1620

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.

Walker
Wells
O. Farrow
11-27-41

SWITZER CANYON

Indexed
C.S.R.

TRUNK SEWER "A" LINE

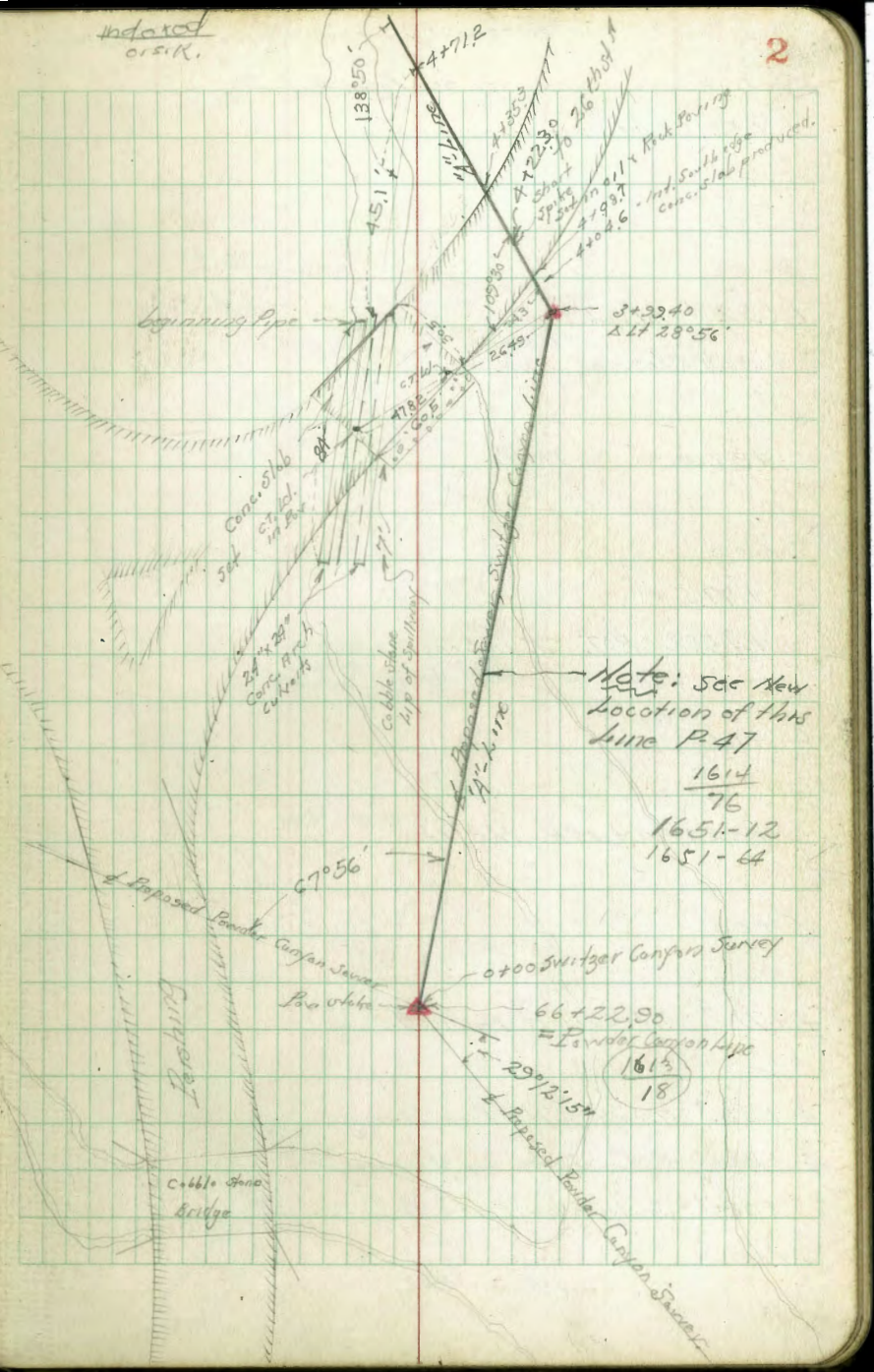
Preliminary Alignment
from Powder Canyon
to UPRR St.

Station	
	Cont. on P-3
3+99.40	= Δ Lt. 28°56' set Paving Stake
3+00	
2+00	
1+04	= W/L Bank Channel
0+00	= Sta 66+22.90 of Powder Canyon Survey

Reference Books 838-44 = This
T. Point " #9-27-28
F.B. # 1347-71
" # 1591-2
" # 1445-63
" # 1518-60
" # 1522-38 44 = Location Existing Sewers
" # 827 - = original Cuts Construction "
" # 510 = original Alignment Exist. Sewer P-53-41

Indexed
C.S.R.

2



Switzer Canyon Ferrer - "A" Line

Station

Cont. on Page 4

+59.6 = Int. Spk. Line

8+00

7+92.1 = Int. Spk. Line

Water

7+81.7 = Int. 6" Line

+32.8 = Water

7+00

+77.5

+45.02 = P.O.T. CT. in Conc. Dam

6+00

+52 = East MH 11.8' Lt.

5+00

4+71.2 = Int. Culvert Produced.

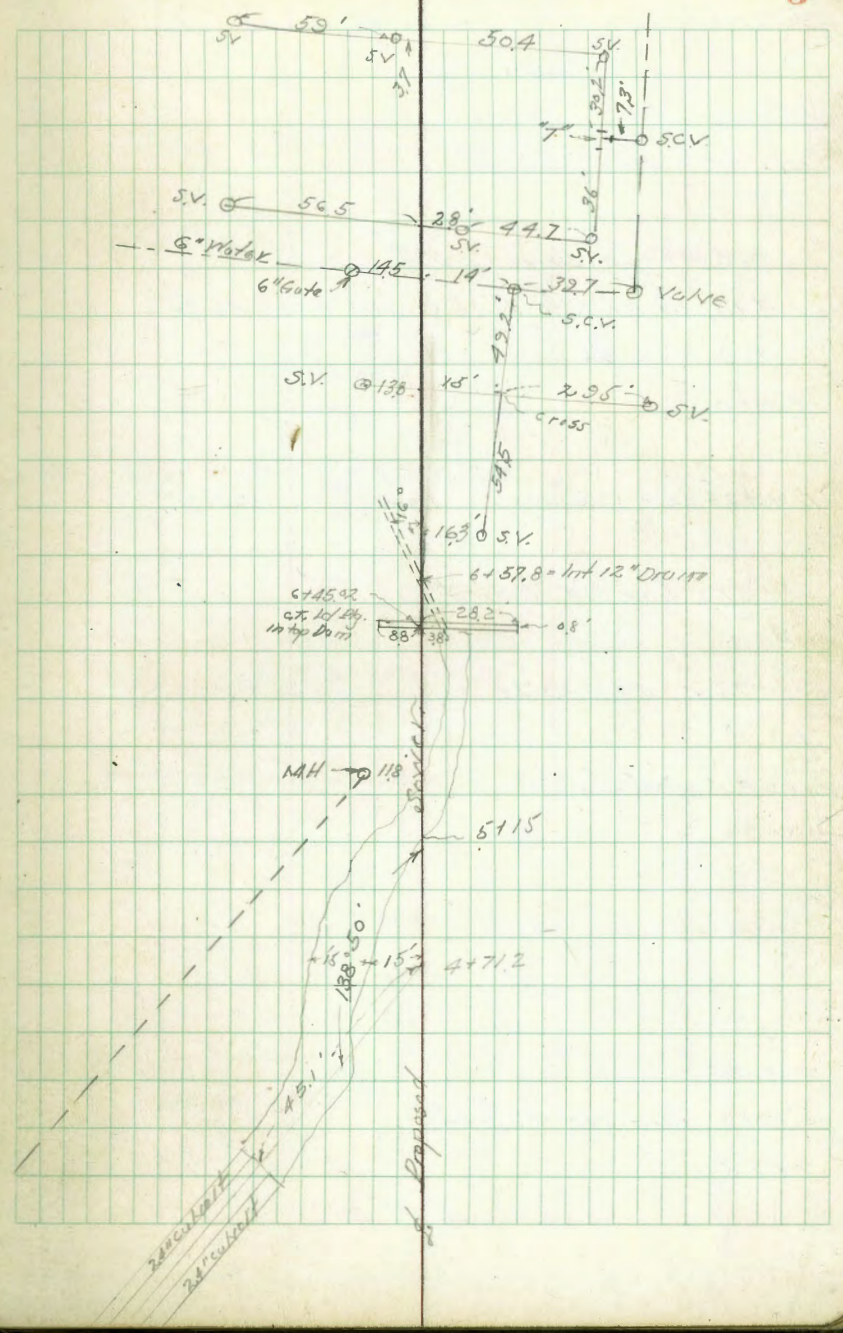
4+35.3 = N. edge Oil & Rock Paving.

4+22.30 = P.O.T. Spike in Paving.

+08.7 = South edge Oil & Rock Paving.

4+00

Cont. from P-2



Switzer Canyon Sewer
"A" Line

Station

Cont. Page 5

13+00

12+82.8 = Int. Spk. Line

+65.8 = opp. Existing MH 6.2' Lt.

+48 at Rt. ∆ to Exist Control Valve 45' Rt.

+13 = Int. Spk. Line

12+00

11+44.6 = Int Spk line? Not sure of sprinkler line location from Control Valve

+07 = Spk C.V. 63' Rt.

11+00

+72.5 = S.V. 19' Lt.

10+03.1 = Int. Spk. Line

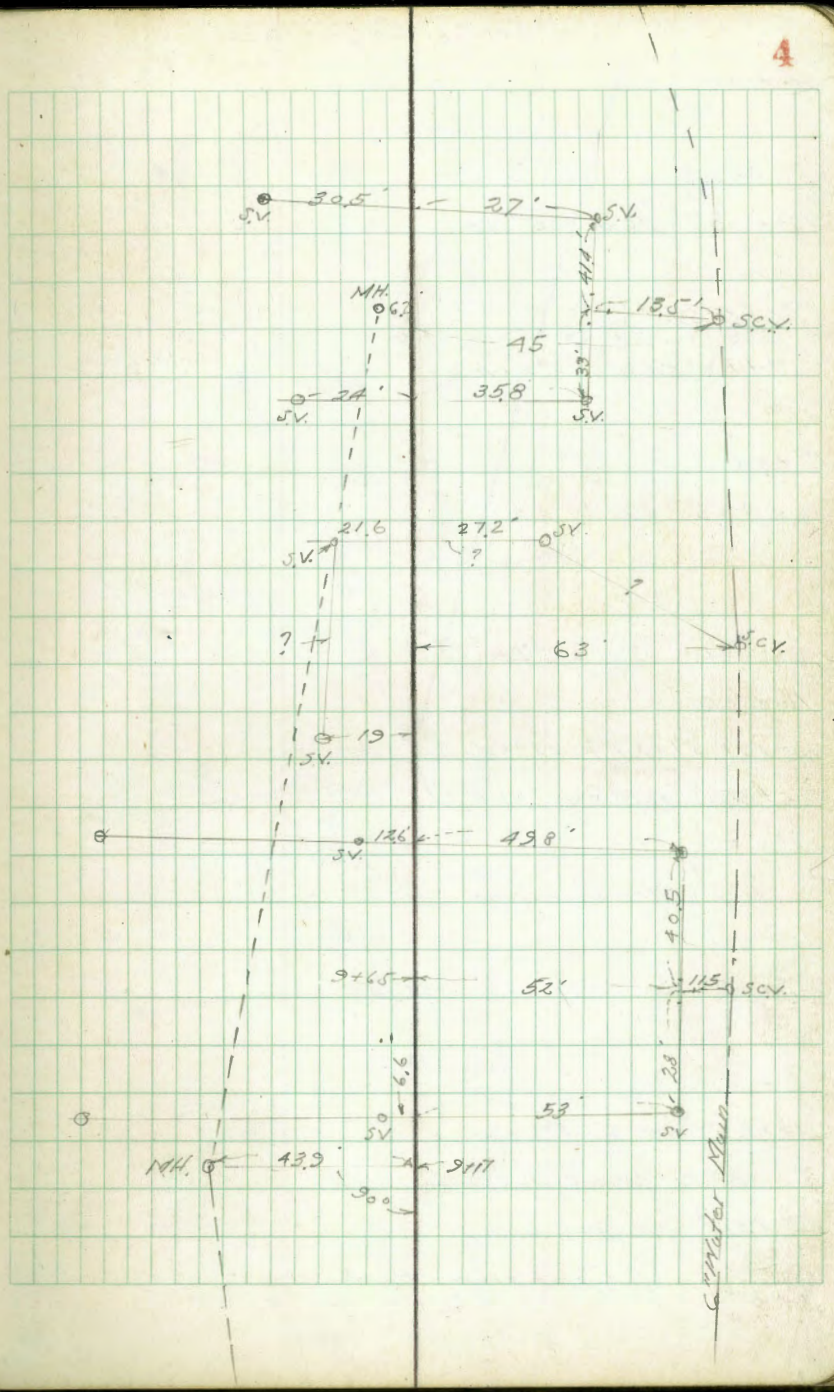
10+00

+35

+17 = Exist. MH 43.9' Lt.

9+00

Cont. from P- 3



Switzer Canyon Sewer

Station "A" Line

Cont. on Page 6

+19.6 = S.V. 6' Lt.

18+08.7 = S.C.V. 6.5' Rt

17+53 = S.V. 17' Lt.
5.9' Rt = Main Line
+47 = Branch 6" Line

17+00

16+89.9 = S.V. 17' Lt.

+21.6 S.V. 6.5' Lt.

16+00

15+71.21 = Δ Rt 17°53'

15+55.6 opp S.V. 11.8' Lt.

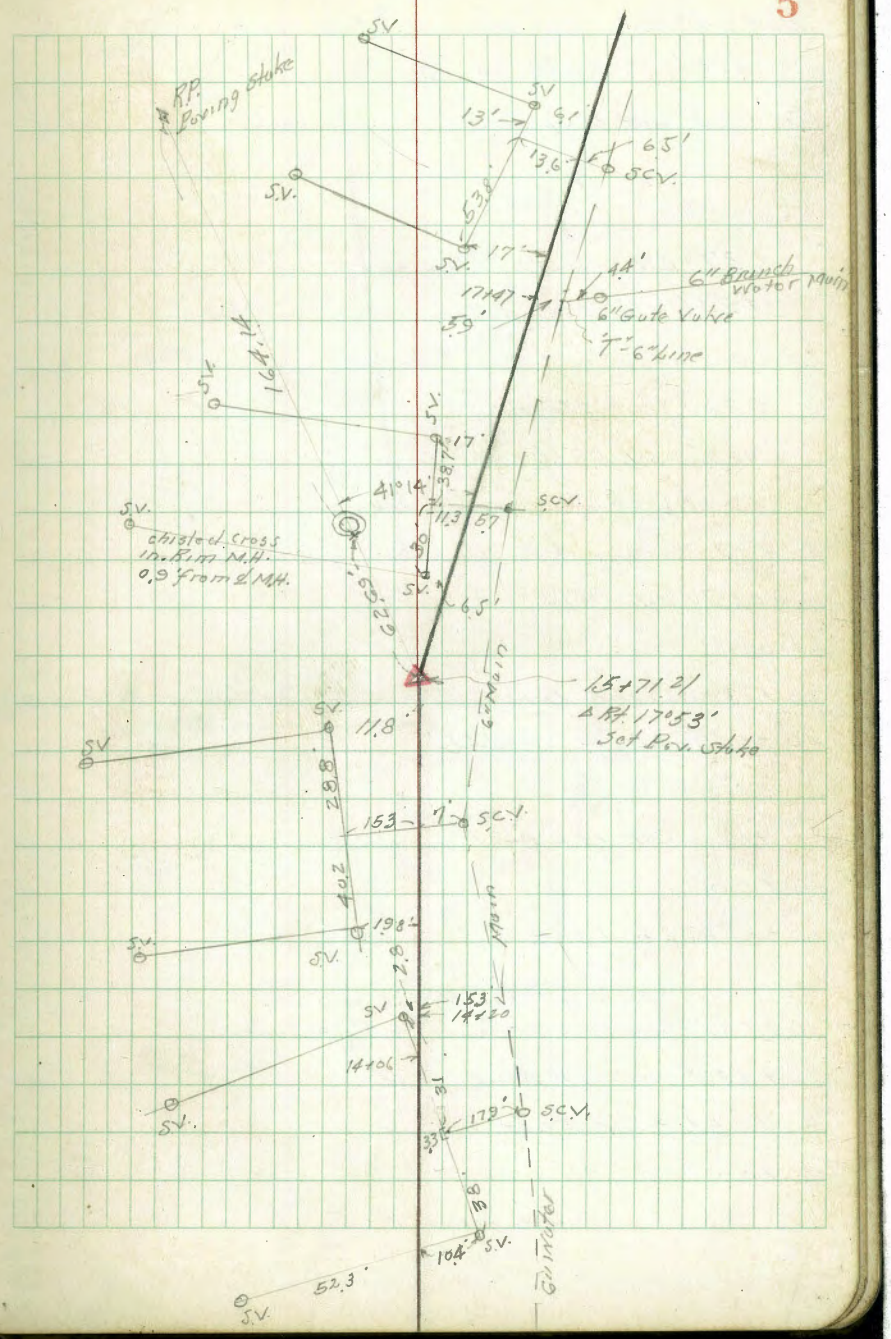
+25.6 = Int. Spk Line.

15+00

14+87 opp Spk Valve 19.8' Lt

14+06 = Int. Spk Line
+89.2 = opp. Control Valve
13+51.4 = Int. Spk. Line

Cont. from P- 4



Switzer Canyon Sewer - "A" Line

Station

cont. on Page 7

23+64 = S.V. 7.5' Rt. 62.4' Lt. = S.V.

+25.1 = S.C.V. 18.5' Rt

23+03.4 = Int 2" Spk. Line

+37 = S.V. 19' Lt.

+24.6 = Int 2" Spk Line

22+00

+96.7 = Int. 2" Spk "

+69.5 = S.V. 5.8' Lt.

+50 = RLY end Driving "Tee"

21+18 = Cleanout to Tile Drain 7.3' Lt.

+10.7 = S.V. 8.7' Lt.

21+00

20+73 = RLY and Driving Tee 4' Rt = Toe Slope 19' Rt = Top Slope

20+64.46 = Δ Lt. 8°10'45"

+11 = S.C.V. 13.6' Rt

20+00

19+87.6 = S.V. 2.3' Lt.

(Existing M.H. 15.7' Lt. on diag.)

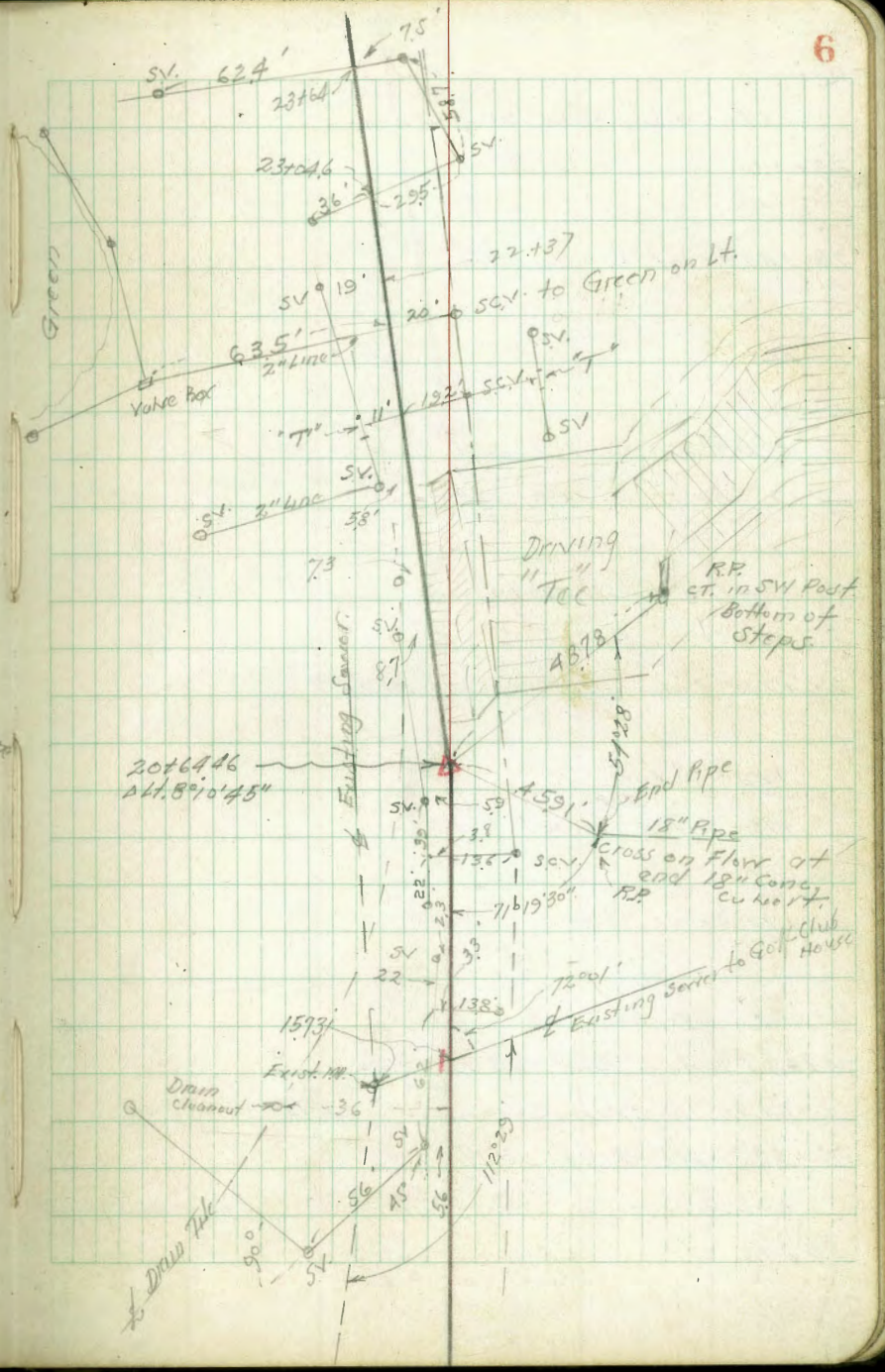
19+58.1 = Int. Branch Sewer to Golf Club House

19+33.5 Cleanout Drain 3.6' Lt.

+05.5 = S.V. 5.6' Lt.

19+00

Cont. from P. 5



Switzer Canyon Sewer "A" line

Station

Cont. on Page 8

+29 = S Valves = Int 2" Spk line

2.9 + 00

28 + 52.2 = Int 2" Spk. line

28 + 00

+83.8 = 86' Rt. S.V. = Int 2" Spk. line

27 + 67.76 = Δ Lt. 3°21'45"

+42.6 = Int. 2" Spk. line

27 + 13.5 = S.V. 56' Lt.

26 + 71 = Drain Tile Cleanout 31' Lt.

+42.8 = S.V. 53' Lt.

+12 = Int 2" Spk. line

26 + 00

25 + 71.5 = S.V. 94' Lt.

25 + 01 = S.V. 20.2' Lt.

24 + 69.7 = Int. 2" line, S.C.V. 9.2' Rt.

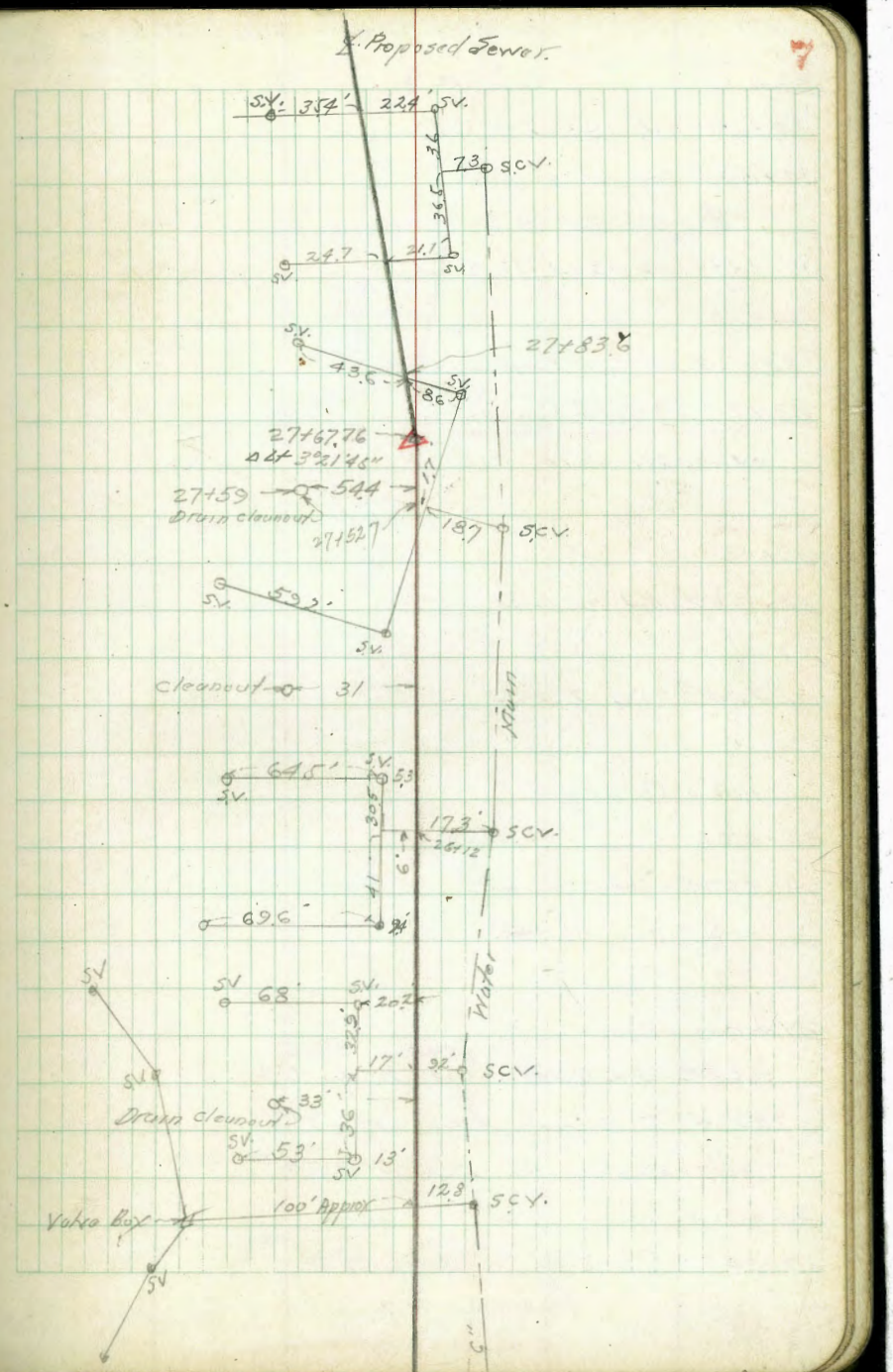
+64.3 = Tile Drain Cleanout 33' Lt.

