1582

DEUTZ

ENGINEER'S
FIELD BOOK
AND NOTES

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.

7-12

The paper stock of this book is made of a **high grade 50% rag** paper having a **water resisting surface** and is sewed with Bing **Special Enamel Waterproof Thread.**

Made in U. S. A.

Walker
Stiss
Isbell

LA MESA

TRUNK LINE SEWER

— ALIGNMENT —

5-10-40

From Home Ave. and Federal Blvd.

To City Boundary Line

Levels P-35 for Property Ties
Fd Book 3-14-44 — See FB 1383

3+18.74 = Δ 13°00' Rt. Set 3/4" x 2' Iron Pin
3-14-44

2+35 = ℄ Elec. Pole 8.8' Rt. = ℄ Pole
Fd Stub.
Set 5/8" x 2' Iron Pin to same Elev.

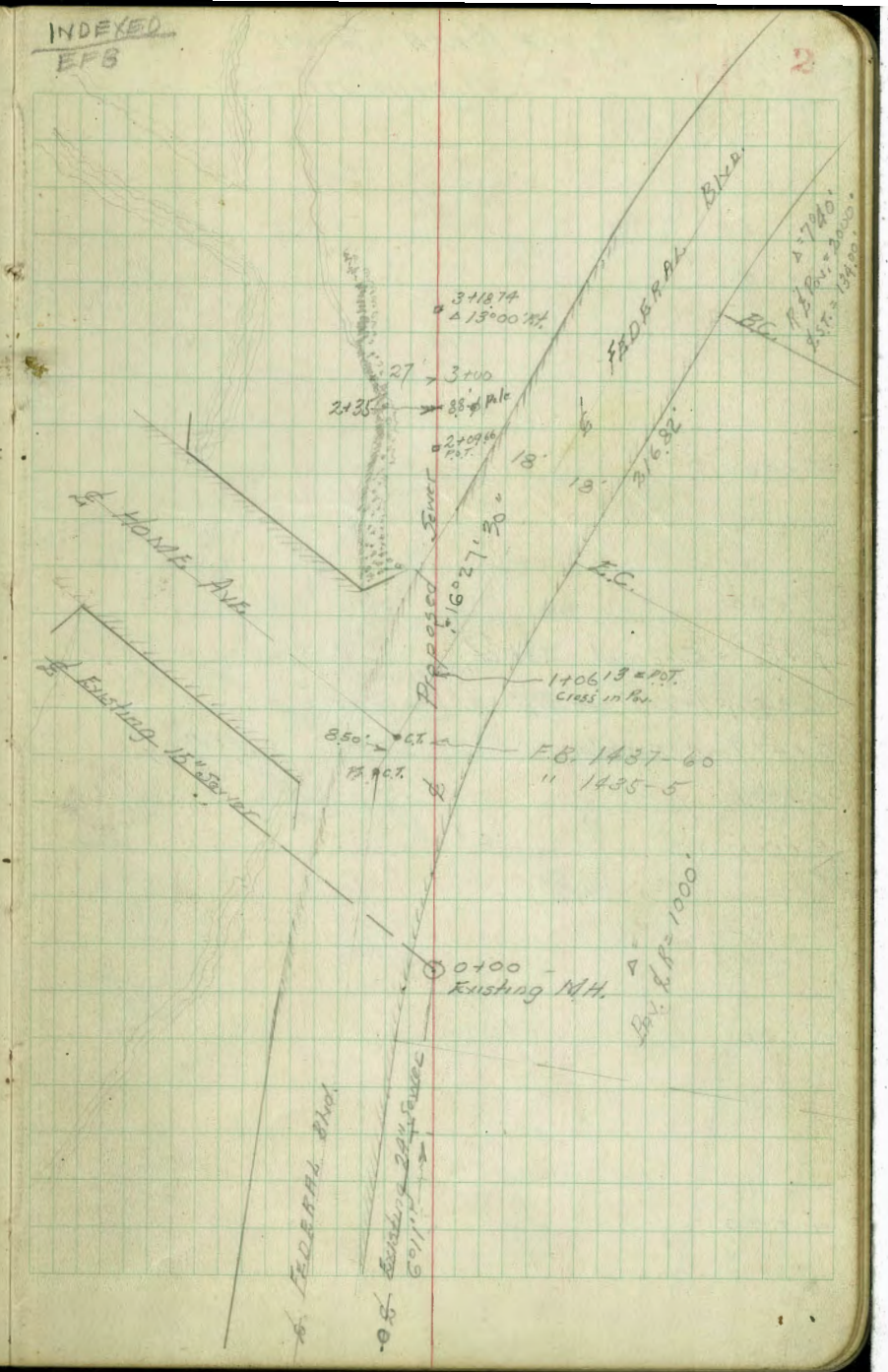
2+09.66 = P.O.T. Stub 3-14-44

1+06.13 = P.O.T. = Int. Sewer-Fed. Federal Blvd.

0+00 = ℄ Existing M.H.

INDEXED
EFB

2



La Mesa Sewer
~ Alignment ~

9+00

8+00

7+00

6+65 = ℄ Elec. Pole 23.5 Lt.

6+49.37 - P.O.T. Set 5/8" x 2' Iron Pin.

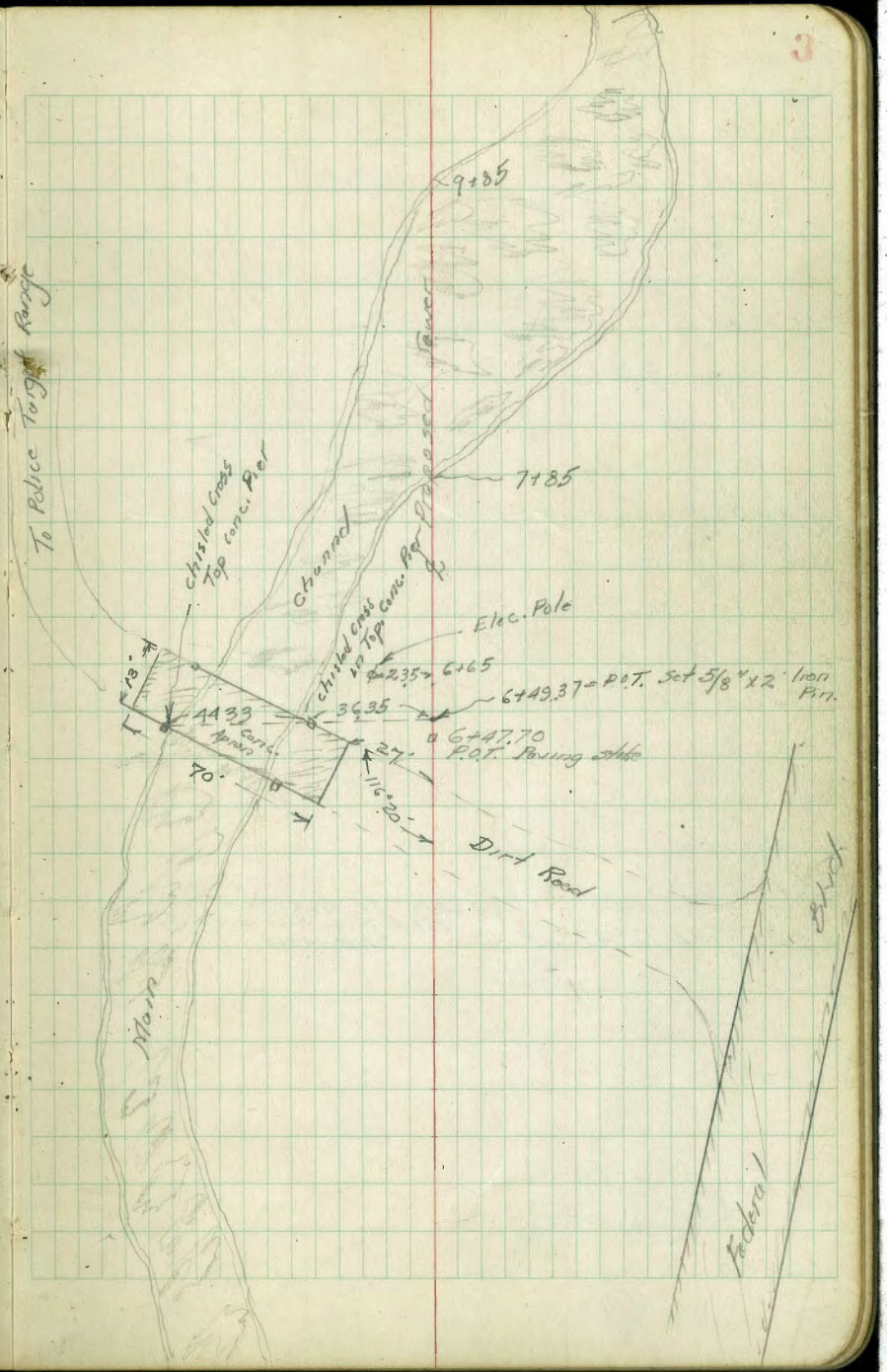
6+47.7 - P.O.T. Stake

6+37.6

6+00

5+00

4+00



16+00

15+00

14+00

13+00

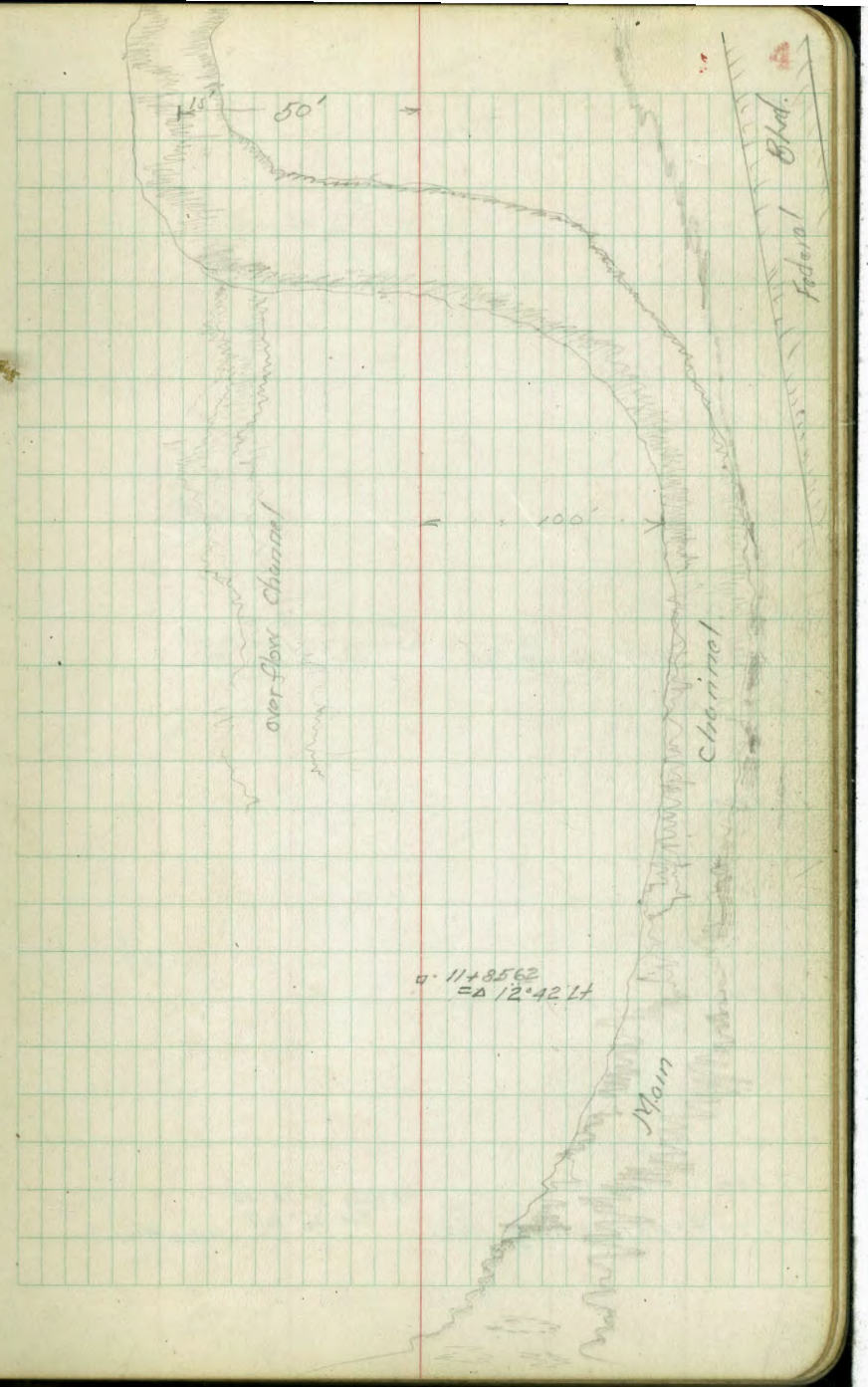
12+00

11+85.62 = Δ 12°42' Lt. stake

Rd Stake - Set 5/8" x 2" Iron Pin
Set to Same Elev as Stake
Set 5-14-44

11+00

10+00



22+00

21+00

20+00

19+79.80 = P.O.T. Paving Stake

Fd. 3-14-44
Set 5/8"x2' Iron Pin.
To Same Elev.

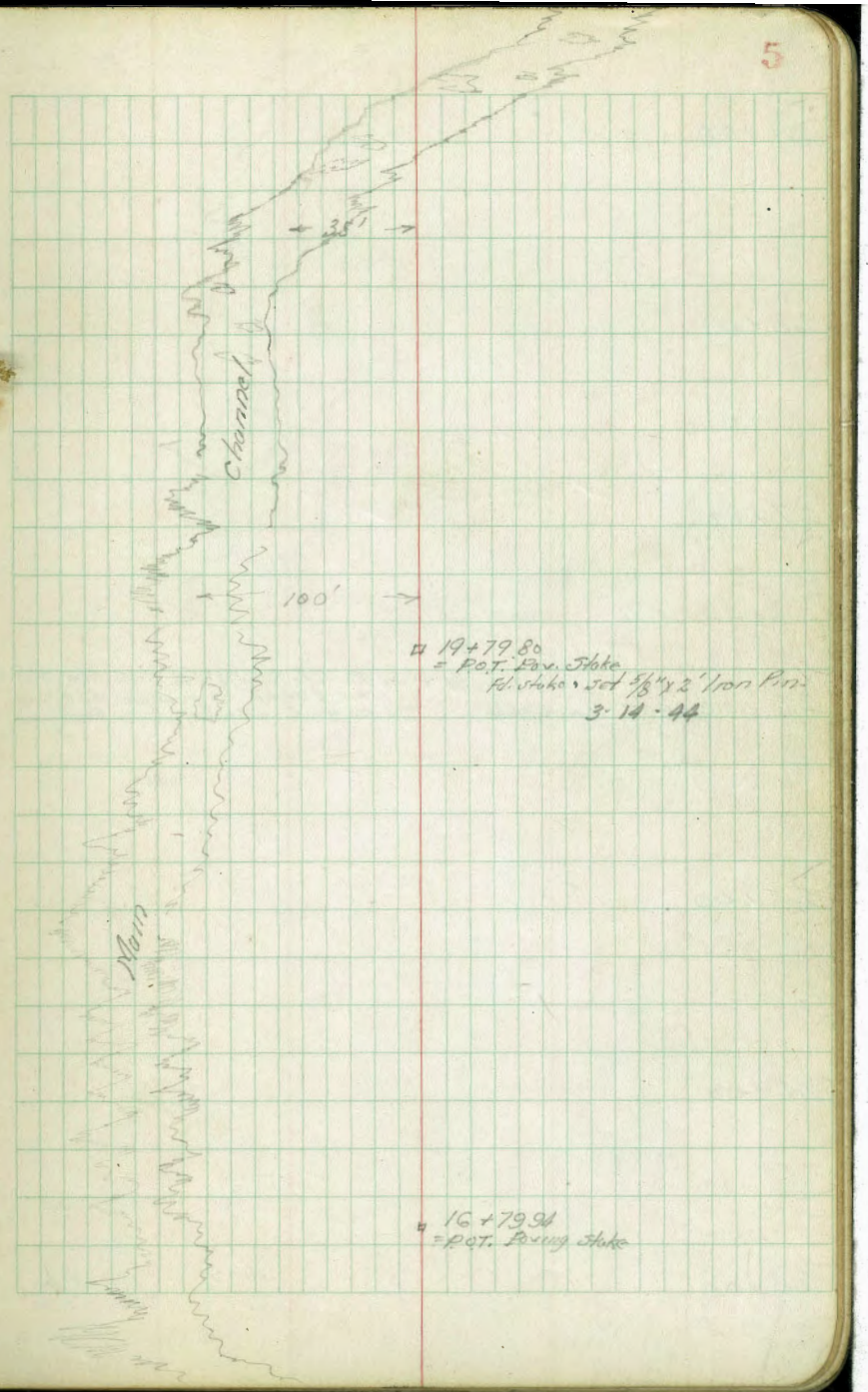
19+00

18+00

17+00

16+79.94 = P.O.T. Paving Stake

Fd. Stake 3-14-44
Set 3/4" Bolt
Same Elev.



19+79.80
= P.O.T. Pav. Stake
Fd. Stake, Set 5/8"x2' Iron Pin.
3-14-44

16+79.94
= P.O.T. Paving Stake

29+00

28+00

27+00

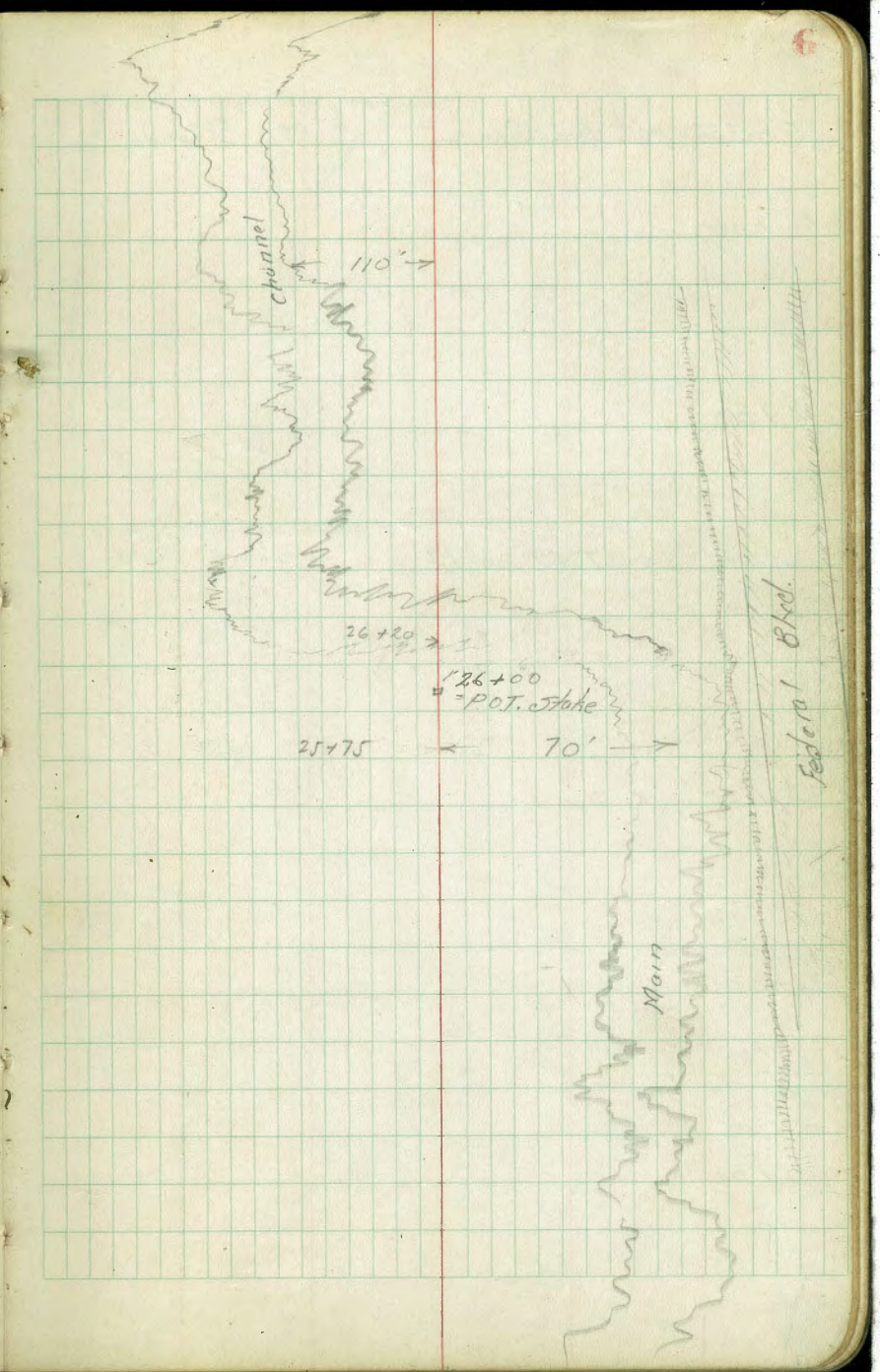
26+00 = P.O.T. Paving Stake

Fd. Stake Rotted = S.t 3/4" x 2" from Pen. 3-14-44
as near ℄ Stake as possible as there
Was no Tack in Stake (No Ties)

25+00

24+00

23+00



35+83.35 = P.O.T. Pot. Stake

Fd. Stake Set 5/8" x 2' Iron Pin to same Elev. 3-14-44

35+00

34+00

+27.10 = △ 17°52'20" Lt.

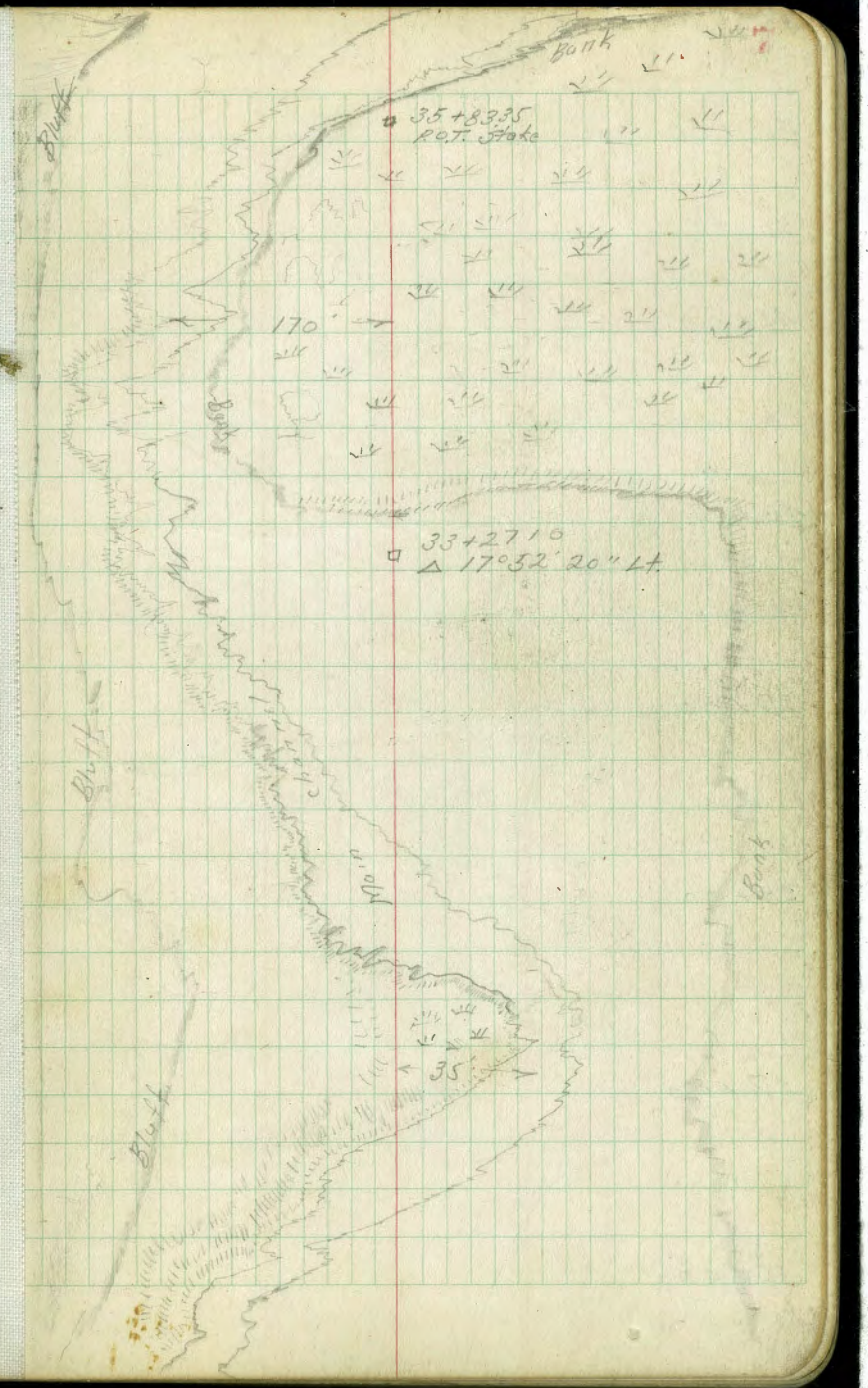
Fd. Stake Set 5/8" x 2' Iron Pin to same Elev.

