

W 686

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 $30.6 + (20 - 16) \times 2$ or 2 ft. added to 30.6 = 32.6. For slopes of 1 on $1\frac{1}{2}$ see inside of back cover.

Copyright, 1914, by Eugene Dietzgen Co.

50.02

O.D. 68" Pipe 81 1/2"
72
6' 9 1/2"

Hilldale 47581

Tunnel

spike in pole
491.97

Please Return to
City of San Diego Water Dept.
Room 268 Civic Center
Telephone Main 5161

This Field Book is manufactured 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.

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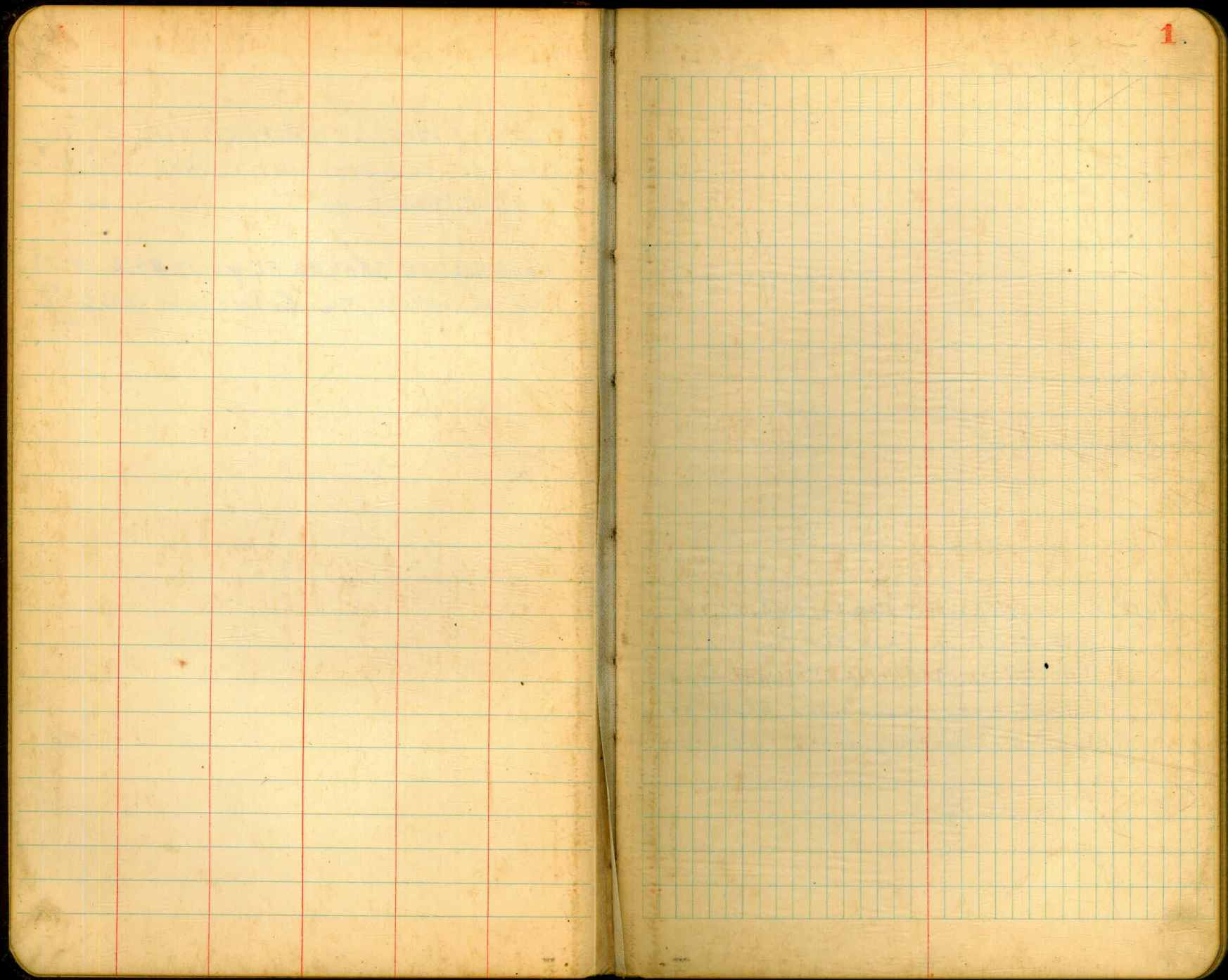
40

to be
of rot
exam
30.0

EL MONTE PIPELINE PROPERTY TIES ✓
SANTEE TO GROSSMONT TUNNEL SITE-2-15 ✓
MCGILLIARD PROPERTY TIES ✓ 16

CONSTRUCTION GRADES EL MONTE II&III 18-79 ✓

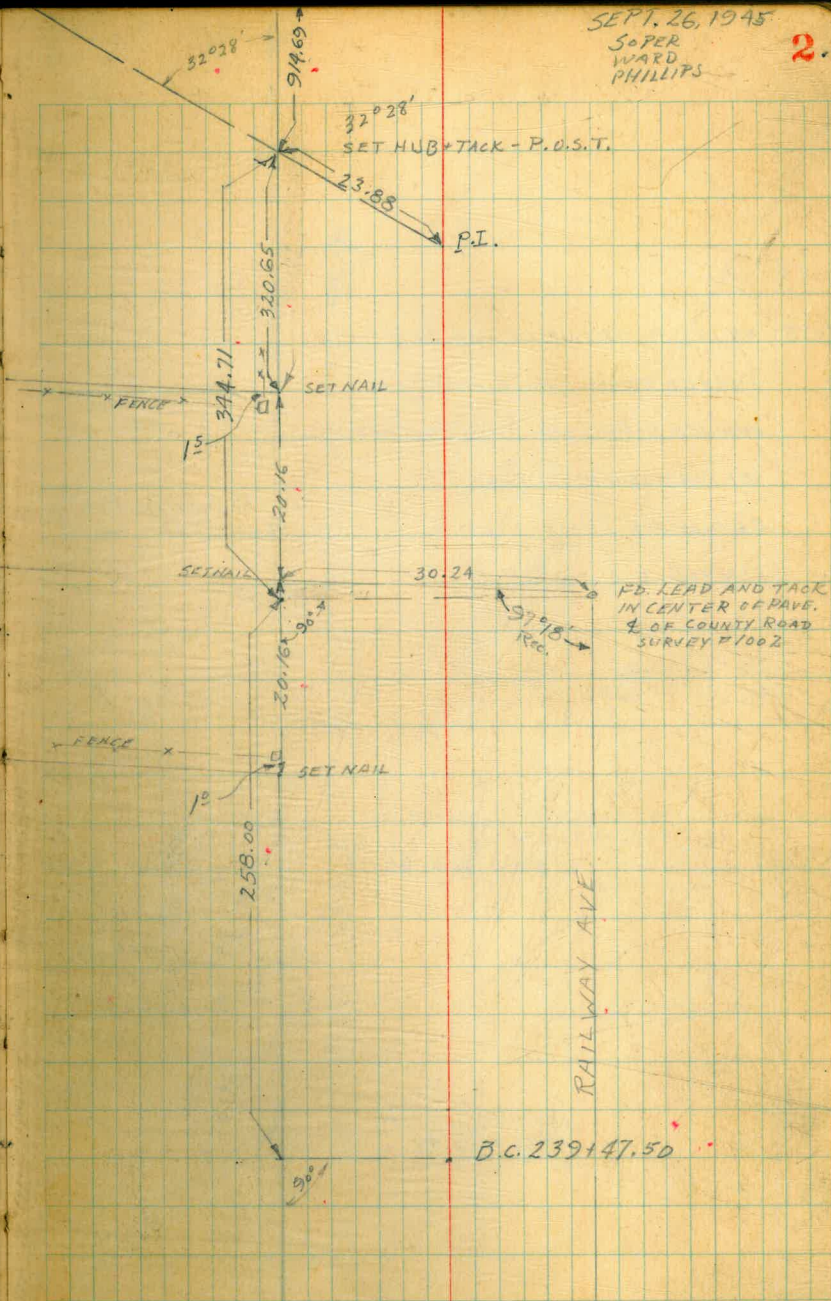
EL MONTE P.L. Elev ARR VAL CHAMP. 434450-60 ✓
Alice



EL MONTE PL. PROPERTIES

← SURVEY #1002

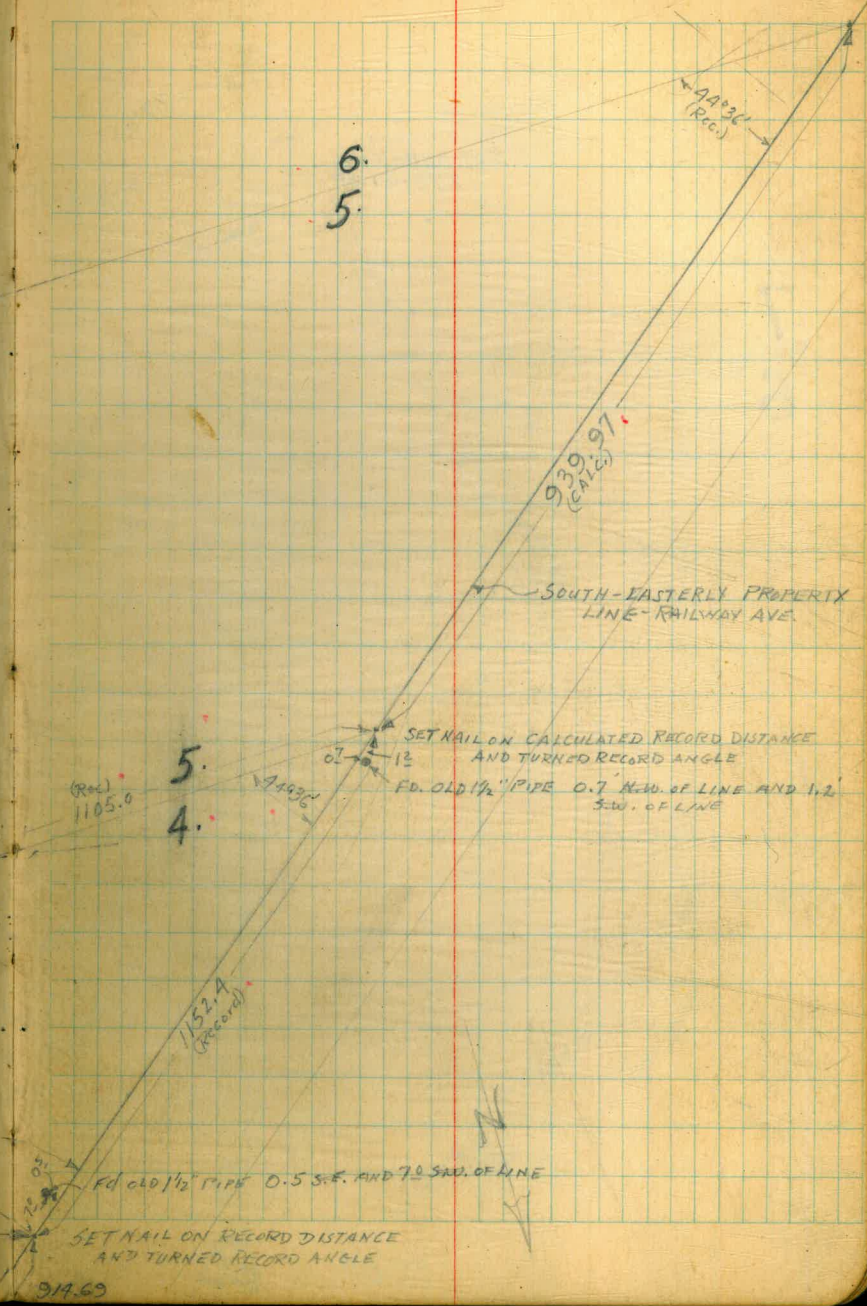
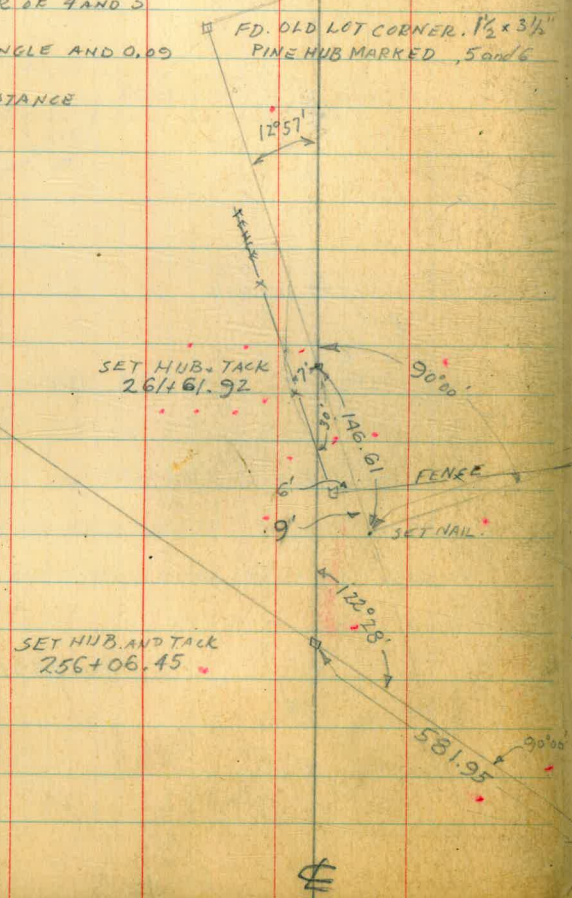
NOTE: ALL CORNERS SET FOR LOTS 5-4, 5, 6, 7, 8, 9 & 10
WERE BASED ON IRON PIN FOUND AT
JUNCTION OF MAGNOLIA & RAILWAY AVES.
DISTANCES AND ANGLES WERE BASED ON
MAP # 817 (COUNTY MAP). ALSO LOT 1 BLOCK 22.



⊕

SEPT. 25, 1945
 SUPER
 WARD
 PHILLIPS 3.

NOTE: ON OCT. 8; SET UP ON OLD LOT CORNER,
 TURNED RECORD ANGLE OF 90° AND
 CHAINED NORTHERLY. THIS CHECKED NAIL
 SET FOR CORNER OF 4 AND 5
 BY 0.25 FOR ANGLE AND 0.09
 FOR RECORD DISTANCE



E

SET HUB & JACK
273+64.85

77°02'

1350.80

63°28'

SET NAIL ON CALCULATED
RECORD DISTANCE AND
TURNED RECORD ANGLE.

FENCE

EASTERLY PROPERTY LINE
MAGNOLIA AVE.

75

608.38

Ed 3/4" I. PIN.

164.8

RAILWAY AVE.

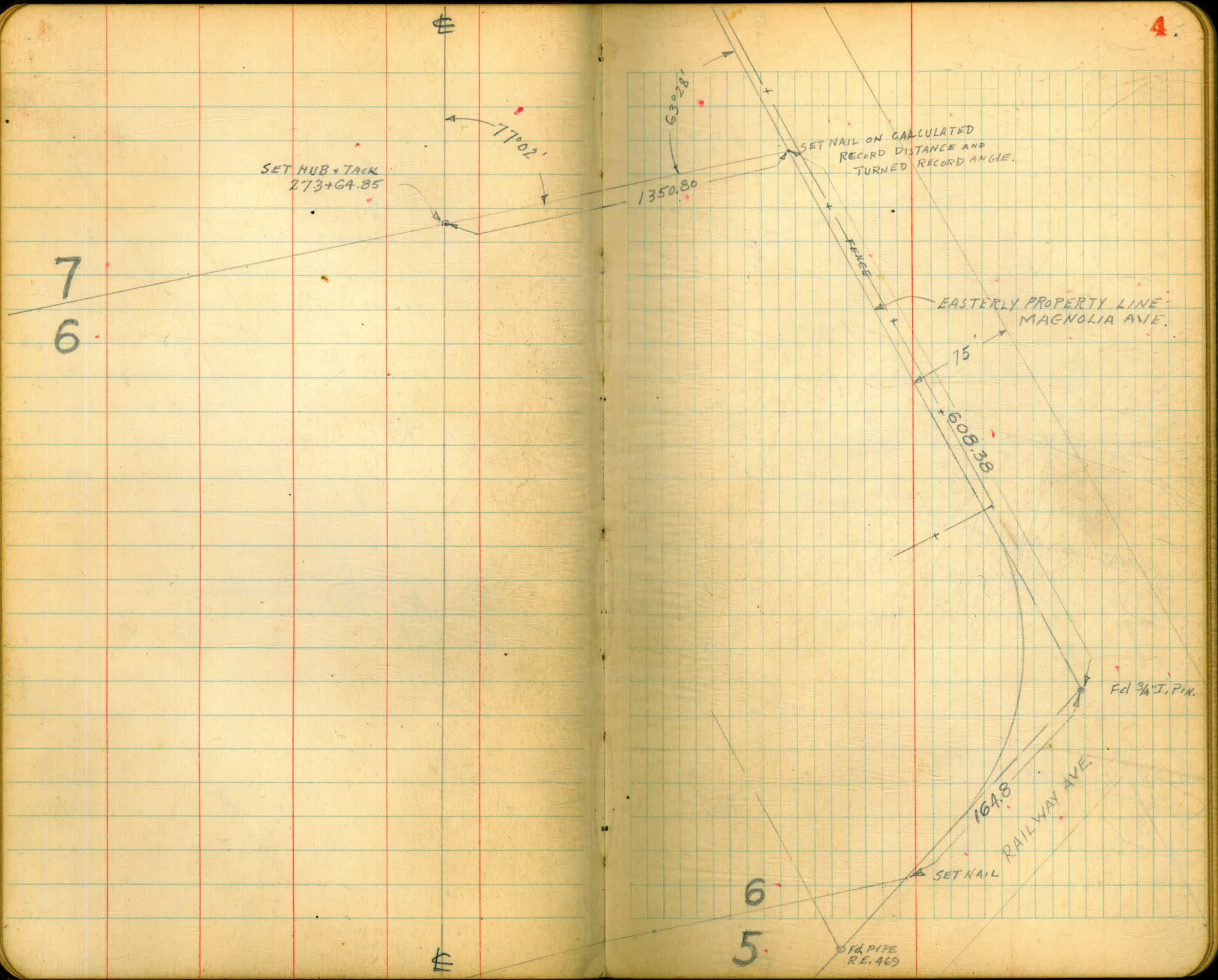
SET NAIL

6 1/2" PIPE
R.E. 469

6
5

E

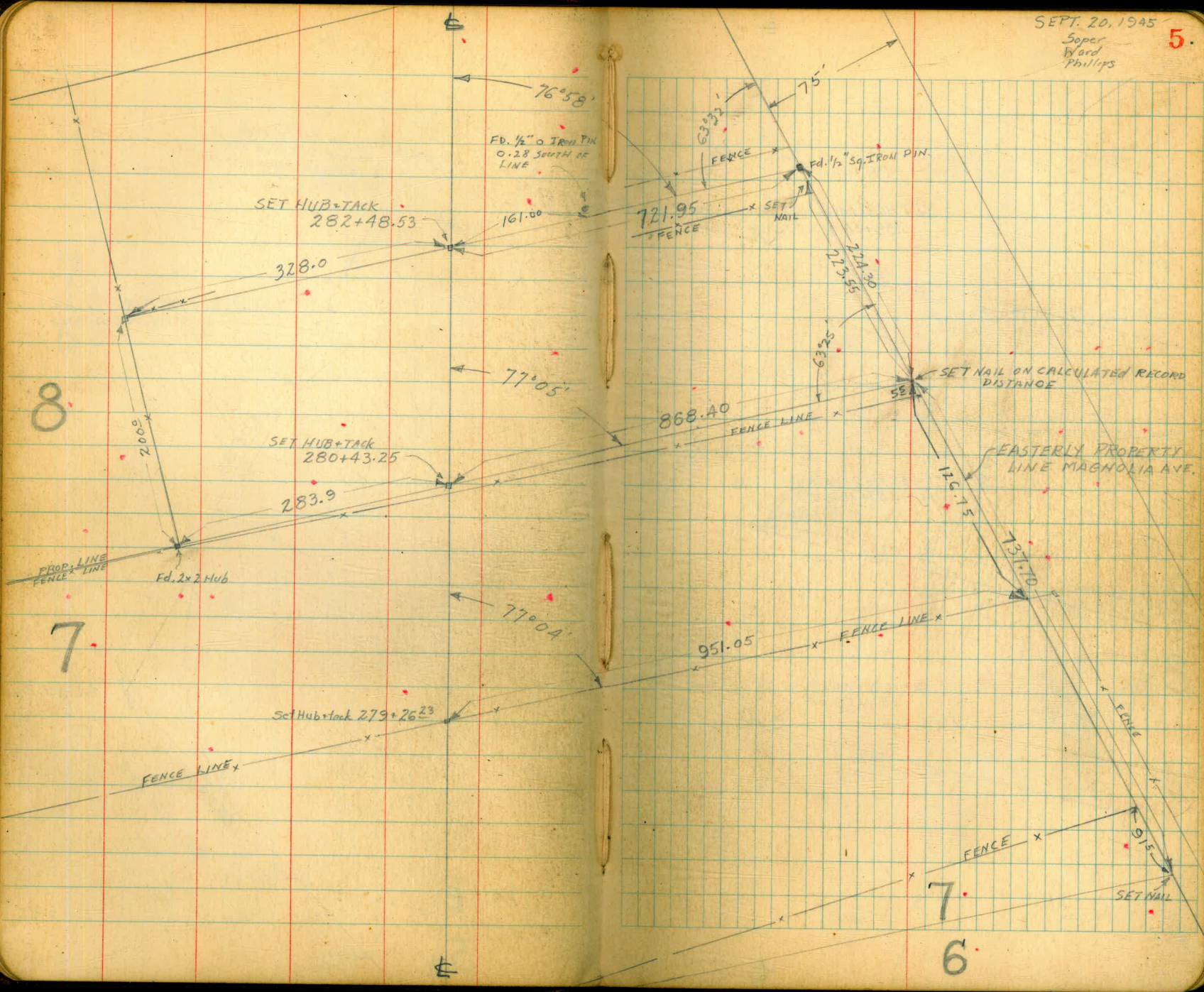
7
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SEPT. 20, 1945

Soper
Word
Phillips

5.



