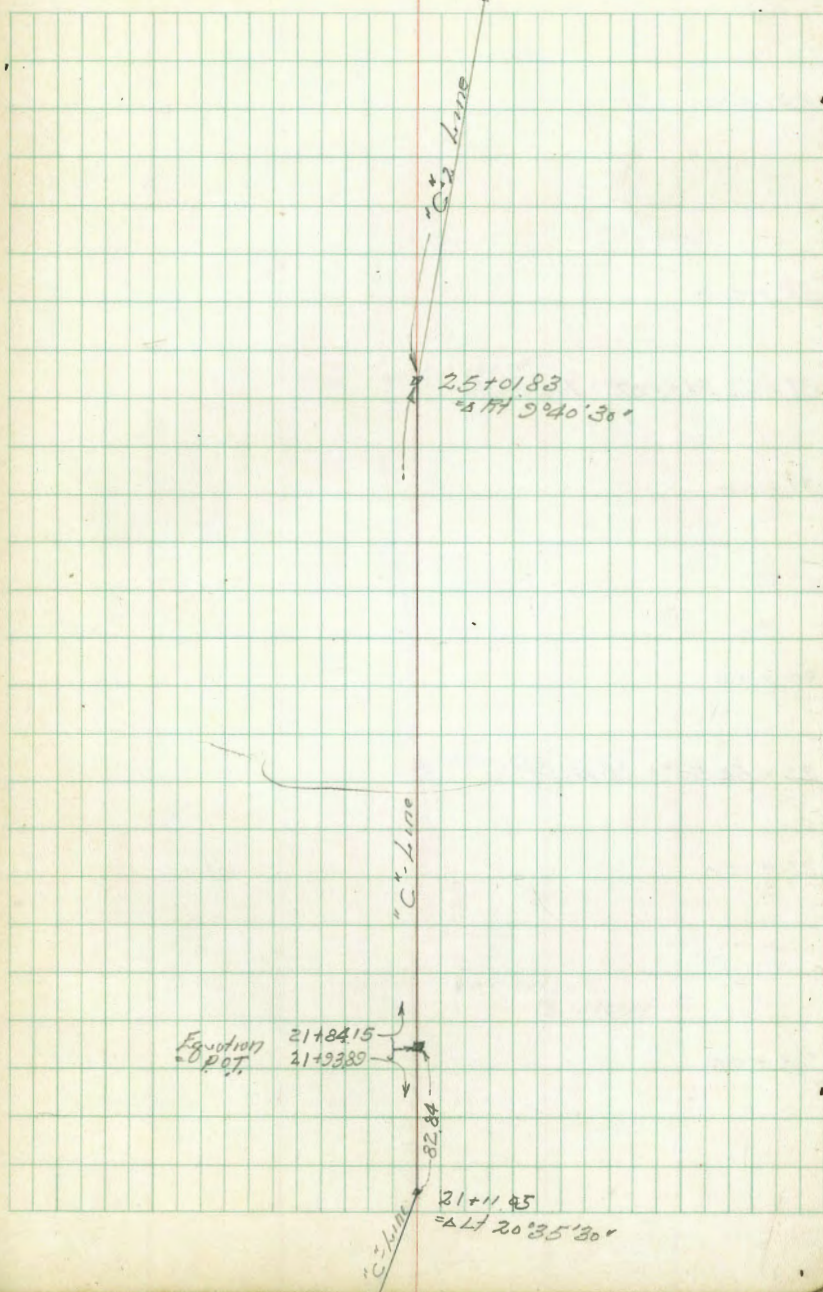
23+00

22+00

$\begin{matrix} 15.65 \\ \uparrow \\ = 21+84.15 \end{matrix}$  Equations  
 $\begin{matrix} \downarrow \\ 21+93.89 \end{matrix}$  P.O.T.

21+11.05  $\Delta H$   $20^{\circ}35'30''$

16





33+00

32+00

31+62.94 = P.O.T. For stake

31+00

30+00

29+56.50  $\Delta$  Lt 4021

29+00

28+00

31+62.94  
= P.O.T.

"C" Line

29+56.50  
 $\Delta$  Lt 40211035  
58.5728+89.26  
FB. 1420-41

"C" Line







Switzer Canyon Sewer  
"C" Line

44+00

43+7451 = P.O.T. = Int. East line Balboa Park

43+00

42+8251 =  $\Delta 2^{\circ}31'45''$  Rt. = Int. Sewer Set Per. Stake

42+7740 = P.O.T. this line Ed. old Per. Stake

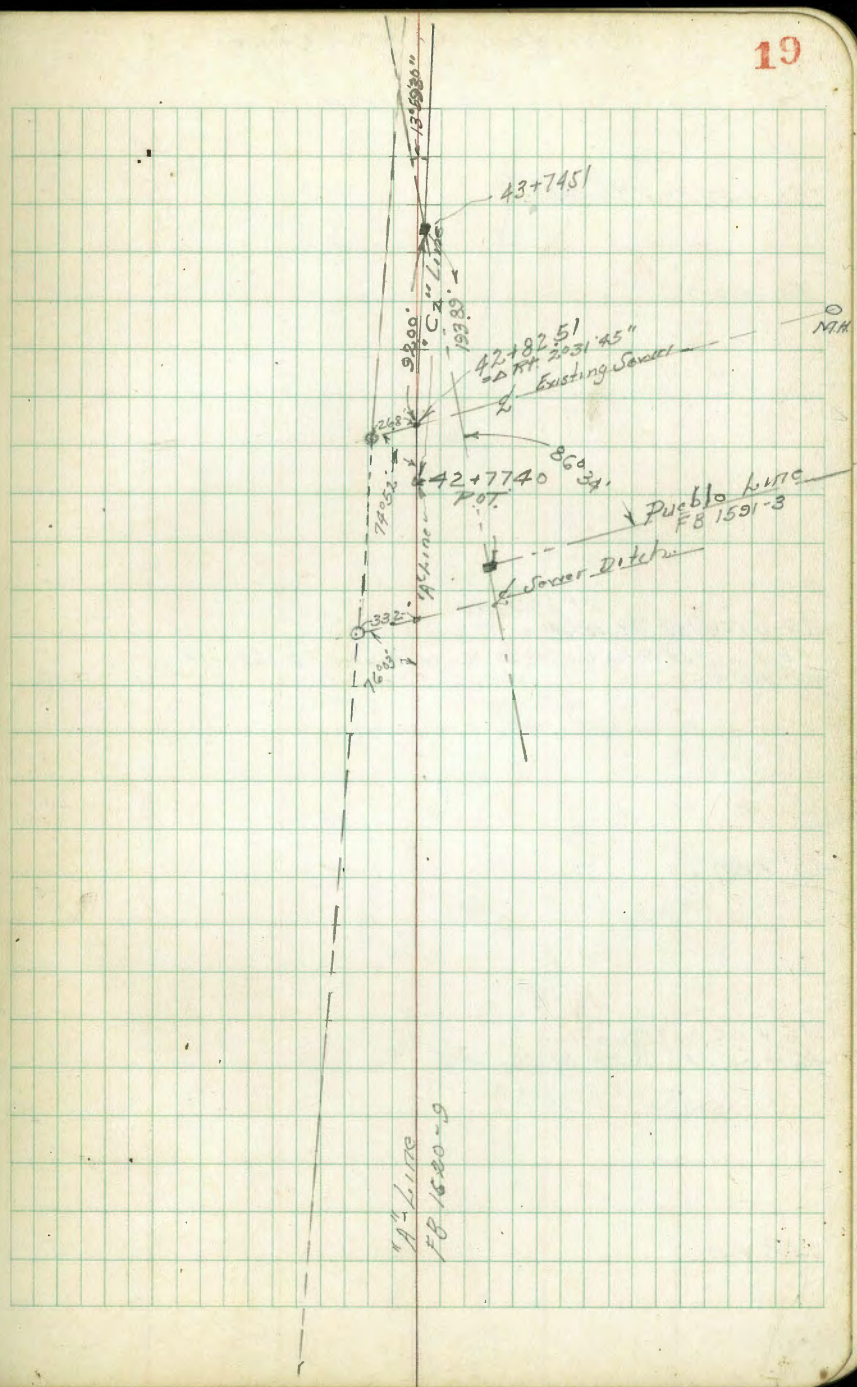
= Int. Existing Sewer Ditch  
42+1038 = P.O.T. set Per. Stake

42+00

41+00

40+00

39+00





Switzer Canyon Sewer  
"C" Line

50+49.63 - P.O.T. Stake

50+00

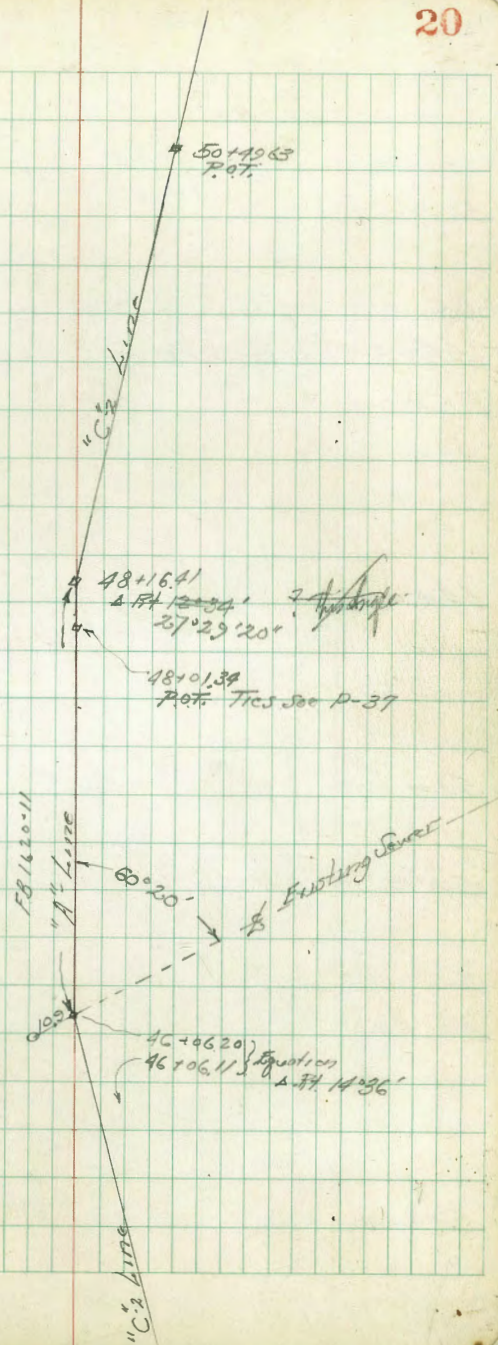
49+00

48+16.41 -  $\Delta$   $27^{\circ}29'20''$   
 $48+01.34$  Int. Line 13' South of  $\Delta$  Stake / FB 1620-11  
 48+00

47+00

46+06.20 } Equations  
 46+06.11 }  $\Delta$   $87^{\circ}14'36''$

45+00





Switzer Canyon Sewer  
 "C" Line

56+00

55+41.3 = opp exist. MH 71' R/L

55+30.69 =  $\Delta$  R/L 18°05'30"

55+00

54+00

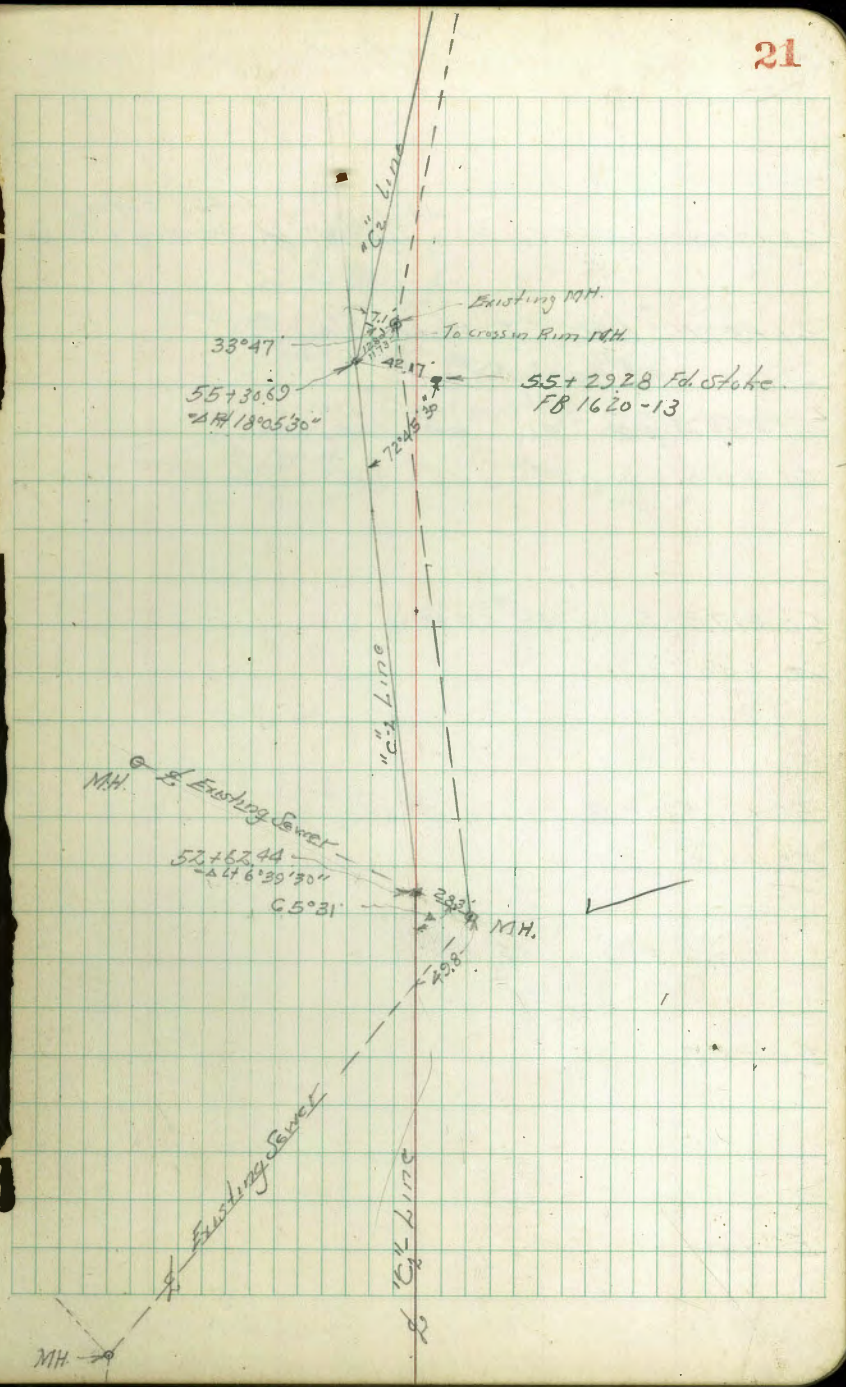
53+00

= Int. Existing Sewer MH = 283' R/L  
 52+62.44 =  $\Delta$  L/H 6°39'30" = Rising Stake

52+08.2 = Int Existing Sewer

52+00

51+00





61+79.8 = opp. S.E. Car Pier, Top = 37' Lt. Pier 6' deep According to Bridge Plans

61+57.16 = E 16" C.I. Water Main

61+33 = Pier 24.2' Lt = E

61+07.74 = Δ Lt. 7' 41"

61+00

60+17.3 = Existing MH. 64' Ht. = E

60+00

59+31.58 = POT. Paving Stake

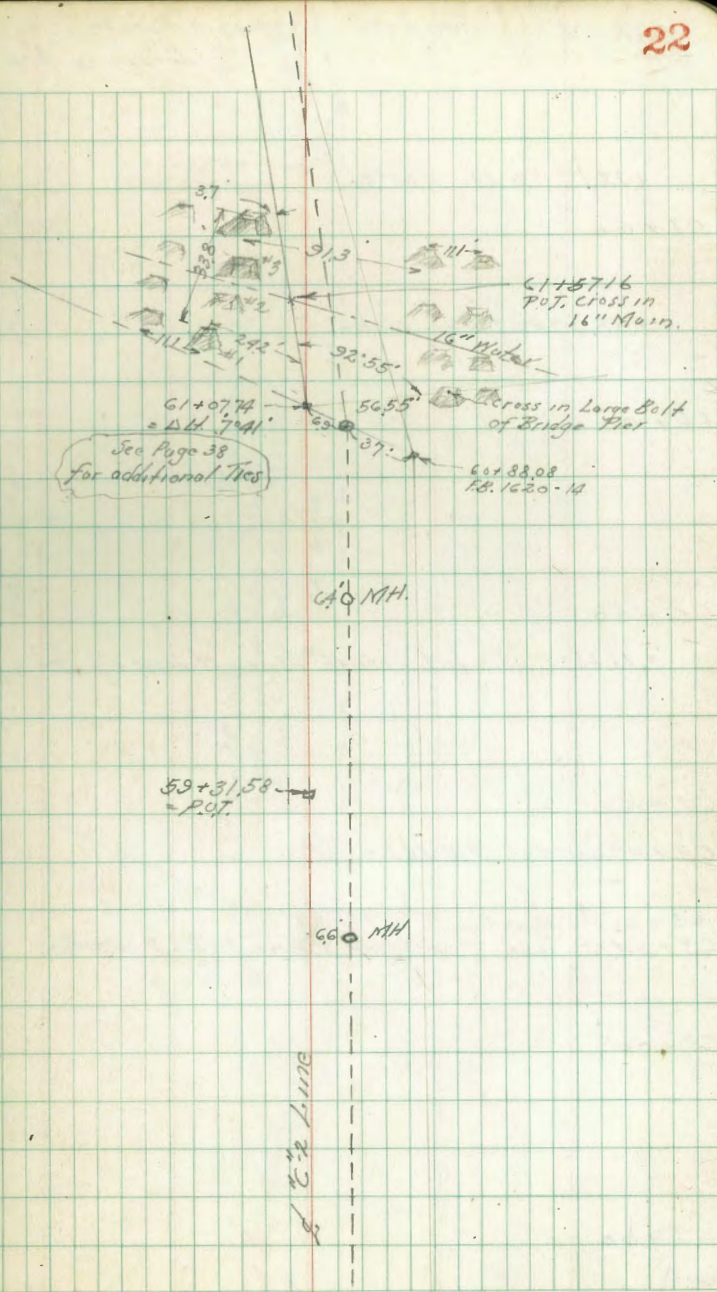
59+00

+A9A = Existing MH. 66' Ht. = E

58+00

57+00

Plans





12-12-42

Switzer Canyon Sewer  
 "C" line & "A" line

+12.10 =  $\Delta$  Lt.  $9^{\circ}14'30''$

67+00

+38.7 = P.O.T. Pav. Stake

66+00

65+00

+75.25 = P.O.T. = Int. North Line Nutmeg St.

