G-205

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ENGINEERS'

LEVEL BOOK

No. 4107

[redacted]

EUGENE DIETZGEN CO.

DRAWING MATERIALS, MATHEMATICAL and SURVEYING INSTRUMENTS

Chicago New York San Francisco New Orleans Pittsburg Toronto

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

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

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

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G-205

CITY ENGINEER

MICROFILMED
APR 12 1965

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Made in U. S. A.

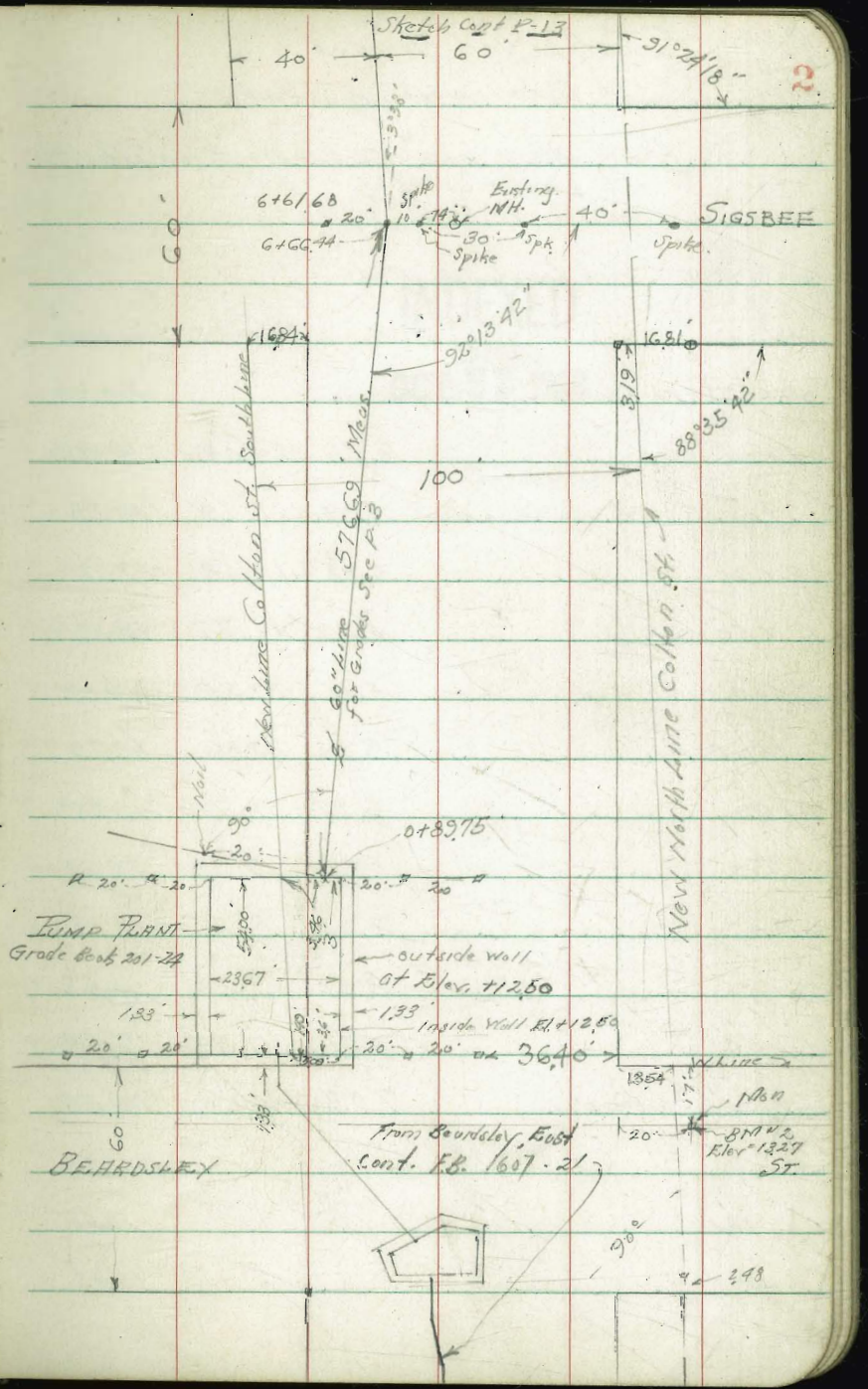
Walker
Wells
Hardin
1-20-42

60" Interceptor Sewer.
from Beardsley St., West.

= 6+61.68 ↑ for Grades See Page 3

6+66.44 = ΔLt. 3°38' Sketch Cont. P-13

INDEXED
WK
OCT 22 1948



Walker
Wells.
Hardin
7-20-42

Construction Grades

60" Intercepting Sewer

from Beardsley St. West, on Colton St

See sketch P-2

for Check Levels see P-45

Station		Rods.	Elev. Stakes.	Elev. Flow Line	Cuts.	offsets.
	16.56					
0+89.75 = West Inside edge Pump House				-20.00		
1+00		6.52	10.04	-19.99	+30.03	20' Lt.
+50		5.37	11.19	-19.95	+31.14	" "
2+00		5.88	10.68	-19.91	+30.59	" "
+50		4.79	11.77	-19.87	+31.64	15' Lt.
3+00		5.31	11.25	-19.83	+31.08	20' Lt.
+50		5.70	10.86	-19.79	+30.65	"
4+00		6.97	9.59	-19.75	+29.34	"
	14.83					
+50		5.78	9.05	-19.71	+28.76	"
+85		6.01	8.82	-19.68	+28.50	"
	12.53					
5+50		5.30	7.23	-19.63	+26.86	"
6+00		5.30	7.23	-19.59	+26.82	Nail
6+66.44						
=6+61.68 = Δ 3°38' Lt.		7.93	4.60	-19.54	+24.14	20' Lt. Stake
7+00				-19.51		
+50				-19.47		
8+00				-19.43		

Cont. P-4

F.B. 1597-39 BM #2.

Conc. Mon 20' N.W.L. Colton = 13.27
17' E. W.L. Sigsbee 3.29+
16.56 π
- 8.05
8.51 T.P.
6.32+
14.83 π
- 6.32 -
8.51 = T.P.
4.02+
12.53 π
5.63
6.90
6.90 = BM
0.00

INDEXED
W.K.
OCT 22 1948

2½ Pipe 20' N.W.L. old Colton
E.L. Sigsbee chk. BM #3

Temp. offsets P-27

60" Intercepting Sewer
Const. Grades
Cont. from P-3

Station		Elev. Stakes	Elev. Flow Line
8+50			-19.39
9+00			-19.35
+50			-19.31
10+00			-19.27
+50			-19.23
11+00			-19.19
+50			-19.15
12+00			-19.11
+50			-19.07
13+00	MH #24		-19.03
+51.68 = P.O.T.			-18.99
14+00		Grades off	-18.95
+50			-18.91
14+75 ± = MH #24			-18.89
15+00			-18.87
+50			-18.83
16+00			-18.79
+50			-18.75
17+00			-18.71

Cuts	Offsets
	Preliminary Grades + Offsets P-34-35-39

60" Intercepting Sewer
Construction Grades
Cont. from P-4

Station		+	-	Elev. Stakes	Elev. Flow Line	Cuts	Offsets
17+50					-18.67		
18+00					-18.63		
+50					-18.59		
19+00					-18.55		
+50					-18.51		
20+00					-18.47		
20+37.76	MH #25 = Flow Junction						
20+41.68	= P.O.T.				-18.44		
21+00					-18.39		
+50					-18.35		
22+00					-18.31		
+50					-18.27		
23+00					-18.23		
+17 +50					-18.19		
24+00					-18.15		
+50					-18.11		
25+00					-18.07		
+50					-18.03		
26+00					-17.99		

Level: P-34-35
Sh. 20 to Sh. 32

Cont. Page 6

60" Intercepting Sewer
Const. Grades
Cont. from P. 5

Station	+	×	−	Elev. Stakes	Elev. Flow Line
26+50 =	P.O.T. MH #26				-17.95
27+00					-17.91
+50					-17.87
28+00					-17.83
+50					-17.79
29+00					-17.75
+50					-17.71
30+00					-17.67
+50					-17.63
31+00					-17.59
+50					-17.55
32+00					-17.51
+50					-17.47
32+82 =	P.O.T. MH #27				-17.45
+50					-17.39
34+00					-17.35
150					-17.31
35+00					-17.27
+50					-17.23

Grades 3/4%

Cuts	offsets.
S.E. Cor 7th St. Top Fire Hydt.	Sct. S.D.&A. & Santa Fe. B.M. #7

446
1.93 +
639 π

Walker
Wells
Hardin
2-20-42

60" Intercepting Sewer

Const. Grades

Cont. from p. 6

Check Levels Sec Page 48-49

Station	+	π	−	Elev. Stakes	Elev. Flow Line	Cuts	Offsets
36+00					-17.19		
+49		6.39 π	4.80	2.09	-17.15	+19.24	20' Rt = Stake
36+99.28 = Manhole Sta.			5.35	1.04	-17.11	+18.15	20' Rt = Manhole
37 +50		5.70	4.58	1.12	-17.07	+18.19	20' Rt Stake
38+06.24 = Equation.							
= 38+03.82 = Δ Lt. 3°04'30"			5.12	0.58	-17.03	+17.61	"
+50		7.24	6.37	0.87	-16.99	+17.86	"
39+05							
39+00			6.88	0.36	-16.95	+17.31	"
+50			6.07	1.17	-16.91	+18.08	"
40+00 = Pot. MH. #28			5.75	1.49	-16.87	+18.36	"
+50			5.08	2.16	-16.83	+18.99	"
40+96.14 = BC. Rt. Δ = 5°34'30"			6.31	0.93	-16.79	+17.72	"
	R = 400'						
	L = 40.40'						
	St. = 13.48'						
	Ext. = .47'						
			Mean Elev. = 0.65				
41+36.54 = E.C.			6.58	0.66	-16.76	+17.41	"
41+99.5							
42+00			6.46	0.78	-16.71	+17.49	"
42+50			6.46	0.78	-16.67	+17.45	"
		6.67					
43+00			6.32	0.35	-16.63	+16.98	"
+50			6.17	0.50	-16.59	+17.09	"

π D-6 = 6.39 = π

5.10 −
1.29 TP
4.41 +
5.70 π
5.34 −
0.36 = TP
6.88 +
7.24 = π
6.46 −
0.78 TP
5.89 +
6.67 π

Walker
Wells
Hardin
2-20-42

60" Intercepting Sewer
Construction Grades
Cont. from P-7

for check Levels see P-49-50

Station	+	π	−	Elev. Stakes	Elev. Flow Line	Cuts	offsets
44+00		6.67	5.13	1.54	-16.55	+18.09	20' Rt
+50			5.35	1.32	-16.51	+17.83	" "
45+00 = Δ Lt. 2°30'			5.37	1.30	-16.47	+17.77	" "
+50			5.63	1.04	-16.43	+17.47	" "
46+00			5.46	1.21	-16.39	+17.60	" "
+65		7.84			-16.33		
~~+50~~			6.18	1.66	~~-16.35~~	+17.99	" "
47+00	POT. MH #29		6.03	1.81	-16.31	+18.12	" "
+50			5.54	2.30	-16.27	+18.57	" "
48+00			5.91	1.93	-16.23	+18.12	" "
+50			5.92	1.92	-16.19	+18.11	" "
49+01 ~~49+00~~			6.35	1.49	-16.15	+17.64	" "
+50			5.31	2.53	-16.11	+18.64	" "
49+95 ~~50+00~~		8.08	5.63	2.45	-16.07	+18.52	" "
				Mean 2.56			
50+50			5.51	2.57	-16.03	+18.59	" "
51+00			5.50	2.58	-15.99	+18.57	" "
+55 ~~+50~~			5.72	2.36	-15.95	+18.31	" "
				Mean = 2.20			
52+00			5.87	2.21	-15.91	+18.11	" "
+40 ~~+50~~			5.82	2.26	-15.87	+18.13	" "

π from P-7 = 6.67
5th & SD+A Track 1.88 −
Top Fire Hydt 4.79

6.67 π
5.46 −
1.21 = TP
6.63 +
7.84 π
Brass Plug opp sta 47 3.08 −
Check BM #9 4.78 − ok

7.84
5.31 −
2.53 TP
5.55 +
8.08 π

Walker
Wells
Hardin
2-20-42

60" Intercepting Sewer
Const. Grades
Cont. from P-8

for check Levels see P-50-51

Station	+	π	-	Elev. Stakes	Elev. Flow Line	Cuts	Offsets
		8.08					
53+00			6.19	1.89	-15.83	+17.72	20' Rt.
+45 ~~+50~~			6.41	1.67	-15.79	+17.46	"
54+00 - POT. MH#30			6.41	1.67	-15.75	+17.42	"
		7.50		Mean = 1.46			
+40 ~~+50~~			6.03	1.47	-15.71	+17.17	"
55+00			5.85	1.65	-15.67	+17.32	"
+54 ~~+50~~			5.84	1.66	-15.63	+17.29	"
56+00			5.90	1.60	-15.59	+17.19	"
+50			5.82	1.68	-15.55	+17.23	"
57+00			5.71	1.79	-15.51	+17.30	"
+50			5.80	1.70	-15.47	+17.17	"
		6.75					
58+00			4.95	1.80	-15.43	+17.23	"
+50			4.97	1.78	-15.39	+17.17	"
59+00			4.88	1.87	-15.35	+17.22	"
+50			4.84	1.91	-15.31	+17.22	"
60+00			4.78	1.97	-15.27	+17.24	"
+50			4.75	2.00	-15.23	+17.23	"
61+00	MH#31 POT.		4.69	2.06	-15.19	+17.25	"
+50			4.89	1.86	-15.15	+17.01	"

check BM#10

BM. #10 SE. Cor Gym Bld. - 2.19 = BM

BM#10 - 2.19
4.56+
6.75

ok to station 59+00

Note: Line Change from station 59+00 to Market St.

New Cuts P-33 And P-41

8.08 π
6.41 -
1.67 TP
5.83 +
7.50 π
5.34 -
2.16
2.19 = BM
.003 Error

Walker
Wolk
Hardin
8-20-42

6.0" Intercepting Sewer

Cents. from P-9
Const. Grades.

Station	+	π 6.75	− 5.00	Elev. Stakes 1.75	Elev. Flow Line
62+00					-15.11
+50					-15.07
+67.92 = BC. 11					-15.06
63+00	Δ = 17°47' D.R = 400 T = 62.58 L = 124.11				-15.03
+25					-15.01
+50					-14.99
+75					-14.97
63+91.53 Equation.					
= 63+92.58 = E.C.					-14.95
64+00					
+50					

Check B.M. #11

6.75 π
418
257
256 = B.M.
.001 = Error.

Cuts:	offsets:
+16.86	

New Cuts P-33

60" Intercepting Sewer
Const. Grades
Cont. from P- 10

Station

60" Intercepting Sewer
Const. Grades
Cont. from P-11

STATION

60" Intercepting Sewer
Construction
Alignment Reference Ties

Sketch Cont. from P. 2

750

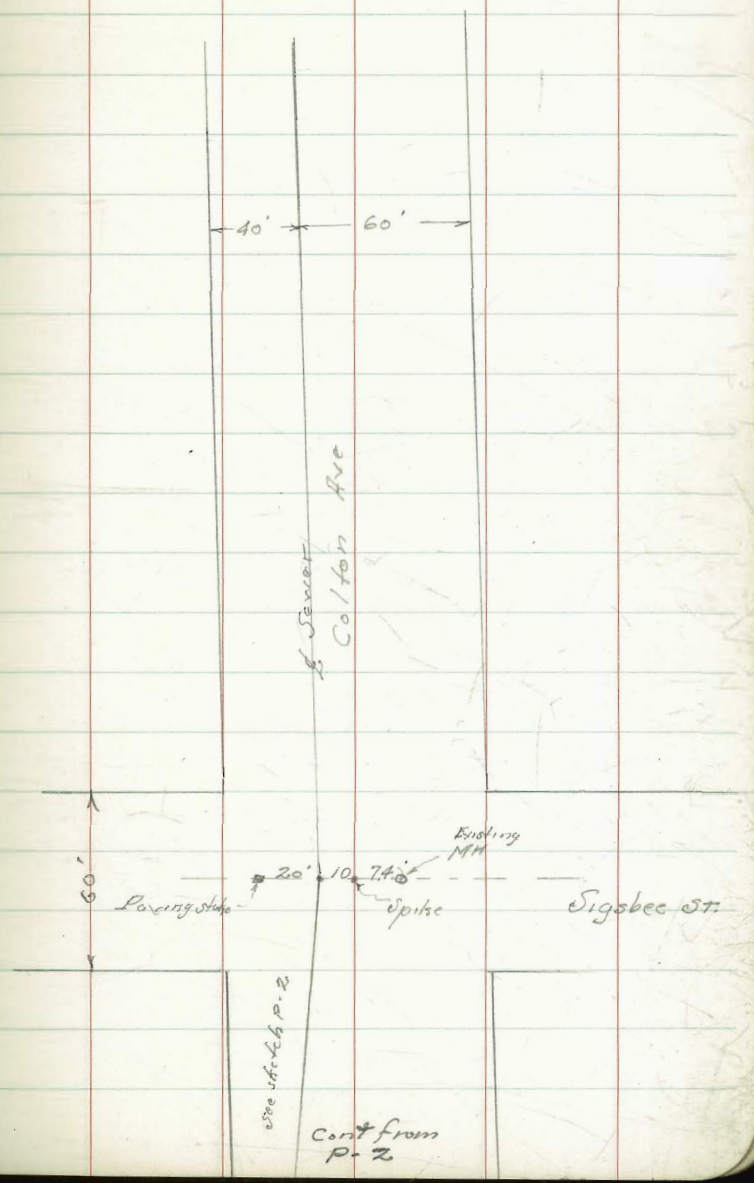
10+00

9+00

8+00

7+00

6+61.68 } Equation
6+66.64 } Δ 4.3938



Construction 60" Interceptor Sewer

"Alignment References Ties."

+50

15+00

14+00

P.O.T.
13+31.68 = M.H. # 24

13+00

12+00

11+00

+50

20+44.43 = P.O.T.

