

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.

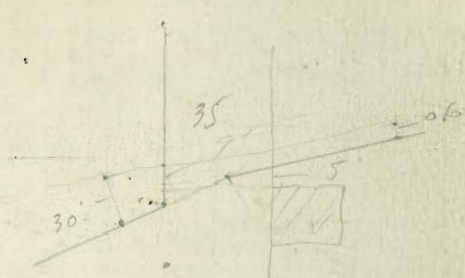
H	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	H
0	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	0
1	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	1
2	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	2
3	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	3
4	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	4
5	13.0	13.1	13.2	13.3	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 $1\frac{1}{2}$ see inside of back cover.

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G-210

CITY ENGINEER

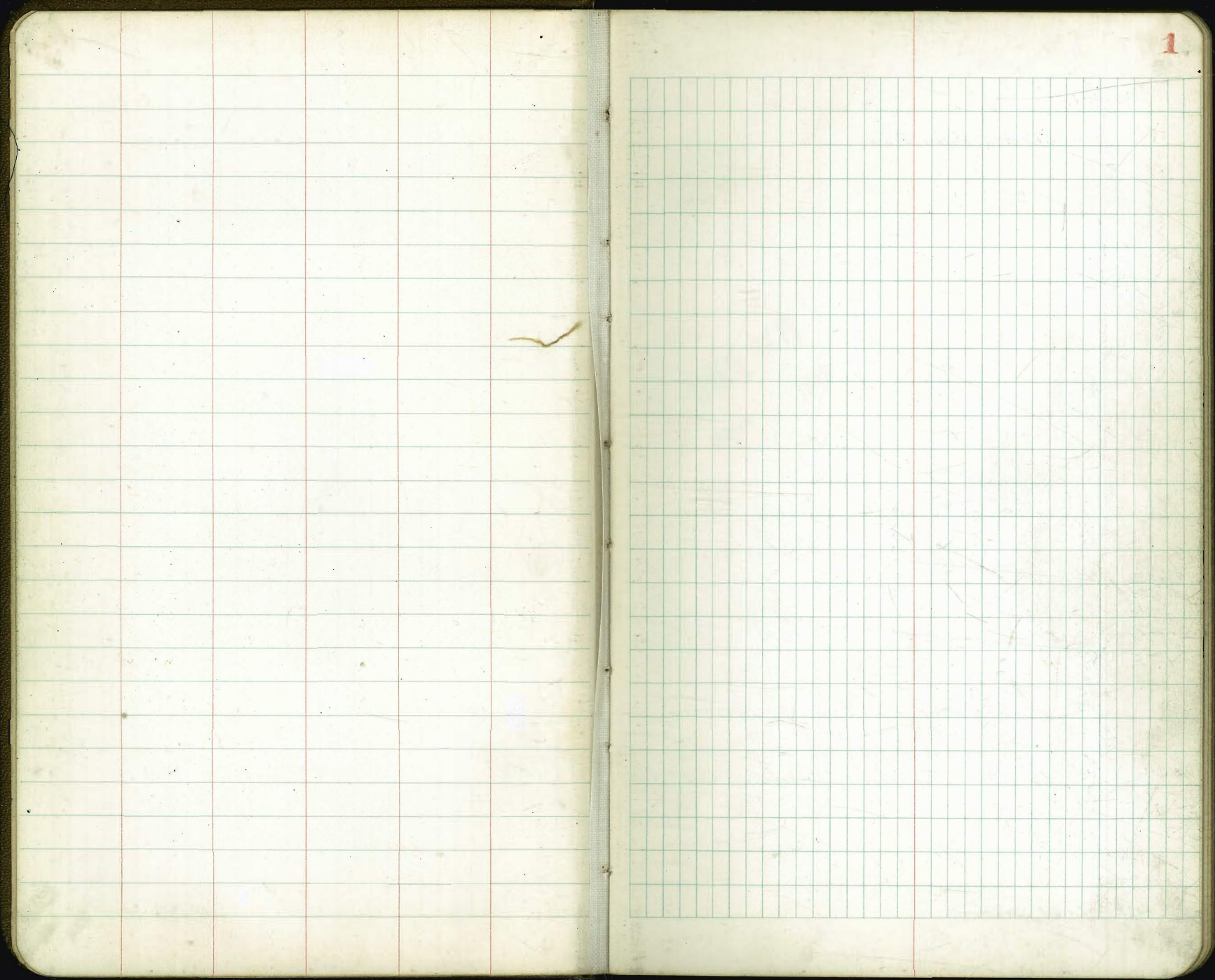


MICROFILMED

APR 12 1965

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Made in U. S. A.



Walker
Haidis
Wirt
11-28-42

Rough Grades for Drive Way
Between Tank #3 + Harbor Drive.

DISPOSAL PLANT.

Station	Top curb W/L Line Grades	Top Curb W/L Line Grades
6+45.46 F.C.	9.49	9.49
6+80 on W	9.84	
6+96 on E		10.00
7+00		10.04
7+15 W	10.19	
7+30 E		10.54
7+46 E		11.00
7+48 W	10.52	
8+00 W & E	11.04	11.04
7+50	11.54	11.54
9+00	12.05	12.04
7+50	12.55	12.55
9+76.71 E = Fence		12.84
9+78.31 = W = Fence	12.85	

10.00 = B.M. Tank #2
5.87 + B.P.

3

15.87X		6+96	7+10	8+00
E 949		10.00	10.54	11.04
6.38		5.87	5.93	7.83
		5.91	5.17	5.71
			7.016	5.09
	6+80	7+15	7+48	8+00
W 949	9.84	10.19	10.52	11.04
6.38	6.03	5.68	5.35	7.83
2.14	2.67	5.18	5.13	6.11
-0.14	-0.36	7.052	7.22	1.0
	8+50	9+00	9+50	9+76.71
E 11.54	12.05	12.55		12.84
4.33	3.82	3.32		
5.80	5.57	4.86		
-1.47	-1.7	-1.54		
8+50	9+00	9+50		9+78.31
W 11.54	12.05	12.55		12.85
4.33	3.82	3.32		
5.80	5.57	4.86		
-1.5	-1.66	-1.56		

Walker
Osborne
Hyden
H. 2010
1-14-48

Disposal Plant Drive Way
Grades for Top of Curbs
from Station C+45.46 To Fence Line
at Harbor Drive

Sketch of location See Page 2.

Station	Left	Right
C+45.46=EC.	9.49	9.49
+75	9.80	9.80
7+00	10.05	10.05
+50	10.55	10.55
8+00	11.05	11.05
+50	11.55	11.55
9+00	12.05	12.05
+50	12.57	12.57
+767'=FH	12.84	12.84
+783'=H		

10.00 = B.M.

6.15 =

Indexed
E.S.K.

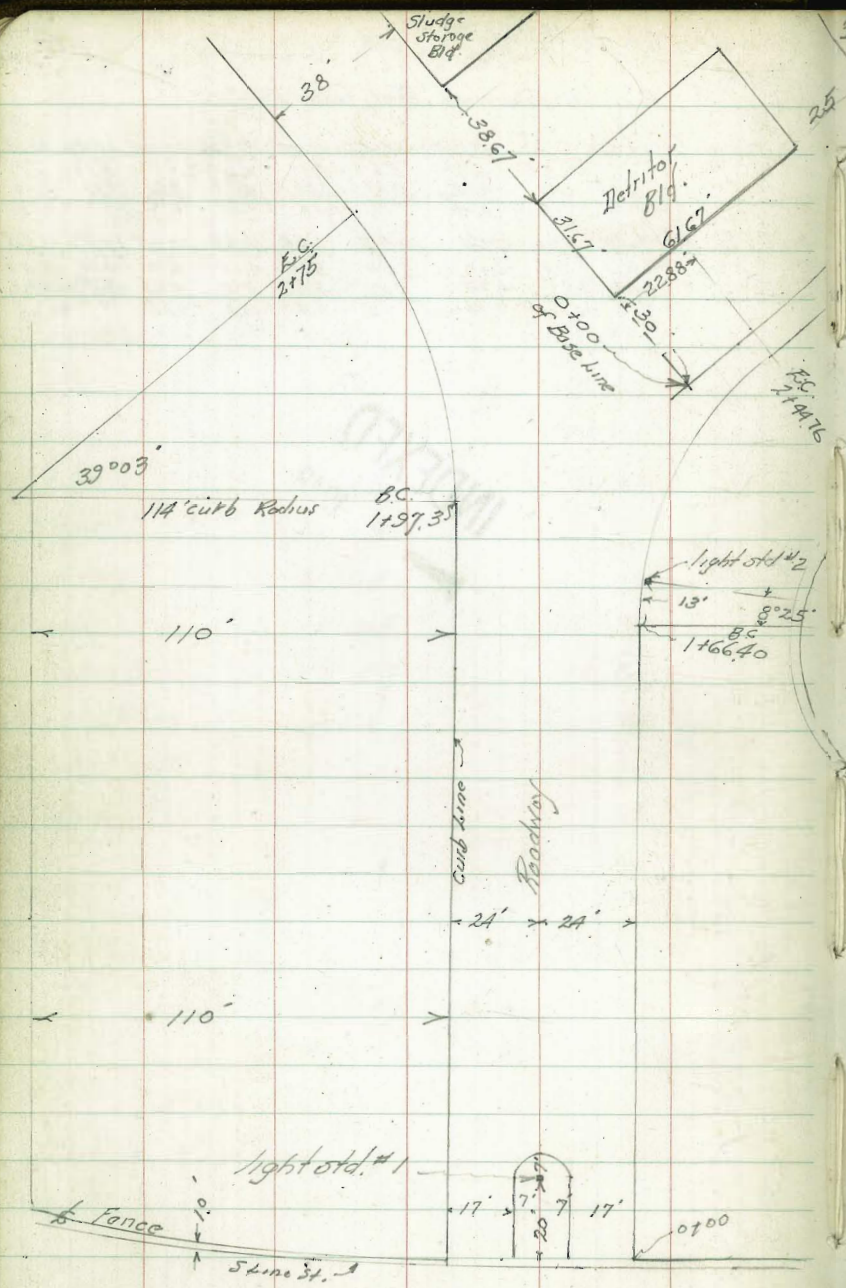
4

16.15 = T Finish Grades Cont. from P. 20

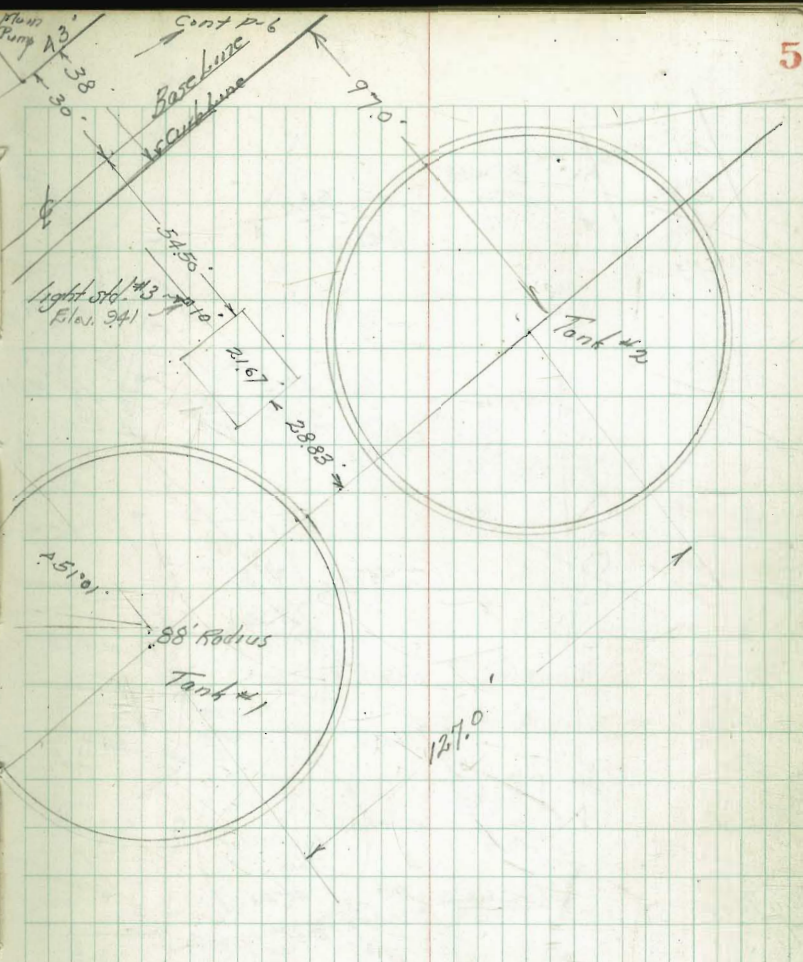
LA	9.49	9.80	10.05	10.55	11.05	11.55	12.05	12.57	12.84
	6.66	6.35	6.10	5.60	5.10	4.60	4.10	3.58	3.31
	6.79	6.44	6.34	5.61	5.23	4.98	4.85	4.32	3.12
	-0.13	-0.09	-0.24	-0.01	-0.18	-0.38	-0.75	-0.74	+1.19
FH	9.49	9.80	10.05	10.55	11.05	11.55	12.05	12.57	12.84
	6.66	6.35	6.10	5.60	5.10	4.60	4.10	3.58	3.31
	6.83	6.45	6.24	5.62	5.50	5.14	4.85	3.84	3.23
	-0.17	-0.10	-0.14	-0.02	-0.40	-0.54	-0.75	-0.34	+0.08

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1948



Harbor



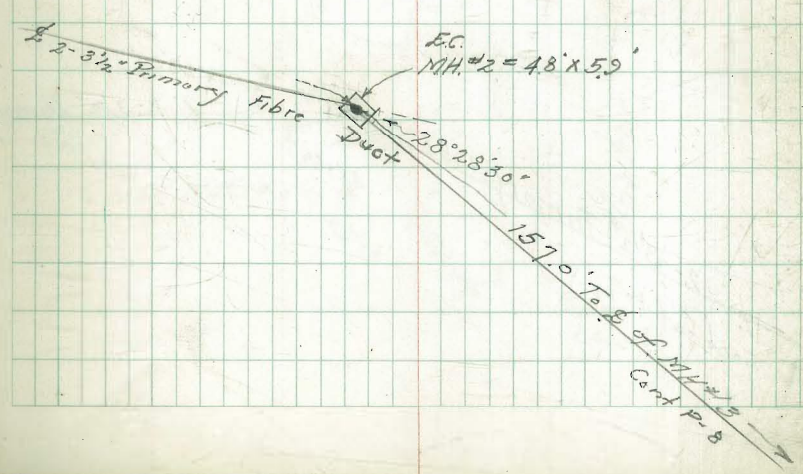
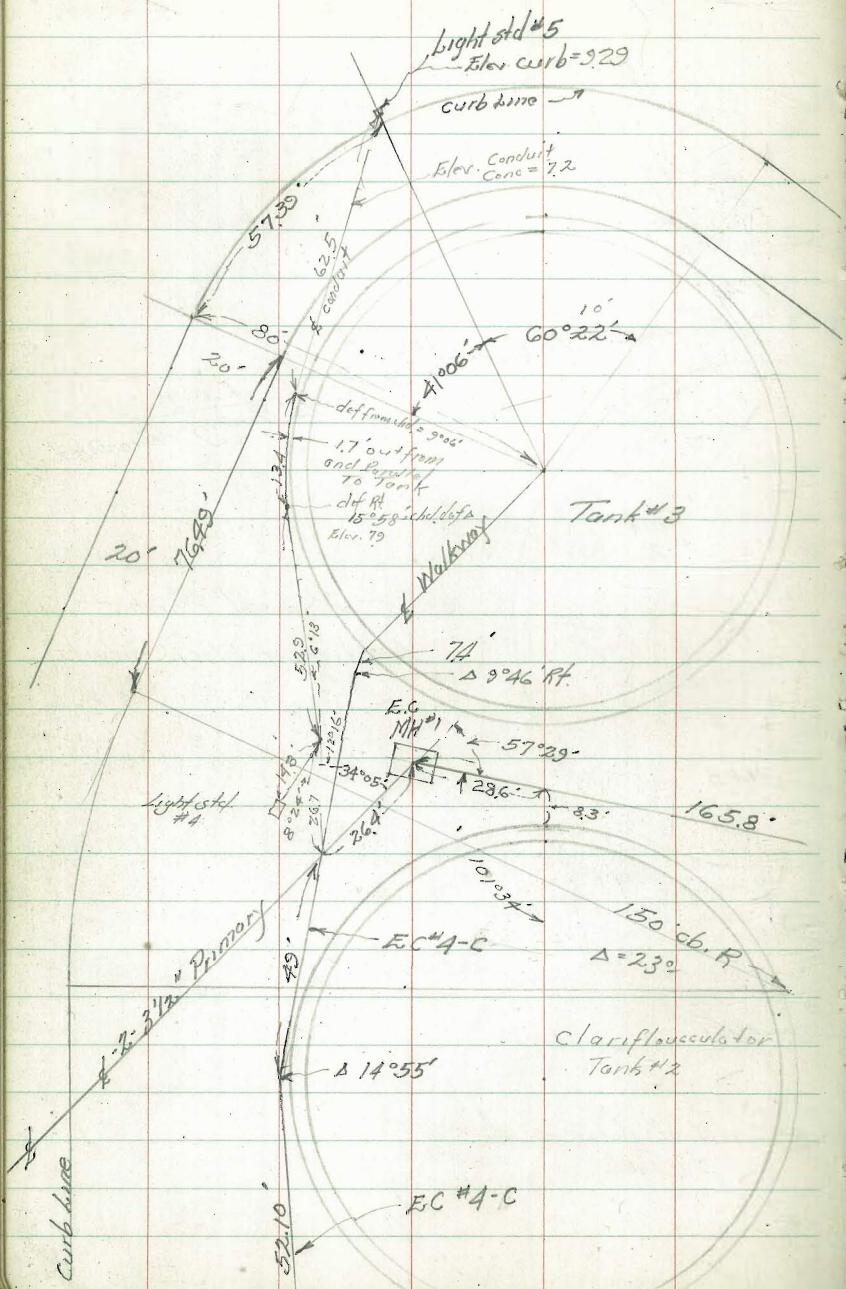
Drive

Location for Construction of
 Light Standards
 Disposal Plant

Walker
 Hovden
 Hazard
 12-22-42

Location Conduits
Cont. from P. 6

1000 = BM.
 460
 1460 929
 581



Walker
Harding
Hazard
12-23-42

Disposal Plant
Location of Existing Elec. Primaries & M.H.s
Cont. from P. 7

from P.C. of Curve of Tank #3 = 332.85

Curb Line

E.C. M.H. #2

23°28'30"