64+00

63+89.60 = P.O.T. FB. 1620-15

= 63+60 = Equations  
 63+54.15  $\Delta$  Lt.  $7^{\circ}55'$  = Int. Sewer Ditch.

63+00

62+00

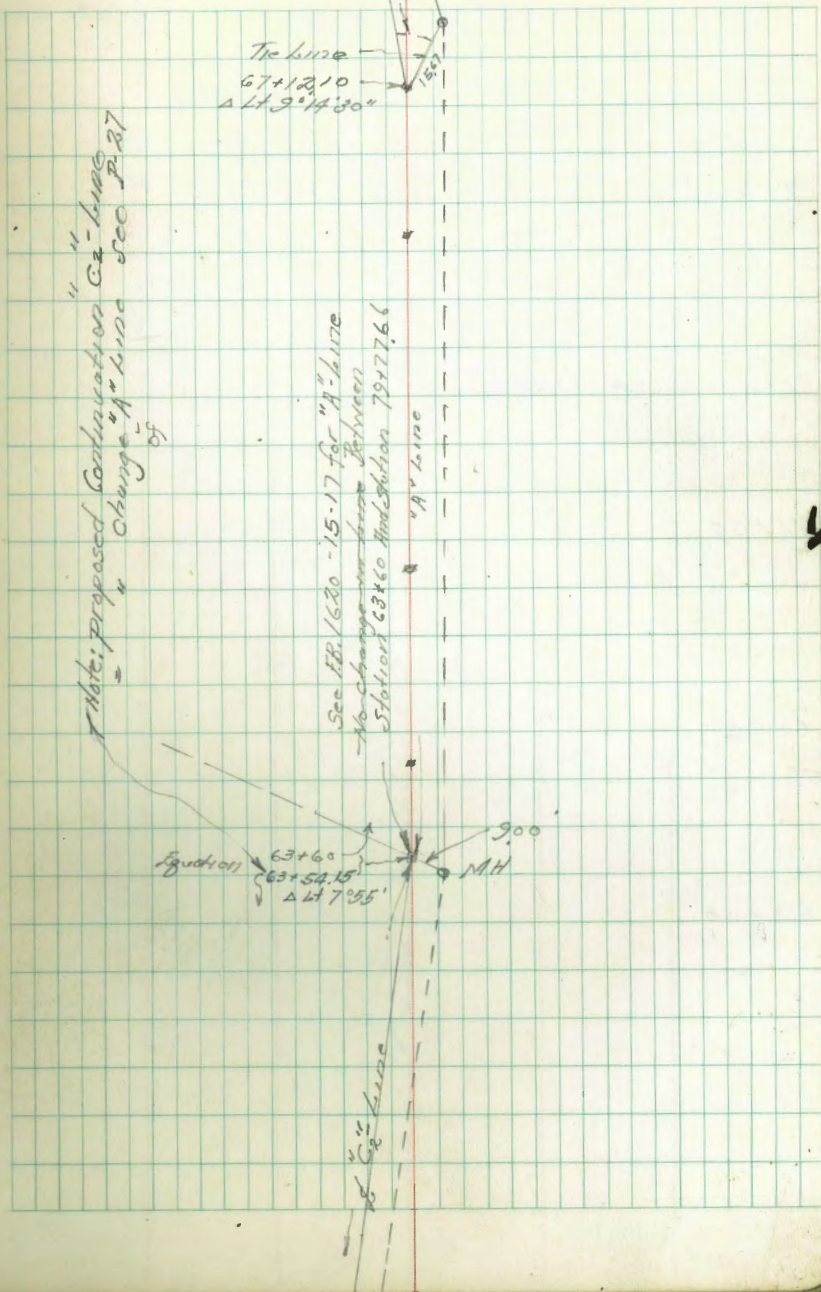
23

Note: Proposed continuation of "C" line  
 & change "A" line sec P. 27  
 of

Sec. 18, 1620-15-17 for "A" line  
 No change in line between  
 Station 63+60 and Station 79+77.66  
 "A" line

The line  
 67+12.10  
 $\Delta$  Lt.  $9^{\circ}14'30''$

Equation  
 63+60  
 63+54.15  
 $\Delta$  Lt.  $7^{\circ}55'$





Switzer Canyon Sewer

"A" - Line Same as in FB  
Cont. from p. 23 1620-15-17

73+00

71+87.12 Alt. 21'44"20"

71+00

70+00

69+00

68+00

"A" - Line  
FB 1620-16

71+87.12  
Alt. 21'44"20"

"A" - Line FB. 1620-15-17



79+83.02 Alt. 48°48'15"

79+77.66 = P.O.T. "C" Line

79+00

78+00

77+00

76+00

75+39.25 Alt. 17°23'

75+00

74+00

"C" Line

79+83.02 Alt 48°48'15"

25

End of "A" Line

79+77.66  
= P.O.T. "C" Line  
See p. 26

75+39.25  
Alt 17°23'

75+39.25  
Alt 17°23'

75+39.25  
Alt 17°23'



Switzer Canyon "C" Line

Trunk Sewer

83+65.62 = ~~End of~~ Existing M.H. = End of "C" Line

83

82

N-Side Redwood St Bridge

81+68 = Opp. Bridge Pier 6.3' H. Pier 11.7' H. Pier

South Side Redwood St Bridge

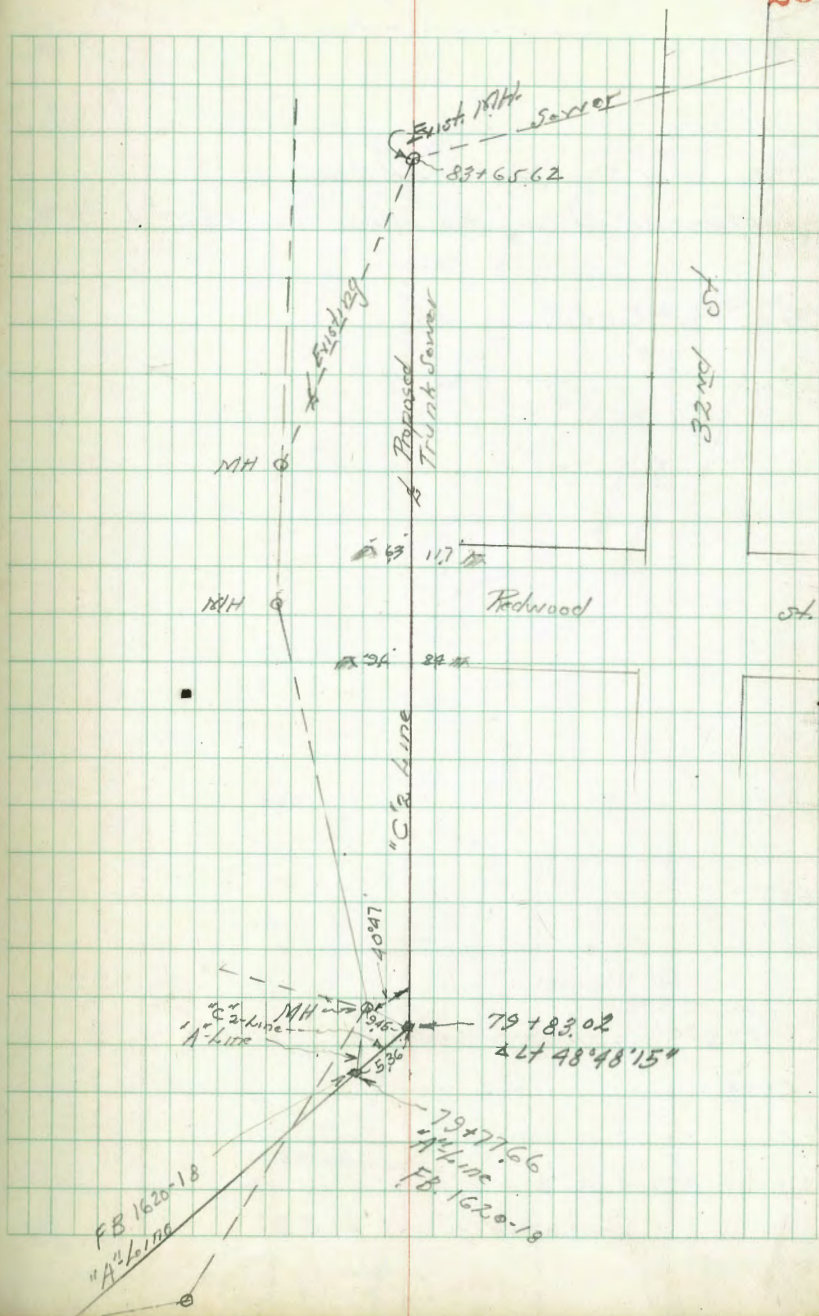
743.5 opp Bridge Pier 26' H. Pier 34' H. Pier

81+00

79+83.02 =  $\Delta$  Lt 48'48"15" Set Rev. Stake

79+77.66 = POT "C" Line = in old "A" line

26









Walker  
 Hyrdin  
 Hazard  
 12-17-42

Switzer Canyon Trunk Sewer  
 Proposed "C" Line  
 = Change of "A" line FB 1620-17  
 from station 75+39.53 to station 79+77.76

72+23.38 = P.O.T.  
 77+00

76+00

75+39.53 = A.R. 22°52'

"A" Line FB 1620-16, 17

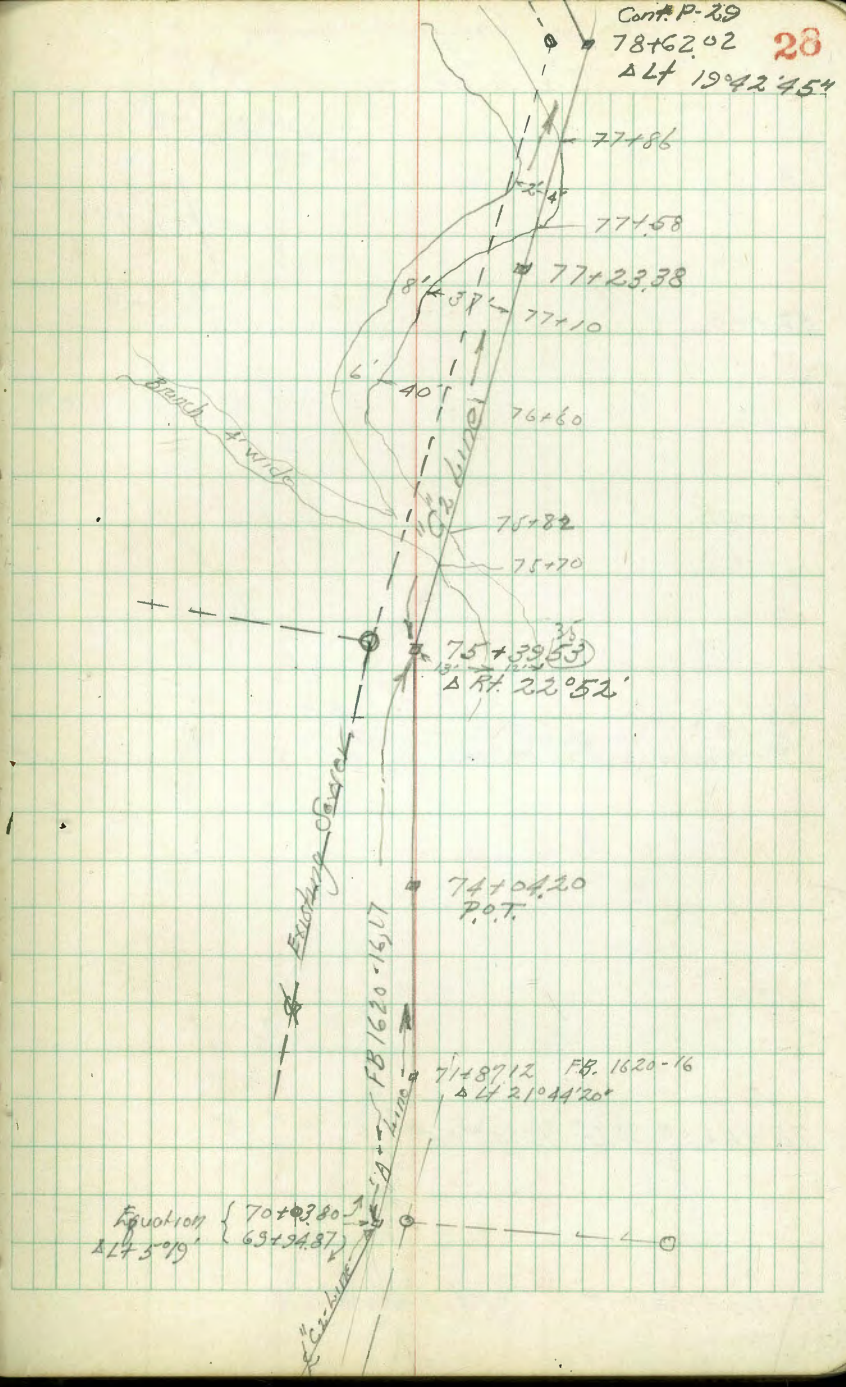
74+04.20 = P.O.T.

71+87.12 = A.H. 21°44'20" of "A" line

70+03.80 } Equation  
 69+94.87 }  $\Delta L 5'09"$

Cont. from p. 27

Cont. P. 29  
 78+62.02 **28**  
 $\Delta L 19'42.45"$



Equation { 70+03.80 }  
 { 69+94.87 }  $\Delta L 5'09"$

71+87.12 FB. 1620-16  
 $\Delta L 21'44.20"$

74+04.20  
 P.O.T.



Switzer Canyon Sewer  
"C" Line

83+00

82+00

81+00

80+00

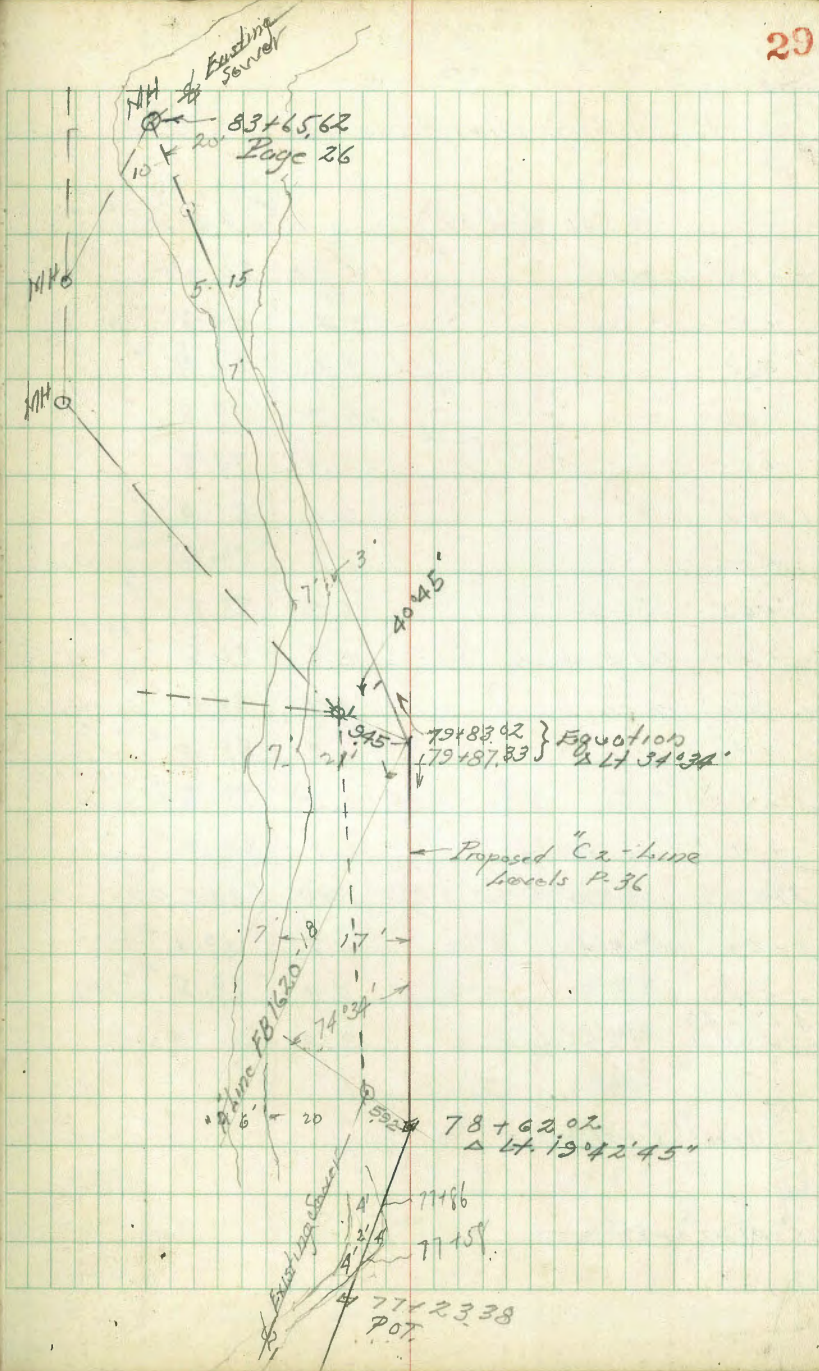
79+83.02 } Equation  
79+87.33 }  $\Delta Lt. 34^{\circ}34'$

79+00

78+62.02  $\Delta Lt. 19^{\circ}42'45''$

77+23.38 = POT. Cont. from P-28

29





Walker  
Hardin  
Wirt  
12-11-42

Switzer Canyon Trunk Sewer  
Profile levels

Alignment see pages 12 to 26 this book

Notes  
9/20

	82.81	(90.08)	(89.81)	BM #45 B.P. on cobbles Lake 1 1/4' W
0+00 on stake	10.02	80.06		
+50	9.4	80.7		
+65	9.2	80.9		
+70	10.3	79.8		
+95	10.3	79.8		
-1+00	9.1	81.0		
+50	6.9	83.2		
+65	6.3	83.8		
+80 - NEY Bank ch.	8.6	81.5	40' H -5' Bank ch 13' W-N, 8'	
2+00 in ch.	8.1	82.0	30' H - S Bk 16' H - S Bk	
+50 " "	6.7	83.4	32' H - N 7' H - S Bk	
3+00 " "	6.5	83.6	35' H - N	
+35 - 10' ch at bank	6.1	84.0		
TP	6.20	(94.85)	143	(88.65)
3+60 on Bank	5.7	89.1		
+700	5.3	89.5		
4+64.45 } Equation = 3+99.4 } 22° 30' H	3.12	(91.73)		

Stone Bridge  
Parishburg & Boulder Canyon FB 1614-17

15+41.20 = P.O.T.