24 + 32 = Spk. Valve 13' Lt.

+09.8 = Int. 2" Spk. line to Green.

24 + 00

Cont. from P. 6



Switzer Canyon Sewer - "A" Line

Station — Cont. P-9

34+69 = oak. 5.5' Lt. = ℄ 12" dia.

34+57.5 = Int. 2" Spk Line

+50 oak 0.4' Rt. = ℄ 6" dia

+36 = oak 1.8' Lt. = ℄ 3" dia

34+00

33+68.80 = Int Existing Sewer

33+62.53 = ∆ Rt 10°41'

+42.8 = S.V. 6.2' Lt.

33+00

32+98.2 = Int 2" Line

32+64.2 = S.V. 2.2' Lt.

+04.2 = S.V. 9.5' Lt.

32+00

+62.5 = Int 2" Line

+34.7 = S.V. 7.6' Lt.

31+00

+68.2 = S.V. 4.9' Rt. = Int 2" Line

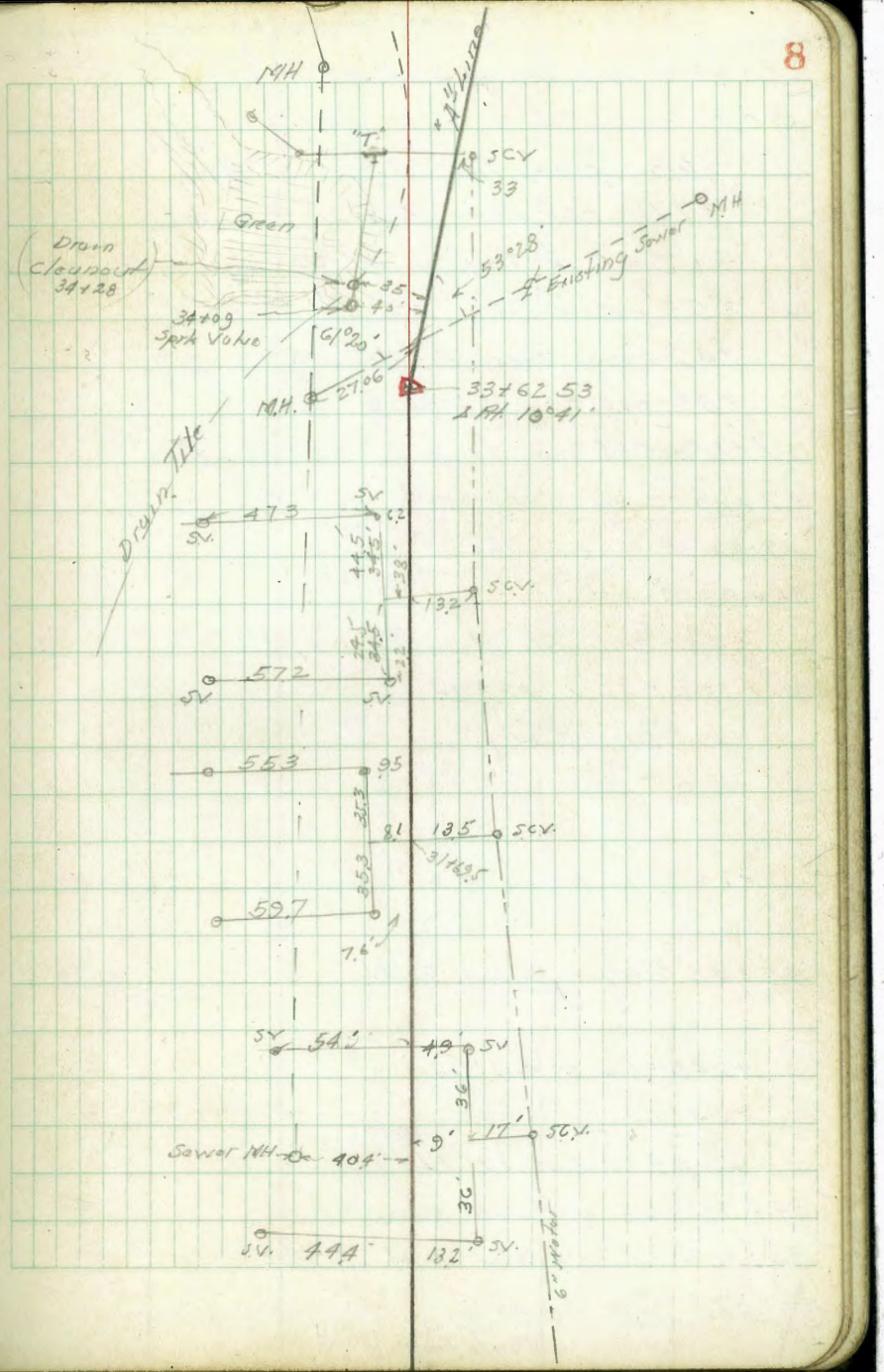
+27.4 = "T" to Control Valve 9' Rt. = "T"

+09 = Existing MH 40.4' Lt.

30+00

29+94 = Int. 2" Line Valve = 13.2' Rt.

Cont. from P-7.



Station

38+11 = Oak Tree 3.4' Lt. 12" dia

38+00

+98 = Oak Tree 3' Rt. 5" dia

+77 = Oak Tree 5.4' Lt. = 10" dia.

+62 = Oak Tree 6' Rt 10" dia

+53' = Oak Tree 5.2' Lt. 10" dia.

+47 = Oak Tree 5.3' Rt 12" dia

+33' = Oak Tree 2.3 Lt = ℄ 6" dia.

37+22 = Oak Tree 4.2' Rt = ℄ 12" dia.

37+10 = Δ Lt. 37°53'15"

37+034 - Int Server

36+93.08 = P.O.T.

+40 = Drain Tile cleanout 9.3' Lt

+33.6 = S.C.V. 18.3' Lt

+19.5 = S.V. 3.8' Rt

36+00

+70 Tile Drain 4' Lt. (According to Field attendant)

35+48.3 = Spk. Valve 8.6' Rt.

+24.9 = Int 2" Spk Line

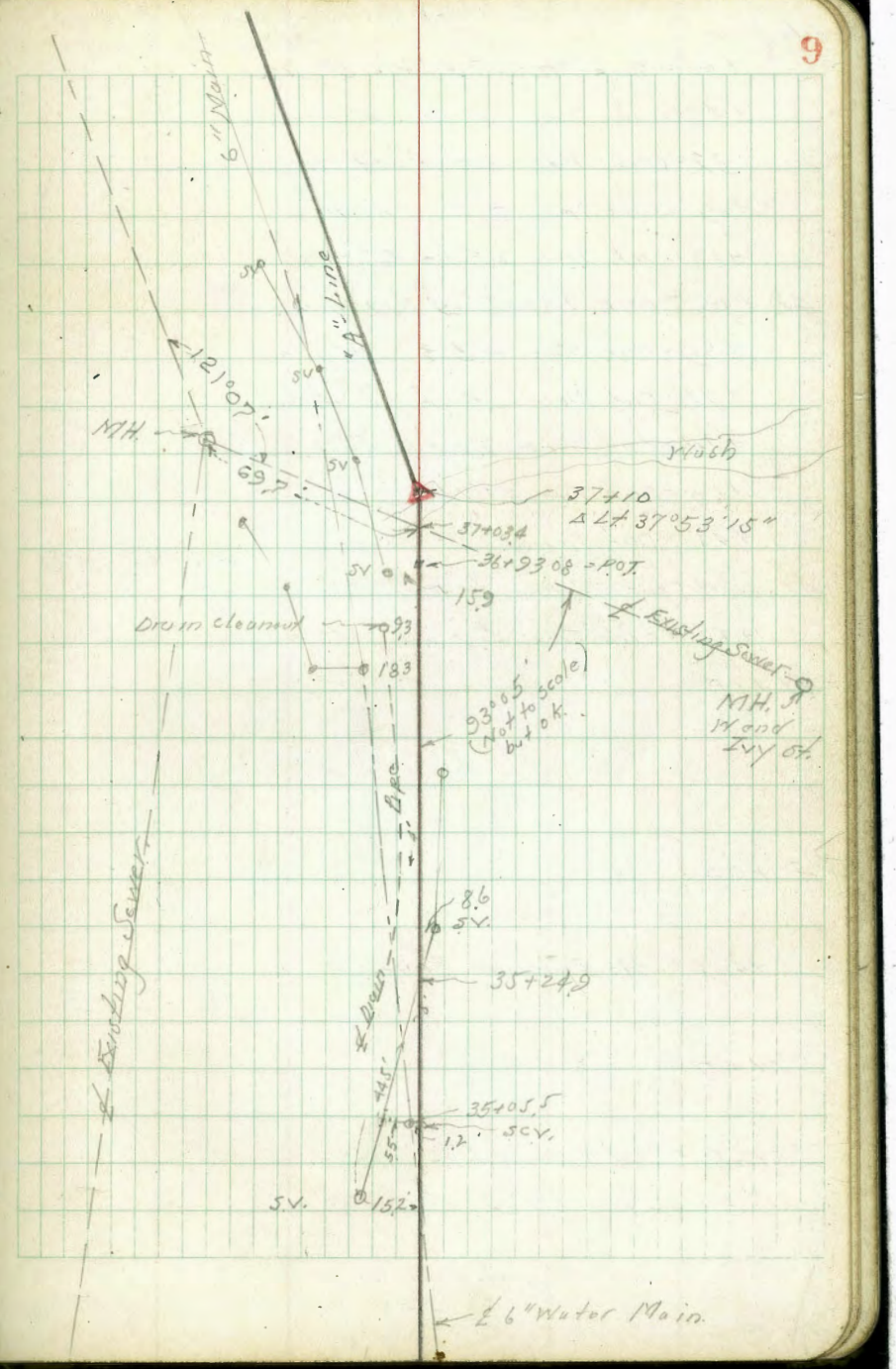
35+05.5 = S.C.V. 1.2' Lt.

34+95 = Int. 6" Water Main

34+80.5 = ℄ Oak Tree 5' Rt 5' dia

34+82.2 = S.V. 15.2' Lt.

Cont. from P-8



Switzer Canyon Sewer - 4" Line

Station

Cont. Page 11

+46 = Oak Tree 7.4' Rt 5" dia

+43 = Oak Tree 7' Lt 4" dia

+32 = Oak Tree 6.8' Rt 14" dia

+19 = Oak Tree 9' Lt 12" dia

+18 = Oak Tree 2.3' Rt 6" dia

42+02 = Oak Tree 9' Lt 12" dia

+99 = Oak Tree 4.5' Rt 11" dia

+78 = Oak Tree 3.4' Lt 7" dia

+74 = Oak Tree 7.7' Rt 8" dia

+60 = Oak Tree 2.1' Lt 9" dia

+45 = Oak Tree 3.2' Rt 10" dia

6" Line = 5.9' Lt

41+34 = Int 2" Branch Water Main

+22 = Oak Tree 5.7' Rt 5" dia

41+00

40+00

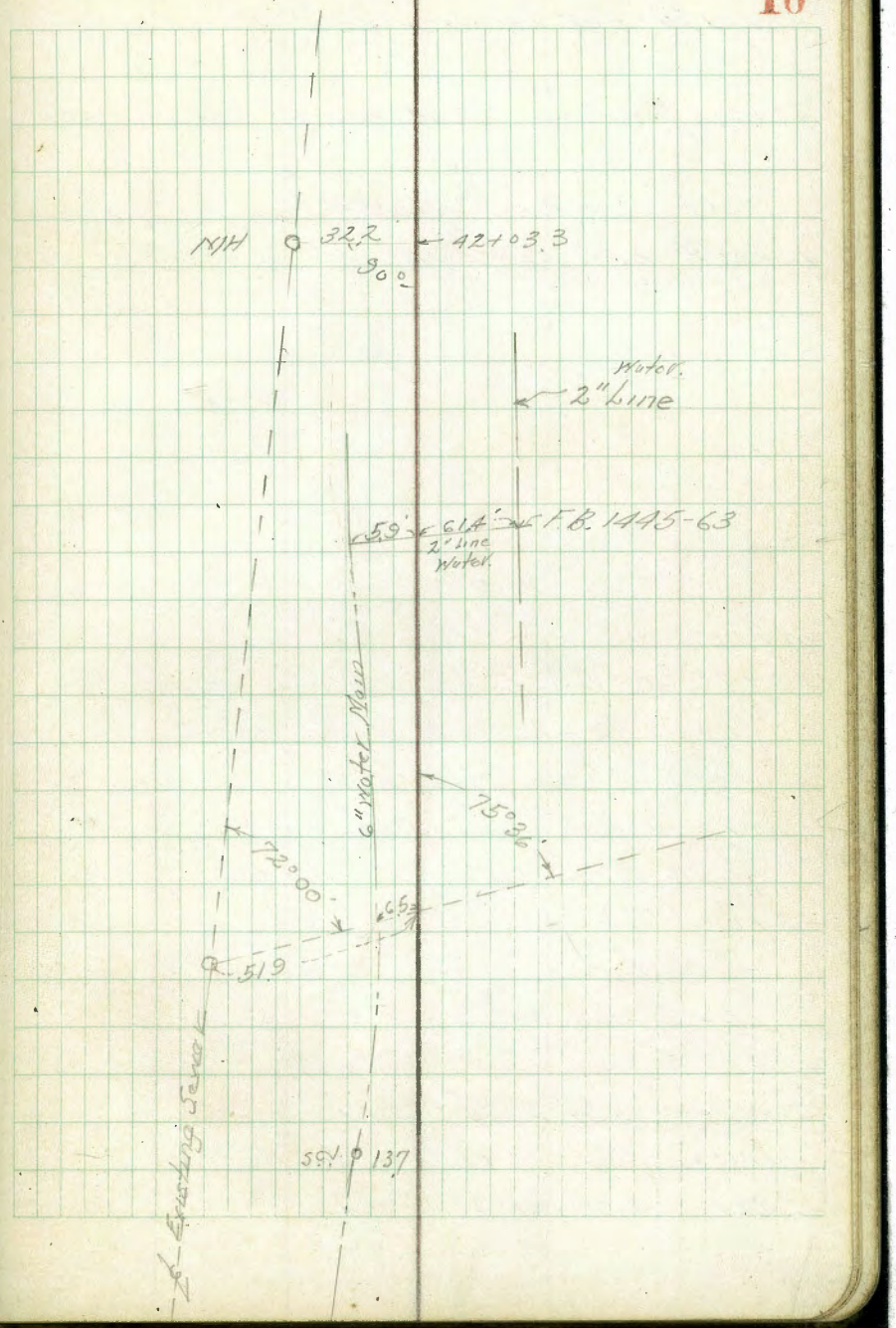
+40.5 = Int. Existing Sewer

39+00

38+65 = Oak Tree 8.4' Rt 10" dia

38+63 S.C.V. 137' Lt

Cont. from P. 10



Switzer Canyon Sewer - "A" Line
Cont. P. 12

Station

48+01.34 = POT Int Line 13' South of ℄ of Laurel ℄

Guard
47+00 = Int. Fence - End grassed golf course

+06.2 = Int. Existing Sewer MH 10.9' Lt on diag

46+00.34 = ΔRt 14°54'45"

45+00

44+00

43+76.60 = Int. East Line Balboa Park

+40 = ℄ Oak Tree 4' Lt 12" dia.

+25 = ℄ Oak Tree 5' Lt 12" dia.

+13 = ℄ Oak Tree 8' Rt 10" dia.

+09.5 = ℄ Oak Tree 6' Lt 10" dia.

43+00

+98 = ℄ Oak 3' Rt 12" dia.

+94 = ℄ Oak Tree 9' Lt 7" dia.

42+82.6 = Int. Existing Sewer

42+77.40 = ΔRt 20°14' Set Paving Stake

+66 = 3' Rt 10" dia.

42+63 = Oak Tree 10.4' Lt 7" dia.

Cont. from P. 10

Walker
Wells
Hardin
12-22-41

11

1302

Fd. Mon. (Concrete)

℄ Laurel

41.74'

107.99'

48+01.34
POT Stake
= Int. Line 13' South of ℄ of Laurel ℄

119.40'

NH

10.9'

46+00.34
ΔRt 14°54'45"

376.72'

℄ Proposed Sewer

Set Pav. Stake

43+76.60

℄ Existing Sewer

1340.40'

195.05'

Bal. Line

MH

27.4'

43+77.40
ΔRt 20°14'

FB 1591-3

86.34' Pueblo Line

Scv. ⌀ 19 → 42+63

Fd. Cont. Mon.

6" Main →

Scv. ⌀ 18.1 → 42+12.8

Switzer Canyon Server.

Station. Cont. Page 13 "A" Line

51+62.7 = Int. Sewer.

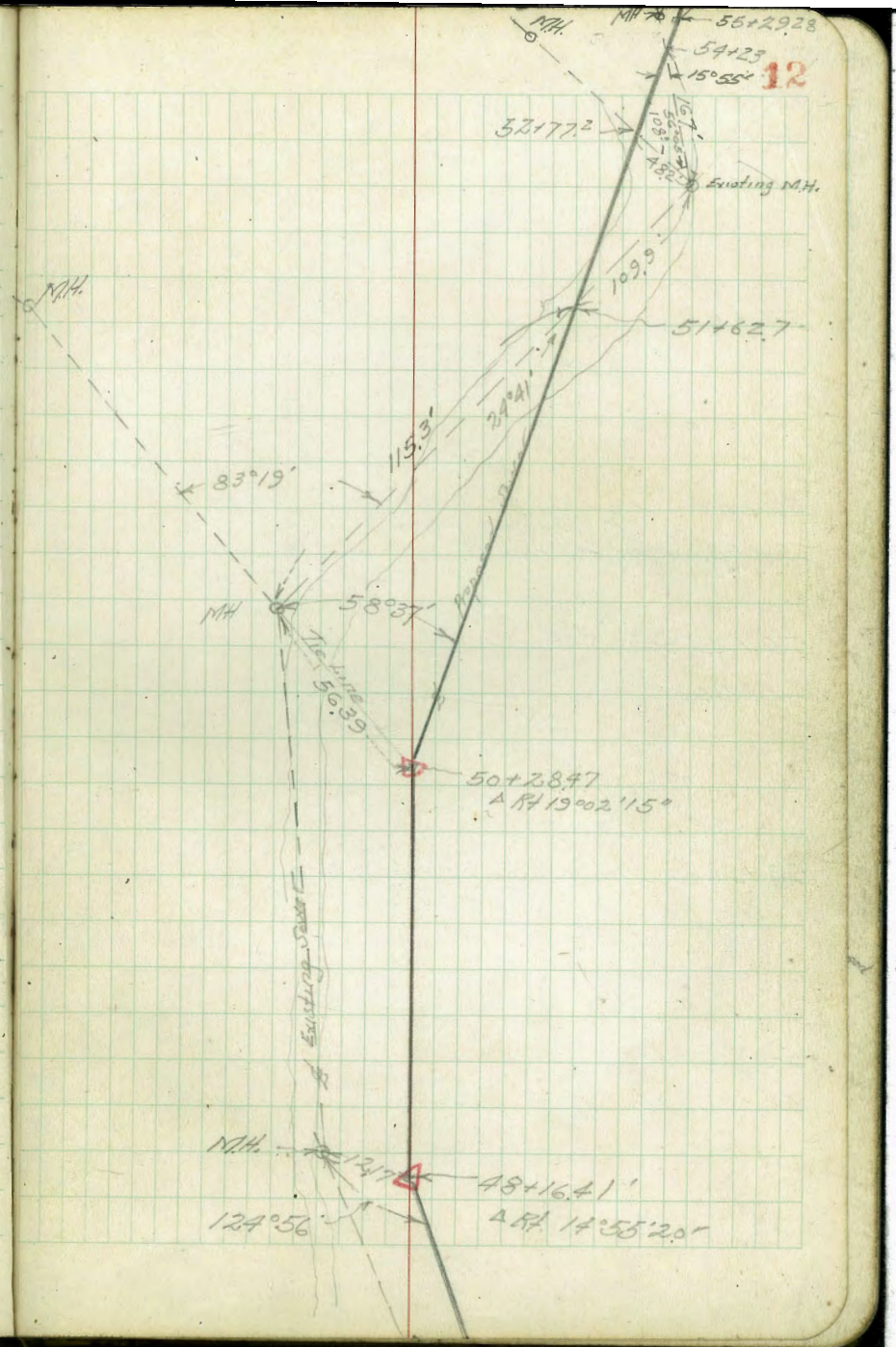
50+28.47 Δ Rt. 19°02'15"

50+00

49+00

48+16.41 Δ Rt. 14°55'20"

from Cont. Page 11



Switzer Canyon Sewer
Cont P-14

"A" Line

Station

+47.6 = MH. 34.5' Lt

58+00

57+00

56+00

P.O.T. Paving Stake

55+95.22 = Int of Line 13' South of ℄ Maple

55+29.28 = ΔPT. 4°45'30"

55+00

54+23 = Int existing Sewer

53+96.23 = Int. of Line 27' East of West Line 29th

287'

53+00

52+77.2 = Int Existing Sewer

52+00

Cont. from P-12

Additional Ties
See Tie Book #9 P-28

13

MH 34.5' 58+47.6 90°

P-14 181.2' 93°30'00" 53.27' 30' ROW

(fd. old Hub. Replaced 1-7-42

Proposed Sewer

5'.

432.61'

19.04'

2° Closed

5.5+95.22 = P.O.T.

MH. 36.45'

55+29.28 ΔPT. 4°45'30"

40° 29.7'

28' closed

86°14'

178.97'

93°45'00"

Tangent

117°36'30"

Fd. Hub

Fd old Hub.

53.10'

Set Nail

Laurel 5'.

7'

15.41'

53°29'23"

27.05'

54+23

Fd. old Hub

Fd. CT. Ld. Plg.

15' closed

15.55'

27'

53'

38.08'

MH.

108.0'

52+77.2

43.2'

MH

5'.

15' closed

27.4'

1'

Fd. CT. Ld Plg. in walk

51+62.7

"A" Line

Station

63+03.6 = Int. Existing Sewer (Sewer leading to Canyon Sewer)

Cont. Page 15

Walker Wells Hardin 1-5-42

61+44.5 = Int. 16" W.L. Water Main

61+22.63 = POT.

60+95.21 = Int Existing Sewer

60+88.08 - Δ Lt. 15°22'20"

7+15.4 = M.H. 34.1' Lt.

60+00

59+00

58+47.6 = M.H. 34.5' Lt.

Cont. from Page 13

Tie Point Book #9 Page 28

See Tie Point Book #9 Page 28 for Location Drawing See 1111-B. Also Grd Book 11 Page 39

See F.B. 1651-38

West side 30th St. Bridge

R.P. chisel cross in top 1½" Bo. M.

Concrete Piers

Steel Pier

Nutmeg St.

Maple

To Int. Proposed Sewer

See Page 13

20' Closing

Switzer Canyon Sewer
"A" Line

Station. Cont. Page 16

69+00

68+00

67+12.10 = Δ Lt. 9°14'30"

67+00

+38.70 - P.O.T. Rev. stake

66+00

65+00

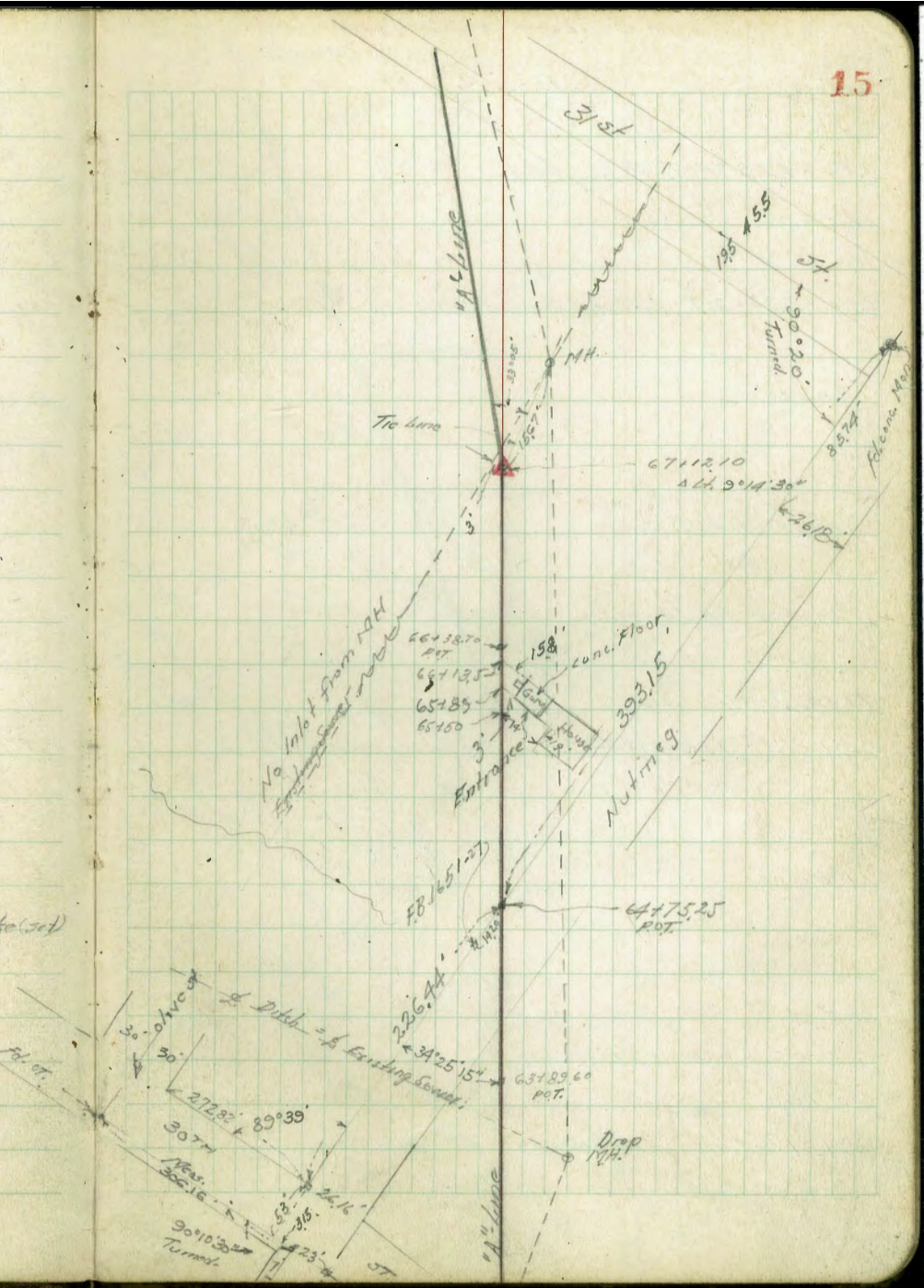
64+75.25 - Int. North line Nutmeg St. - P.O.T. Paving stake (set)

64+00

63+89.60 - P.O.T. Paving stake

63+60 - Int. Existing Sewer

Cont. from Page 14



Switzer Canyon Sewer "A" Line

Station

Cont. on Page 17

74+04.20 = P.O.T. Paving Stake.