33+00

32+00

31+00

30+00



42+00

41+00

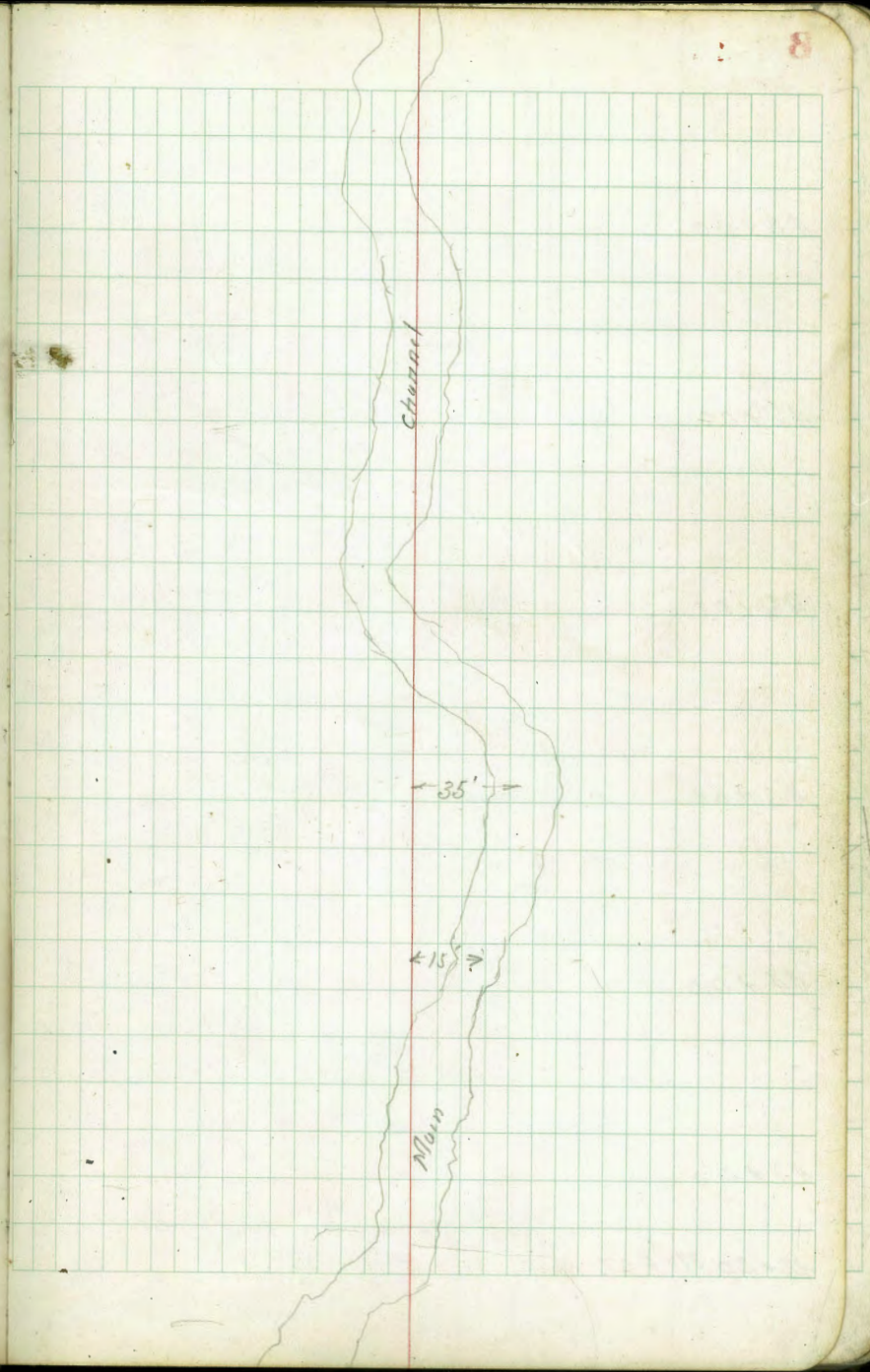
40+00

39+00

38+00

37+00

36+00



48+00

47+00

46+00

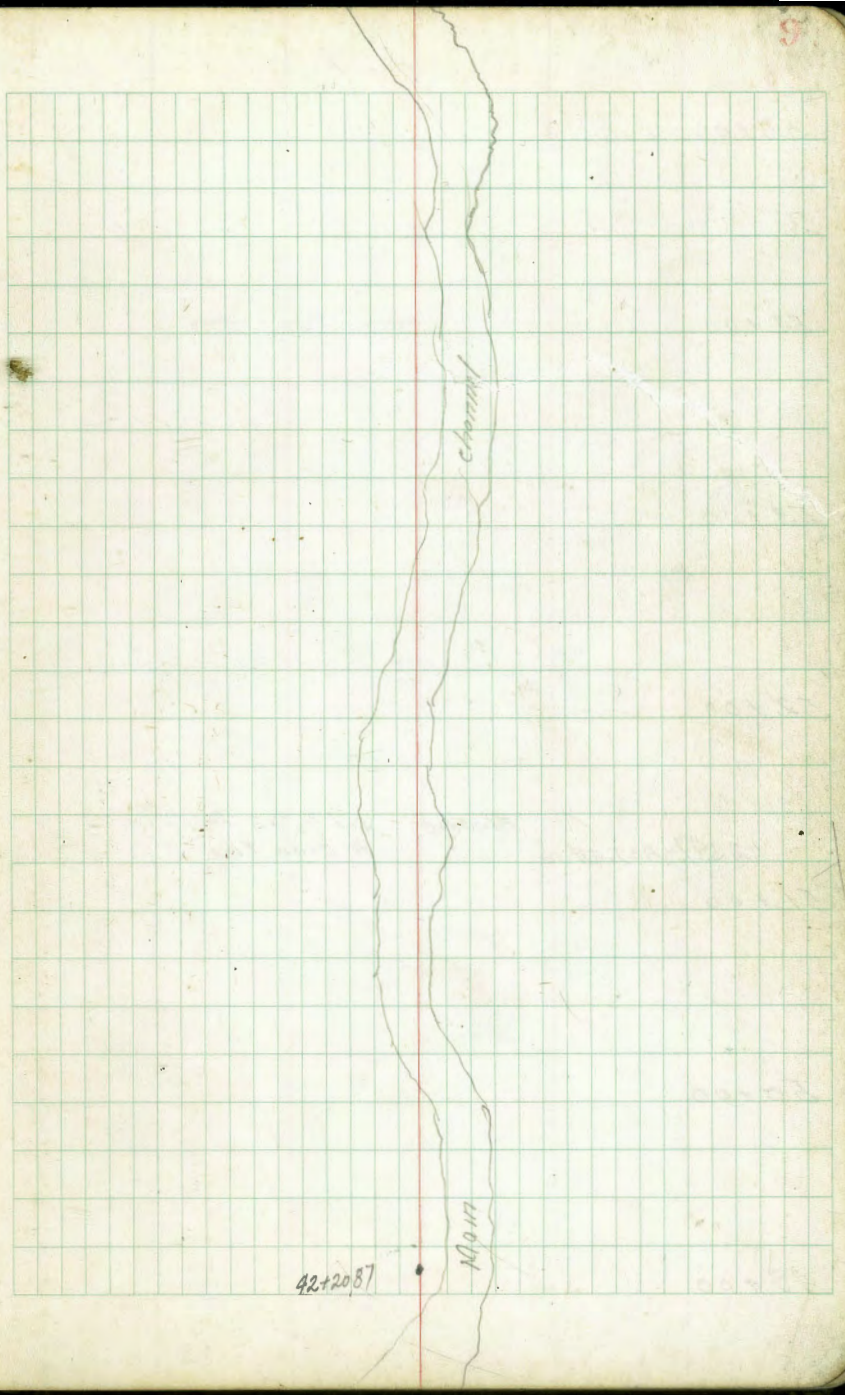
45+00

44+00

43+00

Fd Stake
Set 1/2" x 2' Iron Pin to same Elev

42+20.87 = P.O.T. Stake



55+00

54+00

53+00

52+00

+25.47 = P.O.I. Stub

Rd. Stake Set ½"x2' Iron Pin to Same Elev.

51+00

50+00

49+00

115'

51+25.47

50+70

61+8846 = P.O.T. Boring Stake.

61+7968 = P.O.T. Jct C.T. Ld Plg in Conc. Boring.

Set 3-13-44

61+00

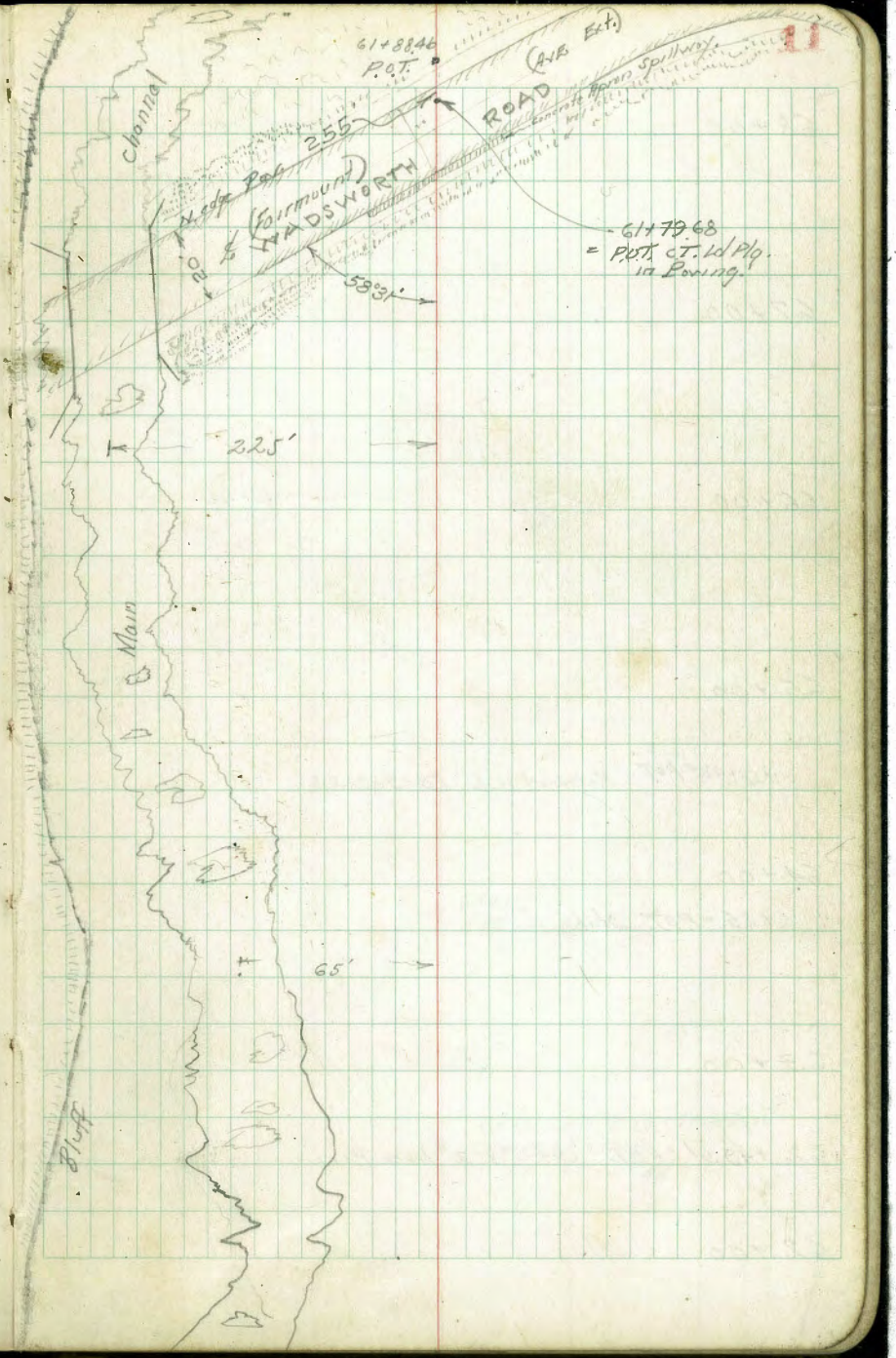
60+00

59+00

58+00

57+00

56+00



68+00

67+00

66+00

65+00

+67.42 = P.O.T. Redwood Hub FB 1383-28

64+00

+85 = P.O.T. Hub.

63+00

62+49.6' = P.O.T. Set 1"x 2' Iron Pin

62+00

63+85
P.O.T. Stub.

Cross in 1"x 24" Iron Pin
62+49.6' = P.O.T.
Set 5-13-44

+12.74 = P.O.T. Paving Stake ← Rd. 3-10-44 Replaced Same With 5/8" X 2' Iron Pin To Elev 1464.3

74+00

73+00

72+00

71+00

70+00

69+00

68+29 = Δ 20°00' Lt. Set 3/4" X 5' Galv. Iron Pin With Redwood Plg C.T. Set 3-13-44

74+12.74 = P.O.T. Paving Stake Now = 5/8" Iron Pin

Bracket 68+29 Δ = 20°00' Lt.

80+00

79+00

+29 = Δ 10°11'30" Lt. Set 5/8" X 2' Iron Pin

78+00

77+00

76+00

75+00

Rev. Stake ℄ 78+29
Δ = 10°11'30" Lt.

Fd. Stake 3-10-44
Replaced 50 ms
with Iron Pin.
(Should be within
0.1 of same
Elev.

87+00

86+00

85+00

Fd. Stake 3-9-44

+63.83 P.O.T. Fd. Stake Set 3/4" Bolt 18" Long → Set to Elev 167.44 → 84+63.83 P.O.T.

84+00

83+00

82+00

81+00

Stub Fd in 1944

93+00.04 = △ 4°39'30" Rt. (Set 5/8" x 2' Iron Pin 3-9-44)

92+00

91+00

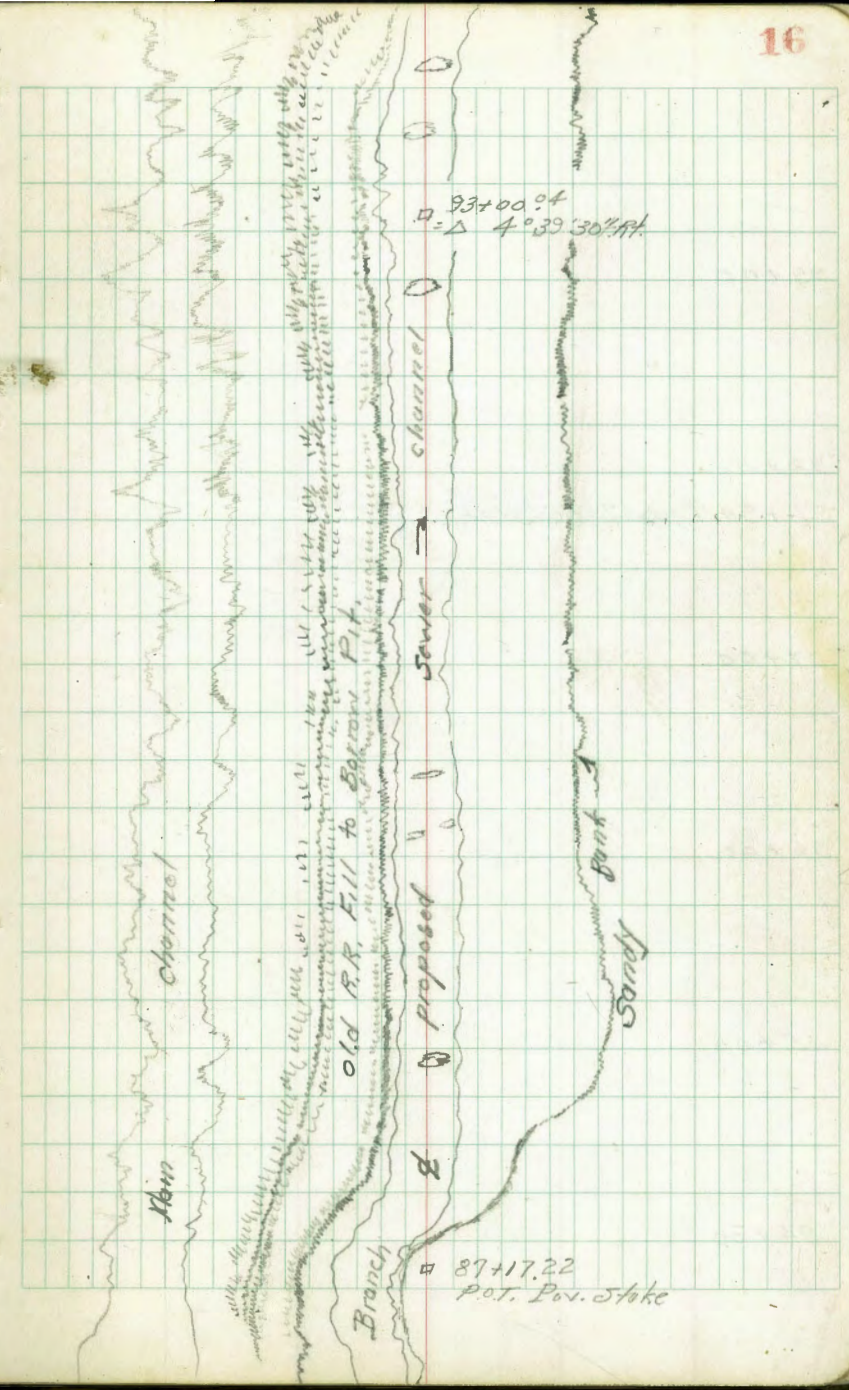
90+00

89+00

88+00

87+17.22 = P.O.T. Paving Stake

Rpl. 3-9-44 Replaced with 5/8" x 2' Iron Pin to Same. -Elev.



99+00

98+00

97+94.07 = Δ 7°56'30" Rt.

97+00

96+00

95+00

94+00

Rev. Stake = 97+94.07
Δ = 7°56'30" Rt.

(Set Iron Pin
5/8" x 2'
3-9-44
Rd stake)

106+00

105+00

104+22.04 = P.O.T. Stub.

104+06.81 = ℄ Paving
Ld Plg C.T.

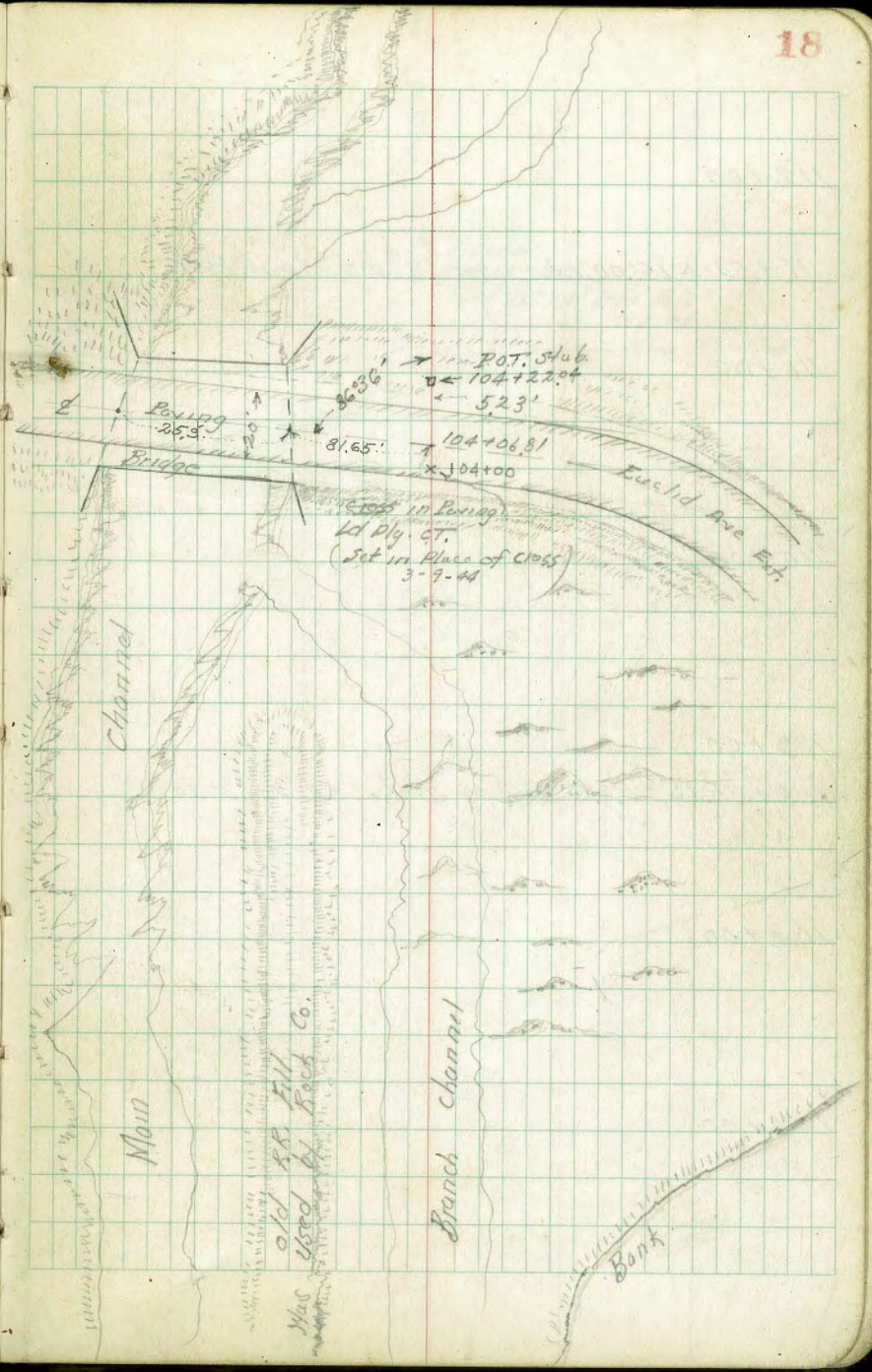
104+00 = Cross in Paving

103+00

102+00

101+00

100+00



112+00

111+54 = Δ 15°00' Lt. set 1/2" x 2' Iron Pin

111+00

110+00

109+00

108+85.75 = P.O.T. Paving Stake FB 1383-30

108+00

107+00

46.315

111+54
- Δ 15° 00' Lt.
Set 1/2" x 2' Iron Pin
3-8-44
(Set to same Elev. as Stub)

185.86

Ft. in 3-8-44

118+00

117+00

Stub Rt. 3-7-44 Set Iron Pin 5/8x2'
0.04 Lower than Stub.
Pin = Elev. 1976.3 F-45

116+17.15 = Δ 21°34'00" Rt. Stub

116+00

115+00

114+00

113+00

Redwood Stub
R.P.

37'

116+17.15
Δ 21°34'00" Rt.
Stub.

Stub
R.P. 25'
on Bank

Replaced by 5/8" x 2'
Iron Pin 0.04 Lower
than Stub

4631.5'

124+00

+1693 = P.O.T. Leaving station

123+00

122+00

121+00

120+00

119+00

123+1693
P.O.T. Lev. Station
(Not Found 3-8-44)

130+00

129+00

Water Main
128+49.5 = Int. 36" RF Conc. Pipe (Steel Cylinder)

128+40 Set Hub 2"x2" Redwood set March 7th 1944

+38 = ℄ Wooden Pipe

128+29.58 = P.O.T. Stub.

+29

128+00

127+00

126+00

125+06.40 = Δ 11°39'30" Lt.

125+00

P-46
Elev. Stake 128+29.58 = 217.95
5.88+
223.83
4.75-
Set BM → 219.08
on hub

Set 2" Redwood Hub 10" Long.

36" RF Conc Pipe (See Page 52) For Elev. Pipe

83.0 ft

128+40
128+38

℄ 20.5 | Wooden Stave Water Main | 20.5

128+29.58 Fd. Stake 3-7-44
P.O.T.

℄ 36" Water Main — Tin Pipe

128+29

Set ¾"x2' Iron Pin → Fd. Stake 125+06.40
3-9-44 Δ 11°39'30" Lt.

137+00

136+00

135+50.93 = P.O.T.

135+00

134+00

~~133+91.36 = Δ 31°50' Rt.~~

133+00

Ft. in 3-7-74

132+12.70 = Δ 21°49'30" Rt. Set Cobble boulder Cross on Top.

132+00

131+00

135+50.93
P.O.T. Slate

RP
Rev. Stake

~~133+91.36~~
~~Δ 31°50' Rt.~~

178.66

Cross on Bolder
1/2" x 10"

132+12.70
Δ 21°49'30" Rt

+22.25 = P.O.T. Laving Stake

143+00

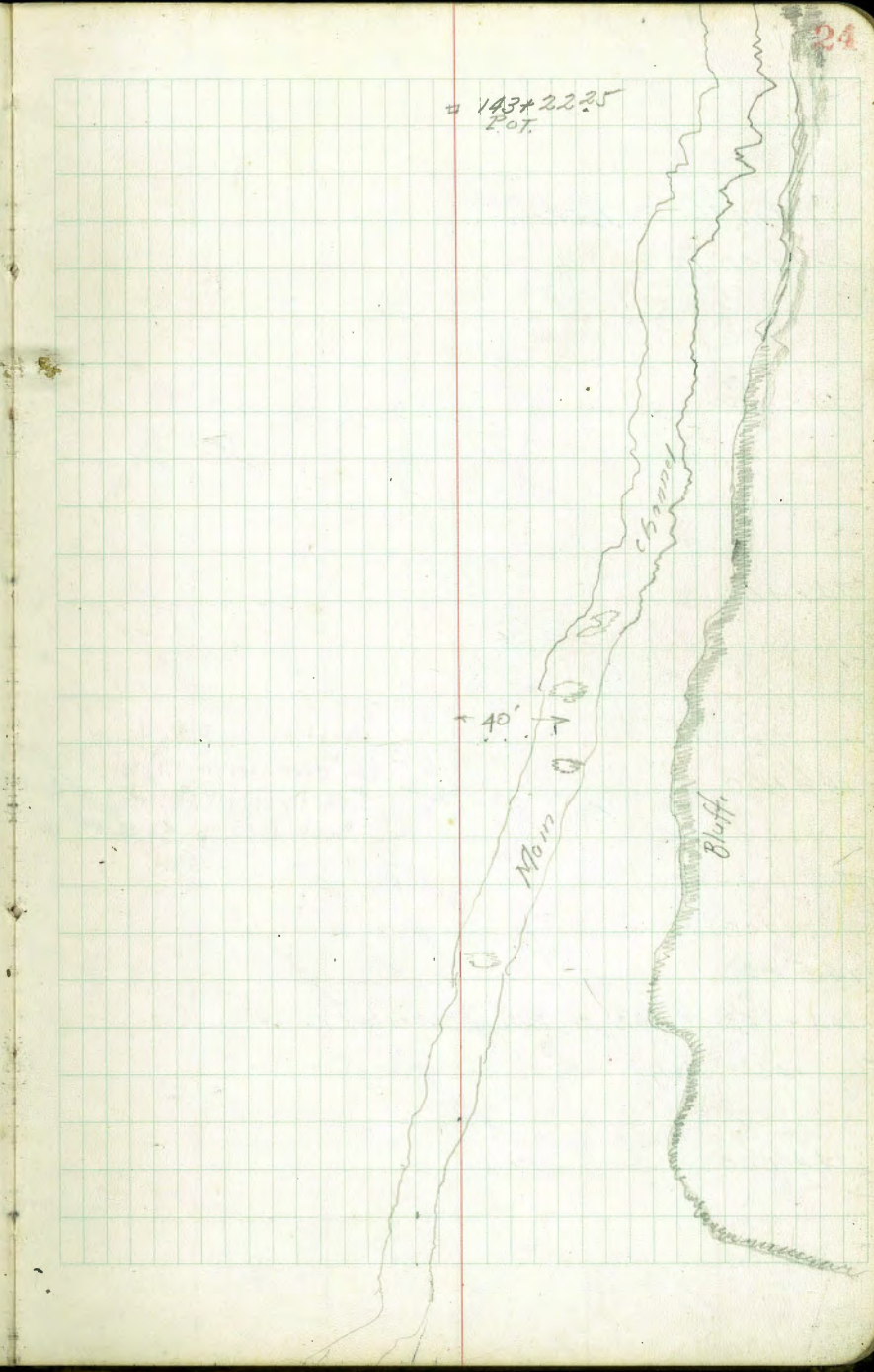
142+00

141+00

140+00

139+00

138+00



+17.76 = P.O.T. Stub.

149+00

148+00

147+00

146+00

Location of Pump House (7.5' from pavement) taken from Insurance Appraisal Book 1500 p. 31 OK in field
G.R.H.