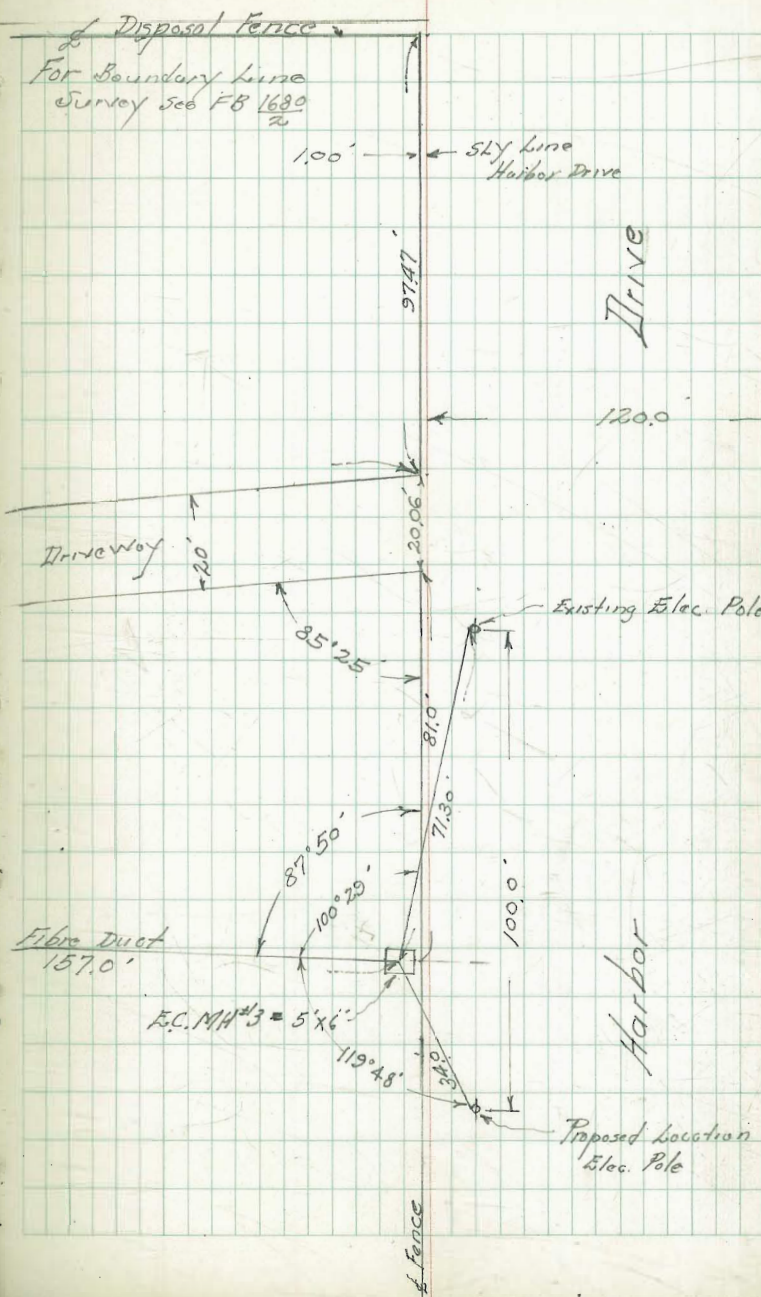
2-3 1/2" Primary

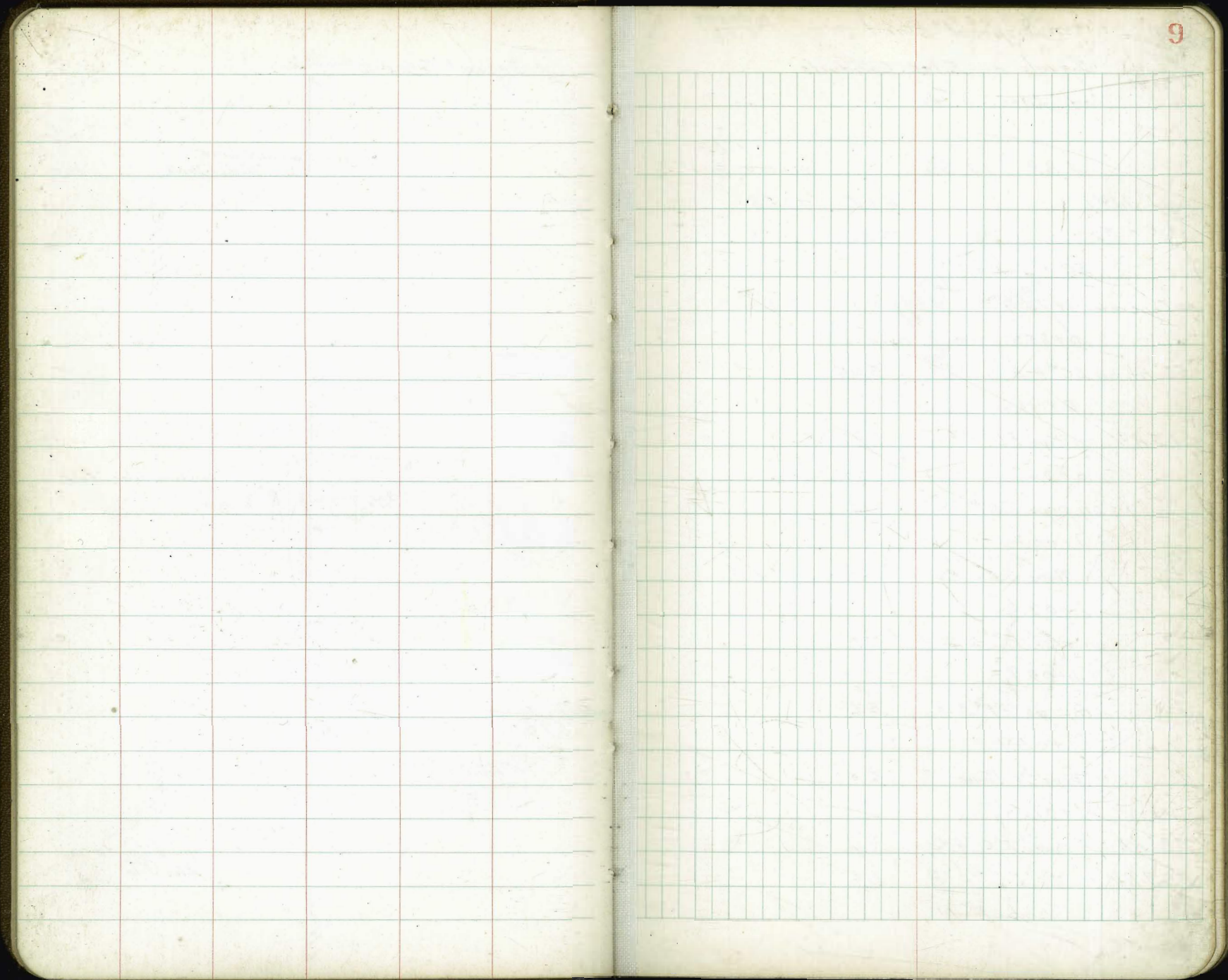
Fibre Duct
157.0'

4.8' x 5.9'

2-3 1/2" Primary 165.8'

Cont. from P. 7





Walker
Hardin
Hugard
12-23-42

Disposal Plant

Indexed
C.S.K.

10

Levels on Elec. Conduits
And Elec. M.H.s

			B.M. Tank #2
	4.33	14.33	10.00
light std #1		4.05	10.28
" " #2		4.58	9.75
EC #4-A			
on Concrete at Tank #1		6.8	7.5
0+85.9 station on Base Line			
55' Rt. on EC #4-A on Pipe		5.65	
0+96.2			
54.5 Rt. on Pipe FL #3		5.7	
0+96.7			
" " on pipe EC #2		6.3	
1+00.2			
" " on Power To Sump Box		5.9	
1+03.6			
" " on pipe EC #2A		5.9	
1+03.9			
" " on pipe FP #3		5.6	
1+05.7			
" " on pipe 3/4 Power		6.0	
1+07.6			
55' Rt. on Conc. EC #4-C		5.6	
55.7 Rt. " EC #4-B		5.6	
Cont. P-11			

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Cont. from P-10

14.33

TP	5.97	13.43	6.87	7.46	
	0+61.67				
39.6 Lt. on Conc. EC #1		5.3			
	0+86.67				
37.1 Lt. on Conc. EC #1		5.3			
72.27 Lt. on pipe FP #2		5.26			
72.77 " " Flight #2		5.3			
127.9 Lt. on ^{3/4} Power-EC #8		4.7			on ^{3/4} Pipe
" " "		4.85			" 1" "
	0+84				
128 Lt. on Conc. EC #8		5.7			
	0+65				
128.5 Lt. on Conc. EC #8		5.7			
	0+61.67				
128.57 Lt. on Conc. EC #8		5.2			
	0+78.4				
21 Lt. on 5-1" FP		6.0			on pipe
	0+79.4				
21 Lt. on 5-1" FP on Conc.		5.6			
	0+86.2 - opp A 10 5-1" FP				
21 Lt. on 5-1" FP		5.7			on Conc.
TP	7.17	14.63	5.97	7.46	
	1+12.75 - opp Power lines in Wall SWLY Cor. Aerostat 2 d				
20.33 Lt. on 1" pipe		5.5			on Top of Top Pipe
	Cont. P. 12				

1+13		
30' Lt. on Conc. F.P. #1	6.8	24" out
1+13.3		
30' Lt. on Conc. EG #2	6.8	
1+14.3		
30' Lt. on Conc. FL #1	6.8	18" out
411.9 = Intersection	EG #2	
E on Conc.	7.4	
27.4' Rt. on diag. with Base line	7.0	
1+28.67		
33.6' Lt. = EG #3	7.2	on Conc
34' Lt. = 1" Tel	6.6	on Pipe
1+35.5 = opp 2-3 1/2" Risers Primary duct		
12' Lt. on Conc Base	5.65	
12' " " Top 3 1/2" Riser	4.84	
1+46.4 = Int. 3 1/2" Primary		
E Base + E Conc. over Duct	8.5	
49' from ^{3 1/2"} Primary = Δ in EC #4-C	Δ = 14'55"	
on Conc.	7.1	
1+46.4		
84.9' Rt. on diag. with Base	6.6	
Δ in EC #4-C	3'46" Rt	
7' from Tank #3	6.9	
2+16.9 = Δ in EC #3	Δ = 10'18" Lt.	
on Top 2" Pipe	6.1	

TR 558 14.16 6.05 8.58

cbk BM #2 4.19 9.97

4.19 \times 14.19 \div Corrected 10.00

2+61.12 = Int EC #5

E on conc. 61

32' Lt. on Pipe EC #5 4.3

34' Lt. " " " 3.8

Fl. #4 " " 3.3

EC #3 = 1" = 2.5 from Cor Digester

EC #5 = 2-3/4" \times 1-1/2"

EC #3 = 2" 3.6 on Pipe

F.P. #4 4.0

Elec. Primary MH #1 4.79 Rim

on Bottom Conc. 11.4

TR 490 15.73 3.36 10.83

Elec. Primary MH #2 4.85 Rim

on Bottom Conc. 11.75

on Conc. over Pipe 7.0

Elec. Primary MH #3 3.22 Rim

Bottom MH on Conc. 9.8

on Conc. 6.9

Elec Primary
2' NLY from MH #1 on Conc. 8.3 7.4

on Tank #3

at digester Bld.
2.4' from Tank #2 ^{Digester} 10" out.

at Tank #2

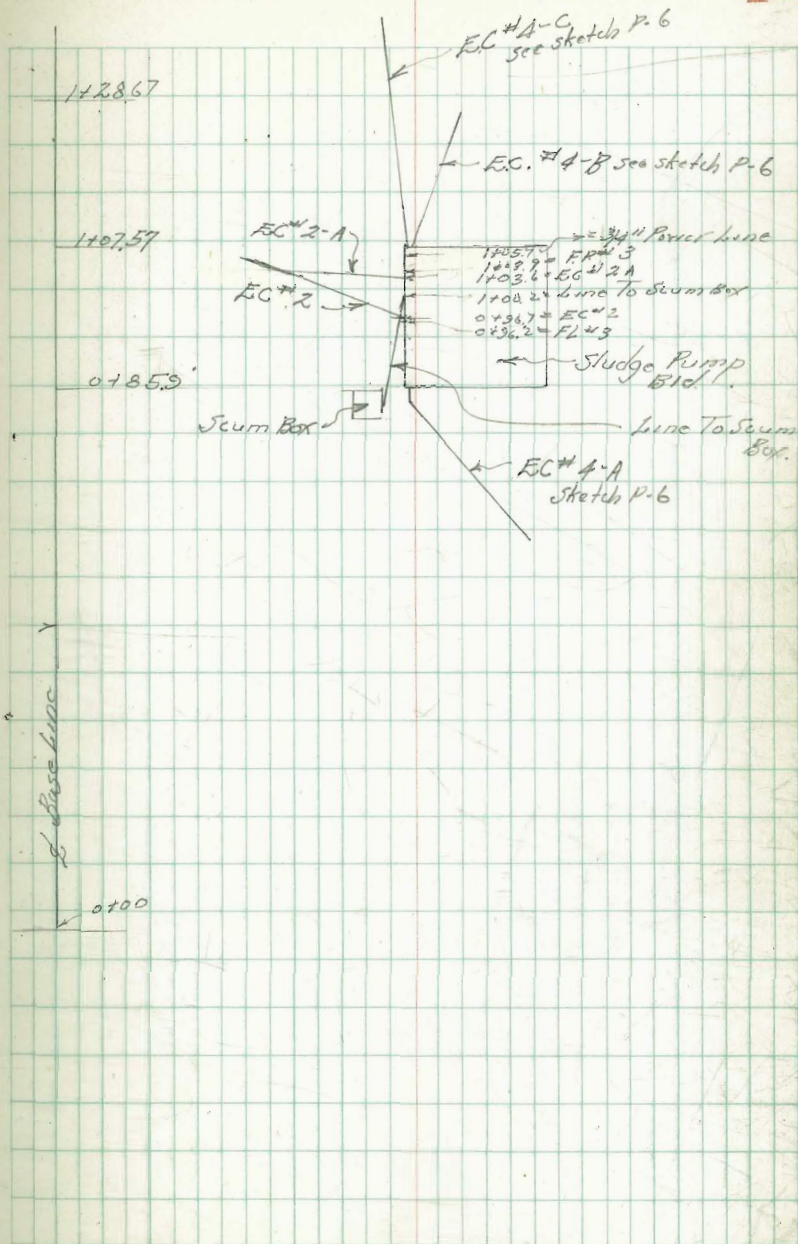
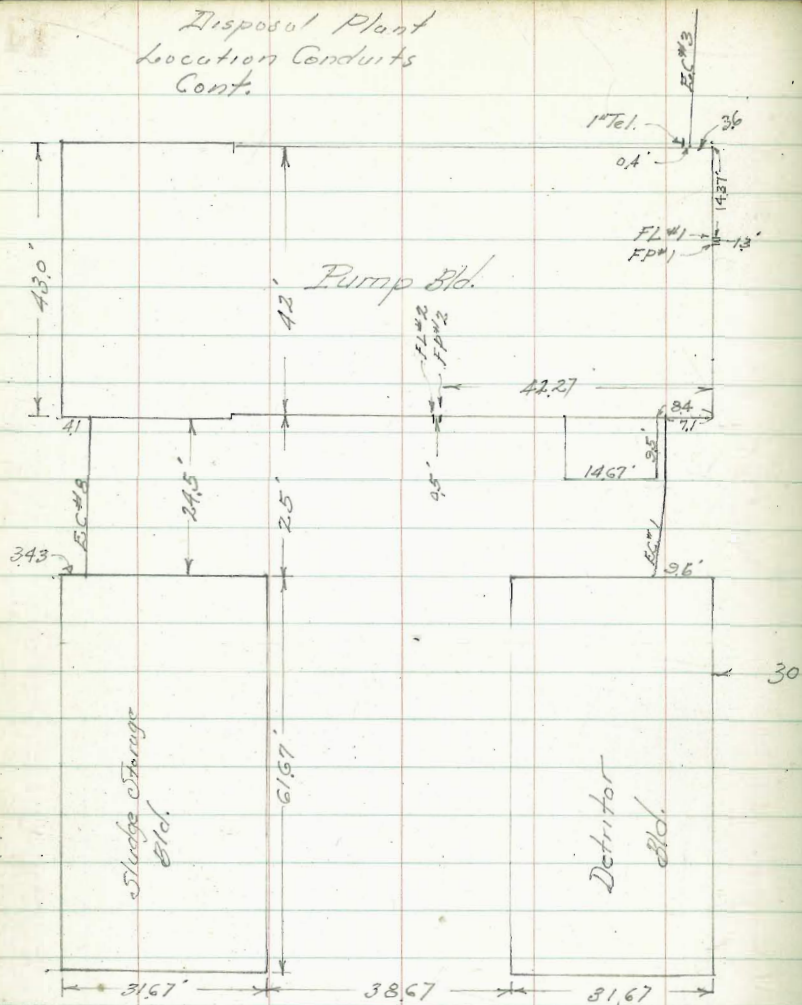
2.7' from #2 Digester Tank

7.5 " " " "

7.9 " " " " 12" out.

over Pipe

Disposal Plant
Location Conduits
Cont.

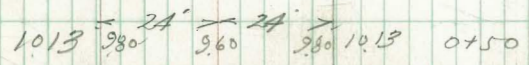
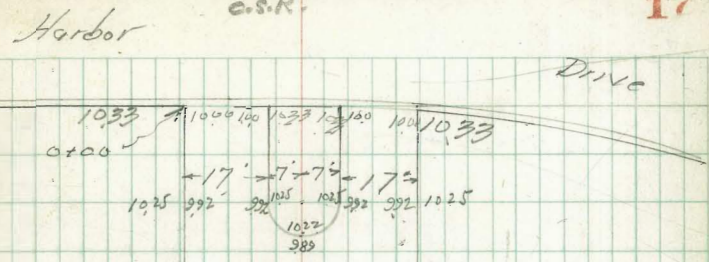


This page features a grid of blue horizontal lines. It is divided into four vertical columns by three vertical red lines. The columns are of varying widths, with the two inner columns being the narrowest and the two outer columns being wider. The page is otherwise blank.

This page features a grid of blue horizontal lines and a single vertical red line. A green grid is overlaid on the page, consisting of 10 vertical lines and 20 horizontal lines, creating a fine grid pattern. The page is otherwise blank.

Disposal Plant
 Finish Grades
 Grade changed to clear 42" Sewer at Aerator
 Pipe from Aerator to Vacuumator Control Box
 Supplementary Grades see Grd. Book 28, 31, 32, 33, 44

index
 C.S.K. 17

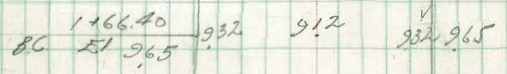


1000-BN
 3827
 13827

INDEXED
 1948

960 940 960 1+00

947 927 947 1+33



$\Delta = 51^{\circ}01'$
 CR = 88
 L = 7896

EL
 943
 2+4476

1+27.30

$\Delta = 33^{\circ}03'$
 CR = 114
 L = 7770

Cont. P. 18

1-13-43

Disposal Plant
Curb GradesIndexed
C.S.K.

Cont. from Grid Book 201-73

Station	Lt	Rt.
"A" Page 19	8.70	
"B" "	8.80	
4162.72	8.90	8.90
(2550) 3 +88.21	8.98	8.98
5+13.71	9.06	9.06
914		
5+39.21 = B.C. of Tank		9.14
1	9.20	9.20
2	9.26	9.26
3	9.32	9.32
4	9.38	9.38
5	9.44	9.44
6		
= 6+45.46 = E.C.	9.49	9.49

8-19-43 Re-stake Abse on Lt. from "A" To 5+13.71

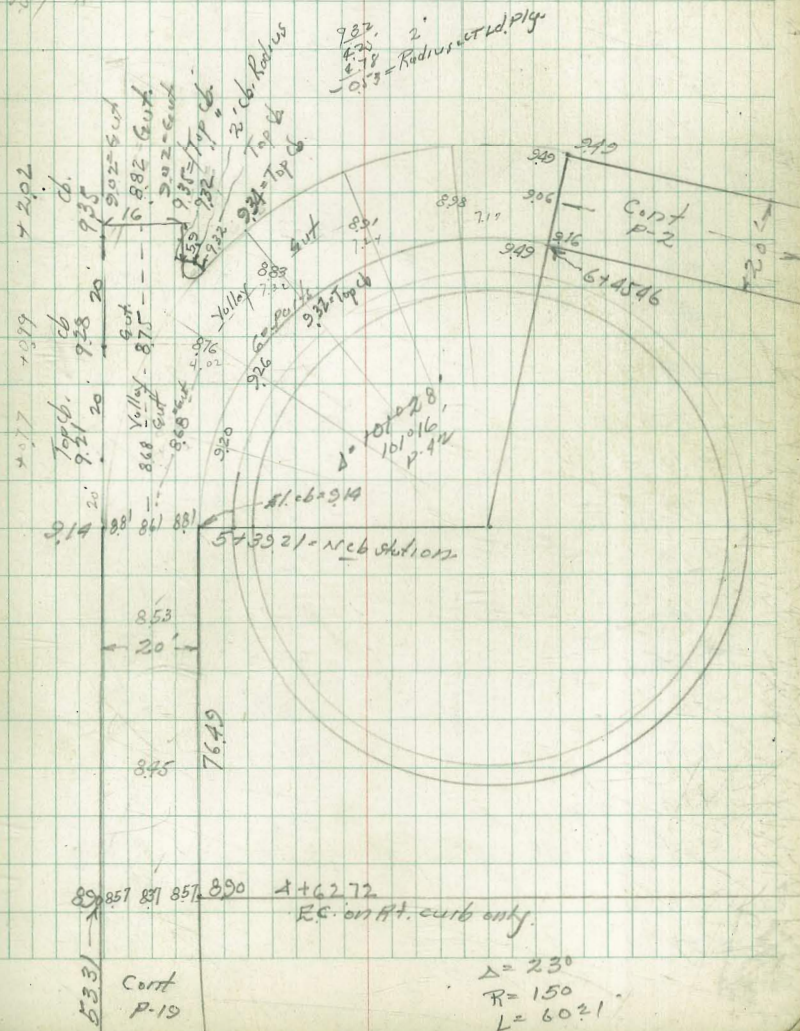
10.00 = B.M.
6.14 +
16.14 T

Lt.	"A"	"B"	B.C.		
	8.70	8.80	8.90	8.98	9.06
	7.44	7.34	7.24	7.16	7.08
	5.82	6.21	7.84	6.22	6.18
	+1.62	+0.93	-0.60	+0.94	+0.90
				+0.45	

Grades for Valve Box Between "B" + 462.72 P-19

S side	W. side	W. side	E side
8.49	8.48	8.51	8.50
7.65	7.66	7.63	7.64
6.15			
+1.50			

10.00 = B.M.	"A"	"B"	B.C.									
2.84 +	8.70	8.80	8.90	8.98	9.06	9.14	9.20	9.26	9.32	9.38	9.44	9.49
12.84 T	4.04	3.94	3.86	3.78	3.70	3.62	3.54	3.46	3.38	3.30	3.22	3.14
3.62 T	2.24	2.16	2.08	2.00	1.92	1.84	1.76	1.68	1.60	1.52	1.44	1.36
5.10 T	+1.10	+0.68	+0.25	-0.18	-0.55	-0.92	-1.29	-1.66	-2.03	-2.40	-2.77	-3.14
14.36 T												

10.00 = B.M.
3.57 +
13.57 T

Walker
Osborne
Hazard
3-2-43
Grades for Baffle Plates
Clariflocculator Tanks #1, 2, 3
Disposal Plant
Tank #1

4.53 14.530 10.00

BM #2
3 P. 10 Tank
Top of Whier
Elev.

Plate #					
#1	8.285	6.245	6.54	-0.295	
#2	8.292	6.238	6.54	-0.302	
#3	8.29	6.24	6.54	-0.30	
#4	8.283	6.247	6.540	-0.293	
#5	8.263	6.267	6.540	-0.273	
#6	8.273	6.257	6.540	-0.283	
#7	8.28	6.25	6.54	-0.29	
#8	8.287	6.243	6.54	-0.297	
#9	8.285	6.245	6.54	-0.295	
#10	8.29	6.24	6.54	-0.30	
#11	8.29	6.24	6.54	-0.30	
#12	8.293	6.237	6.54	-0.303	
#13	8.288	6.242	6.54	-0.298	
#14	8.29		6.54		
#15	8.30		6.54		
#16	8.306				
#17	8.308	6.222	6.54	-0.318	
#18	skip				
#19	8.301				
#20					
#21	8.27	6.26	6.54	-0.28	

Cont. P-22

Indexed
C.S.M.