8.

7.

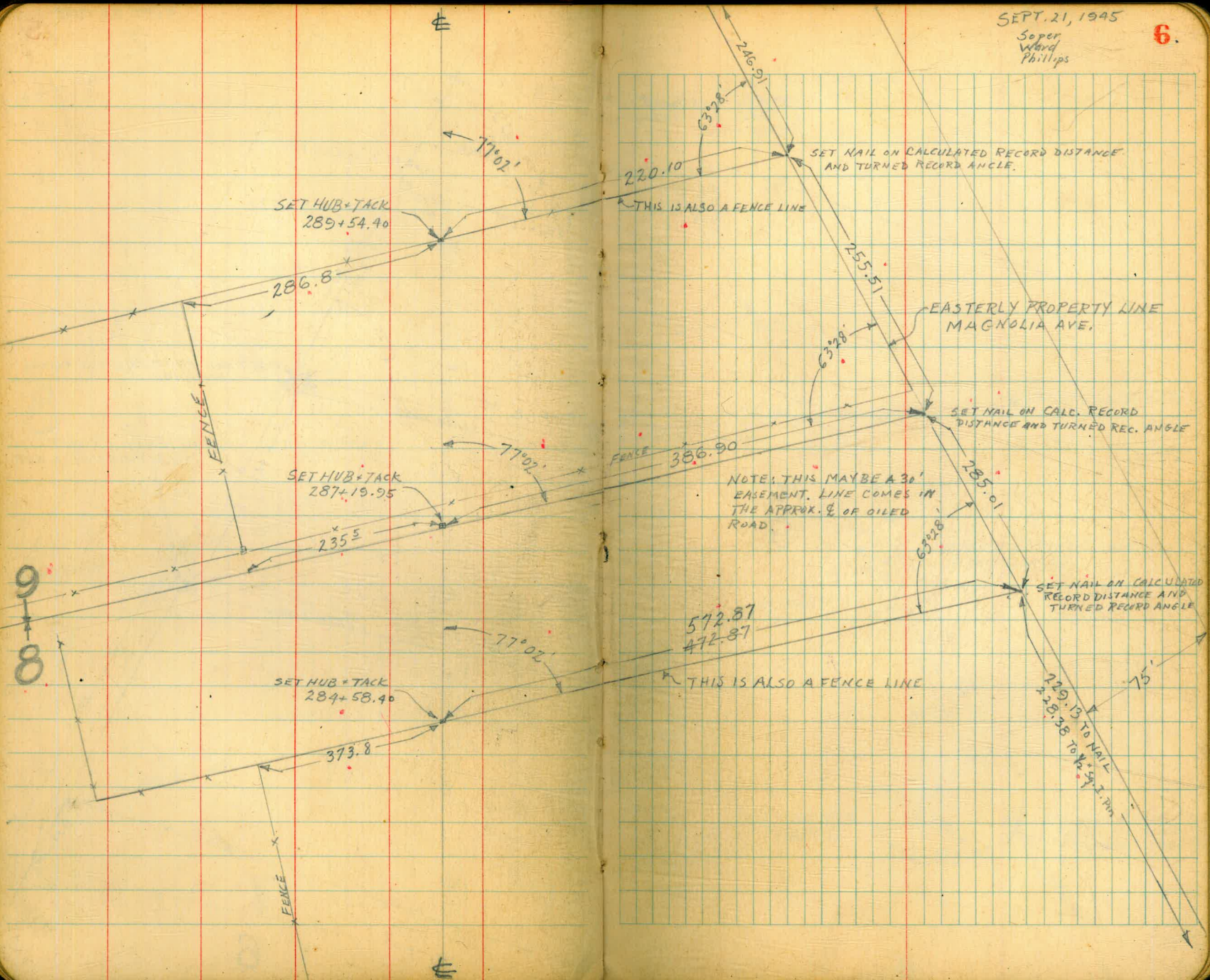
7.

6.

SEPT. 21, 1945

Soper
Ward
Phillips

6.



Sept. 24, 1945

Super
Word
Phillips

7.

SET NAIL ON RECORD
DISTANCE AND TURNED
RECORD ANGLE

OLD FENCE POST
0.5 NORTH AND
0.5 EAST OF NAIL

Ed. IRON PIN 3.5 WEST AND
0.7 NORTH OF NAIL.

SET NAIL ON CALCULATED
RECORD DISTANCE AND
TURNED RECORD ANGLE

PROSPECT STREET

EASTERLY PROPERTY LINE
MAGNOLIA AVE.

SET HUB+TACK
292+64.06

SET HUB+TACK
294+81.33

SET NAIL ON CALC.
RECORD DISTANCE
AND TURNED REC. ANGLE

318.46

75

235.28

476.71

39.36

50.15

63.028

77.02

58.88

246.91

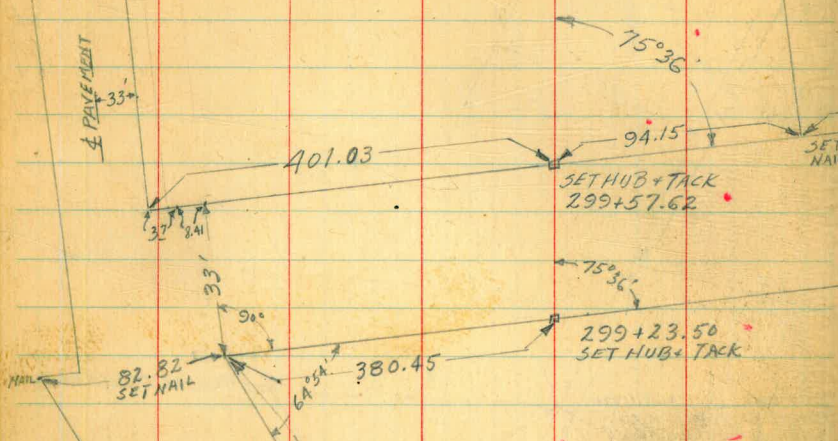
10
9

OCT. 1, 1945
SOPER
WARD
PHILLIPS

8

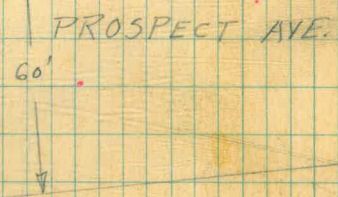
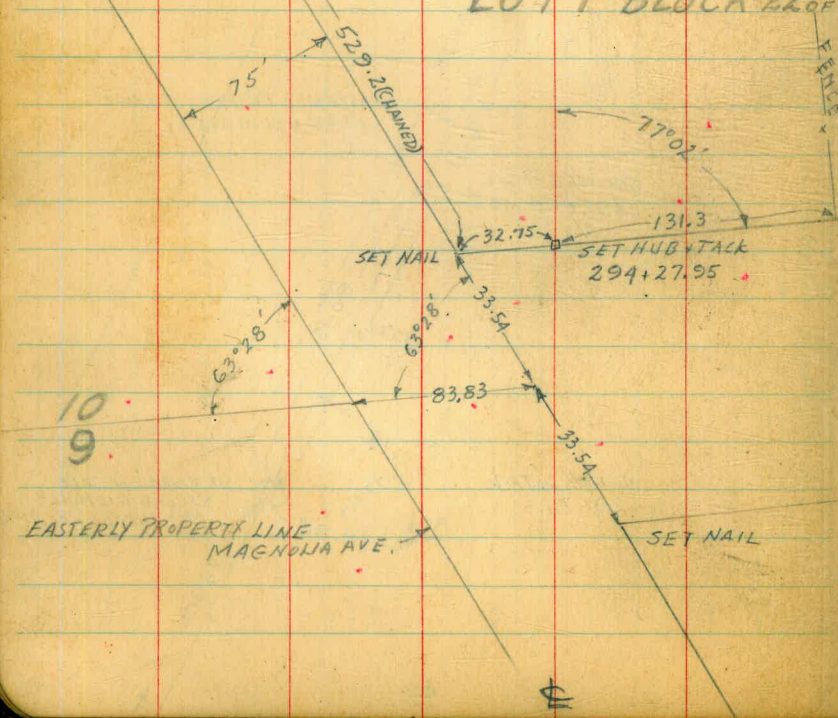
LOT 1 BLOCK 2 - LOCKWOODS

SUBDIVISION OF THE "R" TRACT
(N.O. GLOVER'S MAP OF CAMP GILLESPIE)



LOT 1 BLOCK 22 OF

LOTS M AND O OF RANCHO EL CAJON



294 + 27.95
292 + 80'
1.4782

CONC. MON. - NORMAN GLOVER
CONC. MON. - NORMAN GLOVER

O.P.I.

SET HUB + TACK
P.O.S.T.

14.19

38.45

PORTION OF
LOT 1 BLOCK 2
OF LOCKWOOD'S
SUBDIVISION OF THE
"R" TRACT

39.76

90°03'

SET NAIL

9.83

SET HUB + TACK
P.O.S.T.

68.49

B.C. 302 + 30.26

Oct 2, 1945

SOPER
WARD
PHILLIPS.

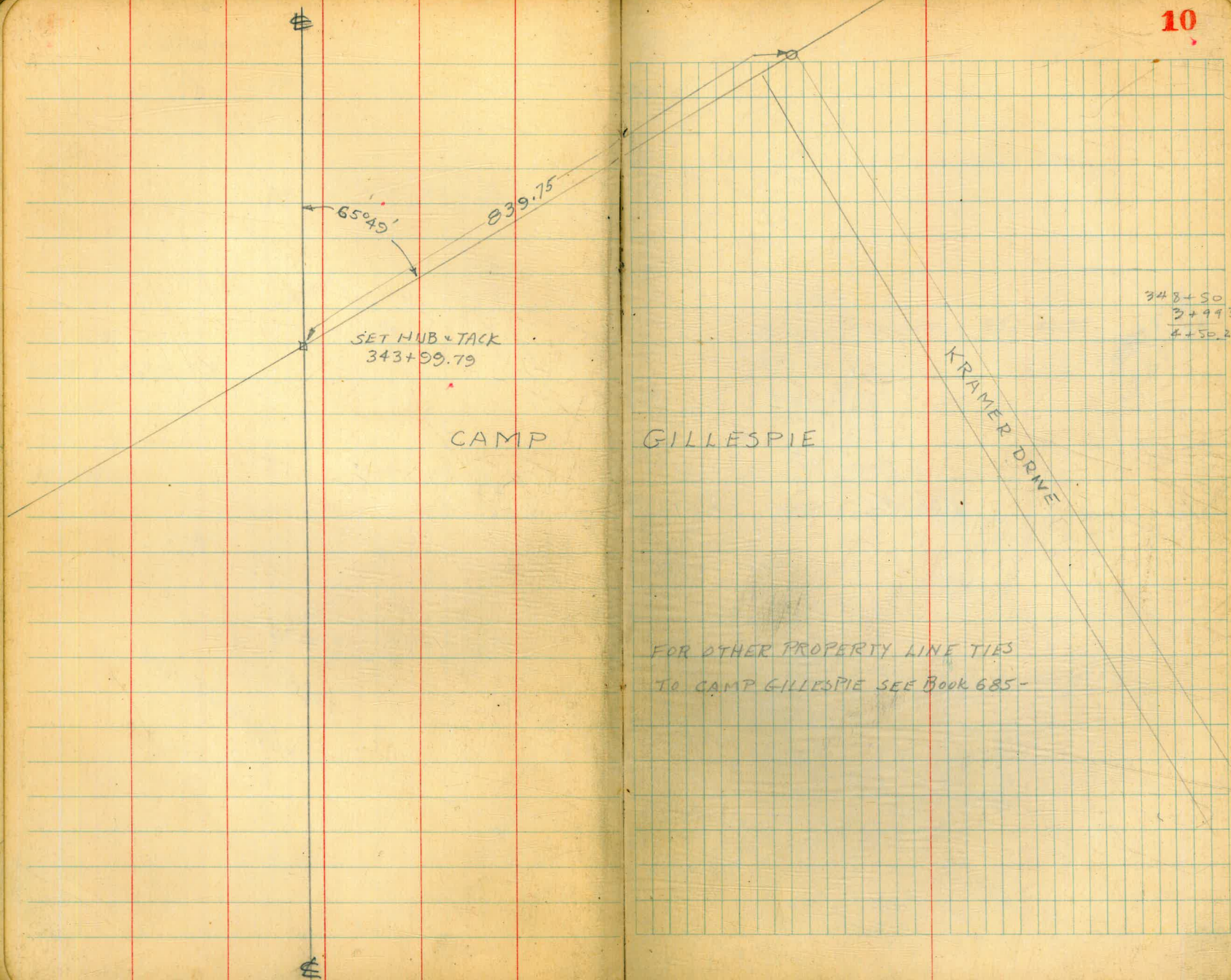
9.

330.20

799.27

PROSPECT AVE.

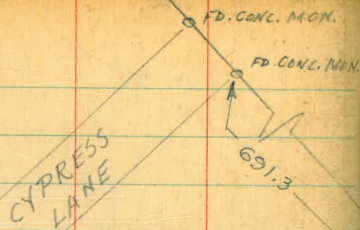
NAIL



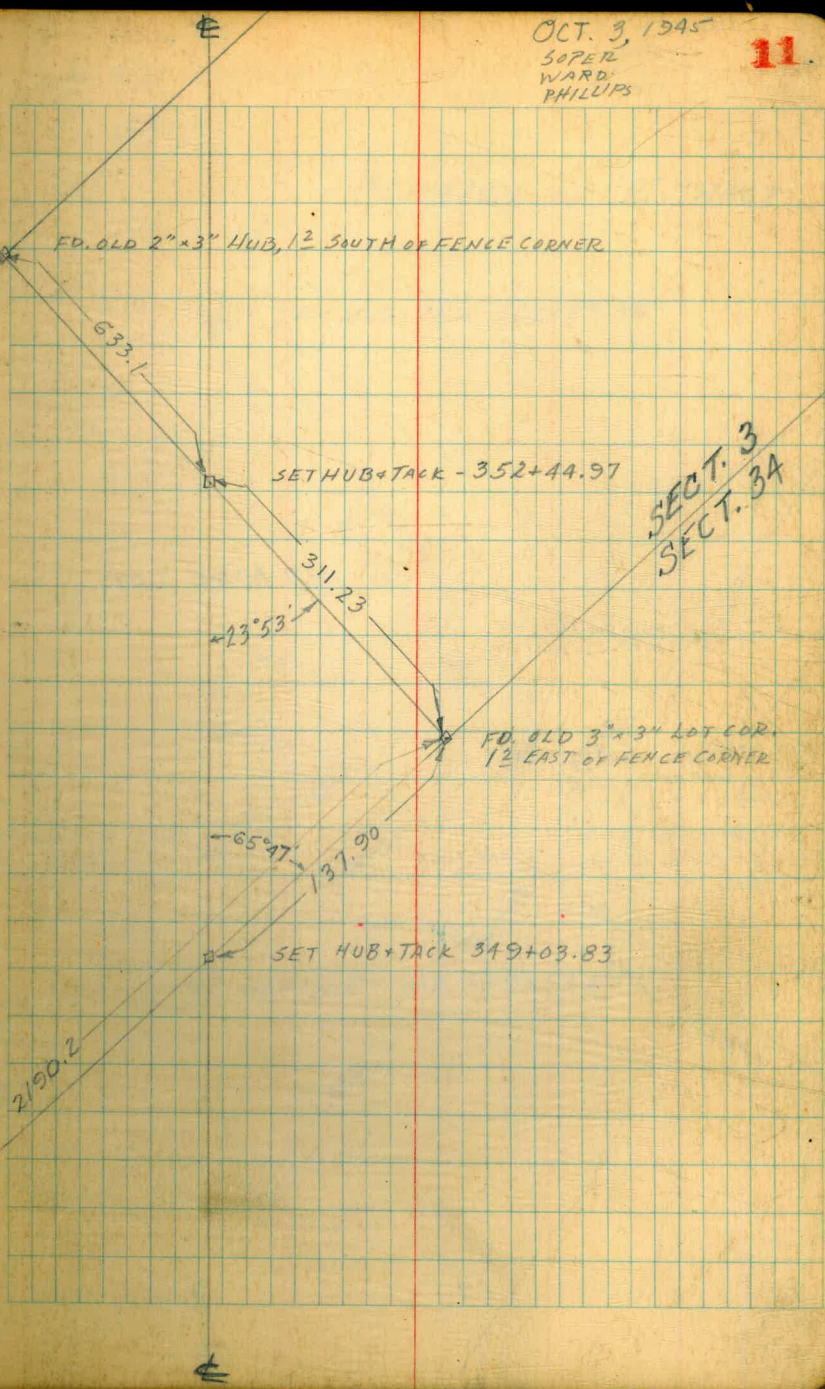
OCT. 3, 1945

SOPER
WARD
PHILLIPS

11.