74+00

73+55.27 = P.O.T. = Int. of Line 13' South of ℄ Palm St

73+00

72+14.5 = Int. Sewer

72+00.4 = Int Sewer

71+90.1 = Int. Sewer

71+87.12 = ΔLt 21°44'20" Set Paving Stake

71+00

70+04.35 = P.O.T. Paving Stake.

+03.85 = MH. 6.05' Lt.

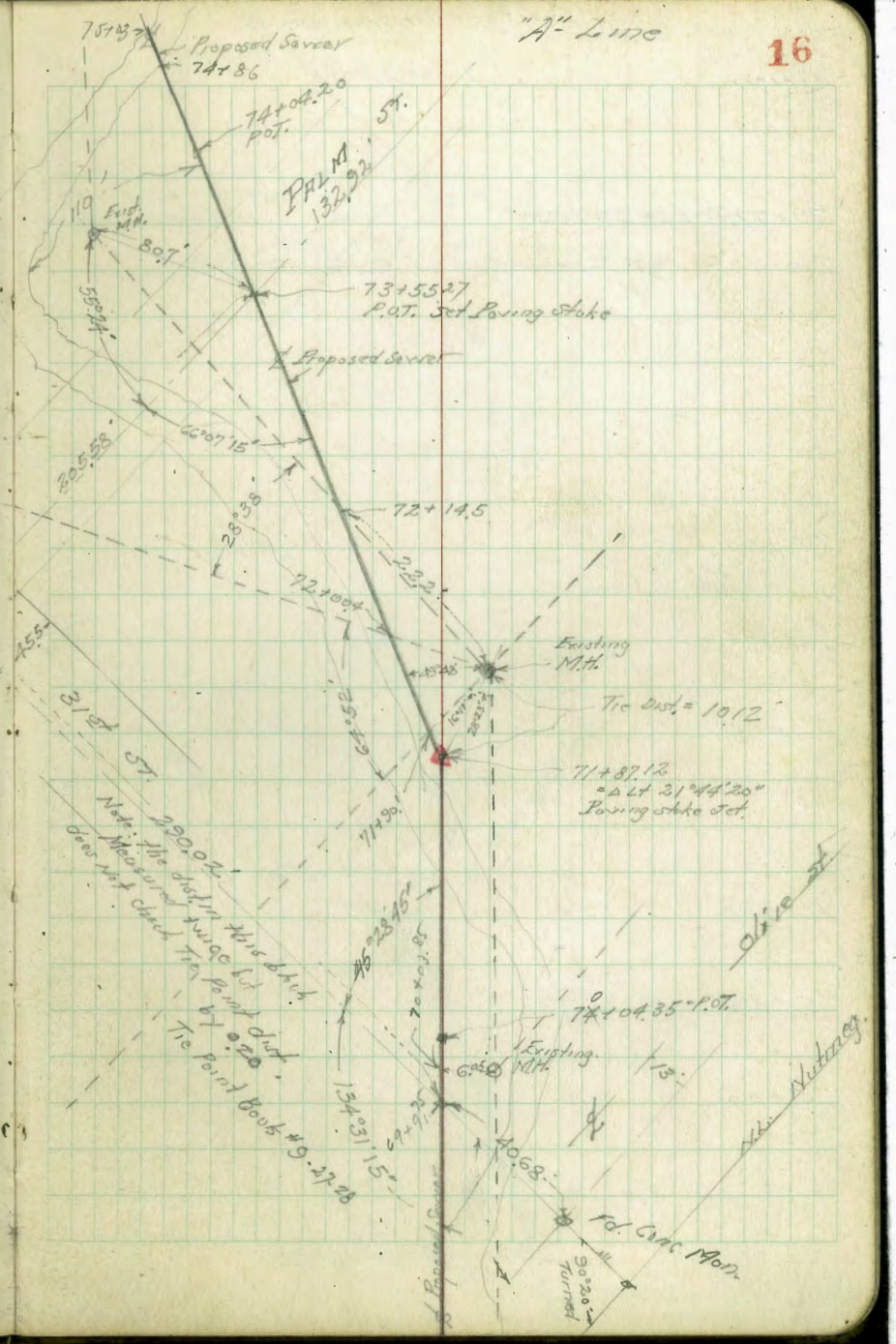
70+00

69+91.75 = P.O.T. Int. Line 13' West of ℄ 31st St.

Cont. from Page 15

"A" Line

16



Switzer Canyon Sewer
"A" Line

Station

Cont. Page 18

79+77.66 = Δ Lt. 47°15'40"

79+49.69 P.O.T. Pouring Stake = Int. Existing Sewer

79+00

78+00

77+00

76+00

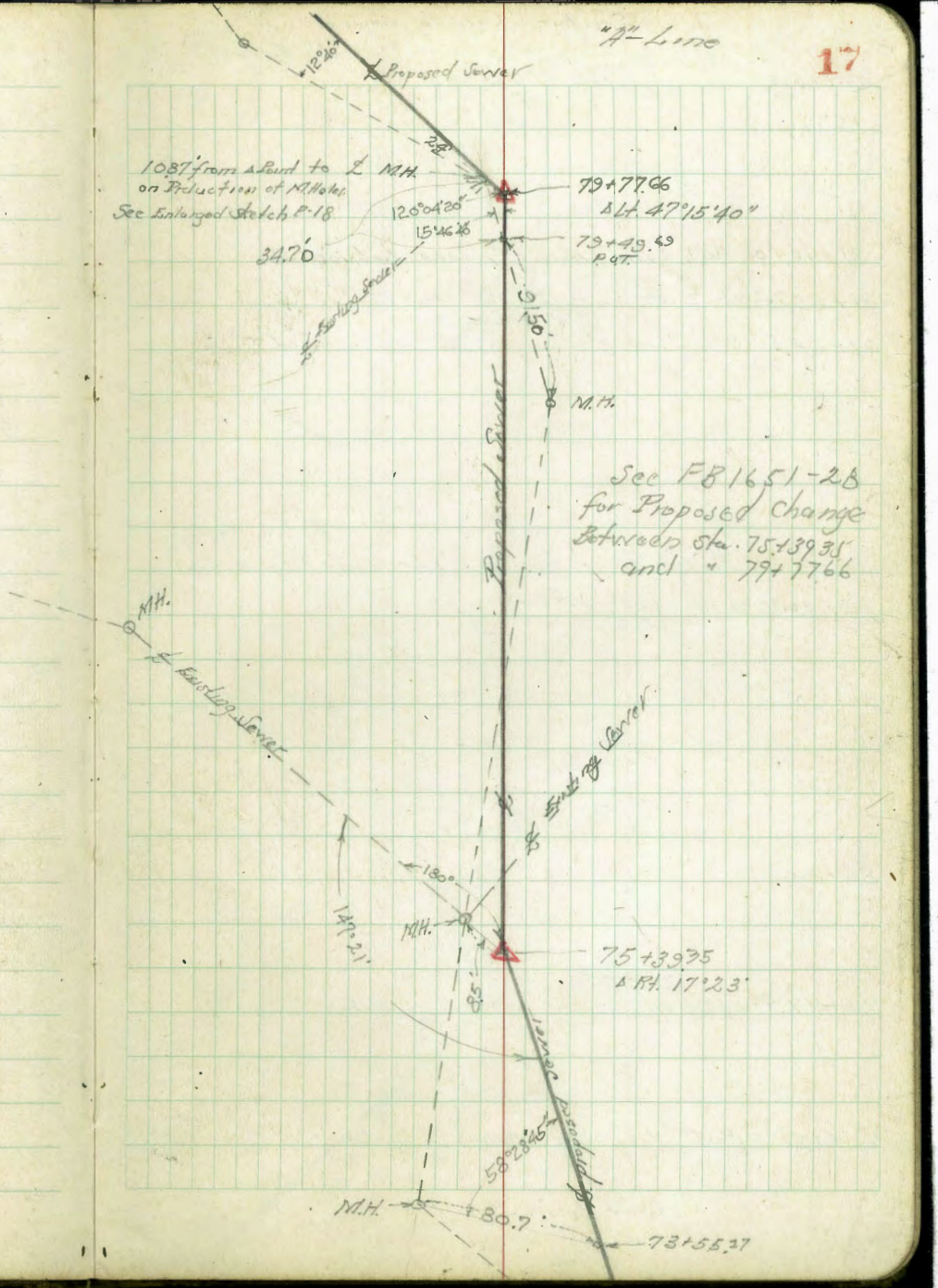
75+39.35 = Δ Rt. 17°23'

75+00

Cont. from Page 16

"A" Line

17



Switzer Canyon Sewer
"A" Line

Station

Cont Page 19

81+76.40 = P.O.T. = Int. North 7' line Redwood St.

81+63.74 = P.O.T. C.T. in Bottom 3" x 10" Timber.

81+63.5 = Conc. Piers 8' Lt. and 9.9' Rt. = Inside edge of Top.

81+42 = Concrete Piers 9.7' Lt. and 8.3' Rt. = Inside Face of Top.

81+38.46 = Δ Rt. 1°17'40"

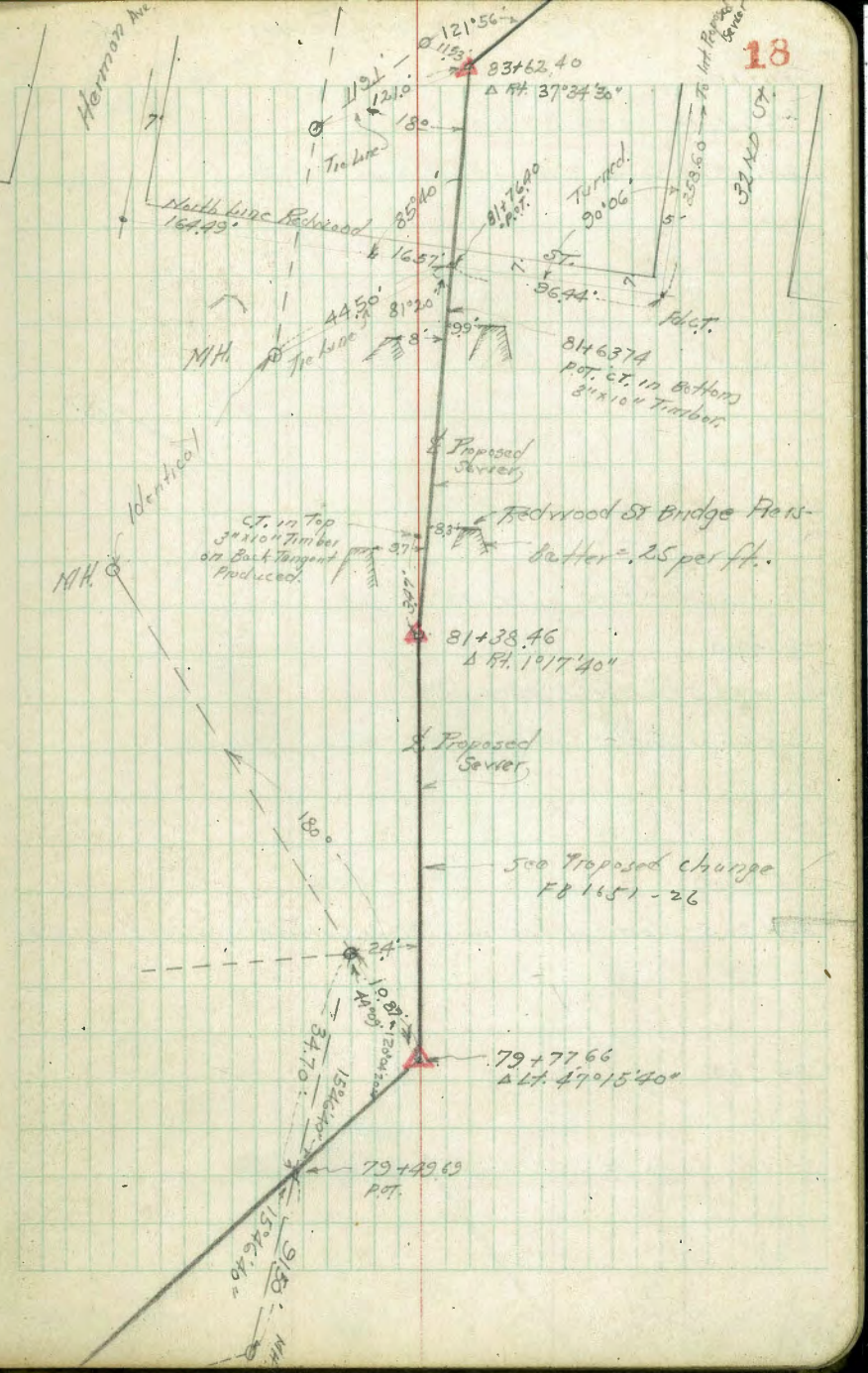
81+00

80+00

79+77.66 = Δ Lt. 47°15'40" Set Paving Stake

79+49.69 = P.O.T. Stake = Int. Existing Sewer.

Cont. from Page 17



Switzer Canyon Sewer "A" Line

Station

88+46.46 = Δ Rt. 89°49'

88+28.16 South 7' line Thorn St

86+06.51 = ℄ 32nd = Δ Lt. 32°42'30"

86+00

+76.5 = Int. w. cl. 32nd St.

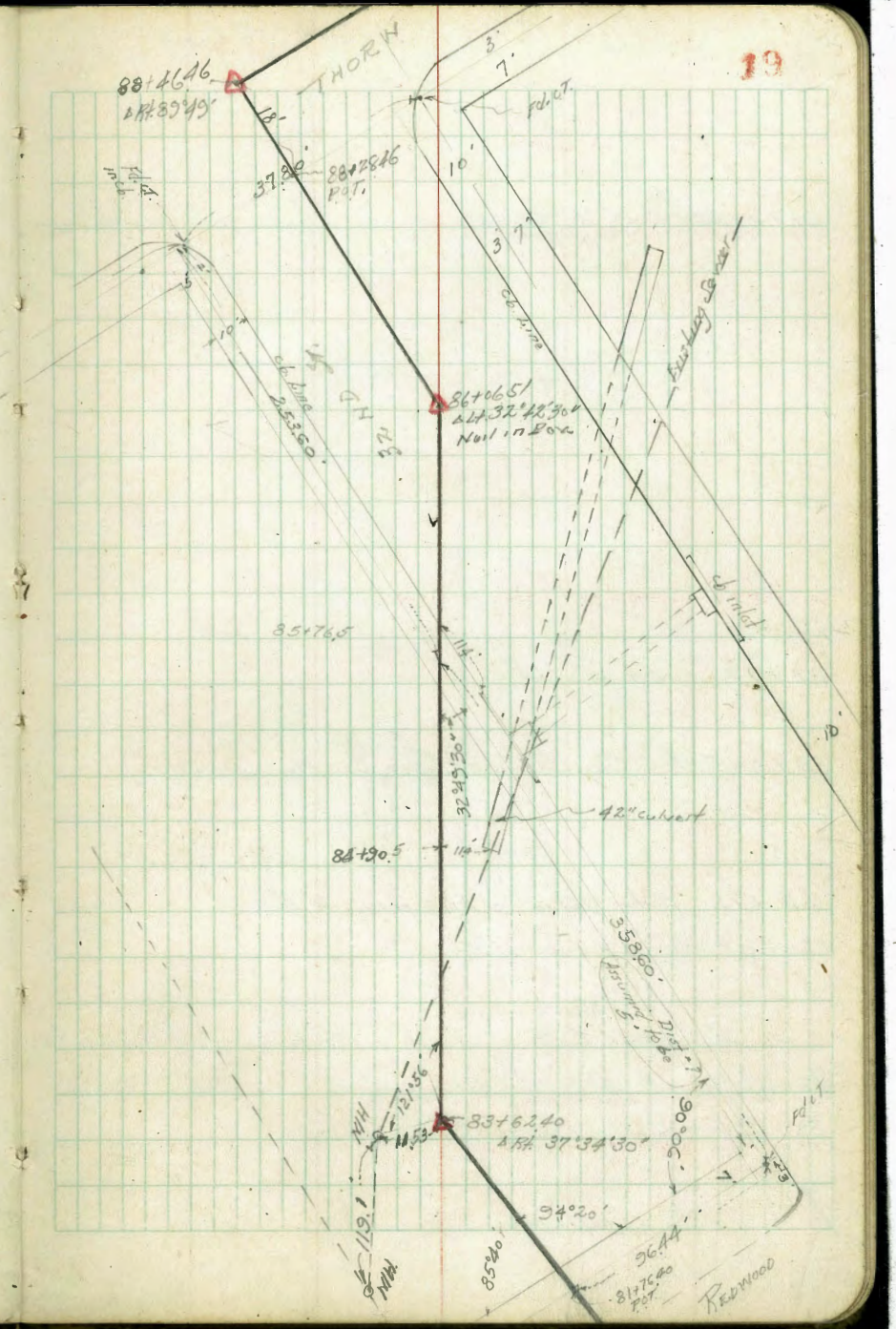
85+68.83 = Int. of line 5 East of W. line 32nd St.

85+00

84+30.5 = West end Existing 42" Conc. Culvert 11.4 Rt. = ℄ culvert.

84+00

83+62.40 = ℄ Rt. 37°34'30" Paving Stake



Cont. on Page 21

31+47.31 = Δ Lt. 89°42'40"

89+97 = MH. 4.6' Lt.

89+53.5 = Int. Conc. Culvert. (see Pav. Plans for Size)

88+72 = Water Valve to Fire Hyd 14' Rt

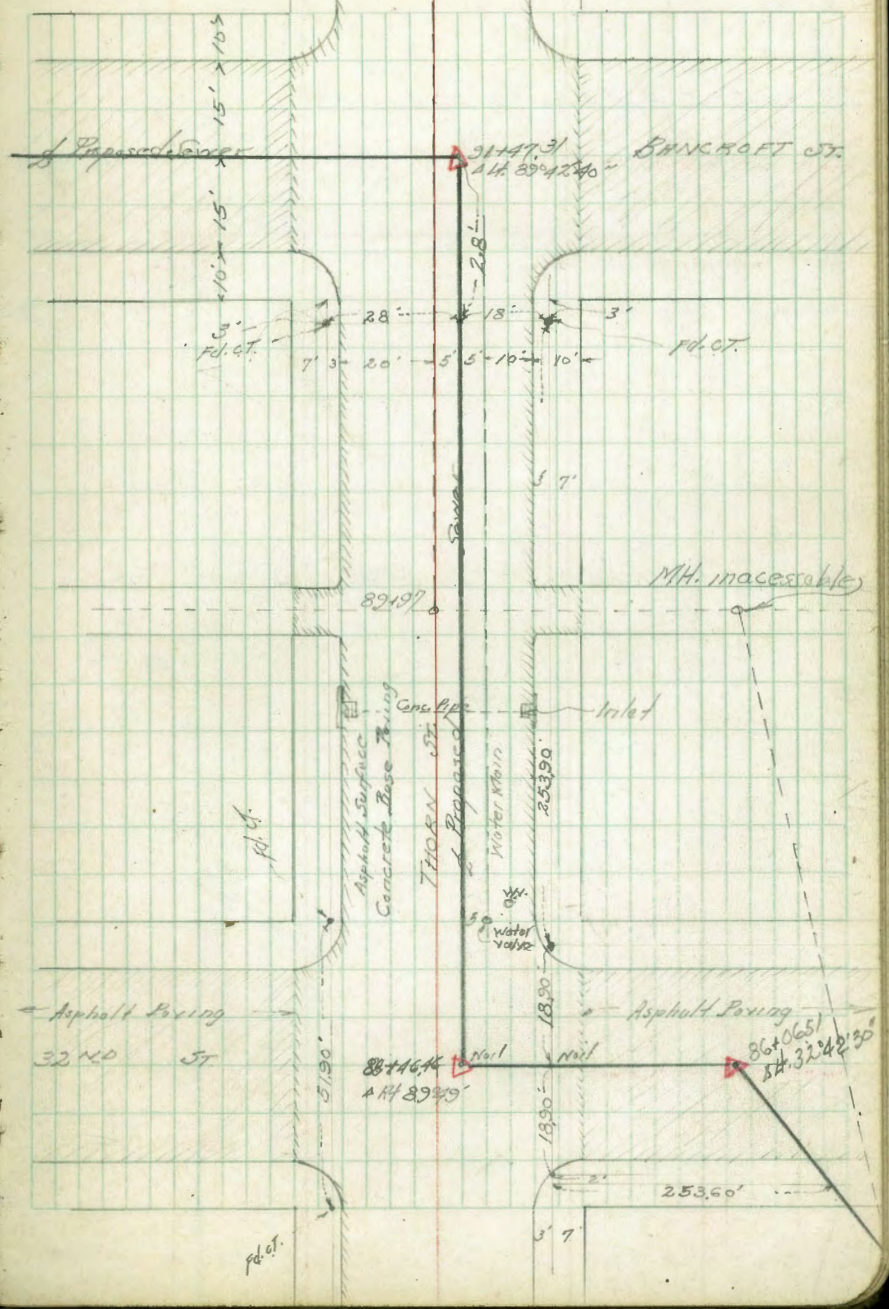
88+72 = Water Valve = 5' Rt

And Elevations.
Note: for Location Existing Culverts in this Intersection, See Pav. Plans.

88+46.46 = Δ Rt. 89°49'

88+28.46 = South 7' Line Thorn St

Cont from Page 19



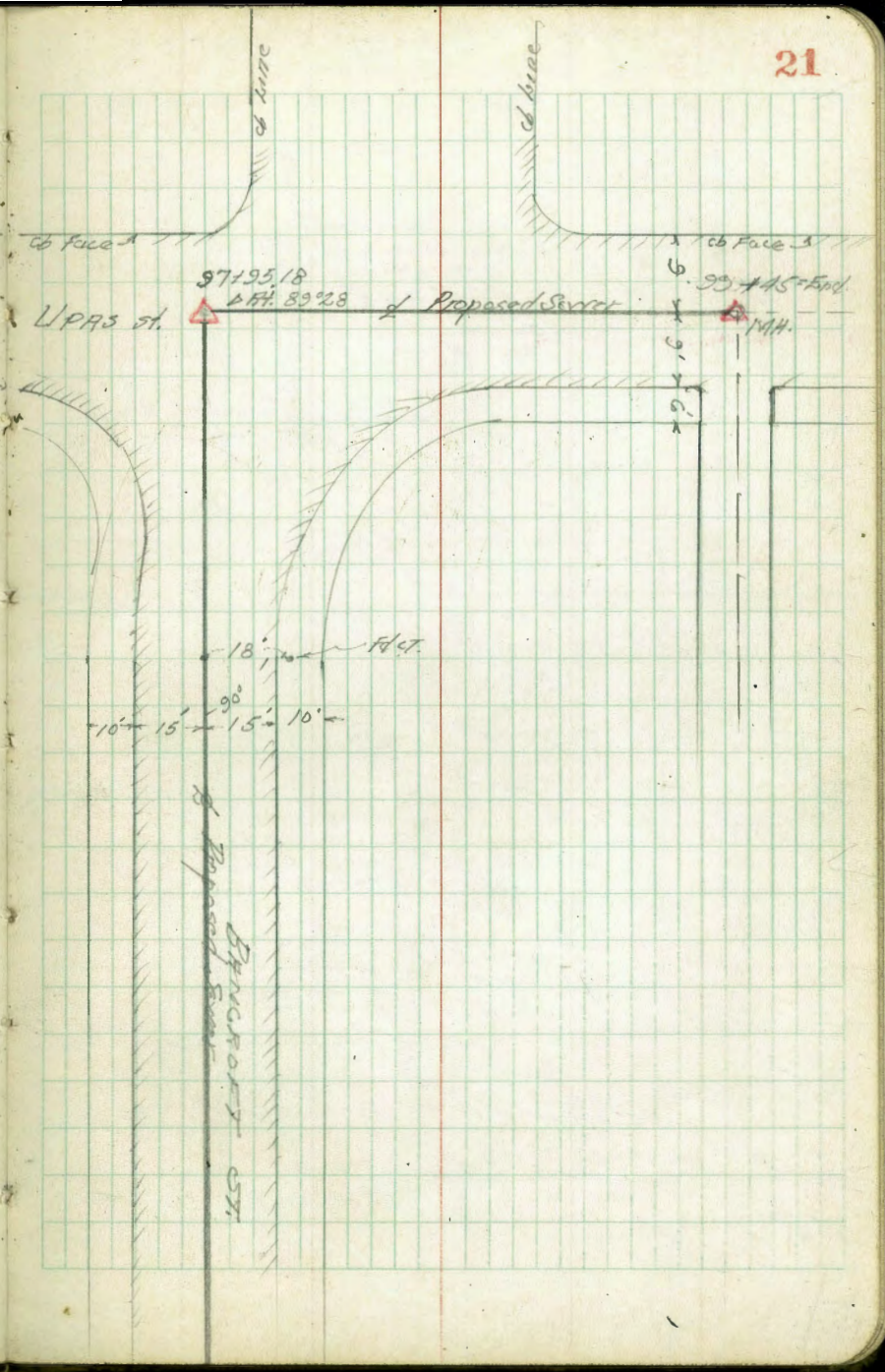
Completed
2-2-42
Walker
Wells
Harslin

Switzer Canyon Sewer "A" Line

99 +45 = End of Line = ℄ Existing MH.