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1948

Fills

Tank # 1

Cont. from p. 21

1453

Plate # 22	8.29			
" # 23	8.28			
# 24				
# 25				
# 26				
" 27				
" 28	8.288			
" 29 ✓	8.278	6.252	6.540	- 0.288
" 30	8.294			
" 31	8.288			
" 32	8.30			
" 33 ✓	8.294	6.236	6.54	- 0.304
" 34	8.303			
" 35	8.292			
" 36	8.302			
" 37 ✓	8.298	6.232	6.54	- 0.308
" 38 skip				
" 39	8.29			
" 40 "				
" 41 ✓	8.312	6.218	6.54	- 0.322
" 42	8.305			
" 43	8.307			
" 44	8.309			
" 45 ✓	8.310	6.22	6.54	- 0.32

Cont. p. 21

Tank #1

14530

# 46	8,302	5,228	
# 47	8,305		
# 48	8,308		
# 49 ✓	8,310	6,22	6,54
# 50	8,324		
# 51	8,316		
# 52	8,318		
" 53 ✓	8,311	6,22	6,54
" 54 ✓	8,311		
# 55	8,316		
" 56	8,305		
" 57 ✓	8,298	6,232	6,54
# 58 skip			
# 59 "			
" 60 "			
# 61 ✓	8,297	6,233	6,54
" 62	8,273		
# 63	8,294		
# 64	8,296		
" 65 ✓	8,288	6,242	6,54
" 66	8,284		
" 67	8,272		
" 68	8,292		
" 69 ✓	8,280	6,25	6,54
" 70	8,292		

Cont p 24

23

Fills:

-0.32

-0.32

-0.308

-0.307

-0.298

-0.29

	Tank #1				
	14.53	Rods		Elev. Micr	
Photo # 71		8303		6.540	
72		8282			
73		8297	6.233	6.54	-0.317
74		8280			
75		8288			
76		8296			
77		8294	6.236	6.54	-0.304

#21	8.69	14.950		6.260	
25			8.704	6.246	6.54
29			8.712	6.238	0.294
33			8.720	6.230	
9			8.710	6.240	

Tank # 2 Grades for Buffalo Plate
 Disposal Plant.
 This one ^{Levels} taken at Adjusting Levels

INDEXED
 WK
 OCT 27 1948

	5.453	15.453	10.00	
Plate #1	9.257	6.196	6.540	-0.344
#2	9.240	6.213	6.540	-0.327
#3	9.276	6.177	6.540	-0.363
#4	9.252	6.201	6.540	-0.339
#5	9.261	6.192	6.540	-0.348
#6	9.275	6.178	6.540	-0.362
#7	9.298	6.205	6.540	-0.335
#8	9.230	6.223	6.540	-0.317
#9	9.239	6.214	6.540	-0.326
#10	9.253	6.200	6.540	-0.34
#11	9.279	6.174	6.540	-0.366
#12	9.252	6.201	6.540	-0.339
#13	9.298	6.155	6.540	-0.385
#14	9.310	6.143	6.540	-0.397
#15	9.250	6.203	6.540	-0.337
#16	9.264	6.189	6.540	-0.351
#17	9.263	6.190	6.540	-0.35
#18	9.238	6.215	6.540	-0.325
#19	9.273	6.180	6.540	-0.36
20	9.236	6.217	6.540	-0.323

Walker
Osborne

Tank # 3 Grades for Miers = Baffle Plate

Disposal Plant

INDEXED

460 14.600

INDEXED

Plate #

1	8.394	6.206	6.540	-0334
2	8.396	6.204	6.540	-0336
3	8.392	6.208	6.540	-0332
4	8.397	6.203	6.540	-0337
5	8.378	6.222	6.540	-0318
6	8.403	6.197	6.540	-0343
7	8.400	6.20	6.540	-034
8	8.393	6.207	6.540	-0337
9	8.402	6.198	6.540	-0342
10	8.389	6.211	6.540	-0329
11	8.405	6.195	6.540	-0345
12	8.402	6.198	6.540	-0342
13	8.390	6.210	6.540	-033
14	8.383	6.217	6.540	-0323
15	8.381	6.219	6.540	-0321
16	8.390	6.21	6.540	-033
17	8.415	6.185	6.540	-0355
18	8.412	6.188	6.540	-0352
19	8.414	6.186	6.540	-0354
20	8.372	6.228	6.540	-0318

26

INDEXED

WK
OCT 27 1948

Walker
Osborne
Hazard
8-19-43

- Disposal Plant -

Elevations Float Control Boxes

	6.14	^π 16.14		10.00
T.P.	21.64	37.78	9.00	16.14
B.M.s - ct. Ld. Ply. Each Box		3.78		34.00
chk. Top Tank		2.78		35.00

Indexed
c.s.k.

INDEXED
1948

Walker
5.15.07.
8.15
Higley

Disposal Plant.
Additional Grades for Curb etc.

Station	Rt Grades	Lt Station	Lt Grades
1+66.40=8C.Rt.	9.65		
+82.07	9.61		
+97.74	9.56		
2+13.41	9.52		
+29.08 out	9.48		
+31.37=PCC 10'cb.R.	9.47		
on East E.G. at Blvd	9.53		
" West " " "	9.48		
2+64.18 P.C. 10'cb.R.	9.37		
2+87.58 = 2 Tank ^{opp}	9.29	6+12	
3+17.58	9.20	157.89	8.17
+47.58 ^{opp} Tank = 8th	9.10	①	8.52
3+65	8.96	②	8.57
4+02.50=8C.	8.90	③	8.61
+17.57	8.90	④	8.65
+32.62	8.90	⑤ opp 4+62.72 ^{opp} on Rt EG	8.70
+47.67	8.90	(2-26.65)	8.80
+62.725 F.C. = 8th	8.90	1-1-8th	8.90
+88.21	8.98	(25.50)3	8.98
5+13.71	9.06		9.06
+89.21 = 8C at Tank #3	9.14	← opp - 8C. Tank #3	9.14

10.00
276-
17.76
343-
933
3801
13.137

Indexed
e.s.k.

PCC at Blvd. at Hk

Rt	265	261	256	252	248	247	253	248	237
	348	352	357	361	365	366	366	365	376
	344				out	407	375	412	426
	+0.08					-0.41	-0.15	-0.47	0.50

Rt	929	920	910	896	890	890	890	890	898	906	910
	347	352	366	360	386	386	386	386	378	370	362
	343		361	357	319	321	321	322		380	390
	0.00		0.00	0.22	+0.67	+0.87	+0.61	+0.44		-0.20	-0.28
	cb High		High								

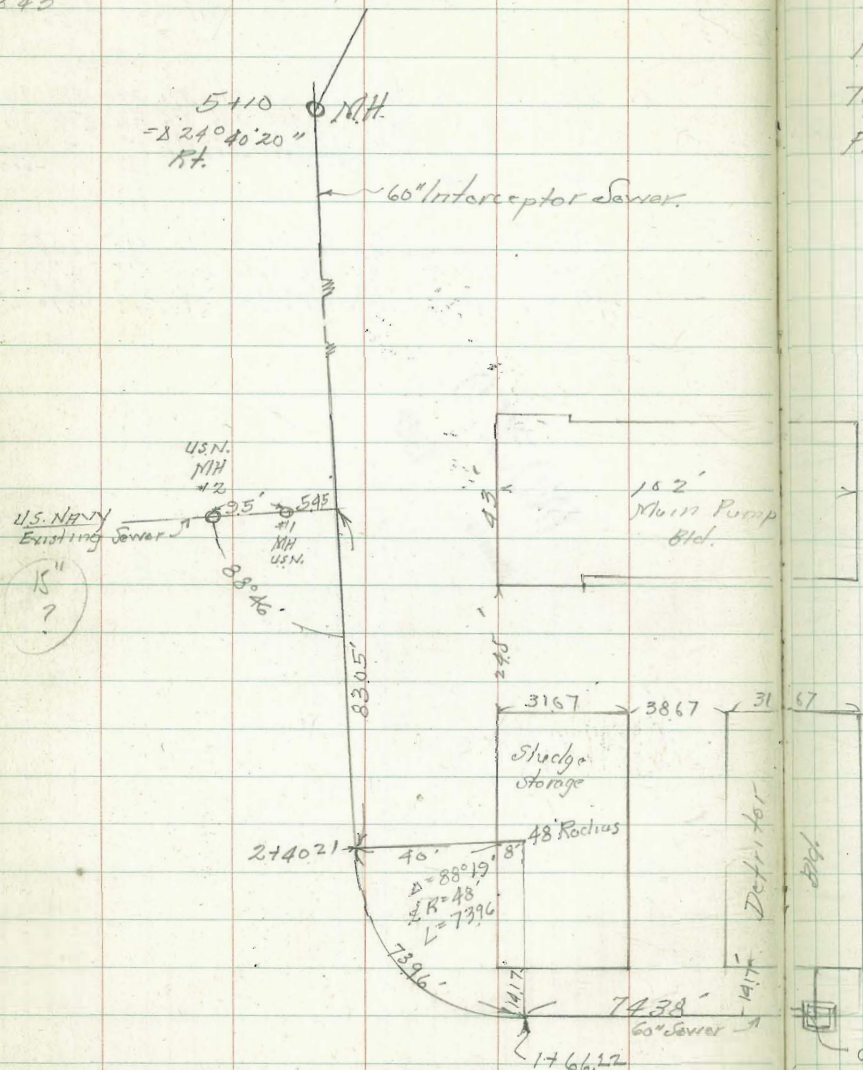
Lt	847	852	857	861	865	870	880	890	898	906	914
	4.29	4.24	4.19	4.15	4.11	4.06	3.96	3.86	3.78	3.70	3.62
	3.14	3.26	3.26	3.21	3.15	3.05	3.02	2.95	2.88	2.80	2.77
	+1.15	+0.98	+0.93	+0.90	+0.94	+1.01	+0.89	+0.91	+0.90	+0.90	+0.85

INDEXED
1948

Walter
Osborne
Hogers
Hogers
7-28-43

Disposal Plant

Location And Elevations of Navy Sewer
M.H.s at Interceptor Sewer



indexed
C.S.K.

	4.97	12.64	7.67	Elev. Stake P-19
Flow MH #1			2.052	-7.88
Top MH #1			4.69	7.95
Flow MH #2			2.046	-7.82

INDEXED
1948

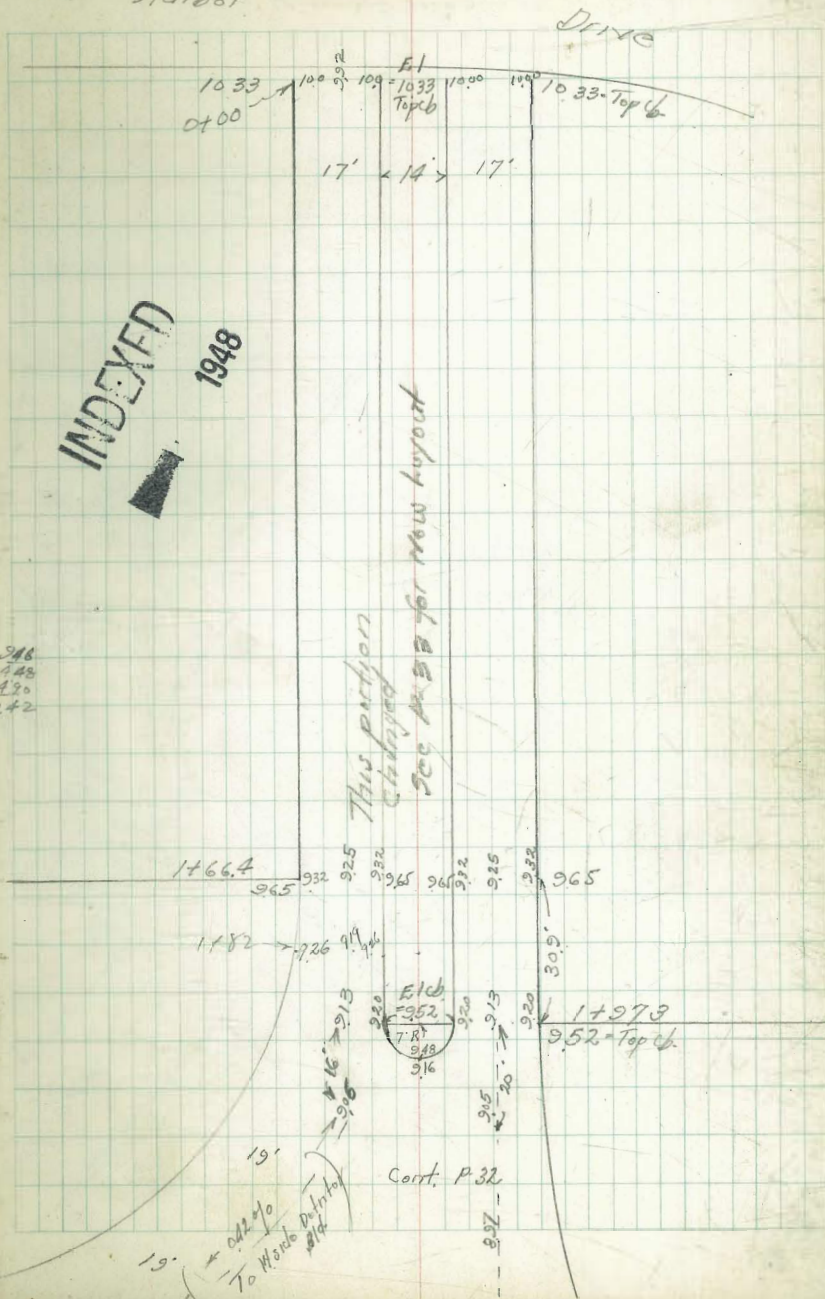
0+00 = Inside edge of
= 0+91.84 = Equations

Walker 11-9-48
 Osburn
 Hogshead
 Disposal Plant Curb Grades
 New Park Design Curbs from
 Harbor Drive

Station	E/cb
0+00	10.33
+25	10.23
+50	10.13
+75	10.03
1+00	9.92
+25	9.82
+50	9.72
	9.65

10.00-8M	Rt.	10.33	10.23	10.13	10.03	9.92	9.82	9.72	9.65	
396		363	373	383	393	404	414	424	431	
13.967		3.71	3.53	3.72	3.78	3.98	4.39	4.57		
		-0.08	+0.20	-0.07	-0.05	+0.06	-0.25	-0.33		
	L	10.33	10.23	10.13	10.03	9.92	9.82	9.72	9.65	9.52
		363	373	383	393	404	414	424	431	444
		3.89	4.00	4.28	4.34	4.83	5.27	4.87	4.81	4.90
		-0.17	-0.27	-0.15	-0.03	-0.37	-0.13	-0.33	-0.50	-0.46
										1.471
	L	10.33	10.23	10.13	10.03	9.92	9.82	9.72	9.65	9.52
		363	373	383	393	404	414	424	431	444
		4.05	4.54	3.75	4.32	4.81	4.49	3.92	3.71	4.54
		-0.42	-0.81	+0.08	-0.37	-0.27	-0.35	+0.32	+0.36	-0.15

Indexed
 W.K. Harbor



Walker
Hazard
Hudson
1-17-44

Disposal Plant
Grades for Concrete Footings
for Lumber Pile Storage

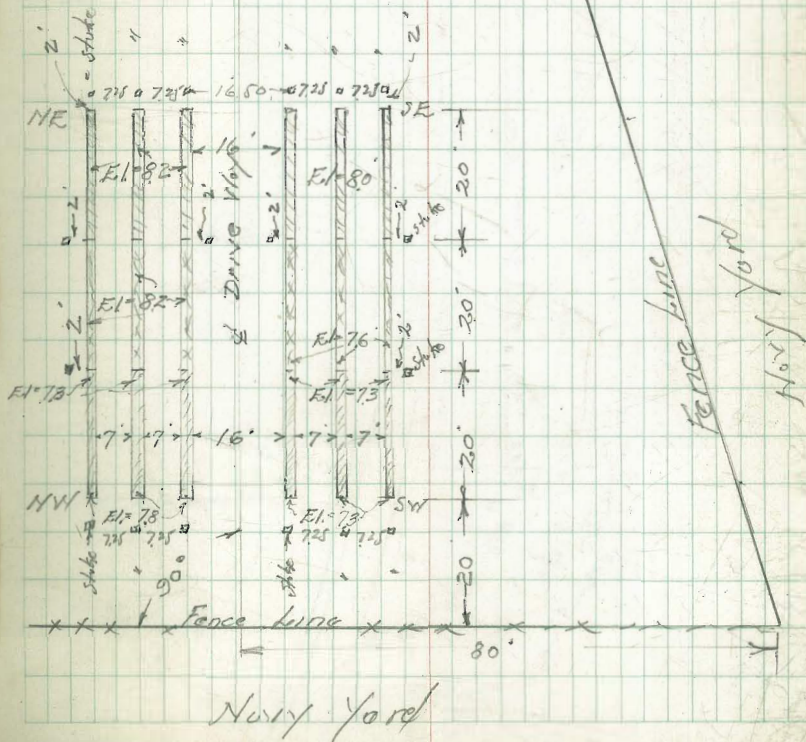
			BM
2.25	12.25		10.00
4.11	12.20	4.16	8.09

Width Curbing or Footing. - 0.5' Top
0.8' Bottom

INDEXED
W.R.

35

INDEXED
1948

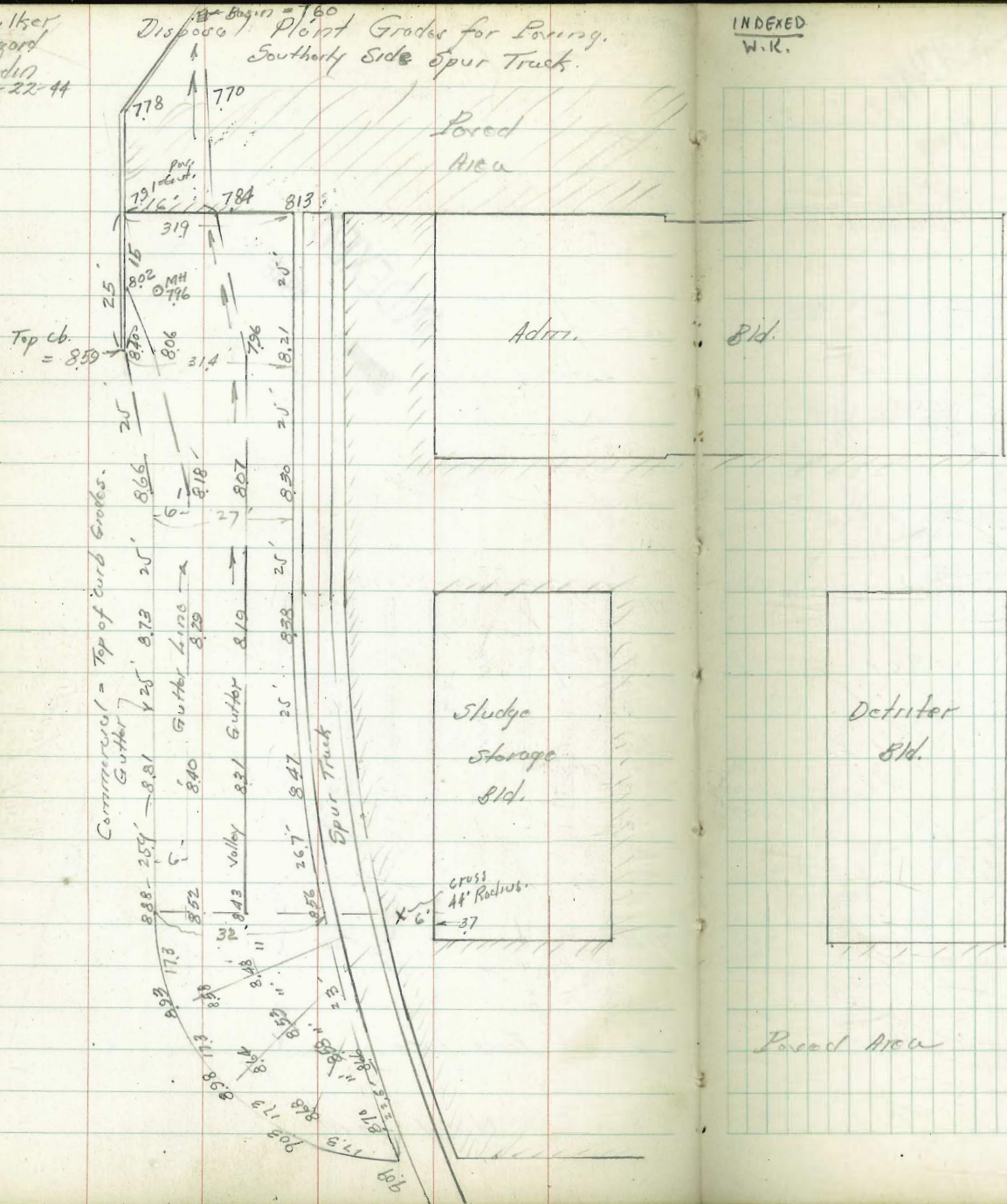


Walker
Hogard
Harden
3-22-44

Disposal Plant Grades for Parking
Southern Side Spur Tracks.

INDEXED
W.R.