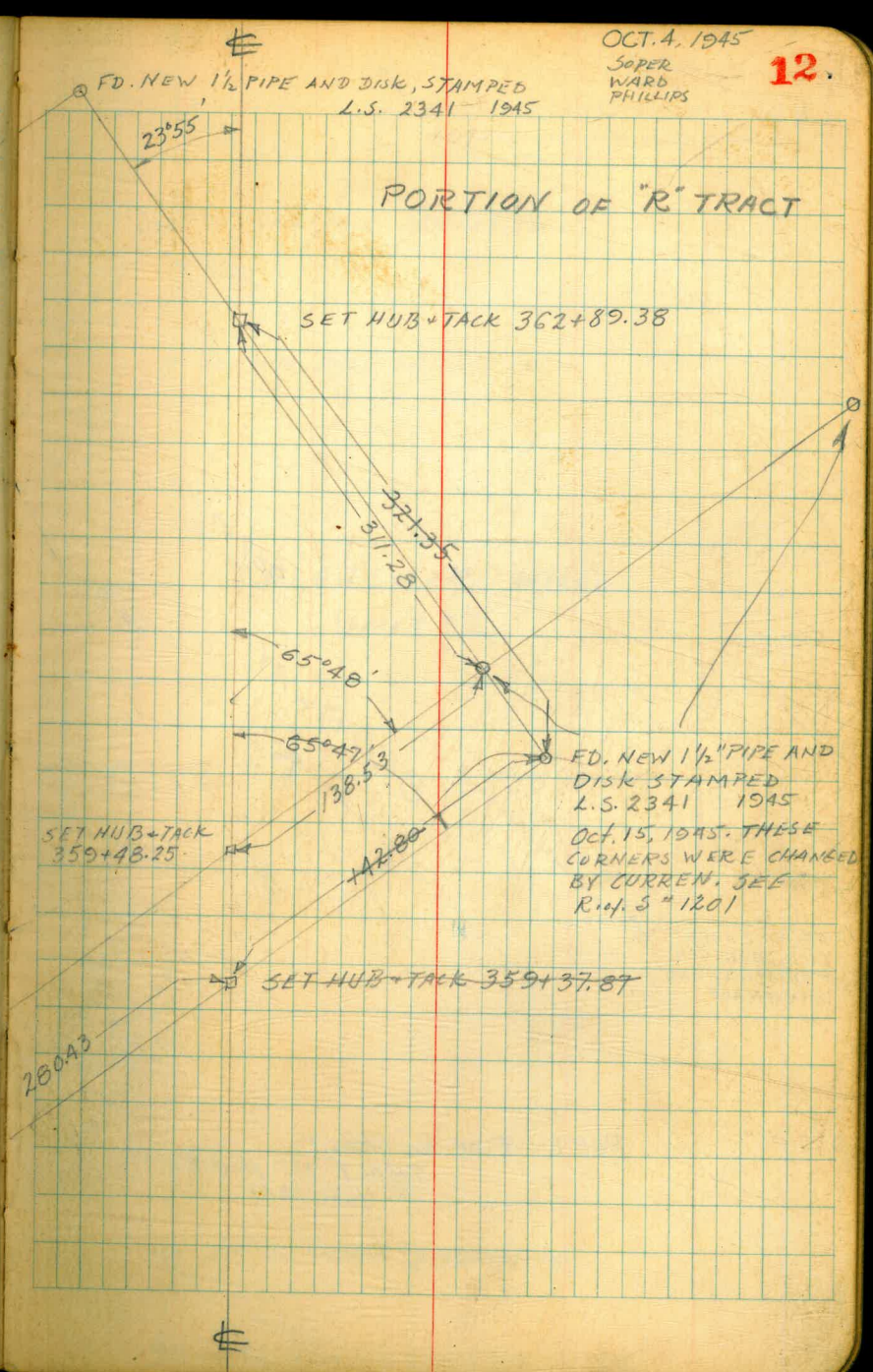
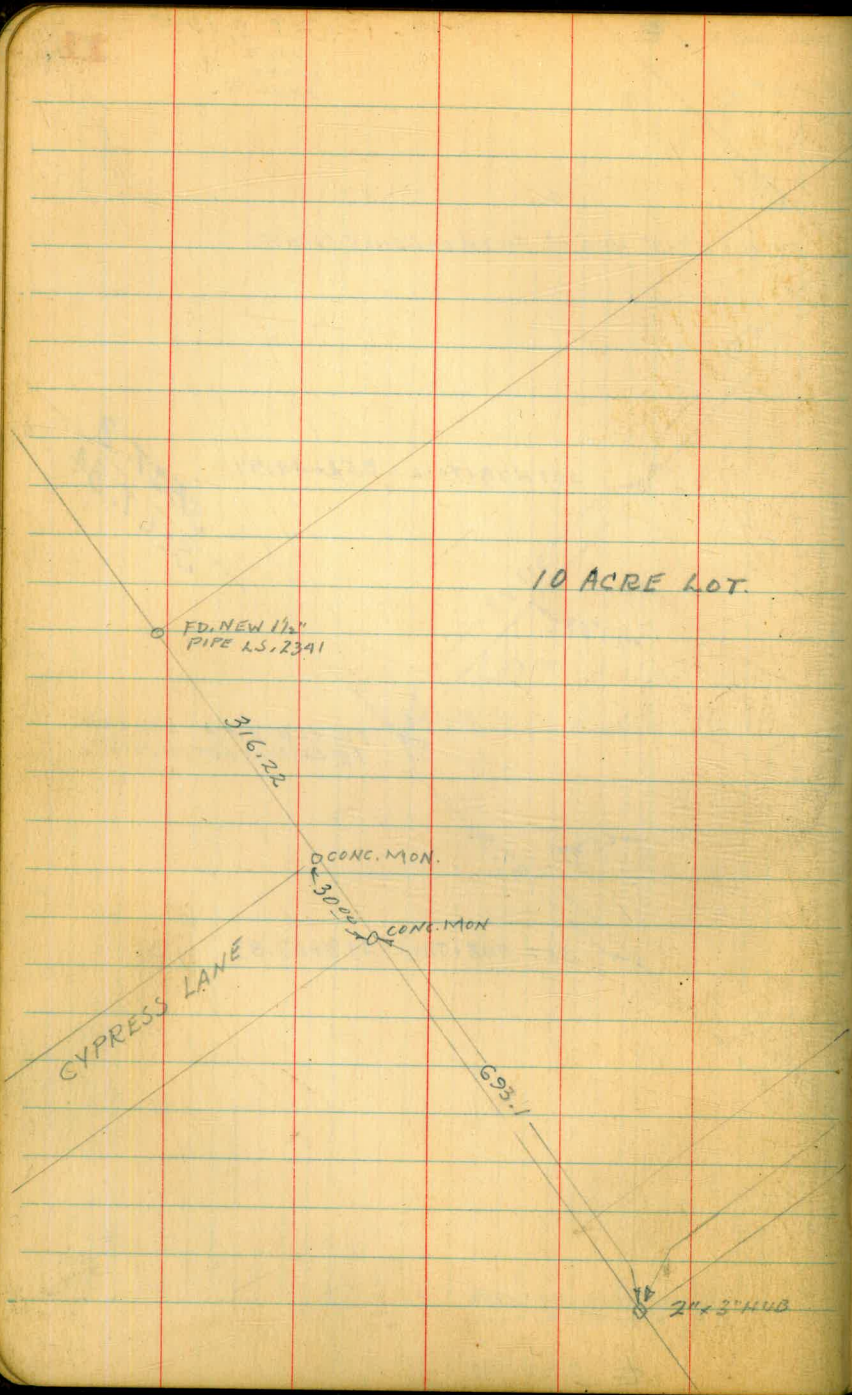


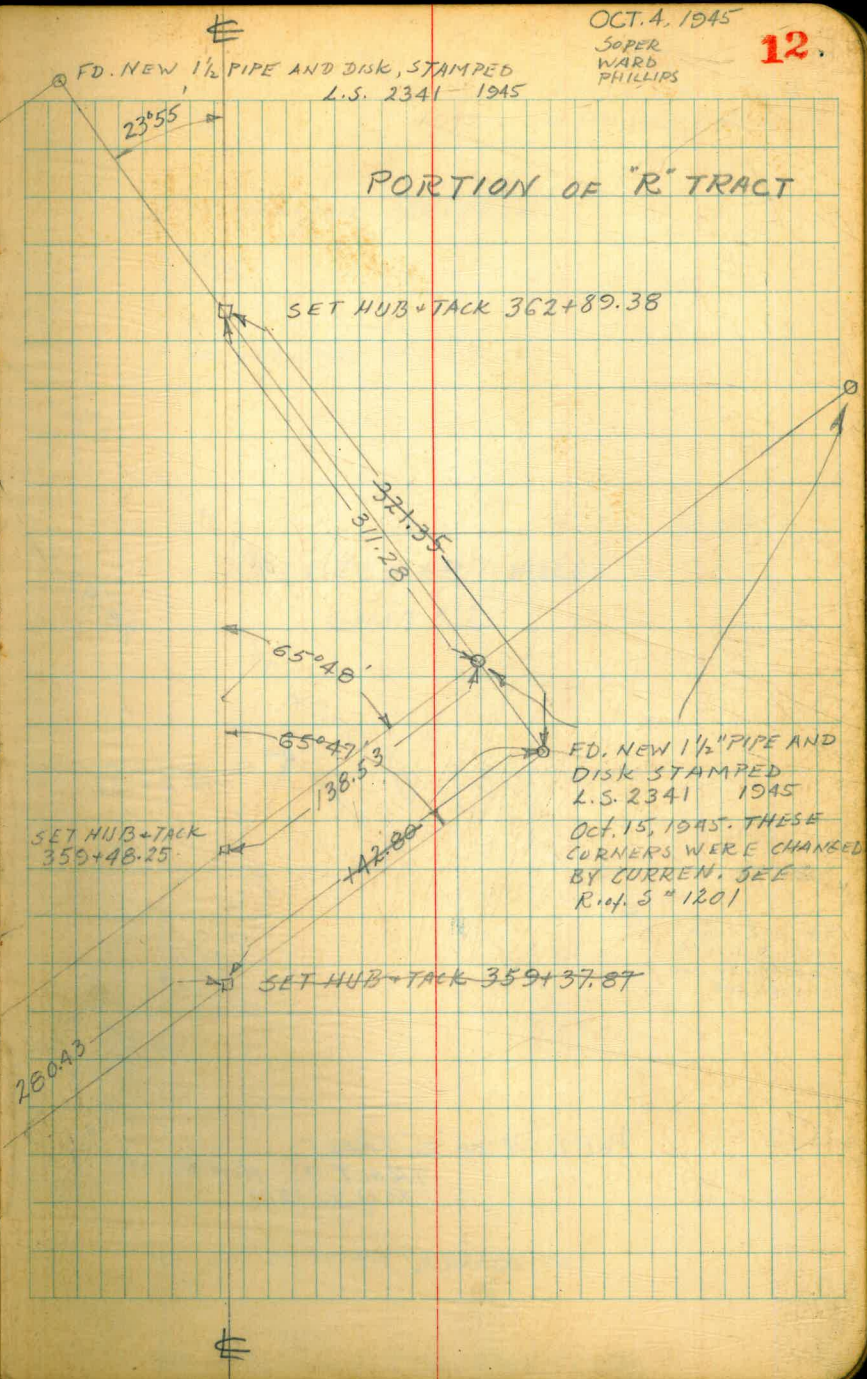
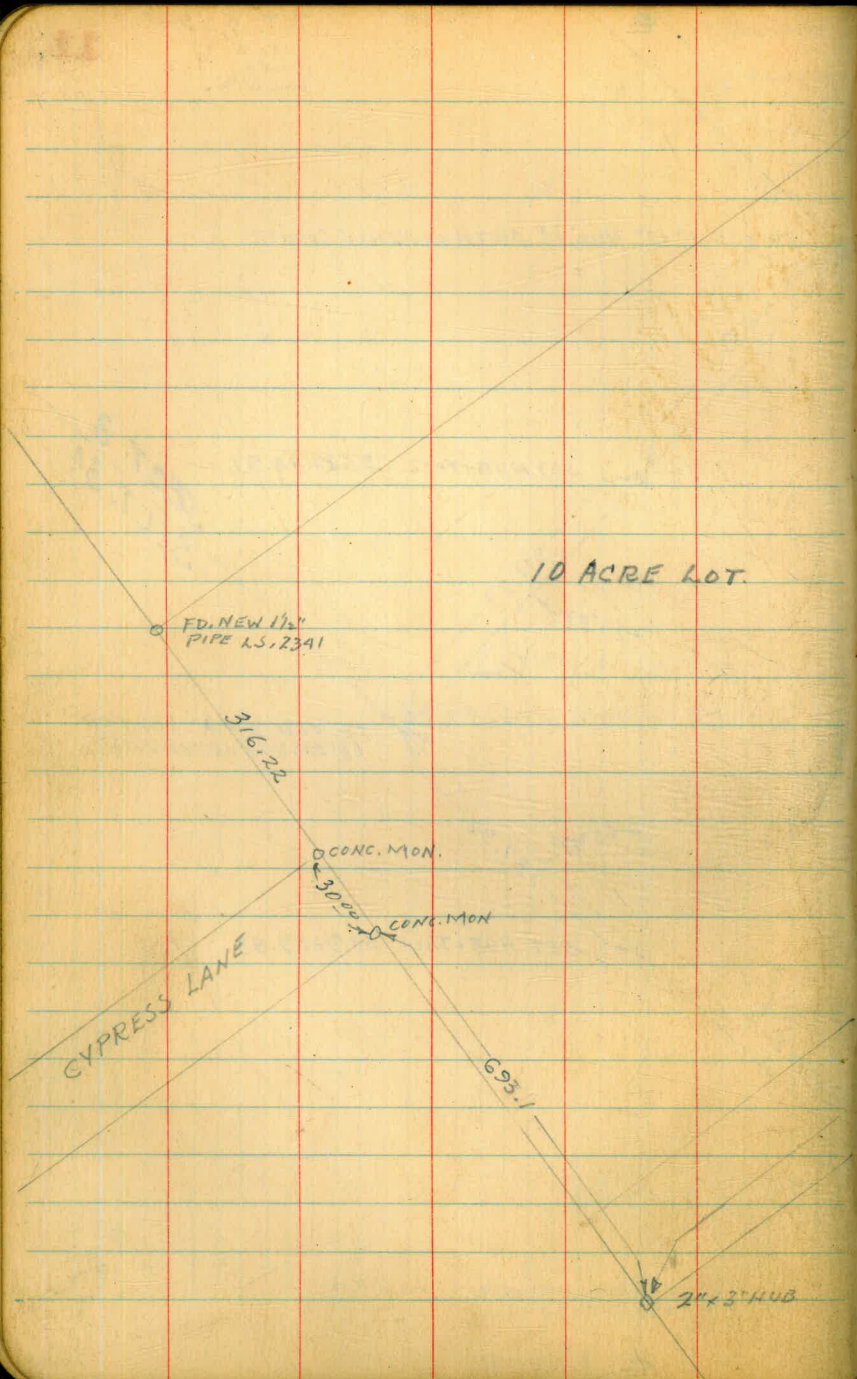
LOT 1 OF THE
MAGNOLIA RANCH TRACT



FD. CONC. MON. WEST
LINE OF MAGNOLIA

Ld. + tack
MAGNOLIA





OCT. 8, 1945
SOPER
WARD
PHILLIPS

13

FD. OLD 1 1/2" PIPE AND TACK ON E
OF BROADWAY AND EAST LINE OF
CUYAMACA ST.

SET HUB + TACK - 386 + 04.20

SET HUB + TACK 385 + 16.55

FLETCHER HILLS
UNIT # 2

887.57

178.87

BROADWAY

FD. NEW 1 1/2" PIPE AND
TACK - L.S. 2341

FD. 2-2 HUB +
Tack, S.W. COR.
OF BROADWAY AND
JOHNSON AVE

OLD FENCE - 355.70
RICHFIELD ROAD?
SEE R.O.S. MAP 1201
OLD FENCE

PORTION OF "B" TRACT
TRACT 7 - Hill Estate
R.O.S. 1201

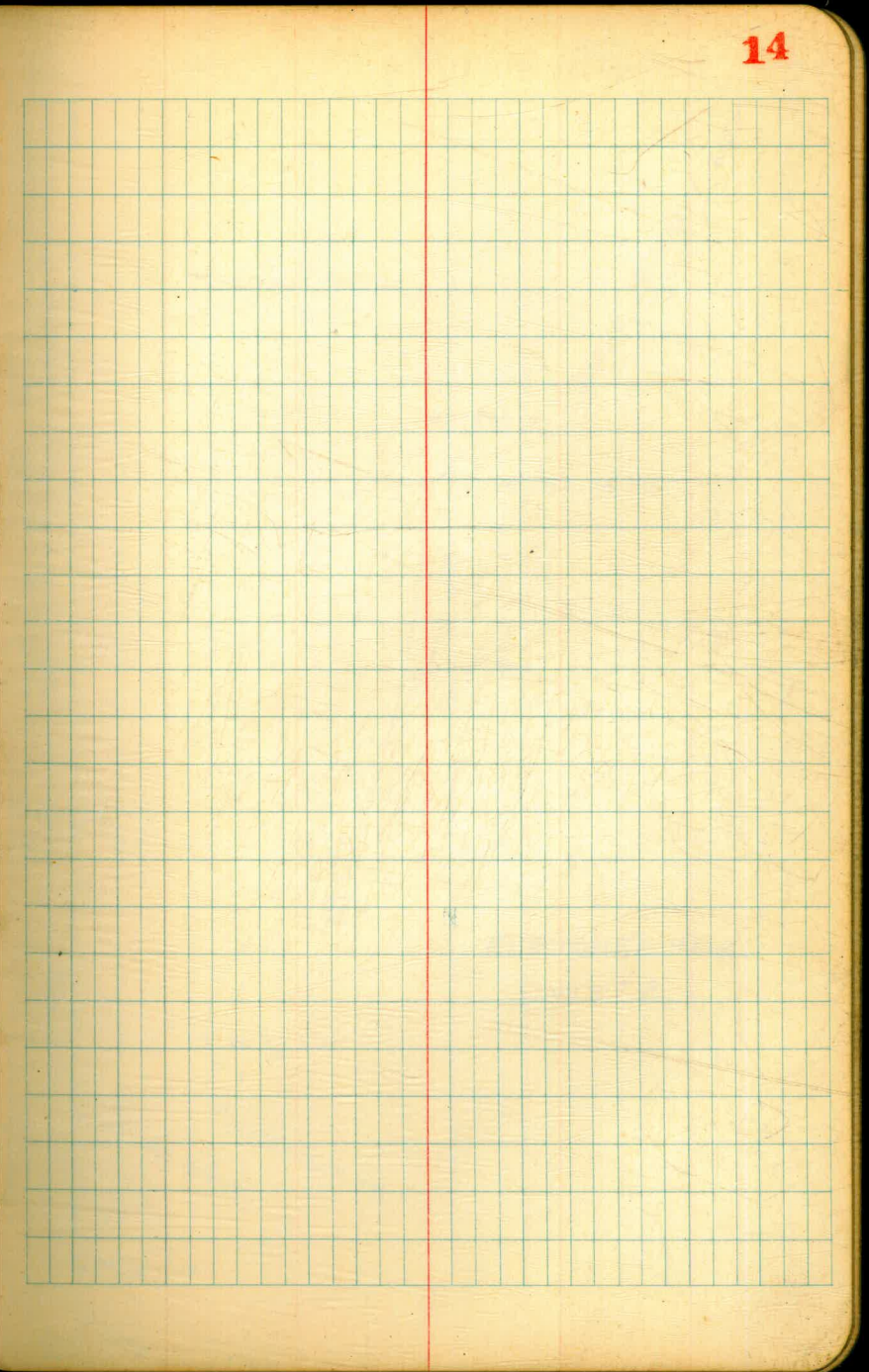
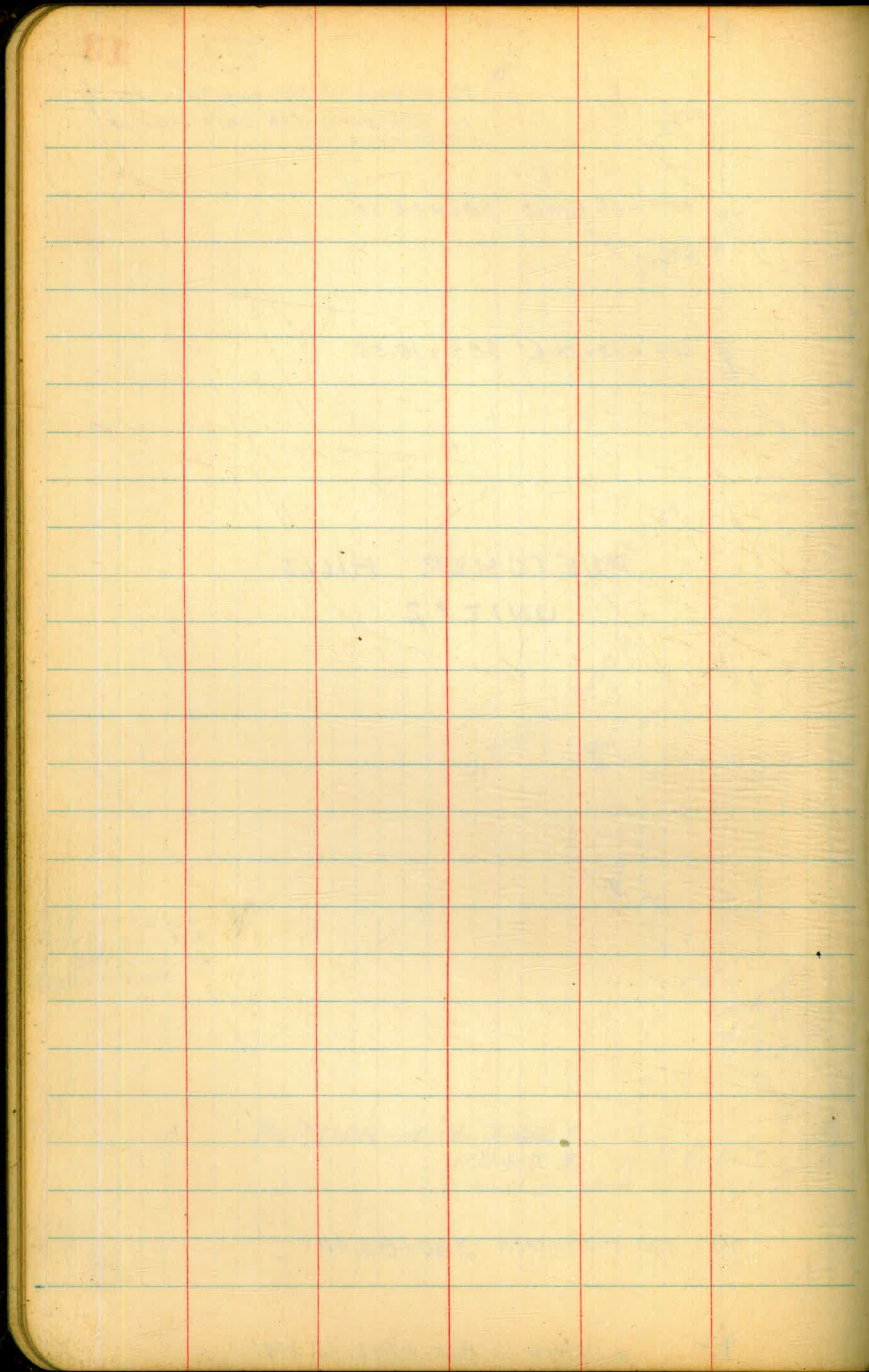
24023'