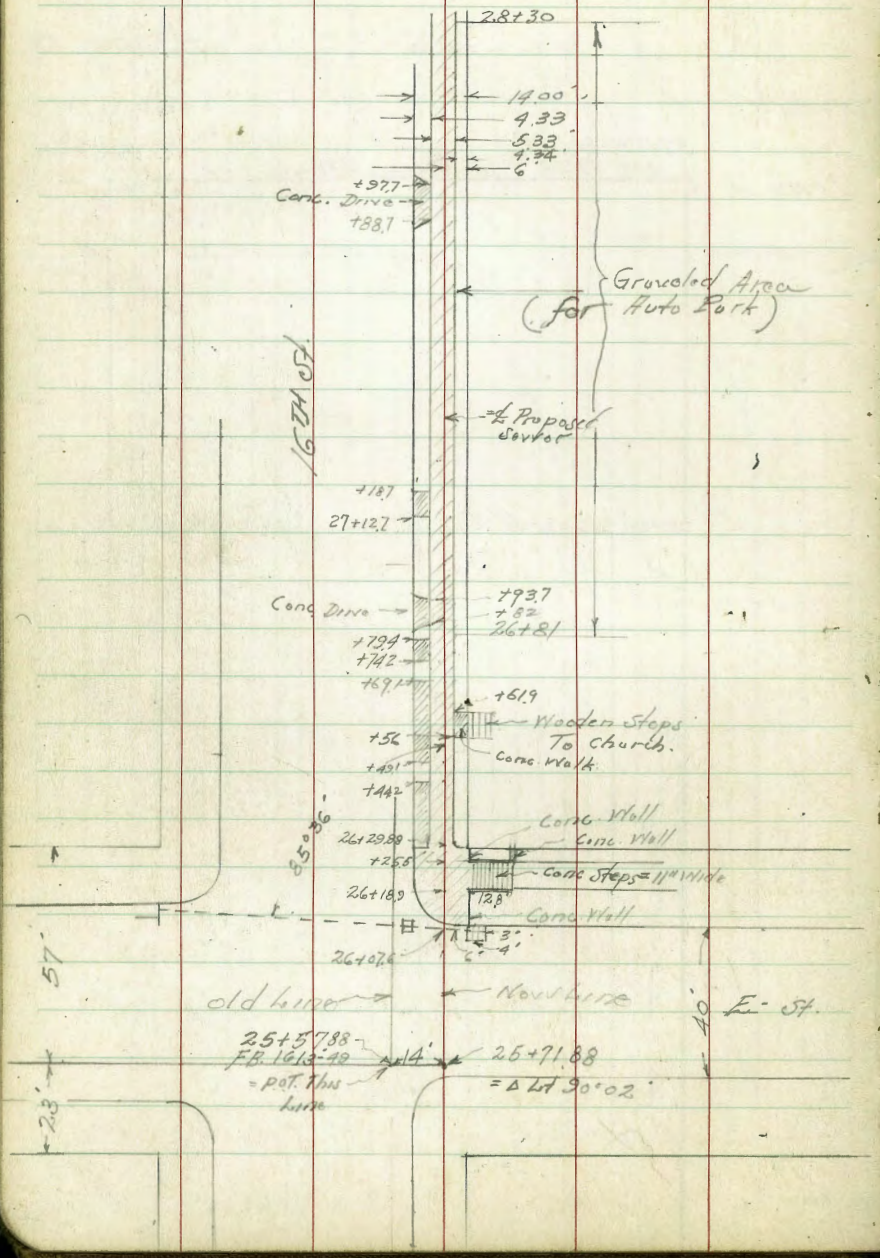
97 +95.18 = Δ Rt 89°28

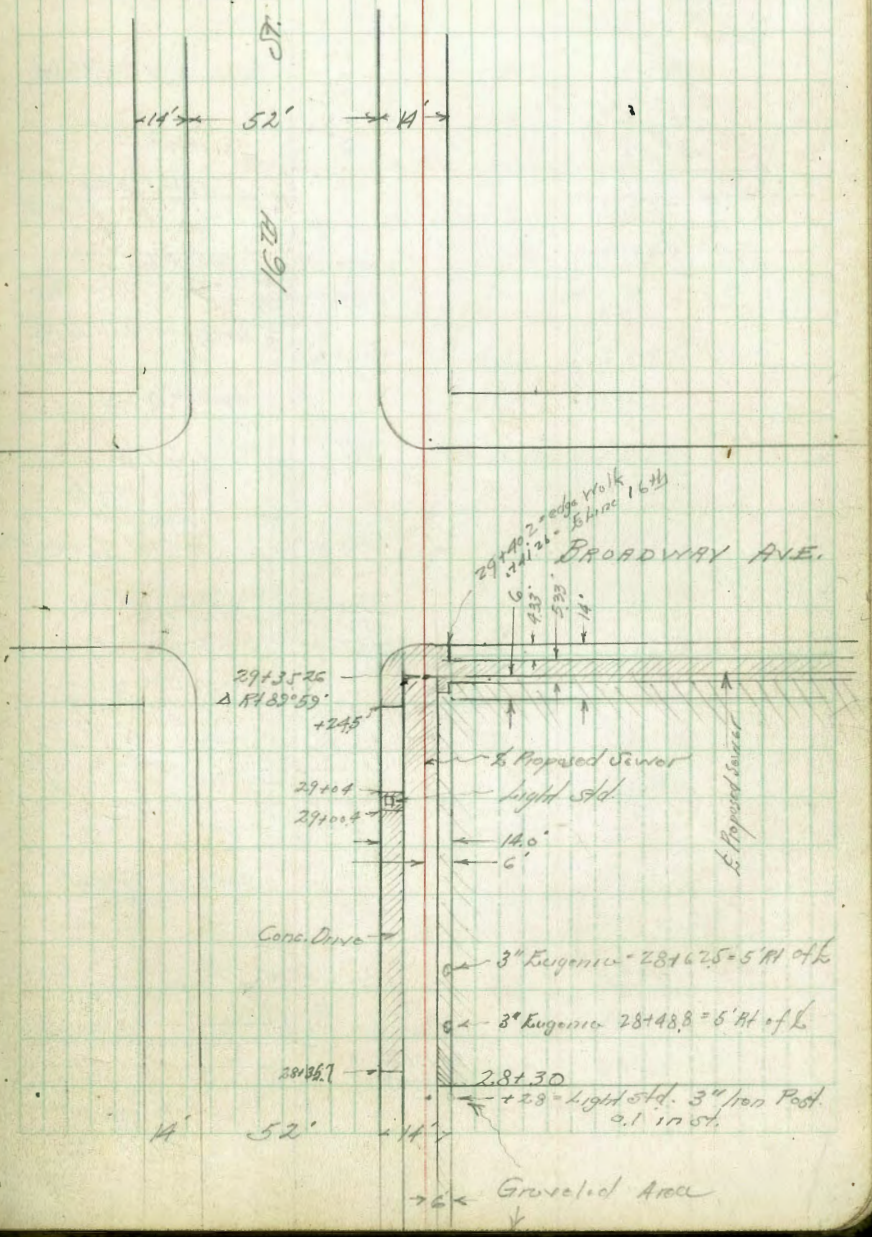
96 +80.68 = P.O.T. New, 18' Rt. of Rt Δ = C.T. = P.C. of Prop.

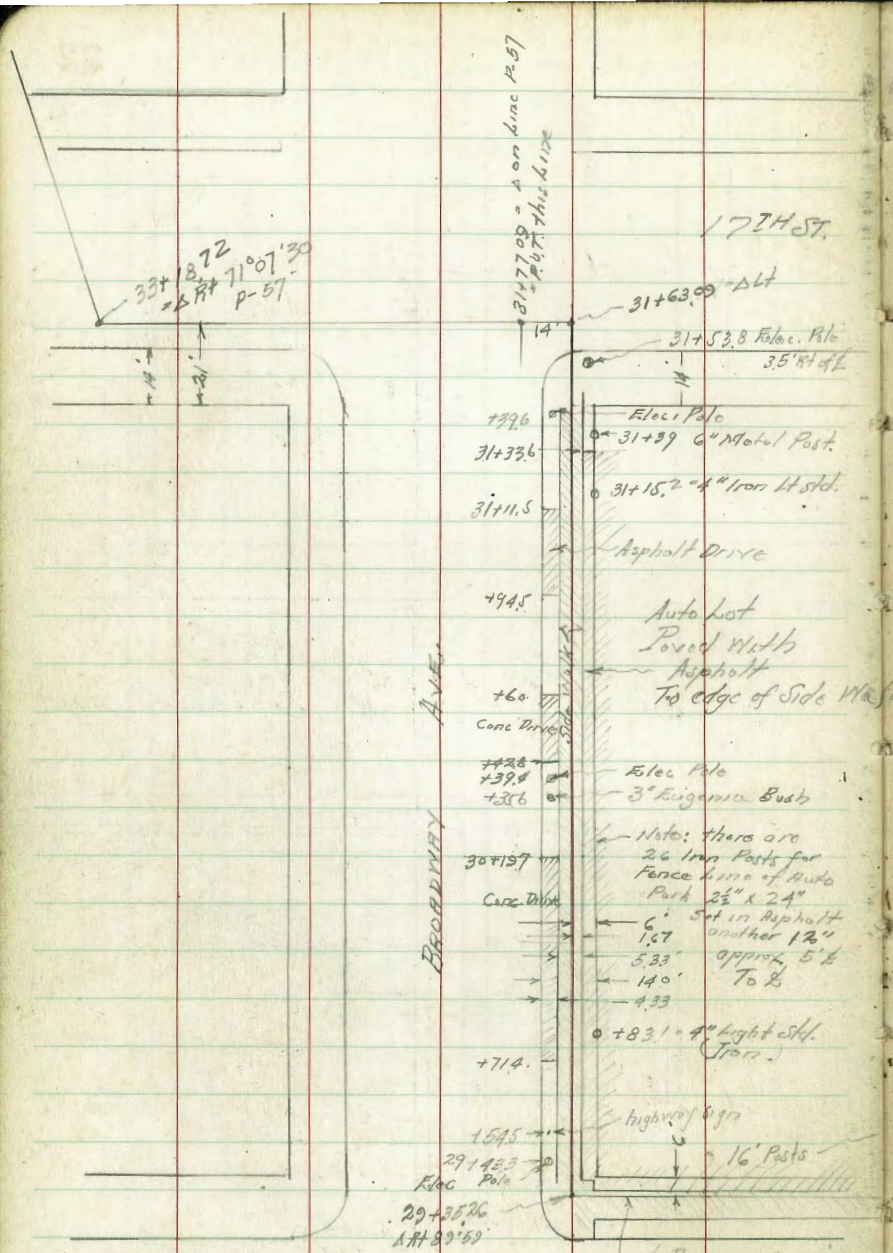


Walker
Osborne
Hazard
3-16-43

Location — Proposed change in Powder Canyon Sewer from 16th & E. To 17th & Broadway.







3-16-43 Levels for line of Proposed Sewer as per Location p-22-23

23

Refer to B.M. #35 Set 5" Tack 16.00 + E

	6.19	(60.15)	(53.96)
25+71.88 = Δ Lt 90°02'		5.81	54.34 ✓
+88.9		5.33	54.82 ✓
26+08.9 = N. Gut		5.44	54.71 ✓
" = N C6.		5.3	54.9 ✓
6' Rt. on Top Conc. Wall		4.57	55.58 ✓
26+50		5.06	55.09 ✓
27+00		4.94	55.21 ✓
+50 -		4.73	55.42 ✓
28+00		4.58	55.57 ✓
+50		4.56	55.59 ✓
29+00		4.45	55.70 ✓
+35.26 = Δ Rt. 89°59'		4.46	55.69 ✓
T.P. 10.23	(65.92)	4.46	(55.69) ✓
29+50		9.84	56.08 ✓
30+00		7.82	58.10 ✓
+50		5.92	60.00 ✓
31+00		4.03	61.89 ✓
+42		2.41	63.51 ✓
+56.09 = W.C.6. 17th		2.40	63.52 ✓
— Same as Along Broadway.			
+57.09 = on W.C. Gut.		2.60	63.32 ✓
+63.09		2.01	63.91 ✓
C&K. 31+77.09		1.85	(64.07) ✓

Walker
Wells
Hardin
1-8-42

Switzer Canyon Sewer

Preliminary Levels for Profile from Pershing Drive and Powder Canyon to Bancroft & Upas Sts.

Alignment See Pages 2-22 this Book.

B.M. #45
F.B. 1614-26

Brass Plg. in top Cobble Edge Inch Pershing & Powder Canyon	7.03	⟨96.84⟩	⟨89.81⟩
0+00 on Paving Stake		15.04	81.80
+50		14.8	82.0
+80		13.3	83.5
+85 in Wash		14.4	82.4
1+00		11.7	85.1
+10 = W.L.Y. edge channel		14.8	82.0
+50 in "		14.2	82.6
2+00 in "		13.5	83.3
+50 " " R.L.Y. edge		12.7	84.1
+55 on E. Bank channel		10.9	85.9
3+00		9.5	87.3
4'Lt. = E edge Bank "		9.6	87.2
14'Lt. " " channel		12.8	84.0
Flow out of 24" Arch Culverts		11.4	85.4
" Inlet " " "		10.44	⟨86.40⟩
3+50		6.8	90.0
+70		5.6	91.2
+95		4.9	91.9
3+99.40 = Lt. 28°56' on stake		5.02	⟨91.82⟩ (91.75 = Flow Elev.)

Page 2 See sketch

This Stake Disturbed See P. 45

Indexed C.S.K.

7/20/42 Reduced & checked & Cattle Claw 1"=80' Profile XXX.

25

	⟨96.84⟩	
4+04.6 = Int Conc. Slab produced	3.3	92.9
73.5' Lt. on Conc. Slab	6.10	⟨90.74⟩
" " " Cobble Lip	9.1	87.7
" " In channel	12.1	84.7
4+08.7 - South edge Paving	4.91	⟨92.43⟩
+35.3 - N " "	4.67	⟨92.17⟩
+38 on Berm	3.6	93.2
+40 " "	3.6	93.2
+43	4.6	92.2
+50	5.2	91.6
+70	5.1	91.7
+80	4.4	92.4
5+10 - South Bank channel	4.9	91.9
+30 " edge "	7.3	89.5
+85	6.2	90.6
6+00	6.1	90.7
+30	4.1	92.7
+40	7.6	89.2
+44.7 - Toe of Dam	6.3	90.5
+45 Ot. - Gr. Ld Ply.	4.19	⟨92.65⟩ Top of Dam
3.8' Rt. on top Dam	4.64	⟨92.20⟩
8.8' Rt. on Flow Drain pipe 12" Conc. R.C.P.	6.63	⟨90.21⟩
(5+52) 11.8' Lt. on Rim M.H.	6.57	⟨90.27⟩ (Rods not taken in order but ok.)
" " " " Flow "	12.58	⟨84.26⟩
6+70	3.7	93.1

Note: 6+46 - Beginning Golf Course: all grass & sod to be replaced from Here to Station - 47+00 exceptions noted Page 28

	(96.84)		
7+00		2.8	94.0
15' Lt. = Lowr Point of channel		3.3	93.5
7+50		0.68	(96.16) on Pag 17+50 & on Wood Peg
T.P.	10.77 (106.93)	0.68	(96.16)
8+00		8.6	98.3
+50		6.8	100.1
9+00		5.8	101.1
+17		5.5	101.4
43.9' Lt. = ℄ Exist MH on Rim		7.18 (5.38)	(99.75) Chiseled Cross on Rim
" " " " " Flow		12.51	(94.42)
9+50		4.8	102.1
10+00		4.8	102.1
72' Lt. in grassed Channel		8.2	98.7 Lowr Point
+50		6.2	101.7
11+00		5.7	101.2
+50		5.6	101.3
50' Lt. = channel		6.0	100.9
12+00		5.0	101.9
12+65.8 Exist. MH 6.2 Lt.		3.4	103.5
" 6.2 Lt on Rim MH		3.30	(103.63)
" " " " Flow "			
13+00		2.8	104.1
+50		1.5	105.4
14+00		0.9	106.0
156' Lt. = channel		2.55	(104.38)
14+50		0.2	106.7

Switzer Canyon Sewer

26

	(106.93)		
T.P.	13.00 (119.78)	0.15	(106.78) on Peg ℄ 14+50
14+85		12.2	107.6
15+00		11.1	108.7
+20		11.3	108.5
15+71.21 - Δ Rt. 17°53'		10.16	(109.63) on stake.
62.69 Lt. on diag. = Cross on Rim		8.52 MH 5.69	(111.26)
63.86' Lt. = ℄ Exist. MH on Flow		13.61	(106.17)
16+00		9.4	110.4
+50		7.1	112.7
17+00		5.1	114.7
140' Lt. = channel		9.1	110.7
17+40		3.1	116.7
18+00		2.5	117.3
45' Lt. = "		6.6	113.2
18+38		2.8	117.0
+86		4.1	115.7
19+00		4.1	115.7
+50		3.8	116.0
20+00		3.1	116.7
10' Lt. = channel		3.3	116.5
19+58 - Int. East Sewer		3.7	116.1 (Rods Not taken in order but ok)
15.73 Lt. on diag = ℄ MH on Rim		4.45	(115.33)
Main Line Flow		= 7.58	(112.20)
Branch Line on Flow		= 6.68	113.10
20+64.46 - Δ Lt. 8°10'45"		2.02	(117.76) on stake
T.P.	12.60 (130.36)	2.02	(117.76) on Above Stake
21+00		12.00	(118.36)

		(130.36)		
21+50		10.7	119.7	
5' Lt. in channel		11.0	119.4	
22+00		9.4	121.0	
+50		7.8	122.6	
23+00		6.3	124.1	
35' Lt. = channel		7.2	123.2	
23+50		4.7	125.7	
+82		2.6	127.8	
24+00		2.4	128.0	
+50		2.6	127.8	
25+00		1.6	128.8	
+50		1.0	129.4	
T.P.	11.39 (140.71)	1.04	(129.32)	on Pvg & 25+50
26+00		10.3	130.4	
30' Lt = channel		11.3	129.4	
26+50		8.8	131.9	
T.P.	12.88 (142.20)	11.39	(129.32)	
27+00		8.8	133.4	
27+67.76	Δ Lt 3°21'45"	6.76	135.44	on Pvmg Cbtr
28+00		5.8	136.4	
65' Lt. = channel		8.6	133.6	
28+50		4.6	137.6	
29+00		3.6	138.6	
+50		2.4	139.8	
30+00		1.1	141.1	
(30+09)	= MH 40.4' Lt on Rim	1.51	140.69	Chisled Cross
"	" " " " Flowl	5.12	(137.08)	

142.20 Switzer Canyon Sewer

27

T.P.	11.46 (152.15)	1.51	(140.69)	
30+50		10.0	142.2	
31+00		9.1	143.0	
70 Lt.		11.1	141.0	
115' Lt = channel		14.0	138.1	
31+20		8.5	143.7	
+65		6.1	146.0	
32+00		5.8	146.3	
+50		5.7	146.4	
33+00		4.5	147.6	
85' Lt = channel		9.3	142.8	
33+10		4.1	148.0	
+35		4.3	147.8	
33+62.53 = Δ Rt 10°41		3.54	(148.61)	
+68.6 = Int. Sewer		3.4	148.7	
27.06' Lt. on diag = Δ MH	Rim =	6.18	(145.97)	
Branch Line	Flowl =	11.52	(140.63)	
Main Line	Flowl =	11.91	(140.24)	
33+77		3.4	148.7	
+90		2.4	149.7	
34+00		2.3	149.8	
40' Lt = channel		6.7	145.4	
34+50		2.3	149.8	
35+00		2.3	149.8	
+35		3.5	148.6	
4' Lt = channel		3.8	148.3	
35+58 = "		3.1	149.0	

	(152.15)		
36+00		2.2	150.0
+50		0.4	151.7
T.P.	5.53 (157.35)	0.33	(151.82) on Reg. ℄ 36+50
37+03.4 = Int. East Sewer		2.8	(154.6) diag. dist.
62.7' Lt. = ℄ MH. Rim =		3.89	(153.46)
Branch Line to SE. Flow =		7.70	(149.65)
Main Line Flow =		8.19	(149.16)
37+10 = Δ Lt 37°53'15"		2.51	(154.84)
+50		2.5	154.8
+90		1.8	155.5
38+00		1.3	156.0
T.P.	12.60 (166.06)	3.89	(153.46)
38+15		8.0	158.1
+40		8.1	158.0
+85		8.1	158.0
39+00		8.3	157.8
35' Lt. = channel		10.7	155.4
+50		7.5	158.6
40+00		7.0	159.1
+50		6.1	160.0
41+00		5.2	160.9
55' Lt. = channel		5.7	160.4

Note: from 34+25 to 35+00 No sod to Remove
" " 37+10 to 39+00 No sod to Remove
" " 41+35 to 43+55 " " " "
" " 44+70 to 45+85 " " " "

	(166.06)		
41+20		4.6	161.5
+50		2.6	163.5
42+00		1.1	165.0
39+40.5		7.5	158.6 (Rods not Taken in ord. of, but ok)
51.9 Lt. and diag. ℄ MH. Rim =		9.70	(156.36)
Branch Line = Flow =		12.68	(153.38)
Main Line — Flow =		14.06	(152.00)
42+03.3 = MH. 32.2' Lt. Rim =		3.55	(162.51) chiseled cross on Rim.
Flow =		7.09	(158.97)
T.P.	10.05 (172.56)	3.55	(162.51) cross in Rim int. 42+03.3
42+50		5.0	167.6
42+77 40° - Δ Rt 2°14'		5.03	(167.53)
42+82.6 = Int. Exist. Sewer		4.8	167.8
27' Lt. diag. = ℄ MH. Rim =		8.29	(164.27)
Branch Line to East Flow =		11.69	(160.87)
Main Line " =		12.23	(160.33)
43+25		6.2	166.4
+55		5.6	167.0
+70		6.3	166.3
15' Lt. = channel		6.7	165.9
43+76.60 = P.O.T.		6.29	(166.27)
44+00		5.9	166.7
+50		5.3	167.3
+70		4.3	168.3
45+00		2.2	170.4
6' Lt. = E. edge Golf Course		4.1	168.5
45+50		2.0	170.6
+85		2.0	170.6
46+00 34° - Δ Rt 14°54'45"		1.08	(171.48)

	(172.56)		
46+06.2 = Int. East Sewer			
10.9 Lt. = ℄ MH. Rim =	1.91	(170.65)	
Branch Line Flow =	5.94	(166.62)	
Main Line Flow	6.39	(166.17)	467+00.34 = ℄
T.P. 9.75 (181.23)	1.08	(171.48)	on stake
46+50	8.7	172.5	
47+00	7.3	173.9	
+50	6.4	174.8	
48+16.4 = ℄ Rt 14°55'20"	5.22	(176.01)	on stake
12.17 Lt. = ℄ MH. Rim =	5.19	(176.04)	chiseled cross
Flow	10.01	(171.22)	
15' Lt. on E Bank channel	4.7	176.5	
23' Lt. = ℄ "	7.4	173.8	
48+50	4.4	176.8	
49+00	3.5	177.7	
40' Lt. = E Bank channel	3.7	177.5	
45' Lt. = ℄ "	6.7	174.5	
T.P. 6.21 (185.95)	1.49	(179.74)	on Pag 5 Rt 49+50
49+50	6.0	180.0	
50+00	5.3	180.6	
50+28.7 = ℄ Rt 19°02'15"	4.97	(180.98)	on stake
56.39 Lt. and Rad. = Exist. MH. Rim =	6.10	(179.85)	
Branch Line to North Flow =	11.35	(174.60)	
Main Line " = Flow	11.81	(174.14)	
53' Lt. = ℄ channel	8.1	177.8	
41' Lt. = South Bank channel	6.1	179.8	
50+70	3.8	182.1	
+91 = South Bank "	3.1	182.8	
+92 = " edge "	6.6	179.3	

(185.95) Switzer Canyon Sewer			
51+05 in channel	6.5	179.4	
5' Lt. = Pocket in "	7.1	178.8	
51+35 in "	6.4	179.5	
+75 " "	4.2	181.7	
52+00 " "	3.1	182.8	
+30 N edge "	3.3	182.6	
T.P. 9.75 (193.72)	1.98	(183.97)	
+40 = N Bank ct	7.8	185.9	
+75	5.8	187.9	
+77.2 = Int. East Sewer	6.5	187.2	
48.2' Rt. = ℄ MH. Rim =	7.75	(185.97)	chiseled cross
Branch Line to N. Flow =	12.51	(181.21)	
Main Line Flow =	12.67	(181.05)	
52+85	6.5	187.2	
53+00	4.6	189.1	
45' Rt. = N Bank channel	8.2	185.5	
50' Rt. = ℄ "	9.6	184.1	
53+50	4.4	189.3	
53+96.23 = P.O.T. stake	2.92	(190.80)	
23' Rt. = N Bank channel	5.1	188.6	
38' Rt. = ℄ "	6.7	187.0	
54+30	2.8	190.9	
+50 = Int. N. Bank "	3.7	190.0	
+52 = " " edge "	6.0	187.7	
+65 in "	6.4	187.3	
+85 " "	4.3	189.4	
55+00 = Int. South Bank "	2.6	191.1	