36

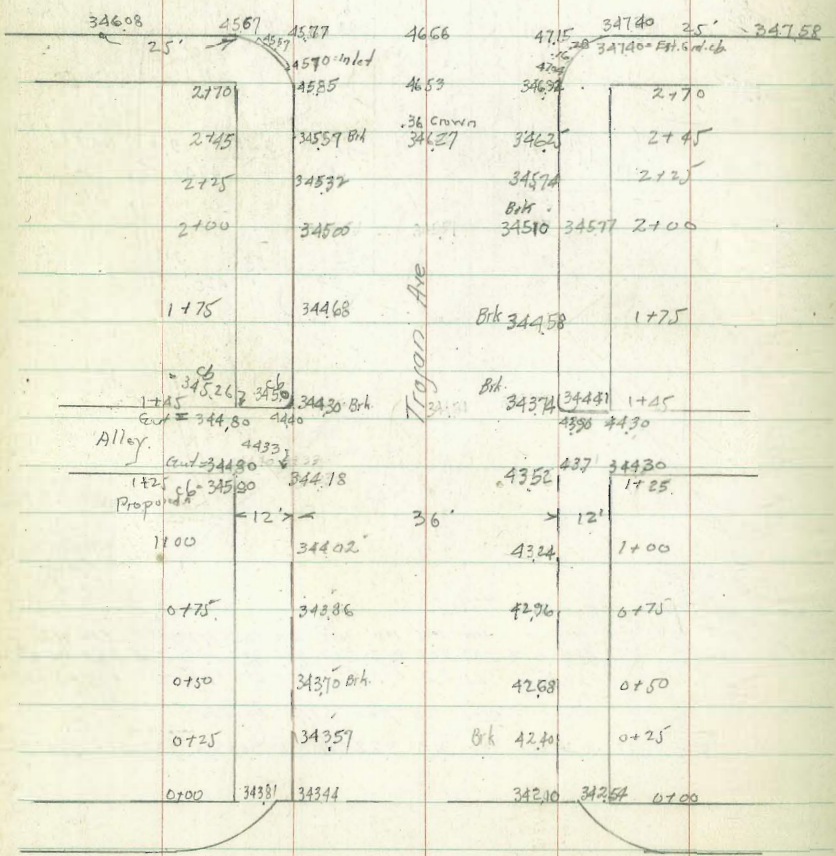
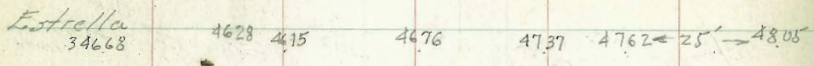
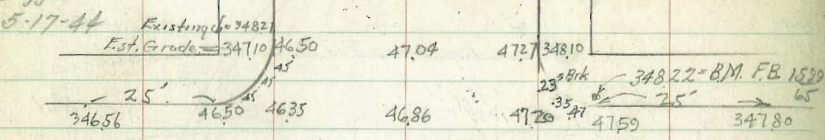


INDEXED
1948

Paved Area

Walker
Hogard
Hurdin
Boeggs

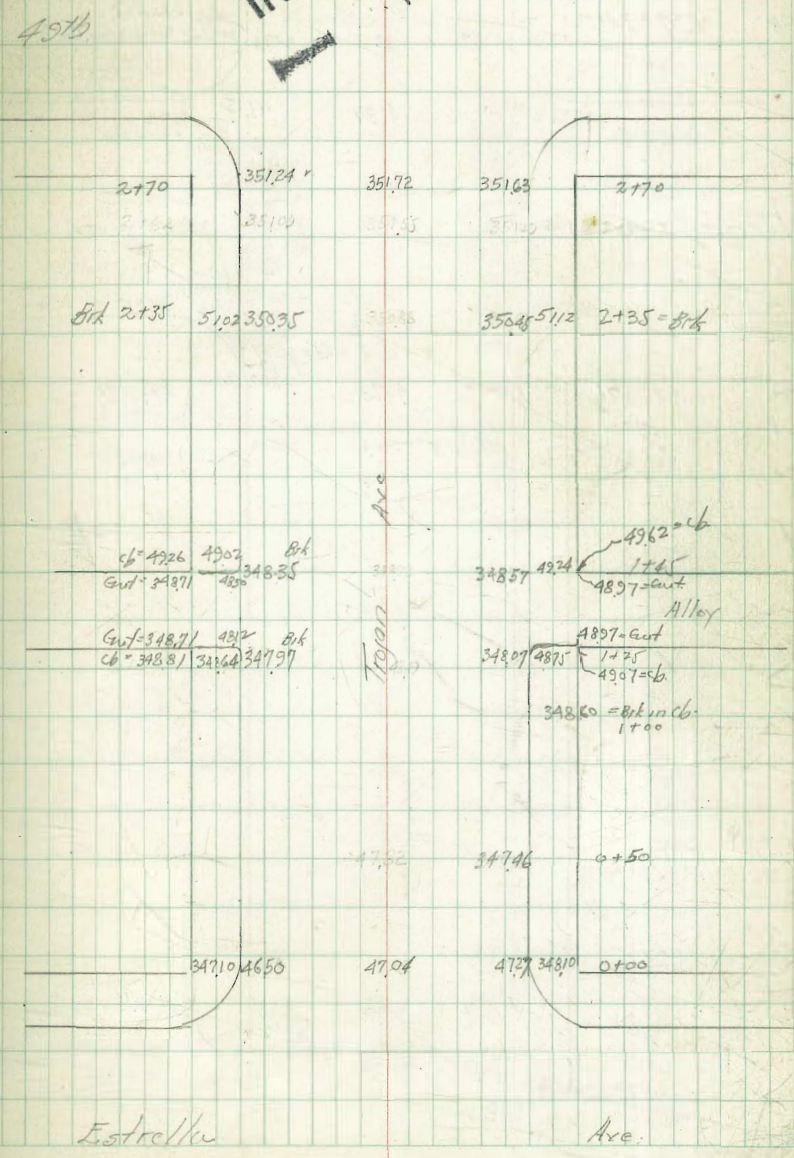
Gutter Grades for Surfacing
Trojan Ave. - from 48th to 49th



4874

INDEXED
W.K.

INDEXED
1948



Estrella

Ave.

Walker
Hazard
Hordin
Boggs

Gutter Grades - Surfacing

ESTRELLA AVE.
from El Cajon Blvd.
to Orange Ave

FB 811-34822
1539 65

34727 47.26 47.37 47.15 46.92

Trojan 34704 46.86 46.76 46.66 34663 Ave.

46.92 46.35 46.15 45.77 45.75
Inlet 45.70
L. Inlet = 345.57
345.61 345.72 346.6
4738.71 347.0 346.50 46.28 4138.71
346.56 346.68 346.08 41137.1

Estrella Ave.

Bk = 0725 350.03 49.36

071801

07100

350.22 349.54 349.84

349.35 350.02

349.46

350.23

B.M.

El Cajon

INDEXED
W.K.

INDEXED

39

1919

Orange

See Page 40
for Intersection.

Ave.

670017 346.58 345.80
+75 344.90
+50 44.52.93
+25 43.25.17
5100 42.40.27
+75 41.54.41
+50 346.55

Bk 4115.85 3403 339.80
" 3193.85 3398 339.87
" 3175.85 3395 339.84
" 3155.85 3409 339.72
" 3135.85 3406 339.69

3100.85 3413.00
+75 342.20
+50 343.27
+25 344.26
2700.85 345.24.09

Bk 1175.85 346.26 346.23
Bk 1150.85 347.18 347.03
347.36
Bk 1100.85 348.41 347.70

FB 1599-65 07585 347.80 Bk
07585 347.9 Bk
B.M. Bk 0725.85 348.38 347.75
348.22 0700 347.59
Established Grade 347.59

Estrella Ave.

345.80 345.4 670017
344.90 +75
344.01 +50
343.11 +25
342.22 5700
341.31 +75
340.41 +50

339.20 339.9 115.85
338.68 339.4 115.85
338.17 339.2 115.85
338.72 339.4 115.85
339.33 340.0 3135.85
340.67 3100.85
341.61 +75.85
342.56 +50.85
343.49 +25.85
344.43 345.10 2700.85 Bk
345.18 45.78 +75.85
345.93 346.56 +50.85
346.67 47.34 1125.85

347.41 348.16 1100.85 = Bk.
347.63 348.23 07185
347.73 07585
348.05 347.68 0735.85
347.80 347.75 0725.85
347.40 347.59 0715.85
348.22 = Est. Gd.

Trojan

Ave

Walker
Hogard
Jaggs
6-30-44

Elevations - Gauges
for Water Dept.

at 30th and Broadway and 31st Broadway
Sta. 811
Broadway
& 30th

	3.36	198.44		195.08
Sta. Top Hydt. 30th & Broadway	1.11			197.33
Sta. Gauge 30th & Broadway	2.73			195.71
T.P.	0.73	186.38	18.79	185.65
T.P.	0.04	173.45	12.27	173.41
T.P.	1.18	162.08	12.55	160.28
T.P.	0.87	150.27	12.68	149.40
Gauge at Sand Trap		14.80	135.47	31st & Broadway
T.P.	10.74	160.72	0.29	149.98
T.P.	11.74	172.04	0.42	160.30
T.P.	12.85	184.58	0.31	171.73
T.P.	12.90	197.04	0.44	184.14
chk. starting B.M.			11.96	195.08

Indexed
c. 5.16

INDEXED

Cont. from P-42

Cross Sections for Walk-Excavations
1446

0+00	5.09	
35' W.	5.4	
0+19.8	5.4	
35' W.	5.5	
0+39.6	5.6	8.9
35' W.	5.6	
0+59.4	5.7	
35' W.	4.8	
0+79.2	5.2	
35' W.	4.7	
1+00.75	5.0	
35' W.	4.6	
1+24.6	4.5	10.0
3' W.	4.5	
1+48.19=	4.5	10.0
3' W.	4.6	
1+70.96	4.4	10.1
3' W.	4.4	

Profile of Gas line

	+	H.I.	-	Elev
BM.	4.13	19.13		10.00
0+00			2.5	11.6
+025			2.7	11.5 Walk
+055			2.8	11.5 "
+24			2.91	12.72
+37			2.8	11.3
+45.07			5.25	8.9
1+02.07			4.96	stage = 9.17 ^{cb} - 514
+61			4.8	9.3
+70.91			4.92	9.7
+96.			4.9	9.2
2+17.17			5.06	9.0
+31.31			5.28	8.8
+65			5.6	8.5
3			5.3	8.8
+46.31			4.25	9.9
+71.31			4.09	10.0

(Locations FB 1686-17)

Walker
Hogard
Hogard
7-16-45

DISPOSAL PLANT — Grades
GAS Burner And Pipe line
WASTE GAS SYSTEM
Drawing No 816-1-D
Location FB. 1680 Page 17

Stations	414	14.14	10.00	Elev. Flow line	Cuts	Offsets
0+00		0.14	14.00	8.00	+6.00	cut mark on h.
+24 ΔH 45°		2.41	11.73	7.88	+3.85	3' ht.
+45.7 ΔH 45°		3.96	10.18	7.78	+2.40	"
+73.57		3.50	10.64	7.64	+3.00	"
1+02.07 2" Sump Box		3.86	10.28	7.50	+2.78	"
+30		3.41	10.73	7.57	+3.16	"
+60		3.23	10.91	7.63	+3.28	"
+90		3.75	10.39	7.69	+2.70	"
2+17.17 ΔR 45°		5.20	8.94	7.75	+1.19	
2+31.31 R 45°		5.32	8.82	7.78	+1.04	
+66.31		5.89	8.25	7.86	+0.39	
3+01.31		5.33	8.81	7.93	+0.88	
+34.31 = Bk		4.80	9.34	8.00	+1.34	
+43.31 = Bk		4.52	9.62	11.00	-1.38	
+71.31		4.11	10.03	11.00	-0.97	
(1+02.07) 2" Invert at Tank No 3	Clor. 418 1.41	9.96	7.00		+2.96	
(1+70.21) at No 2 Primary Tank		12.73	7.73		+5.00	

INDEXED
W.K.

44

INDEXED

1019

Grades - W. Road - P. 45

24 Rad. Ret. on S. end.	elw. stake	Top cb.	
PC - Meet.		15.24	
1/4	15.56	15.21	C 0.35
1/2	15.75	15.25	C 0.50
3/4	15.89	15.32	C 0.57
E.C. = 0+24	16.13	15.45	C 0.68
0+50	16.54	16.05	C 0.49
1+00	17.70	17.21	C 0.59
1+34 = PC.	17.88	18.00	F 0.12
+50	18.79	18.33	C 0.46
+70	19.43	18.75	C 0.68
+90			
2+05	20.39	19.48	C 0.91
2+20			
+30	21.30	20.00	C 1.30
+40			
+50	21.45	20.42	C 1.03
+60			
+70	21.59	20.84	C 0.75
+80			
2+93 = Meet.	✓	21.32	
Exist cb.			

See Page 48

		top cb	Grade
1+57 = 3' Rad. on E.	18.65	18.48	C 0.17
	18.75		
	18.69	19.48	F 0.79
	19.16	20.00	F 0.84
	19.56	20.42	F 0.86
	20.06	20.84	F 0.78
	✓	21.32	

Walker
Hazard
Hurdin
4-4-45

SEWER CONSTRUCTION GRADES
on 43rd from E. C-st. to a point
200' North of E. C-st.
And on C-st. from E. 43rd 150' West
Drawing # 429-5 Other Const. on Sewer in 43rd P. 50-P. 67

43rd St. - Line

Station	Elev.
E. C-st. 198.85	181.16
= 0+00 L Drop M.H. No 7	184.00
+40	185.92
+80	187.84
+120 TP	189.76
+160	191.68
+200 DE.	193.60

C-st - Line

Station	Elev.
E. 43rd Drop 198.85	181.16
= 0+00 L M.H. No 7	184.00
+40	185.92
+80	187.84
+120	189.76
+150 End	191.68

INDEXED
WK

190.48 = B.M. S.M. Spt. in Pole 43rd & C-st.

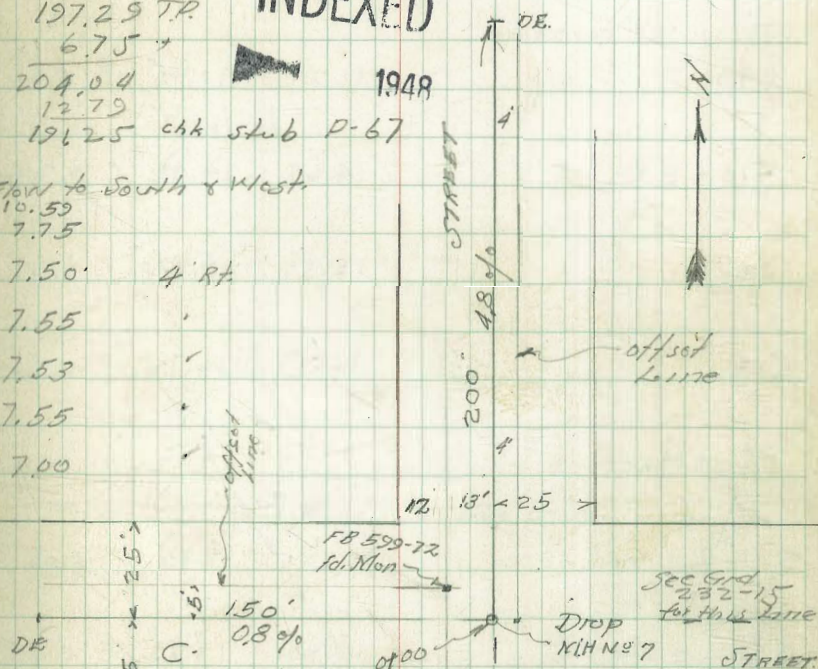
8.37 +
198.85 +
1.56 -
197.29 TP
6.75 +
204.04
12.79
191.25 chk stub P-67

INDEXED

1948

Flow to South & West

10.59
7.75
7.50 4 RT
7.55
7.53
7.55
7.00



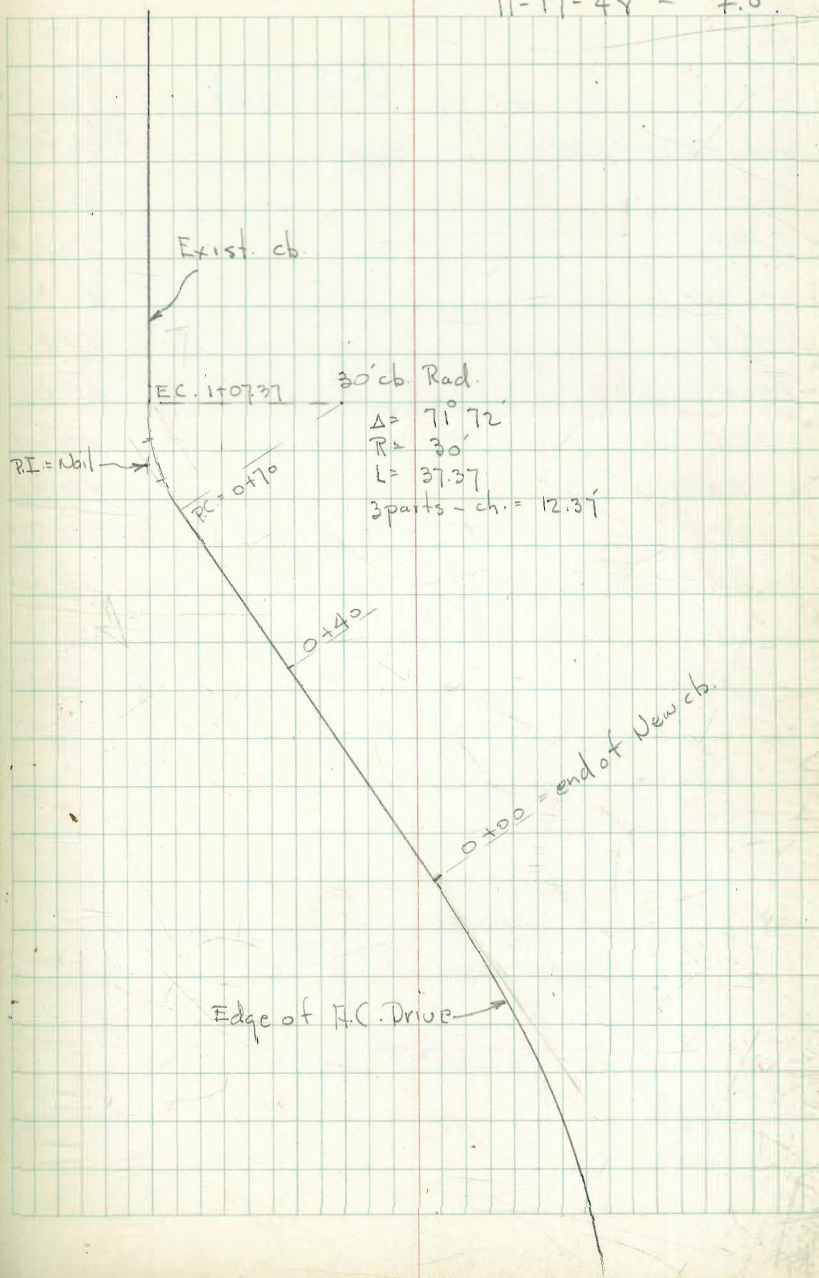
10.59 5 RT
9.51
8.25
7.02
6.00

Note: For Grades
From M.H. No 7
150' East see
Grade 232
Book 15-16

43rd
Friday Street
(Construction Notes P. 67)

11-17-49 - 7.0

Hill Drive 0+00 = End. of cb. on 0.4' curb face	07.16	07.62	F 0.46
+40	11.29	11.45	F 0.16
+70 = E.C.	14.68	14.42	C 0.26
1/3	15.59	15.82	F 0.33
2/3	16.47	16.72	F 0.25
P.C. = Meet cb.		17.12	
on E. curb along Nty. of Parking lot.			
P.C. 10' Rad. = end of cb.		18.75	Top cb.
E.C. = 0+00	17.87	18.52	F 0.65
0+22.2		18.56	C 0.10
0+44.4	18.75	18.41	C 0.34
0+66.6	18.70	18.35	C 0.35
0+88.8 = E.C. 10' Rad. on W.	18.23	18.30	F 0.07
P.C. = Meet end of cb.		18.55	Top cb.



Walker
 Heard
 Hurdin
 Begg
 5-9-44

Gutter Grades on Broadway Ave
 from 3rd to 4th
 (City Repair Work)

649	45.24	39.45	S. W. B.P. Broken + 3/4" Floor Gut.
0200 - E.L. 3rd Ave			
+05		40.33	
+25		40.61	
+50		40.96	
+75		41.31	
1+00		41.66	
+25		42.01	
+50		42.36	
+75		42.71	
1+95.4		43.00	

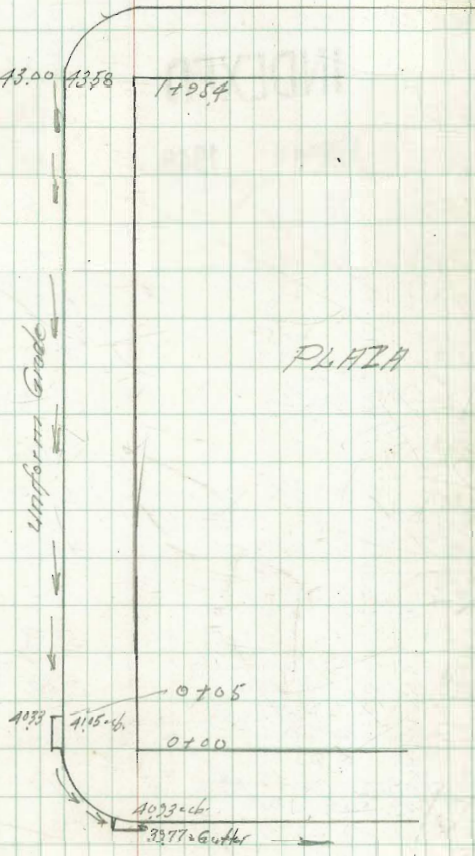
INDEXED
 W.K.