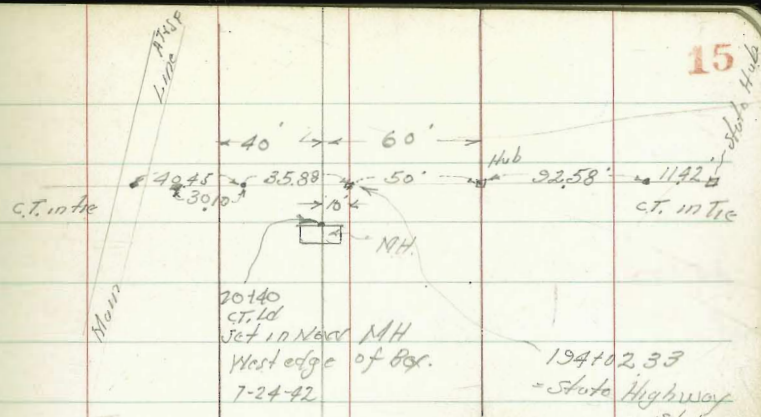
20+00

19+00

18+00

17+00

16+00



+50

25+00

24+75 = L.O.T. = 2"x2" Long Stake

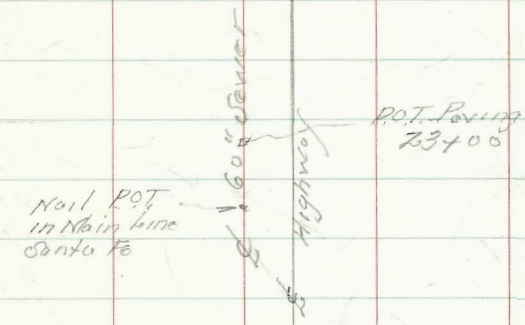
24+00

23+00

22+00

21+00

24+75
L.O.T.



+50

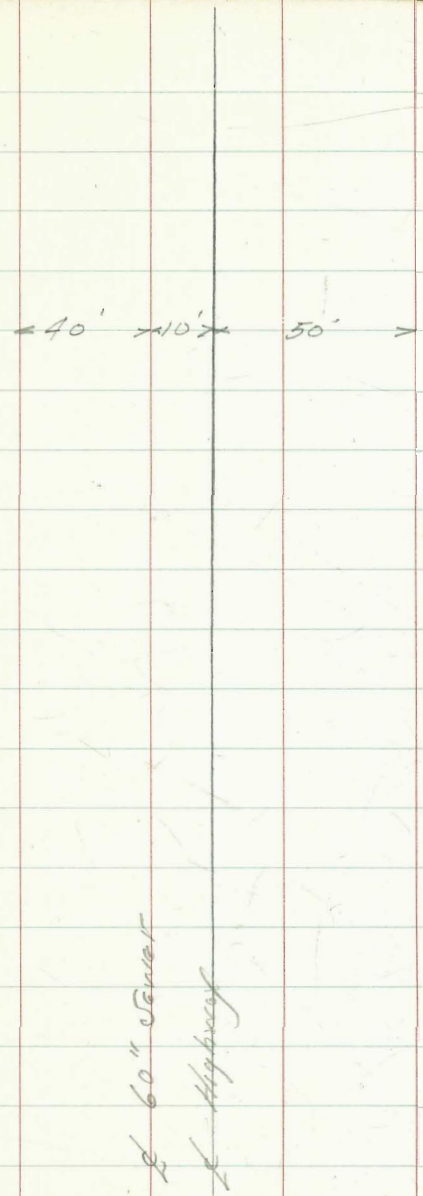
30+00

29+00

28+00

27+00

26+00



35+64.62 = Δ Lt. 4°48'45"

+50

35+00

34+00

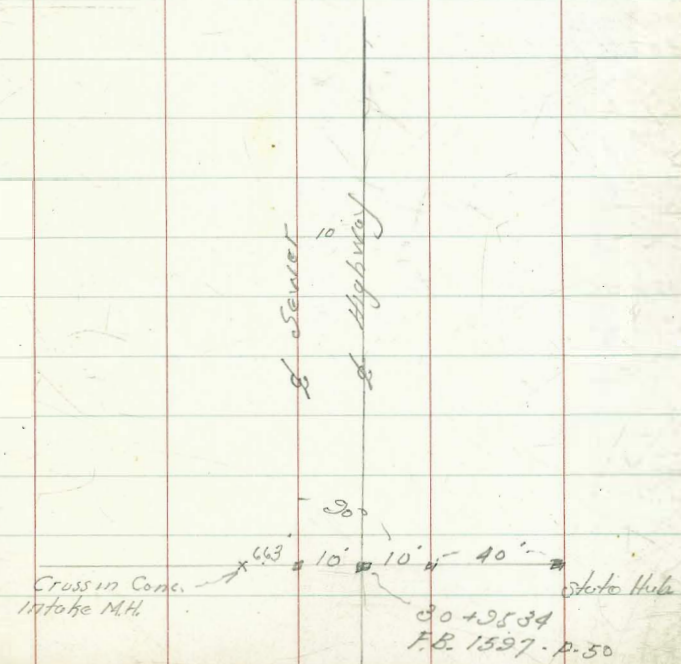
33+00

32+00

31+00

30+95.34 = P.O.T.

35+64.62
Δ = Lt. 4°48'45"



40+96.14 = B.C. Rt.

+50

137.52 = P.O.T. Nail in RR. Spur Tie

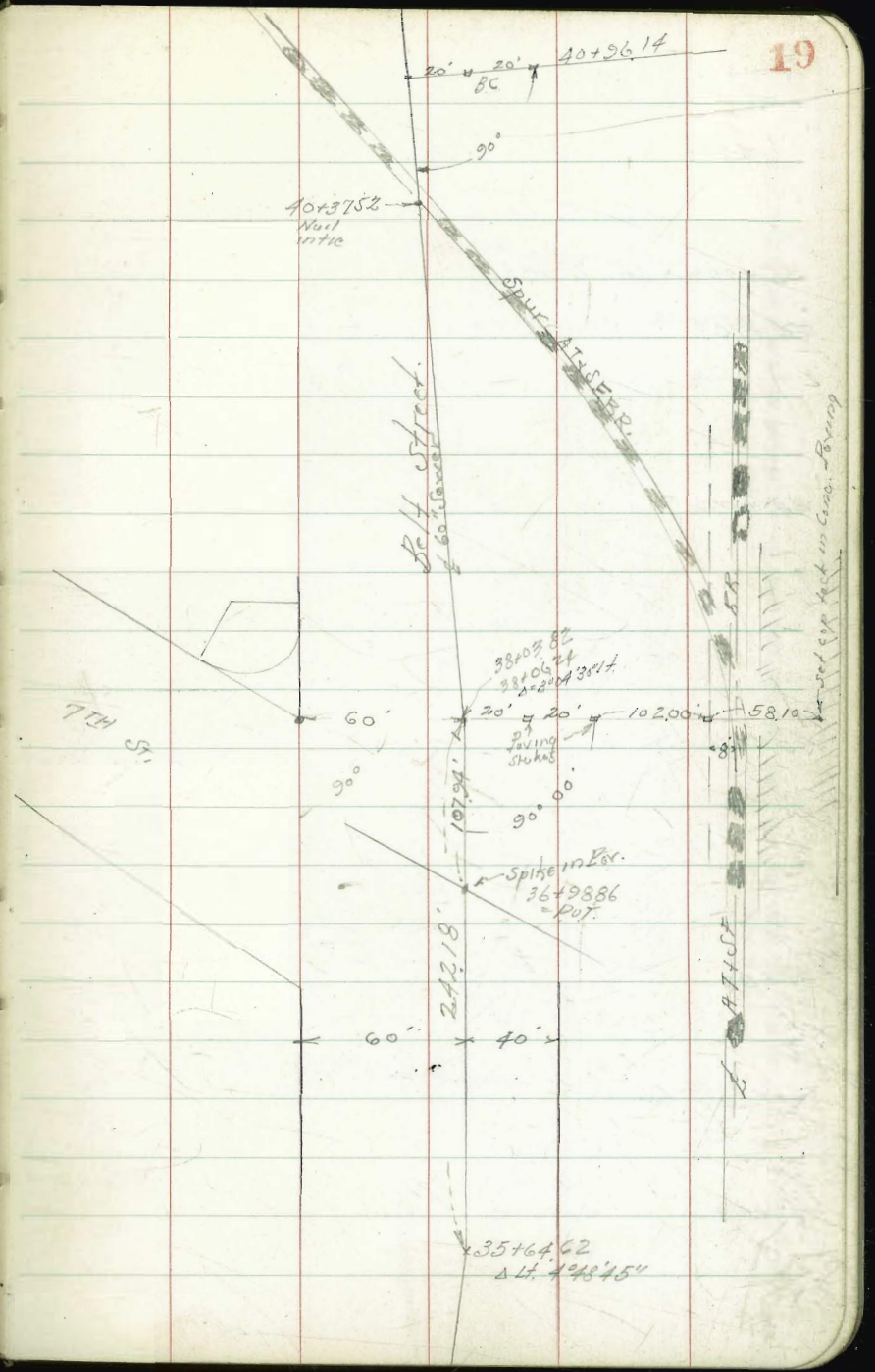
40+00

39+00

= 38+03.82 } Δ Lt 3°04'30"
= 38+06.24 } Equation
38+06.80

37+00

36+00



150

45+00 = Δ Lt. 2°30'

44+76.5'

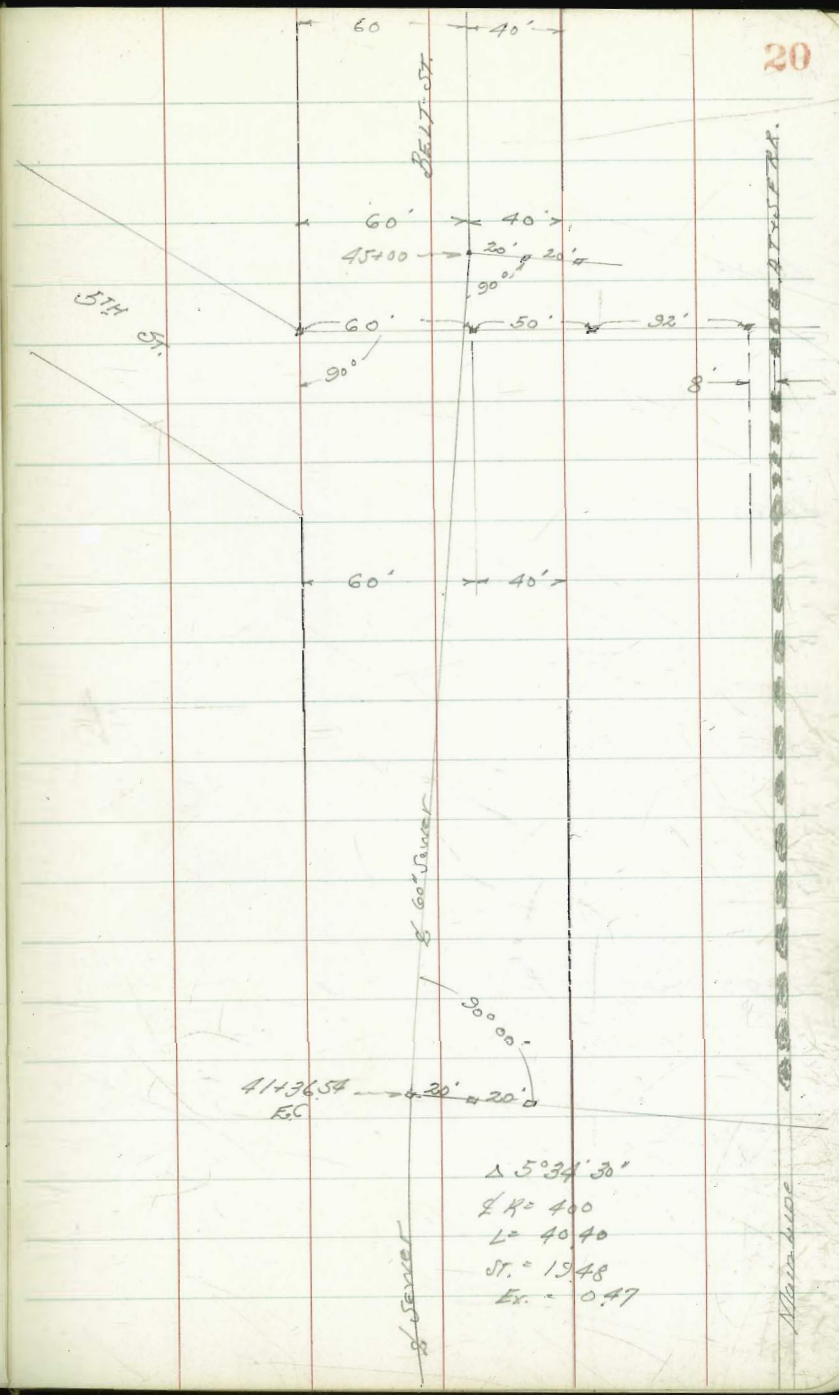
44+00

43+00

42+00

41+36.54 = E.C.

41+00



+50

50+00

49+00

48+00

47+00 P.O.T. MH# 29

46+00

< 60' > 40'

47+00 20' 20' 90°

Belt Street

℄ 60" Interceptor

+50

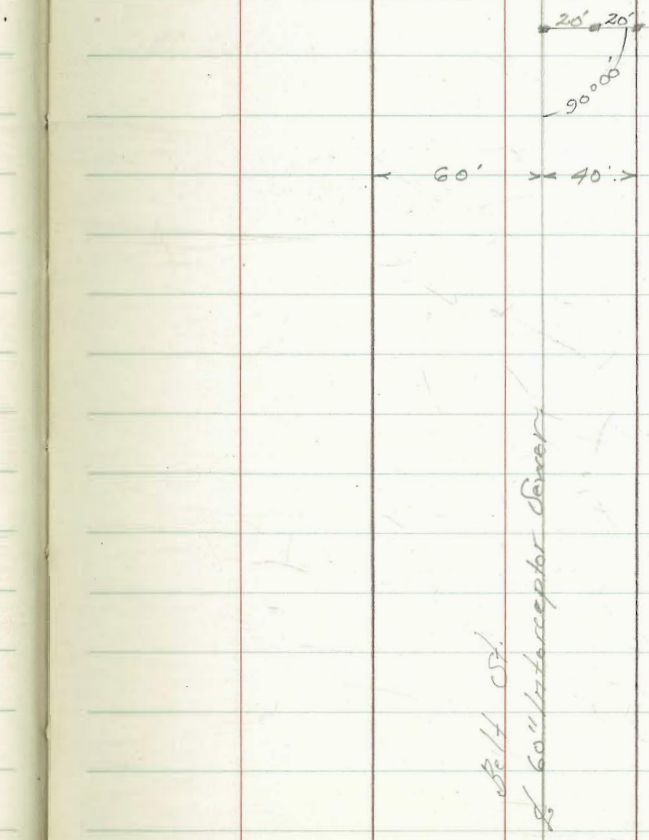
55+00

54+00 = P.O.T. MH #30

53+00

52+00

51+00



750

60+00

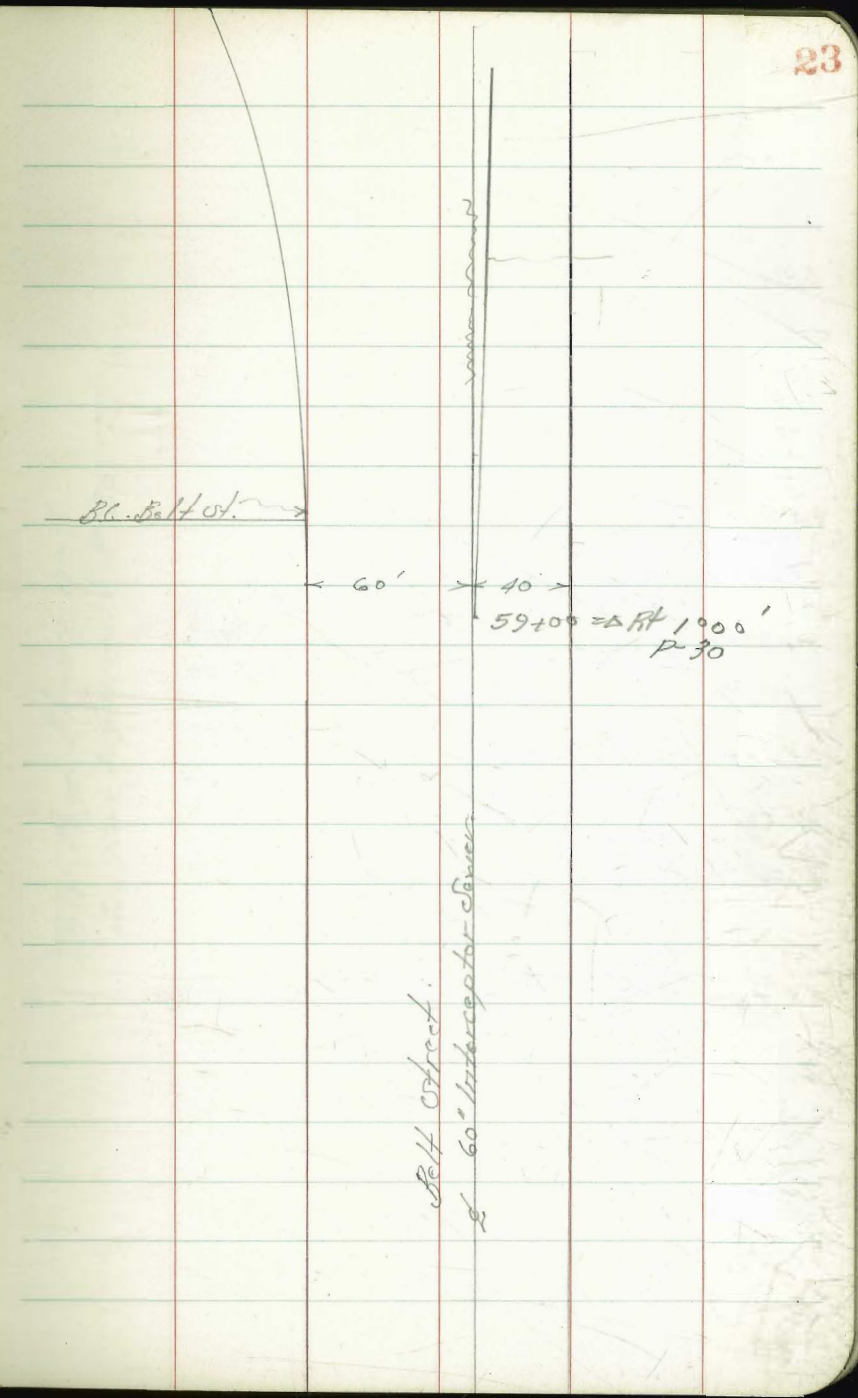
59+03.35 = P.O.T. Sewer = B.C. St. Harbor Drive.