SET HUB + TACK 380 + 83.40

FD. NEW 1 1/2" PIPE - & TACK - L.S. 2341

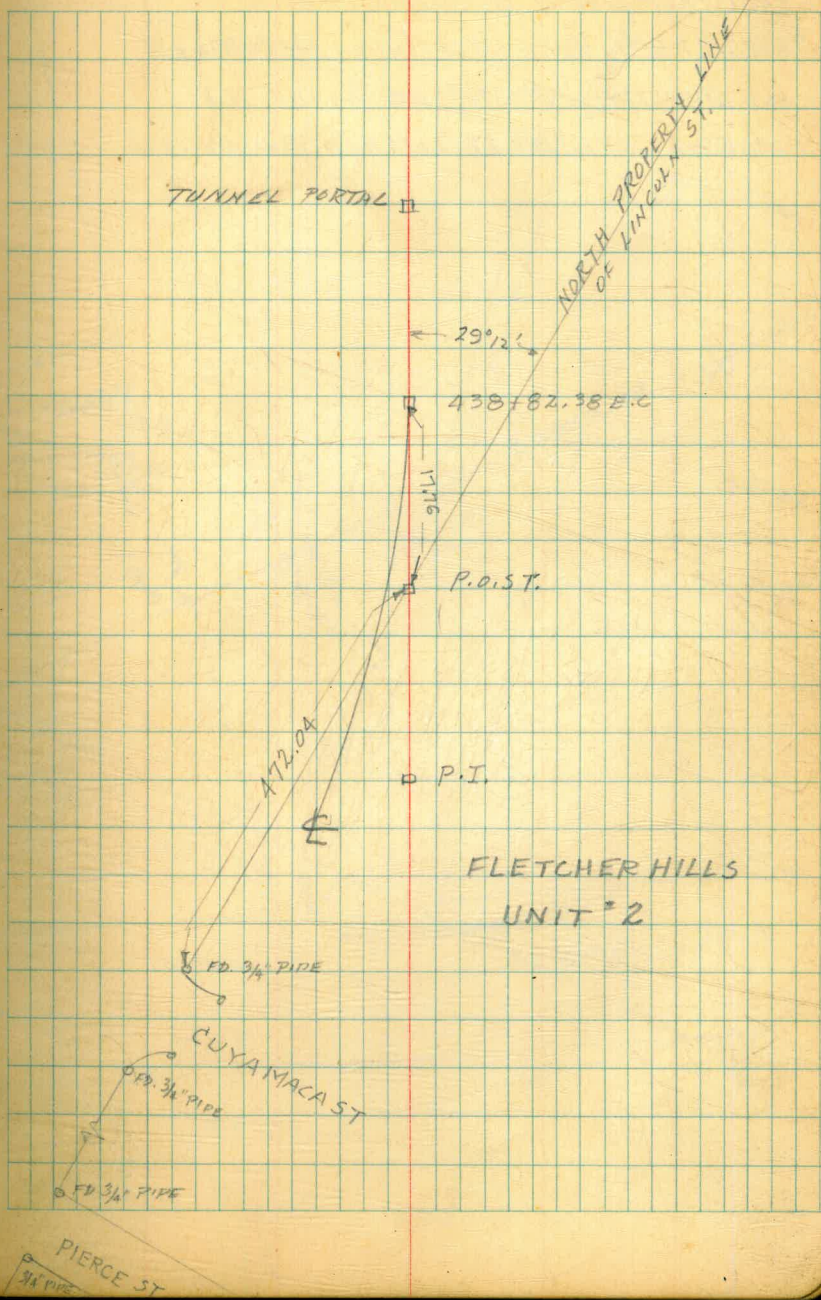
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E



OCT. 8, 1945
SOPEL
WARD
PHILLIPS

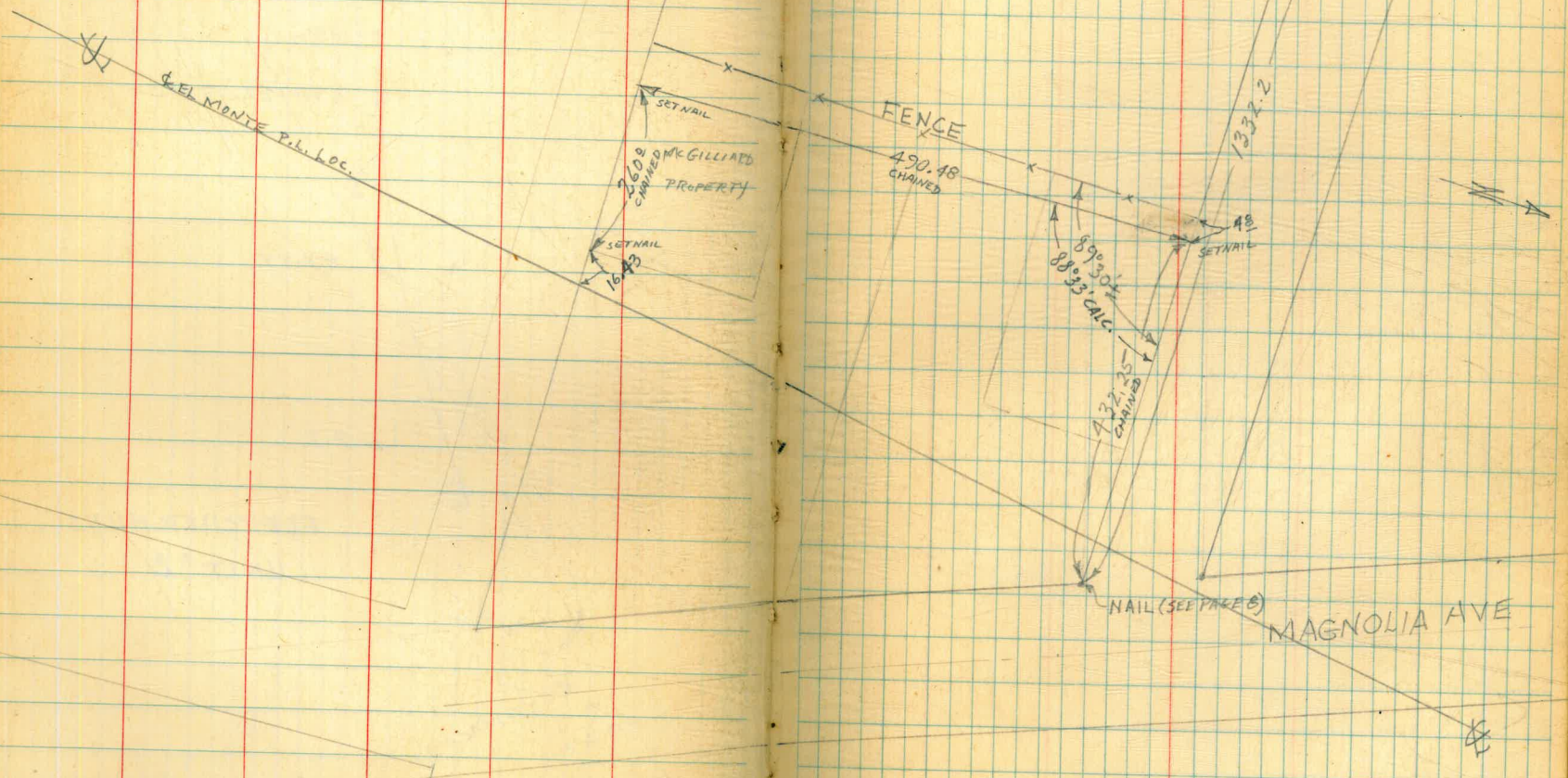
15.



EAST PROP. LINE OF M^CGILLIARD PROPERTY
 ESTABLISHED, USING WEST LINE OF MAGNOLIA AVE
 AND SOUTH LINE OF PROSPECT AVE. AS THE N.E.
 CORNER OF LOT #1, BLOCK 22, LOTS H & O, RANCHO EL CAJON

16

JAN. 1946
 SOPEX
 LUMBELL
 PHILLIPS



Levels to check Elev ex La Mesa Irrigation

Co. P.L. at Crossing El Monte P.L. Sec. 4

BM	7.51	549.49		544.98
TP	0.67	556.24	1.92	547.57
532158 Ground			6.5	549.7
Top pipe			3.67	546.57
Check BM			1.60	

Grade Elev	G.R.	Rod	Cut
111+00			
+50			
112+00			
+26.44			
+85			
113+12.46			
0.55	409.50	3-6-47	408.95
113+85			
113+90	394.00	15.5	6.7
114+00	393.7	15.8	7.1
+50	392.00	17.5	9.0
115+00	391.7	17.8	8.8
+50	391.4	18.1	9.2
116+00	391.1	18.4	9.1

396.44
TP 83929
12.5+66 25' LT

18

409.50

116+50	390.8	18.7	9.8	8.9
T.5	2.94	403.39	9.05	400.45
117+00	390.5	12.9	4.0	8.5
+50	390.2	13.2	4.2	9.0
118+00	389.9	13.5	4.7	8.8
+50	389.6	13.8	4.8	9.0
119+00	389.3	14.1	5.0	9.1
+50	389.1	14.3	5.2	9.1
120+00	388.8	14.6	5.7	8.9
+50	388.5	14.9	5.8	9.1
121+00	388.2	15.2	5.8	9.4
T.P. 6.51	404.55	5.35	398.04	
CK B.M. P.P. 83929		8.10	396.45	396.44
3.17	399.611			396.44
+50	387.9	11.7	1.9	9.8
122+00	387.6	12.0	3.0	9.0
+50	387.3	12.3	2.9	9.4

122+68⁸⁷ 387.2 12.4 3.0 9.4

123+00⁸⁶ 386.5 13.1 3.5 9.6

+32⁸ 385.4 14.2 3.0 11.2

+64⁹ 384.8 14.8 3.6 11.2

124+00 384.8 14.8 5.9 8.9

4.59 401.03 ^{B.M.} 396.44

+50 384.8 16.2 5.4 10.8

125+00 384.8 16.2 4.2 12.0

+50 384.8 16.2 6.6 9.6

126+00 384.7 16.3 4.9 11.4

+50 384.7 16.3 3.6 12.7

3.39 399.83 ^{B.M.} 396.44

127+00 384.7 15.1 3.5 11.6

+50 384.7 15.1 5.3 9.8

128+00 384.7 15.1 4.9 10.2

T.P. 5.42 401.02 4.23 395.60

128+50 384.7 16.3 7.0 9.3

129+00 384.4 16.6 5.5 11.1

+50 384.1 16.9 3.7 13.2

130+00 383.8 17.2 4.4 12.8

+50 383.5 17.5 6.0 11.5

0.53 396.97 ^{B.M.} 396.44

131+00 ✓ 383.2 13.8 4.0 9.8

+50 382.9 14.1 4.9 9.2

132+00 382.5 14.5 5.0 9.5

+50 382.2 14.8 5.2 9.6

133+00 381.9 15.1 5.8 9.3

+50 381.6 15.4 5.8 9.6

134+00 381.3 15.7 6.3 9.4

		396.97			
		Grade	G.R.	Rod	cut
134+50		381.0	16.0	6.6	9.4
135+00		381.0	16.0	6.7	9.3
+50		380.9	16.1	6.9	9.2
136+00		380.9	16.1	6.7	9.4
T.P.	6.18	376.40	6.75	390.22	
			1.27	395.13	= 395.21
	0.87	396.08			395.21
+50		380.9	15.2	6.0	9.2
137+00		380.9	15.2	5.9	9.3
+50		380.8	15.3	5.7	9.6
138+00		380.8	15.3	6.2	9.1
	1.02	396.23			395.21
+50		380.8	15.4	6.3	9.1
			15.		
139+00		380.7	15.5	6.0	9.5
+50		380.7	15.5	7.2	8.3
	0.58	395.79	3-26-97		B.M. 395.21
140+00		380.4	15.4	7.1	8.3

		395.79			
140+50		380.1	15.7	7.3	8.4
141+00		379.8	16.0	7.4	8.6
141+50		379.4	16.4	7.4	9.0
141+71.8					
142+54.5 AH		379.3	16.5	7.5	9.0
143+00		379.0	16.8	7.7	9.1
+50		378.7	17.1	8.0	9.1
144+00		378.4	17.4	8.5	8.9
+50		378.1	17.7	8.8	8.9
145+00		377.7	18.1	9.1	9.0
T.P.	4.29	390.99	9.09	386.70	
+50		377.4	13.6	4.5	9.1
146+00		377.1	13.9	4.8	9.1
+50		376.8	14.2	5.0	9.2

	390.99 Grade Elev	G.R.	Rod	Cut
147+00	376.7	14.3	4.7	9.6
+50	376.6	14.4	5.2	9.2
148+00	376.5	14.5	5.7	8.8
+50	376.4	14.6	6.0	8.6
149+00	376.1	14.9	6.2	8.7
+50	375.8	15.2	6.4	8.8
150+00	375.5	15.5	6.7	8.8
+50	375.1	15.9	7.1	8.8
151+00	374.8	16.2	7.3	8.9
T.P. TOP GINNEY ST @ 151+00	2.99 386.70 383.71	7.28	383.71	
+50	374.5	12.2	3.2	9.0
152+00	374.1	12.6	3.4	9.2
+50	373.9	13.0	3.6	9.4

	386.70			
153+00	373.4	13.3	4.0	9.3
+50	373.0	13.7	4.4	9.3
154+00	372.7	14.0	4.7	9.3
+50	372.4	14.3	5.1	9.2
155+00	372.1	14.6	5.5	9.1
CK B.M. 4565 BM	3.10 386.88	5.50	381.20 =	381.20
+50	371.8	15.1	383.78 6.0	9.1
156+00	371.5	15.4	6.3	9.1
+50	371.2	15.7 B.M.	381.20 ^{6.6}	9.1
157+00	370.9	P.P. 472968 1.60 5.5 LT	16.9 16.5+10	9.1
+50	370.6	16.3	7.2	9.1
158+00	370.2	16.7	7.4	9.3
+50	369.9	17.0	7.7	9.3

		Σ 386.88			
			G.R.	-	cut
159+00		369.6	17.3	8.0	9.3
+50		369.3	17.6	8.5	9.1
160		369.0	17.9	8.8	9.1
+50		368.7	18.2	9.0	9.2
161		368.4	18.5	9.5	9.0
T.P.	2.08	385.86		3.10	388.78
+50		368.1	17.8	8.6	9.2
162		367.8	18.1	9.0	9.1
+50		367.5	18.4	9.3	9.1
163		367.1	18.8	9.5	9.3
+50		366.8	19.1	9.9	9.2
188 ⁵⁶	90.	366.6	19.3	10.0	9.3
164	Break	366.5	19.4	9.9	9.5
+50		366.5	19.4	10.2	9.2

		Σ 385.86			22
			Grade	Grade	cuts
165		366.5	19.4	6.8	12.6
+50		366.5	19.4	5.4	13.8 14.0
166		366.5	19.4	5.2	14.0 14.2
+132 F.C.		366.5	19.4	5.2	14.2 14.0
check BM	3.14	384.34			381.20
+50		366.5	17.8	3.8	14.0
167		366.5	17.8	4.4	13.4
+50		366.5	17.8	4.9	12.9
168		366.5	17.8	5.2	12.6
+50		366.5	17.8	5.9	11.9
169		366.5	17.8	6.3	11.5
+50		366.5	17.8	6.8	11.0
170		366.5	17.8	6.78	11.0
T.P.	5.19	382.75		6.78	377.56
+50		366.5	16.3	5.9	10.4

		T 382.75	GRod	-	cols
171+00		366.5	16.3	5.3	11.0
+50		366.5	16.3	5.2	11.1
172		366.5	16.3	5.3	11.0
+50		366.5	16.3	5.6	10.7
+70	366.5 B 366.5 A	366.5	16.3	5.6	10.7
173		366.5	16.3	5.8	10.5
+27 ³⁷	EC	366.5	16.3	5.3	11.0
TP on BC	4.02	381.42		5.35	377.40
+50		366.5	14.9	4.4	10.5
174		366.5	14.9	3.2	11.7
+50		366.5	14.9	3.7	11.2
175		366.5	14.9	3.8	11.1
T.P.	3.92	382.59		2.75	378.67
+50		366.5	14.9	4.3	10.6
Chc on BM	3.74	382.91		3.56	379.35
BK +66 ⁵⁶		366.5	16.4	5.3	11.1

		T 382.7	Grade	GR	Rod	Cut
176+13 ⁹¹		363.0		19.9	4.8	15.1
+50		362.95		20.0	5.5	14.5
177		362.9		20.0	5.1	14.9
+50		362.85		20.1	4.8	15.3
+69.40 EC		362.8		20.1	5.0	15.1
BM 89.7 Bk	3.60	382.77		20.0	5.1	14.9
178		363.1		19.7	5.2	14.5
+05 ⁹		363.3		19.5	5.4	14.1
+25		364.9		17.9	5.5	12.4
53 ⁷⁸		367.1		15.7	4.9	10.8
+85.7		369.05		13.8	4.4	9.4
8.11	387.28			2-18-47	B.M. @ River view	379.17
179+17.6		371.5		15.8	7.6	8.2
179+33.6		372.8		14.5	0.7	13.8
T.P.	12.71	399.30		0.69	386.59	
179+99.5		373.9		25.4	10.4	15.4
+65.5		374.9		24.4	5.0	19.4

	Grade	G.R	Rod	CUT.
	^{HI} 399.30			
179+81.5	375.6	23.7	2.7	21.0
180+00	376.2	23.1	1.9	21.2
+50	376.3	23.0	1.3	21.7
T.P	1.98 392.19	9.09	390.21	
181+00	376.4	15.8	7.3.6	19.4
+50	376.4	15.8	7.4	8.4
182+00	376.5	15.7	10.6	5.1
+50	376.6	15.6	9.8	5.8
183	376.6	15.6	7.5	8.1
+50	376.6	15.6	6.7	8.9
+65 ⁴⁴	378.1	14.8	5.8	9.0
+81.30	^{HI} 292.19	12.0	2.1	9.9
184	^{HI} 406.26	383.8	9.9	+1.4 11.3
T.P	0.17 393.74	12.69	393.57	
cut +28.1	390.9	15.4	2.3	13.1
T.P	0.62 + H.I.	406.26	12.85	405.64 Elev

	Grade	G.R	Rod	CUT
184+59.5	397.1	21.4	9.3	12.1
185	400.0	18.5	4.7	13.8
T.P	0.23 418.49	12.54	418.26	
+50	405.0	25.8	11.9	13.9
186	412.8	18.0	3.4	14.6
T.P	0.03 430.80	12.39	430.77	
+50	420.6	22.6	6.9	15.7
187	426.0	17.2	1.5	15.7
+50	426.0	17.2	0.6	16.6
+92.2	423.7	19.5	2.4	17.1
188+07.6	421.6	21.6	4.6	17.0
T.P	8.32 443.16	0.46	434.84	13.14
12.00	4.35.30			423.30
+50	411.2	26.4	9.7	17.9+6.7
T.P	12.57 437.57	0.50	425.00	
+85.2	404.3	21.9	4.9	17.0
T.P.	12.79 425.50	3.64	412.71	
189+17	400.3	16.1	2.9	13.2
	416.35			

	Grade	G.R.	Rod	cut
189+50	400.0	16.4	4.7	11.7
190 (out) ↑	400.0	16.4	0.3	16.1
+50	400.0	16.4	+1.3	17.7
+75	400.0	16.4	0.7	15.7
191	399.0	17.4	4.1	13.3
T.P. 11.21	416.35	2.88	405.14	
+50	391.5	16.5	2.9	13.6
+87.2 (shaky)	385.9	22.1	8.9	13.2
T.P. 12.17	408.02	0.81	595.85	
192+19	383.0	13.7	0.8	12.9
+50	381.3	15.4	3.1	12.3
+67 ↑	380.4	16.3	3.9	12.4
+98.6	376.8	19.9	4.8	15.1
T.P. 10.46	396.66	0.60	386.20	B.M.
12.42	386.80		374.38	
1196	385.84		374.38	
950	393.94	1.40	384.44	
193+14.5	375.1	18.8	3.3	15.5
+50	373.5	20.4	6.4	14.0

	Grade	G.R.	-	cut
393.94				25
194	371.2	22.7	9.5	13.2
+50	369.0	24.9	12.8	12.1
T.P. 1.07	382.18		12.83	381.11
195	366.7	15.5	5.3	10.2
+50	364.5	17.7	8.7	9.0
198	362.0	20.2	8.7	11.5
+50	361.2	21.0	11.2	9.8
199	360.3	21.9	12.3	9.6
T.P. 4.16	374.01	12.33	369.85	
+50	359.5	14.5	4.8	9.7
200	358.7	15.3	5.1	10.2
+50	358.7	15.3	5.4	9.9
201	358.7	15.3	5.7	9.6
+50	358.7	15.3	5.8	9.5

	X	G.R.	-	cut
	374.01			
Bk 202	358.7	15.3	5.9	9.4
BM.	1.02	375.40		374.38
T.P.	4.20	372.11	7.49	367.91
+50	358.2	13.9	4.4	9.5
203	357.7	14.4	4.7	9.7
+50	357.7	14.4	4.5	9.9
204	357.7	14.4	4.2	10.2
+50	357.7	14.4	4.9	9.5
205	357.7	14.4	4.9	9.5
+50	357.7	14.4	5.2	9.2
Bk 206	357.7	14.4	5.3	9.1
+50	356.9	15.2	5.7	9.5
207	356.1	16.0	5.8	10.2
+50	355.3	16.8	6.1	10.7
T.P.	1.04	367.06	6.09	366.02

	X	G.R.	-	cut
	367.06			
	Grade	G.R.		
				26
208	354.4	12.5	1.2	11.3
TP				
+50	353.8	13.3	3.7	9.6
Bk 209	353.0	14.1	4.3	9.8
+50	352.8	14.3	4.9	9.4
210	352.6	14.5	5.2	9.3
+50	352.4	14.7	5.5	9.2
211	352.0	14.9	5.5	9.4
TP.	5.78	368.04	7.80	362.26
TP.	4.17	370.67	1.58	366.48
+50	352.0	18.6	9.1	9.5
212	351.8	18.8	9.3	9.5
+50	351.6	19.0	9.5	9.5
TP.	4.67	365.81	9.49	361.14
213	351.4	14.4	4.8	9.6
+50	351.2	14.6	5.3	9.3