<193.72>

55+29.28 = Δ Rt 49°5'30"		1.95	<191.77> on stake
T.P.	12.10 <203.87>	1.95	<191.77>
20' Lt. = South Bank Channel		12.5	191.4
30' Lt. = ℄ channel		13.8	190.1
36.45' Lt. = ℄ MH.	Rim	13.07	<190.80>
	Main Line Flow =	18.71	<185.16>
55+80		10.8	193.1
56+00		10.0	193.9
+50		7.1	196.8
57+00 = S. Bank Int. channel		7.2	196.7
+40 = S. edge Int. "		9.3	194.6
+75 = N " "		8.6	195.3
58+00 = N. Bank "		5.1	198.8
+35		4.4	199.5
6' Rt. = N Bank "		4.4	199.5
10' Rt. = ℄ "		7.5	196.4
58+47.6 = Rt Δ to MH.		4.5	199.4
34.5' Lt. = ℄ MH.	Rim =	3.58	<200.29> Existing No Branch Line
" " " "	Flow =	5.14 8.72	<195.15> from this MH.
59+00		4.5	199.4
30' Rt. = N Bank channel		4.3	199.6
35' Rt. = ℄ "		6.6	197.3
59+50		2.6	201.3
+80		1.9	202.0
60+00		2.8	201.1
TP	10.50 <212.90>	1.47	<202.40> on Loth 60+13

<212.90>

Switzer Canyon Sewer

30 927 566 1.93

60+15 = Rt Δ to MH		10.3	202.6
34.1' Lt. = ℄ MH.	Rim	9.27	<203.63>
Branch line to SE.	Flow = 14.98		<197.97>
Main Line	Flow	15.31	<197.59>
60+40		9.6	203.3
+55 = N Bank channel		9.9	203.0
+60 = " edge "		12.0	200.9
+75 = S " "		11.1	201.8
+77 = S Bank "		8.6	204.3
60+88.08 = Δ Lt 15°22'20"		8.05	<204.85> on stake
37.0' Lt. on Curv = ℄ MH.	Rim =	7.73	<205.17>
Branch line to SE.	Flow = 13.39		<199.51>
Main Line	Flow = 13.92		<198.98>
27.68 Rt. = ℄ 1½ Bolt R.P.		4.36	<208.54> Sketch P-14
60+95.21 = Int. Exist Sewer.		7.8	205.1
61+00		7.5	205.4
+30		6.3	206.6
61+44.5 = Int 16" Water Main		4.5	208.4
20' Lt. = S. Bank channel		7.1	205.8
25' Lt. = ℄ channel		9.2	203.7 on top 16" Main
25' Lt. in ℄ channel		10.1	202.8
61+70		4.3	208.6
62+00		4.0	208.9
+30		4.9	208.0
10' Lt. = S. Bank "		5.0	207.9
15' Lt. ℄ "		9.3	203.6
62+75 = S. Int. "		4.7	208.2
+80 = Int. S. edge "		7.7	205.2

	Int	[212.90]		
63+05	= E. edge channel	7.3	205.6	
+10	= Int E. Bank "	4.0	208.9	
+35		2.6	210.3	
+60		+0.1	213.0	
T.P.	9.99	[220.07]	2.82	[210.08]
(63+60)	= Int Sewer	7.10	[212.97]	
	9' Rt. on drug = ℄ MH. Rim =	9.88	[210.19]	
	Branch line to North Rim =	13.57	[206.50]	Drop. MH.
	Main line Flow E =	14.01	[206.06]	
	W =	15.37	[204.70]	
63+89.6	= P.O.T. on stake	5.67	[214.40]	
64+00		5.5	214.6	
+40		4.8	215.3	
105' Rt	= N Bank channel	7.9	212.2	
110' Rt	= ℄ "	10.0	210.1	
64+75.25	= P.O.T. Int. NL. Nutmeg.	3.88	[216.19]	on stake
65+00		3.1	217.0	
+50		1.6	218.5	
+60		2.2	217.9	
T.P.	9.70	[228.01]	1.76	[218.31]
(65+00)	112' Rt = N Bank channel	14.0	214.0	
"	117' Rt = ℄ "	17.5	210.5	
66+00		8.6	219.4	
+38.7	= P.O.T. stake	7.4	[220.60]	
+62		7.7	220.3	
+80	= N Bank channel	9.2	218.8	
+85	= N edge "	10.8	217.2	
67+00	S " "	10.5	217.5	

	[228.01]		
67+03	= S Bank channel	9.6	218.4
67+12.10	= ℄ 9°14'30"	8.98	[219.03] chiseled cross
15.67 Rt	= ℄ MH. Rim	8.27	[219.74] No Branch
	5.66		line from here
"	" " Flow	13.93	[214.08]
67+35		8.4	219.6
15' Lt	= S. Bank channel	7.6	220.4
20'	= ℄ "	10.0	218.0
67+50		8.3	219.7
68+00		6.7	221.3
T.P.	7.30	[228.65]	6.66	[221.35]
68+40	= S. Bank channel	5.9	222.7
+50	= " edge "	7.7	221.0
+65	= N " "	7.3	221.3
+75		5.3	223.3
69+00		2.3	226.3
5' Lt	= N Bank	+2.3	230.9
2' Rt	= N edge "	6.2	222.4
12' Rt	= S " "	5.7	222.9
69+21		2.9	225.7
+23		5.6	223.0
2' Rt	= N edge "	6.5	222.1 Top Hardpan
69+40		3.5	225.1
10' Lt		3.5	225.1
5' Rt	N Bank	3.5	225.1
7' Rt	N edge "	5.5	223.1
70+03.85	= Rt. ℄ to MH.	1.8	226.8
6.05 Rt	= ℄ MH Rim =	1.20	[227.45]
" "	" Main Line Flow =	5.60	[223.05]
Branch Line to SE.	=	5.24	[223.41]

{see pg. 16

	〈228.65〉			
70+25		1.7	227.0	
10' Rt. = N Bank channel		1.6	227.0	
14' Rt. = L "		3.3	225.3	
T.P.	10.70 〈238.31〉	1.04	〈227.61〉	
70+40		9.2	229.1	
71+00		8.6	229.7	
25' Rt. = N Bank channel		10.2	228.1	Δ in channel to Left.
30' Rt. = L "		11.8	226.5	
71+15		9.0	229.3	
+50 = W Bank "		8.8	229.5	
+52 = W edge "		9.5	228.8	
+70 E " "		9.0	229.3	
+80 " Bank "		5.0	233.3	
71+87.12 = Δ Lt. 21°44'20"		4.67	〈233.64〉	on S stake chisled cross Rim MH
T.P.	11.37 〈245.93〉	4.35	〈233.96〉	
10.12' Rt on diag. = ℄ MH. Rim = 11.97			〈233.96〉	
Branch Line from W. Flow =		4.73	〈241.20〉	229.23
" " " NW. "		3.98	〈241.95〉	229.98
" " " East "		3.35	〈241.98〉	230.01
Main Line "		4.90	〈241.03〉	229.06
72+00		12.2	233.7	
+50		10.2	235.7	
73+00		7.9	238.0	
60' Lt. = E. Bank channel		2.6	236.3	
70' Lt. = L "		14.7	231.2	
73+15		7.0	238.9	
+55.27 = P.O.T. Stake		4.00	〈241.93〉	
80.7' Lt on diag ℄ MH. Rim = 7.69 537			〈238.24〉	See Sketch P-16
Main Line Flow = 13.06			〈232.87〉	No Branch line

	〈245.93〉			
73+68		2.5	243.4	
+88		3.0	248.9	
74+04		3.7	249.6	
+10		3.2	249.1	
(74+00) 110' Rt. = E. Bank channel		8.3	237.6	Δ in channel
115' Rt = L "		11.9	234.0	
T.P.	10.46 〈248.70〉	7.69	〈238.24〉	on Rim MH.
74+20		4.4	244.3	
3' Lt. = E edge channel		10.2	238.5	
74+45		7.2	241.5	
3' Lt. " " "		10.7	238.0	
74+70		6.6	242.1	
10' Lt. E. Bank "		7.6	241.1	
13' " E channel		9.6	239.1	
74+85 = Int E. Bank "		6.6	242.1	
+86 " " Edge "		9.1	239.6	
75+00		7.2	241.5	
+04 " W Bank "		6.6	242.1	
75+39.35 = Δ Rt 17°23' See sketch P-17		4.94	〈243.76〉	chisled
85' Lt on diag. ℄ MH. Rim =		4.79	〈243.9〉	cross on Rim
Branch Line from North Flow =		10.49	〈238.21〉	
Branch Line from East Flow =		10.19	〈238.51〉	
Main Line Flow		10.49	〈238.21〉	
(75+10) 6' Rt = W Bank channel		6.7	242.0	
12' Rt. = L "		7.7	241.0	
75+70 = Int W " "		4.4	244.3	
+72 = Int. W edge "		6.2	242.5	
+80 = Int. E " "		6.0	242.7	
+90 = " " Bank "		3.5	245.2	

		(248.70)			
76+00			3.1	245.6	
TP	5.92	(251.39)	3.23	(245.47)	Pag 2. 76+07
76+30			5.2	246.2	
+32			6.0	245.4	
+40			5.8	245.6	
+65			1.7	249.7	
T.P.	6.68	(256.92)	1.15	(250.24)	on Lath 76+72 ℄
35'Lt. ℄ channel					
77+00			6.1	250.8	
+15 = E Bank channel			6.1	250.8	
+25 " E.dge "			8.0	248.9	
+35 W " "			7.5	249.4	
+45 " Bank "			6.7	250.2	
+80			4.8	252.1	
78+00			2.6	254.3	
15'Rt. = W " "			4.1	252.8	
20'Rt. = ℄ "			6.7	250.2	
78+30			1.4	255.5	
+46			2.4	254.5	
T.P.	10.40	(265.28)	2.04	(254.88)	on Lath 78+46 ℄
+70 = W Bank Int. channel			11.3	254.0	
+71 = " Int. edge "			13.0	252.3	
79+00			12.5	252.8	
+05 = Int. E. edge "			12.4	252.9	
+25 = Int. E. Bank "			9.3	256.0	
79+49.9 - Int. End. Sewer			9.15	(256.13)	on stake
91.5'Rt. on diag = ℄ MH. Rim = 111.6				(254.12)	
Main Line Flow = 16.57				(248.71)	

	(265.28)		
79+77.66 = Δ Lt. 47°54'40"	23.8	(257.90)	on stake
10.87 Lt. on diag = ℄ MH. Rim = 7.60		(257.68)	Should Cross
Branch Line from W. Flow = 11.86		(253.42)	
Main Line Flow = 19.28		(251.07)	
80+00	7.9	257.4	
10'Lt. = E. Bank channel	7.1	258.2	
14'Lt. = ℄ "	10.5	254.8	
80+25 = Int E. Bank "	6.7	258.6	
+45 = " " E. dge "	8.4	256.9	
81+00 = in channel	6.4	258.9	
2'Rt. = E. Bank "	3.2	262.1	
81+18 = in channel, E. edge	5.2	260.1	
81+38.46 = Δ 1°17'40"	3.71	(261.57)	Large on Stake
TP 10.48 (272.05)	3.71	(261.57)	on Above Stake
81+50 = E. Bank	10.4	261.6	
+51 = E. edge channel	11.7	260.3	
(81+76.40) 44.50'Lt. on diag = MH. Rim = 2.31 P.36		(269.74)	
Flow = 11.67		(260.38)	
81+75 = W edge channel	11.4	260.6	
+80 = W Bank "	8.2	263.8	
82+00	8.3	263.7	
10'Rt. = W Bank			
12'Rt. = ℄ channel =	10.7	261.3	
82+35 = Int. W Bank "	6.4	265.6	
+36 Int. " edge "	8.0	264.0	
+40 " E. " "	7.6	264.4	
+45 " E. Bank "	6.7	265.3	
83+00	4.6	267.4	
5'Lt. " " ℄	4.6	267.4	
7 Lt. ℄ "	5.8	266.2	

		⟨272.05⟩		
83+62.40 = Δ Rt 37°34'30"		2.86	⟨269.19⟩	
11.53' Lt. = ℄ MH.	Rim =	2.66 (4.00)	⟨269.39⟩	on diag.
	Main Line Flow	6.66	⟨265.39⟩	
T.P.	11.01	⟨280.40⟩	2.66	⟨269.39⟩ cross on Rim Above MH.
84+00	in channel		10.9	269.5
+15	" "		9.4	271.0
+16	" "		10.6	269.8
+20	" "		10.0	270.4
+35	" "		8.3	272.1
84+90.5 = opp. end of culvert			7.4	273.0
11.4' Rt. on Flow ℄	"		8.03	⟨272.37⟩ 42" Pipe
"	in channel Pocket		9.2	271.2
85+11 = Toe 32ND St. Fill			6.0	274.4
T.P.	12.88	⟨292.92⟩	0.26	⟨280.04⟩
85+37			4.7	288.2
+62.8 =	32ND St. Wedge Sidewalk		4.52	⟨288.40⟩
+72 - ℄	" "		4.46	⟨288.46⟩
+76.5	W cb. 32ND St.		4.35	⟨288.57⟩
+76.6	W Gut. " "		5.30	⟨287.62⟩ on Paving
22.1' Rt. ℄	Inlet on Grating,		5.67 (12.57)	⟨287.25⟩
" "	Flow Conc. Pipe		18.24	⟨274.68⟩ on Nail in Pav.
86+06.51	Δ Lt 32°42'30"		3.45	⟨289.47⟩
86+65	on Paving.		0.80	⟨292.12⟩
T.P.	12.29	⟨303.98⟩	1.23	⟨291.69⟩
87+00	on Pav.		9.42	⟨294.56⟩
+50	" "		5.10	⟨298.88⟩

		⟨303.98⟩		
T.P.	7.24	⟨309.68⟩	1.54	⟨302.44⟩
88+00			6.18	⟨303.50⟩
+21.5 = St. Thorn.			4.63	⟨305.05⟩
+31.5 = S.cb. "			4.74	⟨304.94⟩
88+46.46 = Δ Rt 89°49'			4.32	⟨305.36⟩
89+00 on Pav.			5.65	⟨304.03⟩
+46			6.83	⟨302.85⟩
+53.5 = Int. Conc. Culvert			6.94	⟨302.74⟩
12' Rt on Grating			7.43	⟨302.25⟩
" " " Flow Culvert			6PV 14.27	⟨295.41⟩
22' Lt. on Grating			7.46	⟨302.28⟩
" " " Flow Culvert				
89+97 = MH 46' Lt = ℄		Rim =	6.23	⟨303.45⟩
	Branch Line	Flow =	12.08	⟨297.60⟩
	Main line Int. Sewer.	Flow	12.77	⟨296.91⟩ South East
89+97 ℄ on Pav.			6.20	⟨303.48⟩
90+50 on Paving.			5.53	⟨304.15⟩
91+00 " "			4.13	⟨305.55⟩
+28 " "			3.39	⟨306.29⟩
91+47.31 = Δ Lt. 89°42'40"			3.27	⟨306.41⟩ on Nail
T.P.	9.97	⟨316.38⟩	3.27	⟨306.41⟩
91+72 on Pav.			10.61	⟨305.77⟩
+87.31 N.L. Thorn.			10.23	⟨306.15⟩
92+00 on Pav.			9.97	⟨306.41⟩
+50 " "			9.56	⟨306.82⟩
93+00 " "			8.75	⟨307.63⟩
+50 " "			7.39	⟨308.99⟩

		(316.38)		
24+00	on Pav		5.88	(310.50)
+50	" "		3.96	(312.42)
25+00	" "		1.92	(314.46)
T.P.	11.80	(327.17)	1.01	(315.37)
25+50	on Pav.		10.63	(316.54)
26+00	" "		8.60	(318.57)
+50	" "		7.07	(320.10)
27+00	" "		5.94	(321.23)
+33	" "		5.25	(321.92)
+55	" "		5.22	(321.95)
+87			5.63	(321.54)
27+95.18 = ℄ R4 89°28'			5.33	(321.84)
28+50	on Pav.		5.66	(321.51)
29+00			6.15	(321.02)
29+45	on Rim MH		6.90	(320.27)
"	Flow "		11.67	(315.50)
Check N.W.&R. Upus & Bancroft			4.67	(322.50)
				322.47 = B.M.
				0.03 Error.

Readings Continued from page 36
Station 8+86.41

Station	Azimuth	Stadia	
No. Edge of pav.	58°50'	236	P.O.C.
So. Edge of pav.	62°00'	213	"
No. End of Fence			
1½" Galv.	26°41'	72	
1½" Galv. Fence Brace.	23°38'	72	
℄ Galv Fence	26°16'	33	
1½" Galv. Brace	19°50'	32	
℄ Galv Fence	137°31'	11	
1½" Galv. Brace	153°20'	9	
℄ Galv Fence	175°11'	48	
1½ in. Galv. Brace.	179°23'	48	
So. End of Fence	179°09'	78	
1½ in. Galv. Brace	181°35'	77	

	Station	Azimuth	Stadia		
21	℄ Rev.	12°50'	272		21' Wide
20	"	18°45'	206		P.C.
19	"	17°57'	148		POC
18	"	31°35'	82		
17	So. Edge par.	263°28'	23		
16	No. Edge par.	391°20'	32		From East
15	Con. Slab	326°14'	36		From West
14	N.W. Cor Con Slab	271°20'	78		
13	S.W. Cor. Con. Slab	245°22'	83		
12	S.E. Cor. Con. Slab	254°48'	22		
11	NO. Edge Cor.	267°27'	117		
10	N.E. Edge Cor.	270°05'	178		
9	NE Edge Con	272°27'	203		
8	E. Edge Con.	280°05'	275		
7	W. Edge Con.	270°42'	254		
6	W. Edge con.	265°07'	207		
5	S.W. Edge con.	260°27'	166		
4	P.C. of Junction of Con. Slab.	257°04'	135		
3	E.C. of Small Rad.	254°16'	136		NO. Edge of West Branch
2	NO. Edge	251°13'	183		
1	Junction of Pershing Drive East Edge.	249°51'	241		

Azimuths from forward Tangent clockwise

STADIA READINGS from Sta. 3+99.40 for Location

3+99.40 = Δ Lt. 20°13'45"

Readings Continued from Left Page
Station 3+99.40

	Station	Azimuth	Stadia	
22	East Edge of Pershing Drive.	260°33'	245	
23	" "	271°42'	265	
24	East Edge of Pershing D	229°29'	300	
25	So. Edge of 26 ST Paving	235°15'	259	
26	So. Edge of 26 st Paving.	240°51'	213	
27	" "	243°42'	179	
28	" "	245°48'	125	

Readings From Station 8+86.41 Azimuth from forward Tan.

	Station	Azimuth	Stadia	
1	NO. Edge of par.	176°33'	233	
2	SO. Edge of par.	171°15'	233	
3	" "	146°28'	64	P.C. of Curve to the Right
4	NO Edge of par.	165°04'	49	" "
5	" "	67°12'	28	POC.
6	SO. Edge of par.	86°38'	48	"
7	" "	58°34'	91	"
8	NO. Edge of par.	48°43'	88	"
9	" "	46°45'	147	"
10	SO. Edge of par.	55°43'	143	"
11	" "	59°34'	194	"
12	NO. Edge of par.	54°02'	200	"

Existing Paving of Pershing & 26th

Readings Continued on Page 35

Switzer Canyon Sewer
"C" Line

7+00

6+00

5+00

3+99.40 = Δ Lt. 20°13'40".

"C" Line

This Line Copied into F.B. 1651-12
from 3+99.4 to 1st Reverse
15-Apl. 20

3+99.40
Δ Lt. 20°13'40"

this portion changed See P-47

13+97 = S.V. 6.6' Rt.

13+18 = Int 2" line

12+00

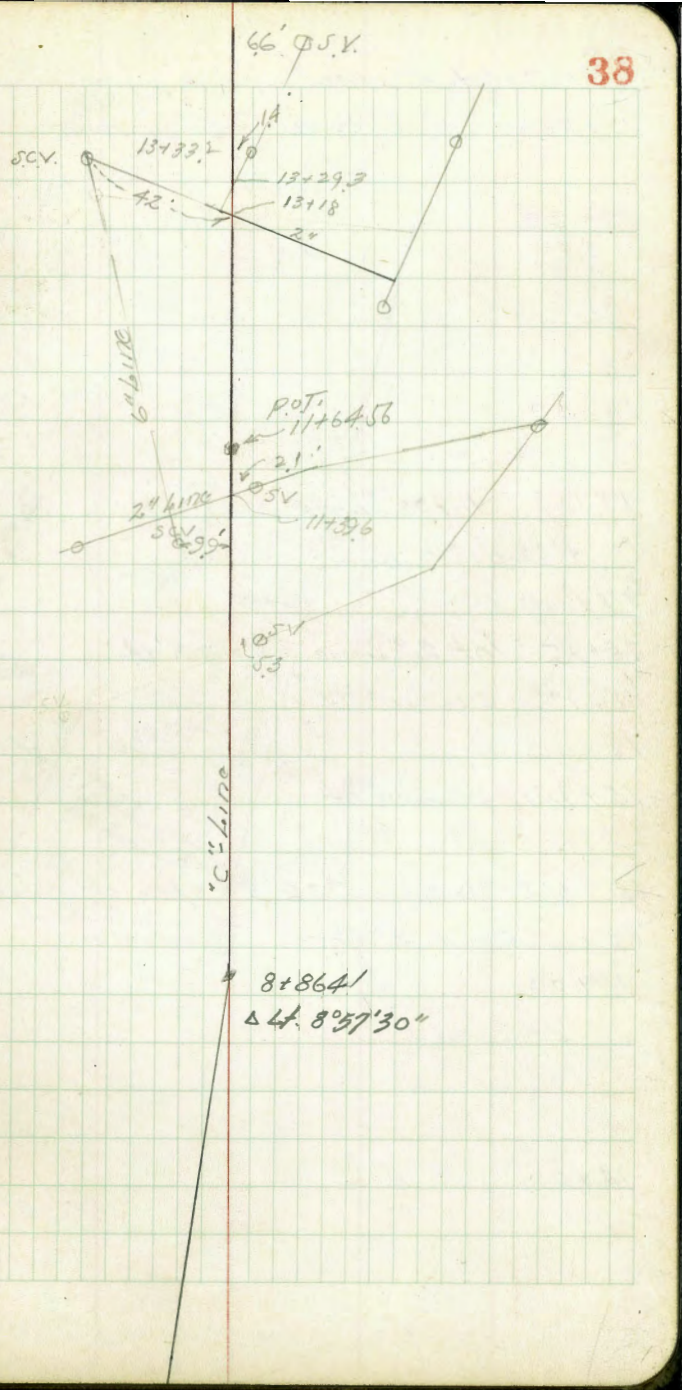
+64.56 = P.O.T. for Stake.
11+43 = S.V. 2.1' Rt
11+39.6 = Int 2" water
11+10 = S.C.V. on 6" line 9.9' Lt.
11+00
10+44.6 = S.V. 5.3' Rt

10+00

9+00

8+8641 = Δ Lt. 8°57'30" = paving Stake

8+00



19+67 = Int. 4" Water

19+58.8 = Int 6" Sewer to Club House

19+00

18+00

17+63 = Int 6" Line

+32.8' S.V. 13' Lt

17+00

16+95 = Int 2" Line T = 7.3' Lt.

16+71 = S.V. 11.6' Lt.