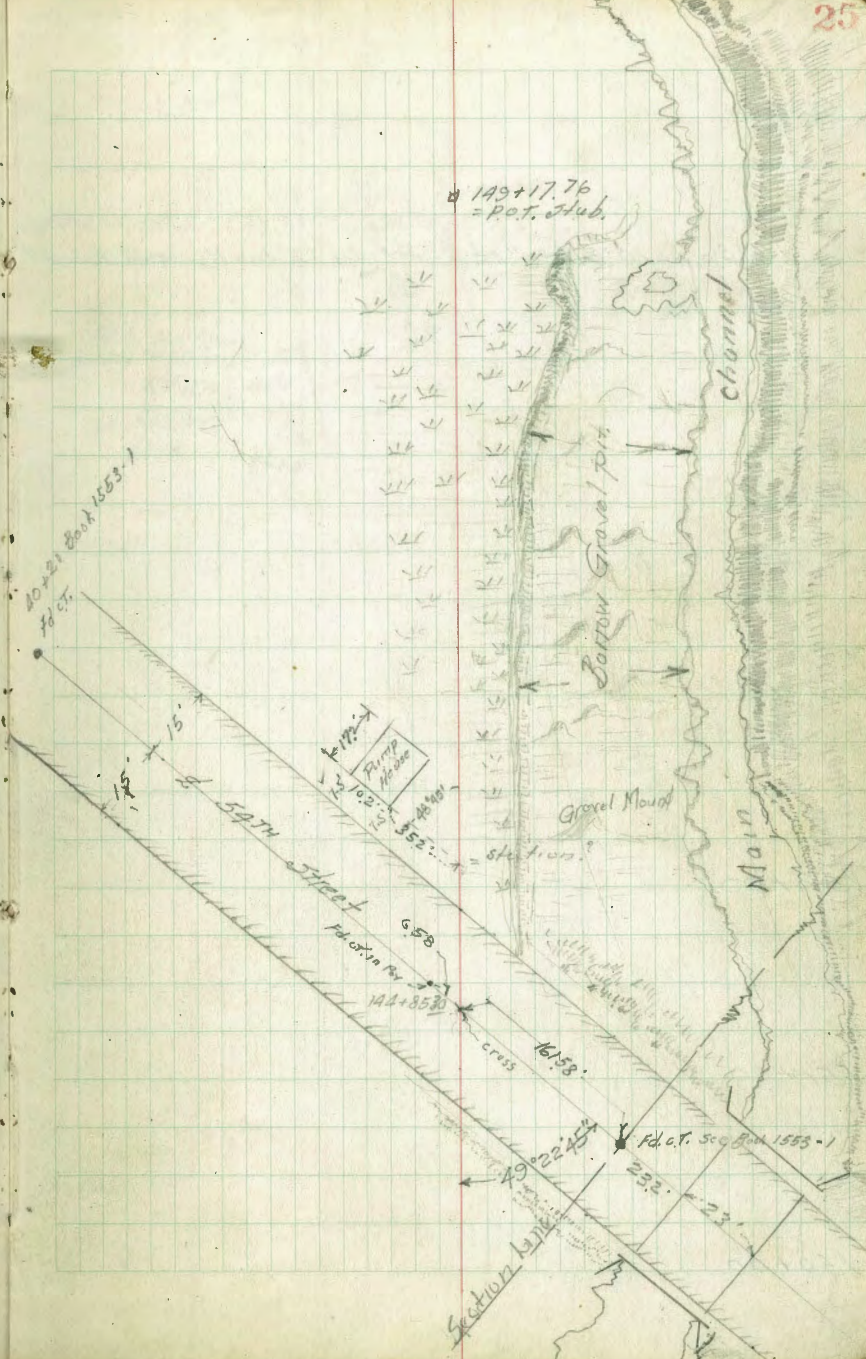
+05.3 = ℄ edge Paving.

145+00

144+85.30 = ℄ 54th St. Paving. = chisled Cross in Paving.

+65.80 = Wedge "

144+00

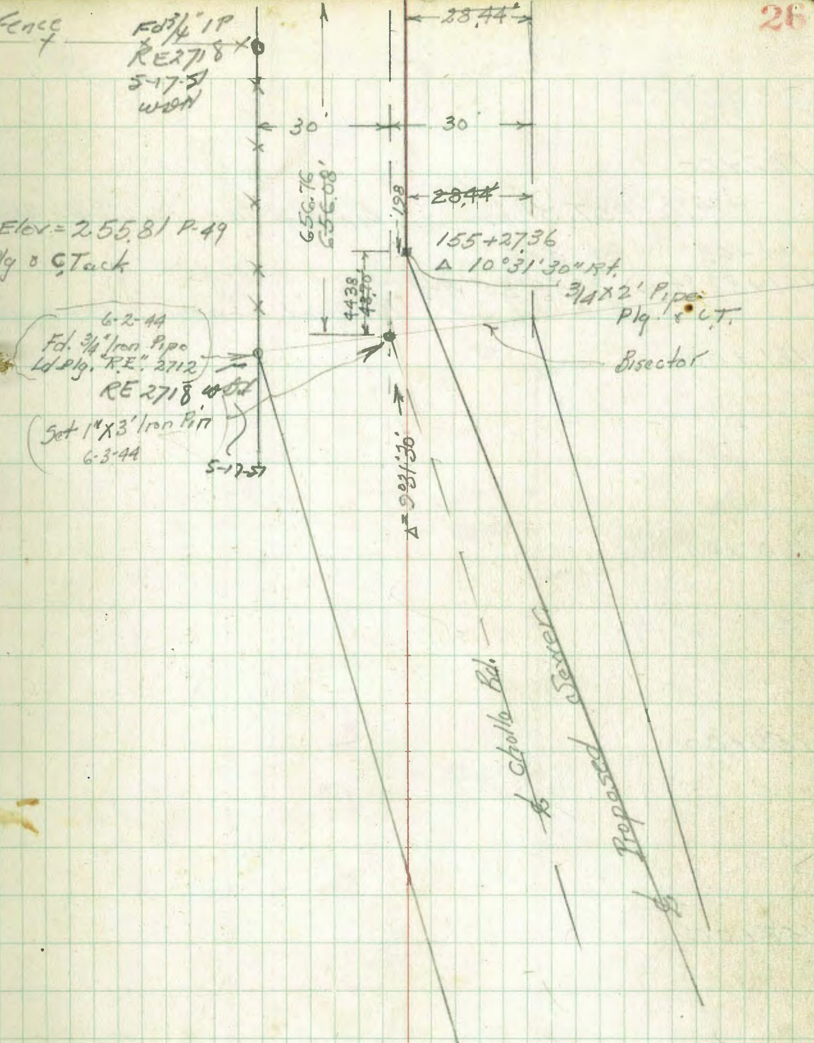


156+00

Fd. stub 3-15-44 Set to same Elev.=255.81 P-49

+27.36=Δ 10°31'30" Rt. Set 3/4"X2' Iron Pipe with Redwood Plg & C̣ Tack

155+00



154+00

153+00

152+00

151+00

150+00

See p. 28

3640.3650
Plotted TPS.
4-12-48 McQ

162+00

Fd. Stub 3-15-44
+79.8 = P.O.T. Stub. Set 5/8" x 2' Iron Pin to Same Elev.

161+63 = Tel Pole 3' Rt.

161+38.84 = Δ 30°53'30" Rt. Fd. Stub 3-15-44
Set Stub Replaced same with ½" x 3' Gulv. Pipe (No Elev)

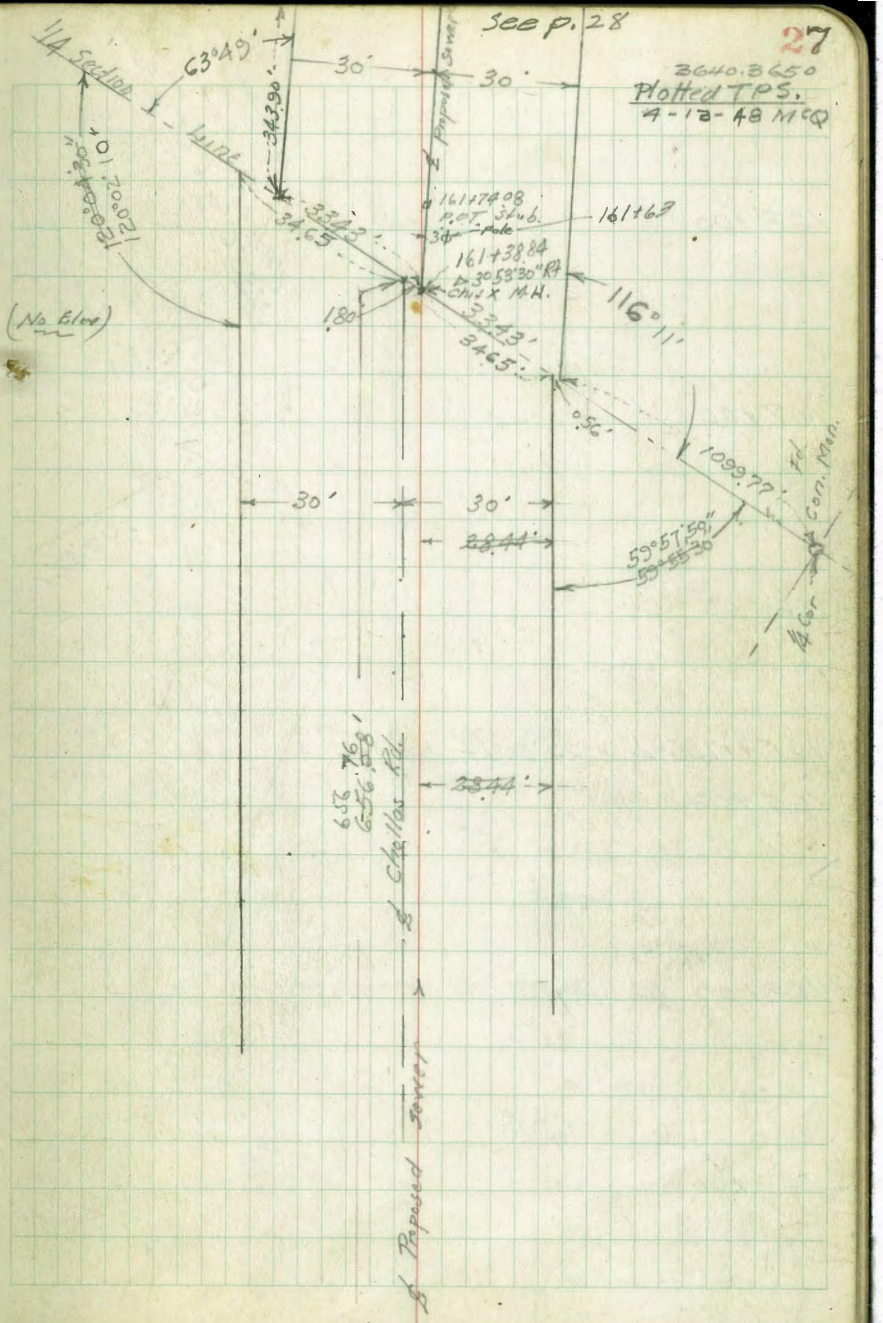
161+00

160+00

159+00

158+00

157+00



168 +00

167 +00

166 +00

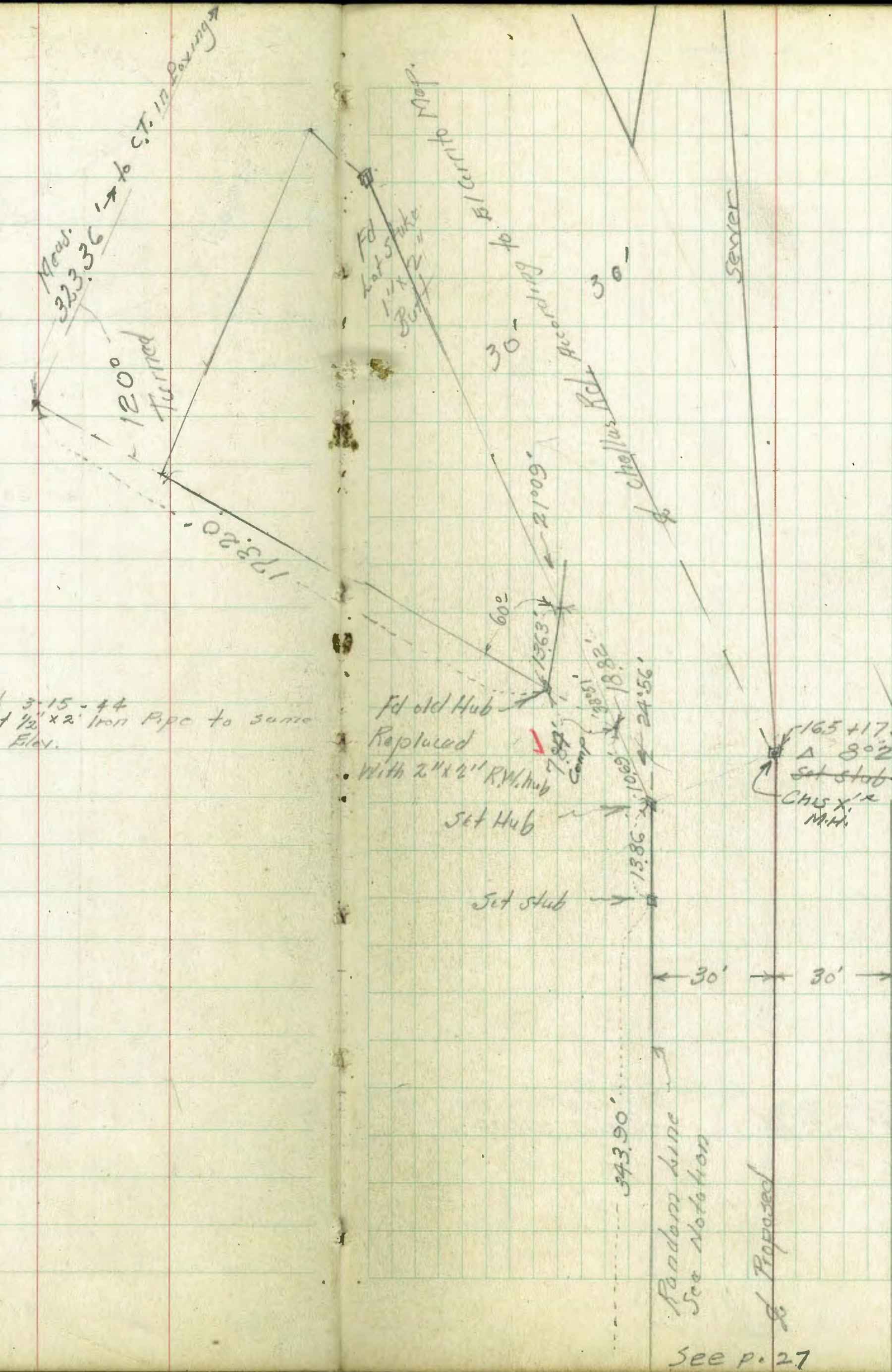
165 +17.95 = Δ 8°22'30" Lt. Stub.

Fd. stub 3-15-44
Set 1/2" x 2' Iron Pipe to same Elev.

165 +00

164 +00

163 +00



← Note: This Line is not the true line of Chollas Road, since the bearing of El-Cerrito Sub. makes the West boundary of Klaterville Hts. different from true North, which line I assumed to be North in Locating this Part of Chollas Road.

See p. 27

174+00

173+00

172+00

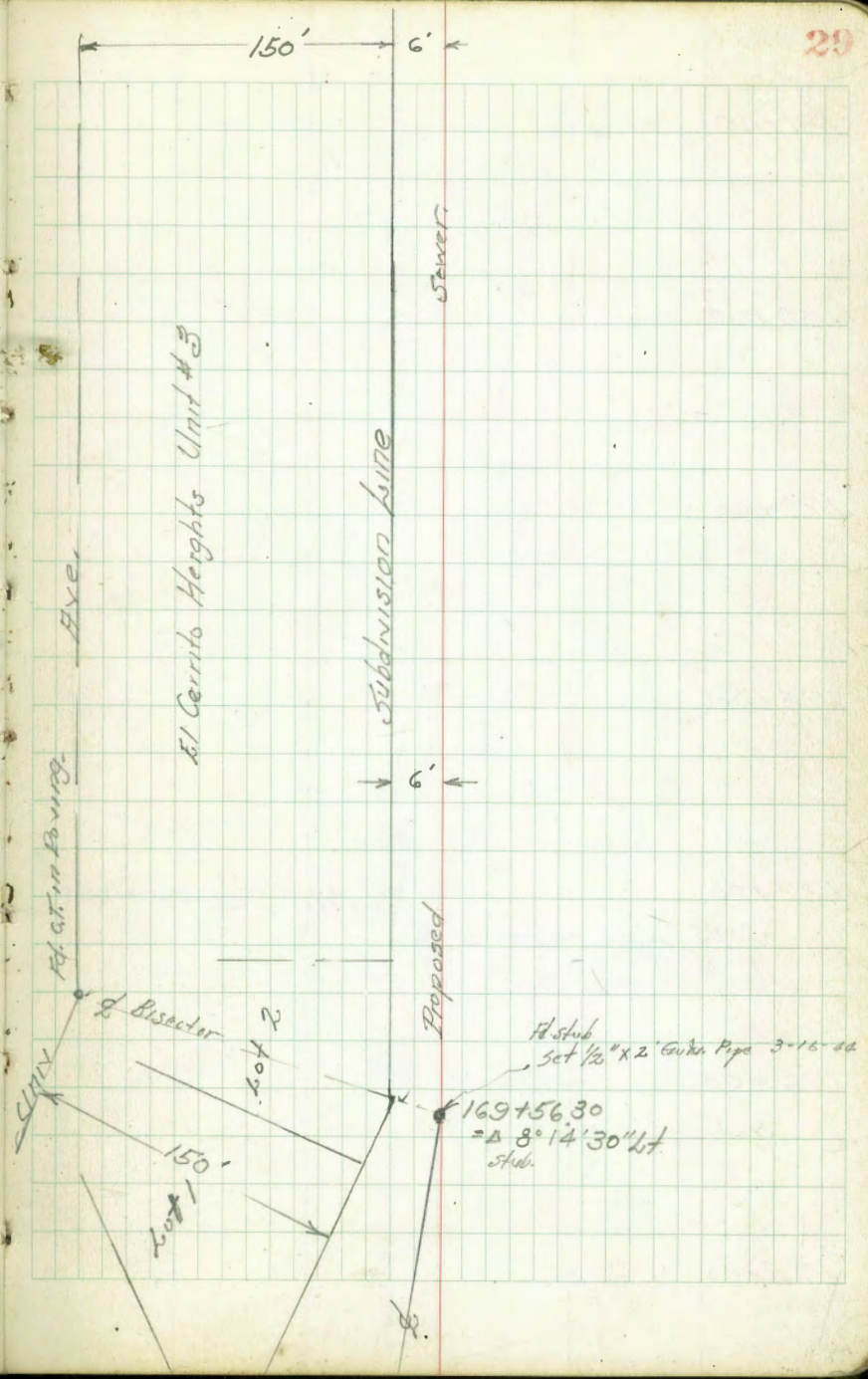
171+00

170+00

+56.30 = Δ 8°14'30" Lt. Stub

Fd. Stub 3-16-44
Set 1/2" x 2' Galv. Iron Pipe
to Elev. 2754.5

169+00



1+00

180+00

179+00

178+00

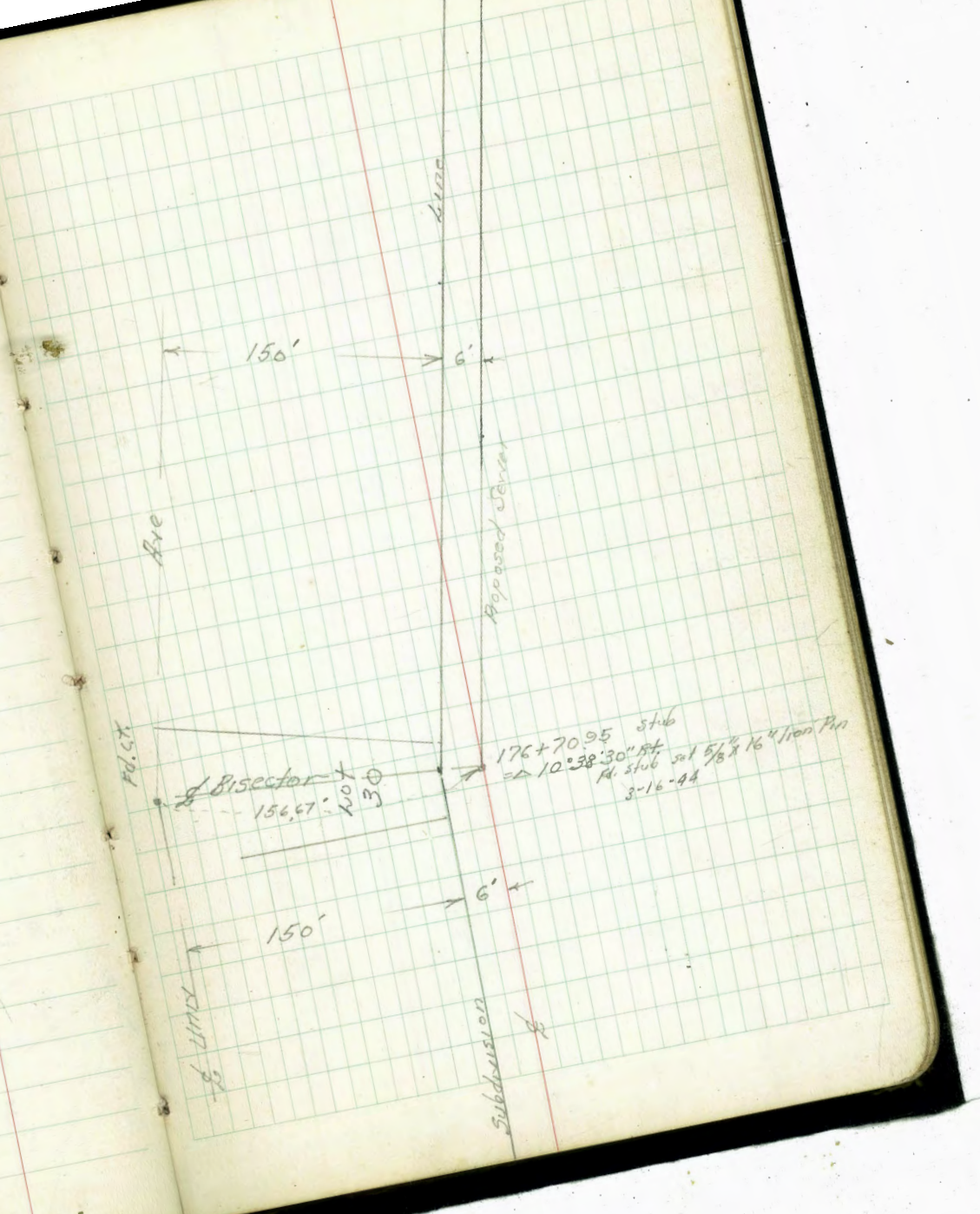
177+00

+70.95 = Δ 10°38'30" Rt.

Fd. stub Set 3-16-44
5/8" x 16" Iron Pin
stub.

176+00

175+00



187+00

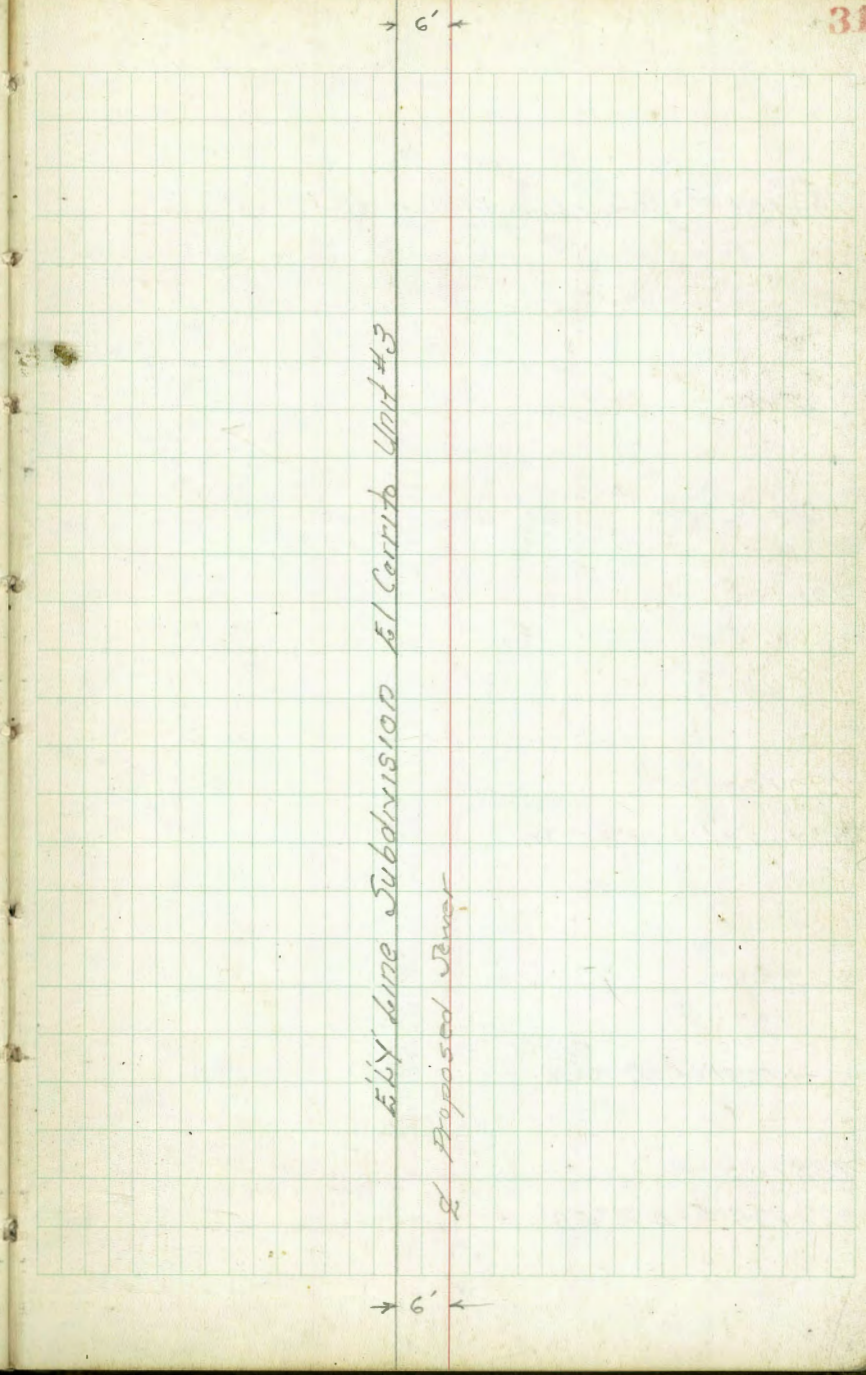
186+00

185+00

184+00

183+00

182+00



193+00.55 = Easterly Line El Cerrito Subdivision Line

192+00

191+00

190+00

189+95.67 = Δ 13°35' Rt.