59+00 = Δ in Line See change P-30

58+00

57+00

56+00



+50

65+00

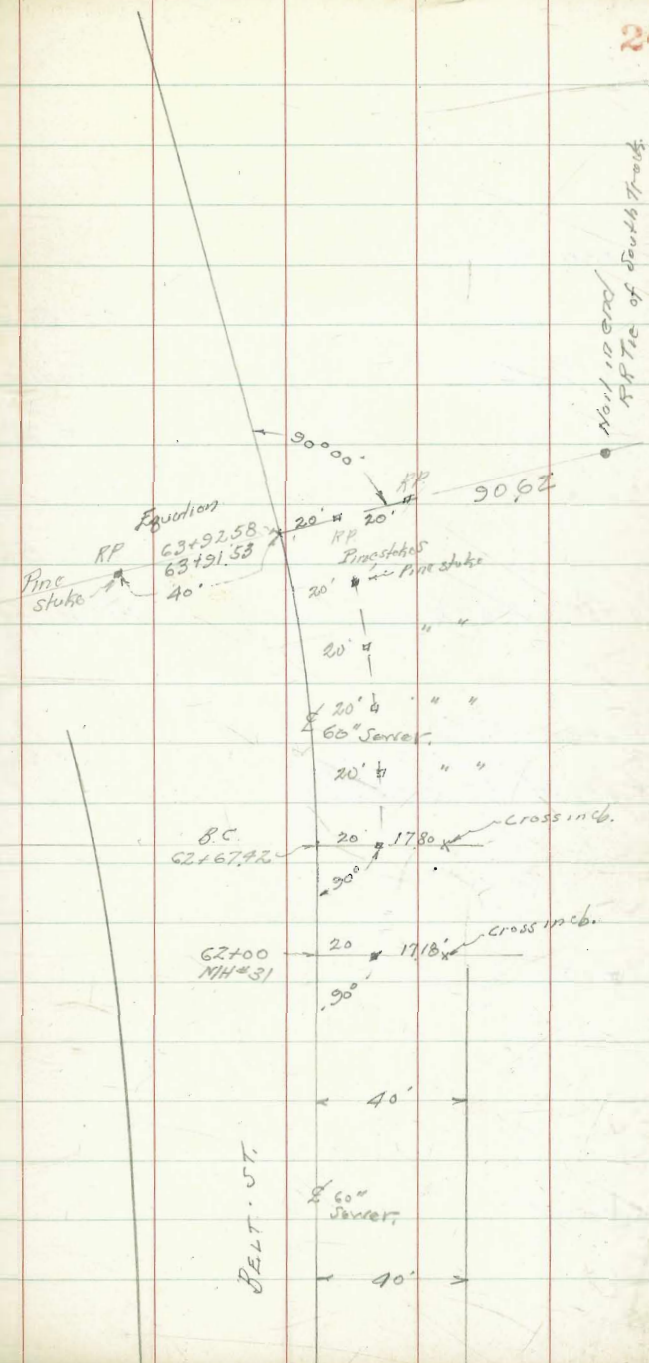
64+00
=63+92.58 Equation.
63+91.53 =E.C. 8°53.5'
1734' chd 20' Rt.

+75 7°42.3' Δ=17°47
26.24' chds 20' Rt. ℄ R=400
+50 5°54.8' T=62.58'
L=124.11
26.24' "
63+25 4°07.42'
26.24' "
63+00 2°20'
34.19' chd 20' Rt.
+67.42 = B.C. Lt.

P.O.T.
62+00 = N/H #31 See New Location N/H P-33

61+00

This Page Abandoned.
See New Alignment P-30



+50 17°28.5

70+00 14°08.6

℄ 60" Sewer Data

+50 10°49

℄ Radius = 430'

Δ = 74°42'30"

69+00 7°29

T = 328.22

L = 560.68

+50 4°09.2

def per ft = 3.974'

68+00 0°49.4

67+87.64 = BC of Sewer

67+00

66+00

This Page Abandoned
See New Alignment
Page 54

℄ Sewer

Δ = 74°42'30"
℄ R = 430
L = 560.68

BC. of Sewer
67+87.64

75+59.61 = P.O.T. Nail on South 7'Line Market

75+52.61 = S'Line Market St.

75+00

74+75

74+44.08 } Equation = R.C.
73+48.42 } 39°21.25'

73+00 34°08

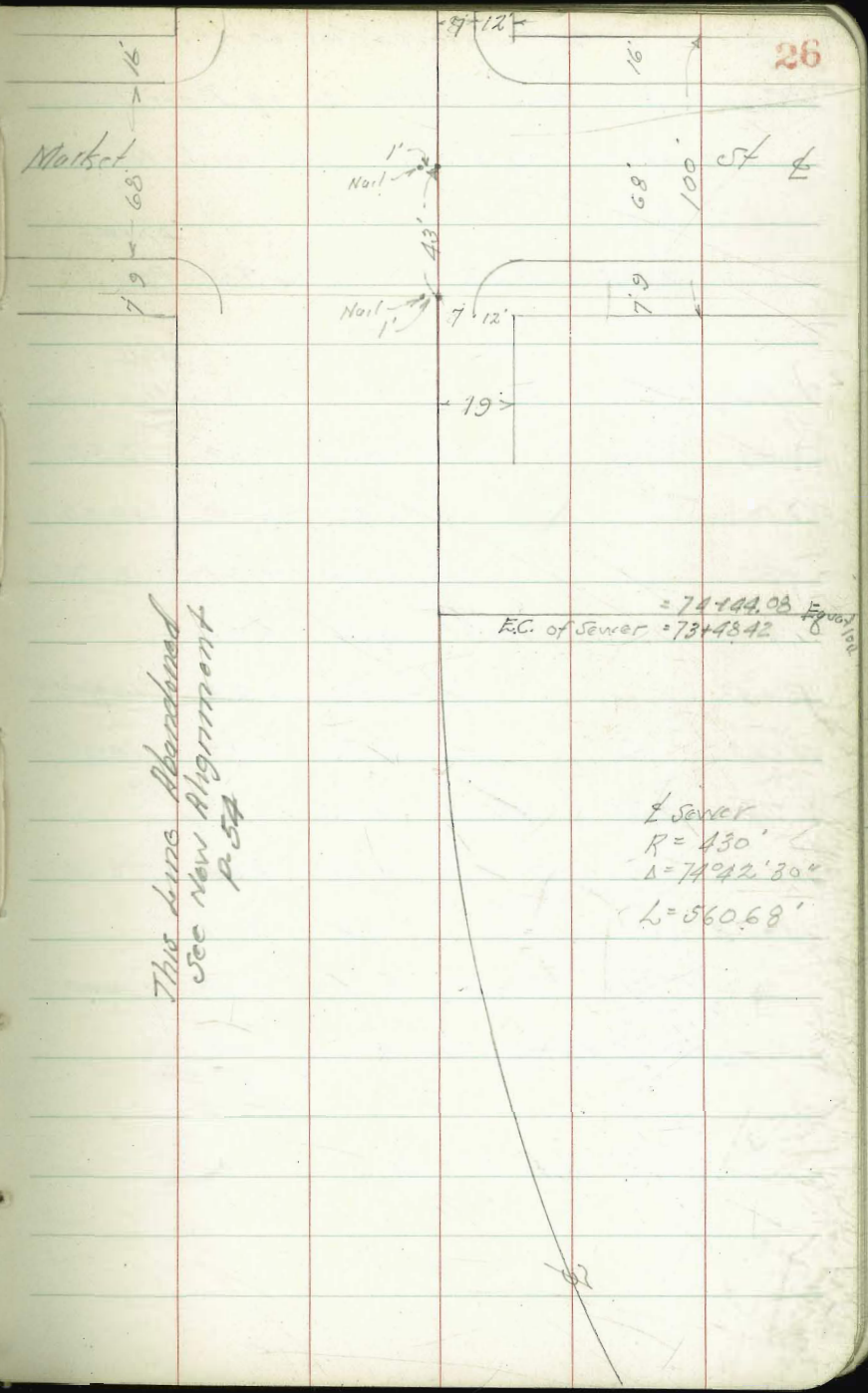
+50 30°48

72+00 27°28.1

+50 24°08.3

71+00 20°48.4

This Line Abandoned
See New Alignment
P.54



Walker
Wells
Hardin
2-21-42

60" Interceptor Sewer
Grades.
And Temp BM's. Set in Power Poles
from Sigsbee St. WLY on Colton St.

	2.55	9.45		6.90	BM. #3 Page 3						
Station				Elev. Nails	Elev. Flow Line	Cuts	offsets				
6+85			1.82	7.63	-19.52	+27.15	34.1' Lt. = Nail in Pole				
8+50			6.31	3.14	-19.39	+22.53	34.9' " " " "				
10+39			4.54	4.91	-19.24	+24.15	34.2' " " " "				
T.P.	2.12	7.03	4.54	4.91							
12+32			3.39	3.64	-19.09	+22.73	34.5' " " " "				
14+22			2.16	4.87	-18.93	+23.80	34.1 " " " "				
T.P.	4.27	4.02	7.28	-0.25							
16+57			0.08	3.94	-18.74	+22.68	33.8' " " " "				
18+93			0.41	3.61							
T.P.	1.77	5.38	0.41	3.61	-18.56	+22.17	34.3 " " " "				
Check BM #5 FB. 1597-43			5.79	-0.41	-						
				-0.40 = BM							
				0.01 Error.							

BM #5 = Spike 150' ± Rt 20+20 ± In Bridge Timber

Cont. P-34 5-7-42

Walker Wells Hurdin 2-21-42

Check Levels for Temp. BM's as run on Page-27

					P-27 Elev. Nails	Mean Elev.
	7.19	6.79		-.040		
18+93			3.17	3.62	3.61	
16+57			2.83	3.96	3.94	3.95
T.P.	2.93	6.89	2.83	3.96		
14+22			2.02	4.87	4.87	
12+32			3.24	3.65	3.64	
T.P.	5.35	9.00	3.24	3.65		
10+39			4.09	4.91	4.91	
8+50			5.86	3.14	3.14	
T.P.	7.89	11.03	5.86	3.14		
6+85			3.40	7.63	7.63	
Chk. BM #3			4.12	6.91 6.90 - BM .01 Error		

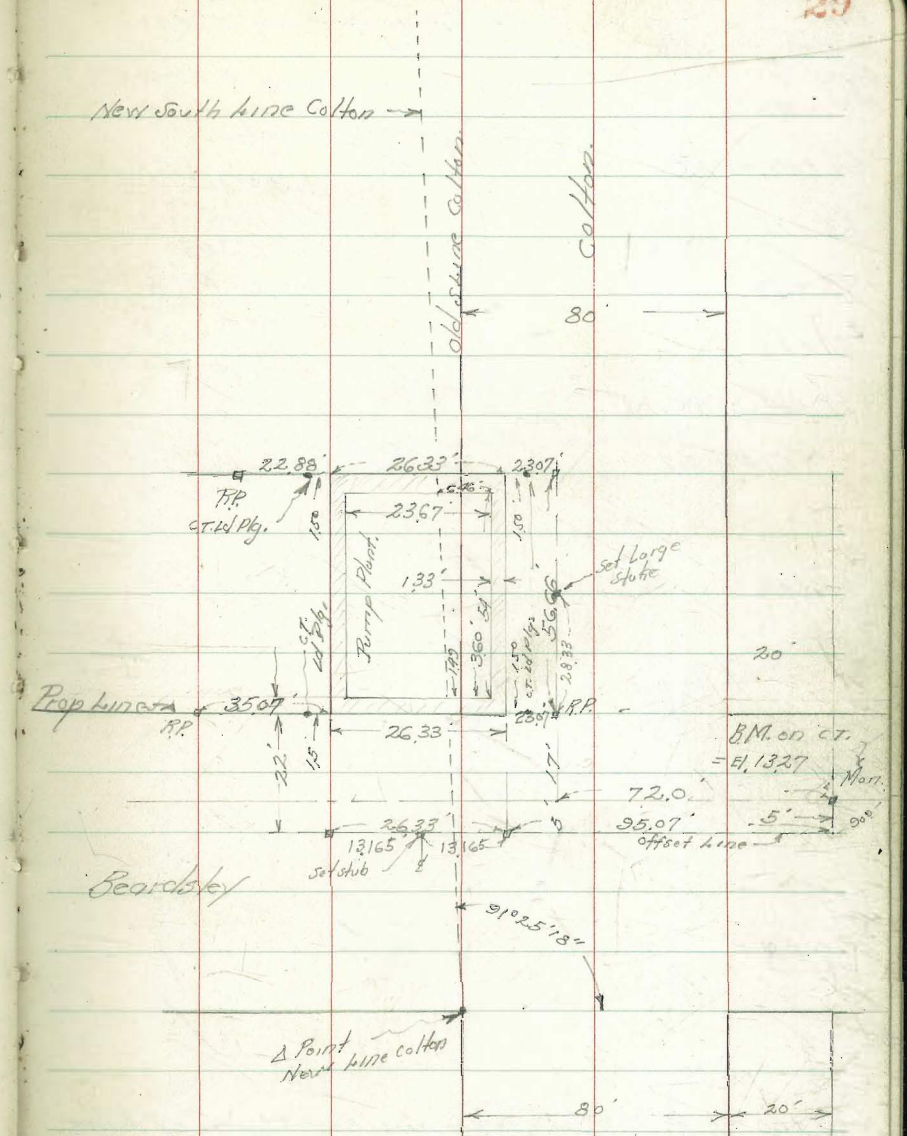
Walker
Hardin
Reed

Restake Pump Plant
BEARDSLEY & Colton St.

5-8-42 = Staking.

5-29-42 = Set C.T.S Ld Plgs 1.50' from Corners in bottom of tank on Conc. Floor.

	3.60	16.87		13.27	BM P-3 Conc. Mon
T.P.	0.00	-2.19	19.06	-2.19	
T.P.	0.93	-14.08	-15.82	-15.01	
S.W. Cop tack			4.90	-18.98	
N.W. " "			4.88	-18.96	
N.E. " "			4.91	-18.99	
S.W. " "			4.87	-18.95	
	3.60	16.87		13.27 = BM	
T.P.	0.00	-2.19	19.06	-2.19	
T.P.	0.93	-17.08	15.82	-18.01	
S.W. Cop tack			4.90	-21.98	
N.W. " "			4.88	-21.96	
N.E. " "			4.91	-21.99	
S.E. S.W. " "			4.87	-21.95	
T.P.	4.96	-17.03	4.91	-21.99	
			1.47	-18.50	



95.07
13.16
108.23

Walker
Bliss
Hurlin
Beggs
Witt 8-14-42

Line Change 60" Interceptor on 8th St. from Station 59+00 to E Market St.

Changed from Line as Shown P. 23 to P. 24

Note: Line change to give more clearance for Incinerator & Western Lumber also Derrick

64+10.65 = E.C.

63+75

63+50

63+25

62+87.60 = B.C. L.L.

+67.47 = P.O.T.

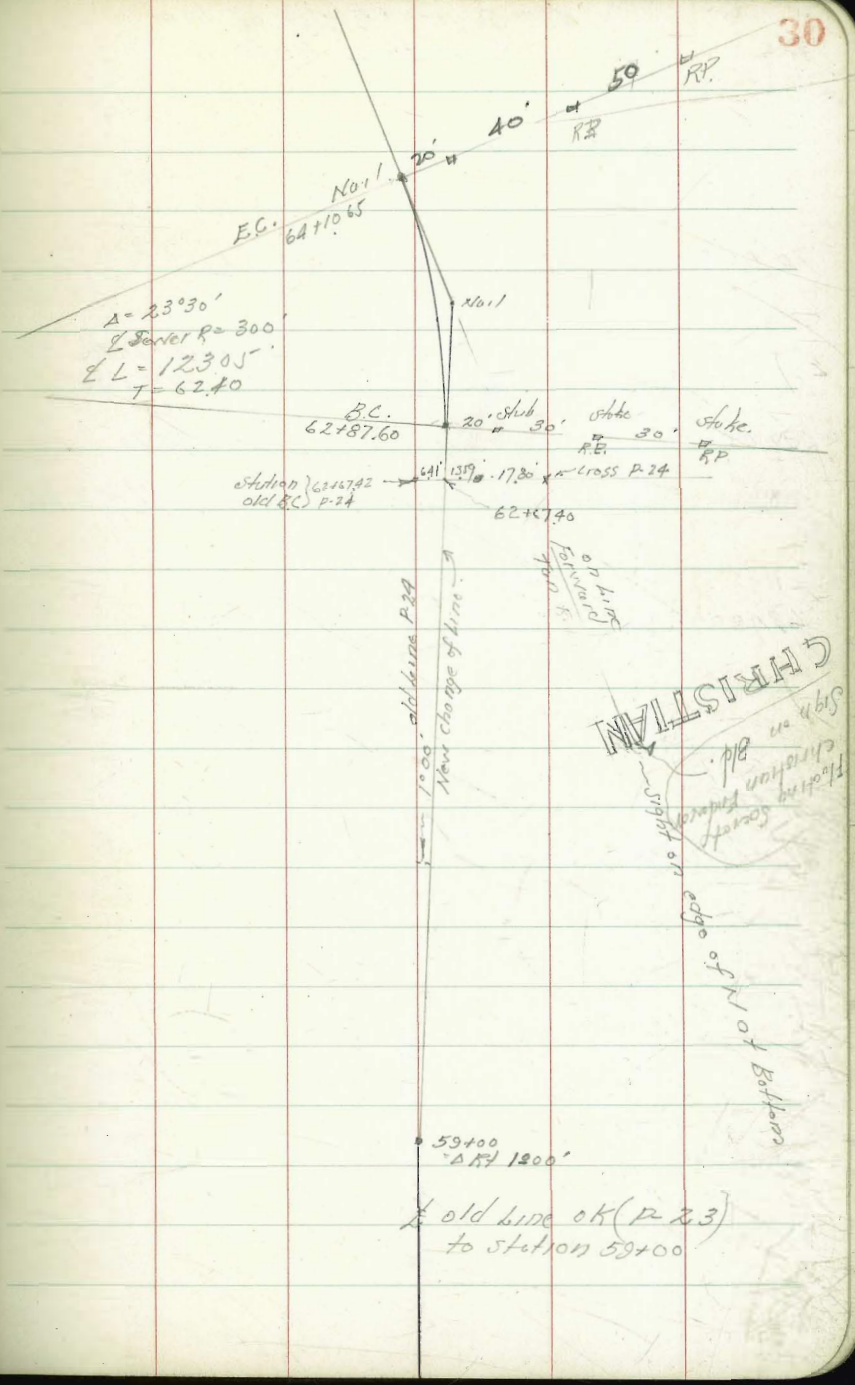
62+00

61+00

60+00

59+00 = Δ Rt 1°00' = Beginning New change of Line

Δ = 23°30'
D = 300
L = 123.05'
T = 62.40'



60" Sewer Change of Line
Cont. from P-30

70+00

℄ Sewer Data
Δ = 79°25'30"
R = 530'
L = 734.70'

69+00 Def per ft. = 3.243'

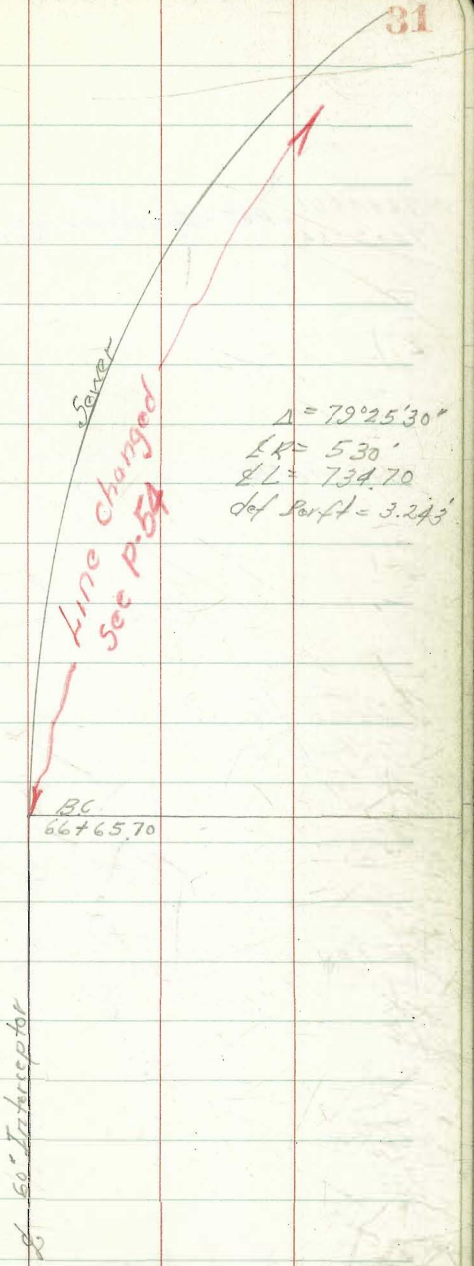
68+00

67+00

66+6570 = B.C. P.T.