	+	Σ 365.91 Grade	G.R. Rod	-	cut
BK 214+00		351.0	14.8	5.3	9.5
+50		350.65	15.2	5.3	9.9
BK 215		356.3	15.5	5.6	9.9
+50		350.2	15.2	5.8	9.8
216		350.1	15.7	6.1	9.6
+50		350.0	15.8	6.4	9.4
T.P.	4.41	363.84		6.38	359.43
217		349.9	13.9	4.2	9.7
+50		349.8	14.0	4.3	9.7
218		349.7	14.1	4.0	10.1
+50		349.6	14.2	4.5	9.7
219		349.5	14.3	4.7	9.6
+50		349.4	14.4	5.3	9.1

	+	Σ 363.84 Grade	G.R. Rod	-	cut
220+00		349.4	14.4	5.4	9.0
+50		349.3	14.5	5.2	9.3
T.P. 1136		370.00		5.20	358.64
BK 221+01.5		349.25	20.75	8.55	12.20
+50		351.4	18.5	6.1	12.5
BK 221+97.03		353.6	16.4	6.0	10.4
222+50		353.7	16.3	6.5	9.7
223		353.7	16.3	6.4	9.9
+50		353.85	16.1	5.5	10.6
3.60		379.61			376.01 ^{B.M.}
224		355.6	24.0	12.9	11.1
+50		361.0	18.6	4.8	13.8
T.P. 11.23		390.47	0.37	379.24	
225		366.4	24.1	8.2	15.9
+50		374.0	16.5	2.3	14.2

T.P	Grade	G.R	Rod	CUT
4.89	393.09	2.27	388.20	
226	378.3	14.8	1.3	13.5
+50	378.3	14.8	1.2	13.6
+75	377.4	15.7	3.2	12.5
227	373.6	19.5	7.0	12.5
T.P 1.16	382.50	11.75	381.34	
+50	362.0	20.5	8.9	11.6
+67.5	358.6	23.9	11.9	12.0
+83.4	356.8	25.7	15.4	10.3
BM Nail in Fence Post BK 228	312 368.42		365.30	11.3
	356.0	12.4	1.1	
+50	355.6	12.8	3.1	9.7
229	355.8	13.1	3.3	9.8
+50	354.9	13.5	3.8	9.7
230	354.6	13.8	4.5	9.3
+50	354.2	14.2	4.7	9.5
231	353.9	14.5	5.0	9.5
+50	353.5	14.9	5.3	9.6

368.42

28

232	353.1	15.3	5.5	9.8
set BM BK +50	4.41 367.10 352.8		5.73	362.99
233		14.3	4.3	9.8
+50		14.3	7.3	10.0
234		14.3	3.9	10.4
+50		14.3	3.8	10.5
235		14.3	3.6	10.7
+50		14.3	4.0	10.3
236	352.8	14.3	4.4	9.9
+50	352.6	14.5	4.7	9.8
237	352.3	14.8	5.0	9.8
T.P 386	365.97		4.99	362.11
+50	352.1	13.9	4.3	9.6

	7 365.97				
238	351.9	14.1	4.6	9.5	
+50	351.4	14.4	4.5	9.9	
check BM					
Brk					
239	351.4	24.6	14.9	9.7	
Nail BM					
in pp. +	6.43	375.93		369.56	
+50	351.4	24.6	14.3	10.3	
240	352.8	23.8	13.7	10.1	
Brk					
+16.10	352.6	23.4	13.2	10.2	
Brk					
+32.19	353.3	22.7	13.1	9.6	
+50	354.4	21.6	11.9	9.7	
241	357.8	18.4	8.0	10.4	
Brk					
+43.9	360.4	15.6	6.2	9.4	
+59.7	360.8	17.7	7.8	9.9	
242	360.8	15.2	4.2	11.0	
Nail					
BM in pp.	8.97	378.53		369.56	
Sec FB					
+50	360.8	17.7	5.0	12.7	
243	360.8	17.7	3.9	13.8	
+50	360.9	17.8	3.5	14.1	

	378.53	G.R.	1-	29 cut
244	360.9	17.6	5.4	12.2
+50 Brk	361.0	17.5	7.6	9.9
245	361.7	16.8	6.9	9.9
+50	362.3	16.2	6.3	9.9
246 Brk	363.0	15.5	5.7	9.8
+50	364.3	14.2	4.3	9.9
247	365.6	12.9	2.31	10.6
	389.17			376.22
+50	367.0	22.2	11.5	10.7
248	368.3	20.9	10.1	10.8
Brk +50	369.6	19.6	8.8	10.8
249	372.1	17.1	7.1	10.0
+25	373.4	15.8	5.9	9.9
+50	375.6	13.6	3.7	9.9
T.P.	1237	397.79	375	385.42

		397.79	G.R.	-	cut
eg. 2491.40 Bank 251 +66.49 EC Hood		372.4	18.4	8.1	10.3
25250		382.4	15.4	5.2	10.2
+50		385.0	12.8	2.2	10.6
2530		387.6	10.2	0.0	10.2
T.P. 10.18		407.97		0.0	397.79
+50		389.2	18.8	8.3	10.5
254		390.8	17.2	6.3	10.9
+50		392.4	15.6	4.6	11.0
255		394.0	14.0	3.2	10.8
Bank +50		395.6	12.4	1.5	10.9
256		395.6	12.4	0.4	12.0
+50		395.6	12.4	0.9	11.5
257		395.6	12.4	1.6	10.8
T.P. 9.62		416.69		0.90	407.07
+50		397.2	19.5	8.5	11.0

		416.69	G.R.	-	cut
258		378.9	17.8	7.0	10.8
check BM 7.45		422.19		1.95	414.74
+50		400.52	21.7	10.5	11.2
259		402.2	20.0	8.0	12.0
+25		403.01	19.2	7.0	12.2
+50		404.7	17.5	7.0	10.5
+57 ⁵⁰ 40-30 ⁵⁰ Bank		406.32	15.9	5.0	10.9
260 +50		412.8	10.0	0.1	9.9
T.P. 12.83		434.90		0.13	422.97
261		422.5	12.4	2.6	9.8
T.P. 13.04		446.98		0.26	433.94
+50		432.9	14.1	3.8	10.3
T.P. 11.84		458.51		0.31	446.47
262		444.5	14.0	4.2	9.8
T.P. 11.13		469.44		0.20	458.31
48 ⁶⁰ 3 ² -Bank		455.7	13.7	3.8	9.9
T.P. 10.65		479.57		0.52	469.92
+79 ²⁵		461.07	18.5	9.0	9.5
T.P. 13.05		430.77		1.35	477.72
+95 ⁵⁰		463.2	16.4	8.0	8.4
263 +11 ¹⁴		444.5	15.1	2.5	12.6
+50		464.5	26.3	9.0	17.3

	+	Grade	G.R.	-	Cut
264		464.5	26.3	10.8	75.5
+38 ⁶³		464.5	26.3	8.3	18.3
+54 ⁶	5° level	466.0	24.8	12.7	12.1
+70 ³²	5° level	468.8	22.0	10.3	11.7
265 ^{101, 23}	5° level	477.3	13.5	0.6	12.9
T.P.	12.49	502.62		0.64	490.13
+48	1°-30' level	485.6	17.0	4.5	12.5
T.P.	13.10	515.08		0.64	501.88
+85 ³	1° level	492.7	22.4	10.1	12.3
266					
11.27		494.7	20.4	7.4	13.0
+58 ⁵⁰		499.9	15.2	3.4	11.8
267		502.0	13.1	0.4	12.7
T.P.	6.33	521.58		0.43	514.65
+22 ²		503.1	18.5	5.9	12.6
check on Nail in rock 507+267+55	0.03	517.72		3.97	517.61
500.55 499.09 +46 ²⁵ pot		503.1	14.4	1.9	12.7
+70		503.2	14.5	3.2	11.3
268		501.00	16.7	6.3	10.4
+50		495.0	22.7	12.5	10.2
T.P.	0.62	505.86		12.48	505.24

	+	Grade	G.R.	-	Cut
269		487.4	18.5	8.3	10.2
T.P.	0.51	493.78		12.59	493.27
+50		479.8	14.0	5.7	8.3
270		467.7	26.1	13.0	13.1
+21 ³³		464.5	29.3	15.9	13.4
T.P.	0.46	481.23		13.01	480.77
+50		462.5	18.7	4.7	14.0
271		459.0	22.2	7.5	14.7
+50		454	22.2	10.1	12.1
+65 ⁻		459	22.2	10.9	11.3
+81		458.6	22.6	11.8	10.8
T.P.	272 ^{0.47}	457.9	23.3	13.1	10.2
+50		469.03		12.67	468.56
		454.5	14.5	3.6	10.9
273		451.0	18.0	6.9	11.1
+50		447.0	22.0	11.0	11.0
T.P.	0.37	457.30		12.10	456.93
274		443.0	14.3	3.4	10.9
+50		439.3	18.0	7.2	10.8

STATION	+	GRADE	G. ROD	-	COT.
		7428.08			
287+00		408.6	19.5	8.4	11.1
+50		408.6	19.5	8.5	11.0
288		408.6	19.5	8.8	10.7
+50		408.6	19.5	9.3	10.2
289		408.0	20.1	10.3	9.8
+50		408.0	20.1	10.4	9.7
290		408.0	20.1	10.6	9.5
+50		408.0	20.1	7.7	12.4
291		408.0	10.1	5.3	14.8
+50		408.0	20.1	5.1	15.0
292		408.0	20.1	5.3	14.8
+59 ⁹⁰	(40 BEV)	408.0	20.1	6.1	14.0
+91 ⁹⁷	(30 BEV)	406.0	22.1	6.6	15.5
CHECK B.M. IN POLE CORNER MAGNOLIA AND PROSPECT.					-8.20 419.88 = 419.85

STATION	+	GRADE	G. ROD	-	COT
					6-10-97. 33
B.M.	+4.11	425.96			419.85
293		405.9	18.1	4.5	18.6
+50		405.9	18.7	4.0	14.7
+75		405.0	19.0	4.8	14.2
294		405.0	19.0	5.4	13.6
+50		405.0	19.0	6.6	12.4
B.M.	+3.20	423.05			419.85
295		405.0	18.0	7.2	10.8
+25		405.0	18.0	7.8	10.2
+50		404.3	18.7	8.6	10.1
T.P. ON TOP OF GAS TANK 20' LT. 236+22					7.61 415.44 T.P.
296		408.0	20.0	10.1	9.9
	+0.44	415.88			
+50		401.6	14.3	4.2	10.1
297		400.2	15.7	5.6	10.1
+50		398.9	17.0	7.0	10.0
T.P. ON WHITE FENCE POST IN CORNER OF YARD OPP 299+00.					-10.03 405.85 T.P.
298		397.5	18.4	8.2	10.2
	+2.34	408.19			
+50		396.7	12.0	1.8	10.2
B.M. REC. ELEV. 419.85 POLE S.W. COR. MAGNOLIA AND PROSPECT.					

STATION	+	GRADE	G. ROD.	-	CUT.
		408.19			
299		394.8	15.4	3.2	10.2
+50		393.0	15.2	5.0	10.2
300		391.2	17.0	6.7	10.3
+50		389.4	18.8	8.7	10.1
301		387.6	20.6	10.9	9.7
+39 ⁰⁸		386.2	22.0	12.2	9.8
+55 ¹⁵		385.8	22.4	12.3	10.1
T.P. RR. SPIKE IN POWER POLE 25 FT. OF JOR. +20				-8.75	399.44 T.P.
302		385.8	22.4	12.4	10.0
	+3.15	402.59			
B.C. +30.26		385.8	16.8	7.1	9.7
+50		385.8	16.8	7.0	9.8
303		385.8	16.8	6.5	10.3
+50		385.8	16.8	5.4	11.4

STATION	+	GRADE	G. ROD.	-	CUT.
		403.06			
304	+3.62	385.8	17.3	4.8	12.5
+50		385.8	17.3	4.6	12.7
305		385.8	17.3	5.2	12.1
+50		385.8	17.3	6.0	11.3
306		385.8	17.3	6.7	10.6
E.C. +04 ⁶⁸					
+50		384.8	18.3	7.6	10.7
307		383.8	19.3	8.7	10.6
+50		383.8	19.3	8.7	10.6
308		383.8	19.3	8.2	11.1
B.C. +47 ²⁵					
+50		383.8	19.3	8.7	10.6
309		382.4	20.7	9.7	11.0
+59 ⁰⁹	(10REV)	381.3	21.8	10.9	10.9
	+2.97	382.99		-7.99	395.07 =
+54 ⁹⁷	(20REV)	380.6	17.4	6.8	395.02 B.M.

B.M. ON 5"X5" CONCRETE MON., L.S. 1880, 20' LT. STA 307+63
ELEV. 395.02

STATION	+	GRADE B. ROD	B. ROD	-	CUT
		397.99			
310		377.0	21.0	-10.5	10.5
+18 ⁵⁶ (2 ND REV.)		375.5	22.5	-11.4	11.1
+34 ⁵⁷ (2 ND REV.)		375.0	23.0	-12.4	10.6
+50 T.P. ON R.I. HVR.		375.0	23.0	-12.5	10.5
				-11.73	386.26 T.P.
311		375.0	23.0	-13.0	10.0
+50	+3.44	389.70			
		375.0	14.7	-4.6	10.1
312		375.0	14.7	5.0	9.7
+50		375.0	14.7	4.7	10.0
313		375.0	14.7	4.7	10.0
+50		375.0	14.7	4.7	10.0
314		375.0	14.7	5.2	9.5
+50		375.0	14.7	4.4	10.3
EP. +80 ⁸⁰		375.0	14.7	4.6	10.1
CHECK B.M.				-4.97	384.73 = 384.74 B.M.

STATION	+	GRADE B. ROD	B. ROD	-	CUT
B.M.	4.23	388.97			384.74
315		375.0	14.0	3.1	10.9
+50		375.0	14.0	1.9	12.1
316		375.0	14.0	2.9	11.1
+50		373.6	15.4	4.8	10.6
317		372.2	16.8	6.2	10.4
+50		372.1	16.9	7.0	9.9
318		372.0	17.0	6.3	10.7
+50		372.0	17.0	6.4	10.6
319		371.9	17.1	6.8	10.3
+50		371.8	17.2	6.9	10.3
320		371.7	17.3	7.2	10.1
+50		371.6	17.4	6.6	10.8

B.M. ON BRASS CAP IN CONC. MON. 62' RT. STA 316.
ELEV. 384.74

STATION	+	GRADE 388.97	G. ROD	-	CUT
321		371.6	17.4	7.2	10.2
+50		371.5	17.5	6.1	11.4
TP	+3.57	387.14		5.40	383.57
+86 ⁵⁷		371.42	15.7	-5.4	10.3
322+02 ⁵⁷		371.3	15.8	-5.8	10.0
+34 ⁵⁹		370.16	17.0	-6.5	10.5
+50 ⁵⁸		369.6	17.5	-6.5	11.0
+75		369.6	17.5	-6.4	11.1
323		370.1	17.0	-6.5	10.5
+50		371.0	16.1	-5.2	10.9
324		371.0	16.1	-4.9	11.2
+50		371.0	16.1	-3.9	12.2
325		371.0	16.1	-3.4	12.7
T.P.	6.48	390.20	-3.42	383.72	T.P.
+50		371.0	13.2	8.0	11.2

STATION	+	GRADE 390.20	G. ROD	-	CUT
326		371.0	19.2	7.8	11.4
+50		371.0	19.2	8.1	11.1
327		371.0	19.2	8.2	10.6
+50		371.7	18.5	8.2	10.3
328		372.4	17.8	7.8	10.0
+25		372.8	17.4	6.7	10.7
+50		372.8	17.4	6.0	11.4
329		372.8	17.4	5.7	11.7
+50		372.8	17.4	4.9	12.5
330		372.8	17.4	5.5	11.9
+50		372.8	17.4	5.8	11.6
331		372.8	17.4	5.2	12.2
+50		372.8	17.4	5.6	11.8

STATION	+	GRADE	G. ROD	-	CUT
		390.20			
332		372.8	17.4	5.0	12.4
+50		372.8	17.4	4.8	12.6
T.P.R.P. 333 ^{Soit} 100	3.90	389.15		4.95	385.25
333		372.8	16.4	4.3	12.1
+50		372.8	16.4	5.6	10.8
334		372.8	16.4	5.2	11.2
+50		372.8	16.4	5.4	11.0
335		372.8	16.4	5.5	10.9
+50		372.8	16.4	5.6	10.8
336		372.8	16.4	5.7	10.7
+50		372.8	16.4	6.2	10.2
337		372.8	16.4	5.6	10.8
+50		372.8	16.4	6.3	10.1
+75		372.8	16.4	7.1	9.3

STATION	+	GRADE	G. ROD	-	CUT
		389.15			37
338		373.2	16.0	5.5	10.5
+50		374.0	15.2	4.8	10.4
339		374.0	15.2	5.0	10.2
+50		374.0	15.2	3.9	11.3
340		374.0	15.2	4.3	10.9
340	3.87	380.27		2.75	386.40
+50		374.0	14.3	5.5	10.8
341		374.0	16.3	6.2	10.1
+50		374.0	16.3	6.7	9.6
342		374.1	16.2	6.6	9.6
+50		374.1	16.2	6.5	9.7
343		374.2	16.1	5.6	10.5
+50		374.2	16.1	5.1	11.0

STATION	+	GRADE 390.27	G. P.O.	-	COT
344 check BM		374.3	16.0	5.4	10.6
	3.65	392.42		1.50	388.77 388.77
+50		374.3	18.1	7.9	10.2
345		374.4	18.0	8.2	9.8
+50		374.9	17.5	7.8	9.7
346		375.4	17.0	7.1	9.9
+50		375.9	16.5	6.9	9.6
347		376.4	16.0	5.9	10.1
+50		376.6	15.8	5.2	10.6
348		376.8	15.6	5.2	10.4
+50		377.0	15.4	5.6	9.8
349 check BM		377.2	15.2	5.0	10.2
	4.68	393.45		3.65	388.77
+50		377.7	15.7	5.8	9.9

B.M. IN POLE S. SIDE CYPRESS LANE. APPROX. 53' RT. STA 349.
ELEV. 388.77

+15

STATION	+	GRADE 393.45	G. P.O.	-	COT
350		378.2	15.2	5.3	9.9
+50		378.3	15.1	5.2	9.9
351		378.4	15.0	5.0	10.0
+50		378.5	14.9	5.1	9.8
352		378.6	14.8	4.9	9.9
T.P. 1st stab 5th stab	8.46	396.43		5.48	387.97
+50		378.7	17.7	7.9	9.8
353		378.8	17.6	7.7	9.9
+50		379.4	17.0	7.2	9.8
354		379.9	16.5	6.7	9.8
+50		380.5	15.9	5.9	10.0
355		380.5	15.9	5.2	10.7
+50		380.5	15.9	5.5	10.4

38

STATION	+	GRADE T 326.43	G.P.OO	-	COT.
356		380.5	15.9	6.0	9.9
+50		380.5	15.9	6.2	9.7
357		380.5	15.9	5.8	10.1
+50		381.2	15.2	5.3	9.9
358		381.2	15.2	4.8	10.4
+50		381.2	15.2	4.8	10.4
359		381.9	15.1	5.0	10.1
+50		381.3	15.1	5.4	9.7
T.P. ^{100LTRP} _{359.4} 5.64		397.01		-5.06	391.37
360		381.3	15.7	5.7	10.0
+50		381.4	15.6	6.0	9.6
361		381.4	15.6	5.6	10.0
+50		381.4	15.6	5.5	10.1

STATION	+	GRADE T 397.01	G.P.OO	-	COT. 39
362		381.9	15.1	5.4	9.7
+50		382.4	14.6	4.9	9.7
363		382.4	14.6	4.4	10.2
+50		382.4	14.6	4.7	9.9
364		380.7 382.0	16.3	5.1	11.2
+50		379.1 381.5	17.9	5.6	12.3
365		377.4 379.5	19.6	7.3	12.3
+50		375.7 377.6	21.3	9.2	12.1
+54 ^{Dev/1054}		375.6	21.4	9.6	12.4
366		376.1			
366 + 02 ⁰² 366 (2000)		375.6	21.4	11.8	9.6
+50 ³⁸ (2000)		375.6	21.4	11.2	10.2
+98 ²⁰ (2000)		378.9	18.1	7.9	10.2
T.P.		10.83 329.97		787	382.14

STATION	+	GRADE 399.97	G. ROD	-	CUT
367+15 ⁹⁴		379.33	20.7	10.2	10.1
+50		380.2	19.8	10.1	9.7
368		381.3	18.7	9.2	9.5
+50		382.5	17.5	8.2	9.3
369		383.7	16.3	6.8	9.5
+50		384.8	15.2	5.0	10.2
370		386.0	14.0	4.2	9.8
+50		386.4	13.6	3.9	9.7
371		386.8	13.2	3.5	9.7
+50		387.1	12.9	3.3	9.6
372		387.5	12.5	2.6	9.9
¹⁰⁰²¹ TP. 10111 372+311	582	403.71		2.08	397.89
+50		387.9	15.8	6.1	9.7
+62		388.0	15.7	6.0	9.7

STATION	+	GRADE 403.71	G. ROD	-	CUT. 40
373		388.0	15.7	5.9	9.8
+50		388.1	15.6	5.6	10.9
374		388.2	15.5	5.3	10.2
+50		388.2	15.5	5.6	9.9
375		388.3	15.4	5.9	9.5
+50		388.4	15.3	5.8	9.5
376		389.0	14.7	5.1	9.6
+50		389.8	14.0	4.5	9.5
377		390.3	13.4	3.8	9.6
+50		391.0	12.7	3.3	9.4
378		391.0	12.7	3.1	9.6
+50		391.0	12.7	2.9	9.8

STATION	+	GRADE T 403.71	G. ROD	-	CUT
379		391.0	12.7	2.8	9.9
+50		391.0	12.7	2.7	10.0
380		391.0	12.7	2.8	9.9
TP	336	403.12		3.95	339.76
+25 ⁷⁴	(1°00' REV)	391.0	12.1	2.1	10.0
+50		390.3	12.8	2.4	10.4
+89 ⁵⁴		399.1	14.0	3.6	10.4
381+05 ⁵³	(1° REV)	388.44	14.7	3.5	11.2
381+50		385.5	17.6	7.5	10.1
382		382.2	20.9	10.0	10.9
+32 ¹⁹	(2° REV)	380.05	23.1	10.1	13.0
+49 ¹⁵	(2° REV)	379.56	23.5	11.4	12.1
+63 ¹¹	(2° REV)	379.25	23.5	10.2	13.3
+81 ¹⁸	2° level	379.56	23.5	10.2	13.3

STATION	+	GRADE 403.12	G. ROD	-	CUT 41
382+97 ¹¹	3° level	380.2	22.9	9.4	13.5
+29 ²⁷	1°30' REV	393.2	19.9	9.1	10.8
+44 ⁸²	3° (REV)	394.2	18.9	8.9	10.0
+76 ⁸¹	1° REV	384.7	18.4	8.7	9.7
+92 ⁶	2° REV	385.1	18.0	8.5	9.5
384+08 ⁵⁷		386.0	17.1	8.0	9.1
TP +50	82.9	406.53	20.0	4.98	398.24
BM +88 ⁴²	22.3	408.69	18.0	8.0	406.46
385+04 ⁴⁰		391.4	17.3	7.5	9.8
TP					
+50		391.8	16.9	6.4	10.5
+75		392.0	16.7	7.0	9.7
386+00		392.95	15.7	5.2	10.5
+25		393.9	14.8	4.9	9.9

R.M. ON N.W. COR. OF HEADWALL ON N. SIDE OF BROADWAY.
ELEV. 406.46.