INDEXED

1948

4th Ave.

Broadway Ave



3rd Ave

Walker
Hagard
Hardin
3-21-44

Grades for Sewer
in Hilltop Drive Ad on 43rd St.
Between Hilltop & C-sts.

Drawing #429-5
172.33

Station	on Pipe	MH	Top	St.	Elev.	Flow
0+00			175.98	stake	157.88	
0+46.77			5.97	166.36	159.38	
1+29			6.61	165.72	160.88	
1+64			5.57	166.81	162.02	
1+99			3.28	169.05	163.14	
2+49			1.11	171.22	164.26	
2+99			0.26	172.07	165.86	
3+39			0.30	173.39	165.86	
3+79			7.30	175.39	167.46	
4+10.55			5.97	176.72	168.74	
4+49			4.69	178.00	170.02	
4+99			3.56	179.13	171.03	
5+49			3.46	180.23	172.26	
5+99			0.83	181.86	173.86	
6+49			0.32	182.37	175.46	
6+99			3.59	183.66	175.46	
7+27.56			7.44	185.81	177.06	
7+56			5.35	187.90	178.66	
7+99			3.12	190.13	180.26	
8+27.56			1.82	191.43	181.16	
8+56			2.77	190.48	182.51	
8+99			3.2	189.6	183.1	
9+27.56			5.2	187.6	183.1	
9+56			3.7	183.1	187.4	
9+99			5.4	187.4		

INDEXED

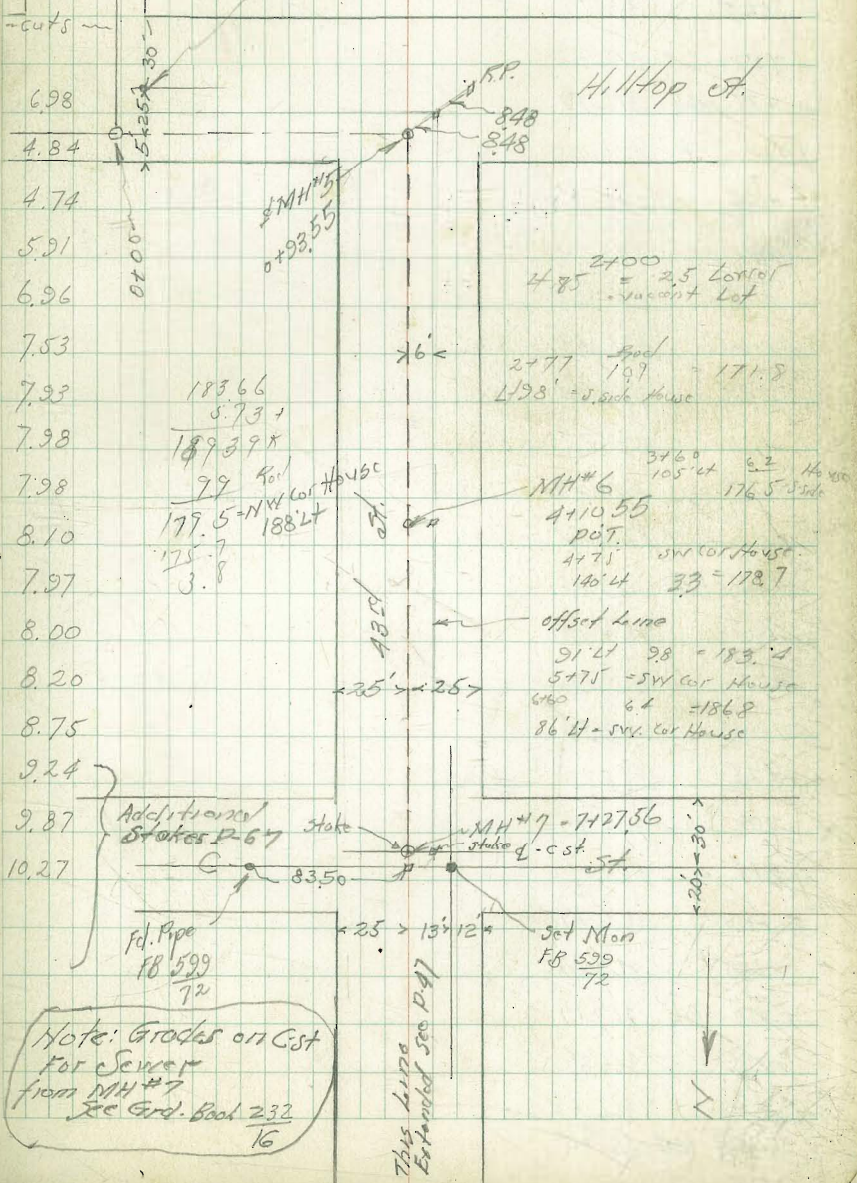
1948

32000

INDEXED
W.K.

N.Y. Hilltop 15519-8M. 34 Iron Pipe
4214 5124 50

160.387
634
160.047
1229
172.33



Note: Grades on C-st
for Sewer
from MH #7
to Grd. Book 232
16

This Line
Extended See P. 47

Walker
H. 2001
H. 12
5-2-44
Gutter Grades - Oregon St.
from Howard To Park
on East Side Street

SL Howard Elev.

= 0+00 π 375.51

+25 373.19

+50 372.98

+75 = Bk 372.77

1+00 372.49

+25 372.20

+50 371.91

+75 371.62

2+00 371.33

+25 371.04

+50 370.75

+75 370.46

3+00 370.17

+25 = Bk 369.88

+50 369.59

+75 369.29

4+00 368.99

+25 368.69

+50 368.39

+75 368.09

5+00 367.79

+25 367.49

+50 = Bk 367.19

+75 366.89

6+00 366.51

+07 = MH color 366.40

INDEXED

W.K.

51

INDEXED

Temp.

BM.

0+26 P-57 = 373.58

1.93

375.51

Note. Grades were plotted to fit
existing paving.

Average width this patch work approx
6'

Walker
Hazard
Hardier
2-7-44

Grades for Culvert
in Lot 2 - Marston Hills
opposite Cypress Ave and Cypress Way.

Plan 2804-B

BM

Top Box 0+00
FB 1660-15 5.23 285.55 Elev. 280.32

Station Existing Box = 0+00
Stakes Flow line
5.23 280.32 275.96

+40 4.57 280.98 275.36

+85.30 = $\Delta 4^{\circ} 27' 57''$ 4.61 280.94 274.68

T.P. 5.09 284.73 5.91 279.64

chk 6 1+367 5.07 279.67

T.P. 0+00 273.33 11.40 273.33

71

1+367.0 = $\Delta 4^{\circ} 49'$ = Bk. 5.10 279.63 273.90 + 5.74

T.P. 0+00 273.33 11.40 273.33

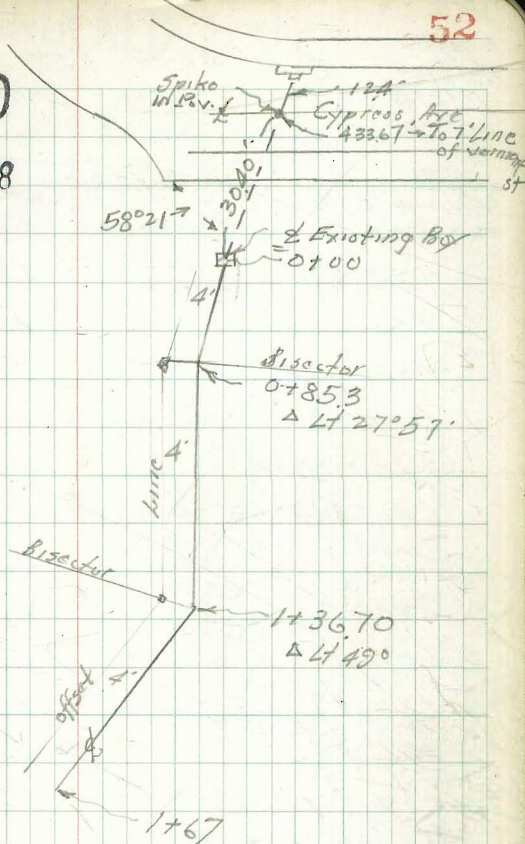
1+67 = End Pipe 7.1 266.23 266.50 - 0.27

INDEXED
W.K.

INDEXED

1948

Cuts offsets



Walker
Hazard
Hardin
1-13-44

Curb Grades on South Side Imp. Ave.
from Eline 65th to 114 66th St.

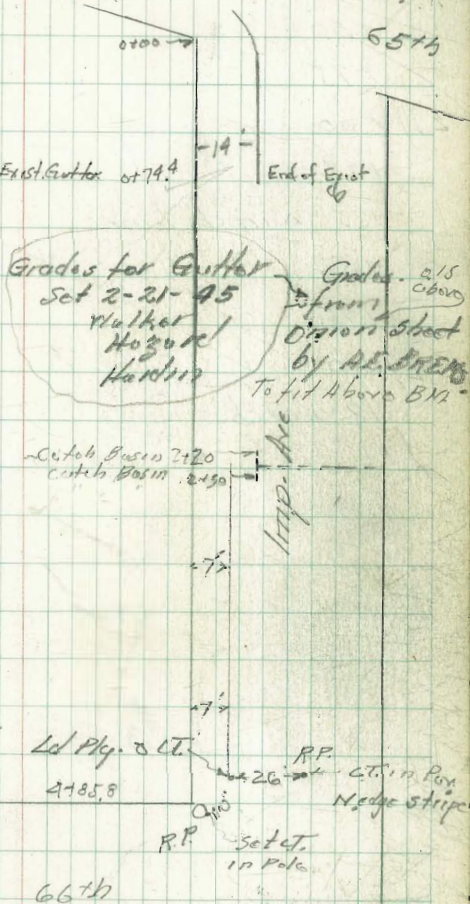
Station	225.62	Elev. Stake	Elev. Top Curb
Eline 65th = 0+00		4.13 221.49	221.30
+25		4.22 221.40	221.23
+50		4.35 221.27	221.17
+75		3.97 221.65	221.10
1+00		4.20 221.42	221.04
+20 = PVC		4.57 221.05	220.98
+40 = Brk.		4.80 220.82	220.94
+60 "		4.93 220.69	220.91
+80 "		4.99 220.63	220.91
2+00 "		5.01 220.61	220.92
+20 "		5.23 220.39	220.95
+30		220.46	
+40 "		5.13 220.49	221.01
+60 "		5.18 220.44	221.08
2+80 = EVC		5.08 220.54	221.17
3+00	03	5.04 220.58	221.27
+40	02	5.09 220.53	221.47
+80	62	4.63 220.99	221.67
4+20	62	3.63 221.99	221.87
+60	75	2.76 222.86	222.07
4+85.8	13	2.14 223.48	222.20

INDEXED
W-12.

INDEXED

53

Proposed	Grade	10'0"	10'0"
Cuts & Fills -	Gutter	B.M. B.P. S.E. Imp. Ave + 85 = 221.15	
+0.19	220.47	Raised 8" per foot. At Storm	.15
+0.17	220.42	To fit General Profile Imp. Ave	221.30
+0.10	220.36	use 83 gutter	4.32
+0.55	220.31		225.62 x
+0.38	220.25	220.27 = End Gutter at 74.4	
+0.07	220.21	+0.84	
-0.12	220.16	+0.66	
-0.22	220.12	+0.57	
-0.28	220.08	+0.55	
-0.31	220.01	+0.60	
-0.56	219.95	+0.44	
-0.52	219.95	+0.51	
-0.64	220.03	+0.46	
-0.63	220.19	+0.25	
-0.69	220.34	+0.20	
-0.94	220.44	+0.14	
-0.68	220.64	-0.11	
+0.12	220.84	+0.15	
+0.79	221.04	+0.95	
+1.28	221.24	+1.31	
	222.00	+1.62	
	222.37	+1.88	
	222.37	+2.11	



Oregon St. Cont. from p-56

380.10

54

2+00	5.56	374.54	374.56	-0.02
+25	5.60	374.50	374.50	0.00
+50	5.73	374.37	374.44	-0.07
+75	5.76	374.34	374.38	-0.04
3+00	5.98	374.12	374.32	-0.20
+28	5.80	374.30	374.26	+0.04
+35 = Δ 177 cb. line				
+57	6.03	374.07		
+75	6.16	373.94		
4+00	6.34	373.76		
+18 = End cb	6.50	373.60		
3+10	5.78	374.32		

75
16
59 = Rod 603 — — 374.07

Walker
Harzoid
Hordin

Grades for 6" Water Main
in Alley Between 37th and 38
From University to Wightman
El. Bot. Pit 6

11-19-43

5L. Univ.
= 0+00

349.09

Elon stake 344.1

+50

4.51 344.58 340.6

1+00 Brk.
+25 Brk.

7.23 339.86 337.0
336.4

+50

342.26 384 338.42 336.2

2+00

3.75 338.51 335.7

+50

3.41 338.85 335.23
335.0

2+75 Brk.
3+00

5.72 336.54 334.16

+50

7.08 335.18 332.47

4+00

8.87 333.39 330.79

+50

10.09 332.17 329.10
328.25

4+75 Brk.
5+00

11.24 331.02 327.75

+50

12.33 329.93 326.75

6+00 N.W. Wightman

13.35 328.91 325.75

Additional Grades

1+25 Brk.

347.85 8.85 339.0 336.4

2+75 Brk.

339.40 1.22 338.18 335.0

4+75 Brk.

7.63 331.77 328.25

chk 5+00 on stake

8.57 331.03
331.02
0.01

Alley, Blk. 56, City Heights

INDEXED
V.L.K.

55

B.M. N.W.B.P. Univ. & 37th = 352.09

Side offsets

Rim MH. FB 1660-9 = 347.38

+4.0 4' LT

1.71

+2.9

349.09

+2.2

10.08

INDEXED

339.01 TP

+2.8

3.35

+3.6

342.26

+2.4

10.00
FB 1660-10
chk top walk 5462

12.23

+2.7

330.03

+2.6

330.06

+3.1

0.03

+3.2

5' RT

+3.2

4' LT

B.M.
Above Rim MH = 347.38

0.97

347.85

8.93

338.93 TP

0.48

339.40

Preliminary Levels
FB 1660-P.9

Oregon St. Curb Grades
on East Side
Between Polk & Howard St

Cont. from P. 57

Station			
	375.50		
5+75	7.85	367.65	367.65
6+00	8.12	367.38	367.38
7+25	8.49	367.10	367.10
6+44 - N.W. Polk on E	8.61	366.89	366.89

Note: B.M. did not check Curb Elevations
by 0.11 Low at Polk 0.18 Low at Howard
and Grades were made to fit Existing Curbs.

Walker
Howard
Hurdin
1-13-44 Levels on Existing Curb East Side Oregon
from St. El Cajon Blvd to Howard St.

To determine Grade for Side Walk
Grades by Brown & Hough Plotted in Field.

N.E.P.

St. El Cajon	11.78	380.10	368.35	
-0+00 curb			5.12	374.98
" " W edge Walk			4.93	375.17 375.17
" " E "			4.83	375.27
0+25 on cb. = Brk. in Walk.			5.20	374.90 374.97 -0.07
750			5.11	374.99 374.91 +0.08
775			5.31	374.79 374.85 -0.06
1+00			5.32	374.78 374.79 -0.01
725			5.45	374.65 374.73 -0.08
750			5.55	374.55 374.67 -0.12
775			5.54	374.56 374.61 -0.05

Cont. P. 54

Cuts & Fills offsets
Grade 3.96 To cb face
" 3.92 " " "
" 3.87

Walker
Hazard
Hurdin

Curb Grades Oregon St (East side)
Between Polk and Howard St.

INDEXED
W.K.

Est. Coates & Hamilton
B.M. N.E.B.P.

57

Station		Elev.	Top curb.
11-17-43	375.50		
0+00 = S.W. Howard on E.			
0+26 = End East cb.	1.92		373.58
0+39.4			
0+50	3.49	372.01	373.32
+75	3.73	371.77	373.05
1+00	3.35	372.15	372.78
+25	4.39	371.11	372.51
+50	4.65	370.85	372.24
+75	4.76	370.74	371.97
2+00	5.14	370.36	371.70
+25	5.53	369.97	371.43
+50	5.70	369.80	371.16
+75	5.93	369.57	370.89
3+00	5.88	370.12	370.62
+19.4 opp ¹¹ End East Ret Wall	5.09	370.41	370.41
+25	5.15	370.35	370.35
+50	5.42	370.08	370.08
+75	5.69	369.81	369.81
4+00	5.96	369.54	369.54
+25	6.23	369.27	369.27
+50	6.50	369.00	369.00
+75	6.77	368.73	368.73
5+00	7.04	368.46	368.46
+25	7.31	368.19	368.19
+50	7.58	367.92	367.92

Cont. P-56

cut & Fills offsets.

-1.31	2.8' from cb
-1.22	"
-0.63	"
-1.40	"
-1.39	"
-1.23	"
-1.34	"
-1.46	"
-1.36	"
-1.32	"
-0.50	"
Grade	
"	4' to cb face
"	4.06 " " "
"	4.12 " " "
"	4.21 " " "
"	3.95 " " "
"	4.0 " " "
"	3.97 " " "
"	4.0 " " "
"	4.09 " " "
"	3.99 " " "

INDEXED

= 368.35
10.401
378.75 x
4.81 -
373.947 p
1.56
375.50 x

Walker
Osborne
Hazard
Hardin
9-30-48

Lowell St. Grades for Drainage
Bet. Shaffer & Scott
Sketch P. 62

Stations	Grades	St. Gutter
EL. Scott = 0+00		+0.20
+0.50		+0.33
+1.00		+0.46
+1.50 = Apex		+0.60
+2.00		+0.43
+2.50		+0.26
W.L. Shaffer = 3+00		+0.10

St. Lowell
= 0+00

GRADES Shaffer St. for Drainage
W.L.
El. Gutter

+0.50	0.00	+0.50
+1.00	-0.15	0.08
+1.50	-0.30	-0.34
+2.00	-0.45	-0.76
+2.50	-0.60	-1.20

INDEXED
W.L.
626 T P-61

58

S.L.

		Apex				
+0.20	+0.33	+0.46	+0.60	+0.43	+0.26	+0.10
608	593	580	566	583	500	616
585		605	589	579	573	590
+0.61		-0.25	+0.17	+0.04	+0.27	+0.26

INDEXED

1948

INDEXED
WK

T
626 W.L.

734 -	000	-0.15	-0.30	-0.45	-0.60
708 TP	626	641	656	671	686
498	582	563	565	576	637
390 T	+0.49	+0.78	+0.91	+0.98	+0.99

EL. +0.50	008	-0.34	-0.76	-1.20
576	618	660	702	746
502	581	555	556	697
+0.74	+0.67	+1.05	+1.46	+0.99

Walker
Osborne
Hugard
Hurdin 9-20-49

JARVIS St. Grades
for Drainage
Ret. Sheffer & Scott
S.L. Gutter Grades
N.L. Gutter Grades

Stations

E.L. Scott

= 0+00

+0.20

+0.30

+0.50

+0.35

+0.42

+1.00

+0.50

+0.55

+0.50

+0.65

+0.67

+2.00

+0.80

+0.80

KEATS St.

Stations

E.L. Scott

0+00

-0.50

-0.50

+0.50

-0.65

-0.65

+1.00

-0.80

-0.80

+0.50

-0.95

-0.95

+2.00

-1.10

-1.10

+0.50

-1.25

-1.25

V.L. Sheffer

= 3+00

-1.40

-1.40

-1.70

+7.0 = 1st East Drainage Ditch

-1.70

466 π P-61 INDEXED W.K.

S.L. +0.20 +0.35 +0.50 +0.65 +0.80
 2.46 4.31 4.16 4.01 3.86
 3.72 3.51 2.92 2.72 1.97
 +0.74 +0.80 +1.24 +1.28 +1.59

N 1030 +0.42 +0.55 +0.67 +0.80
 4.36 4.24 4.11 3.99 3.86
 3.40 2.12 2.16 4.49 3.25
 +0.96 +0.12 -0.05 -0.41 +0.61

INDEXED

INDEXED W.K.

421 π P-61

S.L. -0.50 -0.65 -0.80 -0.95 -1.10 -1.25 -1.40 -1.70
 4.71 4.86 5.01 5.16 5.31 5.46 5.61 5.76
 4.38 4.54 4.69 4.84 4.99 5.14 5.29 5.44
 +0.33 +0.32 -0.04 +0.16 +0.33 +0.44 +0.46 +0.76

470 π P-68

N -0.50 -0.65 -0.80 -0.95 -1.10 -1.25 -1.40 -1.70
 4.71 4.86 5.01 5.16 5.31 5.46 5.61 5.76
 4.10 4.82 4.63 4.89 4.78 4.38 4.02 3.57
 +0.61 +0.04 +0.38 +0.36 +0.53 +1.08 +1.28 +2.01

Walker
Osborne
Hugely 9-30-43 for Drainage as per sketch.
Hugely
Stations.

INGELROY ST. GRADES

INDEXED
W.K.