66+00

65+00



60" Sewer Cont. from P. 31

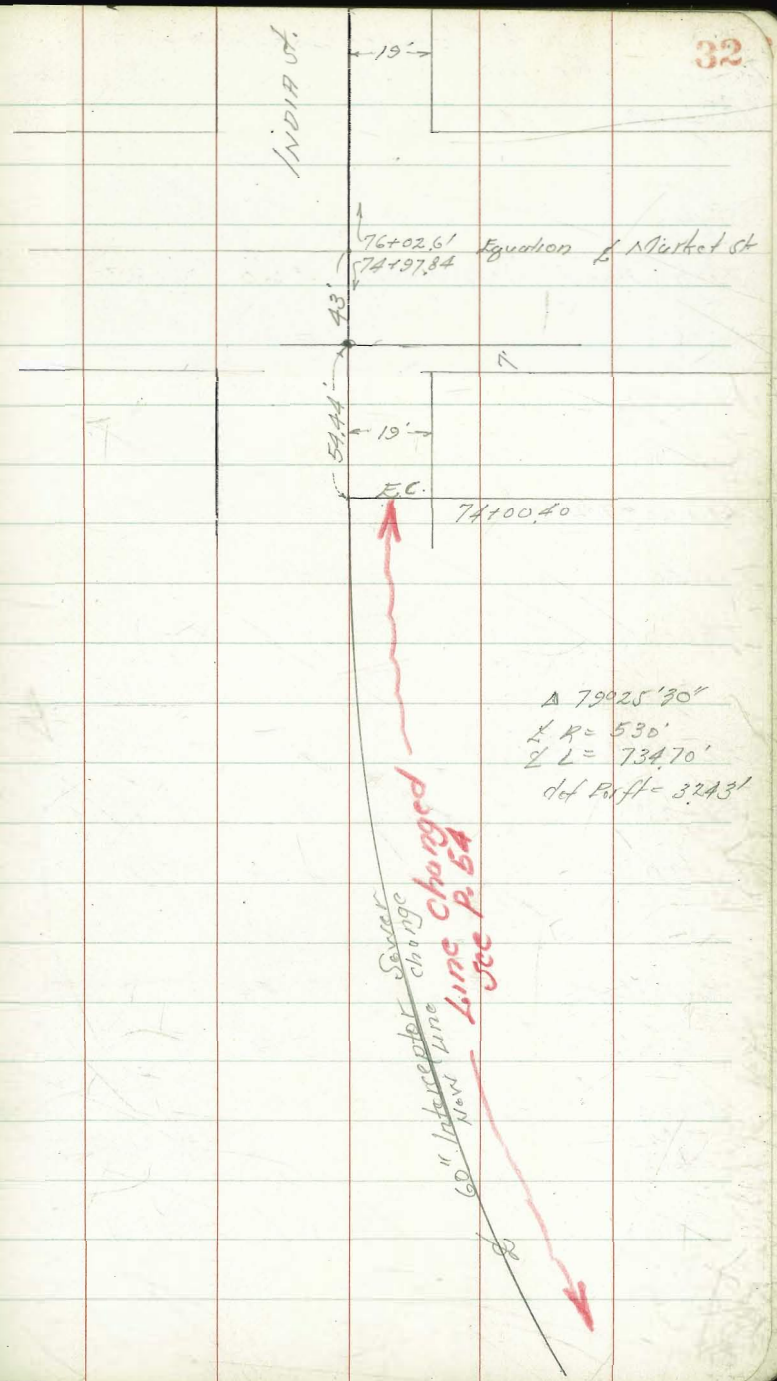
= 76+02.6' } P.O.T. = Equation = ℄ Market Street.
74+97.84 }

74+00.40 = E.C.

73+00

72+00

71+00



Walker
Bliss
Hurlin
Beggs
Wirt 8-14-42

60" Interceptor Sewer Grades
for Line change, as located on P-30-54/32.
Note check Levels P-42

Station		6.47		El. Stakes	El. Flow Line
59+00 (Page 9)	= 1° Rt = New Line		4.60	1.87	-15.35
+50			4.57	1.90	-15.31
60+00			4.53	1.94	-15.27
+50 =			4.47	2.00	-15.23
61+00 =	MH. #31		4.45	2.02	-15.19
+50			4.50	1.97	-15.15
62+00			4.67	1.80	-15.11
+50			4.60	1.87	-15.07
62+87.60 =	B.C. Lt.		4.50	1.97	-15.04
63+25			4.55	1.92	-15.01
+50			4.64	1.83	-14.99
+75			4.61	1.86	-14.97
64+10.65 =	E.C.		4.58	1.89	-14.94
+50			4.54	1.93	-14.91
		6.92			
65+00			4.93	1.99	-14.87
+50			4.69	2.23	-14.83
		6.76			
66+00			5.00	1.76	-14.79
+50			5.10	1.66	-14.75

Cont. P-41

#11
B.M. Brass Plg in cb. F.B. 1597 -43 = 2.56
W. end cb. 3.91+
Floating Society Christian Endavor Bld. 6.47 ×
4.54 -
1.93 TP
4.99+
6.92 ×
4.35 -
2.57
~~4.56 = BM~~
0.01

Cuts	offsets				
+17.22	20' Rt.				
+17.21	" "		Chk. B.M. #11		
+17.21	" "				
+17.23	" "				
+17.21	" "				
+17.12	" "				
+16.91	" "				
+16.94	" "				
+17.01	" "				
+16.93	" "				
+16.82	" "				
+16.83	" "				
+16.83	" "				
+16.84	" "				
+16.86	" "		Above B.M. #11	=	2.56
+17.06	" "				4.20+
+16.55	" "	stake			6.76 π
+16.41	" "				

C.B. Walker
Hardin
Reed
5-7-42

60" Interceptor Sewer

Grades on Nails set in Power Poles

from station 20 West.

	6.23	5.83		-0.40	BM #5 P-27		offset.
				Elev. stake	Flow Line		
20+44.43 = P.O.T.			7.19	-1.36	-18.44	+17.08	℄ stake
20+96.7			6.44	-0.62 = M ~~-0.61~~	-18.39	+17.77	℄ "
20+96.7			3.60	2.23	-18.39	+20.62	60.27 Rt. = Nail in Pole
21+44.62			5.73	0.09 = M ~~0.10~~	-18.35	+18.44	℄ stake
22+00			4.10	1.72 M ~~1.73~~	-18.31	+20.03	" "
23+00			4.97	0.85 = M ~~0.86~~	-18.23	+19.08	" "
+16.6			3.76	2.05 = M ~~2.07~~	-18.22	+20.27	60.27 Rt. = Nail in Pole
23+50			9.63	-3.81 = M ~~-3.80~~	-18.19	+14.38	℄ stake
24+50			5.00	0.81 = M ~~0.83~~	-18.11	+18.92	℄ "
24+51			1.34	4.49	-18.11	+22.60	65.21 Rt. " " "
T.P.	5.10	5.93	5.00	0.83			on ℄ stake 24+50
25+85			4.33	1.58 = M ~~1.60~~	-18.00	+19.58	
26+56			1.49	4.42 = M ~~4.44~~	-17.94	+22.36	58.14 Rt. = Nail in Pole.
27+00			4.68	1.23 = M ~~1.25~~	-17.91	+19.14	℄ stake
28+00			4.47	1.45 = M ~~1.46~~	-17.83	+19.28	
29+13.4			5.07	0.83 = M ~~0.86~~	-17.74	+18.57	
29+13.4	~~6.47~~	~~10.69~~	1.71	4.20 = M ~~4.22~~	-17.74	+21.94	103.32 Rt. = Nail in Pole.
T.P.	6.47	7.33	5.07	0.86			

Cont. P. 35

60" Interceptor

Cont. from P-34

7.33

			Flow Line		offsets
30+95.34	5.40	1.83 1.93	-17.59	+19.42'	20' Rt.
31+50	5.21	2.04 2.12	-17.55	+19.59'	" "
32+00	5.26	1.99 2.07	-17.51	+19.50'	" "
+50	5.15	2.10 2.18	-17.47	+19.57'	" "
32+82	M.H. to be spotted later				" "
33+00	4.97	2.27 2.36	-17.43	+19.70'	" "
+50	4.46	3.08 3.17	-17.39	+20.47'	" "
33+85.14	4.73	2.52 2.60	-17.36	+19.88'	" "

Check Levels P-36

Re " " P-37

Note. Levels as run the first time from Station 30+95.34 were off 0.1 hence the third set were run which agrees with the 2nd set. Hence the correction as shown.

Const. Grades Cont. P-36

Check Levels 60" Interceptor on line as run P-34-35

	6.09	5.69		-0.40	Elev. P-34
20+44.3			7.05	-1.36	1.36
+96.7			6.31	-0.62	0.61
20+96.7			3.46	2.23	2.23
21+44.62			5.60	0.09	0.10
22+00			3.97	1.72	1.73
23+00			4.84	0.85	0.86
+16.6			3.64	2.05	2.07
+50			9.50	-3.81	-3.80
24+50			4.88	0.81	0.83
T.P. +51	1.77	6.26	1.20	4.49	
25+85			4.69	1.57	1.60
26+56			1.85	4.41	4.44
27+00			5.04	1.22	1.25
28+00			4.82	1.44	1.46
29+13.4			5.44	0.82	0.86
29+18.4			2.07	4.19	4.22
T.P.	6.32	7.14	5.44	0.82	
30+93.1			5.30	1.84	2.9

Cont. P-35

℄ Stake

" "

60.27 Rt = nail in Pole

℄ Stake

℄ "

" "

60.27 Rt. " " "

℄ Stake

65.21 Rt " " "

℄ Stake

℄ "

℄ "

103.32 Rt = Nail in Pole

Check Levels Cont. from P. 36

7.14

31+50	5.11	2.03
32+00	5.16	1.98
+50	5.05	2.09
33+00	4.87	2.27
+50	4.06	3.08
33+85.14	4.63	2.51

C.B. Walker on Recd. - Rod
Hurdin 5-8-42

Re-run Levels over 60" Interceptor from Sta. 20 + to " 33 +

					B.M.	
	5.95	5.55		-0.40		
					P. 36 Levels	
20+4443			6.92	-1.37	1.36	
+96.7			6.18	-0.63	-0.62	℄ stake
+96.7			3.32	2.23	2.23	60.27' Rt. - Nail in Pole
21+4462			5.47	0.08	0.09	℄ stake
22+00			3.84	1.71	1.72	" "
23+00			4.71	0.84	0.85	" "
+16.6			3.51	2.04	2.05	60.27 " " " "
23+50			9.37	-3.82	-3.81	℄ stake
24+50			4.74	0.81	0.81	" "
+51			1.06	4.49	4.49	65.27 Rt " " "
T.P.	5.51	6.32	4.74	0.81		
25+85			4.74	1.58	1.57	℄ stake
26+56			1.90	4.42	4.41	58.14 R " "
27+00			5.09	1.23	1.22	℄ stake
28+00			4.87	1.45	1.44	" "
29+13.4			5.49	0.83	0.82	" "
+13.4			2.12	4.20	4.19	103.32
T.P.	6.41	7.24	5.49	0.83		

Cont. P-39

Cont. from P-38

		7.24			Elev P-36-37
30+98.34			5.40	1.84	1.84
31+50			5.20	2.04	2.03
32+00			5.25	1.99	1.98
+50			5.14	2.10	2.09
33+00			4.97	2.27	2.27
+50			4.16	3.08	3.08
+85.14			4.72	2.52	2.51
T.P.	4.81	6.74	5.31	1.93	
chk. B.M. #6			4.41	2.33	
				2.34 = B.M.	
				.001 Error.	

Walker Hardin Road 6-8-42

Cont. from P-35

					33+85.14
	5.39	7.91		2.52	Fl. stake
34+50			2.22	5.69	-17.31
35+00			2.18	5.73	-17.27
+64.62 = ΔLt. 4°48'45"			2.13	5.78	-17.22
36+00			2.10	5.81	-17.19
+50			2.06	5.85	-17.15
36+98.86 = (P.O.T. Spike)			2.02	5.89	-17.11
37+50			6.93	.098	-17.07
T.P.	3.97	6.57	5.31	2.60	
chk N.E. Hyd. 7th + Bolt Book 1597-43			2.10	4.47	
				4.46 = B.M.	
				.001 Error.	

Iron Pipe Conc. Base P.T. & A.T. & S.E. Main Line 9th St.

Cuts	offsets	
	Lt.	cut Marks
+23.00	51.50 =	on Co. Li. Fence
+23+00	55.30	" " "
+23.00	60.45'	" " "
+23.00	60.3'	" " "
+23+00	60.4	" " "
+23.00	59.9'	" " "
+18.05	60' Lt. = Spike in Post	

Walker
Hardin
Reed
7-24-42

Check Levels 60" Interceptor Sewer
Bet. Station 20 & 25

Original Cuts etc. P-34

	7.09	6.69		-0.40	BM#5 P-34		
20+40± on West edge	New Existing MH		6.79	-0.10 = Elev. of Elev Stake	El. Flow	Lead Plg. on Lead -cuts-	Plg. shelf = West edge Concrete Box.
20+96.7			4.52	2.17	-18.39	20.56	6027' Rt = Nail in Pole
23+00 = P.O.T. Stake			5.83	0.86	-18.23	+19.09	℄ Stake.
23+16.6			4.64	2.05	-18.22	+20.27	6027' Rt = Nail " "
24+75 = P.O.T. ℄			7.22	-0.53	-18.09	+17.56	℄ stake 2"x2" Stake

60" Interceptor Sewer Grades
Cont. from P-33

Station				El. Stakes	Elev. Flow Line	Cuts	Offsets				
	= P.O.T.	676 π P-33									676 π P-33
66+65.70	= ~~B.C. Rt. see Location P-31~~				-14.74	Left out					4.69 -
		676 π									2.07 T.P.
67+00			5.00	1.76	-14.71	+16.47	20' Rt.	= Spk in Pav.			5.46 +
											7.53 π
+50			4.69	2.07	-14.67	+16.74	"	" "			5.37 -
										2.16 =	2.16 = T.P.
68+00	= ~~MH# 32~~		4.64	2.12	-14.63	+16.75	"	" "		4.92 +	~~4.94~~ +
68+31.89	= MH# 32	= Δ Rt. 37°38'	4.69	2.07	-14.61	+16.68	21.13'	" " on Bisector		7.08	~~7.10~~ π
										4.81 -	~~4.80~~ -
+50		7.53	5.38	2.15	-14.59	+16.74	20'			2.27 = T.P.	~~2.30~~ T.P.
										5.15 +	~~5.15~~ +
69+00			5.16	2.37	-14.55	+16.92	20'	" " Pav.		7.42	~~7.45~~ π
										5.15 -	~~5.13~~
+50			5.50	2.03	-14.51	+16.54	19' Rt.	"	S.W. Mkt. + India	2.27 = BM# 13	2.32
70+00			5.38	2.15	-14.47	+16.62	20' Rt	" "			
+50			5.69	1.84	-14.43	+16.27	" stake				
71+00			5.33	2.20	-14.39	+16.59	" "				
71+19.65	= Junction = B.C. Rt	Coronado Line P-54	5.37	2.16	-14.37	+16.53	25' Rt.	= stake Radial Line			2.27 = BM# 13
											6.92 +
+50		7.08	4.91	2.17	-14.35	+16.52	20' Rt.	= "			9.19 π
											3.37 -
72+00			5.12	1.96	-14.31	+16.27	" "	"			5.82
											5.81 = BM# 14
+50			5.18	1.90	-14.27	+16.17	" "				
73+00			4.99	2.09	-14.23	+16.32	" "				
+50			5.19	1.89	-14.19	+16.08	" "				
74+09.80	= E.C.	7.42		2.49	-14.14	+16.63	" "				
~~74+00.40~~	= E.C.		4.93		~~-14.15~~						
74+64.24	= ST Line Market		4.29	3.13	-14.10	+17.23	" "	Chisled Cross on Walk			
+50					~~-14.11~~						
75+07.24	P.O.T. MH# 33 = See Note:										
= 76+02.61	Equation ℄ Market St.				-14.07						

→ New Location MH. 147' SSL. Market
Changed - by Osborne per Beryl Phelps.

Grades Cont. P-58

Walker
Bliss-K.
Hardin
Beggs
Wirt 8-14-42

Check Levels 60" Sewer
for Line as run P-33
" " " " P-41

		6.72		
59+00			4.84	1.88
+50			4.81	1.91
60+00			4.78	1.94
+50			4.71	2.01
61+00			4.70	2.02
+50			4.74	1.98
62+00			4.91	1.81
+50			4.84	1.88
62+87.60	BC.		4.75	1.97
63+25			4.80	1.92
63+50			4.89	1.83
63+75			4.86	1.86
		6.90		
64+10.65	EC.		5.01	1.89
+50			4.98	1.92
65+00			4.91	1.99
+50			4.67	2.23

Check Levels Cont. 9-12-42

	4.56	7.12		2.56 - B.M.
66+06			5.38	1.74

2.56 BM
4.16 +
6.72 T
4.86
1.86
5.04 +
6.90 T
4.34
2.56

60" Sewer check Levels Cont from P-42

		7.12 π			as run P-33
66+50			5.47	1.65	1.66
T.P. 67+00	5.64	7.39	5.37	1.75	as run P-41 1.76
750			5.34	2.05	2.07
68+00			5.28	2.11	2.12
731.89 = Δ			5.33	2.06	2.07
750			5.25	2.14	2.15
TP	4.98	7.38	4.99	2.40	
69+00			5.01	2.37	2.37
+50			5.34	2.04	2.03
70+00			5.23	2.15	2.15
+50			5.53	1.85	1.84
71+00			5.17	2.21	2.20
T.P. 71+19.65 = Δ	5.05	7.21	5.22	2.16	2.16
71+50			5.04	2.17	
72+00			5.25	1.96	
+50			5.31	1.90	
73+00			5.12	2.09	
+50			5.32	1.89	
74+09.90 = E.C.			4.72	2.49	
+424 = S. 7" Line MH			4.08	3.13	

Walker.
Wells.
Hardin
1-20-41

Check Levels. 60" Interceptor Sewer
from Beardsley St. West.