16+00

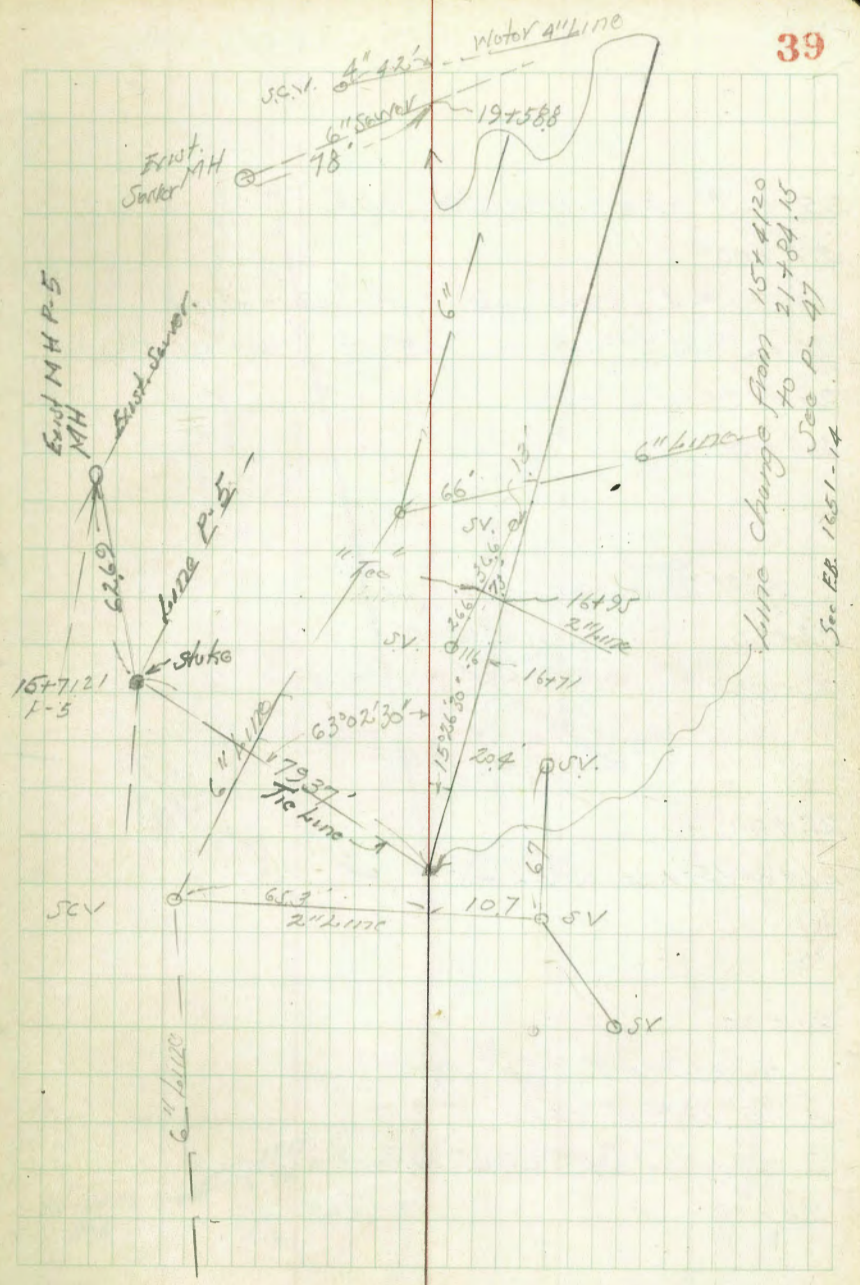
15+74 = S.V. 20.4' Rt

15+41.20 = Δ Rt. 15°26'30 = paving Stake

15+04.5 = Int 2" Line

15+00

14+00



25+01.83 = Δ Rt. 11°33'

25+00

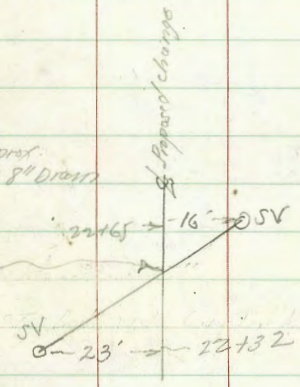
24+70 = 4" Scrub oak 7' Lt (Save this)

24+65 = Holly Tree 6" dia. 8.6 Lt (Save this Tree)

24+23 = Int 6" Water Line

24+00

+22 = Approx Int 8" Drain



23+00

22+51.2

22+00

21+84.15 = Δ Lt. 13°56'45

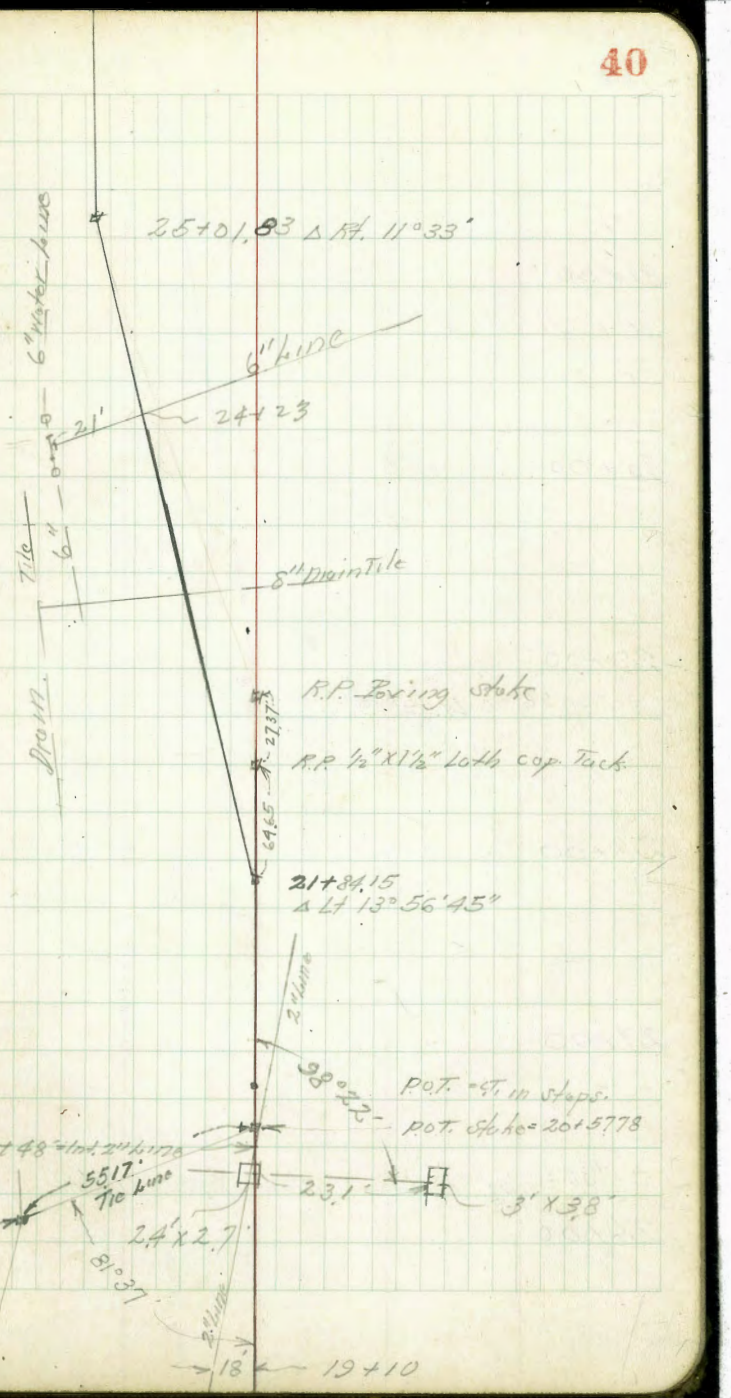
21+00

+77.92 = P.O.T. ct. in steps

20+57.78 = P.O.T. Stake

+31.1 = Int. 18" Conc. Culvert

20+00



31+00

30+00

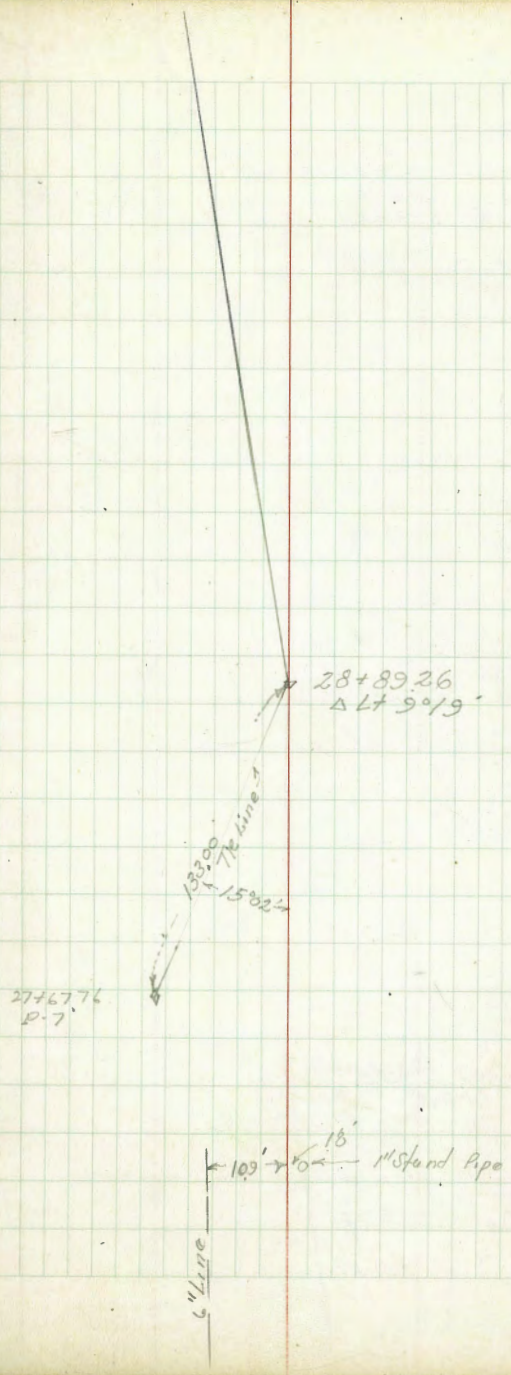
29+00

28+89.26 - Δ Lt. 9°19'

28+00

+36 = Int 1" Line Stand Pipe = 1.8' Rt

26+00



= 37+10 P.O.T. this Line
37+05.27 = P.O.T. } Equation
36+97.21 = Int. East Sewer
36+93.04 = Δ Lt. 32°03'45"

36+00

+14.9 = Int. 2" Line

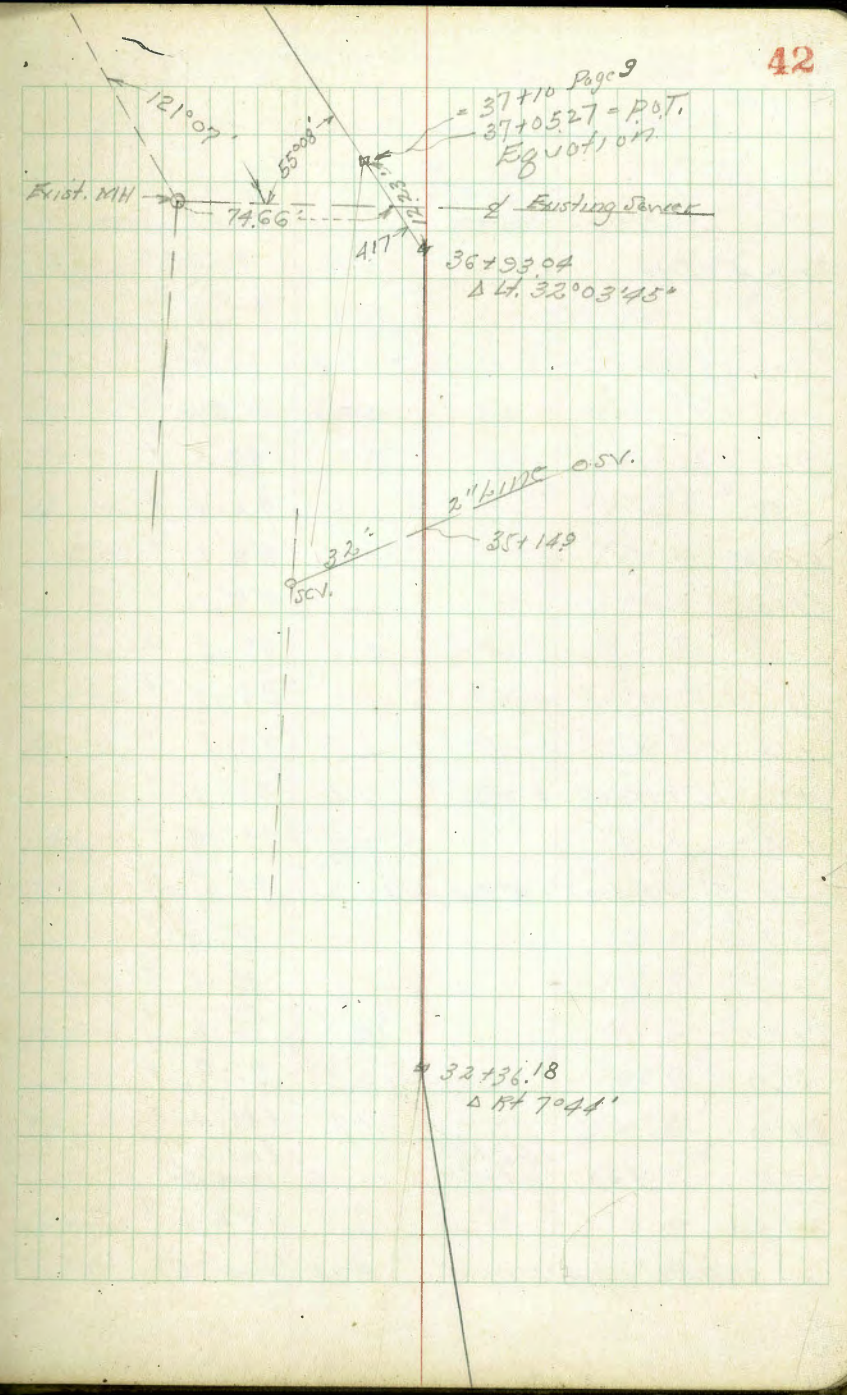
35+00 - 6" Oak Tree 8.2' Lt.
34+92 = 16" Euc Tree 8.4 Rt
34+84 = 5" Oak 0.8' Lt.
34+69 = 6" " 1.5' Rt.
34+75 = 8" " 11.7' Lt.
34+25 - 10" " 6.8' Lt.
34+00
33+74 = 14" Oak 3.3' Lt.
+57 = 16" " 15' Lt.

33+00

32+36.18 Δ Rt. 7°44'

32+00
31+69 = 6" Oak 6.3' Lt.
31+55 = 8" " 7.4' Rt.

Page 9



Walker
Hurdin
Reed
8-28-42

Switzer Canyon Sewer
Levels for Proposed Line Change from Station 3+99.40 to 37+05.27

Alignment see Pages 37-42

			91.75	Elev. Stake
	2.72	101.47	~~91.82~~	3+99.4 P.25
3+99.4 = ℄ Lt.			91.75	
4+04			92.8	
+09 = S edge Por.			92.43	
+36 = N " "			92.24	
+42 = Berm			93.3	
+48			92.2	
5+00			92.1	
+50			93.1	
6+00			93.5	
20' Lt. ℄ 15' Wide Wash			89.7	
6+34 = Top S Bank Wash			93.8	
+36 = ℄ Wash 4' Wide			92.1	
+38 = N Bank "			93.9	
44' Rt. Flow 2'x4' Box Culvert			93.7	
6+70			93.5	
+85			95.3	
7+00			95.6	
+50			97.9	
8+00		113.10	100.4	101.21
T.P.	11.89	113.17	101.28	
8+50			102.8	
8+86.4 ℄ Lt. 8°57'30"			104.36	

	~~113.17~~ 113.10		
9+00		8.3	104.8
+50		7.8	105.3
10+00		7.4	105.7
+50		5.8	107.3
11+00		3.3	109.8
+35		1.0	112.1
T.P. 4.66	117.75 .66	0.10	113.00
11+64.56 = P.T. Paving Stake		2.91	114.75
11+70		2.7	115.0
12+00		7.2	110.5
+30		11.3	106.4
+50		11.9	105.8
13+00		10.4	107.3
+50		7.6	110.1
14+00		6.2	111.5
+50		4.8	112.9
15+00	128.77	2.1	115.6
T.P. 12.81	~~128.84~~		115.96
15+41.20 = ℄ Pt. 15°26'30"	128.77	1.70	~~116.03~~
16+00		10.8	118.0
+50		10.0	118.8
17+00		9.2	119.6
+50		7.9	120.9
18+00		7.2	121.6
+50		6.3	122.5
19+00		5.4	123.4
+50		4.4	124.4

See 1620/48.49

20+00		~~128.84~~ 128.77	3.0	125.8	
+31.1 = Int Drain			1.7	127.1	on Grating
" " "			5.3	123.5	Flowl Line in 10"
12.5' Lt on Flowl			6.3	122.5	N end Pipe
23.1' Rt. on Grating			1.6	127.2	
" " " Flowl			3.6	125.2	
(20+00) 10' Lt. = Top Bank			3.0	125.8	Roadway
20' Lt. = Toe Bank = edge Gross			10.4	118.4	
	⟨134.57⟩			⟨128.10⟩	
T.P 647	34.64		0.67	~~128.17~~	
20+57.78 = P.O.T. Stake			5.22	129.35	
15' Lt. = Toe Bank = edge Gross			14.6	120.0	
20+85			5.0	129.6	
21+00			5.4	129.2	
5' Rt. N edge Berm			3.4	131.2	Roadway
10' Lt. = Toe Fill = edge Gross			13.1	121.5	
21+50			7.4	127.2	
14' Rt N edge Berm			+0.7	135.3	
4' Lt. = S edge Gross			10.6	124.0	
21+84.15 = Δ Lt. 13°56'45"			7.51	127.06	
2' Lt. = edge Gross			8.6	126.0	
22+00 " "			8.0	126.6	
+50			8.0	126.6	
23+00 = Approx. exter Small Drain			9.3	125.3	
+30			5.8	128.8	
+75			4.0	130.6	
24+00			2.6	132.0	
+25			0.7	133.9	
chk stake 20+61.46 P-26	16.77	Corrected ⟨134.53⟩	16.77	⟨117.80⟩ 117.76	stake R 26

24+50		~~134.67~~ 134.53	0.3	134.2	
+80			0.4	134.1	
12' Lt. = Gross		⟨140.14⟩	5.2	129.3	
T.P 12.50		~~140.25~~	6.89	⟨127.64⟩ ~~127.75~~	
25+01.83 = Δ Rt 11°33'			7.38	⟨132.76⟩ on stake	
10' Rt.			3.9	136.2	
9' Lt. = edge Gross			11.0	129.1	
25+30 " "			10.4	129.7	
+50			10.1	130.0	
26+00			8.4	131.7	
10' Rt			3.4	136.7	
10' Lt			8.6	131.5	
26+50			7.0	133.1	
27+00			6.1	134.0	
+33			4.7	135.4	
+50			3.2	136.9	
T.P 1310		⟨149.63⟩ ~~149.74~~	3.61	⟨136.53⟩ ~~136.64~~	
27+90			6.8	142.8	
28+17			5.0	144.6	
+67			6.6	143.0	
28+89.26 = Δ Lt. 9°19'			6.59	⟨143.04⟩ on stake	
29+00			7.0	142.6	
+20			7.1	142.5	
+50			5.6	144.0	
30+00			4.6	145.0	
+50			3.3	146.3	

		~~149.74~~ 149.63 ✓			
31+00			1.9	147.7 ✓	
T.P.	7.15	~~155.91~~ ~~156.02~~	0.87	~~148.76~~ ~~148.87~~	
31+50			4.0	151.9 ✓	
32+00			2.1	153.8 ✓	
32+36.18	= Δ Rt 1° 04'		5.33	150.58 ✓	on stake
+82			4.6	151.3 ✓	
33+00			3.5	152.4 ✓	
+50			5.1	150.8 ✓	
34+00			4.0	151.9 ✓	
+50			4.2	151.7 ✓	
35+00			3.4	152.5 ✓	
+50			2.8	153.1 ✓	
4' Lt.			4.5	151.4 ✓	
36+00			4.0	151.9 ✓	
+50			2.9	153.0 ✓	
36+93.04	Δ Lt. 32°03'45"		0.61	~~155.39~~ ✓	on stake
37+05.27 = 37+10 N	Equation p-28 P.O.T.		1.05	~~154.86~~ ✓ ~~154.97~~ 154.84 ~~0.13~~	on stake 0.02 Error.
T.P.	1.51	~~156.37~~ ~~156.48~~	1.05	~~154.86~~ ✓ ~~154.97~~ 153.48 ✓	
69.7' Lt. of 37+10			2.89	~~153.59~~ 153.46 ~~0.13~~ Error. 0.02 =	
chk Rim MH					
		Check Starting Elev		3+99.4 P-43	
Brass Plg in Cobble Bridge Pershing Dr. & Powder Canyon				89.81 = BM P-25	
	8.25	98.06		89.81 = BM ✓	
chk 3+99.4			6.31	91.75 ✓ 91.82	
				0.07 diff.	

Note. The starting BM on stake 3+99.4 should be 0.07 lower than shown on page 43 the other one at 37+10 = an accumulation of Error. (Corrections made Heinge)

Walker
8/1887
Hyrdm
Beggs 8-10-42

Switzer Canyon Survey
Proposed Change in Line

Powder Canyon Line

= 71+50.50
71+48.12

New Location Powder Canyon Line
1703'30"

66+12.90
65+03.37
1.11.53

67+36.38
Δ Rt. 31°51'30"

Old Line Powder Canyon
FB 1613-18
FB 1614-79

0+00 P-2

399.40'
"A" Line

"B" Line
497.80

50°36'30"

111.53

24°54'

Switzer Canyon
New location
changed
See FB 1651-12

Station
Powder Canyon = 65+03.37

0+00 Switzer

Equation = 21+84.15 P-40'
21+93.89
= P.O.T. this line

47

21+11.05
= Δ 26°35'30" Lt.

4" Water Line — 19+65 — 19+64

6" Sewer — 6" — Water
17+57.6

"C" Line

16+12
16+61.48
= Δ Rt. 22°05'

15+41.20 P-39
= P.O.T. this line

11+64.56 = P.O.T. P-38
= P.O.T. This Line

8+96.41 P-38
= Δ Lt. 8°57'30"

P-2
3+99.40
"A" Line P-2

"C" Line

13°29'

3+99.40
4+97.80
Equation
Δ Lt. 13°29'

Note: See Page 55 for Line of Proposed change from 0+00 to 3+99.4 See 1614 for Final Location

See F.B. 1651-12, 64

Walker Bliss Hurdin Boggs 8-1042

Levels for Proposed change in Line Switzer Canyon Sewer

	8.42 ⟨90.17⟩		⟨81.75⟩	Elev. stake 1.64+29 FB 1144
0+00	in channel	12.39	⟨77.78⟩	on stake
+50		12.0	78.2	
4' Lt.	= N edge "	12.0	78.2	
6' Lt.	= Top Bank	9.7	80.5	
0+87		10.4	79.8	
1+00		8.3	81.9	
+50	in channel	9.4	80.8	
4' Lt.	N edge "	9.4	80.8	
2+00	in "	8.3	81.9	
+50	S " "	7.2	83.0	
65' Lt.	N " "	7.2	83.0	
3+00		5.2	85.0	
+50		3.9	86.3	
4+00		2.6	87.6	
15' Lt.	= S Bank "	3.2	87.0	
24' Lt.	S edge "	6.2	84.0	
TP	8.51 ⟨96.45⟩	2.23	⟨87.94⟩	
4+50		6.1	90.4	
4+97.85 = 3+99.40	Δ 13°29' Equation	4.72	⟨91.73⟩	on stake
			91.75 P-43	
			.02 Error	

Levels from 3+99.40 to 15+41.20 Cont P-43

See Pg 43

Levels on change of Line from 15+41.20 to 21+93.80 = 21+78.45

	11.06 ⟨127.02⟩		⟨115.96⟩ Elev. stake 15+41.20 P-43
15+41.20 = POT.		11.06	⟨115.96⟩
-50 +75		11.1	115.9
16+00		11.0	116.0
+30		10.7	116.3
+61.48 = Δ Rt. 22°05'		10.11	⟨116.91⟩
17+00		8.4	118.6
+50		6.6	120.4
18+00		5.5	121.5
+50		4.6	122.4
18' Lt. = 8 2" Water Line			
20' Lt. Top Bank		4.6	122.4
31' Lt. Toe "		9.0	118.0
19+00		3.8	123.2
+50		2.8	124.2
20+00		1.4	125.6
T.P.	9.09 ⟨136.02⟩	0.09	⟨126.93⟩
+36' = Int 18" Conc. Culvert		8.9	127.1
12' Lt. = 2.4 x 2.7' Grating	Inlet	9.02	127.00
Flood Pipe		12.3	123.7
13.5' Rt. = 2 Grating	Inlet	8.87	127.15
" Flood Pipe		11.27	124.75
20+65		7.3	128.7
21+71.05 = Δ 20°35'30" Lt		4.31	131.71 on stake
+35 = Toe Berm		2.7	133.3

(136.02)

21+45 = Int 2" Water		1.3	134.7
7+48 = N edge Berm		1.3	134.7
21+93.89 = Equation			
= 21+84.15 = POT this Line		8.96	(127.06)

Contd Page 44

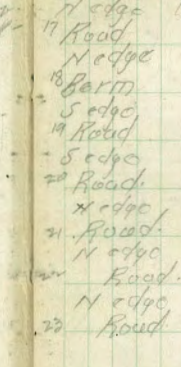
Readings from ⊠ B

Location of Existing Roadway

between Sta 16+61.48 & 21+11

Azimuths clockwise from ⊠ B

AB = Azimuth 0°



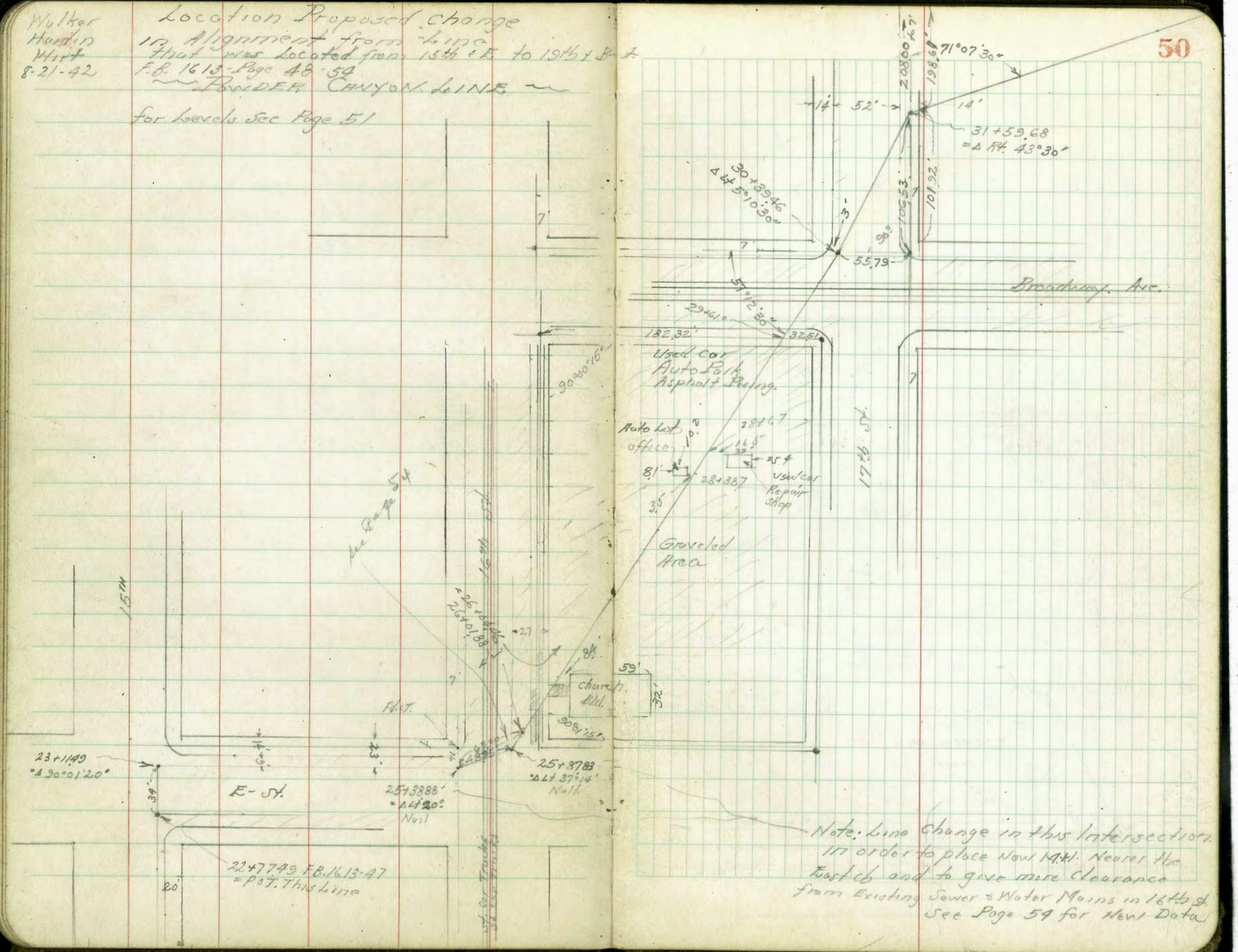
Station	Azimuth	Stadia	
1 N Side Road	182°46'	357'	
2 S " Road	178°25'	347'	
3 N " "	184°42'	200'	
4 S " "	178°31'	195'	
5 NW Cor	172°55'	195	Toe Slope under Const.
6 SW "	165°58'	198	"
7 NE "	166°58	96'	"
8 SE "	153°20"	106'	"
9 S. edge Road	175°30'	95'	
10 N " "	189°25	96'	
11 Stairway SW Cor Landing	201°20'	33	
12 SE " "	205°54	27	