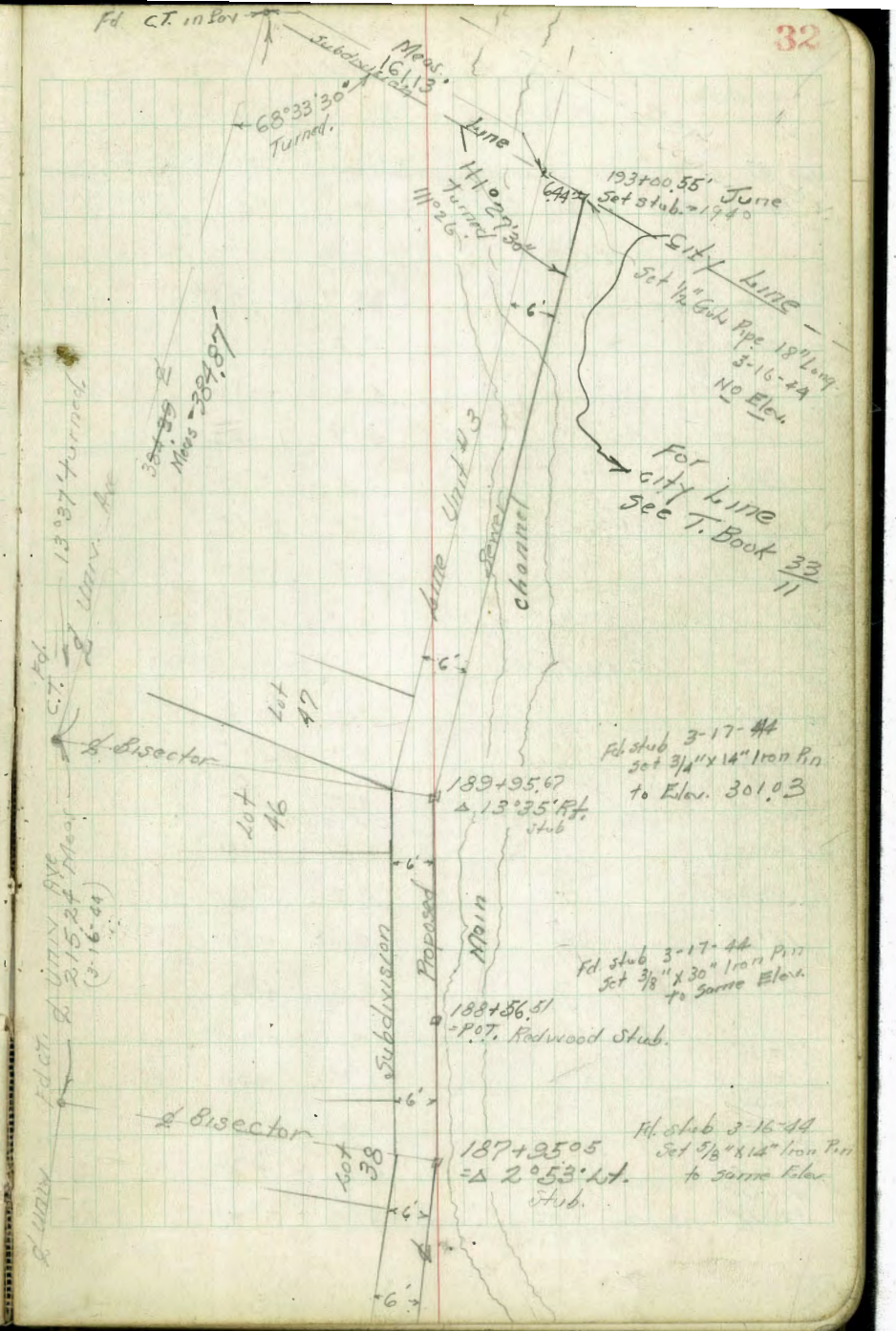
189+00

+56.51 = P.O.T. Redwood Stub

188+00

187+95.05 = Δ 2°53' Lt. Stub

Fd. Stub 3-16-44
Set 5/8" X 14" Iron Pin
to Same Elev.



Walker
Bliss
Isbell
12-28-40

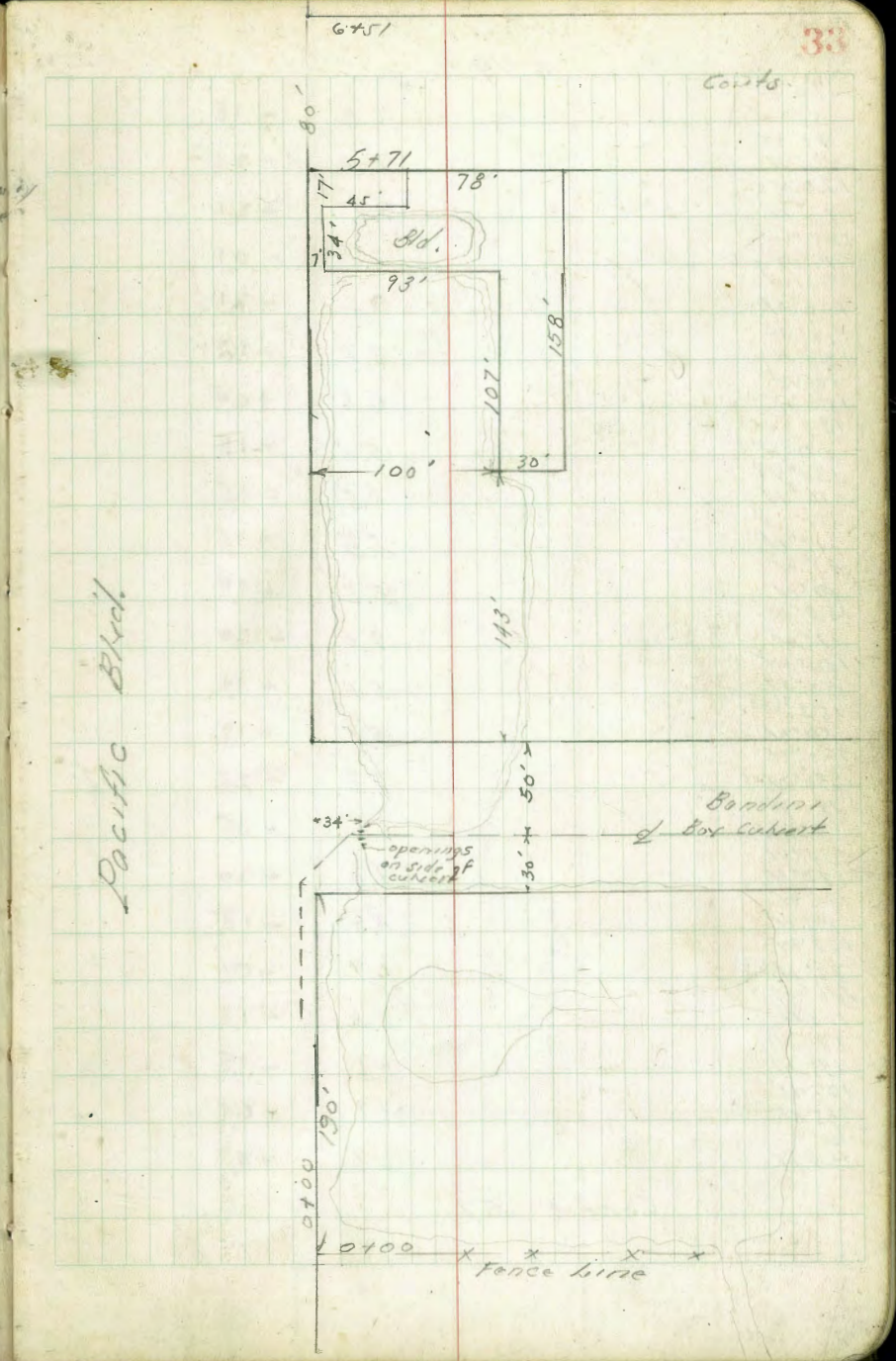
Elevations on Undrained Lands North of Pacific Blvd. Bet. Wright & Witherby

Indexed
D.M.

NW Bandini + Pacific Blvd.	5.39	6.99	1.60	B.M. Chiseled Sq. in curb.
	0+00			
N L Pacific		4.7	2.3	
10' N		4.7	2.3	
50' N		5.8	1.2	
100' N		4.7	2.3	
114' N		5.8	+ 1.2	
123' N		8.8	- 1.8	
133' N		8.7	- 1.7	
150' N		5.2	+ 1.8	
	0+07 W			
150' N		5.2	+ 1.8	
133 N		8.5	- 1.5	
123' N		8.5	- 1.5	
100 N		8.2	- 1.2	
50' N		8.3	- 1.3	
10' N		8.0	- 1.0	
0 0		4.8	+ 2.2	

Note: Shots from here are from Base lines

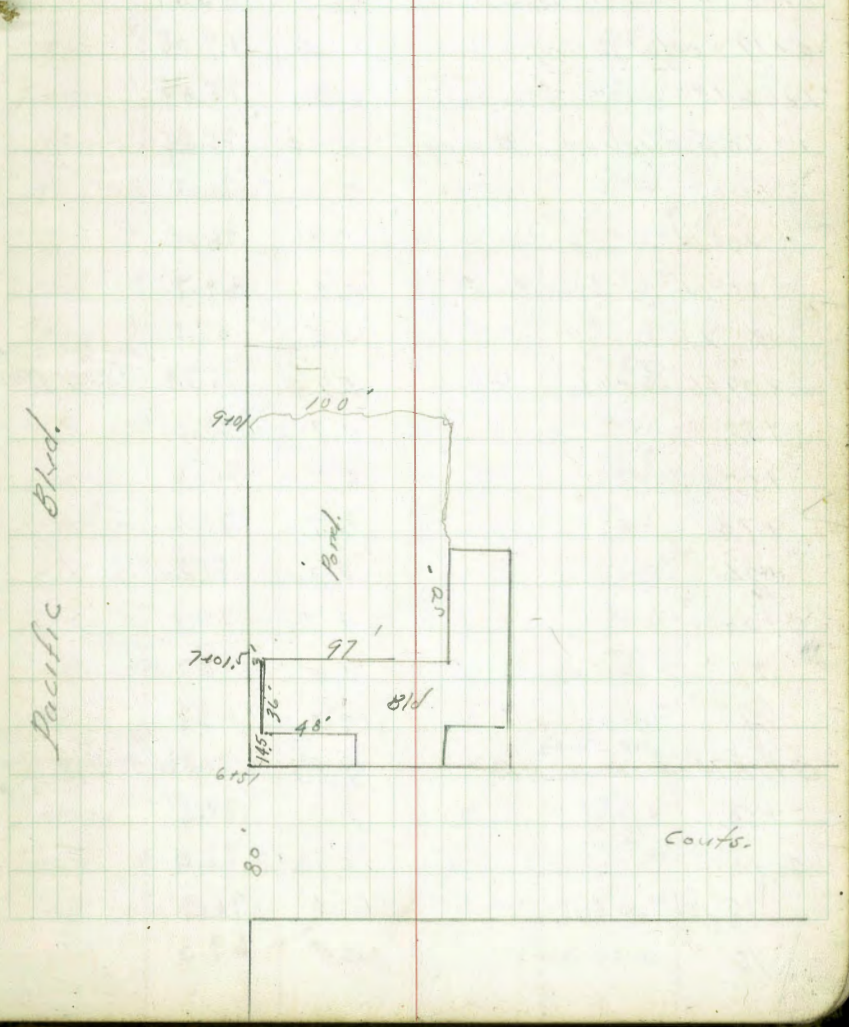
90 W 00 N		5.0	+ 20
90 W 11 N		8.6	- 16
95' W 20' N		4.6	+ 24
90' W 37' N		9.1	- 21



6.99

90' W 50' N	8.8	- 1.8
90' W 70' N	9.1	- 2.1
120 W 70 N	9.1	- 2.1
125' W 70' N	7.1	- 0.1
90' W 100 N	9.1	- 2.1
90' W 138' N	8.7	- 1.7
90' W 150 N	6.6	+ 0.4
130' W 00 N	5.1	+ 1.9
130' W 10' N	8.5	- 1.5
130' W 17' N	5.5	+ 1.5
147 W 17' N	5.2	+ 1.8
158' W 17' N	9.0	- 2.0
130' W 50' N	5.6	+ 1.4
152' W 50' N	5.1	+ 1.9
160' W 50' N	9.3	- 2.3
130' W 72' N	6.5	+ 0.5
135' W 72' N	9.0	- 2.0
130' W 82' N	8.8	- 1.8
127' W 82' N	6.9	+ 0.1
130' W 100 N	8.8	- 1.8
130' W 135 N	8.9	- 1.9
127' W 135 N	7.9	- 0.9
130' W 150 N	6.3	+ 0.7

Cont P-57



Walker.
Bliss
Isbell
c. 1940

— LEVELS —

LA MESA TRUNK LINE SEWER

Location Page 2 -

	6.79	81.69	74.90	B.M. C.T. E Horn Ave & Federal Blvd F.B. 1561-33
E Rim MH = 0+00 Page 2		7.98	73.71	✓ ✓ NW 1/8/44
0+00 Flow Line 24" Lamesa Line		18.17	63.52	✓
0+00 " " 15" Horne Ave Line		17.82	63.87	✓
0+19 = edge Paving.		7.64	74.05	✓
1+06.13 = on " & Tangent		6.30	75.39	✓
1+70.5 = NLY edge Paving		6.74	75.55	✓
2+00		6.0	75.7	✓
23' Lt. on Rip Rap (conc.)		5.7	76.0	✓
25' Lt. " channel		14.0	67.7	✓
30' Lt. in "		14.6	67.1	✓
2+09.66 on Stub POT		5.90	75.79	✓ Set 5/8" x 2' Iron Pin To same Elev 3-14-44
+38		4.7	77.0	✓
+55		6.7	75.0	✓
+70		6.5	75.2	✓
+84		9.9	71.8	✓
3+00		9.7	72.0	✓
27' Lt. Top Bank.		11.0	70.7	✓ ✓
39' " in Channel		13.2	68.5	✓ ✓
3+18.74 = ∠ 130°00' Rt. on Stake		9.83	71.86	✓ Set 3/4" Iron Pin To same Elev 3-14-44
+50		9.2	72.5	✓
4+00		8.7	73.0	✓
78' Lt. on Bank.		10.4	71.3	✓
90' " in Channel		12.4	69.3	✓

INDEXED
EFB

81.69 ✓

35

4+09			7.4	74.3 ✓
4+45			C.Z	75.5 ✓
4+55			7.7	74.0 ✓
+65			7.0	74.7 ✓
+90.			9.0	72.7 ✓
5+00			8.2	73.5 ✓ ✓
+50			7.3	74.4 ✓
+80			7.6	74.1 ✓
6+00			5.6	76.1 ✓
57 Lt. on Bank.			6.7	75.0 ✓
70 " in Channel			10.2	71.5 ✓
T.P.	5.50	82.69 ✓	4.50	77.19 ✓ Note in Pole 20' Lt. 6+68
6+47.7 = P.O.T. Stake			7.02	75.67 ✓
7+00			7.0	75.7 ✓
+50			6.9	75.8 ✓
+80 = Bank of Channel			8.0	74.7 ✓
+85 in "			7.9	72.8 ✓
8+00 " "			9.6	73.1 ✓
+55 on Ridge Gravel in channel			5.8	76.9 ✓
9+00 " " "			6.1	76.6 ✓
+40 on " " "			7.1	75.6 ✓
+75 in "			6.7	76.0 ✓
+85 Ely Bank			5.4	77.3 ✓
10+00			5.7	77.0 ✓
55 Rt. on Bank			5.3	77.4 ✓
65' Rt. in Channel			6.3	76.4 ✓

	82.69			
10+50		5.7	77.0	✓
11+00		4.5	78.2	✓
+50		3.4	79.3	✓
11+85.42 = 12°42' Lt.		3.21	79.48	Pos. Stake
12+00		3.0	79.7	✓
10' Lt. Bank Trib. channel		2.7	80.0	✓
20 " in " "		5.0	77.7	✓
85' Rt. Bank main channel		3.6	79.1	✓
95' " in " "		5.6	77.1	✓
T.P.	8.52	88.00	3.21	79.48
12+50			9.0	79.0 ✓
13+00			8.1	79.9 ✓
+20			6.7	81.3 ✓
+55			7.5	80.5 ✓
14+00			6.3	81.7 ✓
10 Lt. in Trib channel			7.3	80.7 ✓
100' Rt. top Bank Main "			6.2	81.8 ✓
110' " in main "			11.5	76.5 ✓
14+45			6.1	81.9 ✓
+80			4.9	83.1 ✓
15+00			6.4	81.6 ✓
+11 in Main channel			8.3	79.7 ✓
+25 Gravel Ridge			6.2	81.8 ✓
+55 " in Main "			8.8	79.2 ✓
+65			5.5	82.5 ✓
+85			4.9	83.1 ✓

	88.00			
16+00			4.8	83.2 ✓
35' Lt. on Bank.			4.4	83.6 ✓
50 " in Main channel			6.9	81.1 ✓
16+50			6.1	81.9 ✓
+72			3.2	84.8 ✓
+79.94 = P.O.T.	12.09	96.42 ✓	3.67	84.33 ✓ stub.
17+00			13.1	83.3 ✓
+25			11.1	85.3 ✓
+50			12.2	84.2 ✓
+70			12.0	84.4 ✓
18+00			10.0	86.4 ✓
120' Lt. on Bank main ch.			10.5	85.9 ✓
130' Lt. in Main ch.			13.2	83.2 ✓
18+45			10.1	86.3 ✓
+65			11.5	84.9 ✓
19+00			11.2	85.2 ✓
+25			9.8	86.6 ✓
5' Rt. in Wash			10.9	85.5 ✓
+45 " "			10.6	85.8 ✓
+60			6.8	89.6 ✓
+70			7.4	89.0 ✓
19+79.80 = P.O.T. on stub.			6.36	90.06 ✓
+90			4.5	91.9 ✓
20+00			5.0	91.4 ✓
5' Lt.			5.0	91.4 ✓
15' Lt.			10.1	86.3 ✓
80' Lt.			9.1	87.3 ✓
100' Lt.			12.3	84.1 ✓

96.42

20+20			8.3	88.1
+50			9.2	87.2
21+00			7.8	88.6
+50			7.7	88.7
+95			6.6	89.8
22+00			7.7	88.7
+35 - Bank			8.8	87.6
+45 in channel			10.6	85.8
+75 Gravel Ridge			7.0	89.4
23+00			7.2	89.2
+25			7.0	89.4
+50			5.1	91.3
T.P	6.91	98.37	4.96	91.41
+75			6.5	91.9
+90			8.1	90.3
24+00			6.5	91.9
60' Rt. in Main channel			9.0	89.4
40' " on Bank "			7.0	91.4
24+50			6.3	92.1
25+00			6.0	92.4
+50			5.2	93.2
+80			4.8	93.6
+85			3.2	95.2
26+00 = P.O.T. Stub.			2.94	95.43
+15			2.4	96.0
+20 = W. Edge channel			7.2	91.2

98.37

26+55 in channel	5.3	93.1	
27+00	4.8	93.6	
+50	3.1	95.3	
28+00	2.9	95.5	
110' Lt.	2.7	95.7	
150' Lt in E Main ch.	4.6	93.8	
T.P. 9.05	104.36	3.06	95.31
28+20	7.5	96.9	
+60	7.1	97.3	
+75	8.8	95.6	
+95	4.9	99.5	
29+00	4.9	99.5	
+60 = W.L.Y. Bank	6.3	98.1	
+75 in channel	9.8	94.6	
30+00 " "	8.4	96.0	
+10 " "	8.6	95.8	
+30 Gravel Ridge	6.7	98.7	
30+82.20 P.O.T. Stake	5.23	99.13	Book 1383-28
31+00 W.L.Y. Bank	6.6	97.8	
+15 in Main ch.	8.2	96.2	
+65 " Main ch.	6.9	97.5	
+85 on Bank	4.0	100.4	
32+00	3.6	100.8	
+15	4.4	100.0	
+40	2.8	101.6	
+55	3.4	101.0	

	104.36			
32+80		4.5	99.9	
+85	Picket	7.4	97.0	
+90		4.4	100.0	
33+00		3.7	100.7	
	T.P. 12,62 113,24			
33+27.1	0:Δ 17°52'20" Lt.	3.74	100.62	on stake
+42		12.8	100.4	
+50		9.9	103.4	
+75		8.5	104.8	
34+00		8.0	105.3	
+50		7.8	105.5	
105' Lt.	on Bank.	7.6	105.76	
150	" in edge ch.	12.0	101.2	
176	" " Main "	14.1	99.21	
35+00		7.2	106.0	
+60		4.7	108.5	
+83.35	= P.O.T. Stake	5.07	108.17	
+87	SLY Bank.	5.0	108.2	
+92	" edge main ch.	9.4	103.8	
36+00	in " "	11.3	101.9	
+50	" " "	9.9	103.3	
37+00	" " "	9.2	104.0	
+50		8.4	104.8	
15' Rt.	in " "	10.8	102.4	
38+00		6.6	106.6	
35' Rt.	" " "	11.1	102.1	
38+55		5.8	107.4	

	113.24			
38+55		7.5	105.7	
39+00		8.7	104.5	
+10	in ch.	9.3	103.9	
+30		7.4	105.8	
+50		6.7	106.75	
40+00		6.4	106.8	
TP 1206	119.03	6.27	106.97	
40+30	in ch.	12.7	106.3	
+60	" "	10.9	108.1	
+80	" "	11.5	107.5	
41+00		10.2	108.8	
+15		10.4	108.6	
+25	in ch.	11.7	107.3	
41+67.40	on stake	9.29	109.74	Book 1383-28
+74		5.3	113.7	
42+00		4.8	114.2	
+20.87	on P.O.T. Stub.	4.56	114.47	
+45	on Bank ch.	4.6	114.4	
+60	in Main ch.	9.3	109.7	
43+00		7.6	111.4	
+50		6.2	112.8	
+80	in ch.	7.1	111.9	
44+00		6.5	112.5	
+50		5.7	113.3	
45+00		5.0	114.0	
+15	in ch.	7.1	111.9	

		119.03			
45+35			4.6	114.4	✓
46+00			3.8	115.2	✓
T.P.	8.50	124.03	3.50	115.53	✓
46+35			8.3	115.7	✓
+50			5.5	118.5	✓
47+00			4.9	119.1	✓
+08			4.8	119.2	✓
+13			7.5	116.5	✓
+48.60	on Hub		7.02	117.01	Book 1383-78
+65			5.8	118.2	✓
48+00			5.6	118.4	✓
+45			5.5	118.5	✓
+70	on Bank ch.		5.0	119.0	✓
+75	SLY edge Main ch.		7.2	116.8	✓
49+00	in channel		6.0	118.0	✓
+30	gravel ridge		4.7	119.3	✓
+40	in ch.		5.9	118.1	✓
+55			4.9	119.1	✓
50+00			3.9	120.1	✓
+35	in ch.		5.8	118.2	✓
+50			5.1	118.9	✓
+70	NLY Bank ch.		1.1	122.9	✓
51+00			1.0	123.0	✓
T.P.	12.53	135.52	1.04	122.99	✓
51+26.47	=P.O.T.		12.42	123.10	✓
+50			12.0	123.52	✓

		135.52			
52+00			12.0	123.5	✓
+15			11.7	123.8	✓
+30			13.3	122.2	✓
+50			11.0	124.5	✓
53+00			10.6	124.9	✓
+10			12.3	123.2	✓
+50			10.4	125.1	✓
54+00			9.0	126.5	✓
100' Lt.	=Bank Main ch.		8.5	127.0	✓
115' Lt.	= in " "		11.6	123.9	✓
54+50			8.4	127.1	✓
55+00			7.7	127.8	✓
+50			7.6	127.9	✓
+80			8.3	127.2	✓
56+00	on Mound Loose dirt		5.2	130.3	✓
+15	" " " "		2.6	132.9	✓
+35	" " " "		5.0	130.5	✓
+70	=Not Ground.		6.4	129.1	✓
57+00			6.3	129.2	✓
45' Lt.	on Bank		2.6	132.9	✓
65'	" in ch.		7.7	127.8	✓
+50			6.2	129.3	✓
+80			5.7	129.8	✓
58+00			4.4	131.1	✓
+50			4.1	131.4	✓
+75			3.6	131.9	✓

		135.52			
59+00			5.1	130.4	
+30			3.2	132.3	
T.P.	12.66	143.15	5.03	130.49	
+55			11.9	131.3	
+65			10.4	132.8	
60+00			9.9	133.3	
225' Lt in ℄ Main channel			13.5	129.7	
60+50			8.6	134.6	
61+00			7.9	135.3	
+35			7.6	135.6	
61+50 = Toe Spillway Conc. Apron			6.6	136.6	Fairmount Ave Paving.
+54 on Paving Apron			5.30	137.85	
+59.31 " SLY edge Paving			5.06	138.09	
+82.70 = NLY " "			5.20	137.95	
61+88.46 = POT. Stub.			5.00	138.15	
+92 = NLY edge Berm			5.0	138.2	
+98			7.0	136.2	
62+00			6.9	136.3	
+49.61 on Stub.		Not on Plan	6.77	136.38	Book 1383-28 → Note: Set 1"x2" Iron Pin to Same Elev. 3-13-44
63+00			5.5	137.7	
105' Lt. in on Bal channel			6.6	136.6	
145' " " Main "			10.0	133.2	
285' " " Trib. "			9.8	133.4	
63+50			4.8	138.4	
+85	P.O.T. on Stub.		6.10	137.05	
64			6.3	136.9	

		143.15			
64+25			5.5	137.7	
+50			7.5	135.7	
64+67.42 on Redwood Hub.			7.33	135.82	Book 1383-28
65+00			7.0	136.2	
+50			6.0	137.2	
66+00			5.5	137.7	
T.P.	6.56	144.19	5.52	137.63	
+50			6.2	138.0	
67+00			5.6	138.6	
+50			5.5	138.7	
68+00			5.5	138.7 +38.2	138.7 Not on this Elev ?
+29 = Δ 20°00' Lt. (Pipe)			5.60	138.59	See P-70 new Elev. on Paving St.
15' Rt. to the Bank.			6.0	138.2	
25' Rt. on Bank			0.0	144.2	
50' Rt. - old dirt Road			0.0	144.2	
68+50			5.3	138.9	
+60			4.1	140.1	
69+00			4.3	139.9	
65' Lt. in ch			5.7	138.5	
69+50			3.9	140.3	
70+00			1.8	142.4	
+25			3.8	140.4	
T.P.	7.76	151.17	0.78	143.41	
50 in ch.			9.4	141.8	
71+00 " "			9.1	142.1	
60' Lt. in ch			10.1	141.1	
100' " " "			11.2	140.0	