	Grades P-3				BM#2						
	4.24	17.51		13.27							
					Elev. Stake P-3	Elev. difference					
1+00			7.47	10.04	10.04						
+50			6.32	11.19	11.19						
2+00			6.83	10.68	10.68						
+50			5.74	11.77	11.77						
3+00			6.26	11.25	11.25						
+50			6.65	10.86	10.86						
4+00			7.92	9.59	9.59						
+50			8.45	9.06	9.05	0.01					
+85			8.69	8.82	8.82						17.51 ✗
		12.53									9.00 −
5+50			5.30	7.23	7.23						8.51 T.P.
6+00			5.30	7.23	7.23						4.02 +
											12.53 ✗
+66.44	℄ Sigsbee Δ Lt. 3°38		7.93	4.60	4.60						
=6+61.86											
7+00											
+50											
8+00											
+50											
9+00											

Check Levels.
60" Interceptor Sewer

9+50
10+00
+50
11+00
+50
12+00
+50
13+00
+50
14+00
+50
15+00
+50
16+00
+50
17+00
+50
18+00
+50
19+00

Check levels
60" Interceptor

19+50
20+00
+50
21+00
+50
22+00
+50
23+00
+50
24+00
+50
25+00
+50
26+00
+50
27+00
+50
28+00
+50
29+00
+50

Check Levels

60" Interceptor

		Elev. Stake P-	Elev. Stake P-
30+00			
+50			
31+00			
+50			
32+00			
+50			
33+00			
+50			
34+00			
+50			
35+00			
+50			
36+00			
+99	6.11	4.01	2.10	2.09
36+99.28 = Manhole		5.06	1.05	1.04
37+50		4.99	1.12	1.12
38+06.24 ↑ Equation				
38+03.82 ↓ = ΔLt 3°04	6.12	5.54	0.57	0.58
+50		5.27	0.85	0.87
39+05		5.77	0.35	0.36
39+50		4.96	1.16	1.17

Elev. Stake P-7 | Elev. Stakes P-7

Walker
Wells
Harding
2-20-42

BM # 7 - P-6 = 4.46
1.65 +
6.11 +
5.54 -
0.57 = TP
5.55 -
6.12 +

Walker
Wells
Hurlin
2-20-42

Check Levels

60" Interceptor Sewer

			Elev Stake	Elev Stake Grade Const.	Mean Elev.
40+00 =	P.O.T. M.H. #28	6.12	4.64	1.48	1.49	
+50			3.97	2.15	2.16	
+96.14 =	B.C. Rt. Δ = 5°34' D = 4°00 L = 4090 ST = 1948		5.20	0.92	0.93	
41+36.5 =	E.C.		5.48	0.64	0.66	0.65
+99.5			5.35	0.77	0.78	
42+50		6.60	5.83	0.77	0.78	
43+00			6.26	0.34	0.35	
+50			6.11	0.49	0.50	
44+00			5.07	1.53	1.54	
+50			5.28	1.32	1.32	
45+00 =	Δ Lt 2°30'		5.31	1.29	1.30	
+50			5.57	1.03	1.04	
46+00			5.40	1.20	1.21	
+65		8.23	6.58	1.65	1.66	
47+00 =	P.O.T. MH #29		6.42	1.81	1.81	
+50			5.93	2.30	2.30	
48+00			6.31	1.92	1.93	
+50			6.31	1.92	1.92	

6.12 T
5.35
0.77 TP
5.83 +
6.60 T
5.40 -
1.20 TP
7.03 +
8.23 T

Walker
Wells.
Hardin
2-20-42

Check Levels
60" Interceptor Sewer

		π 8.23			Elev. Stokes Grade Const	Mean Elev.					8.23 = π
49+01			6.74	1.49	1.49						5.66 =
+50			5.71	2.52	2.53						2.57 T.P.
+95			5.79	2.44	2.45						5.19 +
											7.76 π
											5.60
											2.16
											2.19 BM
50+50			5.68	2.55	2.57	2.56					0.03 Error.
51+00			5.66	2.57	2.58						2.19 - BM #10
		7.76									4.84 +
											7.03 π
+55			5.41	2.35	2.36	2.355					
52+00			5.57	2.19	2.21	2.20					
+40			5.51	2.25	2.26						
53+00			5.88	1.88	1.89						
+45			6.10	1.66	1.67						
54+00 = MH #30			6.09	1.67	1.67						
+40			6.31	1.45	1.47	1.46					
55+00			6.12	1.64	1.65						
+54			6.10	1.66	1.66						
56+00			6.17	1.59	1.60						
+50			6.09	1.67	1.68						
57+00			5.98	1.78	1.79						
+50			6.07	1.69	1.70						
		7.03									
58+00			5.23	1.80	1.80						
+50			5.25	1.78	1.78						

chk. BM #10

Walker
Wells
Hardin
2-20-42

Check Levels
60" Interceptor Sewer

				Elev. Stake	Elev. Stake Const. P-9
		7.03			
59+00			5.16	1.87	1.87
+50			5.12	1.91	1.91
60+00			5.05	1.98	1.97
+50			5.02	2.01	2.00
61+00 =	POT. MH #31		4.97	2.06	2.06
+50			5.17	1.86	1.86
62+00			5.27	1.76	1.75
+50					
+67.42 = B.C. Lt.					
	Δ = 17°47'				
	℄ R = 400				
	" L = 124.11				
	ST. = 62.58'				
63+00					
+25					
+50					
+75					
63+92.58 = E.C.					

Mean Elev.

Check B.M. # 11

Walker
Wells
Hardin 2-20-42

7.03 T
4.46 -
2.57
2.56 = BM
0.01 Error

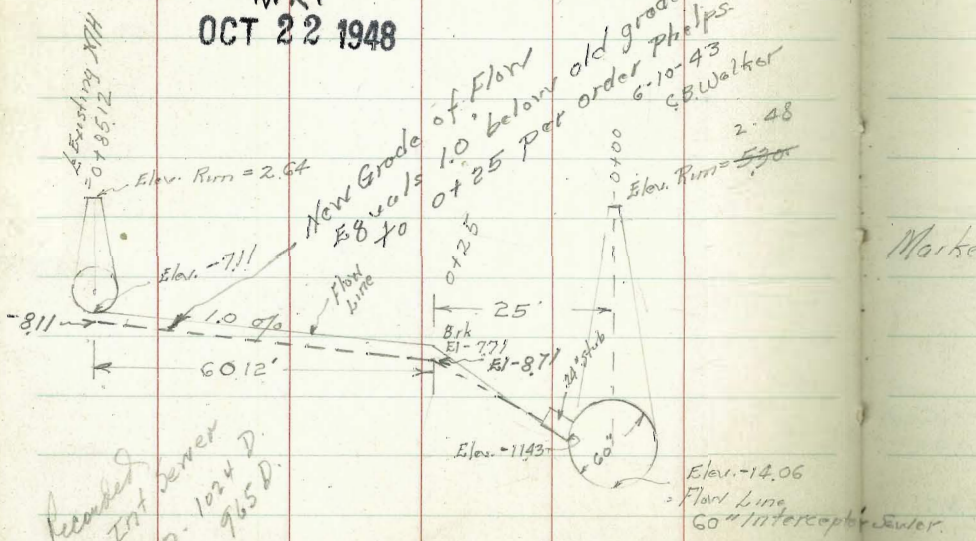
Walker
Osborne
Hazard
6-5-43

Grades for Construction of Sewer in Market St To Interceptor Sewer M.H. #33

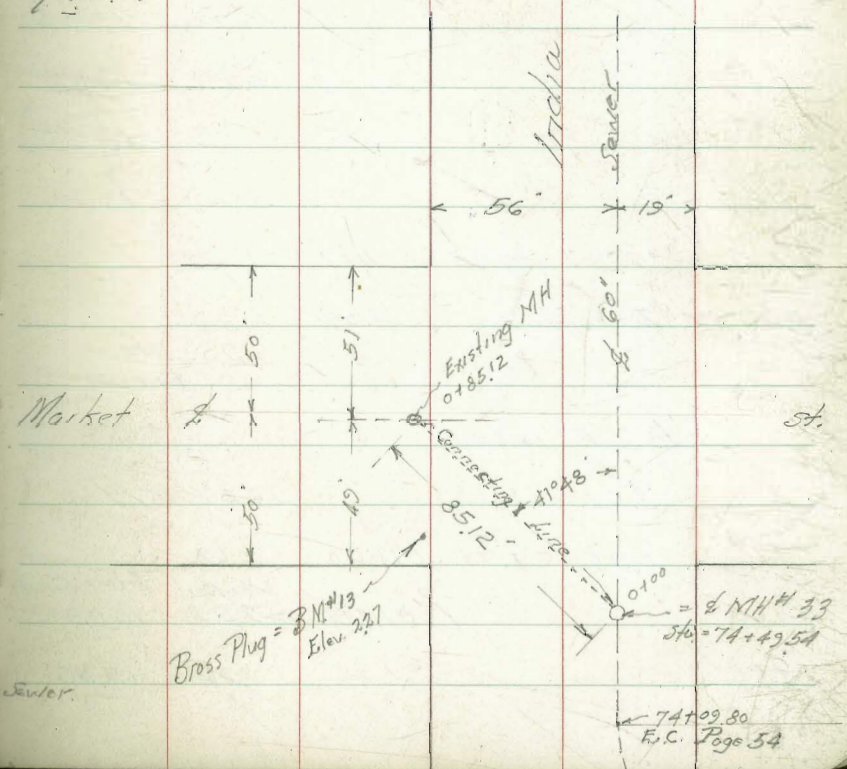
		π			B.M. #13 Sw. India & Mkt. Page 41						
	5.51	7.78		2.27							
Station			10' Lt. Rods	Elev. Stakes	Flow Line Elev.	Cuts	Offsets	10' Rt. Rods	10' Rt. Elev. Stake	Flow Line	10' Rt. Cuts
0+00		Rim	5.30	2.48							
℄ MH #33		60" Flow	16.54 21.84	-14.06	-14.06						
" "		on Flow 24" Stub	19.21	-11.43	-11.43 =	Flow 24" at inside Edge 60" Line					
0+25 = Brk.			5.47	2.31	-8.71 ~~-7.71~~	+11.02 ~~+10.02~~	10' Lt.	10' Rt. 5.21	2.57	-8.71 ~~-7.71~~	+11.28 ~~+10.28~~
+45			5.65	2.13	-8.51 ~~-7.51~~	+10.64 ~~+9.64~~	"	5.30	2.48	-8.51 ~~-7.51~~	+10.99 ~~+9.99~~
+65			5.67	2.11	-8.31 ~~-7.31~~	10.42 ~~+9.42~~	"	5.20	2.58	-8.31 ~~-7.31~~	+10.89 ~~+9.89~~
		Rim = 5.14 Flow = 14.89		2.64 = Rim	-8.11 =	Drop +10.75					
+85.12 = ℄ Existing MH. 1.0' South of ℄ Mkt. St.				-7.11	-7.11						

1.0%

INDEXED
W.K.
OCT 22 1948



Recorded on Int Sewer Plan. 1024 D. 965 D.



Higline Grades. 60" Interceptor.

from Beardsley St. West.

	4.08	17.35		13.27	B.M. Mon. Beardsley & Cotta P-3				
T.P.	1.92	-0.73	20.00	-2.65					
				Elev. Spikes	Elev. Flow	Cuts.	offsets		
						1707 New cut			
1+00			1.15	-1.88	-19.99	+18.11	15.75' Rt.		
2+00			0.19	-0.92	-19.91	+18.99	15.75' Rt.		
+50			1.45	-2.18	-19.87	+17.69	13.95' Rt.		
3+00			2.19	-2.92	-19.83	+16.91	13' "		
+50			2.66	-3.39	-19.79	+16.40	13.22' "		
4+00			1.09	-1.82	-19.75	+17.93	12.51' "		
+50			1.77	-2.50	-19.71	+17.21	9.68' "		
T.P.	12.83	10.93	1.17	-1.90					
chk BM #3 Page 3			4.04	6.89					
				6.90 = BM.					
				0.01 Error.					
	Reset	1+00							
	3.65	16.92		13.27 = B.M.					
			Rod.						
T.P.	0.95	-1.73	19.60	-2.68					
				Elev. Nail	Elev. Grade				
1+00			-1.19	-2.92	-19.99	+17.07	15.75' Rt.	17.0 = ℄	
+55			-1.22	-2.95	-19.95	+17.00			

Walker
Hardin
Wirtg-11-42

Line Change 60" Interceptor Sewer
from station 66+65.7 Page 31
To E.C. P-32

=76+02.61 Equation on ℄ Market St.
75+07.24

Construction
Grades on P-33 and 41

℄ MARKET

Kettner Blvd.

74+09.80 = E.C.

71+19.65 = P.C. 530' Radius

℄ Coronado 300'± Trunk Sewer

Fd. Existing M.H.

Map 22'

68+31.89 = ΔRt. 37°38'

66+65.70 = POT.

64+10.65 = E.C. Page 30

St. 19' = ℄ 60" Interceptor Sewer

Existing M.H. = 76+02.61 Equation St.
75+07.24

74+64.24

43'

This Line See Page 52

℄ MH #33 = Station 74+49.54

54.44'

19'

INDIA

E.C. 74+09.80

530' Radius

31°22'
℄R = 530'
L = 290.15

℄ 60" Sewer

89°57'

275.80'

974'

30' R.P.

25' R.P.

87.19'

71+19.65

79°35'

Fd. Existing M.H.

131°50'

Bisector

RP Spk

21.13'

RP Spk

℄ 60"

20'

21.13'

20'

60" Interceptor Sewer ℄

= P.O.T. this change

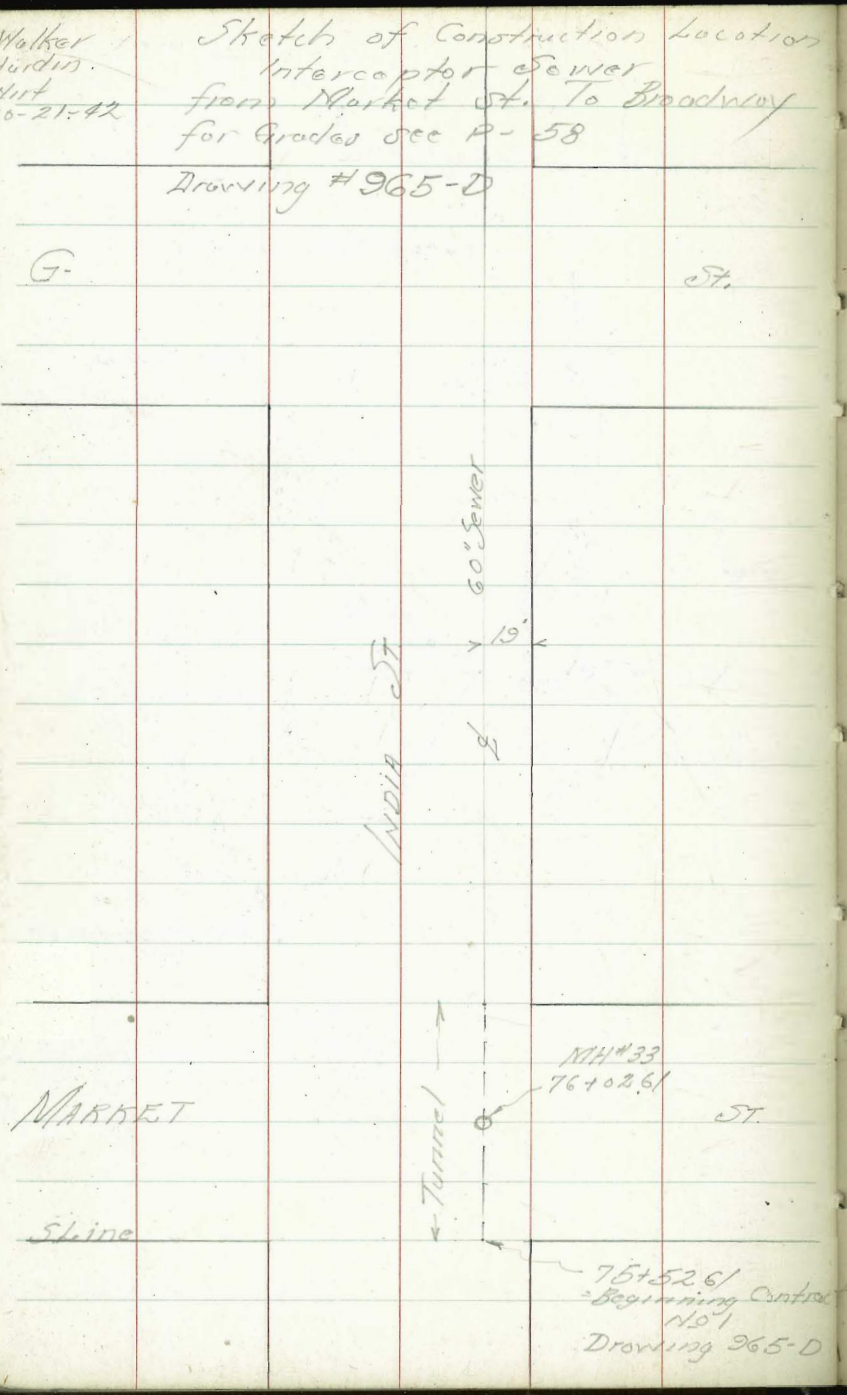
68+31.89
= ΔRt. 37°38'