Sta	+	Grade 408.69	Grade Rod	-	Cut
386+50		394.4	14.3	4.4	9.9
387		395.5	13.2	3.2	10.0
+50		396.5	12.2	2.1	10.1
388		397.6	11.1	1.6	9.5
T.P. BM	1238	419.44		2.23	406.46
+56		398.7	20.7	11.3	9.4
389		399.5	19.9	9.9	10.0
+50		400.7	18.7	9.9	8.8
390		401.7	17.7	9.0	8.7
+50		402.3	17.1	7.3	9.8
391 Break		404.4	15.0	5.8	9.2
+50		405.3	14.1	4.7	9.4
392		406.3	13.1	3.6	9.5
T.P.	1163	427.45		3.62	415.82
+50		407.2	20.3	10.9	9.4

	+	A 427.95 408.2	G. Rod	-	Cut
393		408.2	19.3	9.2	10.1
+50		409.1	18.4	8.7	9.7
+75 Brk		409.6	17.9	8.5	9.4
394		409.6	17.9	7.9	10.0
+50		409.6	17.9	7.8	10.1
395		409.7	17.8	7.7	10.1
^{12.30} 127.98		409.8	17.7	8.3	9.4
+50		410.7	16.7	7.7	9.0
396		412.6	14.8	5.1	9.7
^{10.00} 155.91 T.P. 40 9.86		414.8	12.6	2.5	10.1
397		425.07		16.4	425.81
		415.1	20.0	9.5	10.5
+50		415.4	19.7	9.6	10.1
398		415.8	19.3	9.1	10.2

	+	X 435.07	G Rod	-	Cut
398+50		416.1	19.0	9.1	9.9
399		416.5	18.6	8.9	9.7
1 st level +27 ⁸³		416.7	18.4	8.5	9.9
+50		417.3	17.8	8.2	9.6
400		418.8	16.3	5.6	10.7
+50		420.2	14.9	4.7	10.2
1 st level 401+03 ⁷⁴		421.8	13.3	3.7	9.6
+50		421.8	13.3	3.5	9.8
T.P.	12.60	444.21		3.46	431.81
402		421.8	22.4	13.2	9.2
2 nd level 402+15 ²⁴		421.9	22.3	12.4	9.9
2 nd level +31.72		422.4	21.8	11.7	10.1
2 nd level +79 ⁶²		425.7	18.5	8.7	9.8
403		426.3	17.9	8.2	9.7

	X 444.21	Grade	Grade Rod	-	43 cut
403+50		427.8	16.4	6.6	9.8
404		429.3	14.9	4.9	10.0
+50		430.9	13.3	4.1	9.2
405		432.4	11.8	1.6	10.2
T.P.	12.71	455.32		1.60	442.61
+50		433.9	21.4	10.8	10.6
406		435.4	19.9	9.5	10.4
+50		437	18.3	7.6	10.7
407		438.2	17.1	6.8	10.3
+50		439.5	15.8	6.1	9.7
408		440.7	14.6	4.3	10.3
+50		442	13.3	3.0	10.3
409		442.6	12.7	3.6	9.1

	+	455.32 Grade	Grade Rd	-	Cut
409+50		443.2	12.1	1.7	10.4
410		443.9	11.4	0.8	10.6
TP	9.98	464.49		0.81	454.51
+50		444.5	20.0	9.9	10.1
+75 Bk		444.8	19.7	9.6	10.1
411		444.8	19.7	10.0	9.7
+50		444.9	19.6	10.0	9.6
412		445.0	19.5	9.2	10.3
+50		445.1	19.4	8.6	10.8
413		445.2	19.3	7.3	12.0
+50		445.3	19.2	7.4	11.8
^{10 Bavel} +55		445.40	19.1	7.9	11.2
414+50		446.6	17.9	7.3	10.6
415		448.6	15.9	5.4	10.5
+50		450.6	13.9	3.4	10.5

	+	Grade 464.49	Gr. Rd	-	Cut. 44
416		452.9	11.9	0.9	11.0
TP	12.94	476.51		0.92	463.57
+50		455.4	21.1	10.8	10.3
417		458.2	18.3	8.2	10.1
+50		460.3	16.2	5.8	10.4
418		462.5	14.0	4.1	9.9
+46 ²⁴ 1°30		464.5	12.0	2.5	9.5
419		465.0	11.5	0.5	11.0
TP	12.55	486.01		3.05	473.46
^{30 ft 418} ^{100 ft 419} +726 -2° Bavel		465.3	20.7	8.5	12.2
+50		466.4	19.6	7.0	12.6
420		468.7	17.3	5.2	12.1
+50		471.1	14.9	3.5	11.4
421		473.4	12.6	1.6	11.0
TP	10.87	496.08		0.80	485.21
+50		475.7	20.4	9.3	11.1

	+	Grade x 496.08	G. Rod	-	cut
422		478.1	180	6.9	11.1
+50		480.4	15.7	6.2	9.5
+78 ²⁹	2°30' level	481.7	14.4	3.4	11.0
+94 ²⁴	2° level	483.1	13.0	1.3	11.7
T.P.	874	503.51		131	494.77
423+41	2°30' level	488.7	14.8	4.2	10.6
+57 ⁶¹	3° level	489.7	13.8	3.1	10.7
424		491.2	12.3	2.0	10.3 ¹³
T.P.	1261	514.13		129	501.52 ¹³
+50		492.9	21.2	11.5	9.7
425		494.7	19.4	9.4	10.0
+50		496.4	17.7	8.2	9.5
426		498.2	15.9	5.9	10.0
+50		499.9	14.2	3.9	10.3
Break 427		501.7	12.4	1.3	11.1
T.P.	12.77	525.59		131	512.82

	+	Grade x 525.59	G. Rod	-	cut
Break 427+50		503.8	21.8	12.3	9.5
428		507.2	18.4	8.8	9.6
+50		510.6	15.0	6.1	8.9
Break 429		514.0	11.6	2.6	9.0
Check BM	12.89	533.97		4.45	521.14
+50		517.9	16.1	7.2	8.9 ⁰⁸
					Corrected = better
					Δ 4 p. 15
					R. 1010
+57 ⁴³	B.C. Pt				
Break 430		521.8	12.2	0.5	11.7
T.P.	12.61	546.10		0.48	533.49
+50		526.3	19.8	7.8	12.0
Break 431		530.8	15.3	3.7	11.6
+50		534.9	11.2	0.0	11.2
T.P.	1304	556.72		2.42	543.68
432		539.0	17.7	5.9	11.8
+50		541.7	15.0	2.9	12.1
433		544.4	12.3	0.4	11.9
T.P.	1207	568.39		0.40	556.32
BM Nail in pp on fence line		429100			521.08

	+	56839 Grade	G. Rod	-	Cut
433+50		547.0	21.4	8.8	12.6
Break +75		548.4	20.0	6.9	13.1
434		549.1	19.3	5.3	14.0
+28 ⁴² 1°30' Bevel		550.0	18.4	3.1	15.3
+50		550.0	18.4	1.9	16.5
TP.	7.61	5740.6		1.94	586.45
435		550.0	24.1	3.6	20.5
+50		550.0	24.1	4.9	19.2
436		550.0	24.1	6.4	17.7
+50		550.0	24.1	7.5	16.6
+77 ³⁸ EG.					
437		550.0	24.1	9.9	14.2
+16 ²⁷ TP. A	1:30	550.0	24.1	10.0 10.63	14.1 564.03
+63 ³² 1:30		548.0			
+73 ²⁵ 30		546.8			

	+	7 Grade	G. Rod	-	Cut
438		544.3			
+27 ¹² 5° Bevel		540.9			
+50		540.3			
439		539.0			
30° Bevel +23 ¹⁸		538.4			
20° Bevel +33 ¹⁶		539.3			
+43 ⁸² Back		7			
= 448 + 32 ⁰⁶ ahead					
2° Bevel +31 ¹⁴		545.1			
2°30' Bevel +43 + 0.6 ⁹²		546.0			

Elev BM
07 1st Triang
= 552.14

4

150

4

150

4

150

4

150

4

Blank lined page with four vertical red margin lines.

Blank grid page with a vertical red margin line.

Bless
Kiny
Fohy
8/14/47

Grades for Pipe Line at
Lakeside Valve Chamber

BM	1.23	410.18	408.95	
#1	N Side on Fixed end	14.90	395.28	
#2	N.E. Cor X.	14.84	395.34	
#3	E. Monte of X	15.08	395.10	
#4	San Vicente End	14.97	395.21	
#5	W End X	14.95	395.23	
	16.84 East of X on San Vicente	2.08	408.10	395.13

Eley's Top Remassh. Valve's Lakeside

BM.	1.27	410.22	408.95		
#1		4.04	406.18	406.17	0.01
		4.01	406.21	406.50	0.29
		4.05	406.17	406.50	0.33

83,407
83
406.17

49

407.
406.50
0.50
1
2

406.50

Bliss

King

Fahy

8/16/47

Grade of Pipe as Laid

Under La Mesa Irrigation Cas Siphon

El Monte Pk. Sec 2

Elev. Top pipe

Cut slope

532.700

see p 66

B.M. 3.93 553.25 549.32

TP: Check Sec p. 66 9.28 543.97

531+37 12.0 541.2

531+55 ⁸³ 12.6 540.6

+ 89 13.3 539.9

532.700 13.4 539.8

+ 25 13.3 539.7

DrK +46 12.7 540.5

+70 ⁵ 7.8 545.4

+83. 6.2 547.00

B.M. 8.24 550.22 541.98

531+76 16.75 533.47

TP. 4.37 438.18 16.41 533.81

531+50 533.4

+ 25 533.4

531 533.3

+75 533.3

+50 533.2

+35 ⁶ 533.2

6.71 outside Dig

50

Bot. Pipe

534.5

to ctr. pipe 533.9 ?

533.2

to ctr. pipe 533.1

533.2

533.9

538.7

540.3

Bottom Dig

Bottom Pipe Grades from K1 Portal

BM	043	557.06		556.63	
512+55			574	551.32	invert
				550.82	Bottom Pipe
		Grade	Grade	Pod	
512+85		550.79	6.27	6.28	Grade
513		550.78	6.3	5.98	0.32
+50		550.73	6.35	5.65	0.71
514		550.68	6.38	6.17	0.21
+50		550.63	6.43	5.87	0.61
515		550.58	6.47	6.25	0.2
+50		550.53	6.52	6.52	Grade
516		550.48	6.57	6.57	Grade
+50		550.43	6.62	6.62	Grade
TP	493	555.27	6.72	550.34	

51

		↑ 555.27 Grade	G. Pod	-	Cut
to 521+50					
517		550.38	4.89	4.89	0.0
+50		550.33	4.94	4.63	0.3
518		550.28	4.99	4.68	0.3
+50		550.23	5.04	4.96	0.1
TP	4.87	555.21		4.93	550.34
519		550.18	5.01	5.01	Grade
+50		550.13	5.06	5.05	Grade
520		550.19	5.10	4.9	0.02
+50		550.05	5.14	5.83	0.033
521		550.00	5.20	5.20	Grade
+50		549.95	5.25		Pipe 549.95 Place 0.36 High
TP	6.86	557.25		4.72	550.39

10/10/47
 3155 notes
 Leonard P
 Baker f

Grades for 36" Connection Between

BM	1.04	370.60		369.56	Spike in PP72394
T.P.	2.93	365.90	763	362.97	
0400 = 0409 ⁶⁶		352.8	12.70 G. Rod	353.2	flow ex pipe out
0434.72		353.8	12.8	51	7.5
0463.54		358.8	11.3 12.2	4.9	6.4 7.3
1404.32		355.5 354.2	10.4 11.7	47	5.7 7.0
T.P.	7.76	370.27	3.37	362.53	
Check BM			6.73	369.54	
				369.56	
				0.02	
	2.84	365.81		362.97	
Check 1404 ⁵⁵			4.64	361.17	
Top ex El Capitan Line			7.17	358.64	
			3.1	355.5	Bottom pipe

El Monte P.L. Sec 2 + Ex. El Capitan Line

End of ex pipe in place

10/22/47

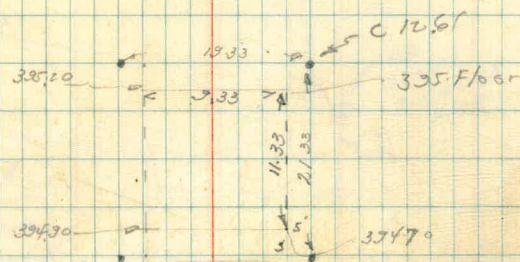
Bliss
LeonaGrades San Vicente 2nd Main

BM 5.24 414.19 408.95

216+23.97 400.8 13.4 3.9 9.5

216+55³³ 400.1 14.1 4.7 9.6218+72²⁴ 398.0 16.2 4.0 12.2218+77³⁶ 397.1 17.1 3.6 13.5216+82⁴⁵ 397.1 17.1 4.6 12.5Transfer of Bench Woodside r
River St. LakesideBM 1.26 410.21 408.95 Spike 17
pp NW River
& WoodsideSet BM 2.77 407.44 SECOR
Main vol. 1/4
Box River
& Woodside

54



10/22/47

+ x - Elev
346 412.41 408.954.80
407.61
395.00

C 12.61 To Top

10/23/47

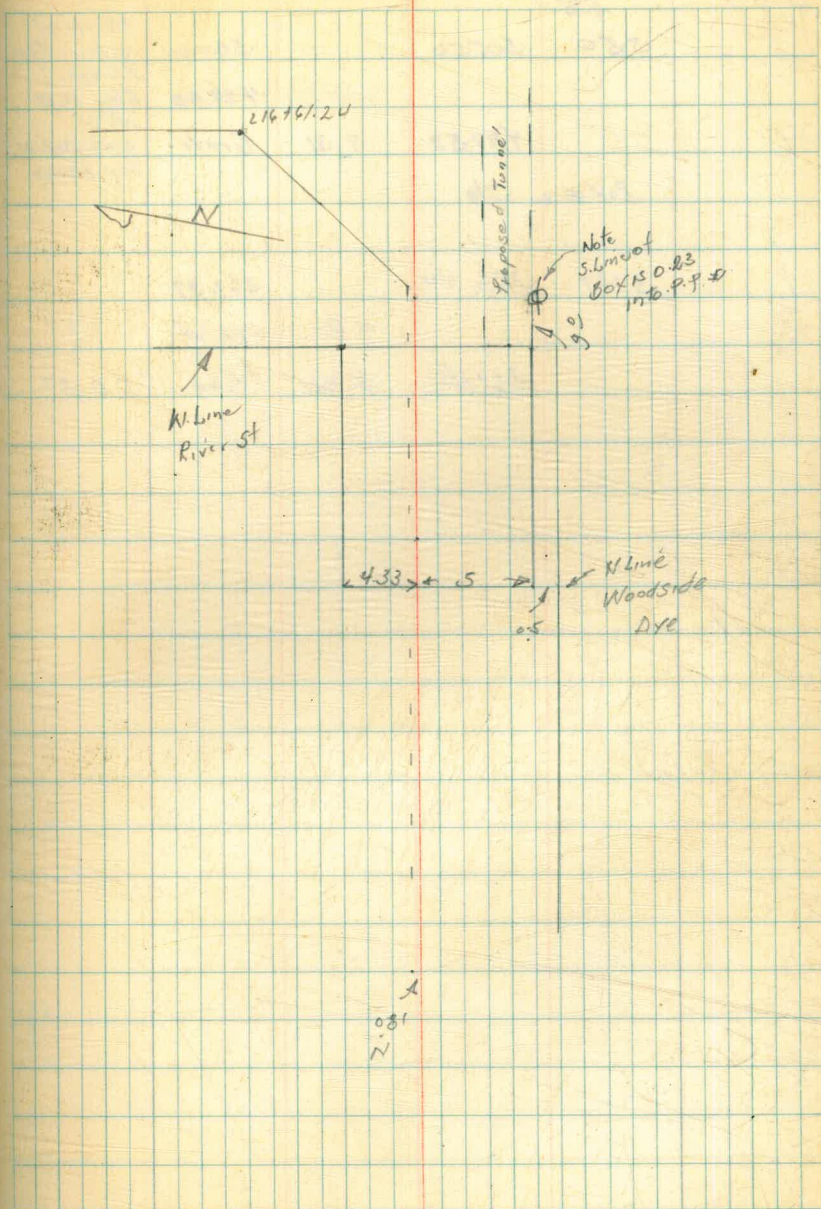
+ x - Elev
366 412.61 408.95SE 5.00 407.61
395
C 12.61SW 5.17 407.44
394.70
12.74NE 3.78 408.83
395.20
C 13.63NW 4.11 408.50
394.90
C 13.60

Bliss

Leonard Sketch of Box NW Corner
Boxer Woodside + River St in Lakeside

40895

55



Elev for Top. MH
North of Bloroff Bx
Sta

Elev

5.50 305.50

500.00

Assumed
Elev Top
Flange

499.83

Elev Top
M.H

499.59

5.91

Grade

0.41 Below
Top Flange

Box #2 Sta

3.47 366.44

362.97

4.80

361.64

4.63

361.44

5.00

4.63

0.37

31
67
24

56

10/30/47.