71+20 SLY End Bank	9.1	142.1
3' Rt. = toe of Bank.	9.1	142.1
5' Rt. = top " "	3.7	147.5
71+50	8.5	142.7
+85 = NLY end Bank	8.1	143.1
5' Rt. = toe Bank	8.1	143.1
8' " = top "	1.7	149.5
72+00	8.1	143.1
+50	7.1	144.1
72+80 = SLY end Bank	6.9	144.3
5' Rt. = toe "	6.0	145.2
6' " = top "	0.5	150.7
73+00	6.9	144.3
60' Lt. in ch.	8.4	142.8
110' " " "	9.5	141.7
73+50	5.8	145.4
10' Lt. in ch.	7.0	144.2
73+80 = NLY end Bank.	6.1	145.1
14' Rt. = toe "	5.1	146.1
16' Lt. = top "	+2.0	153.2
74+00 on Gravel Ridge	5.1	146.1
3' Lt. in ch.	6.2	145.0
74+12.74 = P.O.T. Rv stake	4.70	146.47 Iron Pin = 146.43
+50 on Gravel Ridge in ch.	4.4	146.8
4' Lt. in ch.	5.6	145.6
75+00 = ELY edge ch.	5.9	145.3

(75+00) 80' Lt. in ch.	6.0	145.2
" 130 " " Main ch.	6.0	145.2
75+50 on Ridge in ch.	4.2	147.0
76+00 " " " "	2.8	148.4
15' Rt. in ch.	3.8	147.4
76+50	1.5	149.7
P. 7.23 157.03	1.37	149.80
77+00 on Bridge in ch.	7.5	149.5
10' Rt. in ch.	8.8	148.2
55' Lt. in ch.	9.2	147.8
77+35 in ch.	8.2	148.8
+70	6.6	150.4
78+00	5.7	151.3 See Note, Page 14
15' Lt. in ch	7.2	149.8
78+29 = Δ 10°11'30" Rt. on Rv. Stake	5.16	151.87
+65 on Gravel Bank	4.6	152.4
79+00 " " "	5.5	151.5
30' Lt. in ch.	7.7	149.3
75 " " "	6.5	150.5
79+50 " "	6.6	150.4
+60 on Bank Between chs.	4.4	152.6
80+00 " " " "	4.0	153.0
35' Rt. in ch.	6.9	150.1
80+50 on Bank Bet. ch.	2.2	154.8
+65 in ch.	6.3	150.7
+90	3.8	153.2

157.03

81+00			3.8	153.2
15' Lt. in ch.			6.5	150.5
T.P.	10.80	163.72	4.11	152.92
81+15 in ch.			11.8	151.9
6' Lt. in Pocket			13.3	150.4
81+30			7.3	156.4
+55			8.0	155.7
+80			5.8	157.9
82+00			5.8	157.9
50' Rt. in ch.			8.8	154.9
82+15 on island bot. ch.			3.1	160.6
+30 in ch.			7.6	156.1
+60 = " "			7.7	156.0
83+00 N&Y edge ch.			7.6	156.1
+50			5.6	158.1
+75			5.9	157.8
+85			4.6	159.1
84+00			5.6	158.1
55' Lt. in ch.			6.0	157.7
75' " on old RR Fill			+1.5	165.2
100' Lt. in ch.			3.5	160.2
84+10			6.4	157.3
+35			3.9	159.8
+50 T.P. 6.56			2.8	160.9
+63.83 = P.O.T. Stake		169.04	1.24	162.48
84+85			8.0	161.0

169.04

85+00	7.6	161.4
10' Lt. = East edge Branch ch.	10.4	158.6
85+20	8.8	160.2
+50	8.6	160.4
+75	6.6	162.4
10' Lt. = East edge ch.	9.5	159.5
85+95	7.3	161.7
86+00	5.5	163.5
14' Lt. = " " "	9.1	159.9
40' Lt. on old R.R. Fill Bot. ch.	4.5	164.5
120' " in Main ch.	9.5	159.5
86+50	3.5	165.5
2' Lt. edge Bank	3.7	165.3
5' Lt. toe "	7.0	162.0
15' Lt. in Branch ch.	8.4	160.6
87+00	1.9	167.1
6' Lt. edge Bank	2.6	166.4
10' " toe "	7.0	162.0
20' Lt. = & Branch ch.	8.6	160.4
Stake Replaced with Iron Pin to Elev.		167.44
87+17.22 = P.O.T. for stake	1.52	167.5
87+26 = top Bank	1.5	167.5
140' toe "	8.3	160.7
+50 = edge ch.	8.3	160.7
88+00	6.7	162.3
18' Lt. in ch.	7.7	161.3
27' " " "	7.6	161.4
40' " on R.R. Fill Bot. ch.	+1.3	170.3
125' Lt. in Main ch.	8.4	160.6

5/8" x 2' Iron Pin 3-0-44

169.04

88+50 in Branch ch.		6.5	162.5
89+00 " " ch.		5.8	163.2
+50 " " "		5.7	163.3
+75		4.6	164.4
T.P.	9.23	174.87	3.40 165.64
90+10			7.6 167.3
5' Lt. in Branch Channel			10.9 164.0
18' Lt. " " "			9.0 165.9
38" top RR Fill			+2.3 177.2
125' Lt. in Main ch.			11.3 163.6
90+60 in Branch ch.			7.5 167.4
90+90 " " "			11.5 163.4
91+00 " " "			11.7 163.2
+50 " " "			9.7 165.2
+75 " " "			10.7 164.2
92+00 in ch.			9.6 165.3
16' Lt. toe R.R. Fill			9.3 165.6
42' " = ℄ " "			+1.5 176.4
70' Lt. in Main ch.			9.6 165.3
170' " " " "			9.6 165.3
92+50			6.8 168.1
93+04.4 = Δ 4°39'30" Rt. on Rev. Sta.			5.25 169.62 Station Reset Do not use for BM
+50 on Ridge in ch.			6.2 168.7
10' Rt. in ch.			7.4 167.5
16' Lt. " "			6.5 168.4
93+175 on Ridge in ch.			3.6 171.3

174.87

93+80 in ch.		6.3	168.6
94+00 " "		6.7	168.2
+50 " "		5.6	169.3
+87 Ridge in ch.		4.0	170.9
95+00 in "		6.0	168.9
+20 on Ridge in ch.		3.2	171.7
+50 in ch.		5.6	169.3
96+00		3.4	171.5
+50		2.5	172.4
T.P.	13.91	186.54	2.24 172.63
97+00			14.7 171.8
+20			14.8 171.7
+40			13.3 173.2
6' Rt. in ch			15.5 171.0
+55			12.0 174.5
6' Rt. in ch.			14.7 171.8
97+94.07 = Δ 7°56'30" Rt.			12.42 174.12 on Rev. Sta.
7' Lt. toe R.R. Fill			11.8 174.7
20' Lt. ℄ " "			6.7 179.8
60' in Main ch.			13.4 173.1
100' " " "			13.6 172.9
10' Rt. in Branch "			14.8 172.2
98+20			12.7 173.8
+30			11.1 175.4
+60 in " "			12.8 173.7
+80			11.8 174.7

	186.54	Red.-Oken	
99+00	11.4	175.1	
+40	11.0	175.5	
+50 = Mound loose dirt	9.8	176.7	
+80 = " " "	7.5	179.0	
100+00 " " "	8.6	177.9	
12' Lt. in ch. Not Ground	11.5	175.0	
100+25 on Not. Ground. in ch.	10.4	176.1	
+50 in Branch ch.	10.5	176.0	
101+00 " " "	9.9	176.6	
35' Lt. = toe R.R. Fill	10.0	176.5	
55 " = ℄ " "	4.0	187.5	
75'	10.5	176.0	
165' Lt. in ℄ Main ch.	12.4	174.1	
101+50	10.5	176.0	
+60	10.5	176.0	
+70	8.0	178.5	
102+00	7.8	178.7	
+50	8.4	178.1	
103+00	7.0	179.5	
+45	6.1	180.4	
TP. 11.25	195.60	2.19	184.35
103+51	8.9	186.7	
+82	8.4	187.2	
+87	6.0	189.6	
+97 = SLY edge Pav.	5.41	190.19	
104+00 on cruse in Paving.	5.30	190.30	

195.60		
104+06.8 ℄ Paving.	5.10	190.50
+17 = N Edge "	5.00	190.60
109+22.04 P.O.T. on Stake	4.86	190.74
+25	4.8	190.8
+30	8.3	187.3
+46 Book 1383-19	7.9	187.7
Sta. 62+95 ℄ Euclid Pav.	9.75	185.85 +
		185.91 = Loudin
104+55	12.3	183.3
+80	12.6	183.0
+87	9.8	185.8
105+00	12.1	183.5
+33	12.7	182.9
+46 ℄ Branch ch.	16.6	179.6
+50 in " "	13.9	182.7
+62	12.0	183.6
106+06	11.7	183.9
+12	12.6	183.0
+15	10.1	185.5
+50	10.2	185.4
107+00	10.0	185.6
+50	8.2	187.4
108+06	7.5	188.1
70' Lt. in Main ch.	12.5	183.1
+50	7.3	188.3
109+00	6.5	189.1

		195.60		
T.P.	7.94	197.12	6.42	189.18
109+50	in Branch ch.		6.5	190.6
110+00	" " "		5.6	191.5
30' Lt.	" " "		7.5	189.6
42 "	on Ridge Bet. ch.		2.5	194.6
75' Lt.	in Main ch.		8.7	188.4
110+50	in Branch ch.		5.6	191.5
111+00	" " "		6.2	190.9
+40			5.6	191.5
111+54=Δ	15°00' Lt. on ~~Stub~~		5.11	192.0 (Set 1/2" x 2' Iron Pin Same Elev. 3-8-44)
112+00			4.0	193.1
+50			3.0	194.1
+65			2.9	194.2
10' Lt.	℄ Branch ch.		4.6	192.5
113+00	℄ " "		3.7	193.4
+50	in " "		3.4	193.7
114+00	" " "		2.8	194.3
T.P.	7.31	202.59	1.84	195.28
114+25			6.1	196.5
+50	on Gravel ridge		5.1	197.5
12' Rt.	in Branch		5.7	196.9
20' "	in ℄ " ch.		9.7	192.9
115+00	on gravel ridge		4.4	198.2
+50			4.7	197.9
116+00	in Branch ch.		5.0	197.6
+17.5=Δ	21°34' Rt.		4.93	197.63 = 197.66 Iron Pin on Pav. Stake
20' Lt.			4.5	198.1

See Alignment P. 20

		202.59		
50' Lt.			2.2	200.4
57' Lt.			6.5	196.1
88 Lt.			6.5	196.1
150' Lt.			5.5	197.1
225' Lt.			5.5	197.1
116+50	in Main ch.		5.5	197.1
117+00			3.7	198.9
+40			2.6	200.0
10' Lt.	in ℄ ch.		4.1	198.5
117+85			2.8	199.8
118+00	in ℄ ch.		3.4	199.2
+15	in ch.		2.8	199.8
T.P.	10.37	210.15	2.81	199.78
(117+60) 5' Lt.	in Pocket		12.8	197.4 (Not taken in order)
118+50			8.5	201.7
119+00			7.3	202.9
27' Rt.	in ℄ Main ch.		10.5	199.7
119+30			5.9	204.3
+57			5.8	204.4
+66	in Pocket		9.8	200.4
+75			6.0	204.2
120+00			7.4	202.8
+10	in ℄ Main ch.		7.7	202.5
+50			6.5	203.7
121+00			5.3	204.9
20' Lt.	in ℄ " "		6.6	203.6

per page

121+40	5.0	205.2
+65 = ℄ Main ch.	6.4	203.8
+80 on Gravel Bank.	4.9	205.3
122+00 " " "	4.7	205.5
15' Rt. in ℄ Main ch.	5.1	205.1
122+50 on gravel Bank.	3.6	206.6
+75	2.1	208.1
+85 in ch.	3.7	206.5
123+00	2.8	207.4
T.P. 12.76 219.60	3.31	206.84
+16.93 = P.O.T. Pav. Stake	8.46	211.14 Pav. Stake on Mound dirt
+50	11.2	208.4
20' Lt. in Main ch.	12.3	207.3
123+80	10.6	209.0
124+00	11.5	208.1
20' Lt. in " "	12.7	206.9
+25 in " "	12.2	207.4
+55	11.4	208.2
+70 " " "	12.1	207.5
+85	10.8	208.8
125+00	10.6	209.0
+06.40 = ∆ 11°39'30" Lt.	10.85	208.75 on Stake
+15 in Main ch.	11.5	208.1
+50	9.7	209.9
3' Rt. in " "	10.5	209.1
126+00	8.8	210.8

126+15	9.9	209.7
+23	7.4	212.2
+45 in ch.	9.4	210.2
+57 " "	8.2	211.4
+70 on Mound Gravel	3.2	216.4
+87 in Pocket to ch.	7.3	212.3
127+00 in Pocket to ch.	7.6	212.0
50' Lt. in ch	6.4	213.2
127+35	5.8	213.8
+63 in Pocket	7.8	212.3
+75	3.0	216.6
+85	5.7	213.9
4' Rt. in Pocket	7.2	212.4
T.P. 6.97 226.80	1.77	217.83
128+00	4.9	219.9
+10	7.6	217.2
128+29	6.8	218.0
128+29.58 on P.O.T. Stub.	6.85	217.95
(128+29) 46' Lt. on 36" Steel pipe	10.06	214.74
70' " " " "	9.96	214.84
60' Lt. on Ground.	11.8	213.0 in ch.
128+38 = ℄ Wooden Water Main 36"	6.8	218.0 on ground
46' Lt. on top "	9.24	215.56
70' " " " "	9.01	215.79
60' on Ground. in ch.	11.9	212.9
128+53	4.0	220.8

	224.80		
128+65	5.8	219.0	
129+00	5.4	219.4	
+25	10.6	214.2	
+45	8.7	216.1	
5' Lt.	10.2	214.6	
30' Lt. in ch.	11.3	213.5	
129+70	10.2	214.6	
130+00	10.4	214.4	
+06	10.1	214.7	
+25 on Mound Loose dirt.	2.8	222.0	
+40	8.4	216.4	
+50	9.3	215.5	
131+00 in Main ch.	8.3	216.5	
+20 " "	8.0	216.8	
+40	4.1	220.7	
+55	3.8	221.0	
30' Rt. in ℄ Main ch.	8.6	216.2	
131+75	6.1	218.7	
132+00	4.4	220.4	
+12.70 = Δ 21°49'30" Rt.			
T.P. 12.98	6.22	218.58	T.P. is ℄ of Cross on High Point
132+25 = ℄ ch.	13.1	218.5	
+50	12.5	219.1	
133+00 in ch.	12.0	219.6	
+15 " "	11.9	219.7	
+40	9.1	222.5	
10' Lt. in ch.	10.6	221.0	

	231.56		
134+00	9.6	222.0	
+22 in ch.	10.4	221.2	
+47	8.4	223.2	
+55	6.2	225.4	
+60	7.6	224.0	
135+00	7.4	224.2	
+50.93 = Pot. Stake	6.56	225.00	
136+00	5.3	226.3	
T.P. 6.50	6.56	225.00	231.50
+35	5.1	226.4	
+53 SKY edge ch.	6.1	225.4	
+70 in "	5.7	225.8	
137+00	2.4	229.1	
10' Lt. in ch.	5.0	226.5	
4' Rt. on Nat. Ground	3.8	227.7	
137+50	3.5	228.0	
+85 in ch.	3.7	227.8	
138+00 " "	3.9	227.6	
+26 " "	3.7	227.8	
of Boulder; +50 in ch.	2.9	228.6	
139+00	1.4	230.1	
T.P. 12.18	1.82	230.18	242.36
139+50	11.2	231.2	
140+00	10.7	231.7	
38' Rt. ℄ Main ch.	12.4	230.0	
140+50	10.0	232.4	

		242.36		
141+00			9.6	232.8
+24			9.9	232.5
+36			3.7	238.7
+44			4.0	238.4
+52	in Borrow Pit		11.6	230.8
+75			6.5	235.9
+90	" " "		8.2	234.2
+97	" " "		10.4	232.0
142+13	" " "		10.2	232.2
+26	" " "		8.6	233.8
+45			0.5	241.9
+60	" " "		7.0	235.4
+75	" " "		5.5	236.9
+85	" " "		9.0	233.4
143+00	" " "		8.3	234.1
+08	" " "		7.7	234.7
+19			0.5	241.9
143+22.35 = POT, Paving Stake				
T.P.	8.88	251.02	0.22	242.14
143+30			10.3	240.7
+50			10.0	241.0
144+00			8.4	242.6
+13			8.2	242.8
+20			9.7	241.3
+43			8.3	242.7
+53			4.3	246.7
+65.8 = W edge Pav. 54th			4.25	246.77

		251.02		
144+85.3 = L Pav. 54th			4.06	246.96
145+05.3 = L edge Pav 54th			4.05	246.97
+50			3.8	247.2
146+00			5.0	246.0
Chk. NW Cor Bridge top ch.			3.12	247.90
				247.97 = Moore.
Flow Main ch. under Bridge			15.4	235.6
146+50			5.1	245.9
147+00			4.5	246.5
+50			2.4	248.6
148+00			2.6	248.4
25' Rt. top Bank.			2.0	249.0
45 " in borrow pit.			11.2	239.8
T.P.	11.13	260.02	2.13	248.89
148+50			9.7	250.3
149+00			9.9	250.1
+17.76 = POT, Stub.			9.86	250.16
+50			9.5	250.5
150+00			9.0	251.0
27' Rt. = edge Bank			8.7	251.3
43' " in Borrow pit			15.8	244.2
150+50			8.4	251.6
+85			8.1	251.9
151+00			6.5	253.5
+30			5.1	254.9
+50			5.2	254.8
18' Rt.			7.4	252.6

52+35
Book 1533-96
54th St.

New Bridge

260.02

45' Rt. = top Bank	6.9	253.1
60 Rt. = Bot. borrow pit.	12.9	247.1
152+00	5.5	254.5
+50	5.2	254.8
153+00	4.9	255.1
+50	4.3	255.7
+80	4.6	255.4
154+00	5.7	254.3
+50	4.2	255.8
155+00	4.1	255.9
T.P. 8.98 264.79		
155 +27.36 = Δ 10°31'30" Rt	4.21	255.81
+32	9.1	255.7
+45	7.8	257.0
156+00	6.8	258.0
+50 in old dirt road.	6.8	258.0
157+00 " " " "	6.1	258.7
+50 " " " "	5.3	259.5
87' Rt.	5.9	258.9
100' Rt. in Main ch.	8.5	256.3
158+00	4.2	260.6
+50	3.5	261.3
159+00	3.3	261.5
+58 = SLY end Borrow pit	2.0	262.8
+70 in " "	6.8	258.0
160+00 in " "	6.0	258.8
+50 " " " "	6.3	258.5

See Page 73.

Set 3/4" Pipe 3-15-44 to Same Elev. on Stub. comp.

264.79

161+00 in borrow pit	5.4	259.4
+38.84 = Δ 3°53'30" Rt.	4.94	259.85
+52 in borrow pit.	5.0	259.8
T.P. 7.22 270.94	1.07	263.72
+55	5.9	265.0
+74.08 on P.O.T. stub.	5.66	265.28
+84 = SLY end borrow pit.	3.7	267.2
+95 in " "	9.5	261.4
162+00 in " "	9.6	261.3
+50 " " "	8.7	262.2
163+00 " " "	8.5	262.4
+40 " " "	8.1	262.8
+45 " " "	5.5	265.4
+53 " " "	7.2	263.7
25' Rt. in L. Main ch.	9.2	261.7
163+62 in borrow pit	4.8	266.1
+90 " " "	3.8	267.1
164+00 in ch.	4.4	266.5
+40 " "	4.5	266.4
+50 on Nat. Ground	3.2	267.7
+80 " " "	3.4	267.5
165+00	1.8	269.1
+17.95 = Δ 8°22'30" Lt. 9.15 279.07 Stub	1.02	269.92
+25	8.9	270.2
25' Rt. - Bank ch.	9.3	269.8
34' " in ch.	11.9	267.2

3-15-44 3 1/2" x 3' Galv. Iron Pipe No Elev.

Set 5/8" x 2' Iron Pipe Same Elev.

Set 1/2" Iron Pipe Same Elev. 3-15-44

279.07

166+00	7.2	271.9	
+50	6.9	272.2	
+50	6.2	272.9	
+85	6.9	272.2	
167+00	6.6	272.5	
+05	5.9	273.2	
+45	5.5	273.6	
+68	6.0	273.1	
+71	4.0	275.1	
168+00	3.8	275.3	
+40	3.0	276.1	
45' Rt. in & Main ch.	6.4	272.7	
168+48	3.2	275.9	
+60 in Wash.	4.5	274.6	
+80	3.6	275.5	
169+00	4.1	275.0	
+40	3.7	275.4	Set Pipe 275.45 3-16-44
T.P. 8.44 283.93			
169+56.30 = 8°14'30" Lt.	3.58	275.49	on Stub 6+Ft. 3-16-44
170+00	7.6	276.3	
+34	6.2	277.7	
+50 in Slough to Main ch.	8.0	275.9	
+52 " " " " "	9.2	274.7	
+72 " " " " "	9.0	274.9	
+80 on Bank of Slough.	6.2	277.7	
171+00	5.6	278.3	
+50	5.3	278.6	

283.93

172+00	3.7	280.2	
+48	3.3	280.6	
+52 in Branch ch.	6.1	277.8	
+80	5.5	278.4	
173+00	5.0	278.9	
+50	4.1	279.8	
174+00	3.3	280.6	
+50	3.7	280.2	
175+00	3.0	280.9	
T.P. 9.88 291.87	1.94	281.99	
175+50	10.4	281.5	
135' Rt. in & Main ch.	11.3	280.6	
175+80 = end Branch ch.	10.9	281.0	
176+00	8.4	283.5	
5' Lt. in Pocket	10.3	281.6	
176+07	6.3	285.6	
+50	5.6	286.3	
176+70.95 = Δ 10°38'30" Rt. on Stub	5.16	286.71	286.67 = Iron Pin set 3-16-44
177+00	5.0	286.9	
+50	4.7	287.2	
178+00	3.5	288.4	
+50	3.0	288.9	
179+00	3.2	288.7	
+35	4.9	287.0	
+70	4.8	287.1	
180+00	4.6	287.3	

		291.87		
T.P.	9.94	297.36	4.45	287.42
180+15			10.5	286.9
+50			9.4	288.0
60' Rt			7.8	289.6
130' Rt in ℄ Main ch.			9.9	287.5
180+75			6.4	291.0
181+00			7.2	290.7
+50			6.9	290.5
182+00			6.9	290.5
+50			6.5	290.9
+65			5.5	291.9
183+00			5.2	292.2
175' Rt in ℄ Main ch.			6.8	290.6
183+50			4.1	293.3
184+00			3.5	293.9
+50			2.8	294.6
T.P.	8.66	303.27	2.75	294.61
185+00			7.5	295.8
+50			6.3	297.0
186+00			5.8	297.5
+50			5.3	298.0
187+00			4.8	298.5
20' Rt.			4.8	298.5
35' Rt. = ℄ Main ch.			7.9	295.4
187+50			4.5	298.8
T.P. +9.5 = ℄ 2°53' Lt.	7.54	307.95	2.86	300.41

Fd. Stub 3-16-44 Set 5/8" x 14" Iron Pin to Same Elev.

307.95

188+00	7.2	300.8
6' Rt. = Bank Main ch.	7.7	300.3
15' Rt. = ℄ Main ch.	11.7	296.3
188+20.	5.9	302.1
+56.51 = P.O.T. stub	2.03	305.97
3' Rt. = top Bank Main ch.	3.1	304.9
6' Rt. = toe "	9.3	298.7
15' Rt. = ℄ Main ch.	11.8	296.2
188+81 = edge West Bank Main ch.	3.1	304.9
4' Rt.	10.4	297.6
10' Rt. = ℄ " "	11.6	296.4
188+90 = toe West Bank " "	9.8	298.2
8' Rt. = ℄ " "	11.4	296.6
189+45 = West Bank Main ch.	10.0	298.0
10' Rt. = ℄ " "	10.4	297.6
+53 = Bank " "	7.5	300.5
T.P. 189+95.67 = Δ 13°35' Rt. 307.32	6.78	301.17
190+00	6.0	301.3
9' Rt. = West Bank Main ch.	5.8	301.5
25' Rt. = ℄ " "	10.3	297.0
190+50	5.0	302.3
191+00	6.1	301.2
4' Rt. = West Bank " "	7.5	299.8
10' Rt. = ℄ " "	9.8	297.5
191+10 = Intersection W. Bank ch	7.0	300.3
191+15 = W℄Y edge Main ch.	8.7	298.6

Fd. stub. Set 3/8" x 30" Iron Pin Same Elev.

3/4" x 14" P.K. Iron Set 3-17-44

301.03

on stub.

		307.32 ✓		
191+50	in Main channel		6.7	300.6 ✓
+70	" " "		6.2	301.1 ✓
+80	" ℄ " "		8.0	299.3 ✓
+90	" " " "		7.6	299.7 ✓
192+00			6.1	301.2 ✓
3' Rt.	℄ " "		7.9	299.4 ✓
192+15	= ℄ " "		7.2	300.1 ✓
135			6.5	300.8 ✓
+50	= toe Ely Bank Main Chan.		4.6	302.7 ✓
+55	= top " " " "		3.3	304.0 ✓
T.P.	12.28	316.94 ✓		
193+00.55	= End Line		2.66	304.66 on stub.
10' Lt.	= Sly Bank Main chan		12.4	304.5 ✓
13' "	= " toe " "		14.5	302.4 ✓
30' "	= ℄ " "		16.1	300.8 ✓
T.P.	10.52	323.63 ✓	3.83	313.11 ✓
Chk. S.W. & R.R. Conn. & City Line			4.91	318.72 ✓
				318.82
				0.10 = Error.

Walker
Hazard
Hurdis
Beggs

5-10-44

B.M. ~~Bot.~~ on Hub	Elevation Top 36" Steel Pipe			And 36" Conc. Pipe
	3.73	222.81		219.08
128+29	on Top 36" Pipe		8.19	214.62 ✓
T.P.	3.77	222.85 ✓	3.73	219.08 ✓
128+49.5	= ℄ = 36" Conc. Pipe on Top		8.72	214.13

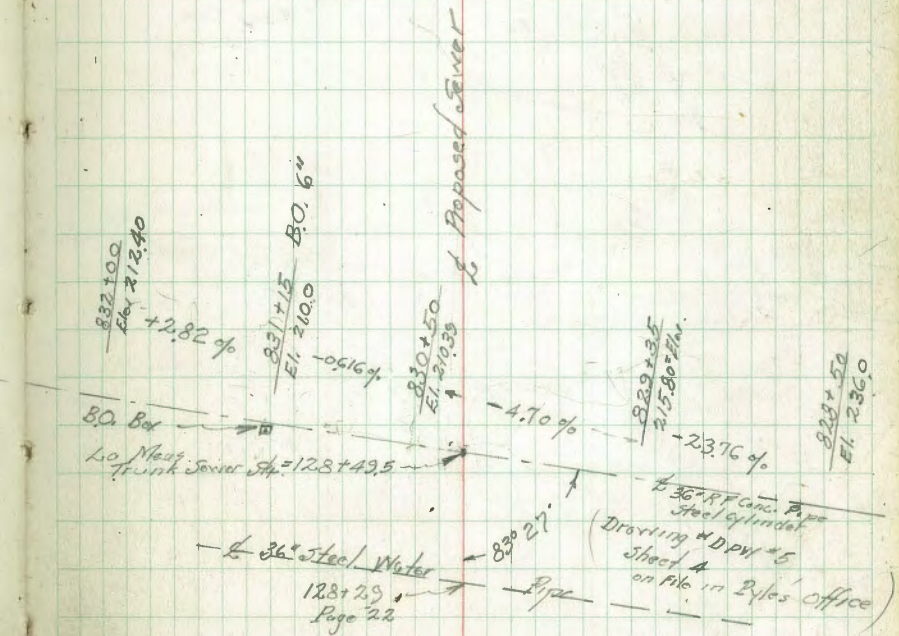
Walker
Hazard
Hurdis
3-9-44

LA MESA TRUNK SEWER

52

Location 36" Water Main at Station 128+49.5.