Stations.	SL Grades	N.L. Grades
W.L. 100 W.M.L. SCOTT = 0+00	-0.23	-0.40
+50 = W.L. SCOTT 1+00	-0.51	
F.L. SCOTT = 0+00	-0.80	-0.80
750	+0.8	+0.10
1+00	+1.00	+1.00

-004 - BM #59 P-61

60

470+

466K

SL	-0.23	-0.51	-0.80	-0.84	+0.08	+1.00
	4.89	5.17	5.46	5.50	4.58	3.66
	3.82	4.17	4.46	3.07	3.79	4.00
	+1.00	+1.00	+1.00	12.43	+0.77	-0.34

N	-0.40	-0.90	-0.84	+0.10	+1.00
		5.50	4.56	3.66	
		2.32	3.06	3.05	
		+3.18	+1.50	+0.61	

INDEXED

1948

Walker
Osborne
Hugory 9-30-43 for Drainage as per sketch.
Hugory

INGELWY ST. GRADES

INDEXED
W.K.

Stations.

W.L.
100' NW L. SCOTT
= 0+00

S.L.
Grades

-0.23

-0.51

-0.80

-0.84

+0.08

+1.00

N.L. Grades

-0.40

-0.80

+0.10

+1.00

-0.02 - BM #59 P-61

470+

466K

60

SL	-0.23	-0.51	-0.80	-0.84	+0.08	+1.00
	4.89	5.17	5.46	5.50	4.58	3.66
	3.82	4.17	4.46	3.07	3.79	4.00
	+1.00	+1.00	+1.00	+2.43	+0.79	-0.34

N	-0.40	-0.70	-0.84	+0.10	+1.00
			5.50	4.56	3.66
			2.32	3.06	3.05
			+3.18	+1.50	+0.61

INDEXED

1948

Walker
Osborne
9-17-43
India & Market Paving
& Resurfacing Portions
of Western lumber yards

INDEXED
WTK

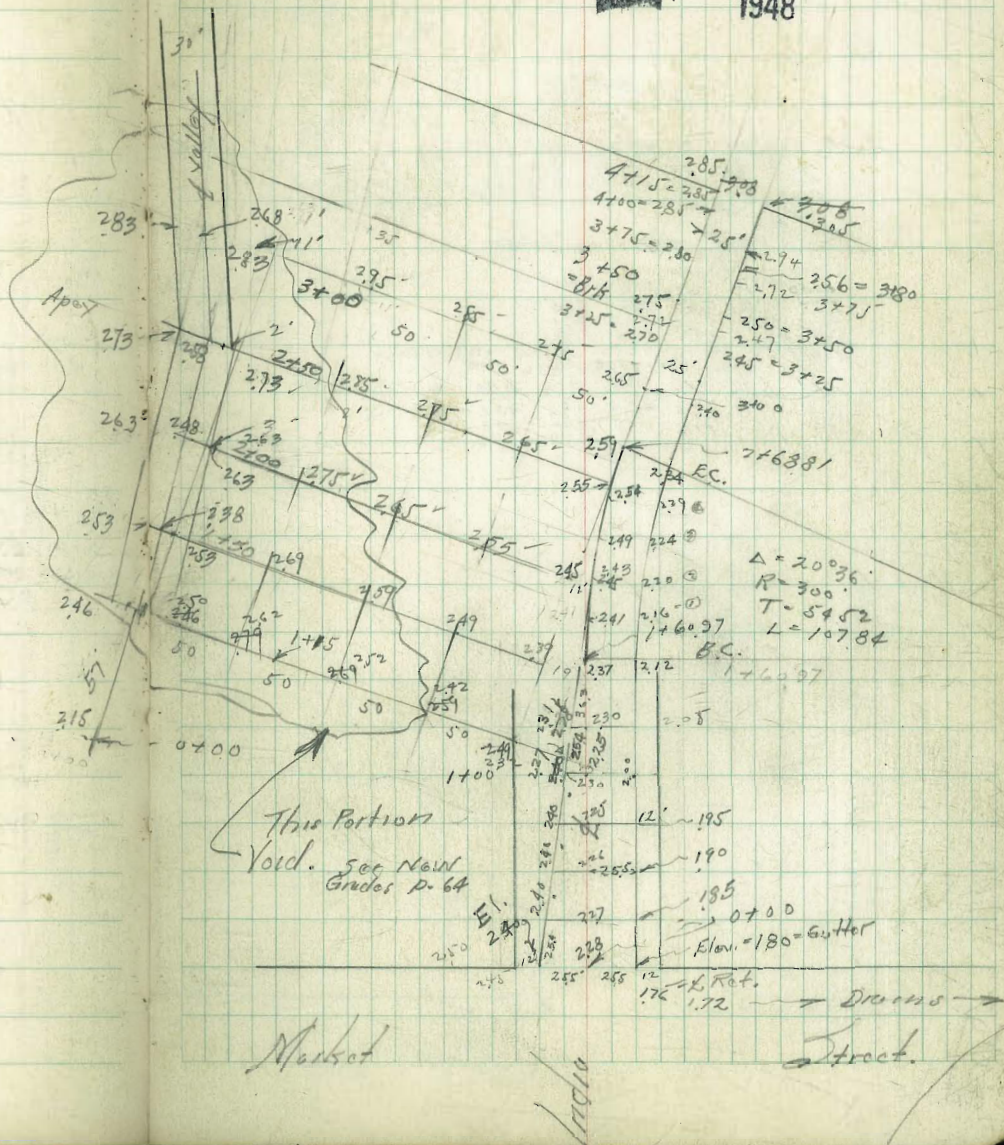
Stations	513	7.40	2.27	SW&P India & Market
= 0+00	w	E	E	
+25		5.15	5.00	
+50		5.15	5.00	
+75			5.00	
1+00			5.00	
+25			5.00	
1+62.97 = B.C. Pt.				
+82.54	2°09'36"	4.95	4.95	
2+04.11	4°07'12"	4.91	4.91	
2+25.68	6°10'48"	4.82	4.82	
+47.25	8°14'24"	4.81	4.81	
+68.82 = E.C.	10°18'			
3+00				
+25				
+50 = B.C.				
+75				
4+00				
+15 = Existing Pav.				
0+00	+25	+50	+75	
w. 4.57	1.80	1.80	1.80	
c. 1.38	2.10	2.10	2.10	
E. 2.27	5.13	5.13	5.13	
	4.62	4.62	4.62	
	4.51	4.51	4.51	

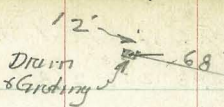
Valley Cut, on Columbia
2.15 2.38 2.48 2.53 2.68

63

INDEXED

1948





Fills on Columbia
 W 2.35 2.50 2.57 2.67 2.77 2.87 2.92 2.88 2.75 2.66 2.92
 4.87 5.11
 4.82
 4.95

Bk
 F 2.20 2.50 2.57 2.67 2.77 2.87 2.92 2.88 2.75 2.66 2.92
 4.56 4.49 4.39 4.36 4.27 4.19 4.14 4.18 4.31 4.37
 4.63 4.67 4.79 4.91 4.92 4.98 5.01 4.86 4.80 5.18
 4.97 4.18 4.60 4.55 4.64 4.79 4.87 4.88 4.49 4.71
 5.11 2.37

East & West stakes in Yards

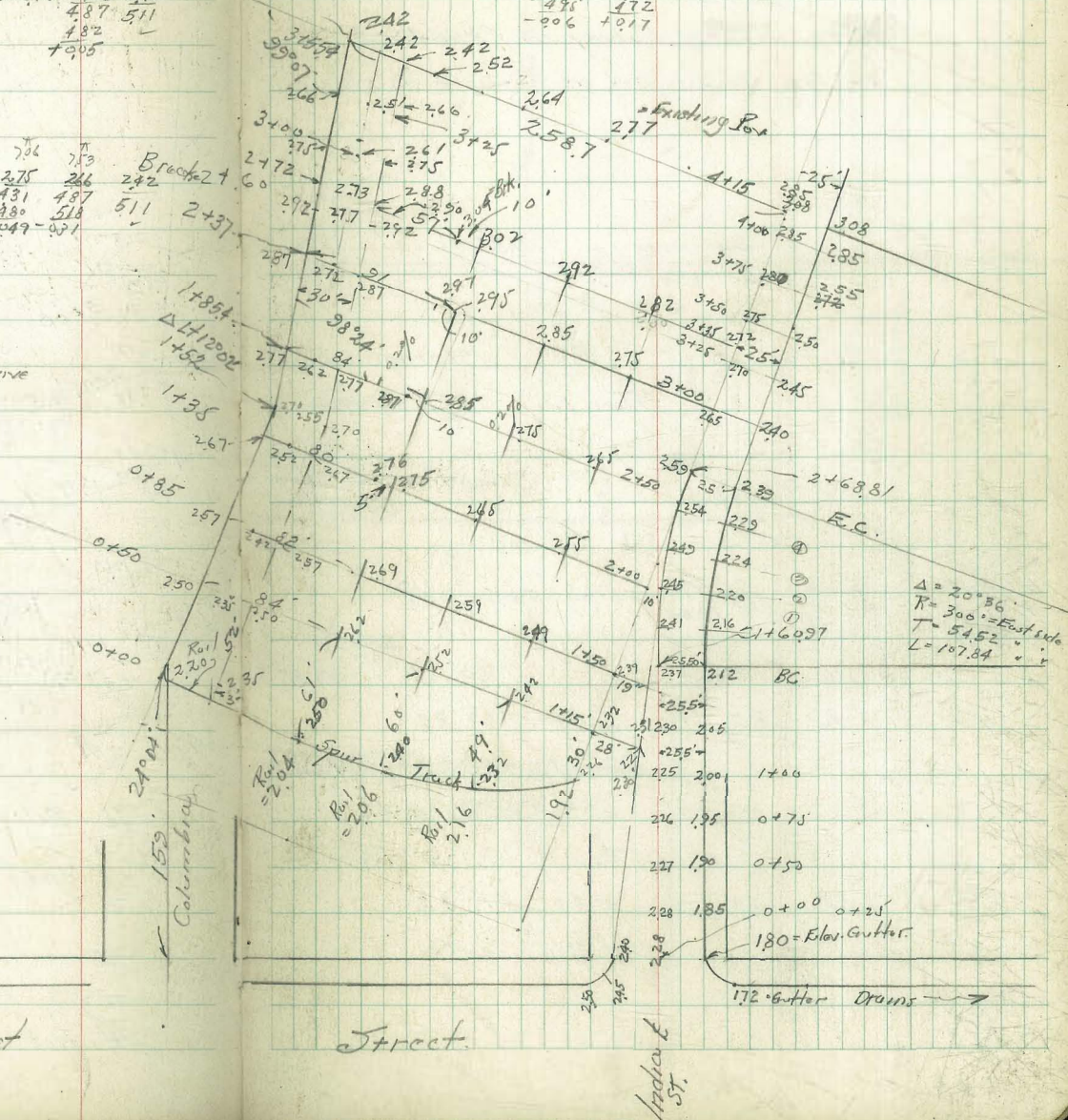
3' from Track	0+00	+50	1+00	1+50	2+00
	2.26	2.32	2.40	2.50	2.35
	4.50	4.74	4.96	4.56	4.71
	5.03	4.82	4.92	5.38	5.06
	4.15	4.12	4.21	4.82	
	4.28	4.00	4.18	1+00	1+50
	2.27	2.32	2.42	2.52	2.63
	4.75	4.74	4.64	4.54	4.44
	4.48	4.23	4.16	4.28	4.05
	4.31	4.05	4.49	4.26	4.38
	1+50			1+06	1+06

Market

2.27 - BM SVI India's Market
 4.77 - 7.87
 7.06 - K
 4.60 -
 2.46 - T.P
 5.07 -
 7.53 - T

Grades for Resurfacing 64
 Yards of Western Lumber Branch
 Was torn up by Trunk Sinker Coast
 also Portions of India St.

2.52	2.64	2.77
5.01	4.89	4.76
4.85	4.72	
4.96	4.91	



$\Delta = 20^{\circ} 56'$
 $R = 300'$ - East side
 $T = 54.52'$
 $L = 107.84'$

Street

India St

172' Gutter Drains

Walker
Hazard
Hardin
1-3-44

LAYOUT PROPOSED
CITY WAREHOUSE

21st & Russ Blvd.

PLAN 1084-D

Preliminary Survey in FB 1640 - P. 70

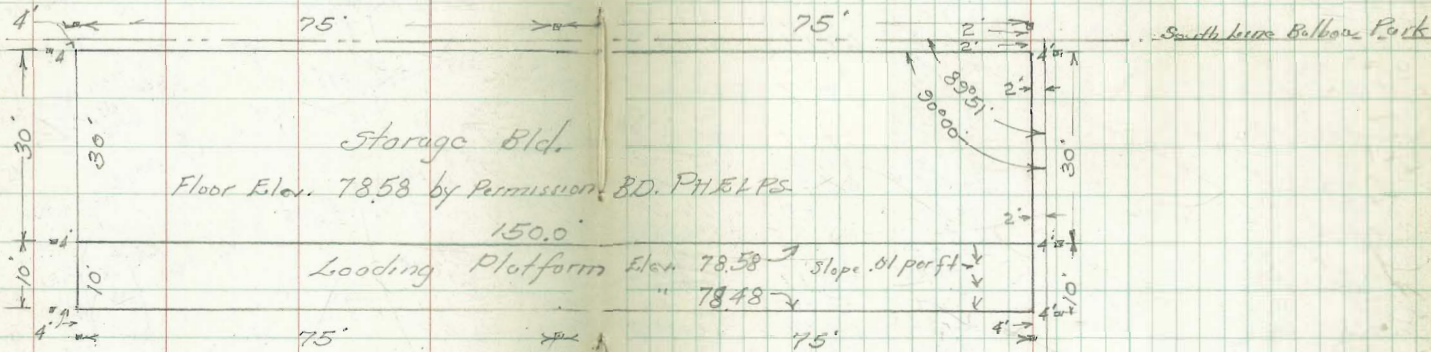
π = Pipe stakes set at corners as shown.

INDEXED
W.K.

65

INDEXED

1948



Walker
Hazard
Hardin
5-3-44

Grades for floor Elev. = 78.00 - 78.58
Set May. 31st 1944

B.M. B.P.
35' Cor
20th & B. - Page 79.

	7.46	77.69		70.23	
T.P.	6.83	80.71	3.81	73.88	
			2.71	78.00 = Floor Elev.	
	6.87	80.75	6.83	73.88 - T.P.	
			2.17	78.58 = Floor Elev.	
T.P.	2.87	80.29	3.33	77.42	
			1.71	78.58	

Portion-Yard Cross Sections

See FB 1682

40

West Line 21st

21st ST

East Line 21st ST

Walker
Osborne
Hazard
7-13-41

City Burns
Grades for open Drain along
east Side of Shops.

Prelim. Book 1637-62

Grades by Berris, Onion Street.

Stations	↑ 72.17		Elev. Conc. Side of Ditch	
South edge shops = 0+70		2.80	69.37	67.37
+85		2.85	69.32	67.32
		2.89	69.31	67.31
1+00		2.92	69.28	67.28
		2.95	69.25	67.25
+20		3.00	69.22	67.22
		3.01	69.17	67.17
+40		3.08	69.16	67.16
		3.07	69.09	67.09
+60		3.16	69.10	67.10
		3.13	69.01	67.01
+80		3.24	69.04	67.04
		3.19	68.93	66.93
2+00		3.22	68.98	66.98
		3.25	68.85	66.85
+20		3.40	68.92	66.92
		3.31	68.77	66.77
+40		3.48	68.86	66.86
		3.37	68.69	66.69
+60		3.56	68.80	66.80
		3.43	68.61	66.61
+80		3.64	68.74	66.74
		3.49	68.53	66.53
3+00		3.72	68.68	66.68
+02		3.50	68.45	66.45
+20		3.55	68.67	66.67
		3.61	68.62	66.62
+40		3.88	68.56	66.56
		3.67	68.29	66.29
+60		3.96	68.50	66.50
		2.56	68.21	66.21
+80	71.00	2.87	68.44	66.44
		3.62	68.13	66.13
4+00		3.95	68.38	66.38
		3.68	68.05	66.05
+20		3.03	68.32	66.32
		3.78	67.97	65.97
+44		3.13	68.25	66.25
		3.78	67.87	65.87
+54 = End Conc. Gutter		3.17	68.22	66.22
4+54 = Beginning Drain 6" tile		3.67	67.83	65.83
		3.28	67.33	65.33

Cont. P-67

INDEXED
WK.

INDEXED

1948

B.M.
S.E.P. 20th B = 70.23

66

1.94 +
72.17 +
583 -
66.84 - TP
466 +
71.00 +

Highline
Cuts = Top of Sides. Note: Flow = 0.25 Lower

Grades were changed from 0.4%
to 0.3% by Berris to meet.
The paving of NW Cor Bld.
4+97.5 P-67

City Shops Drain
Cont. from P-66

Station	Elev	Flow line	Elev	Flow line
4+70	71.00	3.33	67.67	65.21
		3.73	67.27	65.21
+83		3.38	67.62	65.62
		3.78	67.22	65.22
+96		3.42	67.58	65.58
	Water Ret. Wall	3.83	67.17	65.17

Cuts - Flow
+2.00
+2.00
+2.00

Walker Hazard
Hudson Begg
1-15-45

Sewer Const. 43rd St. And C-st.
Cont. from P-50

Station	Elev	Flow line	Elev	Flow line
6+49	5.97	196.45	190.48	178.66
6+73		7.18	189.27	179.43
6+99		6.36	190.09	180.26
7+27.56		5.20	191.25	181.16

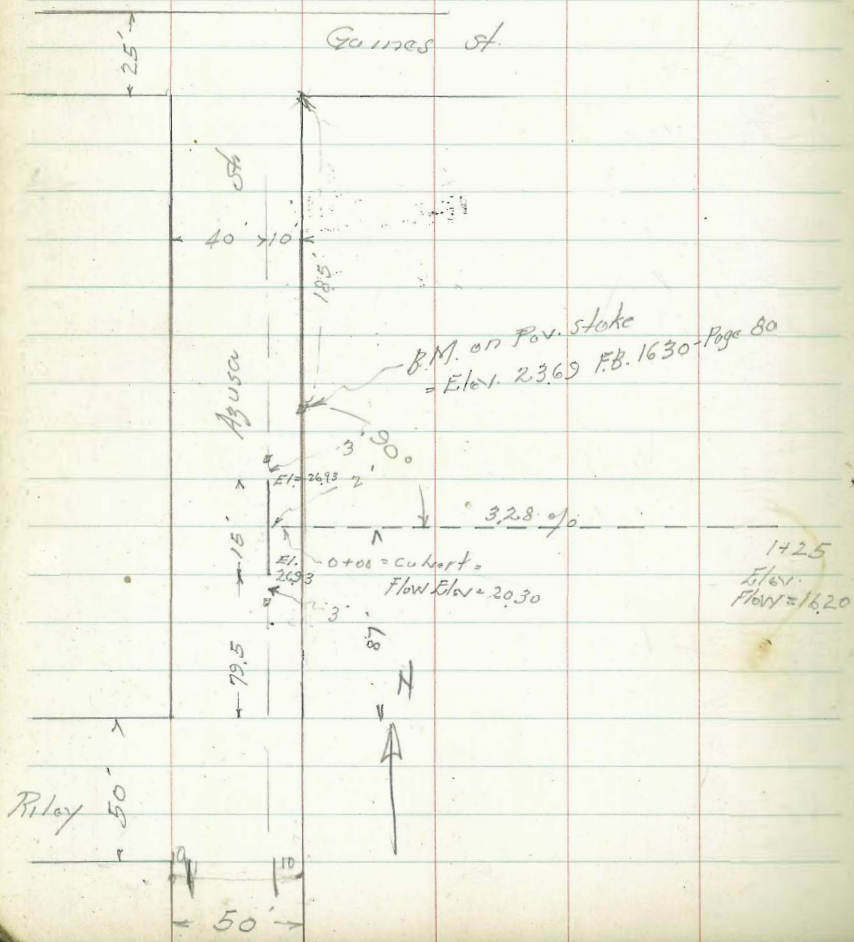
Cuts	offset	Notes
P-50		
3.20	6' W	Fd. in 0.2' below surface P-50
3.84	"	" " " " " "
5.83	"	" " " " " "
10.09	"	all stakes not found.

Note: stakes found at 6+49 and 6+99 are 0.4' lower than shown in Notes P-50 as the st has been surfaced since the original stakes (P-50) were set. I assumed they were disturbed by this amount.

Walker
Osborne
Higgin
8899
7-30-43

Grades for Curb Inlet
And 24" Culvert Azusa St
Bet. Riley And Gaines St.

Inlet = 15' inside



INDEXED
W.K.

2369 B.M. on Stake

Grades for Culvert 9' offsets.

68

2369			
2371			
2666			
0+00	0+40	0+80	1+25 End.
20.30	18.29	17.68	16.20
6.36	7.67	8.98	10.46
2.54	5.27	8.15	10.37
+3.82	+2.40	+0.93	+0.19

Grades for Catch Basins

2693	2693
+0.27	+0.27
2.86	2.54
-3.13	-2.81

2666

146

2520

2521

0.01 Diff.

chk B.M. M.H. 1411 F.B. 1630 P. 79

INDEXED

1948

1425
Elev.
Flow = 1620

Walker
Osborne
Hazard
Boggs

Construction Grades for Sewer

117 Blocks 457-462 - C.C. Seamans

7-29-43 Between Goldfinch & Rose Court

Preliminary Notes in FB 1644 - Page 58

Existing MH. in blk. of 457 = 0+00	North of Torrance St	Plan 6300-L Elev. Stake	Elev. Flow
		182.11	164.27
+50	9.72%	8.63	173.48
1+00		3.09	179.02
+50		6.65	185.36
1+82.45	4.14 25' 0"	4.98	187.03
2+00		2.49	189.52
+50		2.38	196.69
3+00		6.39	200.94
+50		11.11	207.65
4+00		5.25	213.51
4+15.75	15' 12"	4.11	214.65
+50		4.64	217.10
5+00		1.17	220.57
5+46.60	Dead End	3.06	226.03

INDEXED
W.K.