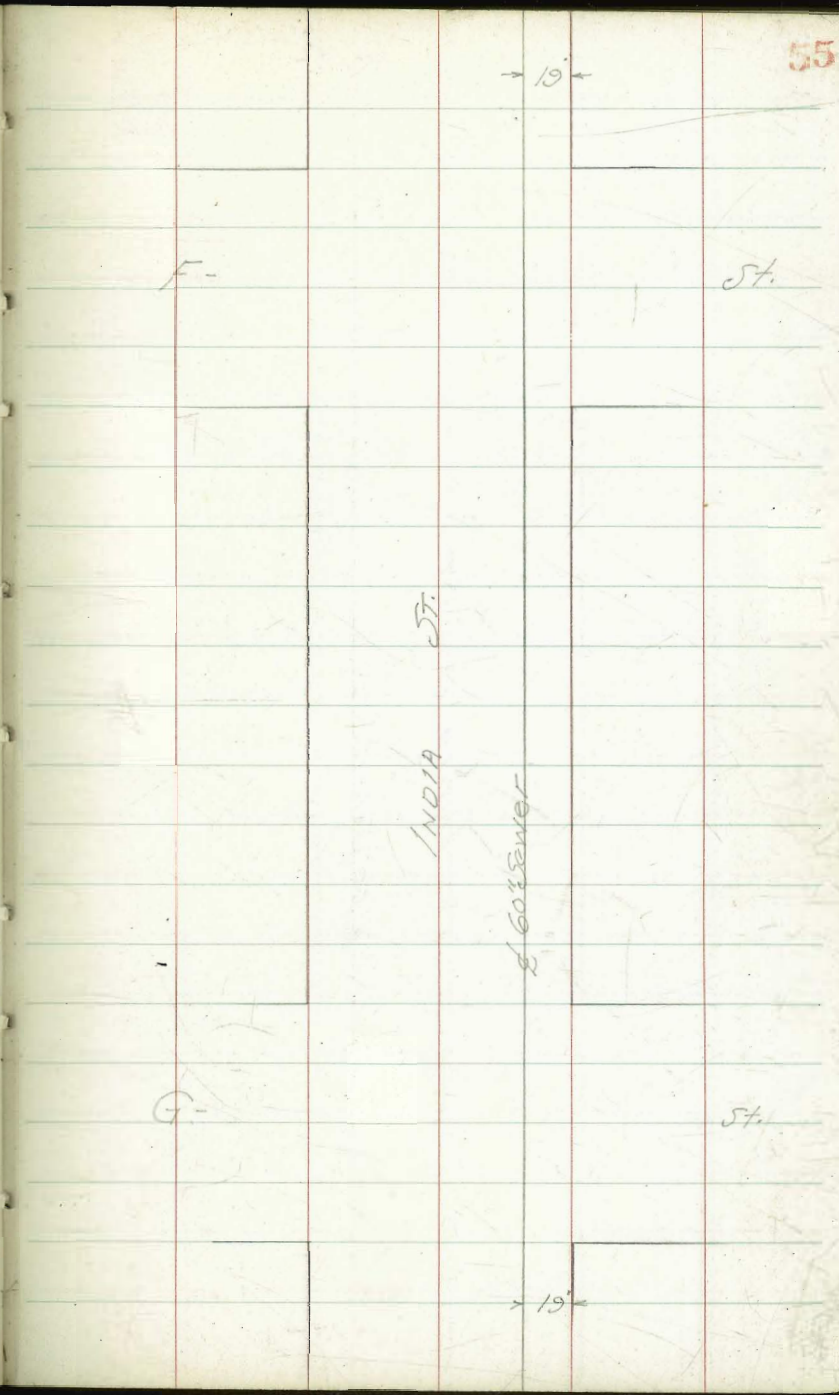
66+65.70
P-31

Walker
Hardin
Wirt
10-21-42

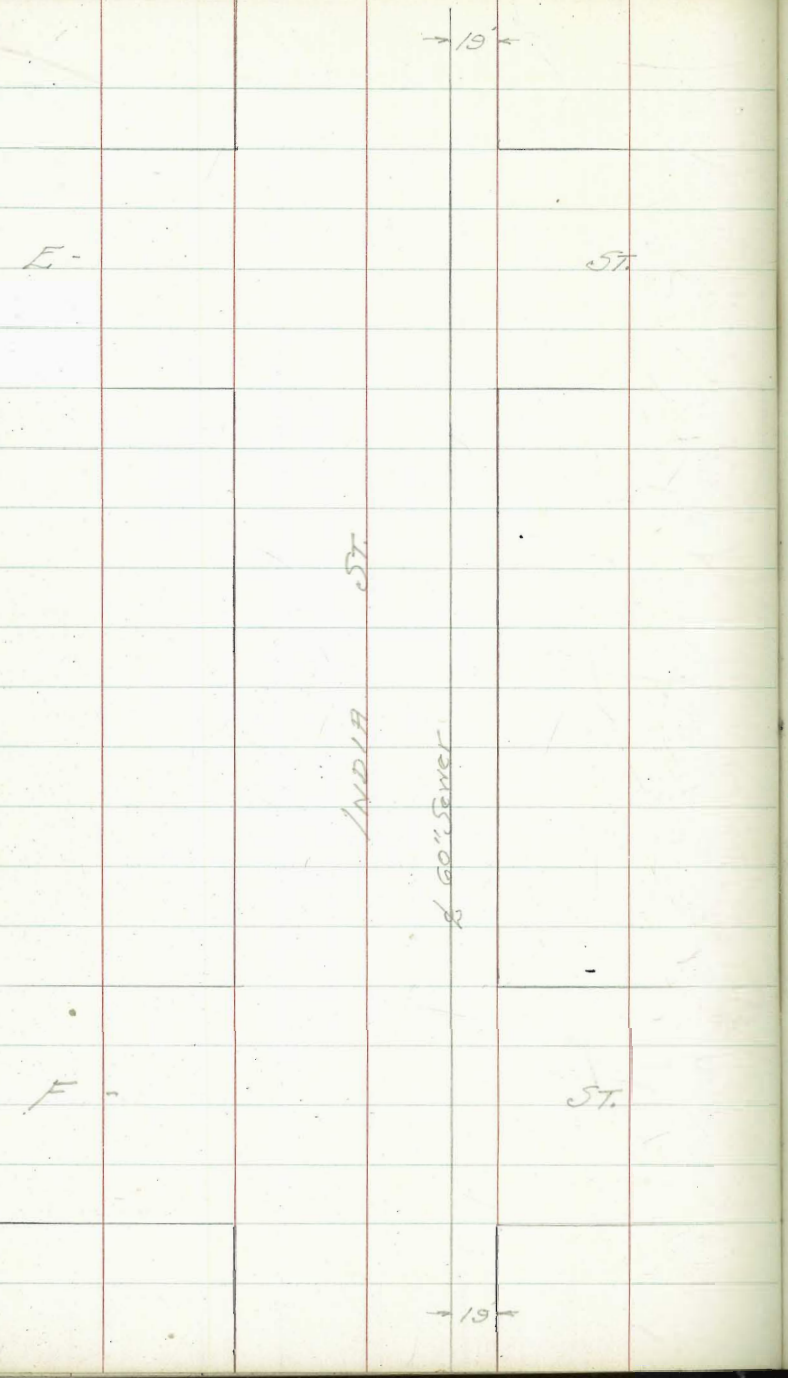
Sketch of Construction Location
Interceptor Sewer
from Market St. To Broadway
for Grades see P- 58

Drawing #965-D





55


19'
E -
ST.
INDIA
ST.
& 60" SEWER
F -
ST.
19'

Walker
Osborne
Hardin
Hazard
1-15-43

Levels on Existing Rails
at Intersection
Broadway and California St
To determine Settlement of Rails
over Newly Constructed 51" Int. Sewer

East Track on Calif St = Track #1

NW-BP
Pacific & Broadway

7.53
12.21
4.68

Page 60
=BM

East Rail Track #1

South line	5.03	7.18
+10	5.00	7.21
+20	4.92	7.29
+30	4.86	7.35
+40	4.94	7.27
+43	4.95	7.26
+50	4.86	7.35
+60 = ℄ Broadway	4.74	7.47

INDEXED
WK.
OCT 22 1948

Platted
1-15-43
C.B.H.

West Rail Track #1

S Line	5.04	7.17
+10	5.04	7.17
+20	4.97	7.24
+30	4.92	7.29
+40	4.98	7.23
+43	4.99	7.22
+50	4.92	7.29
+60 = ℄ Bdwy	4.81	7.40

Reduced and large scale

East Rail #2 Track

SL	5.08	7.13
+10	5.06	7.15

12.21

57

SL +20	5.02	7.19
+30	4.96	7.25
+43	5.00	7.21
+50	4.97	7.24
+60 = ℄ Bdwy	4.92	7.29

West Rail Track #2

SL	5.14	7.07
+10	5.12	7.09
+20	5.07	7.14
+30	4.98	7.23
+43	5.08	7.13
+50	5.03	7.18
+60 = ℄ Bdwy	4.98	7.23

East Rail #3 Track

SL	5.35	6.86
+10	5.27	6.94
+20	5.21	7.00
+30	5.14	7.07
+43	5.18	7.03
+50	5.16	7.05
+60	5.13	7.08

Cont. P. 77

Walker
Hardin
Wirt
10-21-42

Construction Grades
for INTERCETING SEWER
on INDIA St. from S.Line Market
to Broadway Ave, thence West on
Broadway To end of New Sewer

See sketch P-55-57

Grades Cont. from P-41

Station		↑ 10.22		Elev. Stakes	Elev. Flow Line	Cuts.	Offsets.
S.Line Market = 75+52.61			7.42	2.82	-14.107	+16.93	7.2' Rt. = Cross in Cb.
76+02.61 = ℄ MH #33			7.24	2.98	-14.067	+17.05	" " = Nail in Pav.
76+52.61 = NL. Mkt. St.			7.34	2.88	-14.027	+16.91	7.2' Rt. = Cross in Cb.
76+62.61			7.99	2.23	-14.02	+16.25	" " "
77+00			6.84	3.38	-13.99	+17.37	
77+50			6.27	3.95	-13.95	+17.90	
78+00			5.72	4.50	-13.91	+18.41	
78+50			4.81	5.41	-13.87	+19.28	
79+00			4.35	5.87	-13.83	+19.70	
+50			3.89	6.33	-13.79	+20.12	
80+00			3.72	6.50	-13.75	+20.25	
+50			3.17	7.05	-13.71	+20.76	
T.P. 81+00	5.09	↑ 12.24	3.07	7.15	-13.67	+20.82	
+50			4.95	7.29	-13.63	+20.92	
81+64 = ℄ MH #34			4.91	7.33	-13.62	+20.95	
82+00			4.73	7.51	-13.59	+21.10	

Cont. P-59

INDEXED
W.K.
OCT 22 1948

F.B. 1597 - B.M. #14
S.W. B.P. G - And India

chk. cut MK.
74+64 24
P-43

58

-5.81
4.41+
10.22 ↑
7.11 -
3.11
3.13
.002 Error

10.22 ↑
3.07 -
7.15 T.P.
5.09 +
12.24 = ↑

Const. Grades Interceptor Sewer

Cont. from P-58

Station		12.24		Elev. Stakes	Elev. Flow Line	Cuts	Offsets		
									12.24
									.151
								chk 8 N #15	10.73
82+50			4.58	7.66	-13.55	+21.21		S.E. Top Hydt	10.73 BM
								F-Indice	.151
83+00			4.44	7.80	-13.51	+21.31			12.24 π
									3.28 -
+50			4.50	7.74	-13.47	+21.21			8.96 TP
									5.50 +
84+00			3.88	8.36	-13.43	+21.79			14.46 π
									3.66 -
+50			3.55	8.69	-13.39	+22.08			10.80 TP
									6.29 +
T.P. 85+00	5.50	14.46 π	3.28	8.96	-13.35	+22.31	c	chk Rim MH 90+76	17.09 π
								F.B. 1597-72	3.85
+50			5.98	8.48	-13.31	+21.79			13.24
									13.23 = Rim
86+00			5.10	9.36	-13.27	+22.63			0.01
								chk Estu Nail	17.09 π
+50	.08%		5.41	9.05	-13.23	+22.28	7.5' Rt	90+00	5.10
								F.B. 1597-72	11.99
87+00			4.54	9.92	-13.19	+23.11	7.2' Rt		12.00 = Nail
									0.01 Error
= End 60" Sewer = Beginning 51" Sewer									
87+34 = ℄ MH #35		16.16 π	4.71	9.75	-13.16	+22.91	7.2' Rt	14.4' Rt = R.P. Nail	
87+50			6.42	9.74	-13.15	+22.89	"	87+34 Elev. Nail =	9.75
									6.41 +
88+00			5.99	10.17	-13.13	+23.30	"		16.16 π
+50			5.94	10.22	-13.105	+23.33	"		
89+00	.04735%		5.49	10.67	-13.08	+23.75	"		
+50			4.28	11.88	-13.06	+24.94	"		
90+00			3.75	12.41	-13.03	+25.44	"		
+50			3.16	13.00	-13.01	+26.01	"		
South 7' Line = MH. Broadway Ave = 90+85.53 = Δ Lt 27°51'			2.95	13.21	-12.99	+26.20	"		

60" Sewer

51" Sewer

Cont. Page 60

Walker
Hardin
12-14-42

Construction Grades 51" Sewer
Cont. from P-59

Station	MH			Elev. Stakes	Elev. Flow Line	Cuts	Offsets	
91+26.25 = Δ Lt. 62°07'		16.16	2.28	13.88	-12.97	26.85	7' Rt. = Nail in Pav.	16.16 = π
91+50			2.43	13.73	-12.96	+26.69	"	2.43 -
		15.51						13.73 = T.P.
92+00			2.30	13.21	-12.94	+26.15	"	1.78 +
								15.51 = π
+50			2.93	12.58	-12.92	+25.50	"	8.24 -
								7.27 = T.P.
93+00			3.67	11.84	-12.89	+24.73	"	3.25 +
								10.52 π
+50	.04735 %		4.27	11.24	-12.87	+24.11	"	5.84 -
							Chk. N.W. B.P. Pacific + Broadway	4.68
94+00			4.78	10.73	-12.84	+23.57	"	4.68
								0.00 = Error
+50			5.33	10.18	-12.82	+23.00	"	
95+00			6.00	9.51	-12.80	+22.31	"	
+50			6.81	8.70	-12.77	+21.47	"	
96+00			7.71	7.80	-12.75	+20.55	"	
96+00 chk. Bliss' cut Mark			7.97	7.54	-12.75	+20.29	on curb 20.32 = Bliss	

Note: Grade on Pacific Blvd Sewer at Station 111+00 Was Changed to -11.54 in order. (See Bliss Grade Book)
To take care of Pipe Settlement to that Elev. and a grade of .08 % Carried on through To 96+00 = Station on Broadway West of Kettner Blvd.
This made the Above change of Grade .04735 Between Station 87+34 & 96+00

Walker Hardin 12-14-42

~ Check Levels 51" Sewer from India + E To Broadway & California

Grades = Page 59-60

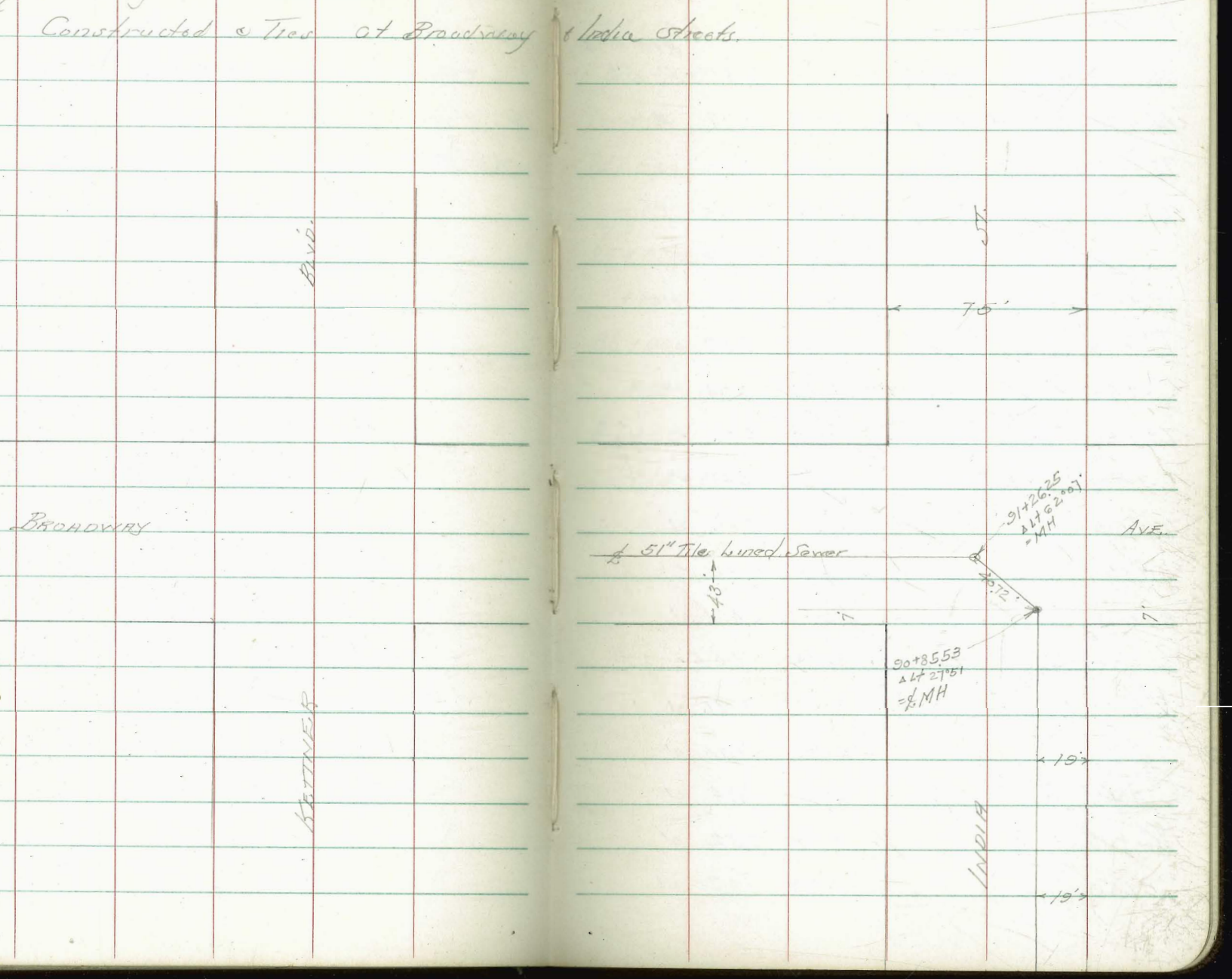
	6.57	16.32		9.75	Elev. Nail 87+34
87+50			6.58	9.74	
88+00			6.15	10.17	
+50			6.10	10.22	
89+00			5.65	10.67	
+50			4.44	11.88	
90+00			3.91	12.41	
+50			3.32	13.00	
90+85.53 = Δ Lt 27°51			3.11	13.21	
91+26.26 = Δ Lt. 62°07			2.43	13.89	.01
+50 TP	1.83	15.56	2.59	13.73	
92+00			2.35	13.21	
+50			2.98	12.58	
93+00			3.72	11.84	
+50			4.32	11.24	
94+00			4.82	10.74	.01
+50			5.37	10.19	.01

		15.56			
95+00			6.05	9.51	
+50			6.86	8.70	
96+00			7.76	7.80	
Chk. Bliss' Cut Mark			8.01	7.55	.01

Walker
Hardin
Wirt
12-12-42

51" Interceptor Sewer

Showing Locations of MHs to be Constructed @ Ties at Broadway & India Streets.