Elevations are the outside Bottom of Pipe And Were Copied from Drawing DPW #3 Sheet 4 on File in the office of Hydraulic Eng. (Fred Pyle)



Walker
Bliss
Isbell
11-8-40

— Preliminary Sewer Levels —
for Police Pistol Range
in Marina Park.
Location P-53

					Fl. Stub 11+85.62 Page 36
	2.37	87.85		79.48	
0+00 on Stub.			4.87	82.98	
0+00 = Top 4" Pipe			7.05	80.80	
0+34 = ℄ Euc Tree 37' Lt = N edge			4.9	83.0	30" dia.
0+52 = " " " 37' Lt = " "			4.9	83.0	" "
0+80			5.3	82.6	
+82 = East edge Walk			6.12	81.73	
+85 = W. " "			6.10	81.75	
+88			6.6	81.3	
1+00			6.8	81.1	
1+45 = ℄ Euc. Tree 4' Rt.			7.8	80.1	35' dia.
2+00			8.4	79.5	
+50			8.6	79.3	
3+00			9.2	78.7	
T.P.	3.16	81.73	9.28	78.57	
3+25.2 = Fence Line Range			3.5	78.2	
+55.75 = Δ 90°28'30" Lt			3.75	77.98	
4+00			4.3	77.4	
+30			4.8	76.9	
+55			4.5	77.2	
+75			4.4	77.3	
4+92 = ℄ Euc Tree 2.2' Rt = South edge				5' dia.	

81.73

5+00			5.4	76.3
+20			7.1	74.6
+50			5.2	76.5
T.P.	2.17	79.22	4.68	77.05
5+75			2.2	77.0
6+00			2.1	77.1
6+14 = ℄ Euc Tree 16' Lt = North edge, 18" dia.				
6+20 = ℄ Euc Tree 2' Lt. = N edge 4' dia.				
6+40 = ℄ " " 6' " = N " 3' "				
6+40			2.5	76.7
6+63.68 = Δ 12°04'84"			2.98	76.24 on stub.
7+00			4.1	75.1
+17 = ℄ Euc Tree 5' Rt. = South edge				24" dia.
7+30			3.7	75.5
7+56 = East Bank of Channel			4.6	74.6
+58 = " edge " "			7.6	71.6
+75 in "			7.0	72.2
8+00 " "			8.1	71.1
+07 = ℄ Euc Tree 6' Lt. = North edge				36" dia. (cluster of trees)
8+08			5.3	73.9
8+20 in Channel			8.4	70.8
+33 = West Bank "			4.9	74.3
+72 = Toe fill Home Ave			4.9	74.3
+83 on Berm Fill			1.6	77.6
+86			2.7	76.5

7922

8+92 = East edge out + Rock	2.56 paving	76.66
9+05.75 = ℄ Home Ave on	2.39 paving	76.83
9+19 = Wedge Paving	2.81	76.41
+27	2.9	76.3
+29 on Berm.	1.7	77.5
9+40 = ℄ Existing MH. on Rim.	3.26 / 7.38	75.96
9+40 = ℄ MH Flow Line	10.64	68.8
Chk C.T. ℄ Federal & Home P-35	4.33	74.89

74.90 = C.T. P-35
0.01

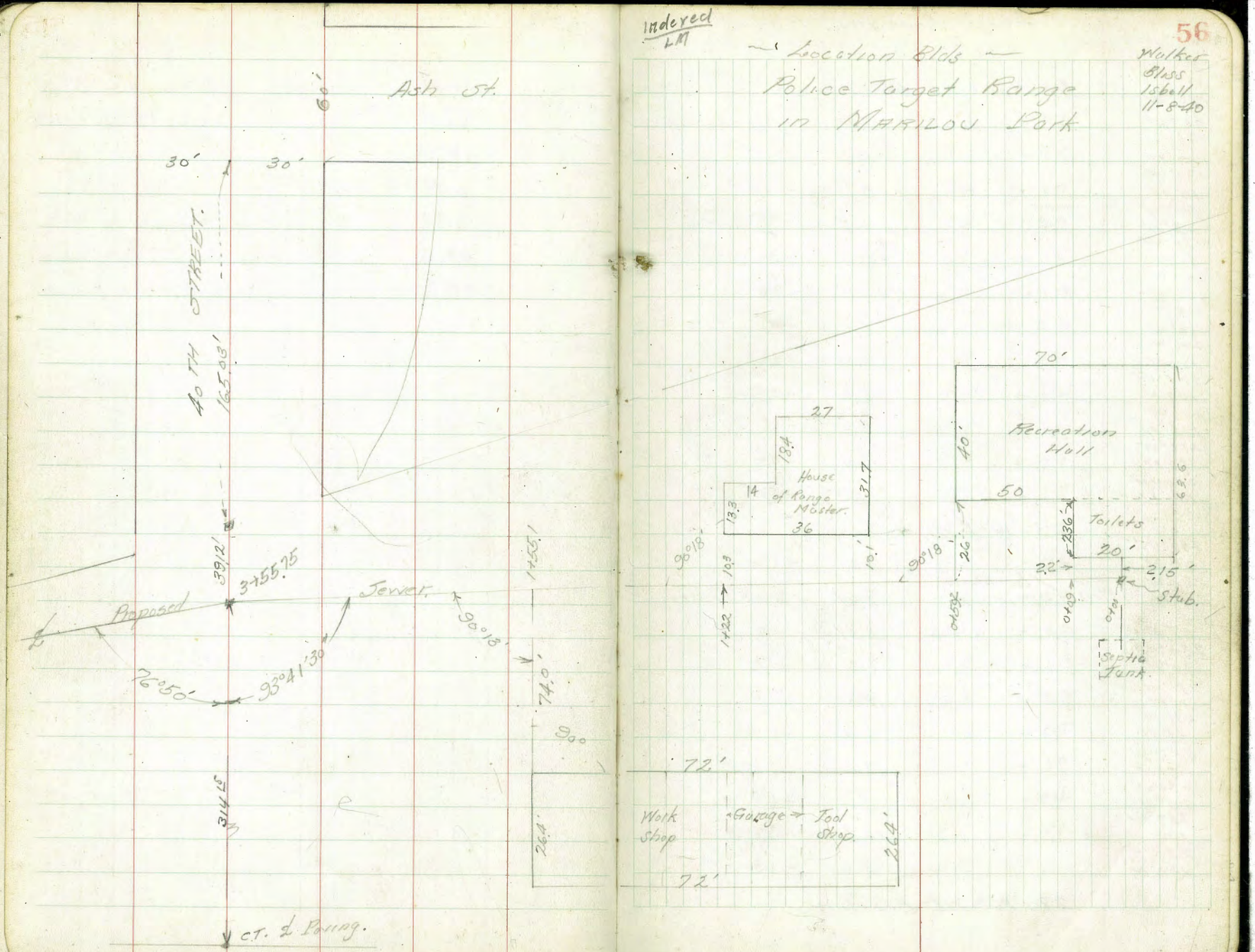
Indexed
LM

56

Walker
Bliss
15611
11-8-40

— Location Bldg —

Police Target Range in Marlow Park



Levels Cont from P 34

6.99

190' W = El. Bandini St.				
190' W				
00' N			5.4	+ 1.6
190' W				
10' N			5.5	+ 1.5
180' W				
10' N			8.7	- 1.7
190' W				
23' N			9.5	- 2.5
190' W				
50' N			10.0	- 3.0
200 W				
50' N			10.0	- 3.0
204' W				
50' N			7.1	- 0.1
200 W				
100 N			9.6	- 2.6
204' W				
100 N			6.6	+ 0.4
200 W				
135' N			8.8	- 1.8
204' W				
135 N			6.6	+ 0.4
200' W				
150 N			5.7	+ 1.3
230' W = L Bandini				
230' W				
00 N			5.8	+ 1.2
220 W 34 N	Side Flow of opening	Bar Culvert	9.67	- 2.68
T.P.	5.12	6.72	5.39	1.00
230' W				
20' N			6.1	0.6
230' W				
35 N			9.8	- 3.1
230 W				
45 N			6.9	- 0.2
235' W				
45' N			9.9	- 3.2
230 W				
100' N			6.3	+ 0.4
237' W				
100' N			10.3	- 3.6
230' W				
150 N			7.0	- 0.3
270' W = WL Bandini				

Not on True Flow line

57

6.72

270' W			
150 N	7.0	- 0.3	
270 W			
100 N	8.8	- 1.1	
270 W			
50 N	9.2	- 2.5	
270' W			
30 N	9.4	- 2.7	
260 W			
30' N	9.4	- 2.7	
256 W			
30' N	6.2	+ 0.5	
246' W			
30 N	5.7	+ 1.0	
270 W			
20 N	9.0	- 2.3	
260 W			
20 N	6.7	0.0	
270 W			
10 N	5.5	+ 1.2	
270 W			
00 N	5.1	+ 1.6	
413' W			
00 N	4.6	+ 2.1	
413' W			
10 N	8.5	- 1.8	
413 W			
50 N	8.2	- 1.5	
413' W			
100 N	7.3	- 0.6	
413' W			
150 N	6.8	- 0.1	
520' W			
00 N	4.4	+ 2.3	
520' W			
07' N	4.8	- 1.9	
520 W			
17 N on Ground at Bld.	9.0	- 2.3	
520 W			
17 N = Foundation	7.2	- 0.5	
520' W			
40 N	8.6	- 1.9	
520 W			
75' N	7.1	- 0.4	
520 W			
100 N at Blds on Grd.	6.8	- 0.1	
T.P. 4.54	7.05	4.21	2.51

NW Cor. Chicken Shack Courts & Pacific

Cont P-58

Levels cont from P 57

	↑ 7.05		
701.5W			
00 N		5.3	+ 1.8
701.5W			
7 N		9.3	- 2.2
701 W			
10 N		10.3	- 3.2
701 W			
97 N		10.3	- 3.2
895 W			
00 N		5.6	+ 1.5
895 W			
20 N		7.6	- 0.5
895 W			
50 N		10.0	- 2.9
903 W			
100 N		6.6	+ 0.5

Walker
Bliss-
Isbell
1-13-41

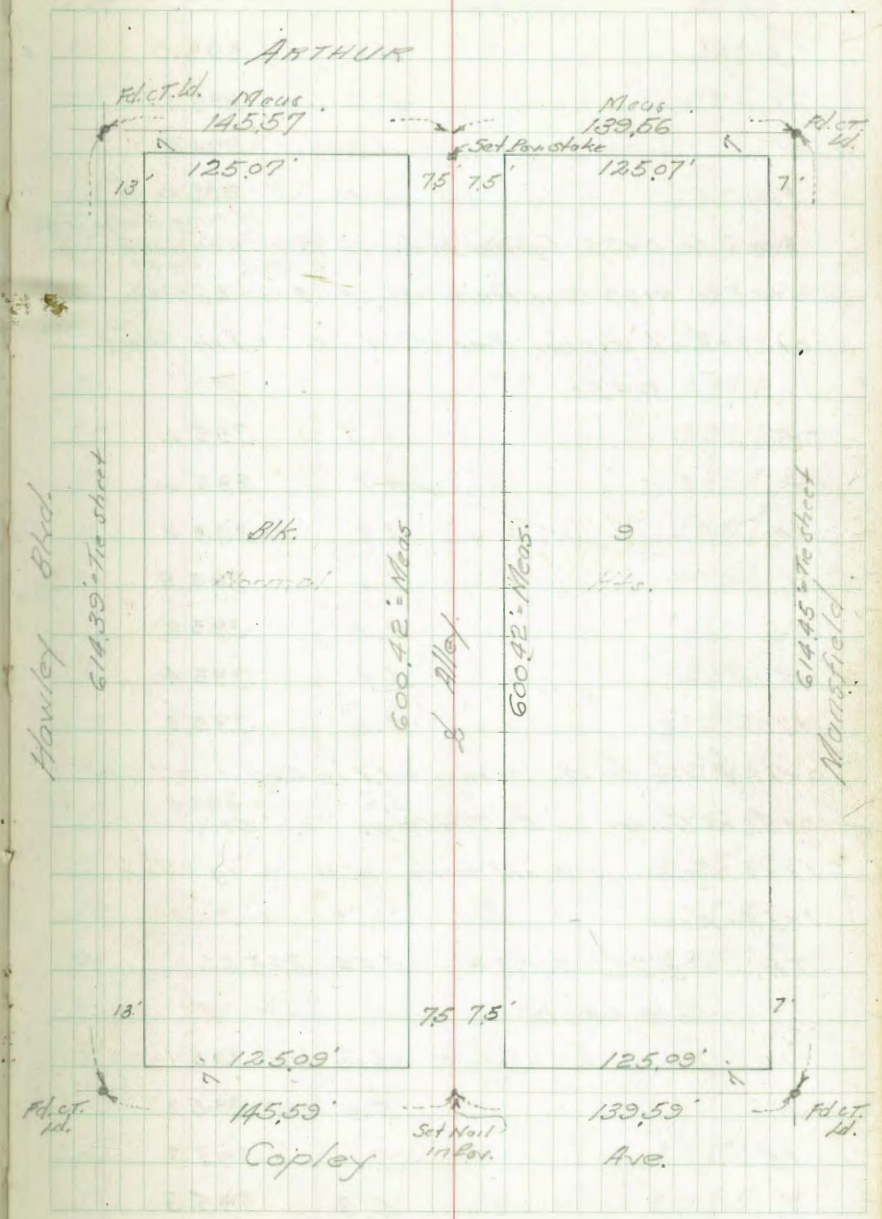
Cross Section Alley Blk. 9
Normal Hts.
Between Mansfield & Hawley Blvd.
from Copley to Arthur.

Indexed

	4.62	397.40		392.78	N.E.B.P. Norris Ave & Mansfield.
T.P.	3.62	399.82	3.20	394.20	N.E. 9" Tack Collar Mansfield.
T.P.	3.91	399.06	4.67	395.15	
Cbh. S.E.B.P. Copley & Mansfield			4.20	394.86	
0-12' = N cb. line Copley.					
-2.5' on Conc. Gutter.			5.44	393.62	
" " top cb.			4.91	394.16	
W " " "			5.00	394.06	
" " Gutter.			5.22	393.84	
E " " in Riddle Water			5.31	393.75	C.B.H.
E " "			5.19	393.87	
" " top cb.			4.79	394.27	
E+25 " "			4.72	394.34	
" on Gutter.			5.22	393.84	
0+00 = N.L. Copley					
E top cb			4.53	394.53	
" Gut. Pav.			4.74	394.32	
E "			4.93	394.13	
W on "			4.71	394.35	
" " top cb.			4.52	394.54	
0+10					
W			3.7	395.4	

Reduced & plotted 1-14-41 C.B.H.

Cont. P-60



Cont. from P-59 — Alley Blk 9

399.06 — Normal Hts.

+3	4.1	395.0
℄	4.0	395.1
+3	4.2	394.9
E	4.1	395.0

W. edge Hedge Trunk

0+00 to 0+22 = Cypress Hedge on ℄ — on line

0+23 to 0+47 = Wire Fence on W. = 0.3 in Alley — 0.1 Back 0+47 — 0+23

0+29 = ℄ .7 Pepper tree on W ℄ = 0.1 in Alley.

0+50

-5	3.7	395.4
E	3.7	395.4
+4	3.9	395.2
℄	3.6	395.5
+2	3.8	395.3
W	3.7	395.4
+10	3.8	395.3

0+91 = ℄ Pole on W. e edge = 1.7 in Alley. 0.7 dia.

0+92 = ℄ Gurage on E, dirt floor. 12.2' Back. 3.6 — 395.5

1+00 = Beginning Board fence on W 0.6' in Alley.

1+38 = End " " " " 1.0' " "

T.P. 5.22 400.84 3.44 395.62

1+00

-10	5.7	395.1
W	5.5	395.3
+5	5.1	395.7
℄	5.3	395.5
+2	5.0	395.8

400.84

+4	5.3	395.5
E	5.2	395.6
+5	5.3	395.5

1+44 = ℄ Conc. Apron to Gurage on W 11.5' wide

6.3' W of ℄ = Toe Apron. 5.06 395.78

6.1' W.W.L. = Gurage Floor. = 4.76 396.08

1+50 = Beginning Board Fence on W 0.8' in Alley

-5	5.1	395.7
E	5.1	395.7
+3	5.1	395.7
℄	5.0	395.8
W	5.1	395.7
+5	5.0	395.8

1+70

-20	5.2	395.6
W	5.5	395.3
+1	5.3	395.5
℄	4.9	395.9
E	4.9	395.9
+5	5.0	395.8
+10	5.1	395.7

2+00 = end of Above fence on W, 0.6' in Alley. 1' dia.

2+00.5 = ℄ Pole on W, E edge = 2' in Alley

2+00

-25	5.0	395.8
-5'	5.3	395.5

Cont. P-61

400.84 Normal Hts.

E	4.9	395.9
℄	4.9	395.9
W	5.2	395.6
+5	5.3	395.5
2+10 = S. edge Conc. Apron on W 0.8' in Alley to 3 Garages		
6.7' W of ℄ = Toe Apron	5.01	395.83
3.2' W " W.L. = Garage Floor	4.68	396.16
2+30		
-3.5 = Garage Floor	4.55	396.29
W	4.93	395.91
+1' on Conc. Toe Apron	5.02	395.82
℄	5.0	395.8
E	4.9	395.9
+7 in Pond.	5.4	395.4
+15 " "	5.4	395.4
+35	4.8	396.0
2+37 = N end of 3 Garages on W Conc. Floor		
-3.6 on Garage Floor	4.56	396.28
W	4.87	395.97
+1.1' in Alley on Toe Apron	4.97	395.87
2+41 = S. end shed on W 1.1' in Alley		
2+50 = N " " " " 1.1 " "		
2+50 =		
-50	5.2	395.6
-35	5.4	395.4

400.84

-25	5.1	395.7
-15 in Pond.	5.4	395.4
E " "	5.3	395.5
℄ " "	5.2	395.6
W	5.1	395.7
+5	5.0	395.8
2+75		
-5	5.3	395.5
W	5.3	395.5
+3	5.1	395.7
℄ in Pond.	5.3	395.5
+5	5.4	395.4
E	4.9	395.9
+13	5.4	395.4
+25	5.2	395.6
+35	4.8	396.0
2+50 to 3+00 = Loth fence on W 1.2' in Alley.		
3+00 = ℄ Pole on W, E edge = 2.5' in Alley 1.1' dia.		
3+00		
-15	4.8	396.0
E	4.8	396.0
+1	5.0	395.8
℄	5.1	395.7
W	5.3	395.5
+10	5.8	395.0
+30	5.2	395.6

Cont. P-62

Cont. from P-61 — Alley Blk 9

		400.84	Normal Hts.	
T.P.	5.34	401.36	4.82	396.02
	3+25			
-50			5.2	396.1
-30			5.6	395.7
-15			5.9	395.4
W			5.7	395.6
℄			5.5	395.8
E			5.5	395.8
+5			5.5	395.8
+15			5.4	396.0
			5.2	396.2
	3+43 = ℄ Garage on E, dirt Floor 65' Back			
	3+53			
-5			4.9	396.5
E			4.9	396.5
+2			5.2	396.2
℄			5.2	396.2
W			5.4	396.0
+15 in Pond			6.0	395.4
+25			5.6	395.8
+40			5.4	396.0
	3+80			
-40			5.1	396.3
-30 in Pond			5.9	395.5
-15 " "			6.0	395.4
-5 " "			5.9	395.5
W			5.5	395.9

401.36

℄	5.3	396.1
E	5.0	396.4
+10	5.0	396.4
4+00		
-5	4.8	396.6
E	4.8	396.6
℄	4.6	396.8
+2	4.6	396.8
W	5.1	396.3
+15	5.6	395.8
+30	6.0	395.4
+40	5.8	395.6

4+24 = ℄ Pole on W. E edge = 2.8' in Alley 15" dia.

4+00 to 425 = Board Fence on W 1' in Alley.

425 to 450 " " " " 1' " " = 425 0.5' in Alley 4+50 (5+00 = Ind. = 0.6' Back

4+50 = Beginning Fence on E 0.1' Back.

4+50		
-10	4.9	396.5
W	4.9	396.5
+1	4.7	396.7
℄	4.4	397.0
E	4.7	396.7
+10	4.8	396.6
+25	4.4	397.0

4+82 = ℄ Pole on W. E edge = 1.5' in Alley.

5+00 Fence on W 0.4 in Alley.

Cont P-63

Cont. from P-62 Alley Blk 9

401.36 Normal Hts.

5+00

-20	4.2	397.2
-10	4.5	396.9
E	3.9	397.5
℄	3.9	397.5
+6.5	3.6	397.8
W	4.0	397.4
+10	4.0	397.4

5+40 Board Fence on W 0.1 Back

W -10	3.7	397.7
W	3.6	397.8
℄	3.9	397.5
E	3.8	397.6
+6.7	3.8	397.6
	3.85	397.51

5+43 = ℄ Garage on ℄ Conc. Floor 6.7' Back

5+51 = S end Fence on E 0.8 in Alley } Both

+57 = N " " " " on Line }

From Sta. 4+00 to 5+51 = Board Fence on W.

5+51 = N end fence on W 0.3' Back.

5+70

-5' at House on Ground	4.2	397.2
E	4.2	397.2
+4	4.9	396.5
℄	4.7	396.7
+3	5.0	396.4

401.36

W	4.1	397.3
+5	4.3	397.1

5+92

T.P. .355	399.36	5.55 395.81
-5	2.3	397.1
W	3.0	396.4
+3.5	4.2	395.2
E	3.8	395.6
+3.5	4.2	395.2
E	3.6	395.8
+5	3.4	396.0

6+00.42 = S Line Arthur

E	4.6	394.8
℄ on Stake Boring.	4.76	394.60
W	4.4	395.0

6+02 = South edge of 4.2' Conc. Walk.

W on Walk	4.72	394.64
℄	4.7	394.7
E " "	4.94	394.42

6+06.2 = N edge Side Walk

E on Walk.	4.92	394.44
℄	4.7	394.6
W " "	4.81	394.55

6+12.42 = South cb. Arthur St.

= W - 125.67 on Par. E/c Hawley Blvd.	5.15	394.21
" " " cb.	4.69	394.67

Cont. P-64

Cont. from P. 63 — Alley Blk. 9

		399.36		Normal Hts.	
W on Alley Rel.			5.32	394.04	
" " Ground			4.9	394.5	
L " "			4.8	394.6	
E " "			5.0	394.4	
E on Alley			5.10	394.26	
			5.98	393.38	
E +125.9	= Mh. Mansfield on Boring.				
" "	on cb.		5.65	393.71	
T.P	5.54	399.40	5.50	393.86	SW. 7" tk. of Mansfield & Arthur.
Chk. SE. BP. Copley & Mansfield.			4.55	394.85	+.01
T.P.	4.43	399.13	4.70	394.70	
T.P.	4.13	398.19	5.07	394.06	
Chk. Sterling BM.			5.40	392.79	SE. Adams & Mansfield
				392.78	= BP. BM.
				0.01	= Error.

Note, Arthur St under Construction, no existing curb from 6+00.42 to 6+02

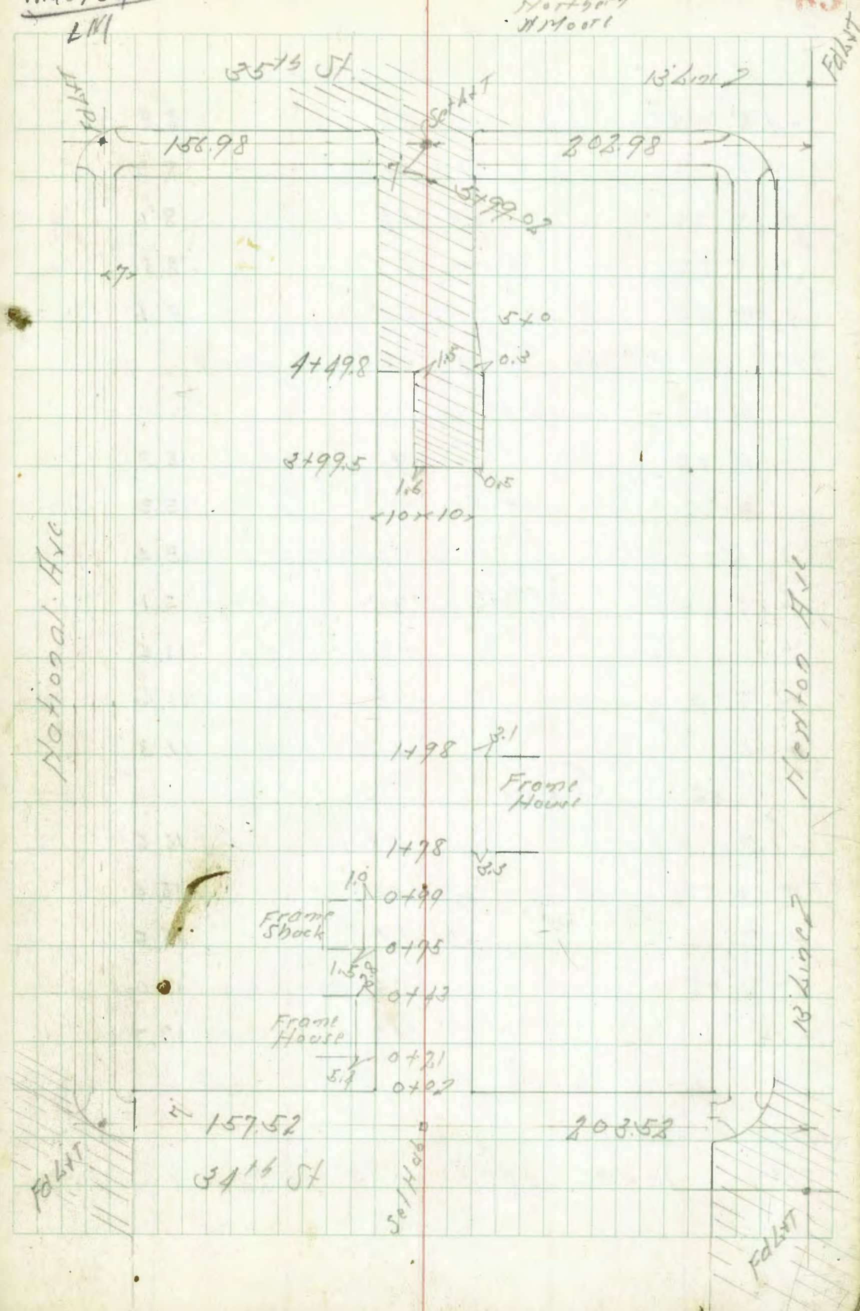
Cross Section Alley Block 5 San Diego Land And Town Co. South Chollas Add.