INDEXED

1948

B.M. R₁₀₀ MH-0100 FB 1644-P-59 = 162.04

Cuts	offsets	
192.01		13.07
186.07		182.11
		-0.52
187.59		187.59
172.01		10.42
4.47		172.01
187.54		4.47
11.53		187.54
199.07		11.53
4.11		199.07
197.96		4.11
207.33		197.96
0.40		207.33
206.93		0.40
11.83		206.93
218.76		11.83
4.73		218.76
214.03		4.73
7.71		214.03
221.74		7.71
1.98		221.74
219.76		1.98
9.33		219.76
229.09		9.33
4.11		229.09
224.98		4.11
224.7		224.98

192.01
5.94
186.07
2.04
ok

TR 187.59
10.42
172.01
4.47
187.54
11.53
199.07
4.11
197.96
2.37
207.33
0.40
206.93
11.83
218.76
4.73
214.03
7.71
221.74
1.98
219.76
9.33
229.09
4.11
224.98
224.7

218.76
9.41
209.35
ok
FB 1644-59

RP.
8' Lt on split

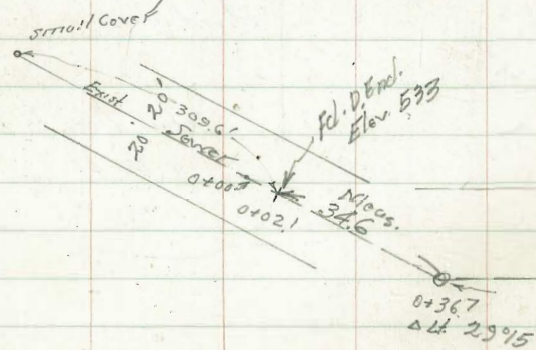
chk Ground
This is ok for
Ground 2' South 15
e. 3" 10x16.17

Walker
Osborne
Hazard
5-24-41

Grades for Sewer in Scott St.
And in Block 3 - New Roseville Add.

Station	T 18.09	Elev. Stakes	Elev Flow Line	Cuts	offsets
0+02.1 = first D End			5.33		
0+36.1 = Δ Lt. 29°15'		8.18	9.91	5.59	
+50		8.31	9.78	5.68	
1+00		8.17	9.92	6.03	
+50	0.7%	8.19	9.90	6.38	
2+00		8.27	9.82	6.73	
+50		7.77	10.32	7.08	
2+98.75 = Δ Lt. 90°01'30"		7.27	10.82	7.43	
3+50		6.17	11.92	8.20	
4+00	1.5%	4.99	13.10	8.95	
+50		3.93	14.16	9.70	
4+83.75 = Dead End		3.00	15.09	10.20	

Preliminary levels FB 1641-58



INDEXED
W.R.

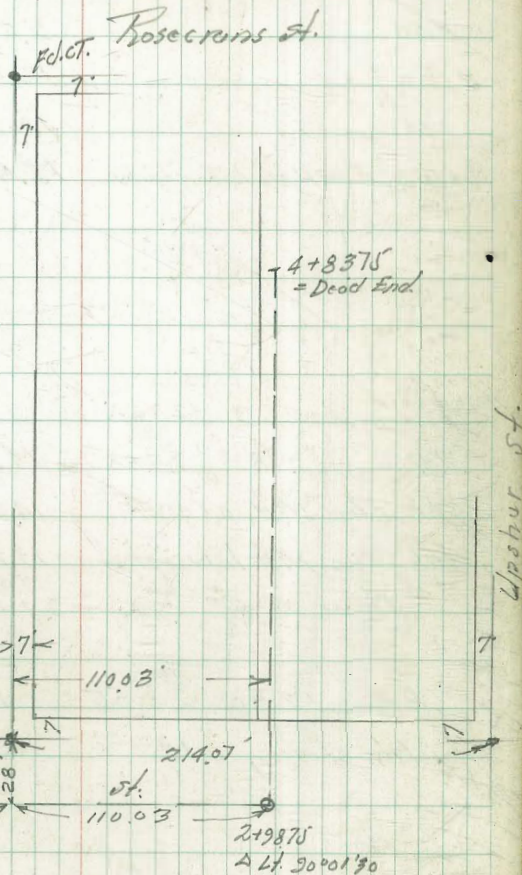
Elev. End cb
on W side Scott
opp. 0+00 FB 1641-58

10.49
7.50
18.09 = T

INDEXED

1948

Cuts	offsets
+4.32	5' Lt.
+4.10	"
+3.89	"
+3.52	"
+3.09	"
+3.24	"
+3.39	5' Rt.
+3.72	5' Lt.
+4.15	"
+4.46	"
+4.89	"



Walker
Osborne
Hazard
5-7-43

Sewer Constructors:
117 Bessemer St.
from San Antonio Place
To Interceptor Sewer B Sheet # 2700.

Station	π	Elev. Stake	Elev. Flood Line
Existing MH = 0+0.0	15.88	See below	1.51 -2.00
+30+5 Const. MH +28.27 = Δ 3'04" H	8.94	7.14	0.00
+50	9.62	6.26	-0.64
+100	12.04	3.84	-2.24
+150	12.55	3.33	-3.84
2+10.9 = 2' MH on Interceptor	13.61	2.27	-5.80

N.W.C.P. Rosecrans & Bessemer	0.63	28.68	28.05
T.P.	0.18	15.88	12.98 15.70
chk Flow MH 0+00	14.37	1.51 ✓	
chk Rim MH Interceptor	13.61	2.27	
" Flow " "	23.18	-7.30 ✓	
		1.50 -5.80	
T.P.	12.80	28.55	0.13 15.75
chk. Starting B.M.	0.50	28.05 ✓	

Existing
MH

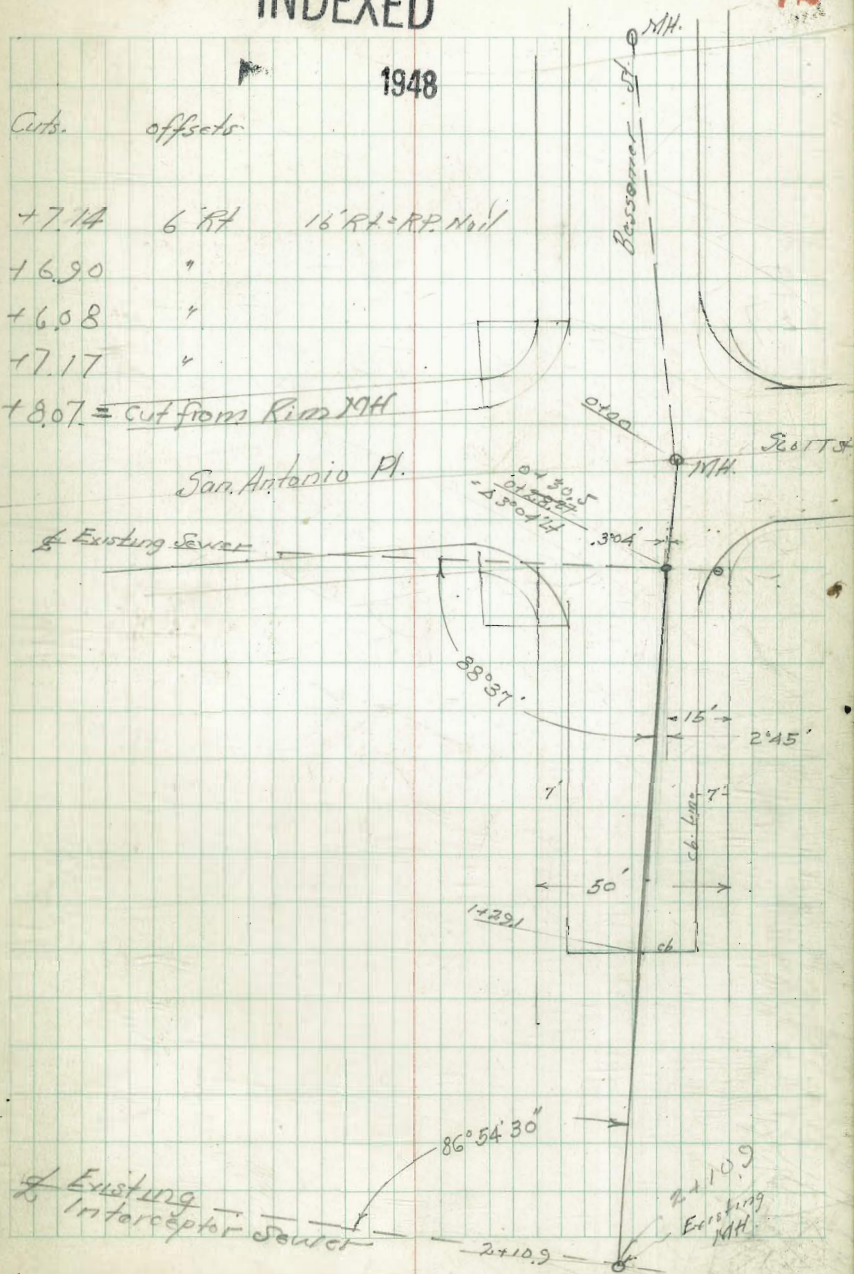
Indexed
c.s.k

INDEXED

72

1948

Cuts	offsets
+7.14	6' RT 16' RT = R.P. Nail
+6.90	"
+6.08	"
+7.17	"
+8.07	= cut from Rim MH

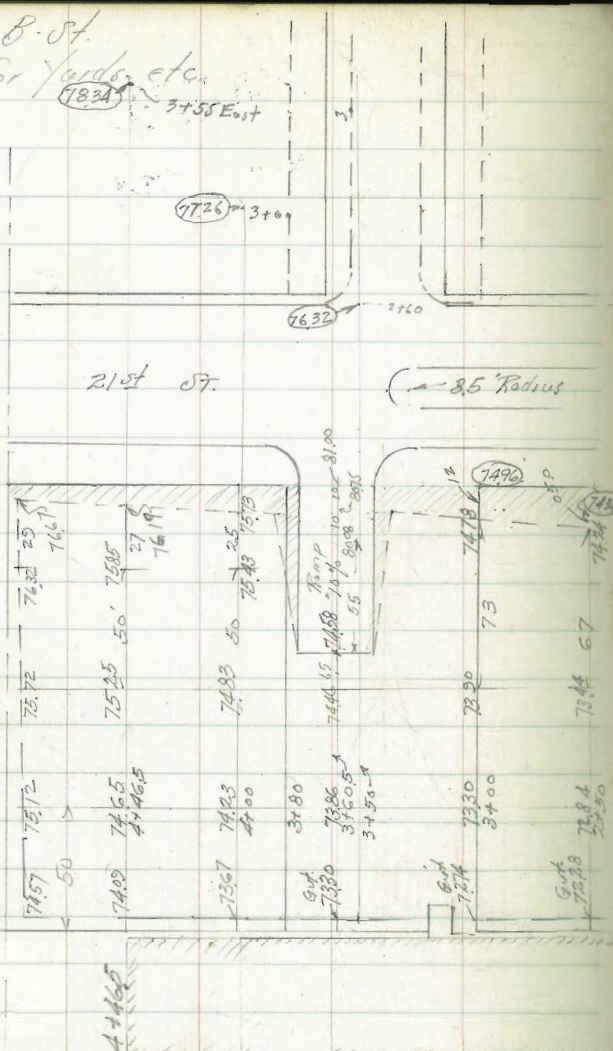


INDEXED

23

A grid of 20 columns and 20 rows on a graph paper page. The grid is formed by light blue lines. A vertical red margin line is present on the left side of the grid, and a vertical red margin line is present on the right side of the grid. The grid is mostly empty, with some faint pencil marks and smudges.

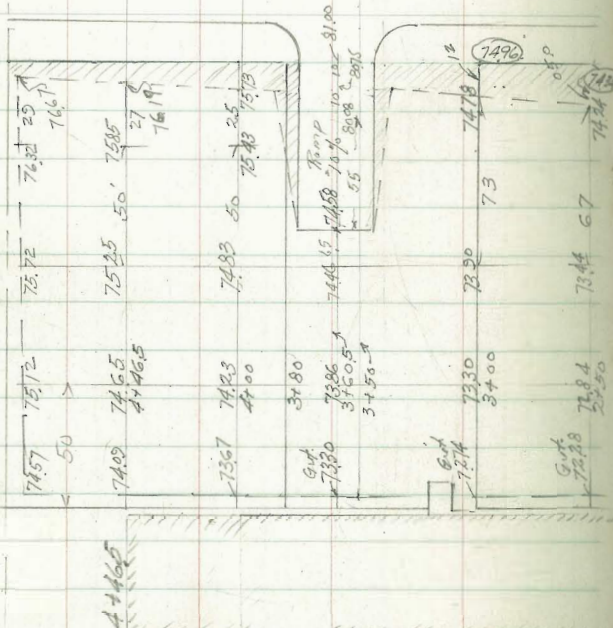
Walker 20th - B. St.
 Osbert
 Hazard Grades for Yards, etc.
 4-30-43



21st St.

3.5 Radius

3.5 Rad.



Walker
Osborne
Hazard
4-19-48

GRADES for Fire Hydr.

SWLY. Co. Rosecrans and Congress

INDEXED
N.K

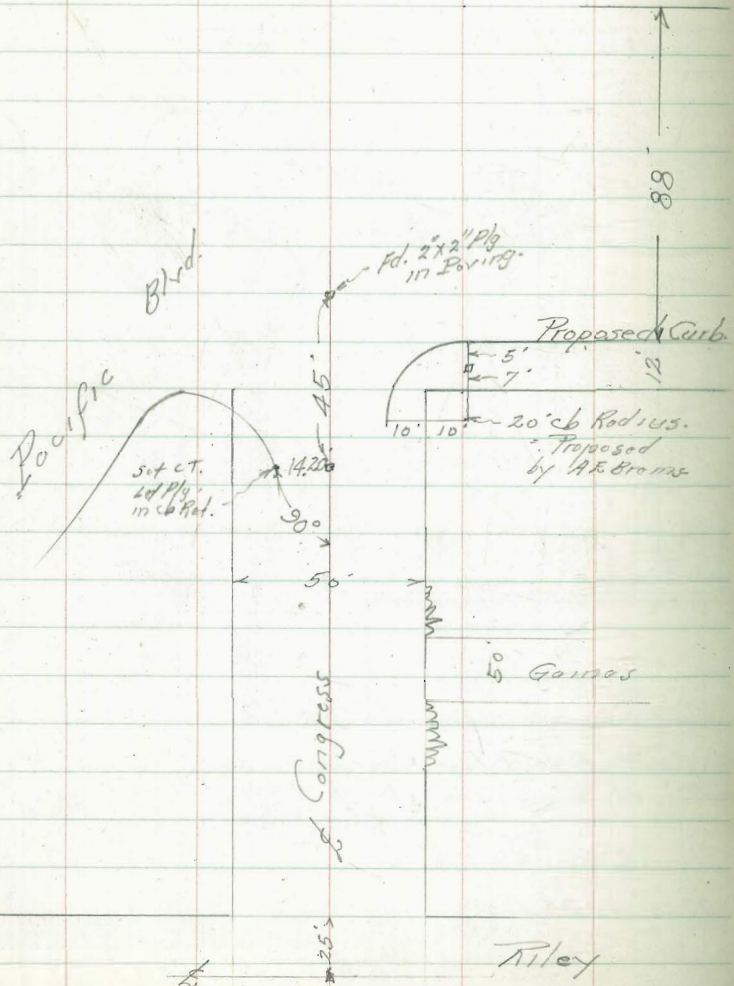
INDEXED

1948

FB 1502-17

4.91	3.54	4.63	NE. SP. San Diego 17.5 ft.
			Rad. El. Stake El. curb cb. R.C.
4.76	4.78	4.78	

20' Radius
Stake 5' from cb face



Rosecrans St.

St.

Fd. Conc. Mort.

25'

Jefferson St.

Walker
Carpenter
Hegard
4-7-48

Construction Grades
for Curb and Walk
on West Side Wilson Ave
Between Landis And Dwight.

INDEXED
W.K.

335.25 = N.W. B.P. Landis 36' 1/2
1.99 +
337.18 = T

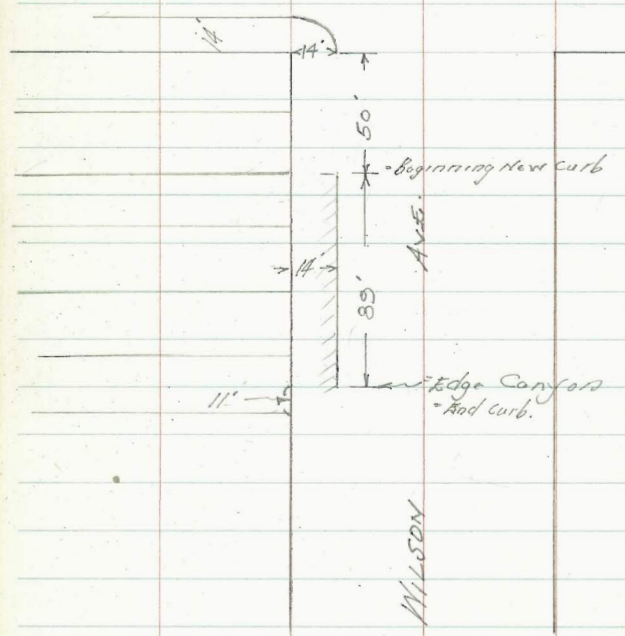
77

0+00	0+50	0+85	0+120	0+139
332.50	329.63	327.62	325.60	324.70
4.68	7.55	9.56	11.58	12.48
	6.15	7.56	9.40	10.59
	1.40	2.00	2.18	1.89

INDEXED

1948

LANDIS



Walker
Osborne
Hagard
2-26-43

Grades for Alley Bk-9. Ocean Beach.
Bet. Santa Cruz & Coronado
from W.L. Froude St. 100' East.

Cross Sections in FB 1576-76

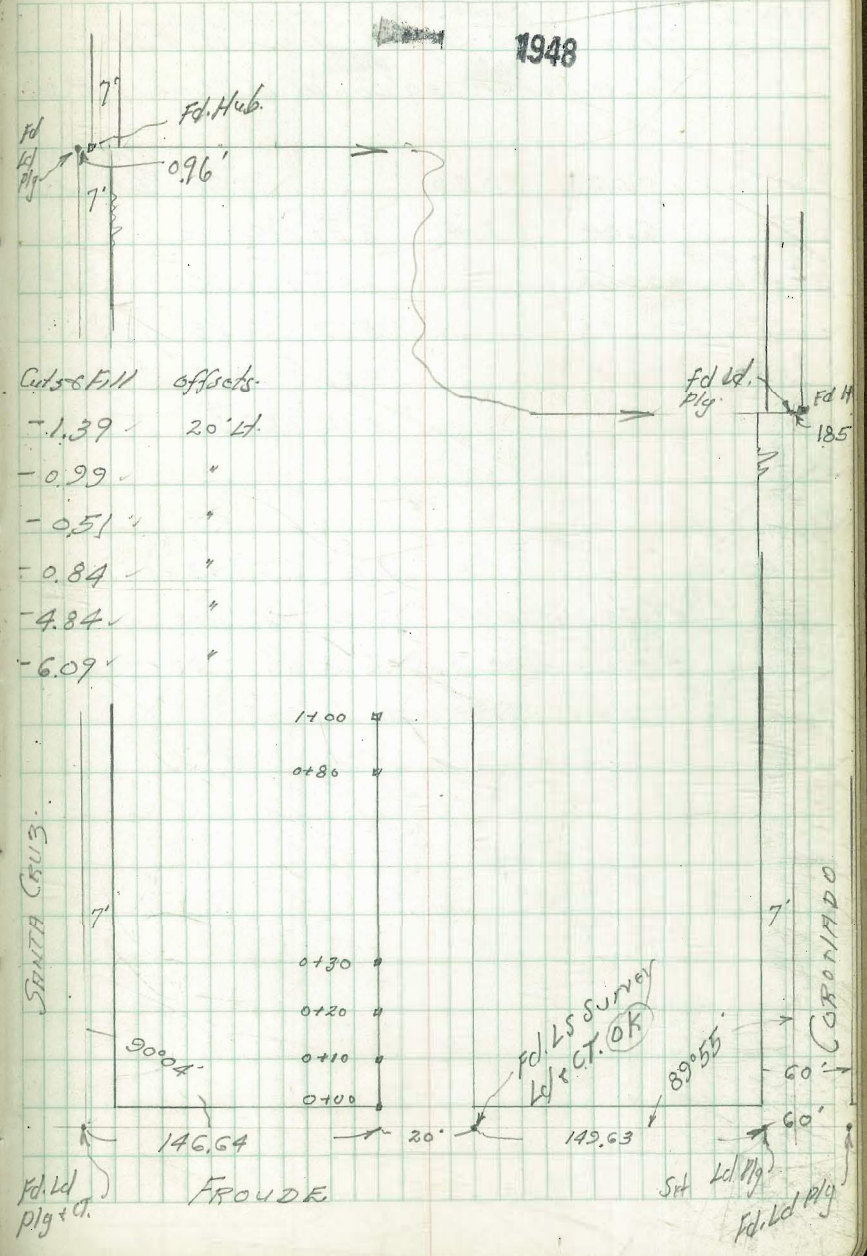
Station	W.L. Froude	NEBP Santa Cruz & Froude	Grade for Flv. Top Fining.
=0+00	12.63	159.18	146.55
+10' Bk	12.83	171.43	158.60
+20 "	5.60	175.64	170.04
+30 "	4.87		170.97
+40 "	5.29		170.35
+50 "	6.76	168.88	170.27
+60 "	5.74	169.90	170.89
+70 "	4.55	171.09	171.60
+80 "	3.98	171.66	172.50
+90 "	2.98	172.66	177.50
+100 "	2.05	173.59	179.68

INDEXED
W.K.