Levels  
FB 1620-4849

21+93.89 = Equation  
21+84.15 = P.O.T.

Levels  
FB 1620-44

12.99

25+01.83 = ALT (144.85)

132.76 Elev. Stake  
FB 1620-44

+25	15.4	129.4	
+50	15.0	129.8	
26+00	13.5	131.3	
+30	13.2	132.6	
27+00	11.1	133.7	
+35	9.7	135.1	
+65	7.4	137.4	
28+00	4.5	140.3	

Cont. p. 31











(20270)

56+35 = Bank ch	7.8	194.9
57+00	6.5	196.2
+20	5.3	197.4
+25	6.3	196.4
750	5.2	197.5
58+00	4.2	198.5
+50	1.8	200.9
+70	1.8	200.9
T.P. 10.01	0.10	202.60
59+00	7.6	205.0
+50	4.6	208.0
+80	4.8	207.8
60+00	6.7	205.9
+17	8.7	203.9
+30	7.7	204.9
+50	7.4	205.2
61+07.74 = Alt. 7'41"	6.48	206.13
chk. 60+88.08 "A" line	7.73	204.89
		204.85 = FB. 1620-30
		0.03

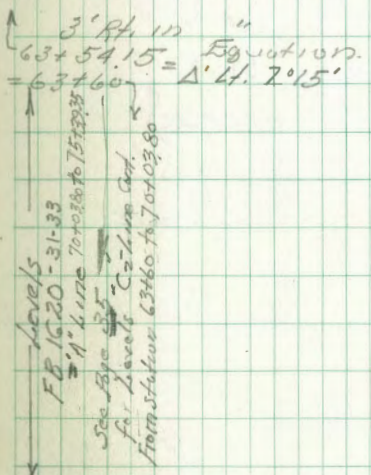
8.83 (213.68)

61+10 = Bank ch	7.8	205.9
+15 in ch.	10.5	203.2
61+38 in "	10	203.7
24.2 ft. on Pier #1	3.43	210.25
" Pier #2	3.43	210.25
" " #3	6.44	207.24
" " #4	6.44	207.24

Above Hub.

(213.68) Switzer Sewer 33

61+57.16 POT Cross	9.90	203.78	16" CI Water Main
62+00 in channel	10.0	203.7	9' wide
+40 " "	9.0	204.7	
+60 = N edge "	8.8	204.9	9' wide
+65 on Bank "	6.0	207.7	
63+00	4.0	209.7	
+15	2.8	210.9	
+45	10.4	214.1	
2' Ht = Bank ch	70.1	213.8	
3' Ht in "	7.2	206.5	
63+54.15 = 63+60 = 6' Ht. 2'15"	0.6	213.1	



79+77.66 POT "C2" line = A in "A" line	9.56	267.46	FB. 1620-17
79+83.02 = Alt. 48'48"15"	8.99	258.87	Flow stake 79+77.66 FB. 1620-33
80+00	9.9	257.6	
+60	8.1	259.4	
+61 in channel	10.3	257.2	

Cont. P. 34



		267.46	
81+00		8.0	259.5 ✓
+435		7.4	260.1 ✓
8.3' RT on Pier		4.12	263.34 ✓
9.6' LA " "		4.63	262.83 ✓
81+68		6.7	260.8 ✓
11.5' RA " "		2.13	265.33 ✓
6.3' LA " "		4.63	262.83 ✓
81+78	in channel	6.1	261.4 ✓
+79	" "	4.5	263.0 ✓
82+00	" "	3.3	264.2 ✓
83+00	" "	0.2	267.3 ✓
TP	4.71	2.00	270.17 ✓
83+65.62	to Eustory MH	0.77	269.40 ✓
Rim MH F.B. 1620-34			= 269.39
			0.01 diff

Completed 12-11-42



Walker  
Harris  
Wirt  
12-16-42

Levels for Ground Profile  
Switzer Canyon Lower  
C2 Line

See Proposed Location p. 27, 28

9.59 <223.99> (214.40) Elev. POT. Stake  
6348960  
TR. 162-31

48+16.01

Levels  
Page 32, 33  
This Book

63+54.15 = 4 1/2" 12' 19'

64+00 9.1 214.9

+31 (64+31) 8.0 216.0

5' Lt = 3" Peach Tree

(64+42.5) 2.7' Rt 1 1/2" Peach Tree

64+50 7.6 216.4

(64+50) 6.9' Lt = 3 1/2" Peach

1" Left  
64+59 = 2" Apricot

+67 3.4' Lt = 2" Apricot

+69 = 27' Rt = 3" Fig Tree

+77 = 2' Fig Tree 2.5' Lt 4" dia.

+84 = 10.2' Lt = 1" Fig Tree " " "

+86 = 6.8' Rt = " " " 3" "

+94 2.6' Lt " " " 3"

65+00 5.9 218.1

11.8' Lt = 6" Fig Tree

<223.99>

65+11 4.3' Lt = 5" Fig Tree

+14 11.9' Lt 5" " "

+19 12.7' Lt 4" " "

+31 10.6' Rt 3" " "

+40 1.2' Rt 4" " "

65+50 4.2 219.8

66+00 3.1 221.9

+04 = 3" Apricot 44' Rt.

TR. 11.33 <223.516> 0.16 <223.83>

66+50 10.4 224.8

+57 11.5 223.7

+62 16.0 219.2

67+00 = 14' Bank Ch. 15.0 220.2

+13 = 11' edge " 18.4 216.8

+50 in ch. 17.7 217.5

68+00 " " 15.0 220.2

+48 = 5 1/2' edge ch 14.4 220.8

+53 = Top Bank. 4.6 230.6

68+65.04 = POT. Stake 2.41 232.75

7' Rt. on Edge Bank. 4.6 230.6

10' Rt. = 11" ch. 14.5 220.7

69+00 4.4 230.8

4' Rt. Bank 4.7 230.5

69+19 = " 5.0 230.2

+21 10.5 224.7



235.16 C<sub>2</sub> Line

69+50	94	225.8 ✓
69+2487-Alt = 70+03.86 } Equation.	8.26	226.90 ✓
chk Rim MH 6.03' Rt	7.66	227.50 ✓
F.B. 1620-31 =	227.45	0.05 diff.
Levels C <sub>2</sub> -line location P-28, 29		
12.24		Blk. stake FB 1620-32
75+39.35 = Δ 22° 52' Rt	256.00	243.76
+68 - Bank channel	12.0	
+70 in channel	13.2	
+82 " "	13.9	
+83 on Bank.	11.8	
76+00	11.0	
+35	10.3	
+55	5.4	
77+00	3.4	
+25	3.4	
+38 - W Bank	5.4	
+58 in channel.	6.5	
+86 " "	5.9	
78+00 = E Bank	4.4	

Levels  
 F.B. 1620-31, 32  
 C<sub>2</sub> Line

256.00 36

78+35	7.91	263.04	3.9
78+62.02 = Δ Lt 19° 42' 45"			0.87 255.13 on stake.
79+00			6.9
+50			5.4
79+87.33 } Equations 79+87.02 } 11 & 14 34° 34'			4.51 258.53 on stake
			258.47 Page 33 0.06 diff
chk. Rim M.H.	5.34	257.70	257.68 P-33 0.02 Error

For levels  
 from station  
 70  
 see Pages 33, 34

83+65.62

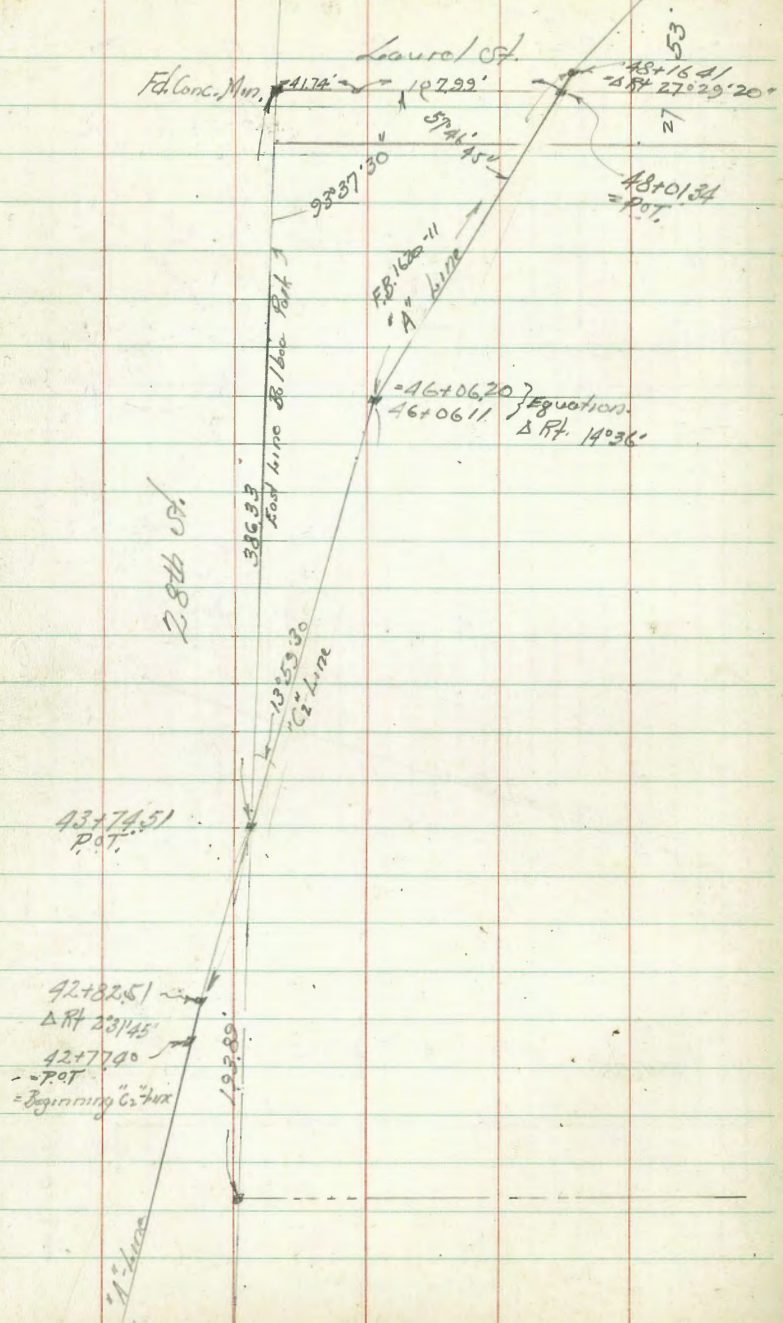














Walker  
Osborn  
Haugard  
3-19-43

POWDER CANYON SEWER  
Proposed Change in Alignment  
Between Upas St. Extension and Myrtle St.

Levels P. 43

$$136+71.85 = \Delta L 34^{\circ}45'$$

$$136+00$$

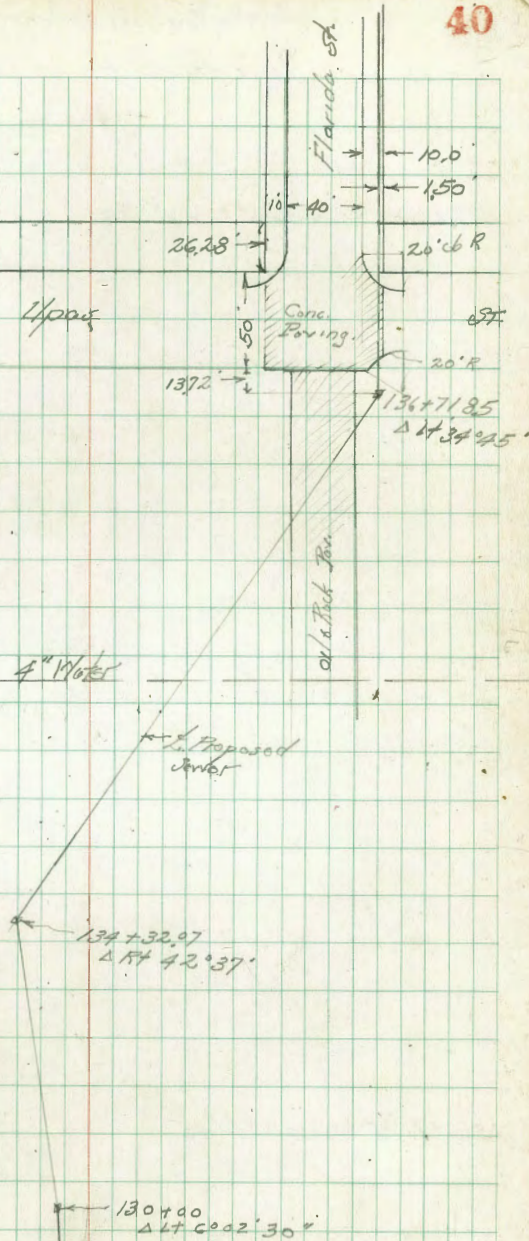
+57' = lat 4" Water Line

$$135+00$$

$$134+32.07 = \Delta L 42^{\circ}37'$$

$$130+00 = \Delta L 6^{\circ}02'30''$$

40







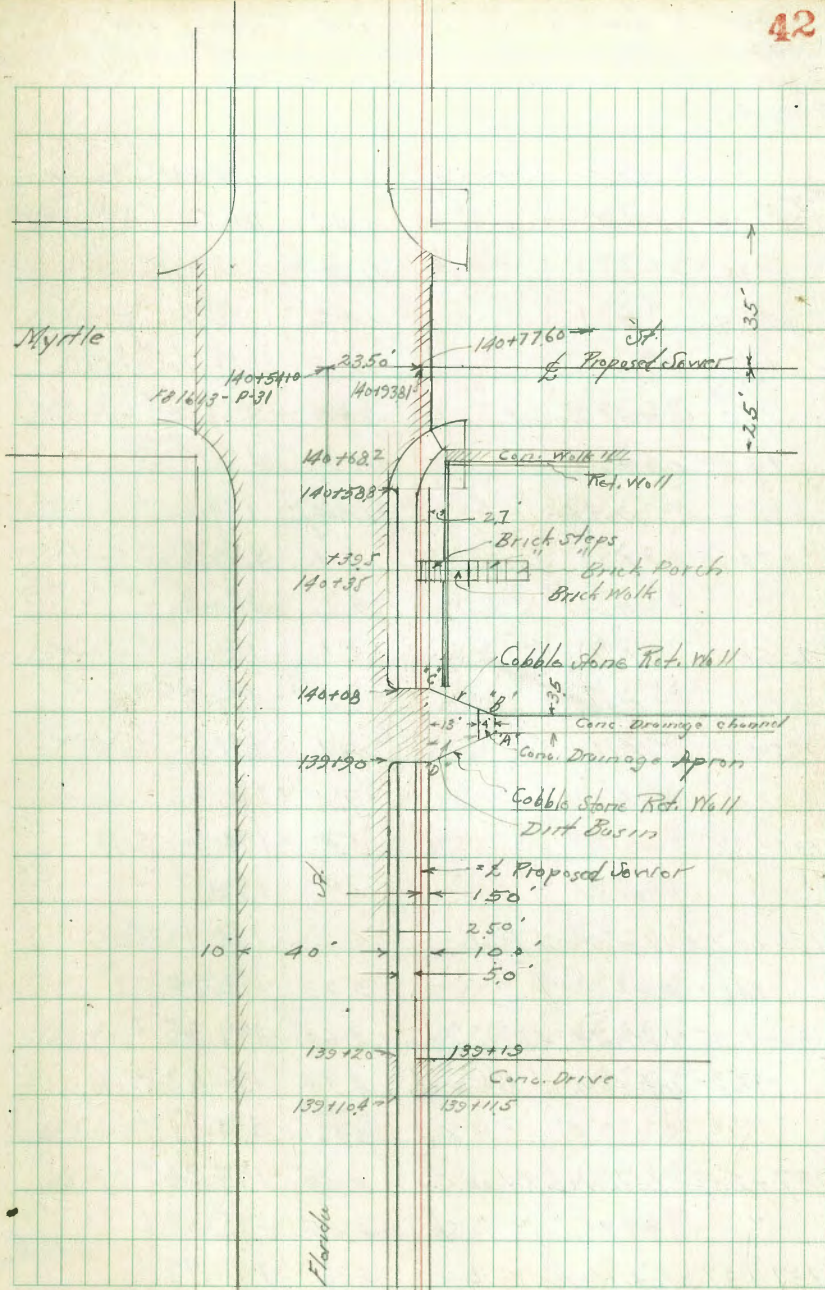


Proposed Change Pavider Canyon Sewer

Cont. from P-41

140+77.68 of A Line FB 1613-P31-P-41  
 140+93.81 = Equation ΔSt. 30°04

2.7' Back of line of Florida St. Topped  
 140+08.9 Beginning Conc Ret. Wall 8" wide With one layer of brick  
 140+08 - N of Drainage Channel  
 139+90 = South of Drainage Channel





Walker  
Osborne  
Hazard  
3-20-43

Levels for Proposed Change in  
Alignment: Powder Canyon Section  
Location R 40, T 42.