Indexed
LM

April 3-41
Sisson
Northern
Moore

BM	4.22	11.04		6.82	S.E. B.P. National & 34th St
		0 − 10 = E Cb 34th St			
N − 140 = S L National Cb Top			4.49		6.55
" " " Gutter			5.26		5.78
S − 140 = N L Newton Cb Top			8.53		2.51
" " " " Gutter			9.10		1.94
		0 + 0 = E Line 34th St			
−15			6.8		4.2
N			7.9		3.1
℄			8.2		2.8
S			7.3		3.7
+5			6.2		4.8
+15			6.0		5.0
		0+18			
℄ = MH on Rim			6.17		4.87 ✓
		0+21			
−15			5.8		5.2
S			5.7		5.3
+6			6.6		4.4
℄			6.5		4.5
+5			6.1		4.9
N			5.5		5.5
+54 = SW Cor House			5.4		5.6
+15 = Garage Dirt Floor			6.7		4.3

Profile # 218



		11.04		
		0+30		
-4.5 = Sly House		2.2	8.8	
N		2.1	8.9	
		2.9	8.1	
S		3.9	8.1	
+15		5.4	5.6	
TP	11.97	22.86	0.65	10.89
		0+49		
-15		7.1	15.3	
S		7.1	15.3	
		7.0	15.4	
+5		7.3	15.1	
+7		10.8	11.6	
N		10.8	11.6	
+15		11.1	11.3	
		0+55		
-15		5.8	16.6	
N		4.0	18.4	
		3.9	18.5	
S		3.4	19.0	
+15		4.7	17.7	
		0+65		
N = Nly Tel. Pole				✓
TP	10.49	32.73	0.12	22.24

	32.73		
	0+75		
-15		8.0	24.7
S		7.5	25.2
		7.5	25.2
N		9.0	23.7
+15		12.0	20.7
	1+0		
-15		8.5	24.2
N		6.5	26.2
		6.3	26.4
S		5.7	27.0
+15		6.0	26.7
	1+30		
N-0.6 = Nly Do. Garage Dirt Floor		5.2	27.5 ✓
	1+50		
-5		6.6	26.1
S		5.6	27.1
		5.4	27.3
N		5.2	27.5
+1.4 = Ely Do. Garage Dirt Floor		5.1	27.6 ✓
	1+72		
S+1.4 = Sly Pow Pole			✓
	1+73		
N-0.2 = Nly Tel Pole			✓

32.73

1+86

-15	5.6	29.1
N	4.3	28.4
℄	4.7	28.0
S	5.3	27.4
+3' = N½ House	5.8	26.9

2+0

-10	7.5	25.2
S	5.9	26.8
℄	5.7	27.0
N	5.0	27.7
+10	4.1	28.6

2+25

-10	4.5	28.2
N	6.1	26.6
℄	8.3	24.4
+8	8.4	24.3
S	9.1	23.6
+15	11.7	21.0

2+50

-15	13.0	19.7
S	10.4	22.3
+3	9.7	23.0
℄	9.8	22.9
+4	8.8	23.9

32.73

N	8.1	24.6
+10	6.2	26.5

2+75

-10	8.1	24.6
-1.4 = N½ Board Fence		✓
N	9.6	23.1
℄	10.1	22.6
S	10.9	21.8
+15	11.8	20.9

3+0

-15	8.6	24.1
S	9.7	23.0
℄	9.6	23.1
N	9.5	23.2
+15	8.5	24.2

3+01

S-0.2 = N½ Plank Retaining Wall	✓

3+03

N+0.2 = N½ Tel. Pole	✓

3+15

-15	6.5	26.2
N	7.3	25.4
+7	8.7	24.0
℄	8.6	24.1
+5	8.6	24.1

	32.73		
S	7.8		24.9
+1	5.1		27.6
+10	5.0		27.7
	3+25		
S+0.2 = Sly Power Pole			
S-0.3 = Ely Plank Retaining Wall			
	3+35		
-10	4.0		28.7
S	4.6		28.1
℄	4.9		27.8
+6	3.8		28.9
N	2.6		30.3
+10	2.6		30.3
	3+37		
N-1.5 = Ely Board Fence			
TP	10.79	39.82	3.70	29.03
	3+42		
S-0.3 = ℄ Garage Dirt Floor	10.6		29.2
	3+44		
N-14 = ℄ Garage Dirt Floor	10.6		29.2
	3+47		
S-0.3 = Wly Board Fence			
	3+68		
-10	7.7		32.1
N	7.5		32.3

Red. to Plat. on Profile 2/18/54 4-7-41 GBH

	39.82		
℄	6.8		33.0
S	6.2		33.6
+6	6.0		33.8
	3+74		
S-0.8 = Ely Board Fence = Wly Do. Garage			
	3+82		
S-0.8 = ℄ Do. Garage Dirt Floor	5.0		34.8
	3+90		
S-0.8 = Ely Do. Garage = Wly Board Fence			
	3+93		
N-5.5 = ℄ Garage Dirt Floor	5.2		34.6
	3+99.5		
-0.5 = Wly Conc. Paving	4.72		35.10
S " "	4.73		35.09
℄ " "	4.88		34.94
+1.6 = Wly "	4.82		35.00
N	4.9		34.9
+2.7 = Wly Board Fence			
+6	5.1		34.7
	4+17		
N-2.7 = ℄ Garage Dirt Floor	3.8		36.0
	4+35		
N-0.5 = Wly Tel. Pole			

39.82

4+19.8

N	= Wly Curb Line		3.18	36 64	
+8.4	= Wly Strip "		3.55	36.27	
4	on Paving		3.59	3623	
S	" "		3.39	3643	
	5+0.				
S	on Paving		2.27	37.55	
4	" "		2.51	37.31	
N	" "		2.17	37 65	
	5+30				
N	on Paving		1.68	38.14	
4	" "		2.11	37.71	
S	" "		1.77	38 05	
	5+50				
S	on Paving		1.87	37 95	
4	" "		2.22	37 60	
N			1.80	38 02	
	5+99.02 - Wly 35' to St.				
N	Top Cb		1.96	37 86	
N	Gutter on Paving		2.37	37 45	
4	" "		2.94	3688	
S	Gutter "		2.84	3698	
S	Top Cb		3.67	3725	
TP	6.23	44.14	1.91	37.91	SE Top Hyd. National + 35th St.
BM			0.0	44.14	44.9

Walker
Hogard
Hurdin
3-14-44

LA MESA TRUNK SEWER

Additional Levels to determine the difference in Ground Profile (at the Stations shown) of Levels as run in 1940 and 1944

	5.51	142.56		137.05	Elev. Stake 63 B.5 P. 40
64+00			5.6	136.9	
+25			4.8	137.7	
+50			6.8	135.7	
64+67			5.9	136.7	Sand Deposit from Flood Waters
65+00			5.5	137.1	
+50			4.4	138.2	
66+00			3.8	138.7	
+50			4.6	138.0	
67+00			4.0	138.6	
+50			3.5	139.1	" " 3/18/44
68+00			3.3	139.3	
68+29	TP 734 △ Lt 20° 00' on Pipe	(147.49)	2.41	(140.15)	3/4" x 5' Pipe with Reducer Plg.
+50			7.4	140.1	
69+00			7.1	140.4	
+50			6.7	140.8	
69+90			6.1	141.4	
70+00			5.3	142.2	
+50			5.4	142.1	
71+00			5.2	142.3	
	→ ok from here to 116+17.5				
	9.88	(207.51)		197.63	Elev. P.in 116+17.5 P-45
116+32			10.0	197.5	
20' Lt. ℄ Main ch			11.0	196.5	20' wide

207.51

116+42 on gravel Mound.	7.2	200.3
+53 " " "	6.6	200.9
+65	9.2	198.3
+86.5 = ELY edge Main ch.	9.7	197.8
117+55 = NWLY " "	9.9	197.6
117+90	7.0	200.5
118+10 on gravel Mound.	4.4	203.1
+23 " " "	5.6	201.9
12' Rt = ℄ 15' Main ch	9.3	198.2
118+50	6.0	201.5
119+00	4.8	202.7
25' Rt = ℄ 15' wide Main ch.	8.8	198.7
119+50	4.6	202.9
120+00	4.5	203.0
44' Rt = ℄ 18' W. Main ch.	5.8	201.7
120+33	3.8	203.7
+50	2.6	204.9
TP 833 (213.79)	2.05 (205.46)	
+75	9.9	203.9
121+00	7.9	203.9
20' Lt ℄ Branch ch.	10.2	203.6
65' Rt = ℄ 15' Main ch.	10.5	203.3
121+50 in ℄ Branch ch	9.6	204.2
122+00	8.5	205.3
+50	6.6	207.2
8' Rt = ℄ " "	7.8	206.0

70

	⟨213.79⟩ ✓		
122+80		6.3	207.5 ✓
+85 = ℄ Edge Branch ch.		8.4	205.4 ✓
123+03 = N " " "		7.0	206.8 ✓
+10		4.7	209.1 ✓
+50		4.8	209.0 ✓
124+00		3.5	210.3 ✓
25' Rt ℄ 20' M ch.		6.9	206.9 ✓
20' Lt. = ℄ 12' Branch "		5.7	208.1 ✓
124+50		3.5	210.3 ✓
+55	9.09 ⟨218.31⟩ ✓	4.9	208.9 ✓ = Wedge M ch. 20' wide
125+06.40 △ Lt 11°39'30"		4.57	⟨209.22⟩ ✓ on P.n
125+50		8.4	209.9 ✓ W edge M ch. 20' wide
126+00		7.5	210.8 ✓
+42 = ℄ M ch.		9.0	209.3 ✓
+56		6.6	211.7 ✓
+70 on gravel Mound		2.4	215.9 ✓
+85		5.6	212.7 ✓
127		6.1	212.2 ✓
+15		5.9	212.4 ✓
+35		4.4	213.9 ✓
+50		3.6	214.7 ✓
+68		3.6	214.7 ✓
+73		2.3	216.0 ✓
+80		4.7	213.6 ✓
128+09		4.0	214.3 ✓

⟨218.31⟩ ✓

71

128+22		0.2	218.1 ✓
TP .328	⟨221.16⟩ ✓	0.43	⟨217.88⟩ ✓
128+29.58 on P.O.T. 846 P-46		3.25	217.91 ✓ .04 E/or
+29.58 " Ground		2.2	219.0 ✓ 55' Lt = ℄ M ch. El 213.7
128+40 on 2"x2" Redwood		2.14	219.01 ✓
+53		3.5	217.7 ✓
+65		4.5	216.7 ✓ ℄ M ch.
129+00		5.4	215.8 ✓ 60' Lt
+25		5.1	216.1 ✓
+45		5.5	215.7 ✓
+70 wide		5.3	215.9 ✓
130+10		4.8	216.4 ✓
TP 444	⟨225.37⟩ ✓	0.23	⟨220.93⟩ ✓
130+25 on Mound Loose dirt		2.8	222.6 ✓
+40		8.6	216.8 ✓
+52 = ℄ M. ch.		10.2	215.2 ✓ 10' wide Flow = 5 W est
131+00		8.2	217.2 ✓ 15' Rt = ℄ M ch.
+25		8.3	217.1 ✓ 20' Rt = ℄ M ch.
+40		4.7	220.7 ✓
+55		4.4	221.0 ✓ 30' Rt = ℄ M ch.
+75		6.5	218.9 ✓
OK from 132+27 to 146+00			
Chk high Point Boulder			
132+12.70 = △ Rt 21°49'30"		6.83	218.54 ✓
			218.58
			.04

Cont. P- 72

3-15-44
C.B.W.

La Mesa Trunk Sewer
Cont. from P. 71

5.15 ⟨252.11⟩ ✓ — 246.96 ✓ — El. & Rev. 194+8530 P-43

146+00	6.0	246.1 ✓	
+50	6.4	245.7 ✓	
20' R	6.1	246.0 ✓	
146+70	5.5	246.6 ✓	
7' R = N edge Borrow Pit	5.5	246.6 ✓	
20' Rt. in ch	13.5	238.6 ✓	
147	5.4	246.7 ✓	
10' Lt.	4.5	247.6 ✓	
3' R = N Bank ch.	6.7	245.4 ✓	ch 20' W Flows South 140' thence SW under Bridge
6' R = N edge "	13.5	238.6 ✓	
147+15 = N Bank ch	4.5	247.6 ✓	
2' Rt = N edge "	13.5	238.6 ✓	
147+20	9.9	242.2 ✓	
1' Lt. on Bank.	4.8	247.3 ✓	
5' R = N edge ch	12.0	240.1 ✓	
15' Rt = ℄ 15' ch	13.5	238.6 ✓	
147+50	11.1	241.0 ✓	
2' Lt.	5.1	247.0 ✓	
10' Rt. ℄ ch — Flows from SE 45° 75'	13.0	239.1 ✓	
147+80	10.4	241.7 ✓	
2' Lt on Bank	3.9	248.2 ✓	
10' Lt.	3.3	248.8 ✓	
15' Rt. in Swamp	11.9	240.2 ✓	

⟨252.11⟩ ✓

72

148+00	9.8	242.3 ✓
5' Lt. on Bank	3.4	248.7 ✓
15' Lt	3.2	248.9 ✓
20' R	11.6	240.5 ✓
148+50	10.4	241.7 ✓
15' R in Swamp	9.9	242.2 ✓
6' Lt.	2.7	249.4 ✓
15' Lt.	2.7	249.4 ✓
149+00	8.6	243.5 ✓
20' R = ℄ 15' channel	9.5	242.6 ✓ Flows SE 70'
3' Lt.	2.1	250.0 ✓
10 Lt.	2.4	249.7 ✓
TP 7.72 ⟨257.38⟩ ✓	2.45 ⟨249.66⟩ ✓	
149+50	10.5	246.9 ✓
2' Lt.	6.8	250.6 ✓ Same 10' Lt.
5' R = Toe Slope	13.5	243.9 ✓
20' R in ℄ M ch.	15.0	242.4 ✓
150+00	9.6	247.8 ✓
2' Lt.	6.6	250.8 ✓
10' Lt.	6.6	250.8 ✓
2' R = Toe Slope	11.4	246.0 ✓
25' R = ℄ M ch. 10' W	14.2	243.2 ✓
150+15	6.4	251.0 ✓
10' Lt.	6.6	250.8 ✓
3' R	11.5	245.9 ✓
150+50	5.9	251.5 ✓
3' R	11.2	246.2 ✓
15' R = ℄ M Ch.	11.9	245.5 ✓
10' Lt.	6.0	251.4 ✓

	(257.38)		
151+00		3.9	253.5
4'R		4.0	253.4
10'R		10.0	247.4
25'R = ℄ M.ch. 15'		11.0	246.4
151+50		2.4	255.0
10'R		3.7	253.7
28'R = ℄ M.ch. 15'		11.0	246.4
152+00		3.0	254.4
15'R = edge Borrow Pit		2.9	254.5
25'R		9.4	248.0
40'R = ℄ M.ch.	Flows From ℄ 45°R	10.7	246.7
152+50		2.6	254.8
13'R = N edge Borrow Pit		2.2	255.2
18'R		8.2	249.2
25'R		9.2	248.2
TP	5.45 (260.75)	2.08	(255.30)
153+00		5.3	255.4
15'R = N edge Borrow Pit		5.5	255.2
25'R " "		11.6	249.1
50'R		11.6	249.1
153+50		5.2	255.5
154+00		6.1	254.6
12'R = N. edge Pit		1.9	255.8
18'R		9.2	251.5
154+50		4.9	255.8
155+00		4.9	255.8
25'R = N edge Pit		4.1	256.6

Pit extends on out 250'

(260.75)

155+27.36 = Δ Rt 10°31'30" 4.92 255.83 255.81 .02 diff.

Orig. Ground Profile ok from 155+27.36 to 193+00.55

Walker Hogan Hardin
5-11-44

La Mesa Trunk Sewer
Proposed Elevations for Top MHs

Stations		Tops MHs Proposed Elev.
3+18.74	= MH A-1	75.0
7+52	= " A-2	78.5
11+85.62	= A-3	82.0
17+21	" A-4	87.0
22+56	" A-5	91.5
27+91.8	= A-6	97.5
33+27.10	= MH-A-7	104.0
38+29	MH A 8	109.0
43+29	" A-9	115.0
48+29	" A-10	121.5
53+29	" A-11	126.0
58+29	" A-12	133.0
63+29	" A-13	139.0
68+29	" A-14	143.0
73+29	A-15	148.0
78+29	A-16	155.0
83+29	A-17	162.0
88+29	A-18	167.0
93+00.94	A-19	172.0
97+94.07	= A-20	177.0
102+47	= A-21	181.0
107+00.68	= A-22	189.0
111+54	A-23	195.00

Station		Top MH Proposed Elev
116+17.15	= MH = A-24	201.0
120+61.77	= MH A-25	208.0
125+06	" A-26	213.0
128+70	A-27	220.0
132+12.70	A-28	222.0
136+75.7	= A-29	230.0
141+38.7	= A-30	235.0
145+08.7	= A-31	241.5
150+64.7	= A-32	252.0
155+27.36	= A-33	257.0
158+33	A-34	262.0
161+38.84	= A-35	265.0
165+17.75	= A-36	271.5
169+56.3	A-37	278.0
173+13	A-38	283.0
176+70.95	= A-39	287.0
180+45.65	A-40	291.5
184+20.35	A-41	296.0
187+95.05	= A-42	302.0
189+95.67	= A-43	304.0

LA-MESA TRUNK SEWER

STADIA (Topog. Location) (Pathom)

Bet. Fairmount & 54th St.

Station	Azimuth	Stadia	Vert	Horiz.	Elev.
			cont p. 76		
	READING From ⊡ 1 El 1382				
⊡ 3	136°06	390'	-3°14'		1449.
⊡ 1	203°14'	725	-2°15'		
	READINGS From ⊡ 2 El.				166.8
⊡ 2	23°14'	725'	+2°18'	725	166.8
	55°20'	604'	+2°02'	604	159.7
	52°00'	304'	+1°20'	304	139.2
	34°00'	315'	+0°45'	315	142.3
	100°20'	204'	0°0'	204	138.2
	66°09'	296'	+1°0'	296	142.4
	57°25'	280'	+1°10'	280	143.9
	59°55'	260'	+0°11"	260	132.7
	59°57'	230'	+0°15'	230	139.2
	38°26'	260	0°0'	260	138.2
	37°49'	246	-0°05'	246	135.7
	38°13'	238'	-0°05'	238'	137.9
	13°33'	170	-0°21'	170	137.0
	7°59'	174'	-0°30'	174	133.4
	299°55'	135'	+0°15'	135'	130.8
	297°40	118	-0°45'	118	136.7
	READINGS from Sta #1 El. 138.2				Rd 58

Rods MAGNETIC.

10.3

11.3

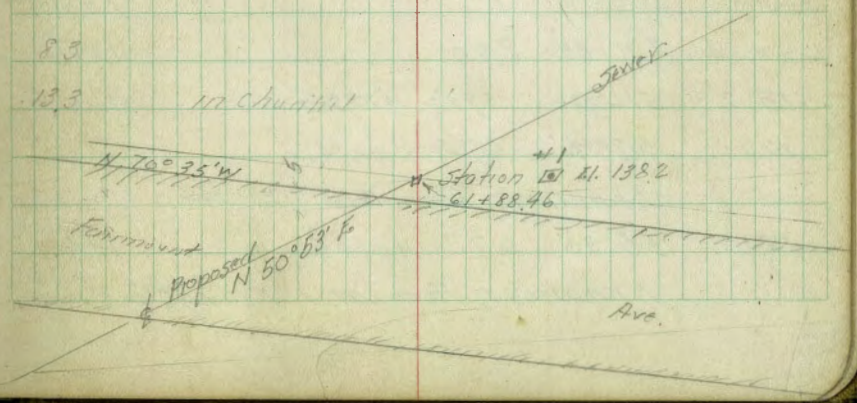
6.3

11.3

7.3

8.3

13.3



Station	Azimuth	Stadia	V △	Horiz.	El	Rod.	MAG.
on Ridge in Channel	326°50	103'			149.6	8.7	
Toe	320° 17'	104			149.3	3.0	
Top Island between two channels	322° 10'	172			153.4	4.9	
on Top of Bank	274° 13'	227			151.5	7.8	
in Bottom Branch of two channels	265° 16'	182			145.6	12.7	
on Toe	241° 37	160			147.2	11.1	
on Bank	241° 35	198			151.4	6.9	
	Readings from □5 Elev 158.3 ✓						
□5 in Road	32°-17'	637	+0° 31'				
in Channel	344°-25	162'	+1° 37'		147.0		
Toe of bank	341° 15	55			141.6		
Top Bank	345° 30'	90			148.9		
Top Bank	250° 40'	97			146.5		
Top Bank	226° 07'	254			143.1		
	Readings From □4 Elev 152.6						
□4 in Road	32° 35.	535	+0.53'		152.6		
Channel	292° 26'	102			133.7 ✓	10.3	
Channel	250°-01'	70			133.3 ✓	10.7	
on Bank	236°-6'	70			138.0	6.0	
L in Road	211° 33'	300			136.0	8.0	
□2	316°06	390'	+2°28'		166.1	2.0 Rod 53	
□1	235°30	674	+0°45'		144.0		
	Readings From □3 El 144.0						
□3	55°30'	673	+0°45		144.0	5.3	
	Readings From □1 El 138.2					8.3	
						5.3	

N 17°-00-00 E

Sta	Azimuth	Stadia	V Δ	Horiz	Elev
	325° 10'	180	+4° 12'		1684
	327° 38'	172	+1° 35'		176.4
	332° 11'	163	+2° 10'		177.8
	343° 10'	155'			162.2
	352° 51'	133			168.5
	Readings from □8			Elev 1716	
□8	31° 18'	407	+0° 30'		171.6
	318° 32'	84			164.8
	320° 45'	63			164.5
	322° 41'	43			157.0
	337° 20'	26			163.4
	202° 17'	232'	-0° 34'		163.9
	200° 19'	314	-0° 59'		162.8
	Readings from □7		Elev	1681	
□7	9° 47'	474	+0° 50'		168.1
	11° 00'	180	+1° 43'		161.4
	4° 38'	120	+2° 20'		160.9
	265° 26	186	+1° 30'		159.9
	265° 02'	156	+1° 15'		158.4
	276° 24'	103			153.7
	270° 15'	58			150.9
	272° 03'	42			153.1
	Readings from □6			Elev 161.0	
□6 East Bank	18° 38'	294	+0° 32'		161.0
T.c. of East Bank	333° 30	65			149.1

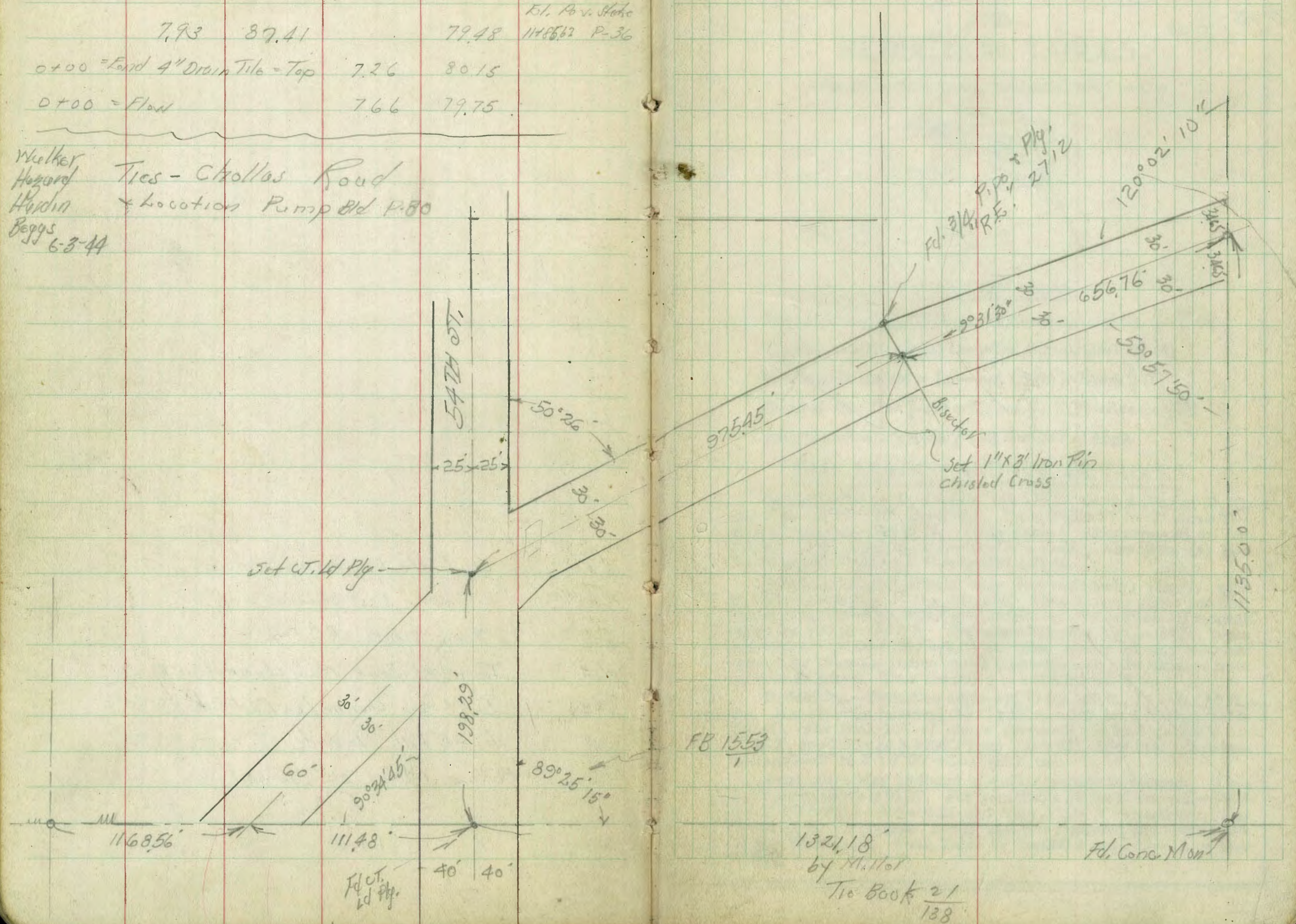
Rod	Magnetic Bearing
12.2	Bottom Channel. 100' W Same elev
5.3	W Side of R.R. Fill East Bank Main Channel
5.3	W Bank of East channel
9.4	Bottom of channel
3.1	on East Bank of East channel
5.3	
3.3	W Side 30' West 8° lower. 80 West Same elev in channel
3.6	East Side of R.R. Fill on Top
11.0	Ctr of channel
4.7	on Bank Secondary Creek
7.3	on Bank " " 25' W. 4° lower
5.3	" " " " 30'. 4° "
	N 7°-20'-00" W
5.4	18' East of East Bank of Secondary Channel
10.3	S.W Corner Rabbit Hutches
10.3	" " Chick Sale Special
11.3	in Channel line extended 30' 1° lower
11.3	" " Main
7.3	on Bank of Island
10.1	in channel 2nd Creek
7.9	Top of East Bank
	N 6°-00-00 W
5.4	47 on #3
9.2	

Station	Azmuth	Stadia	V ∠	Horiz	Elev	Rods	Magnetic Bearing
	121° 21'	243'	+2° 28'		186.6	5.3	on Euclid Ave Paving
	23° 46'	490	+1° 07'		179.8	11.8	Bottom of East channel ℄ ct.
	28° 20'	515	+0° 52'		184.0	5.3	Middle 10' wide RR Fill
	277° 51'	220			164.9	11.3	Toe of W Bank Main channel
	279° 30'	90			165.9	10.3	Toe of Main channel on East Side
	277° 37	72			172.3	3.8	ct. RR Fill 10' Wide
	272° 23'	35			166.0	10.2	Bottom ℄ of 2nd channel
	Readings from ⊡9			Elev 176.2			
⊡9	16° 34'	465'	+0° 33			5.3	N. 0° 45'-00 W.