Station	Azimuth	Stadia	
13 NE Cor Landing NW Cor	215°46'	30'	Stairway
14 Landing NW Cor	209°40	37	"
15 Bottom Steps NE Cor	224°40	43'	"
16 Bottom Steps N edge	232°25'	38	"
17 Road N edge	356°27'	82	
18 Berm S edge	353°15'	83	Roadway
19 Road S edge	11°25'	83'	BC. RT.
20 Road N edge	10°07	136'	
21 Road N edge	0°27'	140	
22 Road N edge	5°38'	184	
23 Road	10°08'	208'	

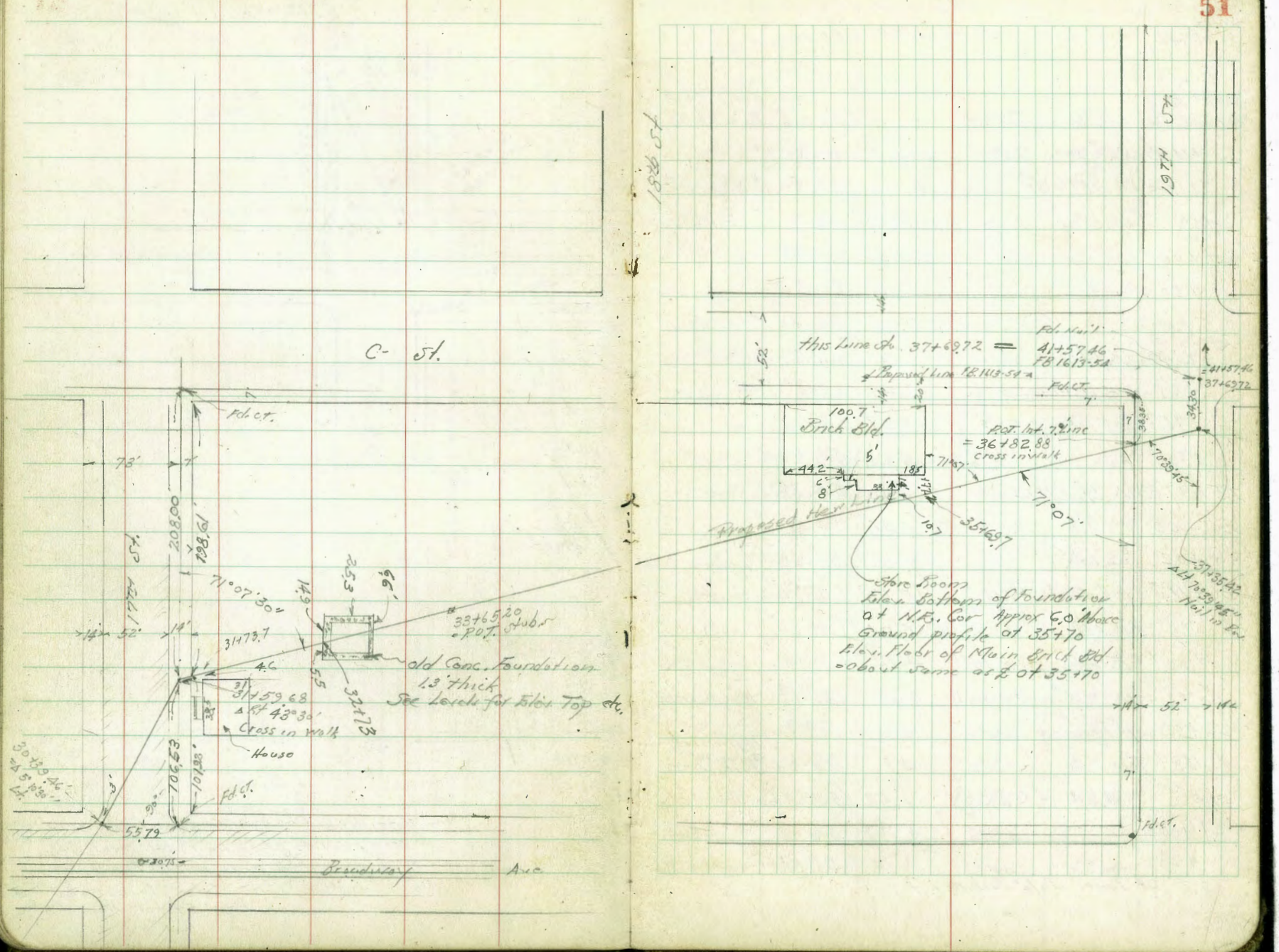
Walker
Hardin
Hirt
8-21-42

Location Proposed change
in Alignment from Line
that was located from 18th & E to 19th & F.
F.B. 1613 - Page 48-59
~ BORDER CANYON LINE ~

for Levels See Page 51



Note. Line change in this intersection in order to place New N.H. Nearer the East ch and to give more Clearance from Existing Sewer & Water Mains in 16th St.
See Page 54 for New Data


C- St.
Fd. ct.
73'
208.00
198.61'
71°07'30"
14'
52'
14'
31+73.7
4.6
31+59.68
Δ Rt 43°30'
Cross in Wall
House
30+30.46
=45+88.38
Ln.
106.53
101.38
3'
39'
5579
Fd. ct.
Pedestrian Arc
25.3'
99'
141'
55'
32+73
33+65.20
POT. Stubs
old Conc. Foundation
1.3' thick
See Levels for Elev. Top of
this line Sta. 37+69.72 = 41+57.46
FB 1613-58
Proposed line FB 1613-58 A
Fd. ct.
100.7
Brick Bld.
5'
44.2'
185
8'
33
10.7
35+69.7
Proposed New Line
71°07'
POT. Int. 7.2' Line
= 36+82.88
Cross in Walk
71.97'
10°29'45"
Store Room
Elev. Bottom of Foundation
at N.E. Cor Approx 6.0' Above
Ground profile at 35+70
Elev. Floor of Main Brick Bld.
about same as ℄ of 35+70
1827 Sq. Ft.
19TH ST.
Fd. Nail
41+57.46
37+69.72
52'
20'
7'
34.3'
34.3'
10°29'45"
37+35.42
ALH 79°39'45"
Nail in Post
14'
52'
14'
7'
Fd. ct.

Walker
Hardin
Wirt
8-22-42

~ Powder Canyon Line ~
Levels for Proposed change in Alignment
as Located Pages 50-51 this Book.

B.M. +35				SW. 7" Track
FB 1614-16	5.92	(59.88)	(53.96)	E. & 16th St.
23+11.49 = Δ Rt 30°01'20"		10.01	49.87	
+31.49 = E.L. 15th St.		10.06	49.82	
+50		10.10	49.78	
24+00		9.03	50.85	
+50		8.06	51.82	
25+00		7.07	52.81	
+38.89 = Δ Lt 30° 0'		6.01	53.87	
+65 = W Rail W Track		5.49	54.39	
+75.7 = W " E "		5.27	54.61	
+80.8 = E " " "		5.28	54.60	
25+87.83 = Δ Lt. 37°14		5.30	54.58	
26+00		5.43	54.45	
(26+02) 3.2' Lt.		5.62	54.26	N. Sil. Cor
26+11.7 = Int. E cb 16th		5.58	54.30	Grating Inlet
" on cb.		5.01	54.87	Gut.
+30.1 = E. edge Walk 16th		4.74	55.14	
+33 = N " Private Walk		4.69	55.19	6' wide to Church
26+50 on Dirt Terrace		0.6	59.3	
+58 = Toe "		4.1	55.8	Beginning Graveled Park Lot
T.P.	4.64	(63.00)	(58.36)	
27+00		6.7	56.3	
+21		6.2	56.8	

3.2' Lt Power Pole for Parking Lot.

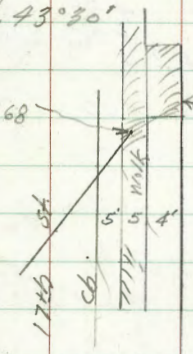
Sidewalk Rider Grader 7-7-43

(63.00)

27+50		6.0	57.0
28+00		5.4	57.6 End Auto Park Graveled Area
28+23		4.8	58.2
+28 = ℄ Eugenia Hodge		4.3	58.7
		4.26	58.74
28+30 = Beginning Asphalt Park Lot			
T.P.	8.29 (67.20)	4.09	(58.91)
28+50 on Paving Park Lot.		8.21	58.99
29+00 " " " "		6.60	60.60
+50		4.85	62.35
+57.6 = S. edge Walk		4.67	62.53 End Asphalt Pav. Park Lot
+69.2 = S. cb Broadway		4.78	62.42
" S Gut.		5.17	62.03
(29+54.5) 2.7' Lt. = Iron Light Pole for Park Lot			
+91.4 = S. Rail Track	St. Cor	4.05	63.15
30+00		3.82	63.38
+08.95 = N Rail N Track		3.62	63.58
Rim MH 2.25 East of 17th		2.25	64.95
Flow " " "	Rod 27.65	25	39.55
30+32 on Pav.		4.23	62.97
30+39.46 = Δ Lt. 5°10'30"		4.03	63.17
3' Lt. on Gut at cb Ret.		4.01	63.19
" " " cb		3.80	63.40
30+48 on Pav.		3.86	63.34
T.P.	3.08 (66.42)	3.86	(63.34) SW. BP Broadway +17.33
31+00 on Pav.		3.01	63.41

66.42

31+49.5 = N. Gut. 17th		4.80	61.62
" N Top ⌀		4.23	62.19
+56.2 = Wedge Walk		4.41	62.01
+59.68 = Δ Rt. 43°30'		4.47	61.95



31+76.3 (on Walk)		4.32	62.10
32+00		4.7	61.7
+18		4.6	61.8
+38		3.0	63.4
+45		5.2	61.2
+73 = Toe old Conc. foundation		4.6	61.8 Wedge for Basement
+73 on Top Wall		0.37	66.05
+74 " " "		0.37	66.05
+74 = Bottom "		5.4	61.0
5' Lt. & Pepper Tree 1.5' dia.			
32+97 = Bottom Wall		7.1	59.3
+97 = Top "		0.38	66.04
+98 = " "		0.38	66.04 E edge
T.P.	11.90 (78.18)	0.14 (66.28)	

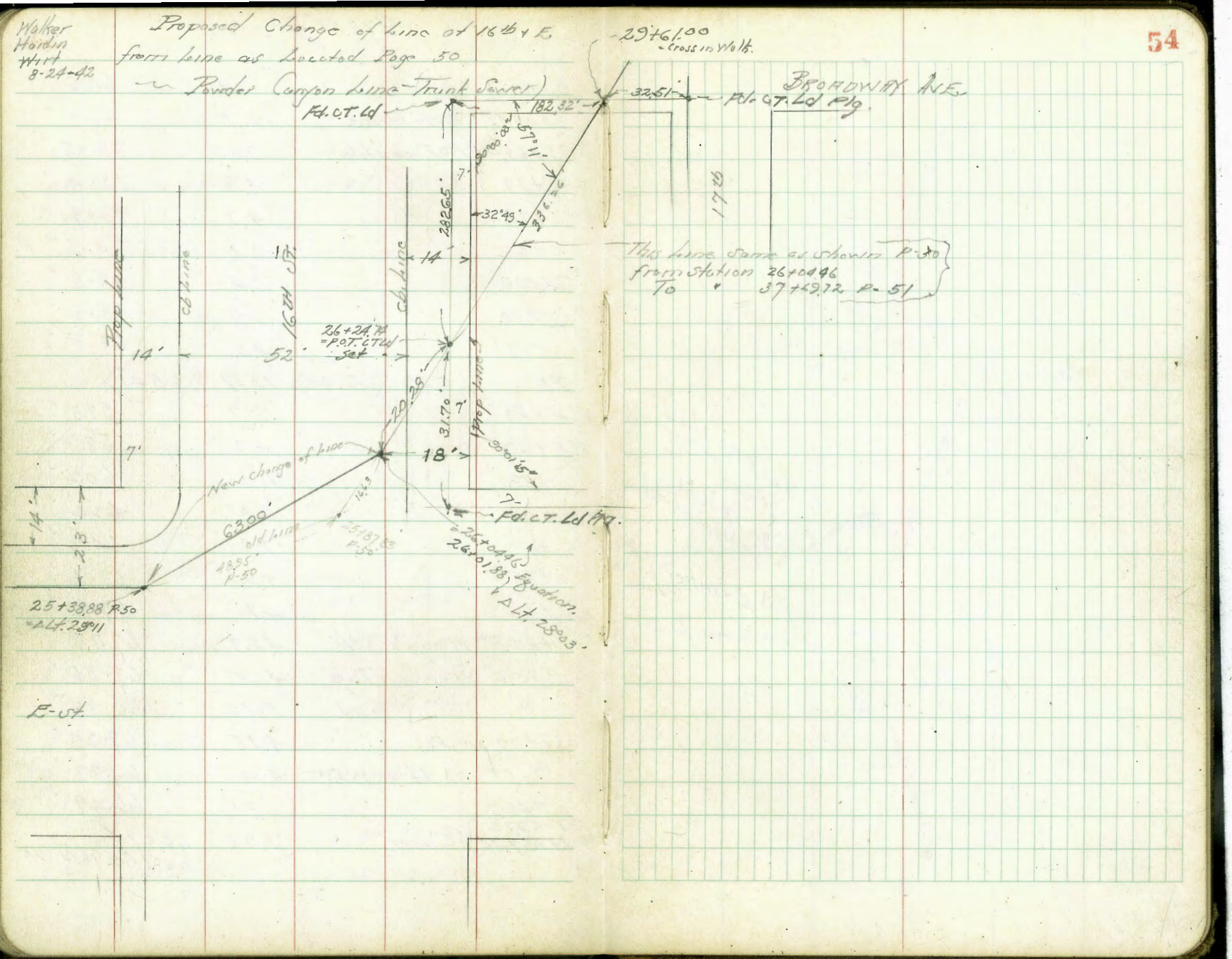
(78.18)

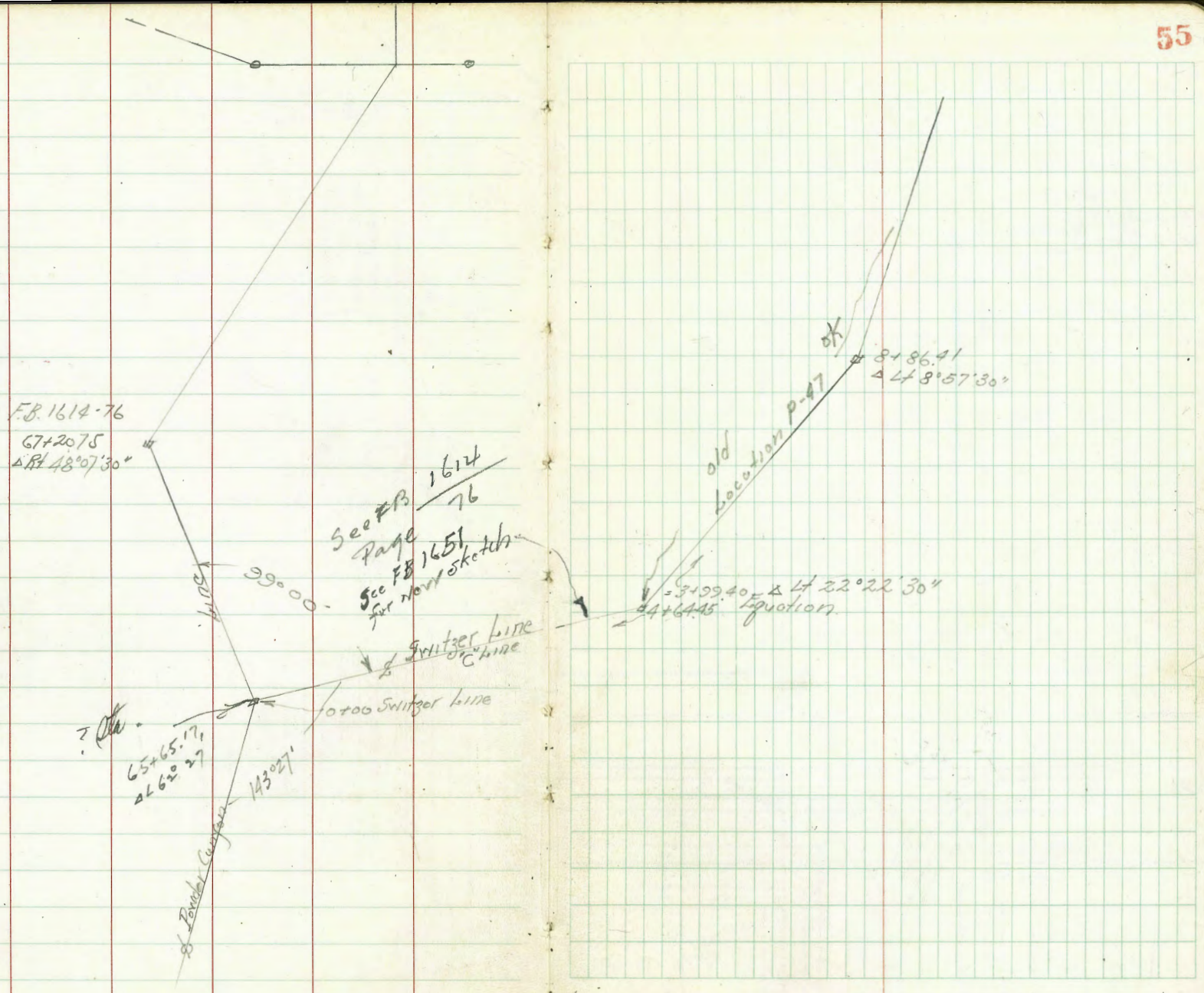
33+10		11.7	66.5
33+34.7 = 17th. Wire Fence		2.1	76.1
33+65.20 = P.O.T. on stake		3.03	75.15
+73		4.8	73.4
+78		4.3	73.9
+82		7.7	70.5
34+00		9.4	68.8
+50		9.9	68.3
+65		9.9	68.3
T.P.	6.59 (72.00)	12.77	(65.41)
34+80		13.7	58.3
35+00		14.0	58.0
+50		11.8	60.2
36+00		9.8	62.2
+50		7.8	64.2
+75		4.9	67.1
+76		4.1	67.9
+80.2 = Wedge Walk		4.23	67.77
+90.2 Wdg. on Top		4.65	67.35
" " " " Gut.		5.13	66.87
37+00 on Pav.		4.75	67.25
+35.42 = Δ Lt 70°39'45"		4.73	67.27
+49.7		5.51	66.49
37+69.72 = 41757.46 } Equation S. P.O.T.		5.93	66.07

66.07 F.B. 1614. 71
0.00

Walker
Hardin
Wirt
8-24-42

Proposed Change of Line at 16th & E.
from line as Located Page 50
~ Powder Canyon Line - Trunk Sewer)




F.B. 1614-76
67+20.75
Δ Rt 48°07'30"
See F.B. 1614/76 Page
See F.B. 1651 for new sketch
99.00'
Switzer Line
℄ Switzer Line
10+00 Switzer Line
65+65.17
Δ Lt 6°27'
143°27'
℄ Boulder Canyon
old location p-47
8+86.41
Δ Lt 8°57'30"
=3+99.40 Δ Lt 22°22'30"
44+64.45 Equation

Walker
Osborne
Hogard
3-12-43

Location of Proposed Change in Sewer Alignment

Bet. Broadway And 16th And 19th and C St.

Locks Page 58

= 31+59.68 ↑
33+73.68 ↓ = Equation. = P.O.T.

33+18.72 = Δ Rt 71°07'30"

16th St.

29+35.26
= Δ Rt 89°59'

BROADWAY

3' to curb face

14'

7'

29+22.26
FB 16 13-49

6 14'

33+73.68
= 31+59.68
Page 61

54.96'

33+18.72
Δ Rt. 71°07'30"

14' 7' 45' 7' 7

St.

Ave.

31477.09
Δ Lt 90°01'

16th St.

FB1613-P-54

=41+5746
38+4497 Equation =Δ Lt 89°35'15 FB1613-54

C-St.

35+8330
Δ Rt. 90°02'

=41+5746
38+4497 } Equation
=Δ Lt 89°35'15

50'
23'
211.37'
30'
200.37'
4'
7'
Lot 18
Lot 18
℄ Proposed change
Abandoned
This portion
34+59.51
Δ Lt. 71°07'10"
19TH ST.

77°07'30"
33+7368
=31+59.68
Equation
33+6520
=P.O.
Page 51
P.51
33+1872
=Δ Rt. 71°07'30"
21'
17TH ST.
106.58'
7'
7'
BROADWAY AVE.
31+77.09.
Δ Lt 90°01'
20

Walker
Osborne
Hazard
3-12-43

Levels for Proposed Change in Sewer as per Location - P-56.

3/19/43 Redrawn ch. H.