Page 9	5.05	(199.93)	194.88	NE B.P. Florida Cypress P. 10 Redevelop Special
134+32.0 = 1st 42.37'	11.41	188.53	✓	
+34	11.3	188.6	✓	
+36	12.3	187.6	✓	
+39	12.3	187.6	✓	
+50 on Nat'l Ground	10.4	189.5	✓	
+63 on Fill	8.0	191.9	✓	
+63 " Nat Ground	10.4	189.5	✓	
+74 on Fill	7.1	192.8	✓	
" " Nat	9.1	190.8	✓	
135+00 " Fill	7.1	192.8	✓	
" " Nat	9.1	190.8	✓	
135+50 " Fill	8.1	191.8	✓	
" " Nat	9.1	190.8	✓	
135+82 " Fill	5.4	194.5	✓	
" " Nat	7.4	192.5	✓	
136+02 = Wedge on Road	5.20	194.73	✓	
+46 = F. " " "	5.23	194.70	✓	
136+71.85 = 1st 34°45'	2.68	197.25	✓	
+92.3 = Int. South of Ret. on cb.	4.30	195.63	✓	
" " " " " " Gut.	5.16	194.77	✓	
137+20.2 = Int. N. cb. Ret. on Gut	5.59	194.34	✓	
" " " " " " Sp.	4.85	195.08	✓	
137+37 = Int. Wedge Walk	4.96	194.97	✓	Pl. cb Return

(199.93)

43

137+50	4.7	195.2	✓	
1' Lt. on Walk	4.99	194.94	✓	
138+00	4.3	195.6	✓	
1' Lt. on Walk	4.49	195.46	✓	
138+50	3.8	196.1	✓	
1' Lt. on "	4.02	195.91	✓	
138+76.5 = 2.5' Conc. Walk	3.56	196.37	✓	
+93.7 = Conc. Walk (25' wide)	3.4	196.5	✓	
TP 6.87	(201.75)	5.05	(194.88)	NE B.P. Florida Cypress
139+19 on Conc Drive	4.95	196.80	✓	
" " Side Walk 15' Lt.	5.22	196.53	✓	
139+90 = Sub. Drainage Channel	4.50	197.25	✓	on cb
" " " " "	4.96	196.79	✓	" Gut
3' Rt. on Top cobble Wall	3.16	198.59	✓	at 3'
on Wall of "A"	1.71	200.04	✓	
" Floor " "A"	4.26	197.49	✓	
" " " "B"	4.26	197.49	✓	
" Wall " "B"	1.62	200.13	✓	
" " " "C"	3.11	198.64	✓	
140+08 = N Gut. Channel	4.78	196.97	✓	
" on N cb	4.28	197.47	✓	
140+08.2 (4.2' Rt. on Wall)	1.63	200.12	✓	Conc.
140+35 on Brick Steps	3.96	197.79	✓	
" 5.2' Rt. on Brick Landing	1.06	200.69	✓	



20175

Paradise Canyon Sander's  
Cont. from p. 43

140+68.2=Int. Conc. Walk.	3.28	198.47	✓
4.2' Rt. on Conc. Ret Wall	1.52	200.23	✓
140+75=Int. South cb Ret.	3.08	198.67	on cb.
" " " "	3.75	198.00	on Guts.
140+93.81 = Δ Rt 90° 04'	2.44	198.31	✓
= 140+77.67 = Equator	4.34	197.41	✓
chk. on 140+54.10		197.40 = 18164-36	
		0.01	

44

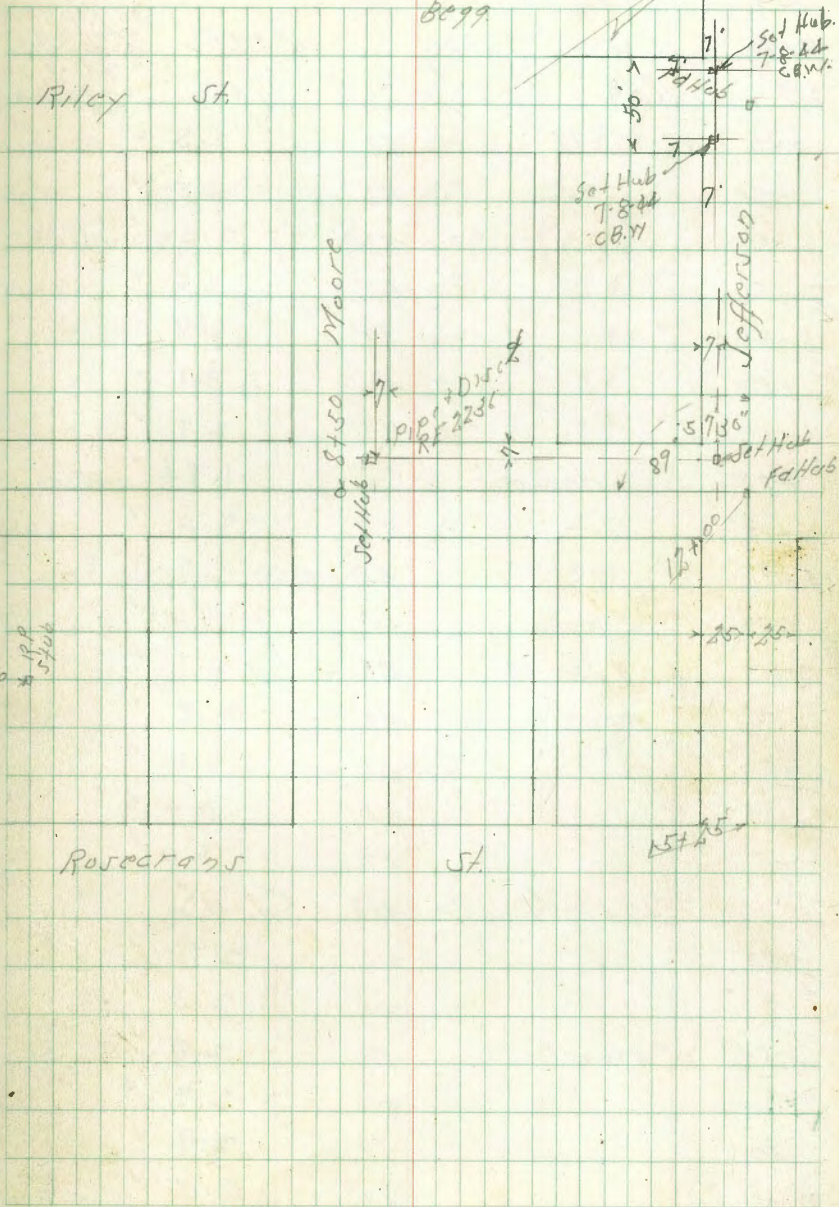
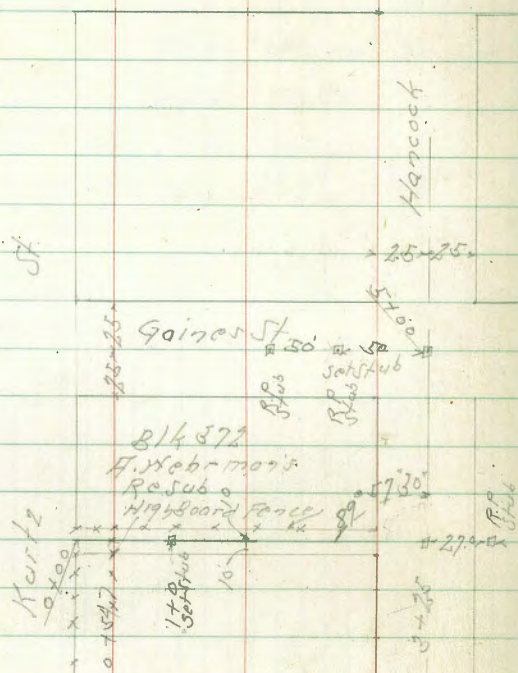


Proposed Sewer Alley @ 4372 A Hebrman's Place  
Hancock-Gaines + Jefferson St.  
Levels Next Page.

Indexed  
C.S.K.

June 11-43  
Sisson  
81.55  
8099

45





Sketch Page 45

BM	5.13	$\langle 9.63 \rangle$	$\langle 4.50 \rangle$	SE Top RR Rd Hancock 9-20-04 1890.6
TP	607	$\langle 7.72 \rangle$	$\langle 1.65 \rangle$	028 Stub 5.18
0+0	NK Kurtz	5.2	2.5	
+50		5.2	2.5	
+100		5.20	2.52	028 Stub
+150		5.2	2.5	
2+0		4.9	2.8	
+50		4.6	3.1	
3+0		5.0	2.7	
+25	A = $\frac{1}{2}$ Hancock	5.88	1.84	028 Stub
+50		5.7	2.0	
4+0		5.8	1.9	
+50		6.1	1.6	
5+0	A = $\frac{1}{2}$ Quincy	5.6	2.1	
+50		4.9	2.8	
6+0		4.9	2.8	
+50		4.3	3.4	
7+0		4.7	3.0	
TP	474	$\langle 7.78 \rangle$	$\langle 3.04 \rangle$	
+50		5.1	2.7	
8+0		5.5	2.3	
+50	= $\frac{1}{2}$ Moorh.	5.0	2.8	
9+0		5.1	2.7	
+50		4.9	2.9	
10+0		4.8	3.0	

			$\langle 7.78 \rangle$	
10+50		5.2	2.6	
11+0		4.9	2.9	
+50		4.9	2.9	
12+0	A = $\frac{1}{2}$ Jefferson	4.4	3.4	
TP	597	$\langle 8.66 \rangle$	$\langle 2.69 \rangle$	028 Stub 12+0
+50		5.0	3.4	
13+0		4.9	3.8	
+50		4.9	3.8	
14+0		4.8	3.9	
+50		4.7	4.0	
15+0		4.7	4.0	
+25	NK Rosecrans	4.8	3.9	
TP	346	$\langle 10.40 \rangle$	$\langle 6.94 \rangle$	
BM		5.85	$\langle 4.53 \rangle$	SE Top RR Rd San Diego Hill + Rosecrans 1892



Cross Section 916 St. Front  
Johnson Ave 260' North

BM	0.83	283.27			
TP	5.52	277.46	11.83	271.94	282.44

0+10 = H Cb of Job 2502

H Top Cb		4.95	272.51
H Gutter		5.45	272.01
$\frac{1}{2}$		5.72	271.74
F Gutter		5.88	271.58
F Top Cb		5.87	272.09

0+0 = H L Johnson Ave

F		4.6	272.9
Cb Top		5.47	271.99
Gutter + 1/2" 12" Conc Pipe		6.54	270.92
$\frac{1}{4}$		5.77	271.69
$\frac{1}{2}$		5.53	271.93
$\frac{1}{4}$		5.45	272.01
Gutter		5.52	271.94
Cb Top		4.94	272.52
H		4.7	272.8

0+13 = Sly Hedge

H = 2 12" Hedge

0+50 = Sly 7' Conc Drive on H

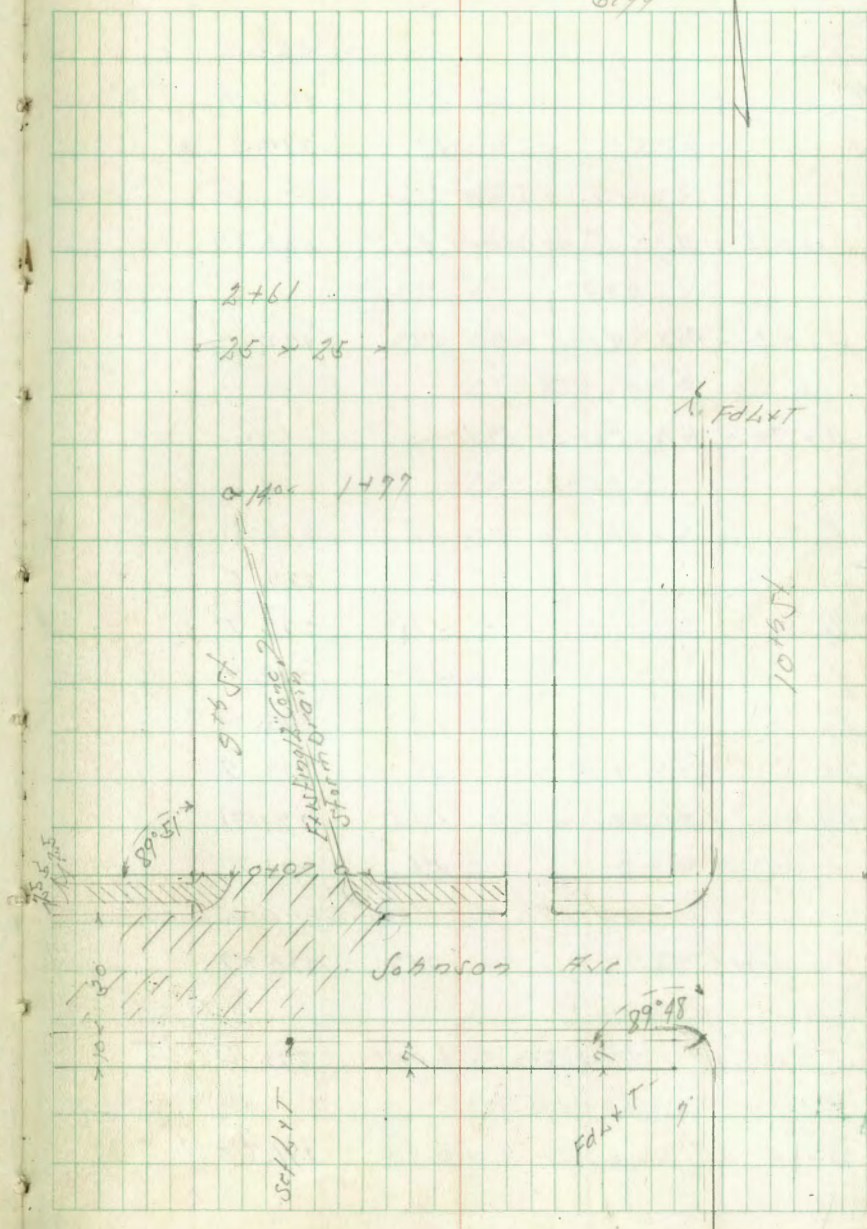
H = 2 x 12" Hedge		4.23	273.23
+0.8 = Fly 7' Conc Drive		4.23	273.23
Cb		4.6	272.9
$\frac{1}{4}$		4.5	273.0
$\frac{1}{2}$		4.3	273.2

NOX BP  
Job 2502 +  
916 St.  
= 282.44

50' x 10' dc  
10' Cb  
7.5' QH  
Mixed  
c.s.k.

July 7, 1943  
J. S. 507  
81.55  
8899

47





277.46

1/4	4.3	273.2
cb	41	273.7
F	32	274.3

0+57 - Sly Conc Wall

H+0.4 = Sly Conc Wall 4.22 273.24

0+91

H+0.4 = Hly Conc Wall 5.00 272.46

0+91.5

H+9.0 = Hly Parer Pole

1+02

F 1.2 276.3

cb 27 274.8

1/4 31 273.9

1/4 41 273.4

1/4 43 273.2

cb 48 272.7

+9.5 = Fy 8" Flag Stone Dr. 2 5.55 271.91

H 5.6 271.9

1+12.5 = 2 2" Ribbed<sup>24"</sup> Conc Dr. NE of F

F - Hly Conc Dr. 0.57 276.89

1+22

F - 0.5 = 1/2 + Hly 2" Conc Wall 4 0.90 272.14

1+47

H+0.5 = Fly Conc Wall 5.78 271.68

48

277.46

1+50

-20 8.5 269.0

21 58 271.7

+5 48 272.7

cb 45 273.0

1/4 41 273.4

1/4 40 273.5

1/4 35 274.0

+5 18 275.7

cb 14 276.1

F 0.6 276.9

1+75

F 39 273.6

cb 48 272.2

1/4 52 272.3

1/4 57 271.8

1/4 61 271.4

cb 71 270.4

7 87 268.8

+5 102 267.3

+20 131 264.4

1+97 = Hly 12" Conc Pipe

14' Wall 2" Flag Stone 826 269.20 ✓



277.46

2+0

-20	16.4	261.1
11	12.8	264.2
06	12.3	265.2
+5	8.1	269.1
1/4	8.1	269.1
1/2	7.5	270.0
3/4	6.9	270.6
06	7.0	270.5
F	5.9	271.6

2+18

Top of Existing MH 773 269.73

2+20

F	7.8	269.7
06	8.1	269.4
1/4	8.2	269.3
1/2	8.4	269.1
3/4	14.0	263.5
06	16.4	261.1
11 = 18" Fac. TICC	18.3	259.2
+12	21.6	255.9
+20	26.0	251.5
TP 0.40	258.46	19.40 258.06

2+44

1/2 5.1 258.1

258.46

2+61

12.8 245.71

Sta 2+15 + HI - Elev BM

272.28 255

269.73 MH

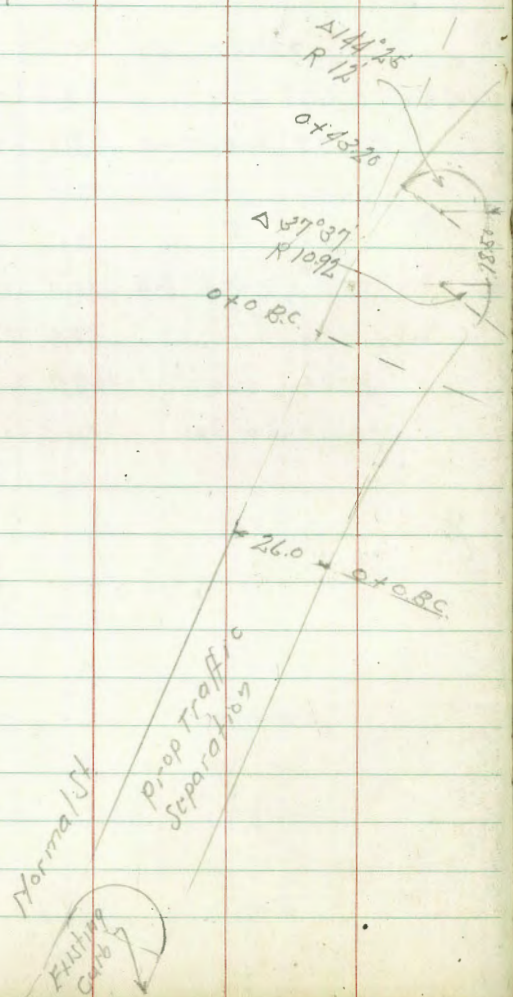
20' End 2+15	2.8	269.5
2+33 Break Top	3.6	268.7
2+38 " " Bot	5.9	266.4
2+52	9.6	262.7
2+60 Break Top	10.5	261.8
2+70	16.0	256.3
2+80	23.0	249.3

Same slope this is far enough

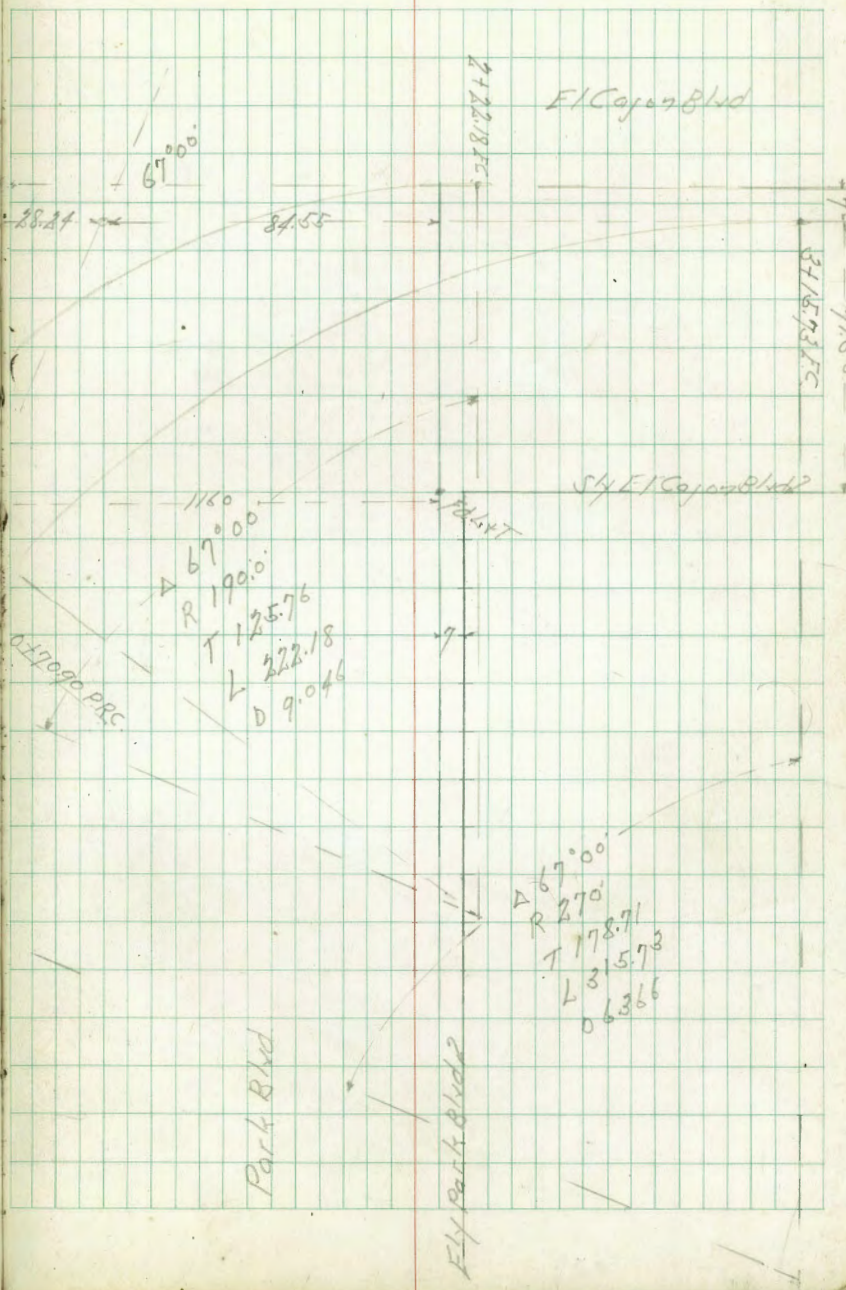


Proposed Traffic Separation  
 El Cajon Blvd - Park Blvd & Normal St

July 15, 42  
 Sisson  
 8/1/41  
 Sisson



Indexed  
 c.s.k.