INDEXED

18

1948



Walker
 Osborne.
 Hardin
 Hooper
 1-14-43

Grades for Sidewalk
 on West side 19th St.
 Between B-st and C-street
 from South Property Line of B-st
 to a point 100' South of Skine of B-st

					B.M. B.P. 56 Co. 5 20th B-st
	0.07	70.30		70.23	
TR	6.04	68.04	8.30	62.00	
Skine B-st = 0+20	on curb		6.05	61.99	62.00
+35	" "		5.79	62.25	62.35
+70	" "		5.38	62.66	62.70
1+00	" "		5.12	62.92	63.00

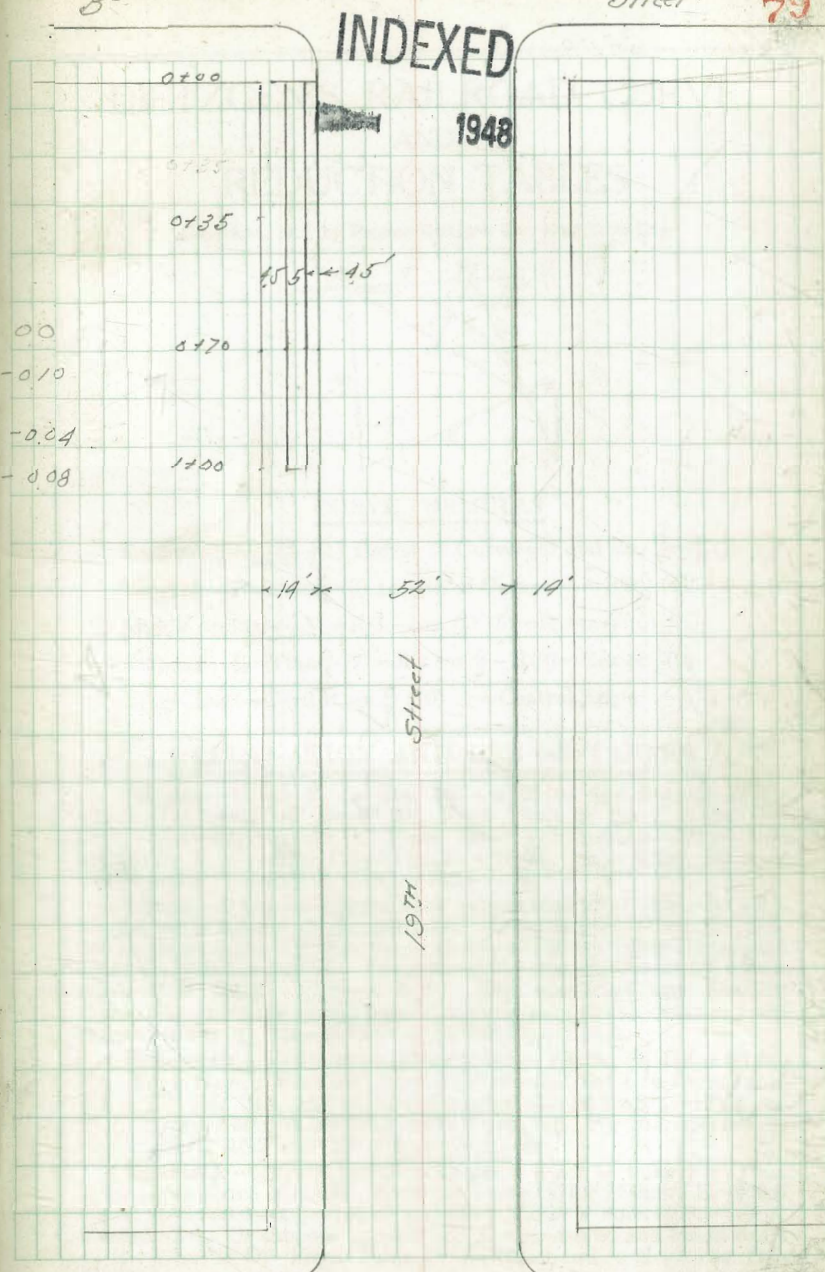
NL-C-st
 = 3+00

3.01 65.63
 Note Chisled crosses in curb
 4' from Edge of 5' walk at each
 of Above Stations

B-

INDEXED
 W.K.

Street 79



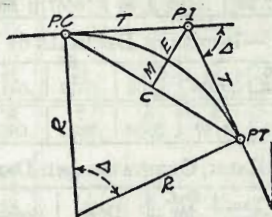
C-

Street

Elev. 34.00

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

Copyright, 1914, by Eugene Dietzgen Co., New York City



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 $= M = R(1 - \cos \frac{\Delta}{2})$ (5) $= R \text{vers} \frac{\Delta}{2}$ (6)
 External $= E = T \tan \frac{\Delta}{4} = R \div \cos \frac{\Delta}{2} - R$ (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° 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 $= 2^\circ 16.2' + 8^\circ 20' \div 2 = 6^\circ 26.2'$, etc.

Externals.—May be found in similar manner to tangents. Thus E for curve above is 115.37. For from Table IV for 1° 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	1/4	3-16	1/2	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.—RADI, ORDINATES AND DEFLECTIONS.

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot
0° 10'	34377.5	.036	.145	0.05'	7°	819.02	1.528	6.105	2.10'
0° 20'	17188.8	.073	.291	0.10	20'	781.84	1.600	6.395	2.20
0° 30'	11459.2	.109	.436	0.15	30'	764.49	1.637	6.540	2.25
0° 40'	8594.42	.145	.582	0.20	40'	747.89	1.673	6.685	2.30
0° 50'	6875.55	.182	.727	0.25	3	716.78	1.746	6.976	2.40
1° 10'	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
1° 20'	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
1° 30'	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
1° 40'	3819.83	.327	1.309	0.45	9	637.28	1.965	7.846	2.70
1° 50'	3437.87	.364	1.454	0.50	20	614.56	2.037	8.136	2.80
2° 10'	3125.36	.400	1.600	0.55	30	603.80	2.074	8.281	2.85
2° 20'	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
2° 30'	2644.58	.473	1.891	0.65	10	573.69	2.183	8.716	3.00
2° 40'	2455.70	.509	2.036	0.70	30	546.44	2.292	9.150	3.15
2° 50'	2292.01	.545	2.181	0.75	11	521.67	2.402	9.585	3.30
3° 10'	2148.79	.582	2.327	0.80	30	499.06	2.511	10.02	3.45
3° 20'	2022.41	.618	2.472	0.85	40	478.34	2.620	10.45	3.60
3° 30'	1910.08	.655	2.618	0.90	12	459.28	2.730	10.89	3.75
3° 40'	1809.57	.691	2.763	0.95	30	441.68	2.839	11.32	3.90
3° 50'	1719.12	.727	2.908	1.00	13	425.40	2.949	11.75	4.05
4° 10'	1637.28	.764	3.054	1.05	40	410.28	3.058	12.18	4.20
4° 20'	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
4° 30'	1494.95	.836	3.345	1.15	15	383.07	3.277	13.05	4.50
4° 40'	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
4° 50'	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
5° 10'	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
5° 20'	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
5° 30'	1228.11	1.018	4.071	1.40	40	319.62	3.935	15.64	5.40
5° 40'	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5° 50'	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
6° 10'	1109.33	1.127	4.507	1.55	21	274.37	4.594	18.22	6.30
6° 20'	1074.68	1.164	4.653	1.60	22	262.04	4.814	19.08	6.60
6° 30'	1042.14	1.200	4.798	1.65	23	250.70	5.035	19.94	6.90
6° 40'	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
6° 50'	982.64	1.273	5.088	1.75	25	231.01	5.476	21.64	7.50
7° 10'	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
7° 20'	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
7° 30'	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
7° 40'	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
7° 50'	859.92	1.455	5.814	2.00	30	193.18	6.583	25.88	9.00

Note. Chord Deflection=2 times tangent deflection.

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10'	58.34	.30	10'	560.11	27.31	10'	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

188
1028
3.76
316.27
169.63
146.6
179.8
178.8
287

TABLE IV.—TANGENTS AND EXTERNALS TO A 1° CURVE.

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
91°	5830.5	2444.9	101°	6950.6	3278.1	111°	8336.7	4386.1
10'	5847.5	2457.1	10'	6971.3	3294.1	10'	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	30	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	102	7075.5	3374.9	112	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	103	7203.2	3474.4	113	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	104	7333.6	3576.8	114	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	105	7467.0	3682.3	115	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	106	7603.5	3791.0	116	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	107	7743.2	3902.9	117	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	108	7886.2	4018.2	118	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	109	8032.7	4137.1	119	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	6808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	110	8182.8	4259.7	120	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

TABLE V.—CORRECTIONS FOR TANGENTS AND EXTERNALS.

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

FOR TANGENTS ADD

Central Angle	DEGREE OF CURVE													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.79	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.40	4.88	5.35	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34
110°	.51	1.03	1.56	2.08	2.61	3.14	3.67	4.21	4.76	5.31	5.86	6.43	7.01	7.60
120°	.62	1.25	1.93	2.52	3.16	3.81	4.45	5.11	5.77	6.44	7.12	7.80	8.50	9.22

FOR EXTERNALS ADD

Central Angle	DEGREE OF CURVE													
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.002	.007	.010	.014	.018	.023	.027	.032	.035	.039	.043	.047	.051	.056
20°	.006	.011	.017	.022	.028	.034	.039	.045	.051	.057	.063	.070	.076	.082
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.137	.153
30°	.013	.025	.038	.051	.065	.079	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.446
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.183	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.055	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.771	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.266	.353	.440	.528	.617	.707	.797	.877	.977	1.07	1.18	1.29
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524										

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	296.98	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	196.96	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	1.83	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	2.23	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	325.08	357.23
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	3.83	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	239.03	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°	.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

46.50
21.67

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=15²÷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.

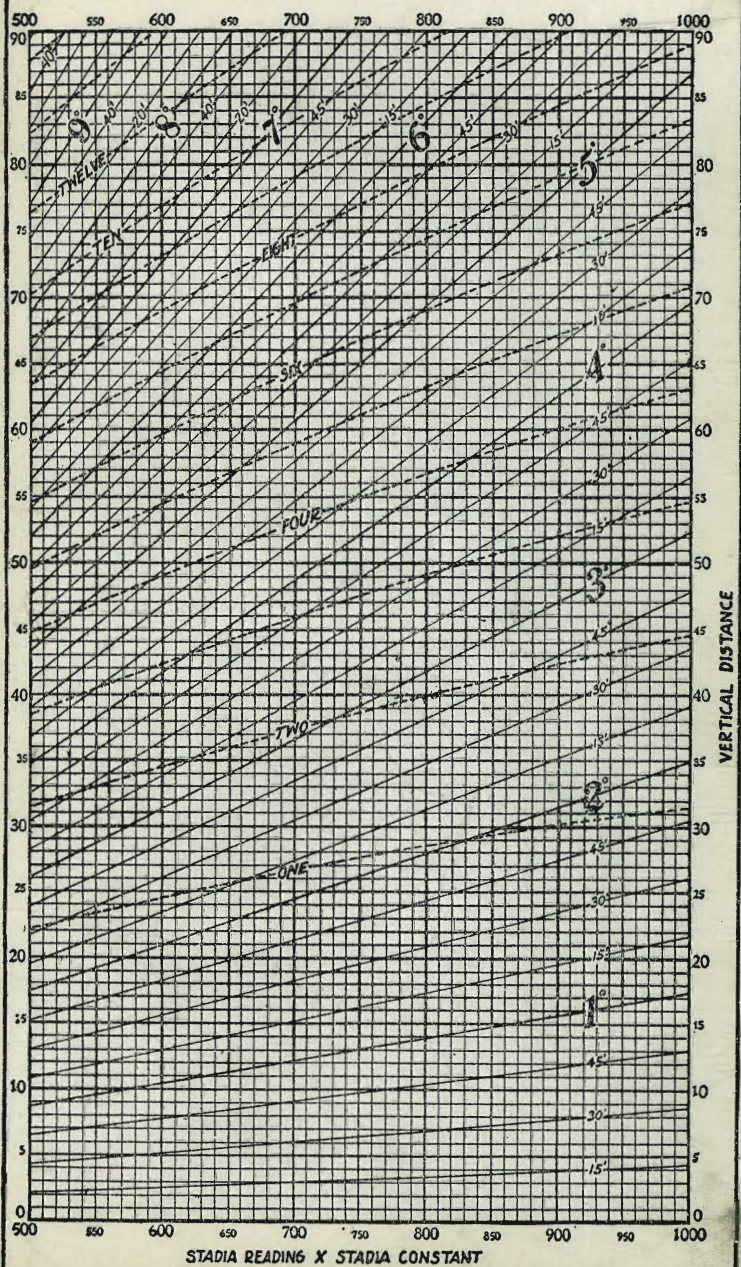
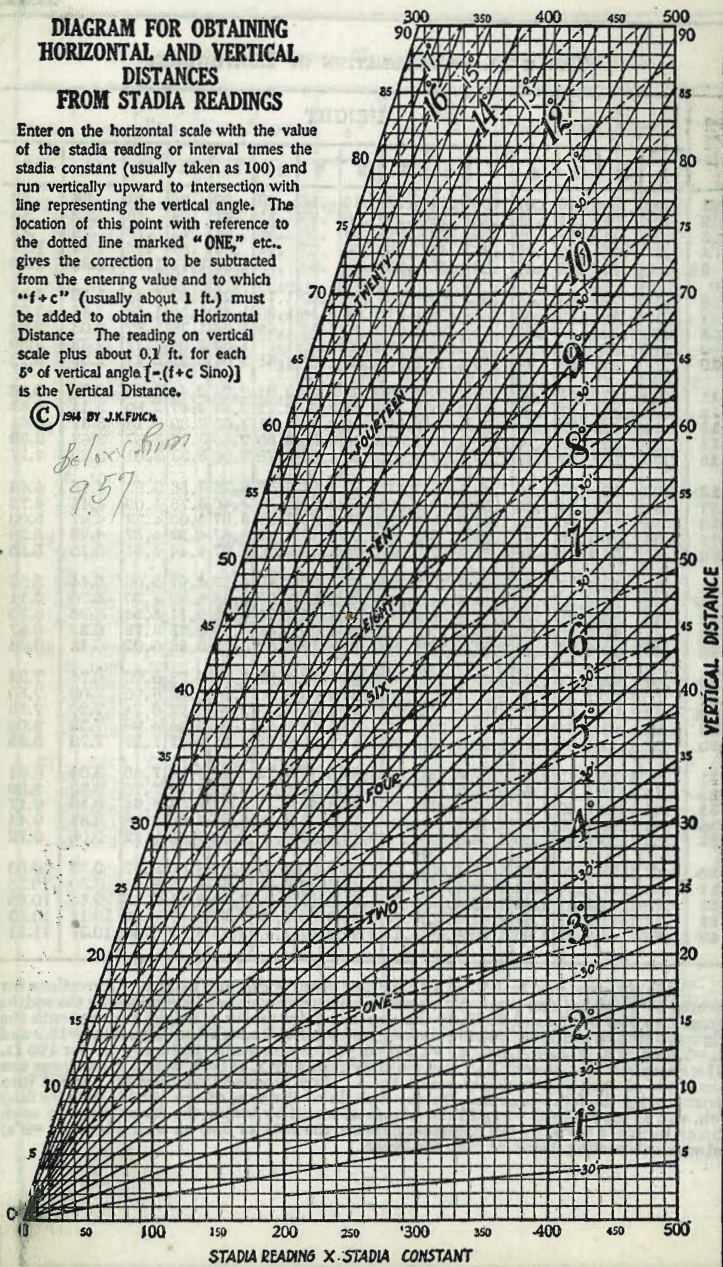
Right triangles. See fig. (a).
 Given Sought.
 a, c A, B, b $\sin. A = \frac{a}{c}$, $\cos. B = \frac{b}{c}$, $b = \sqrt{(c+a)(c-a)}$
 a, b A, B, c $\tan. A = \frac{a}{b}$, $\cot. B = \frac{b}{a}$, $c = \sqrt{a^2 + b^2}$
 A, a B, b, c $B = 90^\circ - A$, $b = a \cot. A$, $c = \frac{a}{\sin. A}$
 A, b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

**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 [$-(f+c \text{ Sino})$] is the Vertical Distance.

© 1914 BY J.K. FURCH

*Belmont Hill
957*



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$$\begin{array}{r} 141 \times 3 \\ \hline 6.8 \times 8 \times \\ \hline 8. \sqrt{859} \end{array}$$

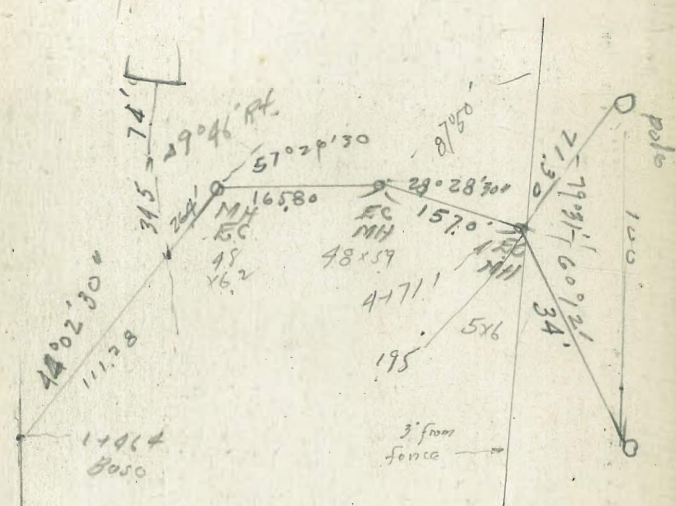
22
5770

1068

$$\begin{array}{r} 31416 \\ \hline 1068 \\ \hline 281328 \\ \hline 188476 \\ \hline 31416 \\ \hline 16 / 33852288 \quad (2) \\ \hline 2711 \end{array}$$

$$618 \sqrt{120}^2$$

14955
 654
 8415
 325
 263
 62
 783
 428
 7.11
 195
 86
 2718
 373.6
 35
 370.1
 374.00 PUG
 8.5
 365.5
 367.0



1418
 320
 73
 790
 627
 14.37
 12.45
 116
 335
 411
 791.200
 110
 395
 def 28°20'
 chd = 76
 1.57
 785
 785
 8635

6558
 16
 6542
 14
 556

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

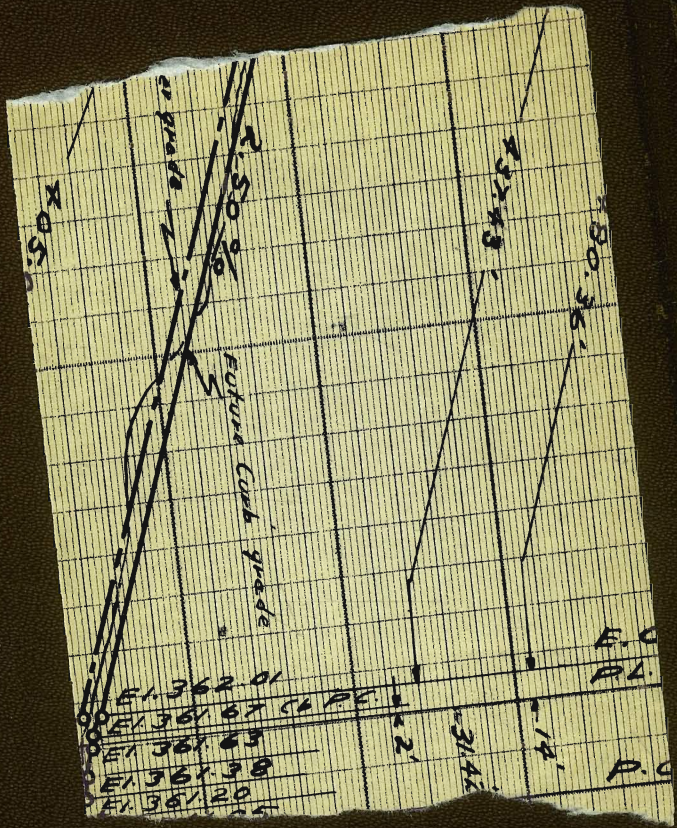
Example—If point is 22.6 ft. above grade, how far should it be from center line to be a slope stake point? Ans. from Table 41.9. For same slopes but other widths of roadbed correct above figures by one-half difference in width of roadbed; thus in example above for 20 ft. roadbed distance will be 41.9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

MADE IN U.S.A.

1875

1632-51

573-40



2.50

in grade

2.50

Future Curb grade

3.44

2.00

- 01 E1 362.01
- 02 E1 361.87 Ck PE
- 03 E1 361.63
- 04 E1 361.38
- 05 E1 361.20

E.C

PL

2.00

3.14

1.4

P.C