	2.58 (65.92)		(63.34) 5 W.M. B.P. Broadway + 17th P-52
29+35.26 = Δ Rt. 89°59'		10.25	55.67
+50		10.38	55.54
30+00		8.82	57.10
+50		6.90	59.02
31+00		4.77	61.15
+50		2.86	63.06
31+77.09 = Δ Lt 90°01'		1.85	64.07
+89.7 = S Rail of S Track		1.63	64.29
32+04.6 = N " " N "		1.68	64.24
32+23 = N Gut. Broadway		2.71	63.21
+37.09 = N " "		2.56	63.36
T.P.	2.58 (67.16)	1.34	(64.58)
32+50		3.98	63.18
33+18.72 = Δ Rt. 71°07'30"		6.09	61.07
33+39.3		5.45	61.71
+66.6 = E Gut		5.83	61.33
" " Top Cb.		5.24	61.92
33+73.68		5.22	(61.94)
31+57.68 Equation = P.O.T. this line			61.95 P-53 .01 Error.
34+50			

Used P-53

Levels for Proposed change -

58

- Cont. from left Page and P-50

	0.72 (75.87)		(75.15) B.M. on P.O.T. Stake 33+65.20 P-53
34+59.51 = Δ Lt 71°07'10"		7.87	68.00
7.75		8.8	67.1
5' Rt. on Top Bank		8.0	67.9
16" " = Toe "		16.3	59.6
T.P. 1.48	(64.96)	12.39	(63.48)
35+00		1.7	63.3
+13.5 = S edge Brick Bld.		4.7	60.3
3.7 Rt on Natural Ground		7.1	57.9
" " on Bottom Conc Fd.		8.8	56.2
35+27		7.0	58.0
+55.3 = opp Bik. in Brick Bld.		7.7	57.3
3.6 Rt. Bottom Conc Ft.		8.8	56.2
35+72.8 = N edge Conc Sid. Walk		8.15	56.81
+77.3 = S. Gut		8.70	56.26
+78.7 opp E Grating		8.60	56.36
1' Rt. = W end grating		8.69	56.27 2.8 x 6' Grating on Wall
35+83.30 = Δ 90°02' Rt.		8.43	56.53
4.3' West, 3.1' North = Rim Eng. MH 5.7' dc		8.36	56.60
T.P. 12.24	(69.12)	8.08	(56.88)
36+00		12.11	57.01
+50		10.09	59.03
37+00		8.15	60.97
+50		6.03	63.09
+88		4.48	64.64
38+44.97 Equation = 41+57.46 = Δ Lt 89°35'15"		3.06	66.06 66.07 = P-53 .01 diff

Used

Wulker
Osborne
Hazard
Hurlin
10-26-43

New Levels on & Proposed Powder Canyon Trunk Sewer between Switzer Dam and Pershing Drive to determine Coverage, if any, through Newly Excavated Basin of Dam.
Location Sewer FB 1614-75

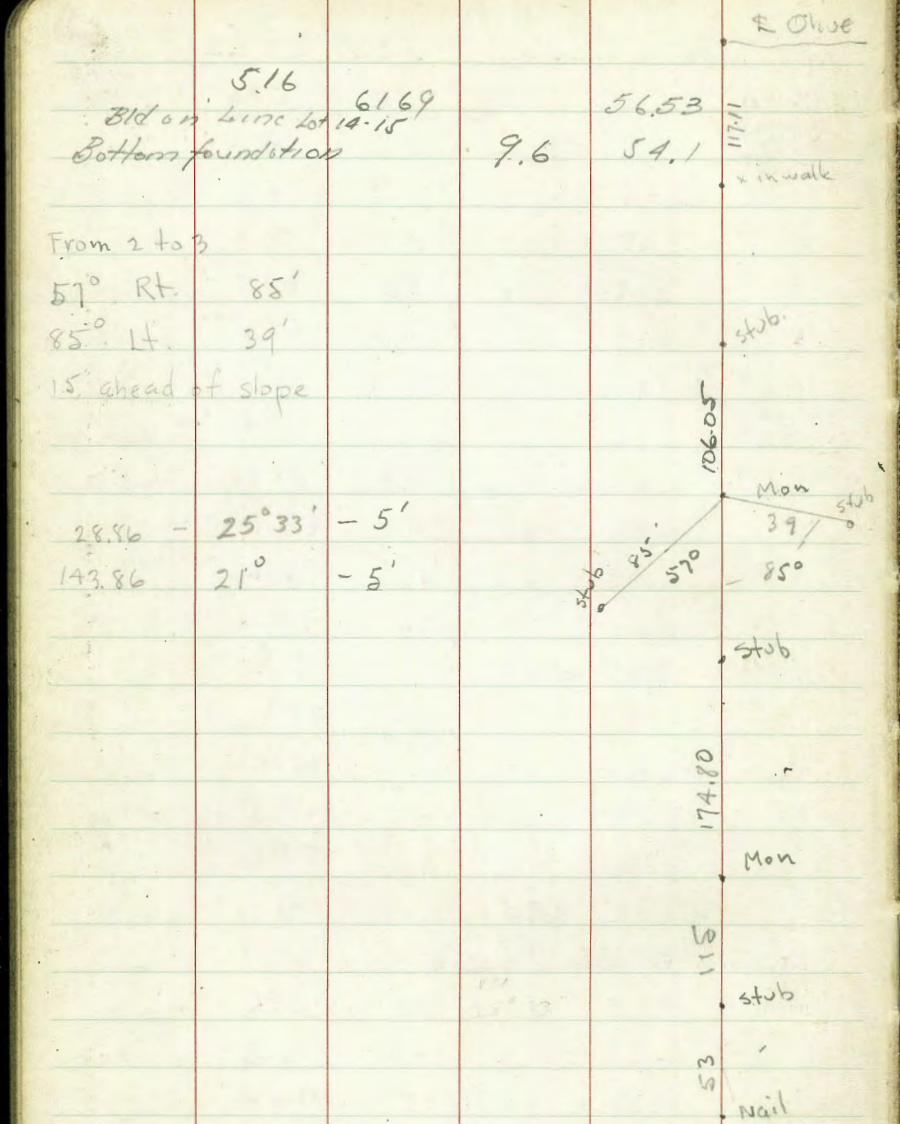
	1.06	73.37		72.31	Elev. Sta 57+45 - P20 FB 1614
57+25			1.9	71.3	
+50			3.1	70.3	
+88			2.9	70.5	
58+00			12.4	61.0	Will be cut Down about 3' more
T.P.	6.76	70.16	9.97	63.40	
59+00 on			6.9	63.3	To be about 3' Lower
100' Lt	in Basin		10.2	60.0	Finished Grade
50 "	" "		10.8	59.4	"
47 "	" "		6.7	63.5	To be about 3' Lower
50' Rt.			7.5	62.7	"
65' Rt.			4.3	65.9	
125' Rt. = Toe old RR Bank			1.1	69.1	
60+00			4.9	65.3	To be about 4' Lower
135' Rt.	" " "		+1.7	71.9	
120' Rt.			2.3	67.9	To be about 4' Lower
38' Lt.			3.4	66.8	"
50' Lt.			8.2	62.0	Finished Grd
100' Lt.			8.3	61.9	" "
61+00			2.2	68.0	To be about 4' Lower
72' Lt.			6.8	63.4	Finished Grd.
60' Lt			6.8	63.4	
50' Lt			2.4	67.8	To be about 4' Lower
50' Rt.			2.2	68.0	To be about 4' Lower
106' Rt			1.6	68.6	
136' Rt. = Toe old RR Bank			+2.3	72.5	

70.16

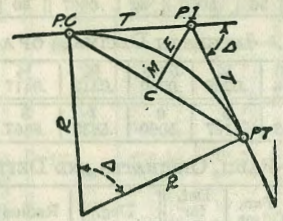
59

T.P. 586	75.50	0.52	69.64	
62+00		5.9	69.6	To be about 4' Lower
130' Rt.		0.2	70.3	
90' Rt		1.03	70.8	
80' Rt.		5.4	70.1	To be about 4' Lower
25' Lt.		5.8	69.7	To be 4' Lower
34' Lt		10.0	65.5	Finish Grd
60' Lt		10.0	65.5	" "
63+00		5.1	70.4	To be 3' Lower
40' Lt		7.8	67.7	Finish Grd.
20' Lt		8.4	67.1	" "
14' Lt.		5.3	70.2	To be 3' Lower
5' Rt		5.5	70.0	" " "
65' Rt		+0.4	70.9	
195' Rt. = Toe old RR Bank		+3.6	78.5	
63+65		4.9	70.6	
+73 on Finish Grd.		7.3	68.2	
64+60 " " "		6.0	69.5	
65+00		1.9	73.6	
T.P. 983	83.31	2.02	73.48	
7' Rt. = Finish Grd Ch.		13.4	69.9	
30' Rt " "		13.5	69.8	
35' Rt.		10.0	73.3	To be about 3' Lower
120 Rt		8.9	74.4	" "
127' Rt		3.4	79.9	
216' Rt. = Toe old RR Fill		1.2	82.1	
65+65.17 = Δ Lt 65°27		3.25	80.06	FB 1614 P-67

80.09
0.03 diff.



DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



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=Rtan$\frac{\Delta}{2}$ (3) Length of Curve=L=100$\frac{\Delta}{D}$ (4)

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

External=E=Ttan$\frac{\Delta}{4}$- (7) =R÷cos.$\frac{\Delta}{2}$-R (8)=Rexsec$\frac{\Delta}{2}$(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 I.—Minutes in Decimals of a Degree.

1′	.0167	11′	.1833	21′	.3500	31′	.5167	41′	.6833	51′	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

Table II.—Inches in Decimals of a Foot.

1–16	3–32	1/8	3–16	1/4	5–16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729

1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

Table III.—Radii, Ordinates and Deflections.

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan Offset	Def. for 1 Foot
0° 10′	34377.5	.036	.145	0.05′	7°	819.02	1.528	6.105	2.10′
20	17188.8	.073	.291	0.10	20′	781.84	1.600	6.395	2.20
30	11459.2	.109	.436	0.15	30	764.49	1.637	6.540	2.25
40	8594.42	.145	.582	0.20	40	747.89	1.673	6.685	2.30
50	6875.55	.182	.727	0.25					
					8	716.78	1.746	6.976	2.40
1	5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50
10	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55
20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60
30	3819.83	.327	1.309	0.45					
40	3437.87	.364	1.454	0.50	9	637.28	1.965	7.846	2.70
50	3125.36	.400	1.600	0.55	20	614.56	2.037	8.136	2.80
					30	603.80	2.074	8.281	2.85
2	2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90
10	2644.58	.473	1.891	0.65					
20	2455.70	.509	2.036	0.70	10	573.69	2.183	8.716	3.00
30	2292.01	.545	2.181	0.75	30	546 44	2.292	9.150	3.15
40	2148.79	.582	2.327	0.80	11	521.67	2.402	9.585	3.30
50	2022.41	.618	2.472	0.85	30	499.06	2.511	10.02	3.45
					12	478.34	2.620	10.45	3.60
3	1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75
10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90
20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05
30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20
40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35
50	1494.95	.836	3.345	1.15					
					15	383.07	3.277	13.05	4.50
4	1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65
10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80
20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95
30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10
40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40
50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70
5	1146.28	1.091	4.362	1.50	20	287.94	4.374	17.37	6.00
10	1109.33	1 127	4.507	1.55	21	274.37	4.594	18.22	6.30
20	1074.68	1.164	4.653	1.60	22	262.04	4.814	19 08	6.60
30	1042.14	1.200	4.798	1.65	23	250.79	5.035	19.94	6.90
40	1011.51	1.237	4.943	1.70	24	240.49	5.255	20.79	7.20
50	982.64	1.273	5.088	1.75					
					25	231.01	5.476	21.64	7.50
6	955.37	1.309	5.234	1.80	26	222.27	5.697	22.50	7.80
10	929.57	1.346	5.379	1.85	27	214.18	5.918	23.35	8.10
20	905.13	1.382	5.524	1.90	28	206.68	6.139	24.19	8.40
30	881.95	1.418	5.669	1.95	29	199.70	6.360	25.04	8.70
40	859.92	1.455	5.814	2.00	30	193.18	6.583	25.88	9.00

Note. Chord Deflection=2 times tangent deflection.

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

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

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
31°	1589.0	216.3	41°	2142.2	387.4	51°	2732.9	618.4
10′	1598.0	218.7	10′	2151.7	390.7	10′	2743.1	622.8
20	1606.9	221.1	20	2161.2	394 1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	42	2199.4	407.6	52	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	43	2257.0	428.5	53	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439 2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	44	2314.9	450.0	54	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	45	2373.3	472.1	55	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	494.8	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	518.2	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	542.2	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	566.9	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	592.3	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

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

Central Angle	Tangent	External	Central Angle	Tangent	External	Central Angle	Tangent	External
61°	3375.0	920.2	71°	4086.9	1308.2	81°	4893.6	1805.3
10′	3386.3	925.9	10′	4099.5	1315.6	10′	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	72	4162.8	1352.6	82	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	73	4239.7	1398.0	83	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.3
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	74	4317.6	1444.6	84	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	75	4396.5	1492.4	85	5250.3	2041.7
10	3661.9	1070.2	10	4409 8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	76	4476.5	1541.4	86	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	77	4557.6	1591.6	87	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	78	4639.8	1643.0	88	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	79	4723.2	1695.8	89	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	80	4807.7	1749.9	90	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

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

FOR SUB-CHORDS ADD										Excess of arc per 100 ft.	LONG CHORDS				
D	10	20	30	40	50	60	70	80	90		D	200	300	400	500
4°	.00	.00	.01	.01	.01	.01	.01	.01	.00	.02	1	199.99	299.97	399.92	499.85
6	.00	.01	.01	.02	.02	.02	.02	.01	.01	.05	2	199.97	299.88	399.70	499.39
8	.01	.02	.02	.03	.03	.03	.03	.02	.01	.08	3	199.93	299.73	399.32	498.63
10	.01	.02	.03	.04	.05	.05	.05	.04	.02	.13	4	199.88	299.51	398.78	497.57
12	.02	.04	.05	.06	.07	.07	.07	.05	.03	.18	5	199.81	299.24	398.10	496.20
14	.02	.05	.07	.08	.09	.10	.09	.07	.04	.25	6	199.73	298.90	397.26	494.53
16	.03	.06	.09	.11	.12	.12	.12	.09	.05	.33	7	199.63	298.51	396.28	492.57
18	.04	.08	.11	.14	.15	.16	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.90	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.88	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.42
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

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

TABLE VII.—MIDDLE ORDINATES FOR RAILS IN FEET.

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

SLOPE REDUCTIONS.

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

TRIGONOMETRICAL FORMULAS.

See fig. (a).

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

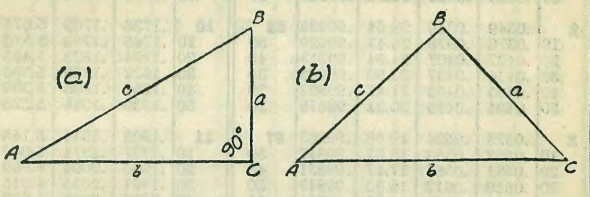
cos. $A=\frac{b}{c}$

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

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

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

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



FORMULA FOR SOLVING TRIANGLES.

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

Table VIII.—Natural Trigonometrical Functions.

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

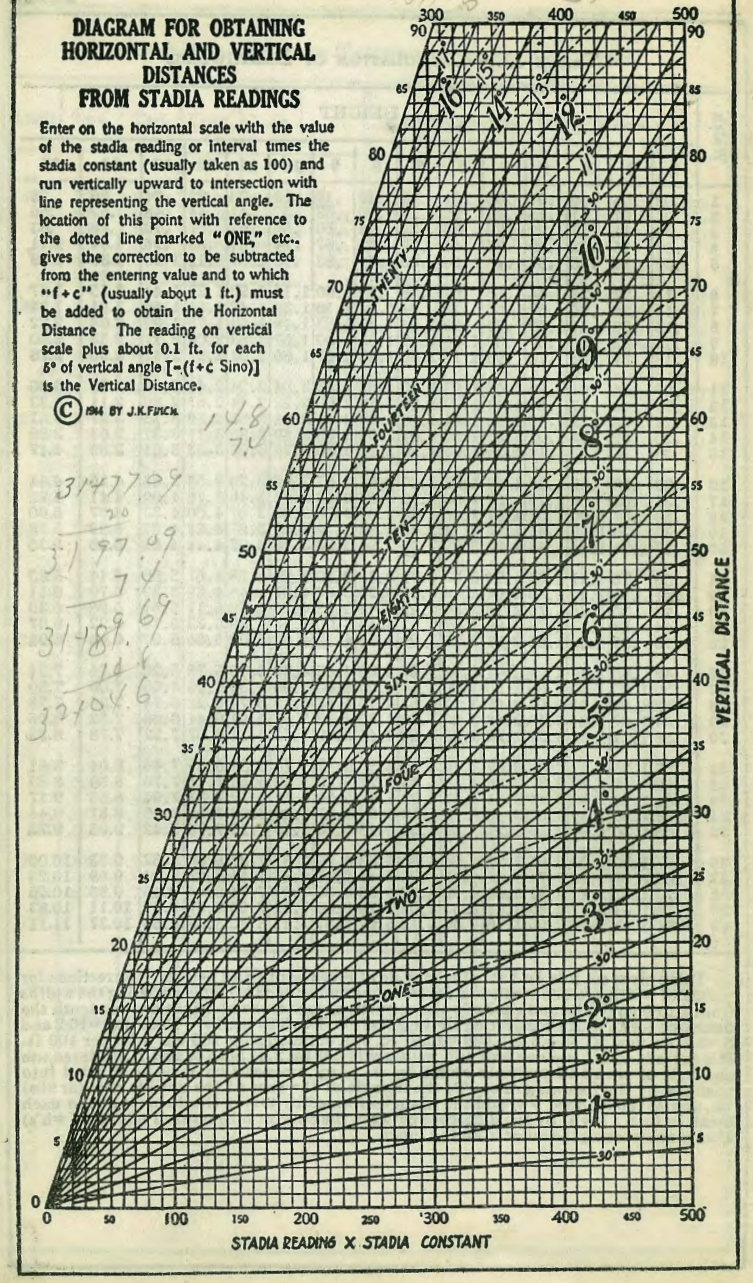
Table IX.—Calculation of Earthwork.

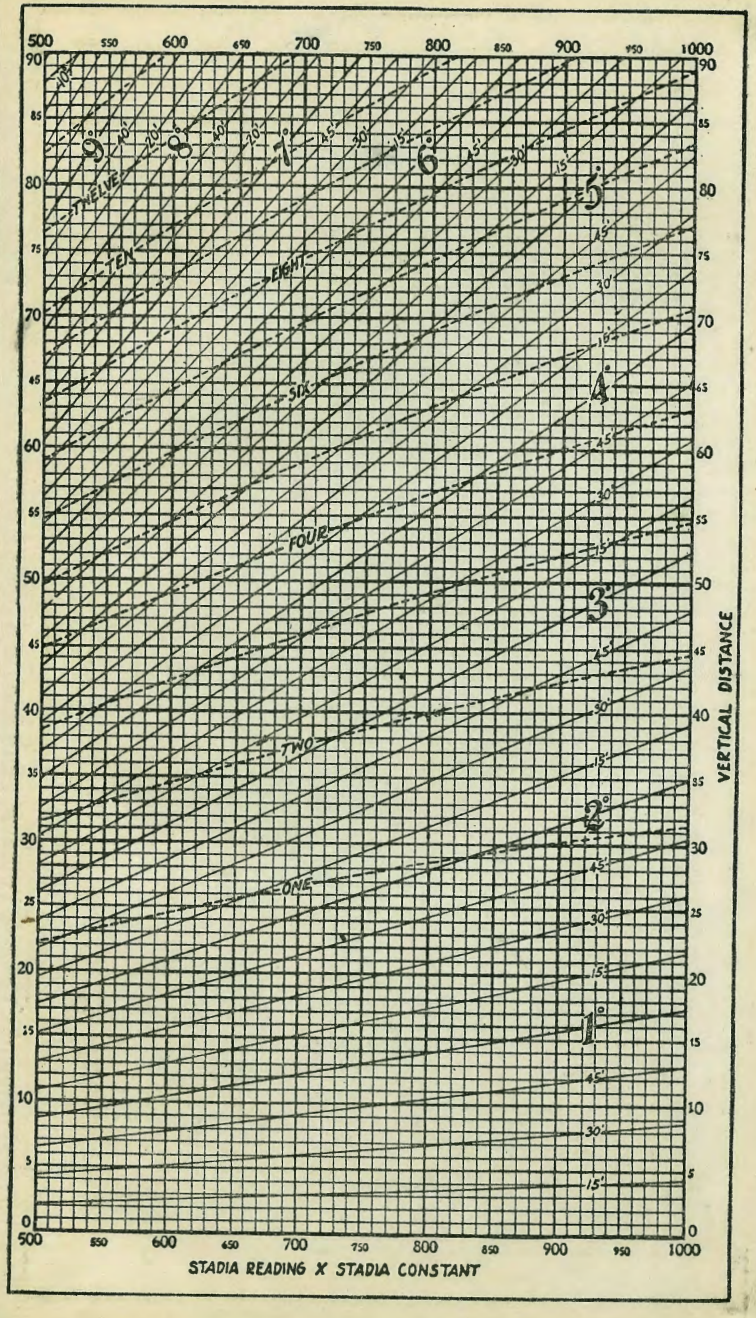
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96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

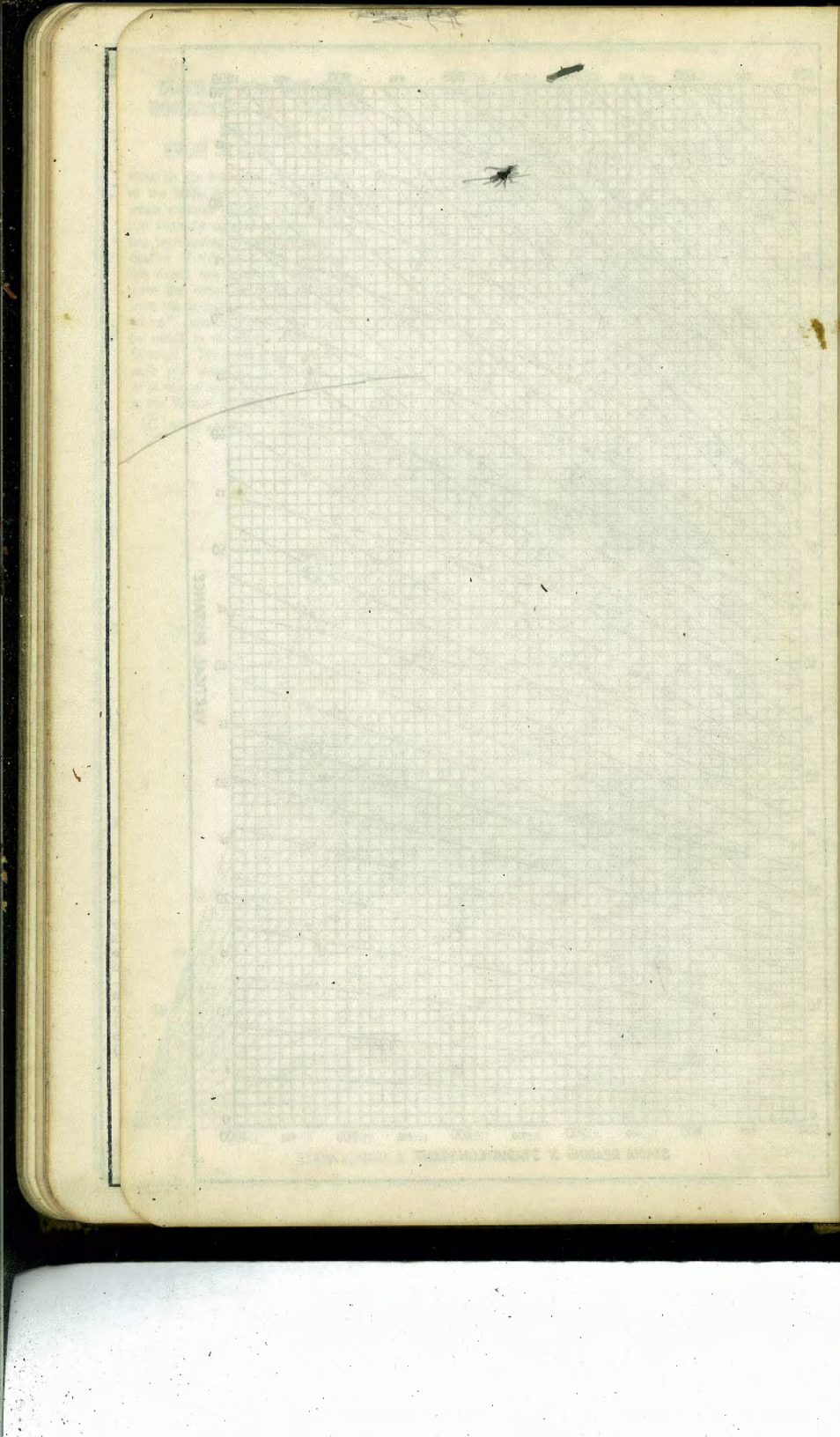
Table gives cu. yds. in 1 ft. of a triangle of given width and height. Corrections for tenths of width are one tenth the values found under each height considering the widths from 1 to 9 as tenths and similarly the corrections for tenths of height are one tenth the figures opposite width considering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

DIAGRAM FOR OBTAINING HORIZONTAL AND VERTICAL DISTANCES FROM STADIA READINGS

Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the correction to be subtracted from the entering value and to which "f + c" (usually about 1 ft.) must be added to obtain the Horizontal Distance. The reading on vertical scale plus about 0.1 ft. for each 5° of vertical angle [=(f + c Sino)] is the Vertical Distance.





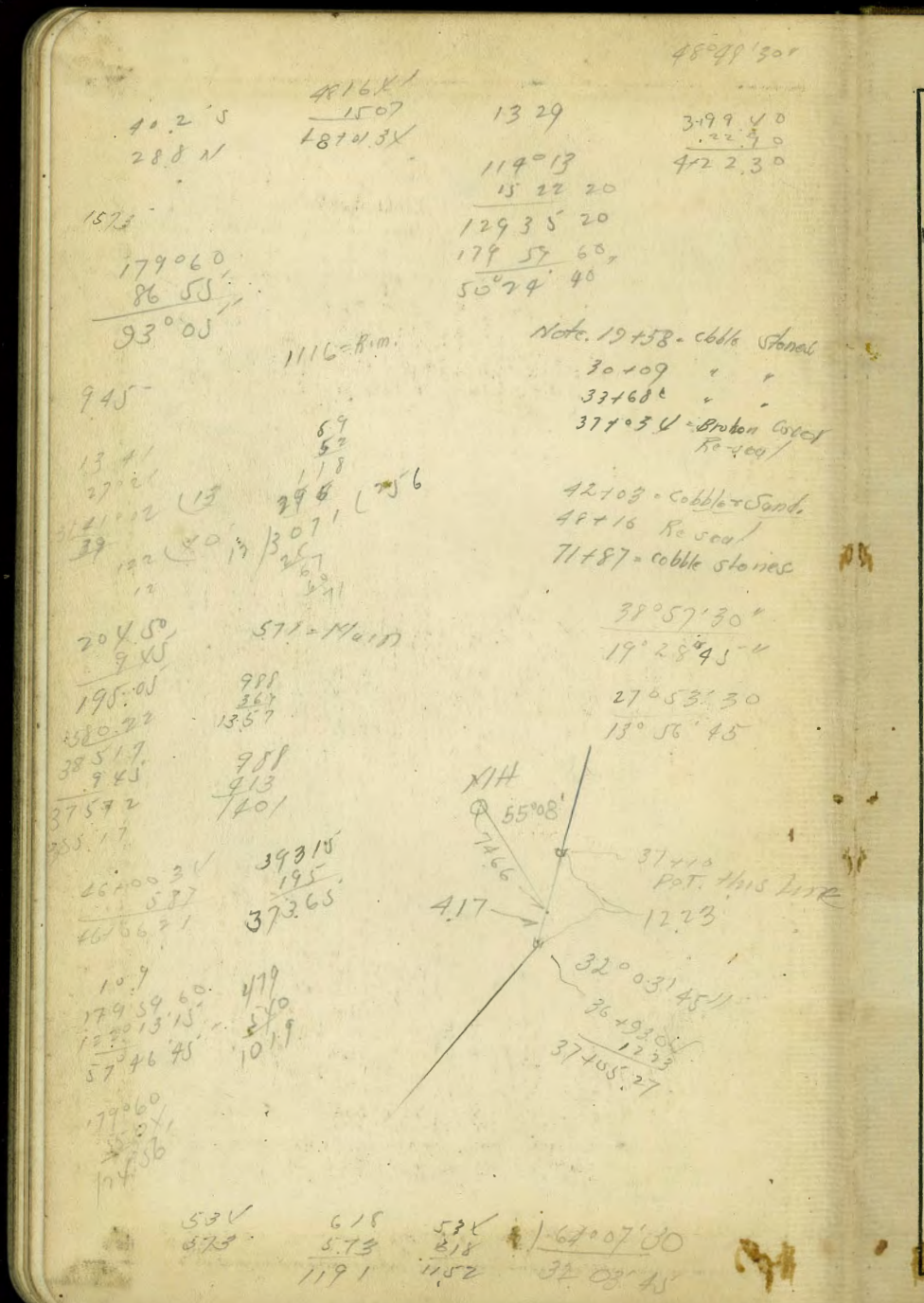


21.2
1.9
3.3

179.86
.69 10
110 50

7.75
7.75
.98
4.92
12.61
12.67

(Levining).



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.