Cross Section Carley St.  
Arroyo Drive to North of Nutmeg  
Levels next Page

Sept. 18-43

515307

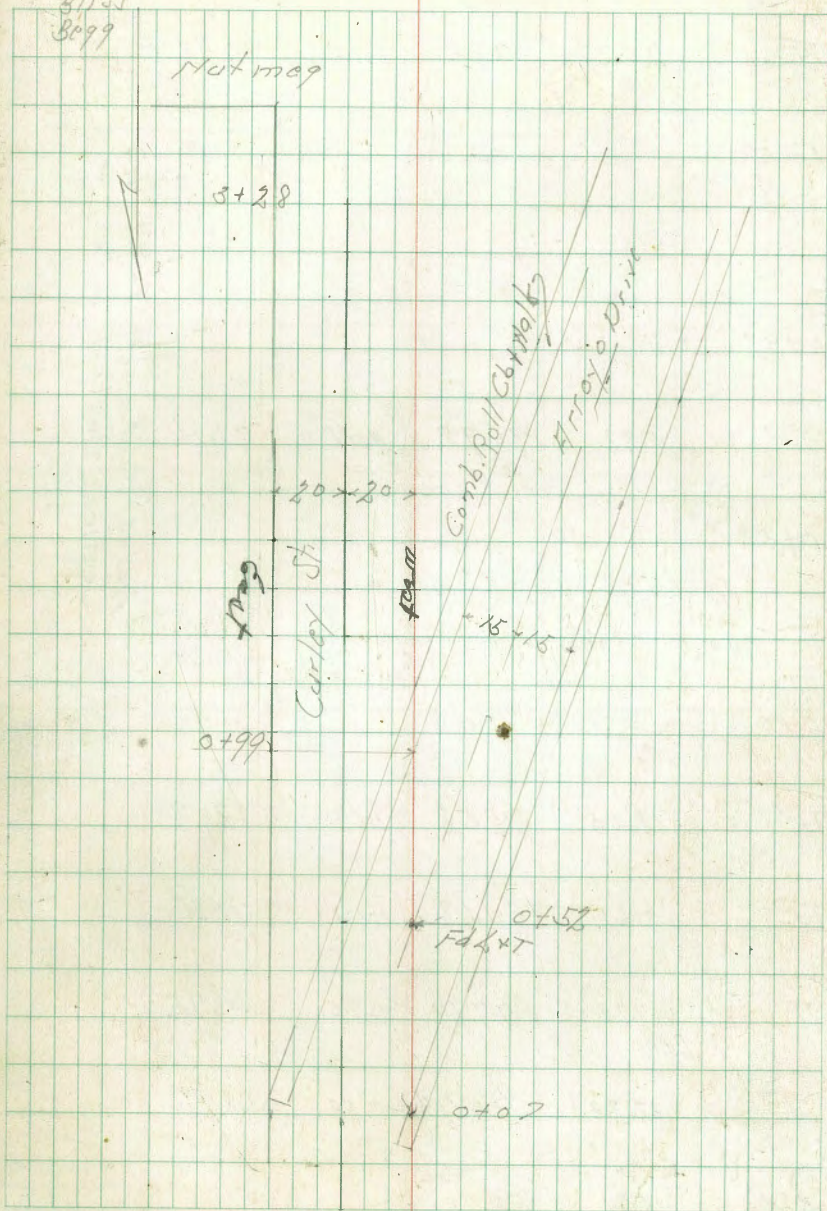
81155

8099

indexed

C.S.K.

51









2+28

2+25

TP 12.42 109.88 0.39 97.46

2+06

2+0

2+90

2+50

2+0

97.85

L = E

PX = W

12.42	116.9	110.2							
103.8	121.9	116.7	109.9	105.4					
87.4	85.5	95.2	94.2	105.8	93.7	93.9			
84.4	83.8	92.3	94.4	92.7	94.5	95.6	88.9		
84.4	83.7	87.9	92.3	91.3	91.5	93.8	93.2		
89.1	89.1	89.1	89.2	89.1	90.8	91.8	82.4	82.1	
90.6	90.2	90.9	89.8	86.1	82.5	81.9			

97.85



Encanto Park Location of 81dg + Trees

Index  
C.S.K.

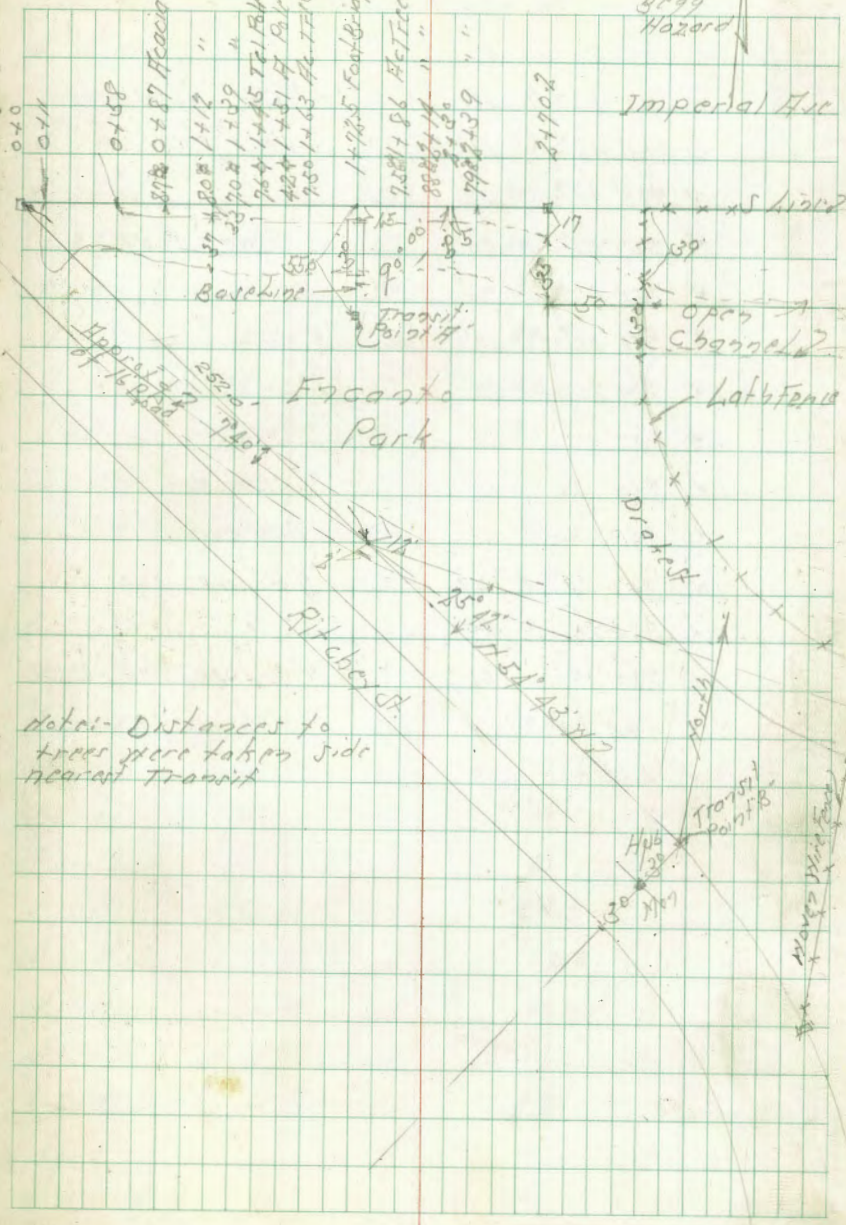
See 1594-1

Oct 9 48  
Sisson  
8115  
8199  
Hazard

Transit at A" Angles turned Clockwise From Base Line

Angle	Distance	Notes
✓ 43° 48'	230	10" Pepper Tree
✓ 74° 20'	45.0	8" " "
✓ 86° 57'	68.0	5" " "
✓ 88° 09'	100	20" Eucalyptus Tree
✓ 95° 28'	92	3" Pepper
✓ 105° 18'	105	Do. 30" Euc "
✓ 99° 34'	138	22" Euc
✓ 109° 35'	152	22" Euc
✓ 117° 33'	172	22" Euc
✓ 119° 00'	119	25" Euc
✓ 115° 15'	86	3/4 Faucet
✓ 126° 45'	197	30" Euc
✓ 129° 06'	158	20" Do. Euc
✓ 131° 00'	94	Floodlight Pole
✓ 141° 58'	119	30" Euc
✓ 141° 03'	151	NY Car Fire Place Concrete
✓ 139° 52'	155	NY " 28" x 45" x 6" FH
✓ 143° 20'	157	Light Pole
✓ 136° 00'	210	12" Euc Tree
✓ 149° 50'	125	32" " "
✓ 144° 10'	146	3/4 Faucet
✓ 151° 48'	142	21" Euc Tree
✓ 156° 15'	171	24" Euc
✓ 170° 43'	90	7" Euc
✓ 154° 21'	39	3/4 Faucet

Cont



Notes: Distances to trees were taken side nearest Transit



## Transit at 7"

Angle Stadia Dist

✓ 178° 27'	41	16" Cypress Tree
✓ 197° 37'	42	N.E. Cor. Toilet Bldg
✓ 213° 32'	40	11.5 x 8.0 x 11.5 x 8.0 N.W. Cor. EOC
✓ 213° 43'	48	S.W. "
✓ 237° 02'	50	6" Flower Tree
✓ 251° 07'	71	" " "
✓ 256° 45'	42	8" Elder Tree
✓ 220° 20'	54	6" " "
✓ 227° 40'	56	7" " "
✓ 260° 15'	51	4" Fougat
✓ 260° 55'	84	7" Pepper Tree
✓ 267° 43'	100	9" Flower Tree
✓ 274° 28'	69	15" " "
✓ 280° 38'	51	7" Pepper Tree
✓ 295° 53'	34	9" " "
✓ 336° 35'	18	8" " "

Transit at 8" H.I. 5.0  
Angles turned from North  
Azimuth Vert Stadia Dist Hor Dist

55

✓ 3° 34'	- 18° 23'	96'	86.5'	3" Pine Tree
✓ 16° 37'	- 21° 42'	66'	57.0'	5" " "
✓ 25° 53'	- 19° 45'	87'	77.2'	4" " "
✓ 34° 58'	- 18° 06'	101'	91.5'	12" Tree "
✓ 48° 51'	- 15° 30'	109'	101.3'	10" " "
✓ 55° 00'	- 15° 55'	88'	81.4'	4" " "
✓ 58° 47'	- 15° 25'	64'	59.5'	4" " "
✓ 63° 43'	- 14° 45'	97'	44.0'	3/4 Fougat
✓ 42° 30'	- 22° 47'	31'	26.4'	6" Tree
✓ 41° 19'	- 19° 20'	67'	59.7'	4" " "
✓ 69° 13'	- 11° 45'	94'	90.2'	4" " "
✓ 71° 36'	- 12° 10'	78'	69.8'	24" " "
✓ 72° 33'	- 12° 38'	43'	41.0'	6" " "
✓ 96° 58'	- 2° 03'	68'	67.9'	26" " "
✓ 100° 45'	- 1° 32'	42'	42'	24" " "
✓ 103° 45'	+ 0° 50'	74'	74'	17" " "
✓ 107° 58'	-	76'	76'	18" " "
✓ 111° 15'	-	61'	61'	18" " "
✓ 141° 19'	+ 13° 43'	68'	64.2'	6" " "
✓ 161° 00'	+ 18° 25'	58'	52.3'	7" " "
✓ 177° 28'	+ 25° 08'	32'	26.3'	8" " "
✓ 226° 45'	+ 28° 26'	18'	14.0'	3/4 Fougat
✓ 253° 32'	+ 14° 28'	31'	29.1'	28" Tree
✓ 266° 07'	-	20'	20'	20" " "
✓ 272° 45'	-	51'	51'	8" " "



Azimuth	Vert	Ja. Dist	Hor	
✓ 284° 43'	-	98'	98'	40" Euc Tree
✓ 296° 40'	-	99'	99'	3/4" Fougol
✓ 296° 00'	-	146'	146'	22" Euc Tree
✓ 297° 28'	-	158'	158'	20" " "
✓ 303° 45'	-6° 00'	187'	184.9'	26" " "
✓ 301° 18'	-6° 05'	118'	116.7'	3" " "
✓ 303° 45'	-8° 30'	81'	79.2'	33" " "
✓ 314° 11'	-13° 02'	64'	60.8'	4" " "
✓ 321° 36'	-17° 32'	42'	38.2'	3/4" Fougol
✓ 325° 10'	-20° 00'	34'	30.0'	8" Euc Tree
✓ 336° 00'	-17° 35'	61'	55.4'	2" Pine Tree
✓ 319° 37'	-14° 15'	85'	79.9'	5" Euc "
✓ 334° 42'	-16° 34'	82'	76.3'	3" Pine "
✓ 336° 12'	-16° 15'	107'	98.7'	3" " "
✓ 327° 00'	-14° 45'	111'	103.9'	3" Euc "
✓ 315° 50'	-11° 45'	138'	132.4'	" "
355° 47'	-18° 45'	78'	70'	4" Pine "







1771 = cb EC 5' Rod

1766 = EC Line 43' d

1753

1740 = 2 43' rd

1727

1714 = wcb 43' d st

364.98

359.38  
5.60  
70=cb

358.98  
5.00  
70=60'

359.39  
5.59  
70=cb

359.12  
5.86  
70=60'

359.34 5.64 70=cb	358.97 6.01 70=60'	359.42 5.56 70=cb	358.97 6.01 70=60'	358.90 6.00 70=cb	359.37 5.61 70=cb	359.20 5.70 70=cb	359.12 5.86 70=60'	359.84 5.14 70=cb	359.15 5.80 70=60'	359.83 5.15 70=cb
359.62 5.46 70=cb	359.27 5.71 70=cb	359.00 5.98 70=cb	359.43 5.55 70=cb	359.66 5.82 70=cb	359.22 5.76 70=cb	359.72 5.76 70=cb	359.80 5.18 70=cb	359.78 5.20 70=cb	359.22 5.76 70=cb	359.72 5.76 70=cb
359.78 5.71 70=cb	359.45 5.75 70=cb	359.04 5.94 70=cb	359.56 5.49 70=cb	359.77 5.81 70=cb	359.88 5.10 70=cb	359.96 5.80 70=cb	359.59 5.63 70=cb	359.38 5.66 70=cb	359.02 5.91 70=cb	359.52 5.46 70=cb
359.41 5.67 70=cb	359.13 5.85 70=cb	359.48 5.56 70=cb	359.10 5.88 70=cb	359.07 5.91 70=cb	359.19 5.79 70=cb	359.17 5.81 70=cb	359.24 5.74 70=cb	359.90 5.08 70=cb	359.32 5.46 70=cb	359.88 5.10 70=cb
359.40 5.88 70=60'	359.97 5.81 70=cb									

364.98



3704.6 = W L Hilcy

2775

2750

2725

270

1780 - E. L. 43rd St.

86498

359.25

5.92  
13.5

358.80

6.18  
13.5

358.97

6.01

359.02

6.96  
13.5

359.51

5.47  
13.5

359.29

5.49  
13.5

358.82

6.16  
13.5

359.06

6.92

358.96

6.05  
13.5

359.57

5.41  
13.5

359.32

5.56  
13.5

358.85

6.13  
13.5

359.07

6.91

358.93

6.05  
13.5

359.62

5.36  
13.5

359.43

5.63  
13.5

358.90

6.08  
13.5

359.17

6.81

358.93

6.05  
13.5

359.68

5.30  
13.5

359.42

5.56  
13.5

358.92

6.06  
13.5

359.17

6.81

359.04

5.94  
13.5

359.73

5.14  
13.5

359.40

5.68  
13.5

358.95

6.04  
13.5

359.14

6.84

359.06

6.92  
13.5

359.73

5.25  
13.5

86498



TP 5.04 364.15 5.88 359.10

4+49.4 - W.L. Fairmount

4+25

4+0

3+7.5

3+50

3+24.6 = E.L.H. 1/10/1

364.98

LT

T

PT

359.15 358.80 359.11 358.88 359.18

5.88 / 13.5 6.10 / 13.5 5.87 / 13.5 6.10 / 13.5 5.88 / 13.5

359.15 358.75 359.88 358.75 359.21

5.88 / 13.5 6.10 / 13.5 6.10 / 13.5 6.10 / 13.5 5.77 / 13.5

359.17 358.78 358.90 358.81 359.35

5.87 / 13.5 6.10 / 13.5 6.09 / 13.5 6.17 / 13.5 5.65 / 13.5

359.15 358.76 358.93 358.80 359.33

5.88 / 13.5 6.10 / 13.5 6.06 / 13.5 6.10 / 13.5 5.65 / 13.5

359.21 358.78 358.93 358.85 359.46

5.77 / 13.5 6.10 / 13.5 6.05 / 13.5 6.16 / 13.5 5.57 / 13.5

359.17 358.81 358.99 358.95 359.38

5.87 / 13.5 6.17 / 13.5 5.99 / 13.5 6.05 / 13.5 5.66 / 13.5

364.98



4+994 = E.C. 6 L. 101

4+894

4+794 = Fairmount

4+694

4+594 = W.C. 6 L. 101

4+544 = C. 6 B.C.