~~Bliss~~

Leonard

Boxer

Levels For Disposal of
Blow off water from Blowoff at Sta

BM 417 357.14 362.97

Flow Line Culvert at 0+00 9.36 357.78

6+00 Ground 8.0

1+0 9.1

2+0 8.9

3+0 8.8

4+0 7.9

5+0 8.0

6+0 7.3

7+0 7.4

T.P. 739 367.45 7.05 360.09

8+0 8.2

+34 in Field 9.2 358.2

57



				Flow culvert.
0400	6.82	364.60	357.78	
+3			5.4	
+12			5.2	
+14			6.1	
+50			6.5	
+37			6.8	
1400			6.8	
+50			7.5	

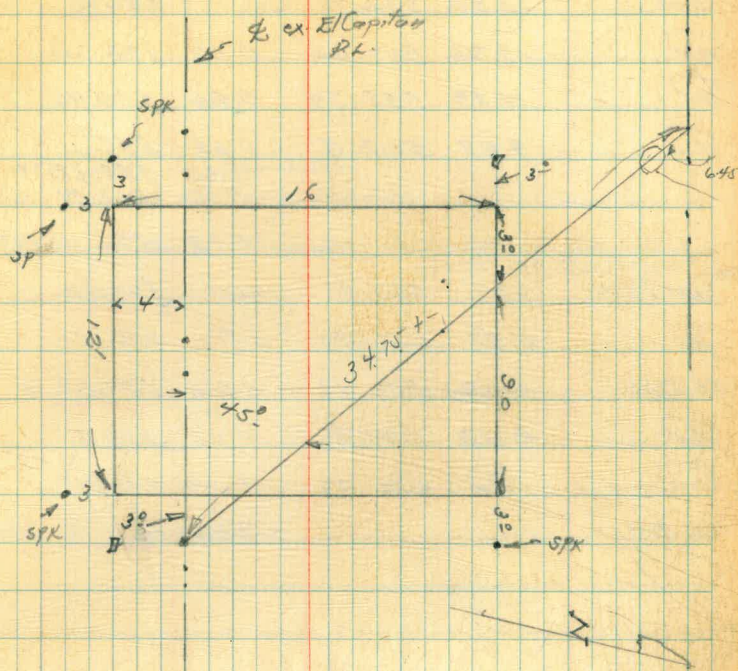
11/6/47	+	x	-	Elev	
Bliss Leonard BM. Baker	3.80	411.25		407.45	
		Elev Grade	G. Rod	-	Cut
S.W. Cor		397.50	13.75	554	8.21 ✓
S.E. Cor		397.50	13.75	4.43 ⁶⁸	9.07
N.E. Cor		397.0	14.25	4.04	10.21
N.W. Cor		397.0	14.25	4.43	9.82
Check BM.				3.80	
BM.	3.77	410.21		407.44	
					333
Top El. Mark pt.		10.3		399.9	
				3.3 o.d.	
				396.6	Bottom Pipe
Top El. Capitan		7.76		402.45	
				3.15 o.d.	
				399.30	
				96.6	
				2.20	
		16.75			Flow Drain

Meter Box at Woodside and River Sts
Lakeside

59

28.3-

34.75



EL MONTE P.L.
ELEV. 5 AT AIR VAL CHAMBER
STA 432+50±

BM	13.30	534.38		<u>521.08</u>	U
IP	13.26	547.62	0.02	534.36	
IP	11.83	558.79	0.66	526.96	
IP	9.07	567.18	0.68	558.11	
			8.30	558.88	
			5.67	561.51	
			10.75	556.43 = (556.34)	pl. 117.
SET TBM.	1.73	567.87	1.04	<u>566.14</u>	
IP	0.43	556.44	11.86	556.01	
CK BM	0.64	552.22	4.66	<u>551.78</u>	
IP	0.23	539.70	12.95	539.47	
IP	1.32	530.43	10.59	529.11	
CK BM.			9.36	<u>521.07</u> = 521.08	

BM	13.05	505.02		491.97	
CK BM			6.55	498.47	498.68
IP	12.76	516.28	1.30	503.72	
IP	9.66	524.58	1.56	514.92	
CK BM.			3.20	521.18	= 521.08

JAN. 11 1957
Beatty
1301307
P. 1011

60

SPIKE IN P. Pole # 171554

water elev in chamber
Top 2 - Air Val assemblies

Bottom of Conc Chamber, between 2 Air Val. 3
could be top of 68" pipe
SELY Cor AVA Chamber

CHIS X ON NELY Cor of B.O. CHAMBER

SPIKE IN P. Pole # 171554

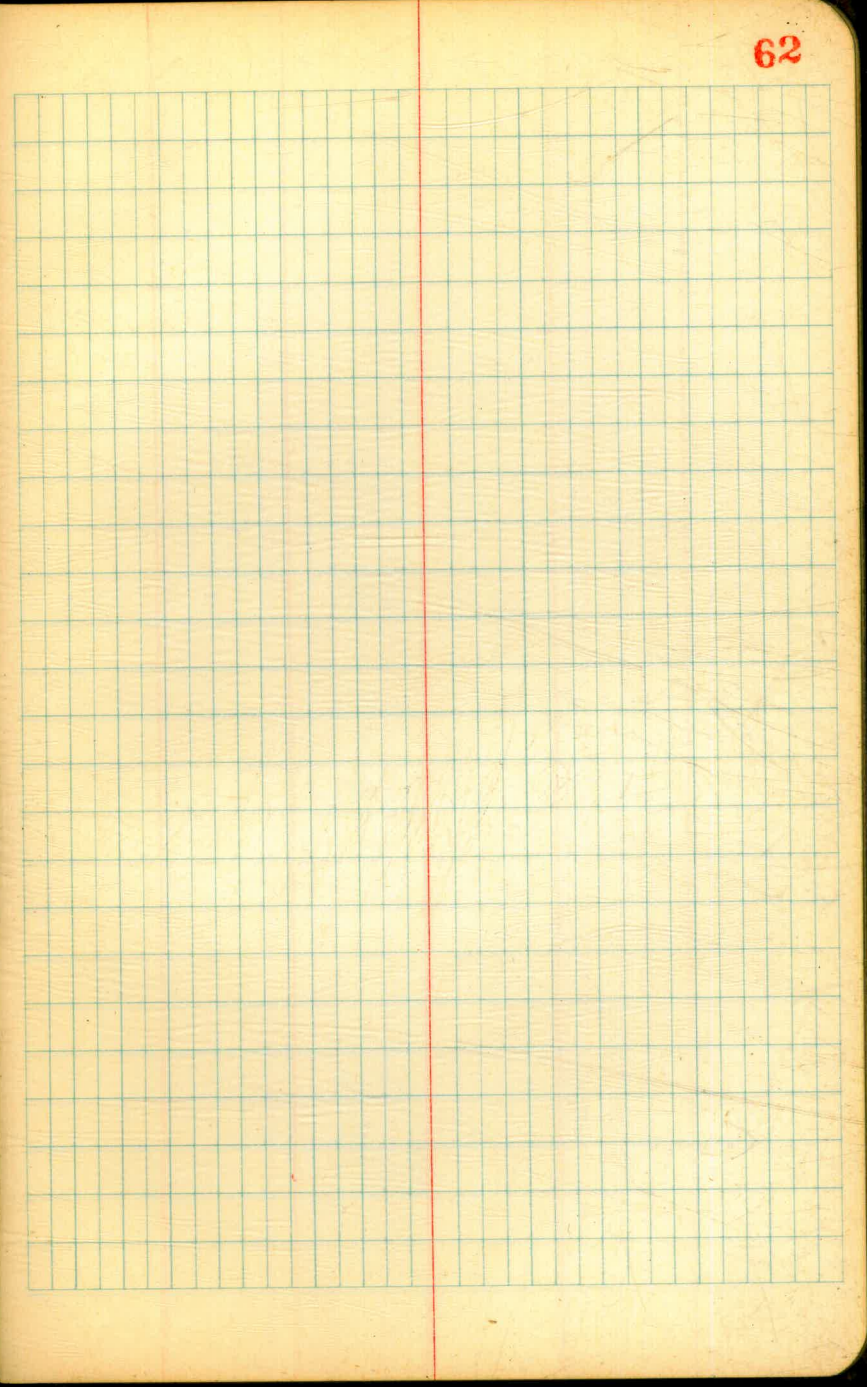
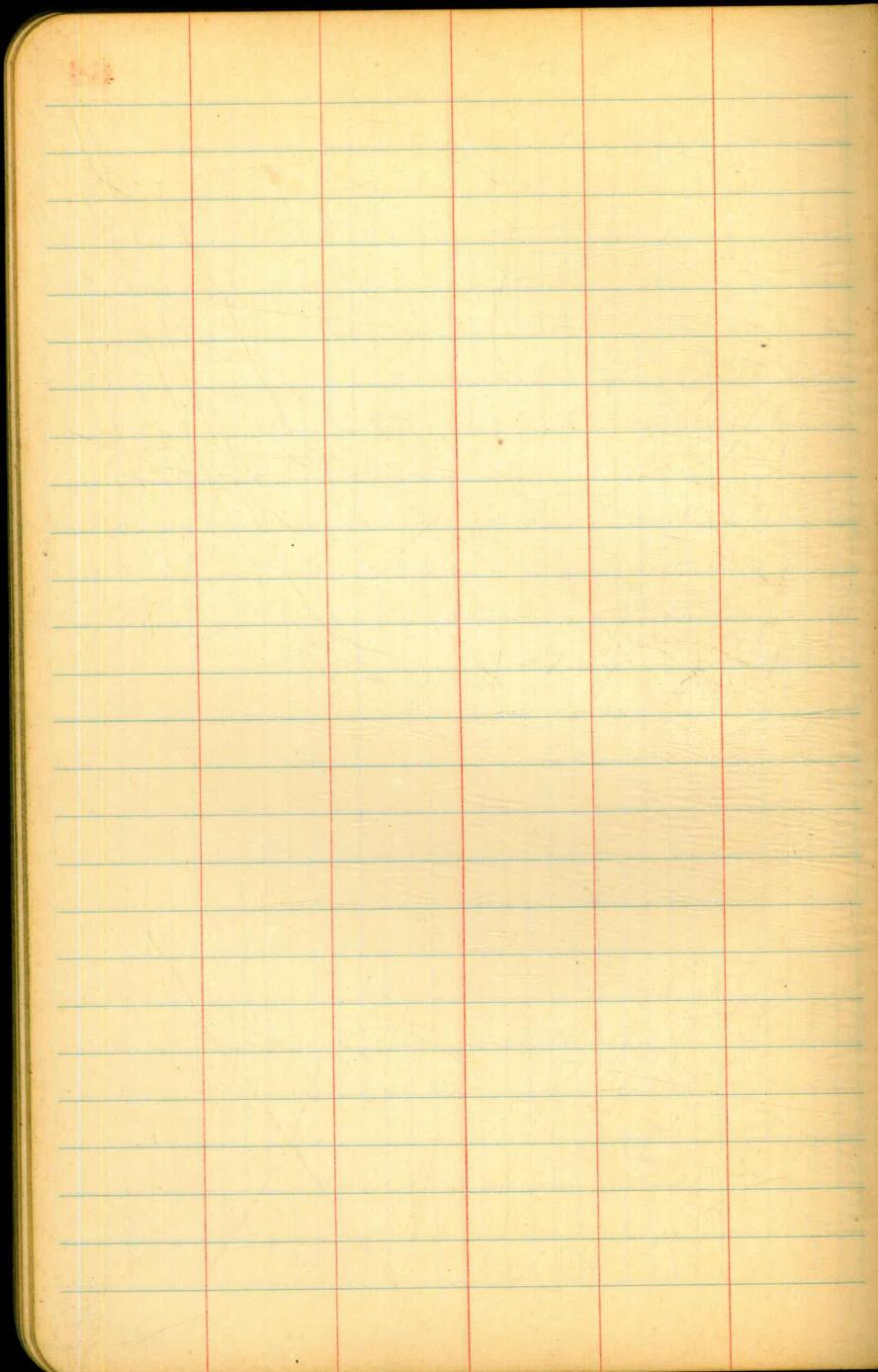
Nail in P. Pole SW Cor Pierce St & Main St
3/4" I.P. in 150' NWly of above pole (County?)

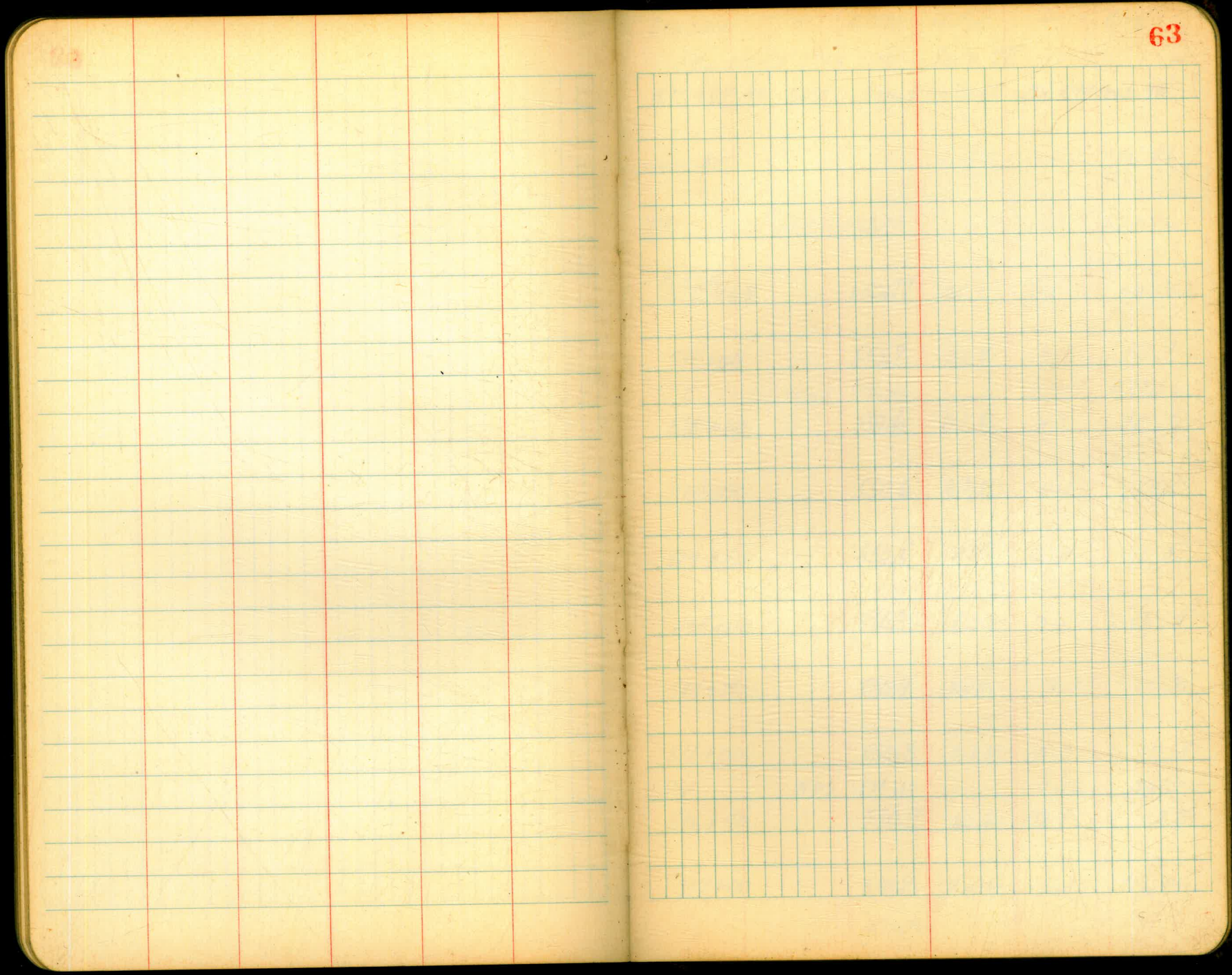
556.34

SPIKE IN P. Pole # 171554

60

61





STATION: + GRADE. G. ROD. - CUT. 64

EL MONTE PIPE LINE - SECT. IV

B.M. = 589.97 50' RT. STA. 511+74.66 BK. 694 PAGE 44. ^{.09} ^{.23}

Check B.M.			3.18	589.83
				589.97 ^{Per}
				0.14 ^{diff.}
TP	9.85	583.01	1.29	583.16

PORTAL:				
512+65		550.77	33.7	4.4
				59.3

513+00		550.7	33.8	8.1
				25.7

TP	11.29	584.45	9.94	573.16
----	-------	--------	------	--------

513+50		550.6	23.5	0.9
				22.6

514+00		550.6	23.5	4.0
				19.5

514+50		550.5	23.6	5.8
				17.8

515+00		550.4	23.7	7.0
				14.7

515+50		550.4	23.7	7.9
				15.8

516+00		550.3	23.8	8.3
				15.5

TP	11.04	574.10	7.66	563.04
----	-------	--------	------	--------

516+50		550.2	20.5	7.7
				12.8

517+00		550.2	20.5	6.3
				14.2

570.76

STATION	+	GRADE	G. ROD	-	CUT.
517+50		550.1	20.6	5.2	15.4
518+00		550.0	20.7	3.5	17.2
^{B.P.} 518+50.18		550.0	20.7	2.1	18.6
519+00		549.9	20.8	2.8	18.0
519+50		549.8	20.9	4.3	16.6
520+00		549.8	20.9	6.2	14.7
520+50		549.7	21.0	6.9	14.1
521+00		549.6	21.1	9.6	11.5
^{T.P. on 1/10} 521+50	10.6 ~	570.70	21.1	7.46	560.08
521+50		549.6	17.9	11.4	97.55 side
				5.7	12.2
521+95 ⁹⁵		549.5	18.0	7.3	10.7
522+05 ⁹⁸		549.3	18.2	7.3	10.9
522+17 ⁹¹		549.1	18.4	7.5	10.9
522+50		548.5	18.9	8.9	10.0
		567.54			

STATION.	+	GRADE	G. ROD	-	CUT.
^{T.P. on 5/23} 523+00	9.38	567.54	2.35		558.16
523+00		547.5	13.0	2.35	10.7
523+50		546.5	14.0	3.7	10.3
^{F.P.} 523+99.9		545.5	15.0	4.5	10.5
524+50		544.8	15.7	5.2	10.5
525+00		544.1	16.4	5.8	10.6
525+50		543.4	17.1	6.6	10.5
526+00		542.7	17.8	7.2	10.5
526+50		542.0	18.5	7.6	10.9
^{B.P.} 526+66 ⁶⁶		541.8	18.7	8.0	10.7
527+00		541.3	19.2	8.4	10.8
527+50		540.4	20.1	9.4	10.7
^{T.P. on 10' offset} 528+00	10.35	560.51	0.58		559.16
528+00		539.4	11.3	0.58	10.9
528+50		538.5	12.2	1.8	10.4
		550.74			

STATIONS	+	GRADE	G. ROD	-	CUT
529+00		537.3	13.4	3.2	10.2
529+50 ⁶⁵		536.0	14.7	4.3	10.4
529+86 ⁷¹		533.2	17.5	5.9	11.6
529+98 ⁷¹		532.4	18.3	7.7	10.6
530+20 ⁸³		532.4	18.3	6.8	11.5
T.P.	872 6.71	530.74 corrected 550.70		8.76 10.83	541.94 543.99
530+47 ⁸⁶		533.9	20.9	10.8	10.1 ^{541.93}
531+00		534.7	20.1	9.6	10.5
+07 ⁶⁹		534.8			
E.C. 531+21 ⁹⁰		534.8	20.0	9.4	10.6
B.C. 531+31 ¹⁵		534.9	19.3	9.2	10.7
531+55 ⁸³		534.9	19.9	8.0	11.9
532+00		534.95	19.9	5.5	14.4
532+51 ⁸⁶		535.0	19.8	2.7	17.1
532+75 ⁸⁶		533.2	15.6	5.1	10.5
		534.82			

B.M. - SPIKE IN COTTONWOOD TREE OPP STA. 530+00, ELEV. 541.98

STATIONS	+	GRADE	G. ROD	-	CUT
532+87 ⁸⁵		540.0	14.8	4.4	10.4
533+23 ⁸⁴		540.0	14.8	3.8	11.0
533+33 ⁸³		539.7	15.1	4.7	10.4
533+76		538.8	16.0	4.5	11.5
534+07 ⁸³		538.1	16.7	6.1	10.6
534+19 ⁸³		537.8	17.0	6.5	10.5
T.P.				9.59	548.27
534+50		537.7	20.2	9.6	10.6
535+00		537.5	20.4	10.1	10.3
535+50		537.2	20.7	10.7	10.0
E.C. 535+60 ⁸³					
536+00		537.0	20.9	10.2	10.7
536+50		536.0	21.9	10.4	11.5
537+00		535.0	22.9	12.45	10.4
B.C. T.P. 537+19 ¹⁶	12.15	537.86		7.14	545.71
537+43 ⁸²		534.12	18.7	8.3	10.4
		532.85			

STATION:	+	GRADE	G. ROD	-	CUT
537+50		533.7	19.1	8.5	10.6
537+75		531.8	21.0	9.4	11.6
537+91.8		530.5	22.3	9.3	13.0
538		530.5	22.3	8.9	13.4
+50		530.4	22.4	7.4	15.0
539		530.4	22.4	5.7	16.7
+50		530.3	22.5	6.5	16.0
540 E.C. 540+24.04		530.3	22.5	7.3	15.2
+50		530.3	22.5	6.9	15.6
+50		530.2	22.8	7.5	15.1
541		530.2	22.6	8.2	14.4
+50		530.1	22.7	7.8	14.9
B.M. 150 T.P. ON 542+00 RED TOP HUB.	0.14	552.85		552.71	
542+00		530.1	18.1	5.6	12.5
542+50		530.0	18.2	7.0	11.2

↑
K 548.25

STATION:	+	GRADE	G. ROD	-	CUT
543		529.7	18.5	7.9	11.2
+50		529.4	18.8	8.1	10.7
544		529.0	19.2	7.9	11.4
+50		528.7	19.5	8.3	11.2
545		528.4	19.8	8.5	11.3
+50		528.1	20.1	8.9	11.2
T.P. ON RED TOP 546+00	+9.86	538.25	14.1	4.9	7.7
546		527.8	14.2	3.6	10.6
+50		527.5	14.5	1.6	12.9
547		527.1	14.9	3.5	11.4
+50		526.8	15.2	5.0	10.2
548		526.5	15.5	4.7	10.8
T.P. ON RED TOP 548+50	+4.20	542.03		-4.64	537.83 T.P.
+50		526.5	16.0	4.6	11.4
549		526.4	16.1	5.1	11.0
+50		526.4	16.1	5.1	11.0

↑
K 542.47

EXCAVATION CORRECTED AT
STR. 543+80 APPROX.