	7.93	87.41	79.48	Fd. Pov. Stake 1148+62 P-36
0+00 = End 4" Drain Tile = Top		7.26	80.15	
0+00 = Flow		7.66	79.75	

Walker
Hagard
Hardin
Beggs 6-3-44

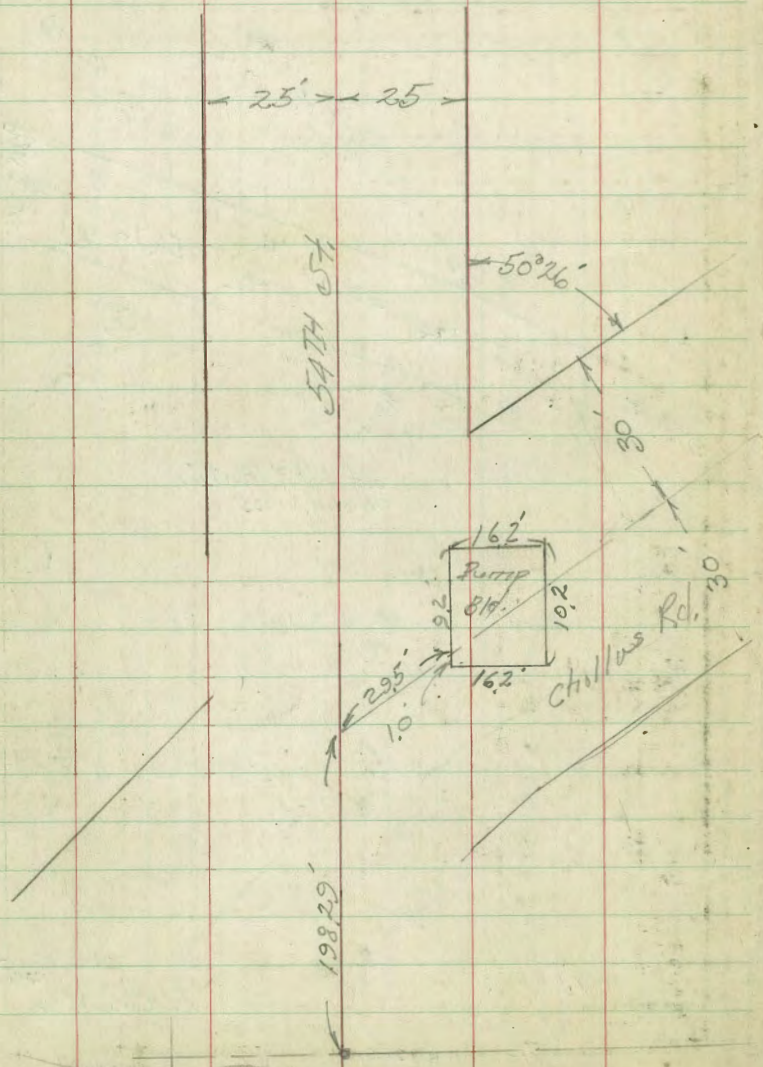
Ties - Chollas Road
& Location Pump Bld P.80



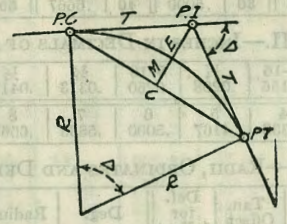
Walker
Hazard
Harden
Boggs 6-3-48

Location Existing Pump Bld at Chollas Road & 54th St

Index
c.s.k.



DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES



CURVE FORMULAS

Radius=R=$\frac{50}{\sin. D/2}$ (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 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	1621.9	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	196.96	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.86	26	194.87	279.76	350.30	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.06	28	194.06	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.28	30	193.18	273.20	334.61	373.20
44	.25	.48	.68	.84	.94	.96	.89	.72	.42	2.50	32	192.25	269.61	326.08	357.28
46	.27	.52	.75	.92	1.02	1.05	.98	.78	.46	2.74	34	191.26	265.81	317.12	340.73
48	.30	.57	.81	1.00	1.12	1.14	1.06	.86	.50	2.99	36	190.21	261.80	307.77	323.61
50	.32	.62	.89	1.09	1.21	1.24	1.15	.93	.55	3.24	38	189.10	257.60	298.03	305.99
52	.35	.67	.96	1.18	1.31	1.35	1.25	1.01	.59	3.52	40	187.94	253.21	287.94	287.94
54	.38	.73	1.04	1.28	1.42	1.46	1.35	1.09	.64	3.80	42	186.72	248.63	277.51	269.54
56	.41	.78	1.12	1.38	1.53	1.57	1.46	1.17	.69	4.09	44	185.44	243.87	266.78	250.85
58	.44	.84	1.20	1.48	1.65	1.69	1.57	1.26	.74	4.40	46	184.10	239.93	255.78	231.95
60	.47	.91	1.29	1.59	1.76	1.81	1.68	1.35	.80	4.72	48	182.71	233.83	244.51	212.92

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

Table VII.—Middle Ordinates for Rails in Feet.

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

SLOPE REDUCTIONS.

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

TRIGONOMETRICAL FORMULAS.

See fig. (a).

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

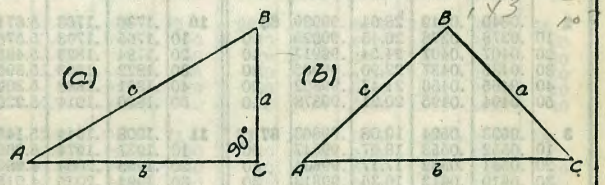
cos. $A=\frac{b}{c}$

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

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

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

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



Formula for Solving Triangles.

Given	Sought.	Right triangles. See fig. (a).
a, c	A, B, b	$\sin. A=\frac{a}{c}$, $\cos. B=\frac{a}{c}$, $b=\sqrt{(c+a)(c-a)}$
a, b	A, B, c	$\tan. A=\frac{a}{b}$, $\cot. B=\frac{a}{b}$, $c=\sqrt{a^2+b^2}$.
A, a	B, b, c	$B=90°-A$, $b=a \cot. A$, $c=\frac{a}{\sin. A}$.
A, b	B, a, c	$B=90°-A$, $a=b \tan. A$, $c=\frac{b}{\cos. A}$.
A, c	B, a, b	$B=90°-A$, $a=c \sin. A$, $b=c \cos. A$
Given	Sought.	Oblique triangles. See fig. (b).
A, B, a	b	$b=\frac{a \sin. B}{\sin. A}$
A, a, b	B	$\sin. B=\frac{b \sin. A}{a}$
a, b, C	$A-B$	$\tan. \frac{1}{2}(A-B)=\frac{(a-b) \tan. \frac{1}{2}(A+B)}{a+b}$
a, b, c	A	If $s=\frac{1}{2}(a+b+c)$, $\sin. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{bc}}$; $\cos. \frac{1}{2}A=\sqrt{\frac{s(s-a)}{bc}}$, $\tan. \frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$; $\sin. A=\frac{2\sqrt{(s-a)(s-b)(s-c)s}}{bc}$
A, B, C, a	area	$\text{area}=\frac{a^2 \sin. B \sin. C}{2 \sin. A}$
A, b, c	area	$\text{area}=\frac{1}{2} b c \sin. A$
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.	
or					
0	0	0	00	1	90
10	.0029	.0029	343.8	1	50
20	.0058	.0058	171.9	.99998	40
30	.0087	.0087	114.6	.99996	30
40	.0116	.0116	85.94	.99993	20
50	.0145	.0145	68.75	.99989	10
1	.0175	.0175	57.29	.99985	89
10	.0204	.0204	49.10	.99979	50
20	.0233	.0233	42.96	.99973	40
30	.0262	.0262	38.19	.99966	30
40	.0291	.0291	34.37	.99958	20
50	.0320	.0320	31.24	.99949	10
2	.0349	.0349	28.64	.99939	88
10	.0378	.0378	26.43	.99929	50
20	.0407	.0407	24.54	.99917	40
30	.0436	.0437	22.90	.99905	30
40	.0465	.0466	21.47	.99892	20
50	.0494	.0495	20.21	.99878	10
3	.0523	.0524	19.08	.99863	87
10	.0552	.0553	18.07	.99847	50
20	.0581	.0582	17.17	.99831	40
30	.0610	.0612	16.35	.99813	30
40	.0640	.0641	15.60	.99795	20
50	.0669	.0670	14.92	.99776	10
4	.0698	.0699	14.30	.99756	86
10	.0727	.0729	13.73	.99736	50
20	.0756	.0758	13.20	.99714	40
30	.0785	.0787	12.71	.99692	30
40	.0814	.0816	12.25	.99668	20
50	.0843	.0846	11.83	.99644	10
5	.0872	.0875	11.43	.99619	85
10	.0901	.0904	11.06	.99594	50
20	.0929	.0934	10.71	.99567	40
30	.0958	.0963	10.39	.99540	30
40	.0987	.0992	10.08	.99511	20
50	.1016	.1022	9.788	.99482	10
6	.1045	.1051	9.514	.99452	84
10	.1074	.1080	9.255	.99421	50
20	.1103	.1110	9.010	.99390	40
30	.1132	.1139	8.777	.99357	30
40	.1161	.1169	8.556	.99324	20
50	.1190	.1198	8.345	.99290	10
7	.1219	.1228	8.144	.99255	83
10	.1248	.1257	7.953	.99219	50
20	.1276	.1287	7.770	.99182	40
30	.1305	.1317	7.596	.99144	30
40	.1334	.1346	7.429	.99106	20
50	.1363	.1376	7.269	.99067	10
					82
	Cosin.	Cotg.	Tan.	Sine.	Angle.

Angle	Sine.	Tan.	Cotg.	Cosin.	
or					
8	.1392	.1405	7.115	.99027	82
10	.1421	.1435	6.968	.98986	50
20	.1449	.1465	6.827	.98944	40
30	.1478	.1495	6.691	.98902	30
40	.1507	.1524	6.561	.98858	20
50	.1536	.1554	6.435	.98814	10
9	.1564	.1584	6.314	.98769	81
10	.1593	.1614	6.197	.98723	50
20	.1622	.1644	6.084	.98676	40
30	.1650	.1673	5.976	.98629	30
40	.1679	.1703	5.871	.98580	20
50	.1708	.1733	5.769	.98531	10
10	.1736	.1763	5.671	.98481	80
10	.1765	.1793	5.576	.98430	50
20	.1794	.1823	5.485	.98378	40
30	.1822	.1853	5.396	.98325	30
40	.1851	.1883	5.309	.98272	20
50	.1880	.1914	5.226	.98218	10
11	.1908	.1944	5.145	.98163	79
10	.1937	.1974	5.066	.98107	50
20	.1965	.2004	4.989	.98050	40
30	.1994	.2035	4.915	.97992	30
40	.2022	.2065	4.843	.97934	20
50	.2051	.2095	4.773	.97875	10
12	.2079	.2126	4.705	.97815	78
10	.2108	.2156	4.638	.97754	50
20	.2136	.2186	4.574	.97692	40
30	.2164	.2217	4.511	.97630	30
40	.2193	.2247	4.449	.97566	20
50	.2221	.2278	4.390	.97502	10
13	.2250	.2309	4.331	.97437	77
10	.2278	.2339	4.275	.97371	50
20	.2306	.2370	4.219	.97304	40
30	.2334	.2401	4.165	.97237	30
40	.2363	.2432	4.113	.97169	20
50	.2391	.2462	4.061	.97100	10
14	.2419	.2493	4.011	.97030	76
10	.2447	.2524	3.962	.96959	50
20	.2476	.2555	3.914	.96887	40
30	.2504	.2586	3.867	.96815	30
40	.2532	.2617	3.821	.96742	20
50	.2560	.2648	3.776	.96667	10
15	.2588	.2679	3.732	.96593	75
10	.2616	.2711	3.689	.96517	50
20	.2644	.2742	3.647	.96440	40
30	.2672	.2773	3.606	.96363	30
40	.2700	.2805	3.566	.96285	20
50	.2728	.2836	3.526	.96206	10
					74
	Cosin.	Cotg.	Tan.	Sine.	Angle.

Table VIII.—Natural Trigonometrical Functions.

Angle	Sine.	Tan.	Cotg.	Cosin.	
or					
16	.2756	.2867	3.487	.96126	74
10	.2784	.2899	3.450	.96046	50
20	.2812	.2931	3.412	.95964	40
30	.2840	.2962	3.376	.95882	30
40	.2868	.2994	3.340	.95799	20
50	.2896	.3026	3.305	.95715	10
17	.2924	.3057	3.271	.95615	73
10	.2952	.3089	3.237	.95545	50
20	.2979	.3121	3.204	.95459	40
30	.3007	.3153	3.172	.95372	30
40	.3035	.3185	3.140	.95284	20
50	.3062	.3217	3.108	.95195	10
18	.3090	.3249	3.078	.95106	72
10	.3118	.3281	3.048	.95015	50
20	.3145	.3314	3.018	.94924	40
30	.3173	.3346	2.989	.94832	30
40	.3201	.3378	2.960	.94740	20
50	.3228	.3411	2.932	.94646	10
19	.3256	.3443	2.904	.94552	71
10	.3283	.3476	2.877	.94457	50
20	.3311	.3508	2.850	.94361	40
30	.3338	.3541	2.824	.94264	30
40	.3365	.3574	2.798	.94167	20
50	.3393	.3607	2.773	.94068	10
20	.3420	.3640	2.747	.93969	70
10	.3448	.3673	2.723	.93869	50
20	.3475	.3706	2.699	.93769	40
30	.3502	.3739	2.675	.93667	30
40	.3529	.3772	2.651	.93565	20
50	.3557	.3805	2.628	.93462	10
21	.3584	.3839	2.605	.93358	69
10	.3611	.3872	2.583	.93253	50
20	.3638	.3906	2.560	.93148	40
30	.3665	.3939	2.539	.93042	30
40	.3692	.3973	2.517	.92935	20
50	.3719	.4006	2.496	.92827	10
22	.3746	.4040	2.475	.92718	68
10	.3773	.4074	2.455	.92609	50
20	.3800	.4108	2.434	.92499	40
30	.3827	.4142	2.414	.92388	30
40	.3854	.4176	2.394	.92276	20
50	.3881	.4210	2.375	.92164	10
23	.3907	.4245	2.356	.92050	67
10	.3934	.4279	2.337	.91936	50
20	.3961	.4314	2.318	.91822	40
30	.3987	.4348	2.300	.91706	30
40	.4014	.4383	2.282	.91590	20
50	.4041	.4417	2.264	.91472	10
					66
	Cosin.	Cotg.	Tan.	Sine.	Angle.

Angle	Sine.	Tan.	Cotg.	Cosin.	
or					
24	.4067	.4452	2.246	.91355	66
10	.4094	.4487	2.229	.91236	50
20	.4120	.4522	2.211	.91116	40
30	.4147	.4557	2.194	.90996	30
40	.4173	.4592	2.177	.90875	20
50	.4200	.4628	2.161	.90753	10
25	.4226	.4663	2.145	.90631	65
10	.4253	.4699	2.128	.90507	50
20	.4279	.4734	2.112	.90383	40
30	.4305	.4770	2.097	.90259	30
40	.4331	.4806	2.081	.90133	20
50	.4358	.4841	2.066	.90007	10
26	.4384	.4877	2.050	.89879	64
10	.4410	.4913	2.035	.89752	50
20	.4436	.4950	2.020	.89623	40
30	.4462	.4986	2.006	.89493	30
40	.4488	.5022	1.991	.89363	20
50	.4514	.5059	1.977	.89232	10
27	.4540	.5095	1.963	.89101	63
10	.4566	.5132	1.949	.88968	50
20	.4592	.5169	1.935	.88835	40
30	.4617	.5206	1.921	.88701	30
40	.4643	.5243	1.907	.88566	20
50	.4669	.5280	1.894	.88431	10
28	.4695	.5317	1.881	.88295	62
10	.4720	.5354	1.868	.88158	50
20	.4746	.5392	1.855	.88020	40
30	.4772	.5430	1.842	.87882	30
40	.4797	.5467	1.829	.87743	20
50	.4823	.5505	1.816	.87603	10
29	.4848	.5543	1.804	.87462	61
10	.4874	.5581	1.792	.87321	50
20	.4899	.5619	1.780	.87178	40
30	.4924	.5658	1.767	.87036	30
40	.4950	.5696	1.756	.86892	20
50	.4975	.5735	1.744	.86748	10
30	.5000	.5774	1.732	.86603	60
10	.5025	.5812	1.720	.86457	50
20	.5050	.5851	1.709	.86310	40
30	.5075	.5890	1.698	.86163	30
40	.5100	.5930	1.686	.86015	20
50	.5125	.5969	1.675	.85866	10
31	.5150	.6009	1.664	.85717	59
10	.5175	.6048	1.653	.85567	50
20	.5200	.6088	1.643	.85416	40
30	.5225	.6128	1.632	.85264	30
40	.5250	.6168	1.621	.85112	20
50	.5275	.6208	1.611	.84959	10
					58
	Cosin.	Cotg.	Tan.	Sine.	Angle.

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.

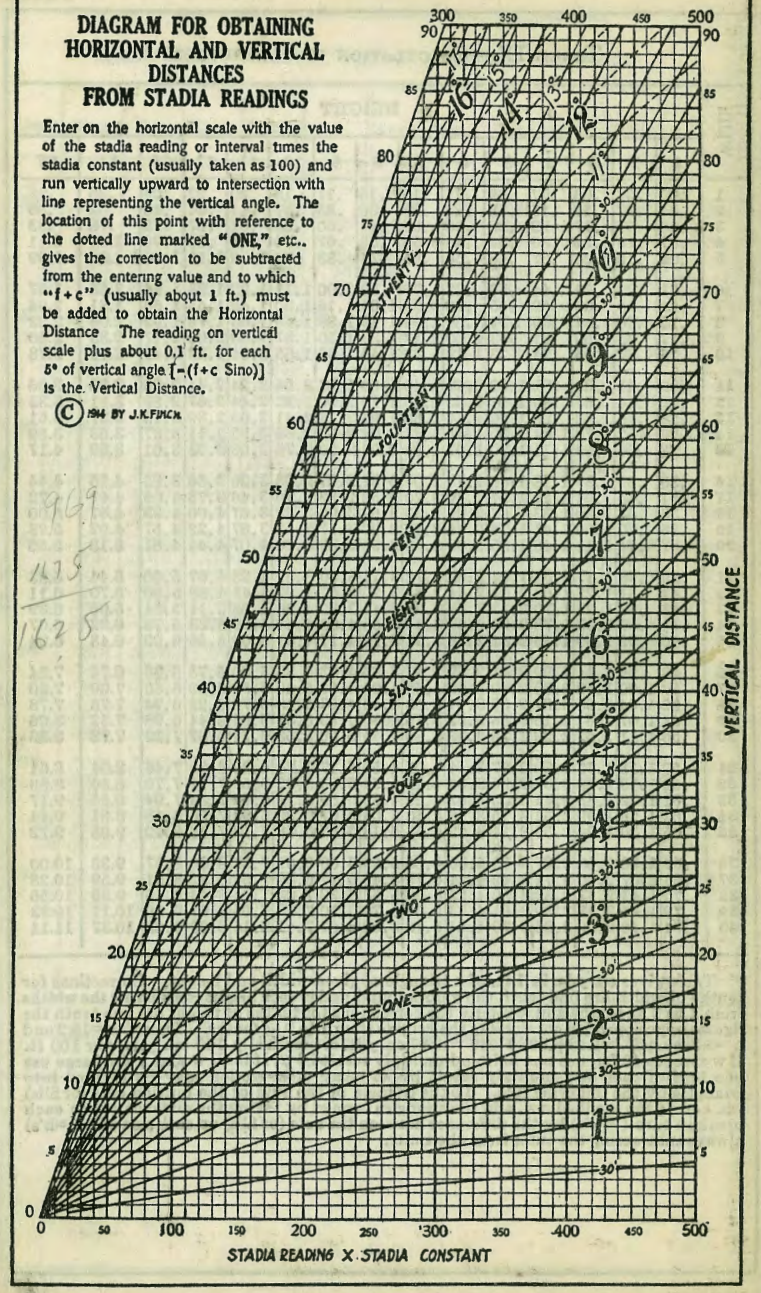
Table IX.—Calculation of Earthwork.

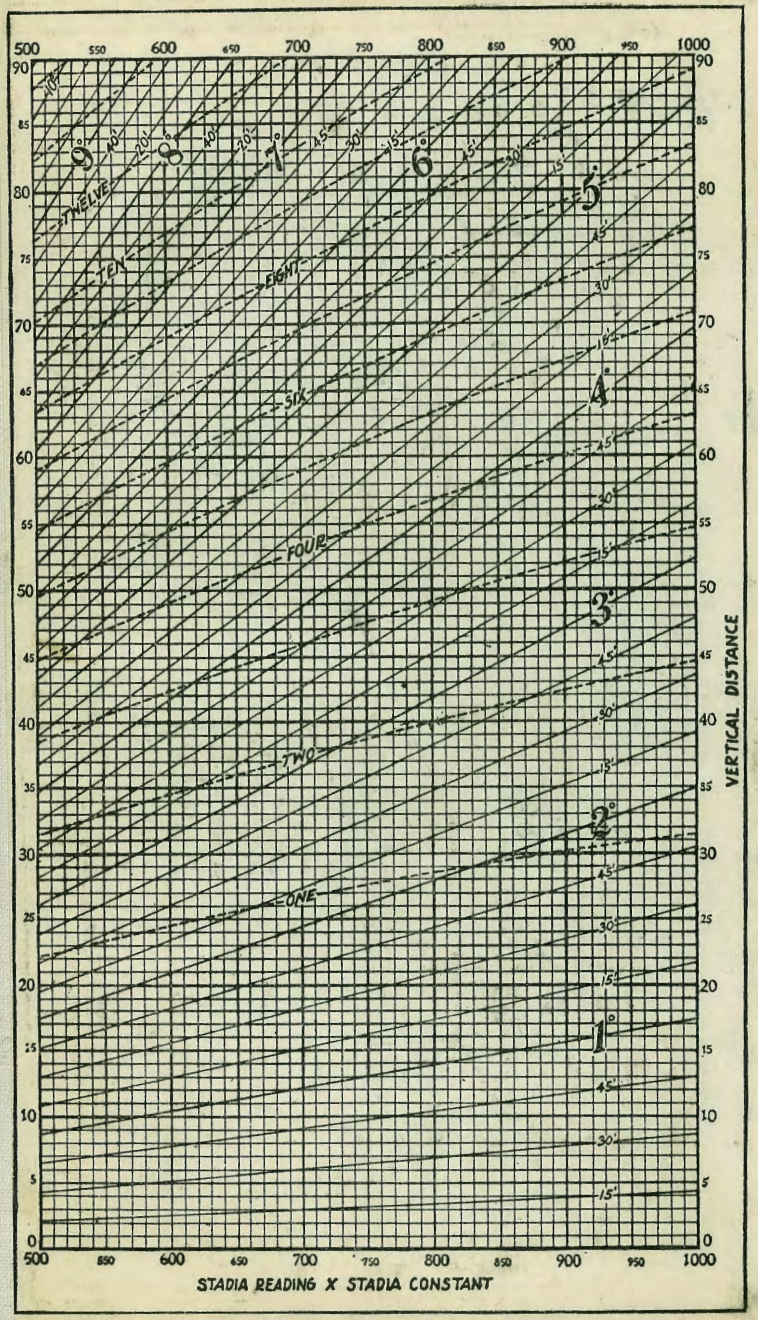
Width	HEIGHT														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18	.20	.22	.24	.26	.28
2	.04	.07	.11	.15	.18	.22	.26	.30	.33	.37	.41	.44	.48	.52	.56
3	.06	.11	.17	.22	.28	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83
4	.07	.15	.22	.30	.37	.44	.52	.59	.67	.74	.81	.89	.96	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.





3.6553 Miles.

5280) 19300.0000

15840

34600

31680

29200

26400

28000

26400

16000

13°35′

6°47′30

1°26′30

5°21′

~~3°5~~

2°53′

1°26′30″

11909

02517

.09392

156

56352

46960

9392

146.5152

45

22°30

137 56 30

115 17 90

43833

8.63

70

269 92

10 83

28075

27549

5.26

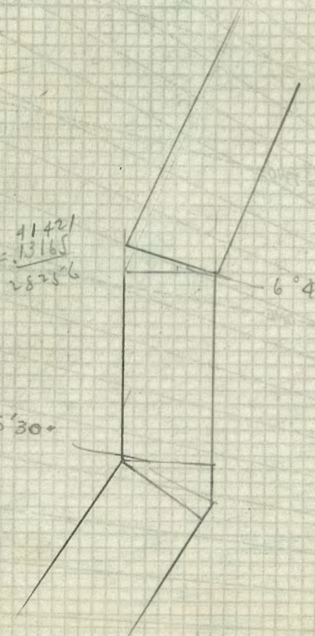
7°30 = 41421 / .13165 / 28256

130 35′

6° 47′

Tan 15°

.26795



6°47′30″

1°26′30″

30°

15°

9°31′30″

4°45′45″

13 39136

13 21270

17866

104 2204

573

104+1681 + Nedge Por.

13°

57

78

= 19°19

5° 39 30

~~USGS~~

City + 6.12 = U.S.G.S

33½ x 20½

¾″ Border + ¼ for Trim

3x5 Box

413

270

143

2+30

2+35 = 48

+15 in Pond = 54

+7 ″ ″ 54

651

80

571

413

158

143

301

2+58

-50 = 5.2

E -35 = 5.4

-25 = 5.1

-15 = 5.4

68°33′30

137 07 00

205 40 30

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.

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