364.15

359.09  
358.76

506 539  
70-C 70-C

359.10

505 541  
70-C 70-C

358.74

499 70-C

359.16

553 20-C

358.62

550 70-C

358.65

520 70-C

358.95

552 70-C

358.63

558 70-C

358.57

495 70-C

359.20

550 70-C

358.75

495 70-C

359.20

495 70-C

358.70 359.32

359.01  
508 70-C

359.01  
514 70-C

358.98  
517 70-C

358.98  
517 70-C

359.00  
515 70-C

359.02  
516 70-C

359.11  
504 70-C

359.27  
508 70-C

359.14  
501 70-C

359.10  
505 70-C

359.06  
509 70-C

359.08  
507 70-C

359.10  
505 70-C

359.29  
496 70-C

359.09  
506 70-C

359.06  
509 70-C

359.07  
508 70-C

359.07  
508 70-C

359.02  
513 70-C

359.03  
513 70-C

359.12  
503 70-C

359.07

508 70-C

358.71

544 70-C

359.08

507 70-C

358.74

511 70-C

359.09

506 70-C

358.77

538 70-C

358.82

503 70-C

359.07

508 70-C

358.83

533 70-C

358.85

500 70-C

359.24

491 70-C

358.85

500 70-C

359.15

500 70-C

358.85 359.19

359.15

500 70-C

358.81

504 70-C

359.10

505 70-C

358.87

538 70-C

359.21

491 70-C

364.15



670

5175

5150

5125

5109.4 = FL Fairmount

5104.4 = CB LC

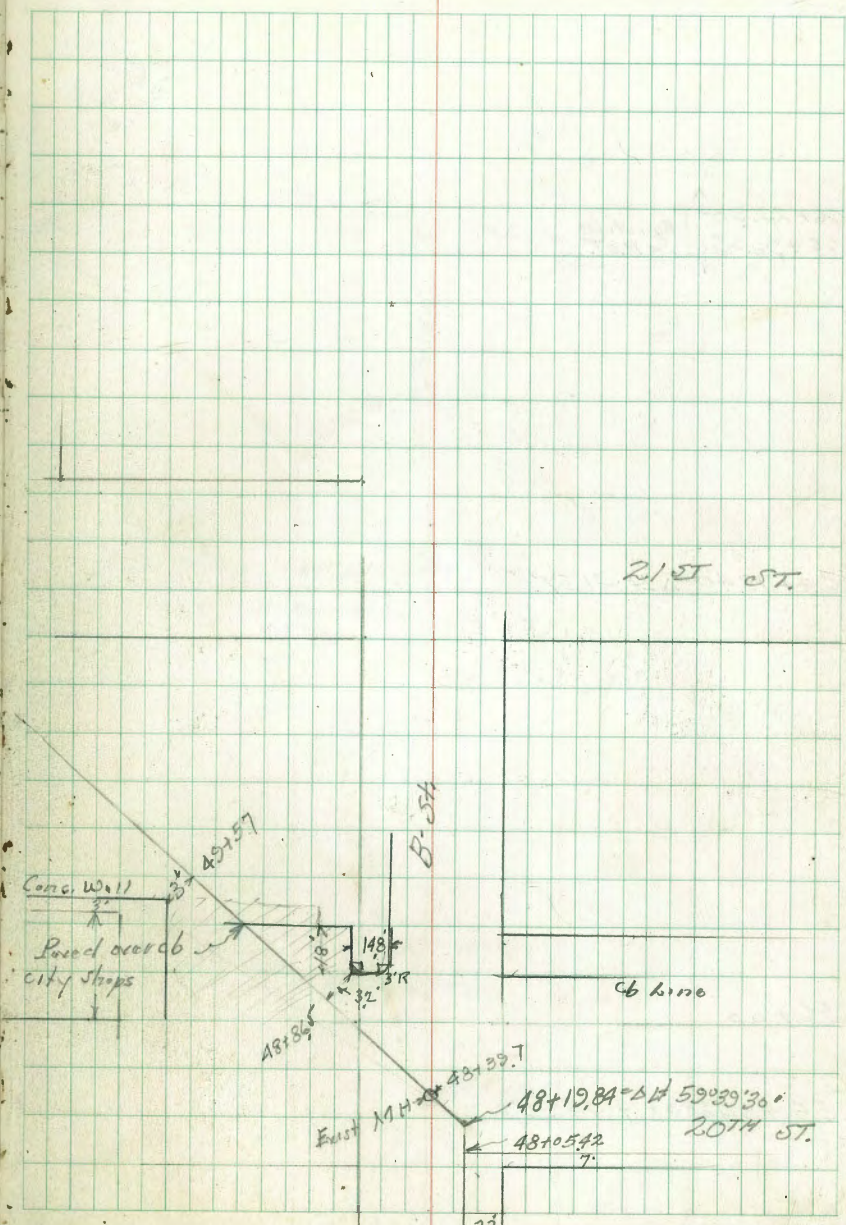
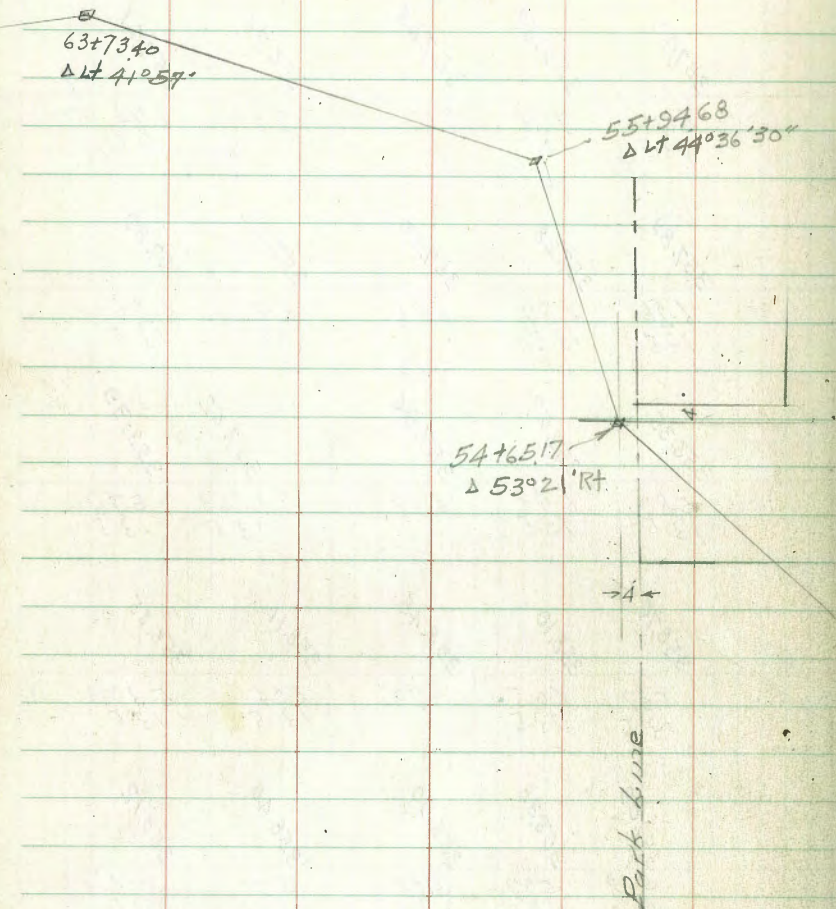
357.45 6.20 13.5	356.67 7.22 13.5	357.08 7.07 13.5	356.76 7.29 13.5	357.41 6.74 13.5
357.89 6.26 13.5	357.28 6.27 13.5	357.50 6.65 13.5	357.22 6.93 13.5	357.89 6.26 13.5
358.35 6.20 13.5	357.67 6.48 13.5	357.96 6.19 13.5	357.62 6.53 13.5	358.39 6.76 13.5
358.76 6.20 13.5	358.10 6.05 13.5	358.45 6.70 13.5	358.11 6.04 13.5	358.85 6.20 13.5
359.03 6.10 13.5	358.38 6.27 13.5	358.90 6.25 13.5	358.40 6.24 13.5	359.12 6.03 13.5
359.05 6.10 13.5	358.56 6.29 13.5	358.99 6.11 13.5	358.50 6.15 13.5	359.14 6.01 13.5

364.15



Proposed Powder Canyon Trunk Sewer  
 Walker  
 Osborn  
 H. G. G. G.  
 H. G. G. G.  
 10-26-43

Proposed change in Alignment  
 from 20th and B-sts  
 to Pershing Drive





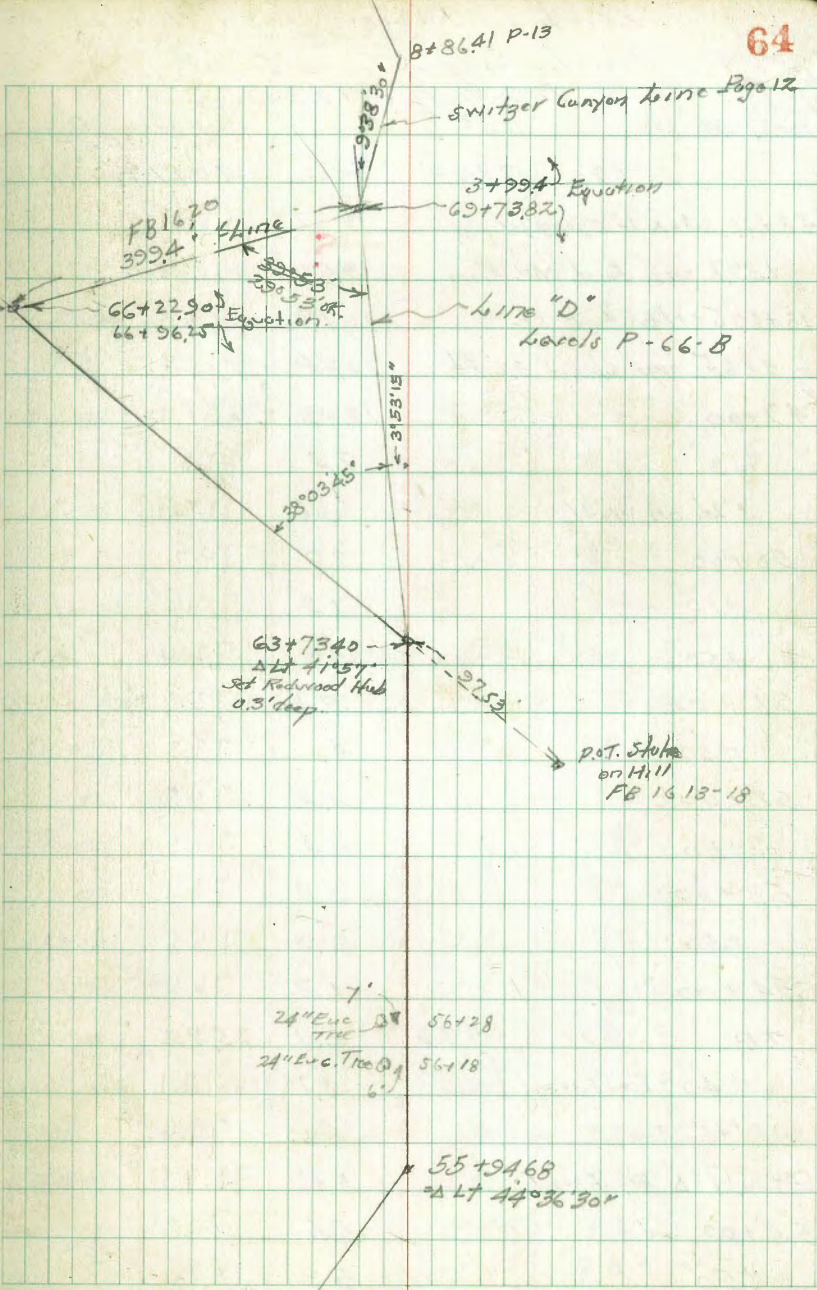
Line  
FB 16.13-18

66+22.90 }  
66+26.25 } Equations  
= P.O.T.

63+73.40 = Δ Lt 41°57'

56+00

55+94.68 = Δ Lt 44°36'30"





Walker  
Osborne  
Hogarth  
Hardin  
10-27-43

Levels for Proposed Line Change  
Pavider Canyon Trunk Sewer  
Location P-63, 64

85.79

65

	776	7793	70.17	
48+19.84 = Δ Lt. 59°39'30"		2.82	68.11	
+32.7 on E. End. N.H. P. 100		2.69	68.24	
48+62.5 = N.G. Int. B-st		10.79	67.14	on Pav
+86.5 opp Cb. Ret. 32' Rt.		10.24	67.69	
49+00		10.09	67.84	
+59		2.4	70.5	
3' Lt. on Well		6.66	71.27	
50+00		7.0	70.9	
+10		2.3	70.6	
+50		5.9	72.0	
51+00		5.1	72.8	
+50		4.6	73.3	
52+00		4.2	73.7	
+50		3.4	74.5	
53+00		2.8	75.1	
+50		2.3	75.6	
54+00		1.3	76.6	
T.P.	9.87	85.79	2.01	75.92
+40 - Top Fill of Darts			8.7	77.1
+45 - Top " on "			6.2	79.6
54+65.17 = Δ Rt. 53°21'		5.86	79.93	
55+00		5.5	80.3	
+50		5.3	80.5	

S.E. 8.P. 201908  
S.M. #12  
FB 1614-16

55+94.68 = Δ Lt. 44°36'30"		5.06	80.73	on stub
56+00 on Fill Dump		4.9	80.9	
+15 " " "		5.1	80.7	
+31 - Top Fill "		7.9	77.9	
+50 Nat. Ground		7.8	78.0	
+76 " "		7.3	78.5	
57+00		6.1	79.7	
+50		4.9	80.9	
58+00		3.9	81.9	
+50		3.1	82.7	
59+00		1.8	84.0	
T.P. 1082	24.80	1.88	83.91	
+50		2.7	85.1	
60+00		8.7	86.1	
+50		7.7	87.1	
61+00		6.6	88.2	
+50		5.2	89.6	
62+00		4.5	90.3	
+50		3.6	91.2	
63+00		3.1	91.7	
+73.40 = Δ Lt. 41°57'		2.47	92.33	on Hub
T.P. 142	24.01	2.21	92.59	on Rock
64+00		1.5	92.5	
+15		11.4	82.6	
+50		13.8	80.2	

Cont. P. 66



66-A

94.01

Powder Canyon Vanner

Cont. from P 65.

10-27-43

Levels for Proposed Line "D"

66-B

Location Page 64

65+00		13.7	80.3	
+20		14.5	79.5	
+23		16.5	77.5	
+39		16.2	77.9	
+42		14.0	80.0	
+55		14.3	79.7	
+65 in channel		19.5	74.5	To be about 3' lower
66+00 " "		19.1	74.9	"
+50 " "		19.1	74.9	"
+85 " "		19.1	74.9	"
+90 on Bank		12.8	81.2	
66+96.25 } Equation		12.85	81.16	Hub has been lowered
-66+22.20 } = P.O.T.		4.21	89.80	FB 1614-17
			89.81	
			5.01	

66+96.25 } Equation  
-66+22.20 } = P.O.T.

chk 8M #45

Levels Cont.  
FB 1614-26

4.01	96.60	92.59	on Rock P-65
64+00	3.9	92.7	
+50	4.0	92.6	
65+00	4.0	92.6	
+50	4.5	92.1	
66+00	5.1	91.5	
+50	6.2	90.4	
67+00	6.9	89.7	
+50	8.9	89.7	
68+00	6.3	90.3	
+50	6.3	90.3	
69+00	5.5	91.1	
+50	5.1	91.5	
69+77.82 } Δ 87°38'30"		91.70	
-3+99.4 } Equation	4.20	91.73	P-30
		0.03	

69+77.82 } Δ 87°38'30"  
-3+99.4 } Equation

Levels FB 1620-43

8+86.41 = Δ 4 8°57'30"

Levels  
FB 1620-43

15+41.20 - P.O.T.