Walker
Hurdin
Wirt
10-21-42

Check Levels 60" Interceptor from Mkt. to E-St. on India St.

Grade Levels See P-58

	4.32	10.13		5.81	BM. #14 P-58
Chk. cut Mark 74+64.24 P-58			7.02	3.11	✓
75+52.61			7.33	2.80	.02
76+02.61			7.15	2.98	✓
+52.61			7.26	2.87	.01
+62.61			7.91	2.22	.01
77+00			6.76	3.37	.01
+50			6.19	3.94	.01
78+00			5.63	4.50	✓
+50			4.72	5.41	✓
79+00			4.27	5.86	.01
+50			3.80	6.33	✓
80+00			3.64	6.49	.01
T.P. +50	5.21	12.26	3.08	7.05	✓
81+00			5.10	7.16	.01
+50			4.96	7.30	.01
+64 = MH.			4.92	7.34	.01
82+00			4.74	7.52	.01
+50			4.59	7.67	.01

		12.26			
83+00			4.44	7.82	.02
Chk. BM			1.52	10.74	S.E. Top Hyd. F-India
				10.73 = BM.	
+50			4.50	7.76	.02
84+00			3.88	8.38	.02
+50			3.55	8.71	.02
T.P. 85+00	4.91	13.89	3.28	8.98	.02
+50			5.39	8.50	.02
86+00			4.51	9.38	.02
+50			4.81	9.08	.03
87+00			3.95	9.94	.02
+34 = EMH			4.12	9.77	.02

Walker Huiding Wirt 11-24-42

Levels on Belt St. from 5th St. West for Grading after 60" Sewer Was Constructed.

Note: Stations are from Belt St Plans - from 18+88.3 to 31+73.97 Harbor Dept. B.M. P-33

4.51	7.07 ✓	2.56

11+954

50' Lt.	5.2	1.9
40' Lt	5.3	1.8
℄	4.8	2.3
31' Rt at Fence	4.3	2.8
50' Rt	4.5	2.6

12+81 = Δ Lt 20°05'

56 Rt = Fence	4.8	2.3
50' Rt	4.9	2.2
℄	4.6	2.5
40' Lt.	5.1	2.0
50' Lt	5.1	2.0

13+00

50' Lt	5.7	1.4
40' Lt	5.4	1.7
℄	4.8	2.3
50' Rt	4.9	2.2
60' Rt. = N.F. = Navy Field.	4.7	2.4

INDEXED
W.K.
OCT 22 1948

7.07

13+50

60 Rt = NF	4.9	2.2
50' Rt.	4.9	2.2
℄	4.8	2.3
40' Lt.	5.1	2.0
50 "	5.1	2.0

14+00

50' Lt	4.8	2.3
40 Lt.	5.1	2.1
℄	5.1	2.0
50' Rt	5.1	2.0
60' Rt. = NF	5.1	2.0

14+154 = ℄ Catch Busin

℄ on Grating	6.02	1.05

14+50 = 62+61.1 of Interceptor Sewer

60' Rt = NF	5.1	2.0
50 "	5.1	2.0

		7.07			
℄			5.1	2.0	
40' Lt.			5.1	2.0	
47.5' Lt on ℄			4.54	2.53	
TP	4.51	7.07	4.51	2.56	
		15+00			
47.5' Lt on ℄			4.54	2.53	
40' Lt.			4.9	2.2	
℄			5.1	2.0	
50' Rt			5.1	2.0	
60' Rt NF			5.2	1.9	
		15+50			
60' Rt NF			5.2	1.9	
50' Rt			5.1	2.0	
℄			5.1	2.0	
40' Lt			5.1	2.0	
50' Lt			5.0	2.1	
		16+00			
50' Lt on Brick Dwe			5.96	1.61	
40' Lt			5.1	2.0	
℄			5.0	2.1	
50' Rt			5.0	2.1	
60' Rt NF			5.1	2.0	

	7.07	Belt St.		
16+08 = New NH				
15' Lt on Top NH =		4.80	2.27	
	16+50			
60' Rt = NF		4.9	2.2	
50' Rt		4.9	2.2	
℄		4.8	2.3	
40' Lt		4.9	2.2	
47.5' Lt on ℄		4.93	2.14	
	17+00			
47.5' Lt " "		4.87	2.20	
40' Lt		4.8	2.3	
℄		4.9	2.2	
50' Rt		4.9	2.2	
60' Rt = NF		5.0	2.1	
	17+50			
60 Rt = NF		4.6	2.5	
50' Rt		4.7	2.4	
℄		4.8	2.3	
40' Lt		5.2	1.9	
47.5' Lt on ℄		5.03	2.04	
	17+68 = Catch Basin			
16' Rt. on ℄ Basin		5.76	1.31	on Grating

7.07

17+75

47.5' Lt on Drive	5.17	1.90
40' Lt.	5.0	2.1
℄	5.1	2.0
50' Rt	4.7	2.9
60' Rt. = NF	4.7	2.8

18+08.3 = EC. Belt St Harbor Plan.

60 Rt	4.7	2.9
50' Rt	4.7	2.4
℄	5.4	1.7
40' Lt.	5.1	2.0
47.5' Lt on Drive	5.09	1.98

18+34

47.5' Lt.	5.2	1.9
40' Lt.	5.1	2.0
℄	5.5	1.6
50' Rt	4.9	2.2
60' Rt. = NF	4.9	2.2

18+59

60' Rt	5.0	2.1
50'	4.9	2.2
℄	5.7	1.4

7.07

Belt St.

40' Lt.	5.2	1.9

18+84

40' Lt.	5.1	2.0
℄	5.8	1.3
50' Rt	5.3	1.8
60' Rt.	5.0	2.1

19+09

60' Rt	5.1	2.0
50' Rt.	5.3	1.8
℄	5.9	1.2
40' Lt	5.0	2.1
47.5' Lt.	5.1	2.0

19+29 = ℄ Catch Basin.

49 Rt. = ℄ Catch Basin	6.09	0.98	on Grating

19+34

47.5' Lt.	4.9	2.2
40' Lt.	5.2	1.9
℄	5.7	1.4
50' Rt	5.4	1.7
60' Rt.	5.4	1.7

19+59

60' Rt	5.0	2.1
50' Rt.	5.3	1.8

	19+59	7.07			
℄			5.5	1.6	
50' Lt.			5.4	1.7	
	19+84				
50' Lt.			5.6	1.5	
40' Lt.			5.4	1.7	
℄			5.3	1.8	
50' Rt.			5.1	2.0	
60' Rt.			5.0	2.1	
IP	513	7.21	4.99	2.08	
	20+083				
60' Rt.			5.0	2.2	
50' Rt.			5.2	2.0	
℄			5.3	1.9	
50' Lt.			5.6	1.6	
	20+34				
50' Lt.			5.5	1.7	
℄			5.5	1.7	
50' Rt.			5.2	2.0	
60' Rt.			5.0	2.2	
	20+50				
60' Rt. at Fence			5.1	2.1	
℄			5.1	2.1	
50' Lt.			5.4	1.8	

		7.21		
	21+00			
50' Lt.			5.4	1.8
℄			5.2	2.0
60' Rt.			5.1	2.1
	21+50			
60' Rt.			5.0	2.2
℄			5.2	2.0
50' Lt.			5.4	1.8
	22+00			
50' Lt.			5.3	1.9
℄			5.2	2.0
60' Rt.			4.9	2.3
	22+50			
60' Rt.			5.0	2.2
℄			4.9	2.3
50' Lt.			5.4	1.8
23+10 - Sewer MH			5.22	2.00	10.5 Lt on Rim
	23+00			
50' Lt.			5.5	1.7
℄			5.0	2.2
60' Rt.			4.7	2.5
	23+50			
60' Rt.			4.7	2.5
℄			5.2	2.0
50' Lt.			5.6	1.6

7.21

24+00

50' Lt.	5.6	1.6
℄	5.1	2.1
60' Rt.	4.6	2.6

24+50

60' Rt	4.8	2.7
℄	4.8	2.7
50' Rt.	5.0	2.2

25+00

50' Lt	5.2	2.0
℄	4.5	2.7
60' Rt	4.5	2.7

25+50

60' Rt	4.4	2.8
℄	4.6	2.6
50' Lt.	5.6	2.2

26+00

50' Lt.	4.9	2.3
℄	4.6	26
60' Rt.	4.6	26

26+50

60' Rt.	4.4	2.8
℄	5.0	2.1
	4.7	2.5

7.21

Bell St

69

T.P.	4.72	7.22	4.71	2.50

27+00

50' Lt	4.8	2.9
℄	5.3	1.9
60' Rt	4.5	2.7

27+28.6

60' Rt.	4.6	2.6
℄	5.2	2.0
50' Rt	4.8	2.9

27+78.6

50' Rt	4.9	2.3
℄	5.2	2.0
60' Rt	4.8	2.9

28+28.6

60' Rt	4.7	2.5
℄	5.3	1.9
50' Lt	5.6	1.6

28+78.6

50' Lt.	5.1	2.1
℄	5.5	1.7
60' Rt.	4.9	2.3

7.22

29+17

60' Rt.	5.0	2.2
℄	4.6	2.6
50' Lt.	5.3	1.9

29+67.68

50' Lt.	5.3	1.9
℄	5.0	2.2
60' Rt.	4.8	2.4

30+09.6 = ℄ MH.

10' Lt. on Rim MH.	4.95	2.27

30+24.59

60' Rt.	5.1	2.1
℄	5.2	2.0
50' Lt.	5.4	1.8

30+81.5

50' Lt.	5.8	1.4
℄	6.0	1.2
60' Rt.	5.4	1.8

31+23.7 = ℄ Catch Basin

3' Rt. = ℄ Basin	6.51	0.71

31+23.7

60' Rt.	5.7	1.5
℄	5.9	1.3
50' Lt.	5.8	1.4

7.22 Belt St.

31+73.97

50' Lt.	5.9	1.3
℄	6.1	1.1
60' Rt.	5.7	1.5

32+35.14

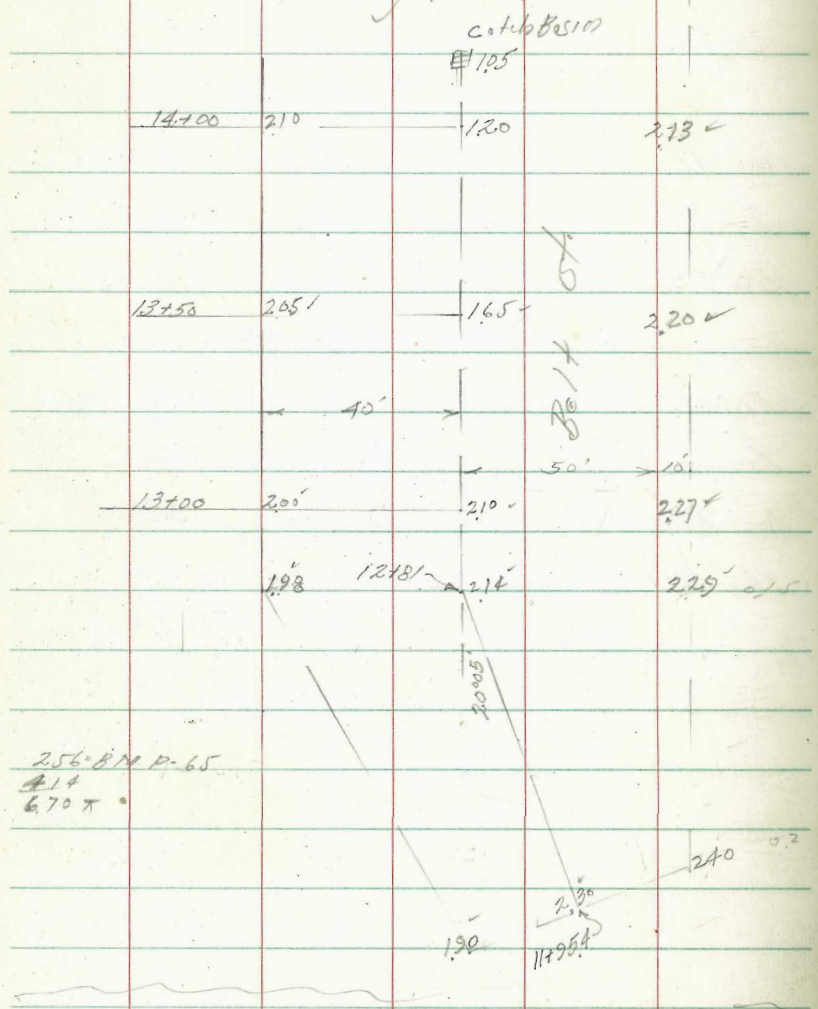
60' Rt.	5.4	1.8
℄	6.0	1.2
50' Lt.	6.3	0.9

32+92.5 = Wedge Paving.

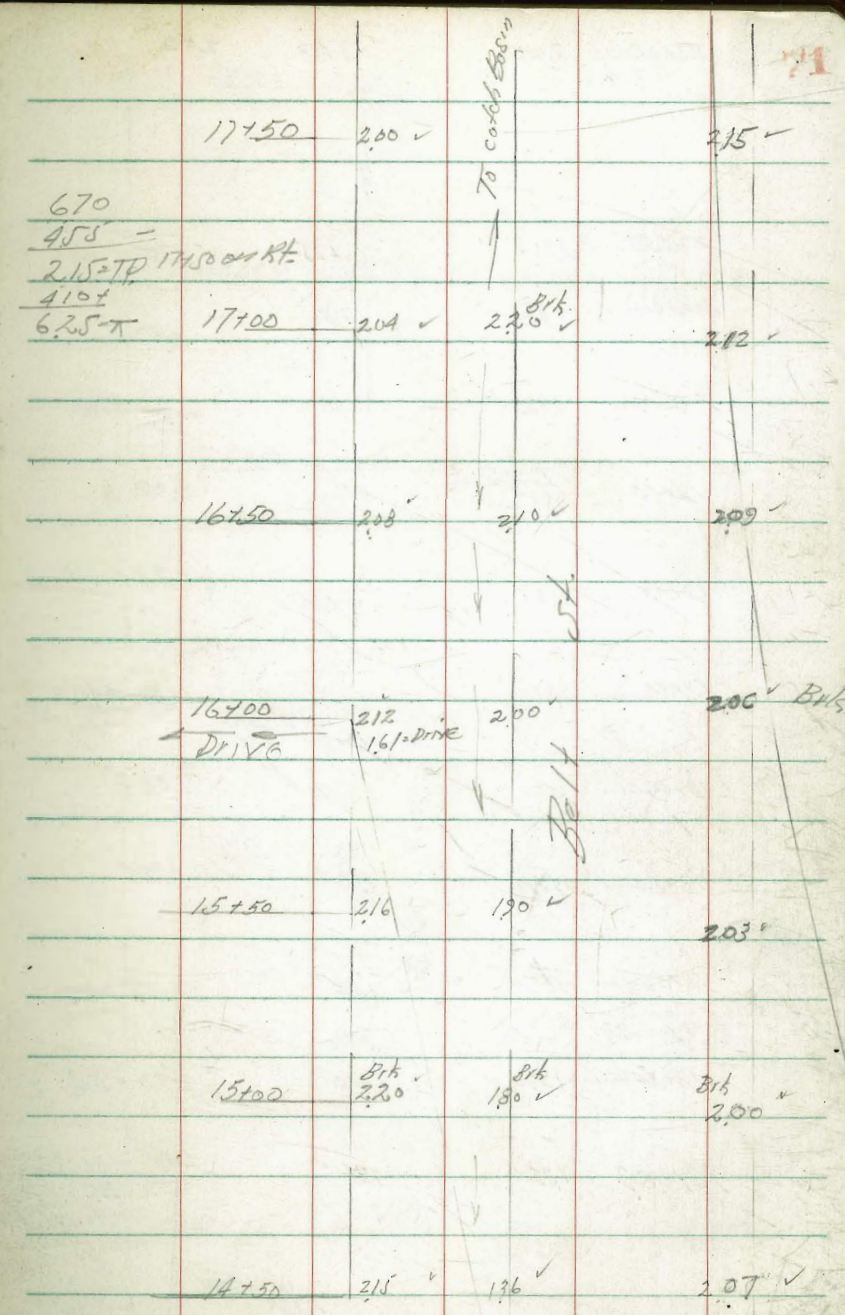
50' Lt. on Pav.	6.00	1.22
℄ " "	5.86	1.36
60' Rt. on "	5.67	1.55
Chk BM #9 F.B. 1597-43	2.37	4.85 ✓
		4.78
		0.07

Walker
Hardin
Wirt
11-25-42

Grades for Rough Surfaceing of Belt St.
Between 5th Ave and West end Navy Field.



WESTERN LUMBER YARDS



21+00 Brk	2.00	1.83	2.40	
20+50	1.90	1.75	2.35	
20+34	1.87	~~1.36~~	2.32	
20+08.3	1.82	1.68	2.30 Brk	
19+84	Low Point 1.81	1.64	2.02	
19+59	1.83	1.60	1.75	
19+34	1.85	Catch Basin ~~.45~~ 19+29 0.98	1.50 = Low Point	
19+09	1.87	1.52	1.66	
18+84	1.89	1.48	1.84	
18+59	1.91	1.44	2.02	
18+34	1.93	1.40	2.20 Brk.	
18+08.3	1.95	1.36	2.19	18+08.3 E.C. Harbor Dept. Plans.
17+75	1.98		2.17	
17+68		1.16	Catch Basin 1.30	

Belt St.

6.25 = π
4.05 -
2.20 = T.P.
2.19 = BM = SE Cor Gym Bk.
4.94 +
7.13 π

24+50	2.70	2.33	2.75
24+00	2.60	2.26	2.70
23+50	2.50	2.20	2.65
23+00	2.40	2.13	2.68
22+50	2.30	2.07	2.55
22+00	2.20	2.00 Brk.	2.50
21+50	2.10	1.91	2.45

Belt St.

27+78.6	2.24	1.86	2.62	
27+28.6	2.34	1.95	2.73	+1.0
27+00	2.40	Brk. 2.00	2.80	Brk.
26+50	2.50	2.10	2.80	
26+00	2.60	2.20	2.80	
25+50	2.70	2.30	2.80	+1.0
25+00	Brk. 2.80 High Pt.	Brk. 2.40	2.80	Brk.

713 π
503 –
210 = T.P. (26+50) on ℄
5.05 +
7.15 π

Belt St.