Walker  
10-27-43

Levels Run over 2 Proposed Sewer  
To Switzer Canyon from 66+229 P-66

67

	373	93.54		BM #45
66+26.25 Powder Canyon line			89.81	P-66-A
66+22.90				
- 0+00 Switzer "		12.36	81.18	'
+ 12 on Bank		11.2	81.6	'
+ 45 in channel N edge		18.3	75.2	'
1+00 " "		16.6	76.9	'
+ 50 " "		14.5	79.0	'
2+00 " "		13.7	79.8	'
+ 30 " " S "		13.6	79.9	'
+ 65 on Bank		8.4	85.1	'
+ 87		4.4	89.1	'
3+00		4.5	89.0	'
+ 50		3.4	90.1	'
3+22.4 - Alt. 22°30		1.81	91.73	' P-30

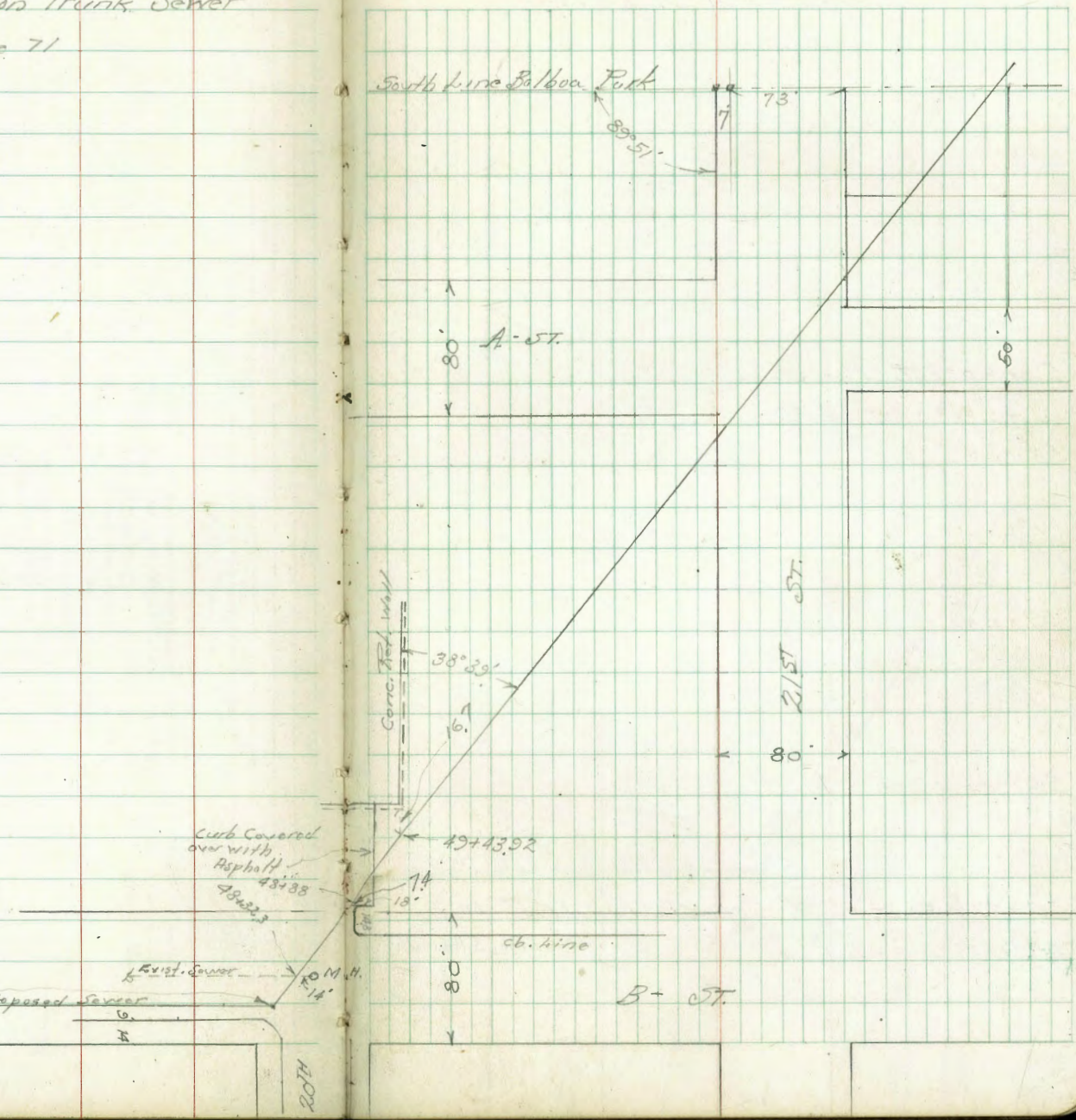
Level  
Cont. FB 1620



Walker  
Osborne  
Hayward  
Alameda  
11-13-49

# Proposed Change in Alignment Powder Canyon Trunk Sewer Levels Page 71

$48+1042 = \Delta L + 51^{\circ}14'$   
 $48+0542 = \text{POT - Int. w/ 7' line 20th}$   
" = F8 1613-14





Proposed Change in Alignment  
 Powder Canyon Trunk Sewer  
 Cont. from P-68

58+60 = P.O.T. Pin Stake

+28.18 = P.O.T. Nail

58+00

57+00

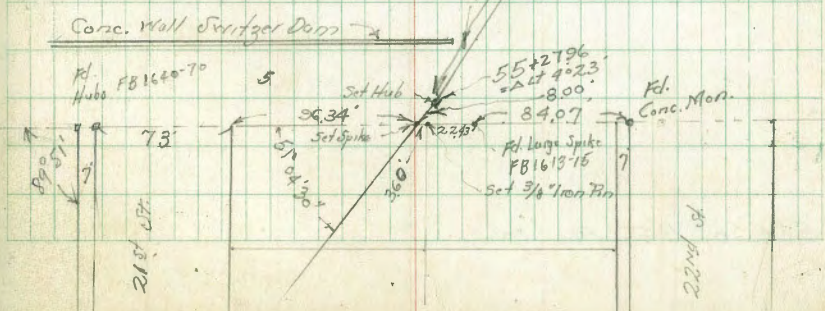
56+00

55+27.26 = Δ Lt 4° 23' set 2"x2" Redwood Hub. 27' E. "

55+19.26 = lot sk. Park

56.170 Bolboa Park

10' x 10' concrete Rd.



58+60  
 P.O.T. Stake

This Point changed  
 see P-76 for final

28

55+27.26  
 Δ Lt 4° 23'  
 8.00'

84.07'

Pd. Large Spike  
 FB 1613-16  
 Set 3/8" Iron Pin

7

22nd St

Conc. Wall Switzer Dam

Pd. Hub FB 1640-70

89° 07'

73'

21st St

Set Hub

96.34'

Set Spike

57° 04' 30"

22.25'

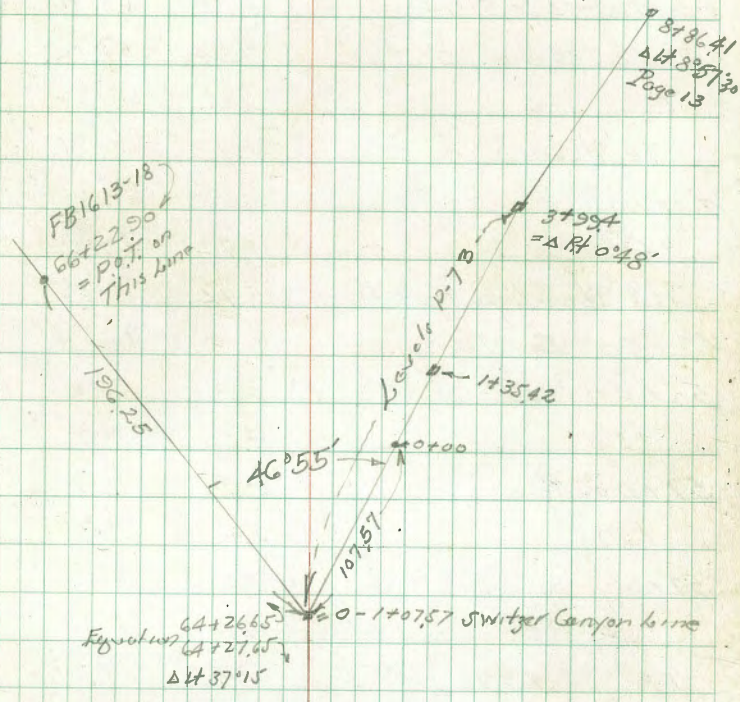
45°

7

22nd St

Pd. Conc. Mon.





Equation  
 $64 + 26.65$   
 $64 + 27.65$   
 $\Delta R 37^{\circ}15'$

58+60 = POT. Pav. Stone



Walker  
Hazard  
Harris  
11-16-43

Profile Levels for Proposed Change  
in Alignment - Powder Canyon Trunk Sewer  
as per locations Page 68-70

			B.M. #12 P-65
	6.87	77.04	79.17
48+10.42 = Δ Lt 51'4"	8.93	68.11	✓
48+48 = N. Gut. B-st	9.24	67.10	✓
+88	2.22	67.82	✓
74 Rt. on cb	8.73	68.31	✓
49+10	9.09	67.95	✓
+43.92	6.72	70.32	✓
16.7' Lt on diage = Top Ret Wall	5.76	71.28	✓
49+50 = End Paving	6.50	70.54	✓
50+00	6.0	71.0	✓
+50	4.8	72.2	✓
51+00	4.3	72.7	✓
+50	3.8	73.2	✓
52+00	3.0	74.0	✓
+34	2.6	74.4	✓
TR 10.98	2.93	74.61	✓
52+50	7.4	78.2	✓
53+00	10.6	75.0	✓
+50	9.9	75.7	✓
54+00	2.3	76.3	✓
+50	8.4	77.2	✓
55+00 = Toe Dam	7.2	78.4	✓
+10 on Earth Dam	5.0	80.6	✓
55+27.96 = Δ Lt 4'2.3"	5.01	80.88	on Hub

85.59

71

55+59.6 = opp. End Dam	5.3	80.3	✓
2.8' Lt on diage = on Top "	9.8	75.8	✓ End Conc. Dam
(55+78) 9.6 Rt = Δ 20" Euc Tree			
(55+89) 8.3" = Δ 30" " "			
55+93 1.0" = Δ 16" " "			
55+88 10' Lt = Δ 18" " "			
799' 8' Lt = Δ 30" " "			
55+70	11.9	73.7	✓
+78	12.1	73.5	✓
+80	10.6	75.0	✓
56+00	9.8	75.8	✓
+30	10.4	75.2	✓
(56+78) 3' Rt = Δ 8" Euc Tree			
+75	5.5	80.1	✓
(56+09) 4' Lt = Δ 18" Euc Tree			
T.P. 5.81	4.45	81.14	✓
57+50	6.0	81.0	✓
58+00	5.1	81.9	✓
+50	1.8	82.2	✓
58+60 on POT. Stake	5.05	81.90	✓
+85	4.9	82.1	✓
6' Lt = edge Bank	9.3	77.7	✓
8' Lt	17.8	69.2	✓
18' Lt	18.0	69.0	✓
20' Lt = Present Basin	22.7	64.3	✓
59+00	5.3	81.7	✓



	$\langle 86.95 \rangle$		
59+01	13.2	73.8	✓
2' Lt	12.7	69.3	✓
7' Lt	17.8	69.2	✓
15' Lt = present Basin	22.2	64.8	✓
59+25	17.2	69.8	✓
4' Rt	11.0	76.0	✓
5' Rt on Bank	2.2	84.8	✓
7' Lt	17.2	69.8	✓
15' Lt in Basin	21.2	65.8	✓
59+35	16.2	70.8	✓
10' Rt	13.2	73.8	✓
12' Rt on Bank	1.2	85.8	✓
8' Lt	16.2	70.8	✓
13' Lt = Edge Basin	19.1	67.9	✓
60+18	14.7	72.3	✓
11' Lt	14.7	72.3	✓
15' Lt in Basin	18.8	68.2	✓
60+23	9.0	78.0	✓
+63	11.0	76.0	✓
+90	10.8	76.2	✓
61+03	3.6	83.4	✓
8' Lt	13.3	73.7	✓
61+30	8.3	78.7	✓
+50	5.2	81.8	✓
+70	9.6	77.4	✓
+87	1.3	85.7	✓

	$\langle 86.95 \rangle$			
62+00	2.6	84.4	✓	
T.P. 0.80	$\langle 85.32 \rangle$	2.43	$\langle 84.52 \rangle$	
62+37		2.5	82.8	✓
+45		5.5	79.8	✓
63+00		5.2	80.1	✓
+15		4.7	80.6	✓
+50		6.1	79.2	✓
64+00		5.8	79.5	✓
64+27.65	Equation			
= 64+26.15	$\Delta H 37'15"$	4.77	80.55	✓
64+50		5.7	79.6	✓
+51		7.5	77.8	✓
+66		7.1	78.2	✓
+67		5.2	80.1	✓
+81		5.5	79.8	✓
+92 in channel		10.5	74.8	✓
65+00 in channel		10.8	74.5	✓
+50 " "		2.9	75.4	✓
66+12 N edge "		10.2	75.1	✓
+16 " Bank "		4.0	81.3	✓
66+22.90 = P.O.T.		4.03	$\langle 81.23 \rangle$	P-66
			81.16	
			0.07 diff.	



Walker  
Harden  
Hoyard  
11-16-43

Levels for Proposed Revision - Portion  
of Switzer Canyon Trunk sewer  
0.5 per location P-70

K.P. 72  
85.32

0-140.757 = Junction with Parakee Canyon Drain	4.77	80.55 ✓
0-140.0	5.0	80.3 ✓
0-89	5.6	79.7 ✓
0-86	7.4	77.9 ✓
0-78	7.2	78.1 ✓
0-76	5.2	80.1 ✓
0-50	5.1	80.2 ✓
0-8'	4.6	80.7 ✓
0+00	1.1	84.2 ✓
+03	0.5	84.8 ✓
+08	4.7	80.6 ✓
+57	6.6	78.7 ✓
T.P. 9.28	0.69	84.63 ✓
0+75	8.8	85.8 ✓
+80 old on RR Fill	5.6	89.0 ✓
1+00 " " "	1.8	92.8 ✓
+25 " " "	+2.8	97.4 ✓
+29 " " "	+2.9	97.5 ✓
+32 " " "	1.0	93.6 ✓
+36 " " "	1.1	93.5 ✓
+42	5.8	88.8 ✓
2+00	5.2	89.4 ✓
+43	5.0	89.6 ✓

94.61

73

2+47	6.0	88.6 ✓
+64	6.0	88.6 ✓
+85	5.5	89.1 ✓
3+00	4.6	90.0 ✓
+50	3.3	91.3 ✓
3+99.4 = RR + 0'48"	2.87	91.74 ✓
		91.75 ✓
		0.01

P-30

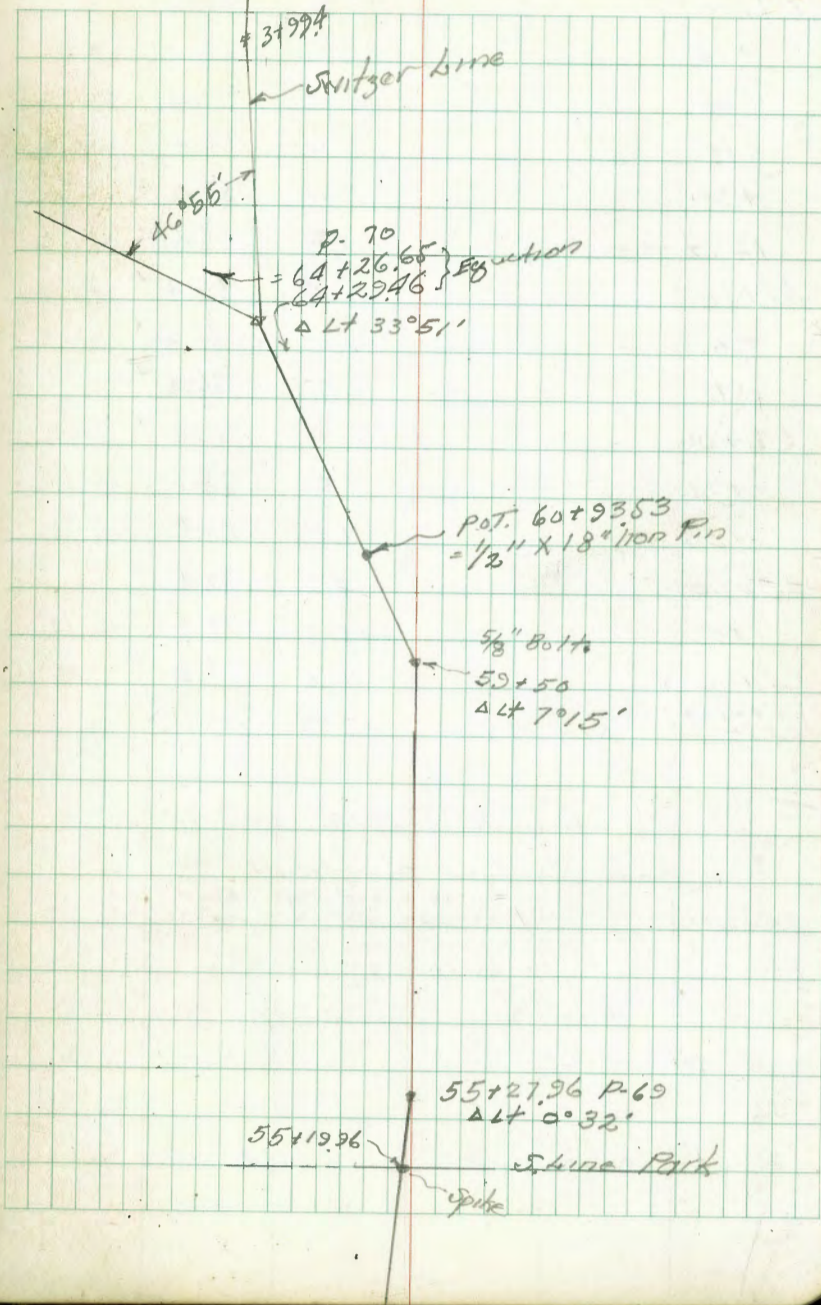


Walker  
Hazard  
Hazard  
11-16-43

Proposed Change #2 in Alignment  
Powder Canyon Sewer

Station	Offset	Distance	Notes
55+60	8.38 (88.96)	80.58	on Hub 55+2796 P-71
776	7.8	81.2	
56+00	14.9	74.1	
+22	13.1	75.9	
+26	12.4	76.6	
+50	11.0	78.0	
57+00	10.0	79.0	
+50	8.2	80.8	
58+00	7.4	81.6	
+50	6.7	82.3	
59+00	5.5	83.5	
+50	4.3	84.7	
+50 = ΔLT 7°15'	2.55	86.41	on both
TR	7.98 (94.39)	2.55 (86.41)	
60+00	2.7	86.7	
11' Lt Edge Bank	2.7	86.7	
60+50	2.2	87.2	
8.5' Lt " "	2.2	87.2	
60+72	6.5	87.9	
4' Lt " "	6.5	87.9	
60+85	3.3	91.1	
2' Lt " "	3.3	91.1	
60+9353 POT. on Iron Pin	3.58	90.81	
61+00	3.5	90.9	
2' Lt. edge Bank	3.5	90.9	

Cont P-75



55+27.96 P-69  
ΔLT 0°32'

S. Line Park

upike



19439

Cont from P. 74

61+10	3.8	90.6	✓
+14	5.9	88.5	✓
+25	4.2	90.2	✓
+35	6.0	88.4	✓
+60	7.4	87.0	✓
12' Lt - edge Bank	7.8	86.6	✓
61+69	11.0	83.4	✓
+80	11.0	83.4	✓
+86	7.5	86.9	✓
62+00	7.8	86.6	✓
+34	9.3	85.1	✓
+40	13.6	80.8	✓
63+00	14.3	80.1	✓
+50	15.1	79.3	✓
64+00	14.6	79.8	✓
64+29.46 Equation			
= 64+26.65	DLT 33°51'	13.86	(80.53)
		80.55	P-72
		0.02	

Rough location East Burma Road from Sulfur Dues North

55+27.96	10' Rt - West Edge Road
	27' Rt - E " "
56+00	21' " - W " "
	40' Rt - E " "

57+00

6' Rt = W edge Road
26' " = E " "
21' Lt Edge 5' Bank

58+00

1' Rt = W edge Road
23' Rt = E " "
30' Lt = 7' Bank

59+00

2' Rt = W edge Road
26' Rt = E " "
20' Lt = 15' Bank

59+50

2' Rt = W edge Road
26' Rt = E " "
20' Lt = 15' Bank

60+00

20' Lt = 15' Bank
0' = W edge Rd
21' Rt - E " "

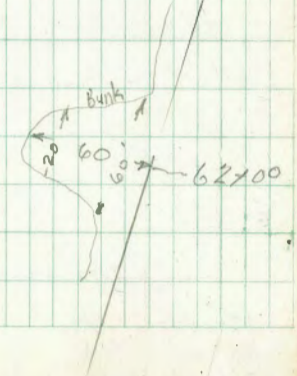
61+00

16' Rt - E edge Rd
2' Lt - W " "
26' Lt Edge Bank 7'

62+00

18' Rt - E edge Road
2' Lt = W " "
5' Lt = 5' Bank
60' Lt = 10' Bank

Cont P-78









Powder Canyon Sewer

Cont. from P-76

66+10 = N edge Main Ch.	2.9	75.1	Switzer (change)
+16 = N Bank " "	3.7	81.3	
66+22.90 = P.O.T. this line	3.88	81.15	on stake
		81.16 = P-66	
		0.01 diff.	