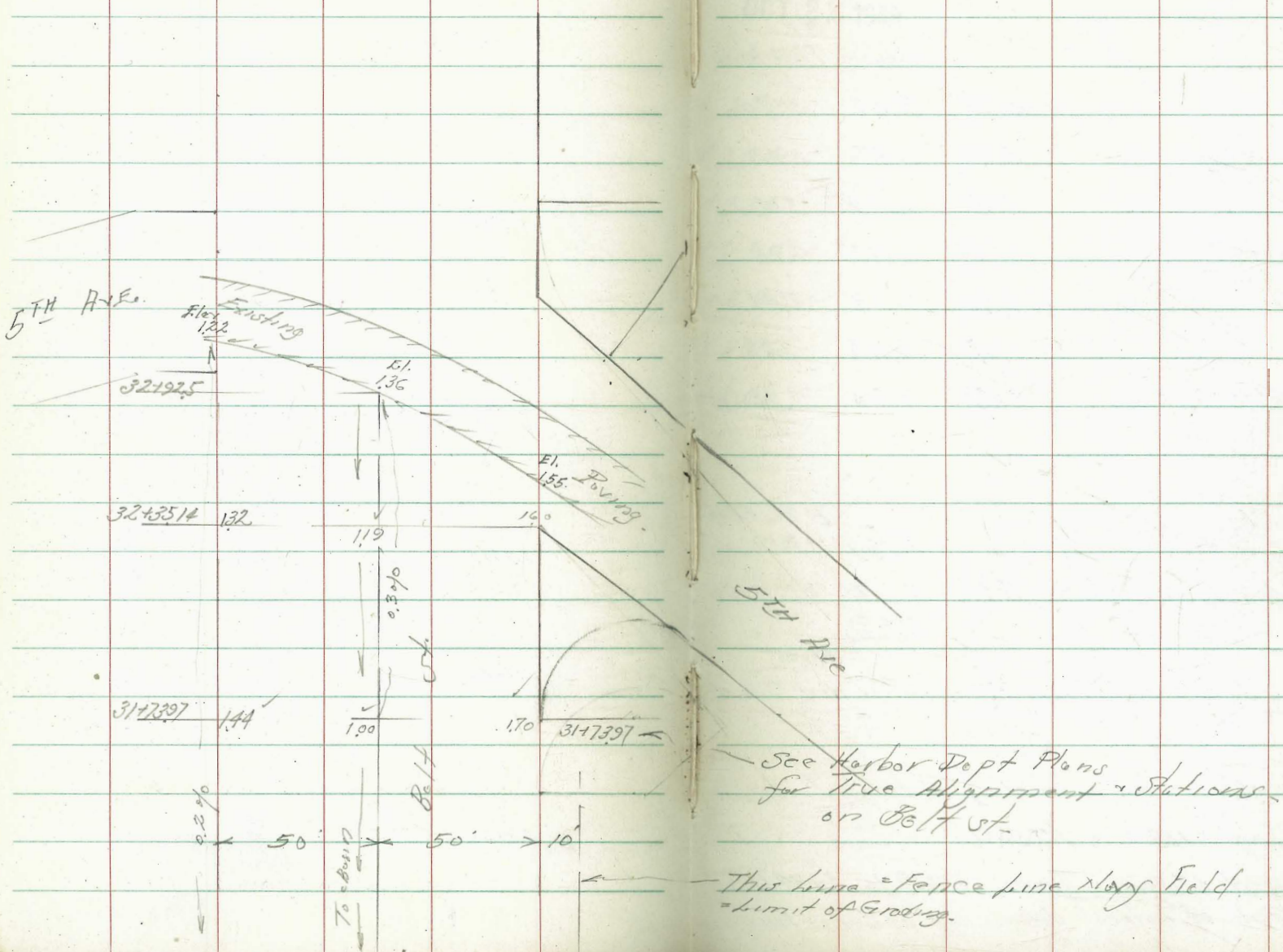
0.20%

0.2%

31+23.7	1.54		1.79	
31+06.7 = catch Basin		0.71		
30+81.5	1.62	0.82	1.89	+1.0
30+24.6	1.73	1.09	2.02	
29+67.68	1.84	1.36	2.15	+1.0
29+17	1.94	Brk. 1.60	2.27	+1.0
28+78.6	2.04	1.67	2.38	+1.0
28+28.6	2.14	1.77	2.50	+1.0

Belt St.

0.2%


5TH AVE.
Elev. 1.22
Existing
El. 1.36
El. 1.55
Paving
32+92.5
32+35.14
1.32
1.19
1.60
0.3%
Belt St.
5TH Ave
31+73.97
1.44
1.00
1.70
31+73.97
0.2%
50'
50'
10'
To Basin
See Harbor Dept Plans for True Alignment & Stations on Belt St.
This Line = Fence Line Navy Field = Limit of Grading.

Walker
Hardin
Hazard
1-6-43

Grades for Construction of Sewer in Rigel St.

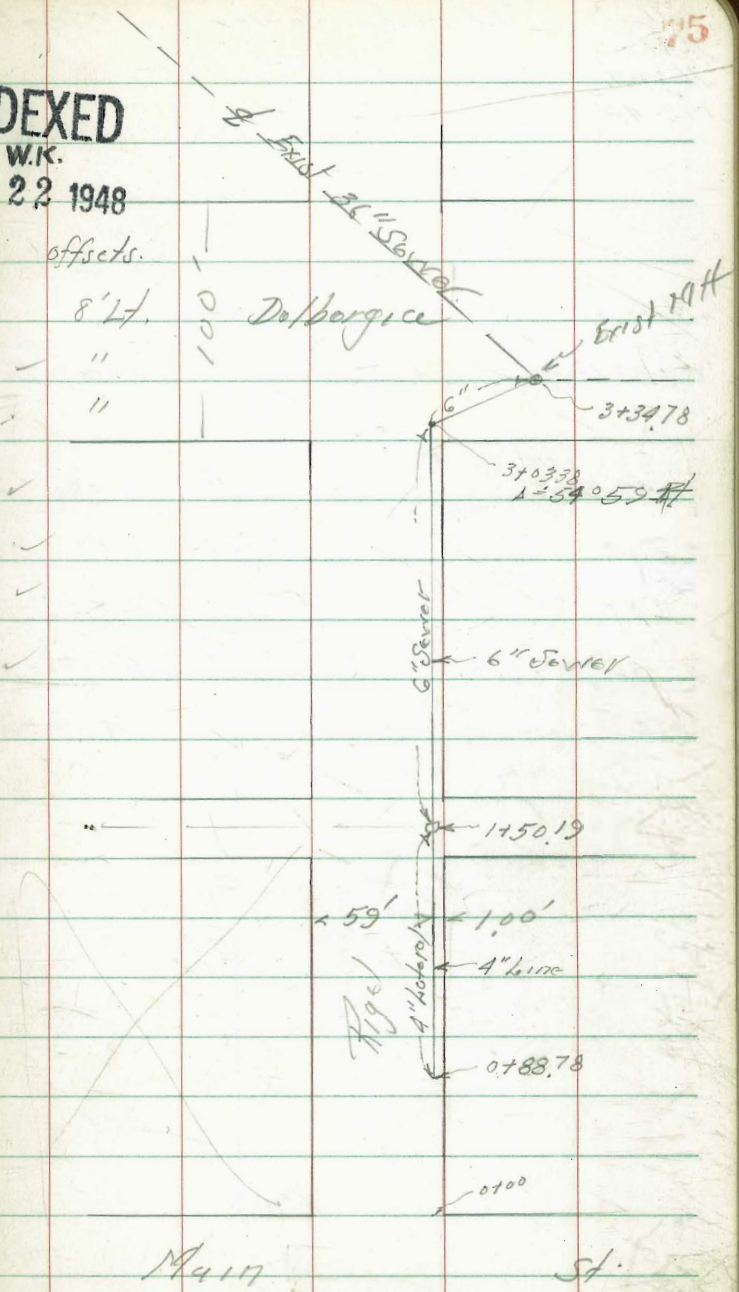
Location FB 1607 -57

INDEXED
W.K.
OCT 22 1948

Station	⊼ 10.67		El. Stakes	El. Flow Line	Cuts	offsets.
3+34.78		5.65	5.02	-3.70	+8.72	8' Lt.
+03.38 = Δ Rt. 54°59'		5.11	5.56	-3.48	+9.04	"
2+50		4.43	6.24	-3.11	+9.35	"
2+00		3.88	6.79	-2.76	+9.55	
1+50.19		4.49	6.18	-2.41	+8.59	
1+00		4.21	6.46	-2.06	+8.52	
0+88.78 = end of Line		4.07	6.60	-1.98	+8.58	
				B.M. FB.1607-58		
	4.71 10.67		5.96	1+50.19 on ℄		
Chk Rim M.H.		5.65	5.02	FB.1607-58		
			5.03			
			0.01	Error.		

Re-staked: see Page 76 for New Cuts etc.

Note: City Constructing 4" Lateral from 0+88.78 to 1+50.19 and 6" Sewer from 1+50.19 to 3+34.78
Grade of 4" Lateral determined by Sewer Foreman



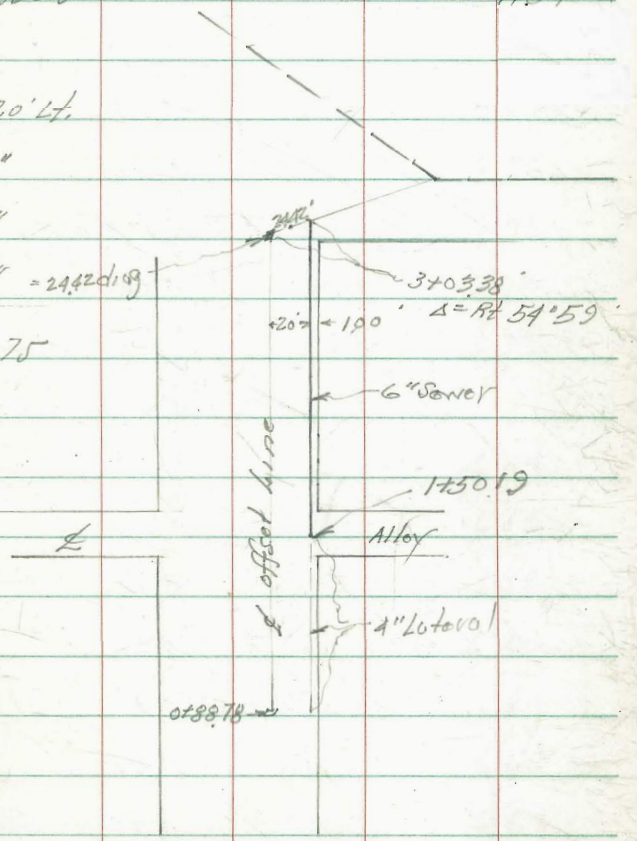
Walker
Hurdis
Hazard
1-12-43

Re-stake Sewer in Rigel St.
as Located Page 75

Reason: = greater offsets desired because of Caving in of loose dirt

Page 75
B.M. on ℄ Stake 1+50.19 = 5.96
5.08
11.04

Station		Elev. Stakes	Elev. Flow Line	Cuts	offsets
0+88.78 = Beginning 4" Lateral					
11.64					
- end 4" lat.					
1+50.19 = Beginning 6" Sewer	4.46	6.58	-2.41	+8.99	20' Lt.
2+00	4.51	6.53	-2.76	+9.29	"
+50	4.09	6.95	-3.11	+10.06	"
3+03.38 = Δ Rt. 54°59' = End 6" Sewer	4.89	6.15	-3.48	+9.63	" = 24.42 dig
+34.78 = Exist. MH.			-3.70	+8.72	see P-75



Track Levels Cont from P-57

12.21

West Rail Track #3

SL.	538	683
+10	536	685
+20	531	690
+30	526	695
+43	527	694
+50	525	696
+60	520	701

East Rail Track #4

SL.	538	683
+10	535	686
+20	531	690
+30	528	693
+43	528	693
+50	526	695
+60 = ℄ Bridge	526	695

West Rail Track #4

SL.	540	681
+10	539	682
+20	538	683

1221

317

SL. +30	538	683
+43	539	682
+50	538	683
+60	538	688

East Rail Track #5

SL.	567	654
+10	557	664
+20	554	667
+30	551	670
+43	548	673
+50	548	673
+60 = ℄ Bridge	548	673

West Rail Track #5

SL.	572	649
+10	566	655
+20	562	659
+30	560	660
+43	557	664
+50	555	666
+60 = ℄ Bridge	554	667

Cont. P. 78

BENCH MARKS - 60" Interceptor Sewer -

Along Colton & Bell Sts.

from Beardsley to India & Market.

Copied from E.B. 1507 P. 39 and 43

13.27 B.M. #2

6.90 B.M. #3

Conc. Mon. 17' East of St. Beardsley and 20' North of Colton

20' North of Colton

Copper Disk in Reduced Plug in 2½ Galv. Iron Pipe E. Line Sigsbee

Levels on Tracks Cont from P. 77

12.21

East Rail Track #6

St.	5.71	6.50
+10	5.70	6.51
+20	5.69	6.52
+30	5.66	6.55
+43	5.67	6.54
+50	5.67	6.54
+60 = ℄ Bldng.	5.66	6.55

W Rail Track #6

St.	5.76	6.45
+10	5.77	6.44
+20	5.77	6.44
+30	5.77	6.44
+43	5.75	6.46
+50	5.73	6.48
+60 = ℄	5.73	6.48

Levels on Track Cont from opp Page

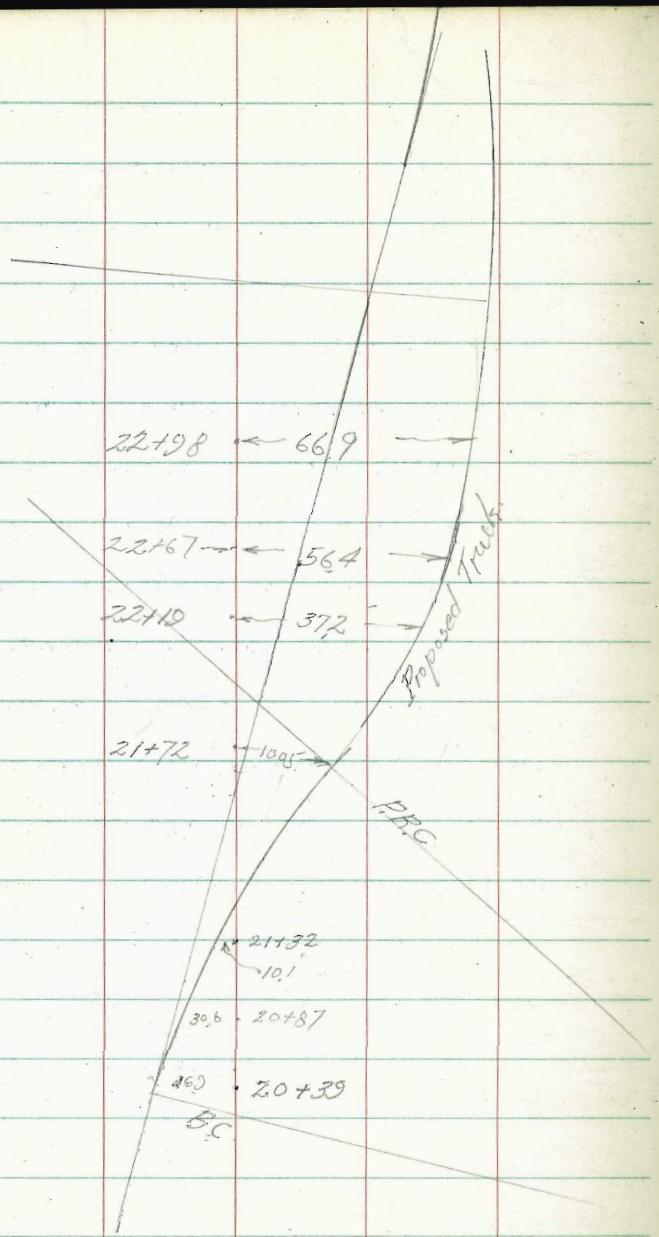
12.21

East Rail Track #7

St.	5.97	6.24
+10	5.91	6.30
+20	5.88	6.33
+30	5.83	6.38
+43	5.82	6.39
+50	5.79	6.42
+60	5.76	6.45

W Rail Track #7

St.	6.00	6.21
+10	5.99	6.22
+20	5.96	6.25
+30	5.92	6.25
+43	5.88	6.33
+50	5.85	6.36
+60	5.84	6.37
chk. cut curb 96+00 #60	4.65	7.56 7.54 .002 diff.


22+98
669
22+67
564
22+42
372
Proposed Truck
21+72
100'
P.R.C.
21+32
10.1
30.6
20+87
46.9
20+39
P.C.

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

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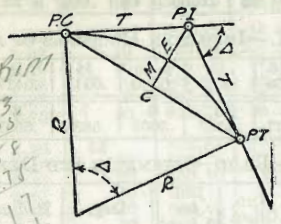


CURVE FORMULAS

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

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

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

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

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

EXPLANATION AND USE OF TABLES

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

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

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

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

Table VIII.—Natural Trigonometrical Functions.

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

Table IX.—Calculation of Earthwork.

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

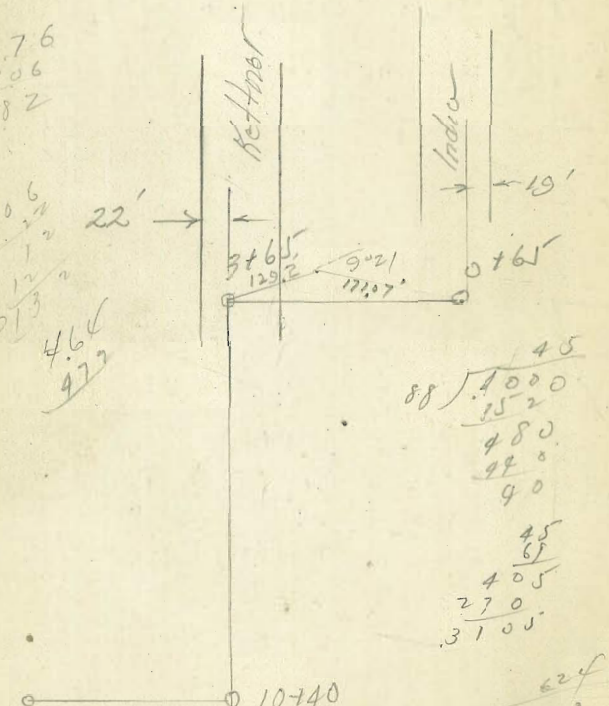
Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering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

39.68
1.33
3.60
39.61
-.81
38.76

100.00
38.76
61.24
.85
60.4

95.07
1.33
3.60
100.00

22.00
45.15
67.15



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.