Next levels Switzer line

From 66+22.9 P-76 = 0+00 this line			
on stake	11.77	92.93	81.16 Above stake
0+00	11.77	81.16	
+11 = N Bank Switzer ch.	11.4	81.5	
+30 = N edge " "	16.2	76.0	
+100 in " "	15.8	77.1	
+50	13.7	79.2	
+200	13.3	79.6	
+40 = S edge " "	12.0	80.9	
+70 = S Bank " "	5.2	87.7	
+300	3.8	89.1	
+50	2.7	90.2	
+65	1.4	91.5	
3+99.4 on Ground	0.5	92.4	
3+99.40 on Stake	1.22	91.71	
		91.72	
		0.01	

Walker  
Hogard  
Hardie  
12-22-43

Levels

77

Switzer Canyon line change

Location P-76

P-76  
97.31

0+00 on Hub	5.03	92.28	
+50	4.9	92.4	
+100	4.8	92.5	
+50	5.0	92.3	
+200	5.8	91.5	
+50	6.1	91.2	
+300	8.1	89.2	
+50	7.8	89.5	
+400	7.2	90.1	
+50	7.0	90.3	
+500	6.6	90.7	
+50	5.6	91.7	
5+93.46	5.59	91.72	Thread Equation
3+99.40 Stake		91.73	
" on Ground		91.71	
	7.42		

use this page

12/30/43  
H.



Rough Locations  
 Cont. from Road P-75

62+50

- 4' Lt. = 10' Bank
- 0' = W edge Road
- 18' Rt. = E " "

63+00

- 0' = W edge Road
- 18' Rt. = E " "
- 4' Lt. = 10' Bank

63+37.24 = 0+00 on Switzer line

- 7' Lt. = 8' Bank
- 2' = W edge Rd.
- 15' Rt. = E " "

1+00 Switzer line

- 16' Rt. = E edge Rd.
- 3' Lt. = W " "
- 12' Lt. = 10' Bank

2+00

- 0' = W edge Rd.
- 18' Rt. = E " "
- 10' Lt. = Top old RR Fill
- 30' Lt. = Bank

2+63' to Old Euc. Tree Each 12" diam. = 6' Lt.

3+00

- 6' Rt. = W edge Road
- 25' Rt. = E " "
- 10' Lt. = Top old RR Fill
- 25' Lt. = Top " " " 10' Above h
- 37' Lt. = 10' Bank

3+37 = End RR Fill

4+00

- 0' = W edge Rd.
- 23' Rt. = E " "
- 80' Lt. = 5' Bank Switzer ch.

uniform slope

5+00

- 6' Lt. = W edge Rd.
- 16' Rt. = E " "

5+35 = BC. Widening Road.

- 11' Rt. = E edge Rd.
- 10' Lt. = W " "
- 40' Lt. = " " Switzer ch. 4' Bank.

5+93.46 at RT Δ to Buck Turn

- 24' Lt. = W edge Rd. to South
- 32' Rt. = E " " " "

Powder Coner Line Cont.

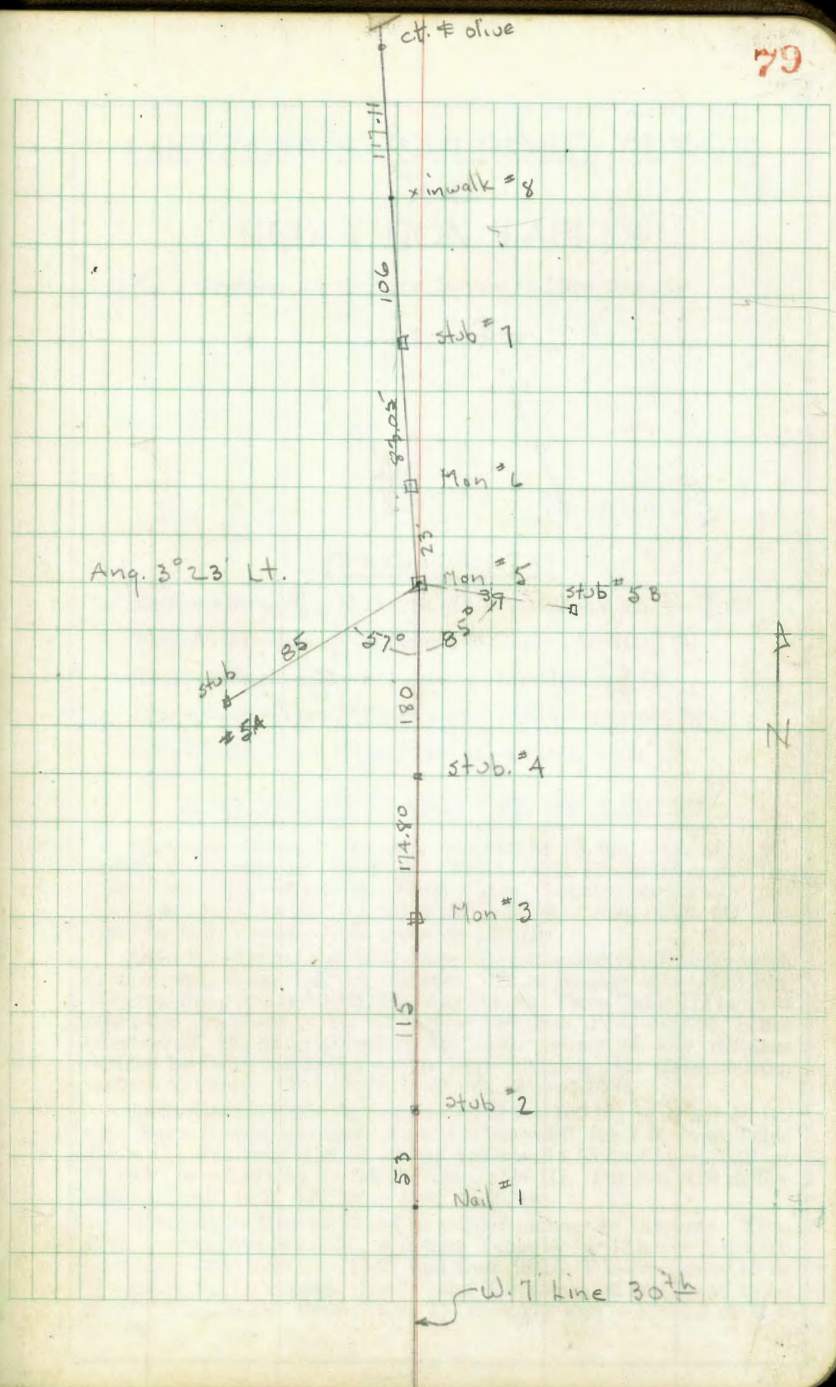
- |       |                    |           |
|-------|--------------------|-----------|
| 55+00 | 30' Rt. = Top Bank | Grading.  |
| 54+00 | 23' Rt. " " " "    | Projected |
| 53+00 | 0' " " " "         | " " "     |
| 52+65 | 10' Lt. " " " "    | " " "     |
| 52+32 | 0' " " " "         | " " "     |
| 52+00 | 16' Rt. " " " "    | " " "     |
| 51+00 | 67' Rt. " " " "    | " " "     |



Base line for 30<sup>th</sup> St. Bridge Topography

W. 7' line 30<sup>th</sup> - P. 38 + B 1620 P. 14

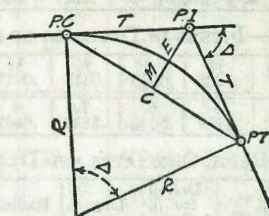
	1.16	290.87	289.71	SE B.P. Kalmia 30 <sup>th</sup>
B.P. SE Laurel + 30 <sup>th</sup>		2.20	288.67	
Sta. #1 - Nail in Pav.		10.86	280.01	
	+343	$\pi$ Transit 283.44		
Sta. #2	28.86	$\times \tan -25^{\circ}33'$ 47805	-5 =	264.64
Sta. 3	143.86	$\times \tan -21'$ 38386	-5 =	223.22
	7.14	215.68		208.54 = Bolt
T.P.	11.77	224.51	294	212.74
Mon. #3		1.35		223.16
#4				206.04
#5		$\angle Pt.$		220.42
5A				232.96
5B				236.02
#7				239.75
#8				279.70





# DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

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## CURVE FORMULAS

Radius— $R = \frac{50}{\sin \frac{D}{2}}$  (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— $M = R(1 - \cos \frac{\Delta}{2}) = R \text{vers} \frac{\Delta}{2}$  (6)

External— $E = T \tan \frac{\Delta}{4}$  (7)  $= R \div \cos \frac{\Delta}{2} - R$  (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.  $\Delta = 62^\circ 10'$   $D = 8^\circ 20'$ . From Table IV for  $1^\circ$  curve  $T = 3454.1$  and  $\div 8\frac{1}{3} = 414.49$  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— $158 - \text{Sta. P. C.} = 54.50$ , hence offset— $7.27 (54.50 \div 100)^2 = 2.16$  ft. Also square of any distance divided by twice the radius equals (approximately) the distance from tangent to curve. Thus  $(54.50)^2 \div (2 \times 688.26) = 2.16$  ft.

**Deflections.**—Deflection angle— $\frac{1}{2} D$  for 100 ft.,  $\frac{1}{4} D$  for 50 ft., etc. For  $c$  ft.—(in minutes)  $.3 \times C \times D^\circ$  or—defl. for 1 ft. from Table III  $\times C$ . For Sta. 158 of above curve— $.3 \times 54.5 \times 8\frac{1}{3} = 136.2'$  or  $2^\circ 16.2'$ , or— $2.50 \times 54.5 = 136.2'$  from Table III. For Sta. 159 deflection angle— $2^\circ 16.2' \div 8^\circ 20' \div 2 = 6^\circ 26.2'$ , etc.

**Externals.**—May be found in similar manner to tangents. Thus  $E$  for curve above is 115.37. For from Table IV for  $1^\circ$  curve  $E = 960.6$  for  $8^\circ 20' = 960.6 \div 8\frac{1}{3} = 115.27$  and from Table V correction—.10 or  $E = 115.37$  ft. Or suppose  $\Delta = 32^\circ$  and  $E$  is measured and found to be 42 ft. What is  $D$ ? From Table IV  $E = 230.9$  and  $\div 42 = 5.5$  or  $D = 5^\circ 30'$ .



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

TABLE III.—RADIUS, ORDINATES AND DEFLECTIONS.

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot
0°	34377.5	.036	.145	0.05'	7°	819.02	1.528	6.105	2.10'
10	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	50	731.94	1.708	6.830	2.35
1	5729.65	.218	.873	0.30	60	716.78	1.746	6.976	2.40
10	4911.15	.255	1.018	0.35	20	688.16	1.819	7.266	2.50
20	4297.28	.291	1.164	0.40	30	674.69	1.855	7.411	2.55
30	3819.83	.327	1.309	0.45	40	661.74	1.892	7.556	2.60
40	3437.87	.364	1.454	0.50	50	649.32	1.929	7.702	2.65
50	3125.36	.400	1.600	0.55	60	637.28	1.965	7.846	2.70
2	2864.93	.436	1.745	0.60	20	614.56	2.037	8.136	2.80
10	2644.58	.473	1.891	0.65	30	603.80	2.074	8.281	2.85
20	2455.70	.509	2.036	0.70	40	593.42	2.110	8.426	2.90
30	2292.01	.545	2.181	0.75	50	583.42	2.147	8.571	2.95
40	2148.79	.582	2.327	0.80	60	573.69	2.183	8.716	3.00
50	2022.41	.618	2.472	0.85	20	546.44	2.292	9.150	3.15
3	1910.08	.655	2.618	0.90	30	521.67	2.402	9.585	3.30
10	1809.57	.691	2.763	0.95	40	499.06	2.511	10.02	3.45
20	1719.12	.727	2.908	1.00	50	478.34	2.620	10.45	3.60
30	1637.28	.764	3.054	1.05	60	459.23	2.730	10.89	3.75
40	1562.88	.800	3.199	1.10	20	441.68	2.839	11.32	3.90
50	1494.95	.836	3.345	1.15	30	425.40	2.949	11.75	4.05
4	1432.69	.873	3.490	1.20	40	410.23	3.058	12.18	4.20
10	1375.40	.909	3.635	1.25	50	396.20	3.168	12.62	4.35
20	1322.53	.945	3.718	1.30	60	383.07	3.277	13.05	4.50
30	1273.57	.982	3.926	1.35	20	370.78	3.387	13.49	4.65
40	1228.11	1.018	4.071	1.40	30	359.27	3.496	13.92	4.80
50	1185.78	1.055	4.217	1.45	40	348.45	3.606	14.35	4.95
5	1146.28	1.091	4.362	1.50	50	338.27	3.716	14.78	5.10
10	1109.33	1.127	4.507	1.55	20	319.62	3.935	15.64	5.40
20	1074.68	1.164	4.653	1.60	30	302.94	4.155	16.51	5.70
30	1042.14	1.200	4.798	1.65	40	287.94	4.374	17.37	6.00
40	1011.51	1.237	4.943	1.70	50	274.37	4.594	18.22	6.30
50	982.64	1.273	5.088	1.75	20	262.04	4.814	19.03	6.60
6	955.37	1.309	5.234	1.80	30	250.79	5.035	19.94	6.90
10	929.57	1.346	5.379	1.85	40	240.49	5.255	20.79	7.20
20	905.13	1.382	5.524	1.90	50	231.01	5.476	21.64	7.50
30	881.95	1.418	5.669	1.95	20	222.27	5.697	22.50	7.80
40	859.92	1.455	5.814	2.00	30	214.18	5.918	23.35	8.10
					40	206.68	6.139	24.19	8.40
					50	199.70	6.360	25.04	8.70
					60	193.18	6.583	25.88	9.00

Note. Chord Deflection=2 times tangent deflection.

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15  
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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
20	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
30	518.08	23.33	20	1027.5	91.40	20	1553.1	206.77
40	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
50	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
			50	1053.3	96.01	50	1580.0	213.86



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	298.80	397.28	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	296.98	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	196.90	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	388.42
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	.85	.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	1.20	.74	4.40	46	184.10	239.03	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°	.366	.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	.468	.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	.208	.179	.151	.128	.105	27	.594	.524	.457	.393	.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

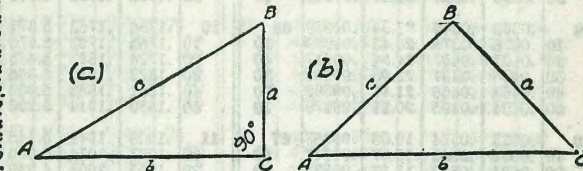
SLOPE REDUCTIONS.

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<sup>2</sup>÷2×250.3=.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.

See fig. (a).

TRIGONOMETRICAL FORMULAS.

- 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	$\sin. A = \frac{a}{c}, \cos. B = \frac{b}{c}, b = \sqrt{(c+a)(c-a)}$
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	$B = 90^\circ - A, b = a \cot. A, c = \frac{a}{\sin. A}$
A, b	B, a, c	$B = 90^\circ - A, a = b \tan. A, c = \frac{b}{\cos. A}$
A, c	B, a, b	$B = 90^\circ - A, a = c \sin. A, b = c \cos. A$
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	$\tan. \frac{1}{2}(A-B) = \frac{(a-b) \tan. \frac{1}{2}(A+B)}{a+b}$
a, b, c	A	If $s = \frac{1}{2}(a+b+c), \sin. \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}$
		$\cos. \frac{1}{2}A = \sqrt{\frac{s(s-a)}{bc}}, \tan. \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$
		$\sin. A = \frac{2\sqrt{(s-a)(s-b)(s-c)s}}{bc}$
A, B, C, a	area	$\text{area} = \frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area} = \frac{1}{2}bc \sin. A$
a, b, c	area	$s = \frac{1}{2}(a+b+c), \text{area} = \sqrt{s(s-a)(s-b)(s-c)}$



289.71

1.16  
290.87

2.20  
288.67  
10.86

3.43

135 = Mon

290.87

10.86  
280.01 = Nail  
3.43  
283.44

Bolt = 208.54

7.14  
215.68

2.94  
212.74

+ 11.77  
224.51

- 1.35  
223.16 = Mon

215.68

9.62



Wirt  
2124-314

66+96.25  
63+82.77  
313.48

66+229.0  
-3 134.8  
63+09.42

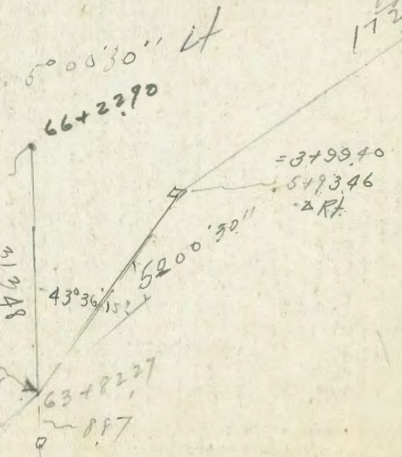
66+229.0  
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63+09.00

52  
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530.21'

962  
424  
1386

63+73.60  
887  
63+82.27



2243  
84.07  
96.34  
202.84  
360  
206.44

199.44  
99.72  
23  
172.26

= 3+99.40  
5493.96  
2 RT

63+09.42  
63+37.27

594.50

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

Roadway 16 feet wide. Side Slopes 1 on 1 1/2  
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.

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