ERROR MADE IN PICKING UP
H.I. FROM WRONG STATION HUB.

67

LEONARD 6-5-47

	+	Grade	C Rod	-	cut
550		526.4	16.1	4.8	11.3
+50		526.3	16.2	5.1	11.1
551+00	+3.77	547.47 526.31	16.2	3.8	10.4
T.P. +03.50		526.3	14.0	1.63	538.70
552+50		526.20	14.1	2.5	11.6
552+08 ²³		526.2	14.1	3.2	10.9
+40 ²³		524.8	15.5	5.2	10.3
553		521.3	19.0	8.4	10.6
TP. ⁰²¹⁵¹ R.P. 21.	11.15	540.83		0.67	522.18
+50		517.4	12.5	2.3	10.2
554		512.4	17.5	6.4	11.1
+25		510.	19.9	8.9	11.0
TP. +47 ²⁵	11.10	529.85 506.8	12.9	0.97 1.7	518.75 11.2
+50 ²⁶		505.1	14.6	3.6	11.0
+71 ⁶³		504.1	15.6	4.4	11.2
355		503.1	16.6	6.2	10.4
		519.72			

68

+50	501.4	18.3	7.1	11.2
+67 ⁸⁰	500.8	18.9	9.4	9.5
555+92 ⁰⁴	500.8	18.9	7.7	11.2
+04.31	501.2	18.5	8.2	10.3
TP. 4.99	519.72		11.78	514.78 ⁰⁷
556+52 ⁴²	505.00	21.7	3.8	11.9
557	505.2	21.5	8.9	12.6
+50	505.3	21.4	5.8	15.6
558	505.5	21.2	4.3	16.9
+50	505.6	21.1	6.3	14.8
559	505.8	20.9	9.5	11.4
			5/27/49	
559+28 ²⁵	505.8	20.9	10.7	10.2
559+50	507.0	19.7	9.9	9.8
560+00	510.0	16.7	6.1	10.6
	526.71			

T.P.	+				
2.77	526.71		5.22	523.94	
560+50	513	15.2	6.2	9.0	
561+00	514.0	16.2	4.6	11.5	
561+50	514.0	16.2	5.3	10.9	
562.	513.5	16.7	5.8	10.9	
+16 ⁵⁰	513.0	17.2	6.3	10.9	
+28 ⁵²	512.75	17.4	6.8	10.6	
BM 140 ⁹⁸ 10.13	530.76	520.03			
	512.4	11.8	0.7	11.1	
562+75	511.0	13.2	1.9	11.3	
563- Not set					
+12 ⁹⁵	509.5	14.7	3.6	11.1	
BM 136 ⁵	508.95	15.3	4.1	11.2	
+50	508.5	15.6	3.6	12.0	
564	508	16.2	4.2	12.0	
564+50	507.3	16.9	5.6	11.3	
	+ 52416				

Sta	Grade	GP	69 - cut	
565	506.61	17.6	6.2	11.4
BK 52.46	505.94	18.3	7.4	10.9
566	509.7	19.5	7.9	12.1
+50	503.5	20.7	9.5	11.2
567	502.2	22.0	11.6	10.4
set BM at P.O. 507 4.13 164 7.50	52416 500.75	1.11 20.2	520.03 100	10.2
568	499.75	21.4	9.6	11.8
+50	498.91	22.7	11.3	11.4
T.P. 12.65	521.14	0.49	508.49	
569	497.2	11.8	0.8	11.0
BK +48 ⁴³	495.04	13.1	2.7	10.4
570	492.9	16.1	5.5	10.6
+50	490.7	18.3	7.5	10.8
BM 10.87	508.98		498.11	
571+00	488.5	13.2	2.0	11.2
	+ 50169			

Cuts

571+50	BK	486.3	15.4	4.0	11.4
572		485.0	16.7	5.6	C 11.1
572+50		483.5	18.1	7.4	C 10.7
572+84	BK	482.7	19.00	7.5	C 11.5
572+96	BK	482.5	19.2	7.9	C 11.3
573+08	BK	482.3	18.4	8.2	C 11.2
Set BM	3.58	501.69	2.15	498.11	Large Rock 40' RT 573+20
+50		482.2	18.1	7.2	C 10.9
574		482.1	18.2	6.7	C 11.5
+50		482.0	18.3	6.0	9/9/47 C 12.3
T.P.	8.81	500.26	-8.73	491.45	
575		481.9	16.4	5.0	11.4
BM	3.14	500.18			497.04
575+98		481.8	16.5	6.00	10.5
575+96		479.9	18.4	8.1	10.3
BM	1.25	498.29			497.04

576+00	479.9	18.7	8.0	10.7
576+08	479.3	19.0	8.2	10.8
576+44	476.9	21.7	8.7	13.0
BM				
576+56	476.5	22.1	9.5	12.6
577+00	476.4	22.2	9.1	C 13.1
577+50	476.4	22.2	10.2	C 12.0
578+00	476.3	22.3	9.1	C 13.2
578+50	476.3	22.3	8.0	C 14.3
579+00	476.3	22.3	8.0	C 14.3
579+50	476.3	22.3	9.4	C 12.9
1.60	498.64			3/2/97
4.57	501.61			BM 497.04
T.P.	4.61	493.83	12.39	489.22
580+00	476.3	17.5	3.4	14.1
580+50	476.2	17.6	5.9	11.7
6142	3-20-47	499.68		B.M. T.P. 493.26
Set B.M.	50' RT	579+00	2.64	Ref Hub 497.04

	493.83			
580+642	476.1	17.7	6.2	11.5
581+00 ⁶³	475.5	18.3	8.0	10.3
+50	474.2	19.6	9.4	10.2
582+00	472.8	21.0	10.5	10.5
+50	471.9	21.9	11.3	10.6
583+00	470.9	22.9	12.4	10.5
T.P.	5.16	486.56	12.43	481.40
+50	470.00	16.6	5.9	10.7
584+00	469.3	17.3	7.0	10.3
+50	468.5	18.1	7.3	10.8
C.K.T.B.M.		3.41	483.15 = 483.18	
585+00	467.8	18.8	8.0	10.8
C.K.T.B.M.		0.82	483.29 = 483.18	
T.P.	5.83	484.06	3.23	478.23
585+50	467.5	14.0	3.2	10.8
586+00	467.2	14.3	3.3	11.0

↑ 481.46

	Grade	G.R.	71	rod cut
586+50	466.8	14.7	3.3	11.4
587+00	466.5	15.0	3.6	11.4
+50	465.3	16.2	5.2	11.0
588	464.2	17.3	6.2	11.1
588+50	463.8	17.7	7.4	10.3
589+00	463.3	18.2	7.5	10.7
7.49	481.46			
T.P. ROCK 25' R 590+20		1.76	473.97	
589+50	462.9	12.8	2.3	10.5
590	462.4	13.3	2.5	10.8
590+50	462.0	13.7	3.5	10.2
591	461.5	14.2	4.1	10.6
591+50	461.1	14.6	4.6	10.0
592+00	460.7	15.0	5.2	9.8

↑ 475.73

	Grade	B.R.	ROd	CUT
592+50	460.2	15.5	5.3	10.2
592+75	460.00	15.7	5.6	10.1
593+00	459.9	15.8	5.0	10.8
593+48 ¹	459.8	15.9	L+ 5.2 RT 5.0	10.7 10.9
	3-20-47 3.03	475.73		B.M. 472.70
593+96 ⁸	458.0	18.3	7.5	10.8
594+33 ²	458.0	18.3	8.1	10.7
594+57 ⁶	459.6	16.7	5.6	11.1
594+69 ⁸	460.8	15.5	5.6	9.9
595+00	461.9	14.4	4.6	9.8
595+42 ¹	463.4	12.9	L+ 3.2 RT 2.9	9.7 10.0
	3.56	476.26		B.M. 472.70
595+78 ²	464.5	18.1	9.4	8.7
596+00	464.5	18.1	6.6	11.5

	Grade	B.R.	ROd	CUT
596+50	464.6	18.0	6.9	11.1
597+00	469.6	18.0	5.4	12.6
597+50	464.6	18.0	4.8	13.2
598+00	464.7	17.9	4.7	13.2
598+50	464.7	17.9	4.8	13.1
599+00	464.7	17.9	4.7	13.2
599+50	464.8	17.8	5.5	12.3
599+74 ³	464.8	17.8	7.5	10.3
	9.86	3-1447	482.56	472.70
CR B.M.			10.81	472.63 = 472.70
OFF ROCK 2.73	483.44			
T.P. B.M. 40' RT 599+25			10.27	480.71 USE 480.78
600+00 ²⁹	466.4	24.6	14.3	10.3
600+50	469.7	21.3	10.7	10.6
600+70 ⁵	470.4	20.6	8.8	11.8

83 94
472.70
10.79

72

↑ 490.98

600+99 ⁵	472.1	18.9	7.6	11.3
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601+50	474.8	16.2	5.2	11.0
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602+00	476.6	14.4	3.8	10.6
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602+50	477.6	13.4	2.8	10.6
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T.P.	1.60	490.98	9.21	489.38
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603+00	478.7	19.9	9.2	10.7
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603+50	478.9	19.7	7.9	11.8
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603+99 ²	479.00	19.6	8.1	11.5
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604+18 ⁶	479.7	18.9	7.0	11.9
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604+50	480.8	17.8	6.9	10.9
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605+00	482.7	15.9	4.6	11.3
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605+51 ²	484.5	14.1	3.0	11.1
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606+00	↑ 485.0	13.6	2.9	10.7
	13.05	498.59		B.M. 485.54

CK. B.M.

12.47 485.54 = 485.54

606+47 ²	485.0	13.0	2.6	10.4
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606++95 ⁵	482.0	16.0	4.5	11.5
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607+31 ⁹	↑ 479.1	18.9	7.5	11.4
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T.P.	8.91	49	8.01	0.69	489.10
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607+55 ³	476.8	12.9	1.3	11.6
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608+02 ⁸	470.5	19.2	7.4	11.8
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608+39 ²	467.8	21.9	11.9	10.0
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608+63 ⁵	467.8	21.9	12.4	9.5
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608+75 ²	468.10	21.6	12.4	9.2
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608+88 ¹ ↑	469.2	20.5	11.2	9.3
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CK. B.M.	3-12-47	4.20	489.74	8.27	485.51 = 485.54
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609+00 ³	471.1	22.7	13.5	9.2
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609+25	475.9	17.9	8.9	9.0
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609+50	480.6	13.2	4.2	9.0
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T.P.	0.81	493.78	12.52	492.97
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609+95 ²	489.3	16.2	7.3	8.9
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505.49

610+07 ¹		490.8	14.7	5.2	9.5
T.P	0.94	505.49	13.01	504.55	
610+55 ⁰		494.6	23.0	10.2	12.8

610+79 ¹		498.00	19.6	7.4	12.2
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611+03 ⁰		500.4	17.2	4.4	12.8
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611+26 ⁹	3-10-47	501.8	15.8	2.9	12.9
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T.P. Ref Hub (75) 61108	1.34	517.56	7.12	516.22	
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611+50 ⁸		503.4	19.9	6.7	13.2
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611+86 ⁹		508.0	15.3	5.0	10.3
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611+98 ⁹		508 ⁹	14.5	4.3	10.2
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612+34 ⁹		509.6	13.7	3.6	10.1
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612+70 ⁹		509.8	13.5	3.5	10.0
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612+94 ⁹		509.5	13.8	3.5	10.3
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613+50		508.2	15.1	5.0	10.1
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↑ 523.34

614+00		506.7	16.6	6.3	10.3
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614+50		505.1	18.2	8.3	9.9
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615+00		503.6	19.7	8.7	11.0
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11.53	↑	523.34			511.81
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615+58 ⁷		501.7	12.7	1.7	11.0
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615+70.6		500.5	13.9	2.5	11.4
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615+94 ²		497.1	17.3	3.5	13.8
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616+18 ⁸		495.0	19.4	3.9	15.5
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616+31 ²		494.9	19.5	4.1	10.4
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616+79.2		494.7	19.7	7.8	11.9
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2.59		514.40			B.M 511.81
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616+91 ²		494.1	19.2	6.5	12.7
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CK B.M			1.47	511.81 = 511.81	
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617+27 ¹		491.1	22.2	8.2	14.0
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617+39 ³		490.5	22.8	10.6	12.2
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↑ 513.28

617+63 ^b	490.5	22.8	12.5	10.3
617+75 ⁸	490.9	22.4	13.0	9.4
618+00 ²	492.6	20.7	9.3	11.4
618+24 ⁴	495.6	17.8	5.6	12.2
618+48 ⁴	498.5	14.8	4.1	10.7
T.P.	0.36	513.28	12.46	512.92
619+00	501.5	23.9	12.5	11.4
619+20 ^b	502.8	22.6	11.3	11.3
619+49 ^b	504.6	20.8	10.2	10.6
620+00	509.0	16.4	5.4	11.0
620+52 ⁸	513.1	12.3	0.8	11.5
	0.49	525.38		524.89
621+00 ⁸	516.0	16.9	5.4	11.5
621+48 ¹	517.9	15.0	3.6	11.4
622+00	518.9	14.0	2.8	11.2

622+44 ¹	519.7	13.2	1.8	11.4
7.96	532.85			524.89
CK BM		6.69	538.33 =	538.34
T.P. 11.36	545.02	3.94	533.66	
622+80 ¹	520.6	12.71	524.89 set	B.M. 12.4
		17.0	4.6	
623+00	521.9	15.7	3.2	12.5
T.P. 0.05	537.60	11.35	537.55	
623+50	525.2	23.7	11.3	12.4
624+01 ²	528.7	20.2	8.6	11.6
624+50	530.6	18.3	6.5	11.8
625+00	532.6	16.3	5.1	11.0
625+46	534.6	14.3	2.5	11.8
626+00	534.6	14.3	2.3	12.0
626+30 ⁵	534.6	14.3	3.0	11.3
626+54 ⁴	534.3	14.6	6.0	8.6
627+00	532.9	16.0	7.6	8.4

548.90

3-4-47
cloudy-cold

Nelson
Phillips
BATT9924

T.P	7.58	548.90	1.13	541.32	
627+26 ³	531.9	531.9	10.6	2.1	8.5
627+62 ²	528.1	528.1	14.4	4.4	10.0
627+86 ¹	525.9	525.9	16.6	6.4	10.2
628+00	524.8	524.8	17.7	7.6	10.1
+50	520.9	520.9	21.6	12.3	9.3
4.11	542.45	542.45			B.M. 538.34
628+81 ⁸	518.4	518.4	10.7	1.1	9.6
629+17 ⁸	516.00	516.00	13.1	3.0	10.1
629+53 ⁸	514.2	514.2	14.9	4.4	10.5
6.09	529.09	529.09			523.00
0.31	523.31	523.31			523.00
630+00	512.7	512.7	10.6	0.4	10.2
630+61 ⁸	510.6	510.6	12.7	2.10	10.6
630+86 ⁸	508.6	508.6	14.7	3.4	11.3
631+21 ⁸	505.3	505.3	18.0	6.7	11.3

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	523.3				
631+69 ⁵	500.2	500.2	23.1	11.9	11.2
631+81 ²	497.4	497.4	25.9	14.8	11.1
	523.31				
632+16 ^{1 20 40}	487.1	487.1	16.5	7.0	9.5
632+28 ⁷	485.1	485.1	18.5	8.6	9.9
632+40 ²	485.1	485.1	18.5	8.7	9.8
632+77 ⁹	485.2	485.2	18.4	8.7	9.7
632+90 ⁹	487.4	487.4	16.2	5.5	10.7
T.P. 2.66	503.56	503.56	10.53	500.90	
T.P. 0.84	511.43	511.43	12.72	510.59	
633+49 ⁷	500.6	500.6	22.7	12.7	10.0
633+73 ⁴	504.5	504.5	18.8	8.8	10.0
633+97 ⁰	508.1	508.1	15.2	4.8	10.4
634+14 ⁵³					
634+21 ⁴	509.7	509.7	13.6	2.9	10.7
0.31	523.31	523.31			B.M. 523.0
+50	511.0	511.0	23.2	12.3	10.9
635+00	513.0	513.0	21.2	10.8	10.4

534.2

635+50 515.0 19.2 9.4 9.8

636+00 516.5 17.7 8.2 9.5

+50 518.0 16.2 6.5 9.7

636+96¹ 519.5 14.7 4.9 9.8

637+50 519.6 14.6 3.3 11.3

638+00 519.6 14.6 2.7 11.9

638+16¹ 519.6 14.6 3.0 11.6

638+29² 520.1 14.1 2.1 12.0

638+53³ 521.9 12.3 2.1 10.2

0.46 534.23 533.77
H.I. B.M. N.W. 11
+ 0.74 534.51 2-20-1947 Paper Tree
533.77

638+77 521.9 12.6 2.5 10.1

639+00 521.7 12.8 2.9 9.9

639+25 521.4 13.1 3.6 9.5

534.51

77

Grade G.R. Rod cut
639+50 521.2 13.3 3.1 10.2

639+75 520.7 13.8 3.6 10.2

640+07² 519.9 14.6 4.1 10.5

+50 518.9 15.6 5.3 10.3

641+00 517.0 17.5 7.7 9.8

Ginny Hub 641100 H.I. ELEV
T.P. 0.60 527.46 7.65 526.86

+50 515.1 12.4 2.5 9.9

642+00 513.2 14.3 4.3 10.0

642+50¹ 511.3 16.2 5.7 10.5

642+97⁹ 509.6 17.9 7.5 10.4

643+45.7 506.1 21.4 11.3 10.1

T.P. 5.87 521.24 12.09 515.37

643+93⁴ 499.8 21.4 10.7 10.7

644+05⁷ 499.0 22.2 11.4 10.8

2-18-97
Cloudy-Cool

Nelson
Leonard
Barra 994
Grade

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	Grade	G.R.	Rod	CUT
	521.24			
644+30 ¹	499.0	22.2	9.9	12.3
644+42 ⁵	499.9	21.3	7.7	13.6
645+02 ³	508.1	13.1	2.8	10.3
T.P.	10.90	531.90	0.24	521.00
645+50	512.2	19.7	9.4	10.3
T.P.	7.20	536.17	2.93	528.97
CK B.M.		4.14	532.03	= 532.01
645+74	514.2		8.1	9.6
		2-18-97		
645+97 ²	516.1	17.4	7.9	9.5
646+22.0	517.7	15.8	6.3	9.5
+50	519.4	14.1	4.5	9.6
T.P.	2.85	533.48	12.22	530.63
+75	520.8	22.2	12.2	10.0
647+00	522.3	20.7	10.4	10.3
CK B.M.		10.84	532.18	= 532.01
647+25	523.8	19.2	8.4	10.8
647+75	527.8	15.2	4.5	10.7
T.P.	0.12	543.02	11.63	542.90
648+25	532.0	22.5	11.6	10.9

	Grade	G.R.	Rod	CUT
+75	537.0	17.5	6.3	11.2
649+00	539.8	14.7	3.6	11.1
+09.8	540.8	13.7	2.7	11.0
T.P.	0.45	554.53	12.99	554.08
+33.7	543.7	23.4	13.0	10.4
+57.5	547.0	20.1	9.1	11.0
+69.5	547.9	19.2	7.0	12.2
T.P.	1.00	567.07	12.76	566.07
650	548.0	30.8	12.8	18.0
+50	548.0	30.8	2.7	28.1
+83.7	548.0	30.8	2.9	28.4
651+00	548.0	30.8	4.7	26.1
T.P.	5.39	578.83	0.45	573.44
+25	548.0	25.9	3.9	22.0
651+51.6	548.0	25.9	8.3	17.6

T.P. 11.80 573.89

562.09

T.P	Grade	G.R.	Rod	Pow Pole cut
		4.54	562.09	Pow Pole
651+73.9	548.0	18.6	5.2	13.4
+85.9	547.4	19.2	7.4	11.8
652	545.8	20.8	9.9	10.9
+45.5	540.6	26.0	15.2	10.8
T.P	12.65	566.63	0.14	553.98
+50	540.3	13.8	3.0	10.8
653	537.2	16.9	6.1	10.8
+50	536.3	17.8	7.8	10.0
+75	535.9	18.2	8.2	10.0
654	535.9	18.2	8.2	10.0
+25	535.9	18.2	7.7	10.5
+50	536.0	18.1	7.4	10.7
655+00	536.1	18.0	5.8	12.2
	12.49	559.12		B.M 541.63
+50	536.3	17.7	4.0	13.7
656	536.4	17.6	3.1	14.5
+50	536.6	17.4	1.8	15.6
657	536.7	17.3	2.7	14.6
+50	536.9	17.1	3.5	13.6
658	537.0	17.0	4.9	12.1
+50	537.2	16.8	5.8	11.0
+75	537.25	16.75	6.1	10.7
659	537.3	16.7	6.5	10.2
+25	538.0	16.0	6.3	9.7
659+82	539.7	14.3	6.1	8.2
	11.48	553.99		B.M on dam 542.51

Grade	G.R.	Rod	cut
10.38	572.47		
651+51.6	548.0	24.5	9.8
651+25		24.5	6.7
651+00		24.5	5.4
+83.7		24.5	4.6
+50		24.5	5.0
650+00	548.0	24.5	9.8

659+50 538.8

2-19-47 clear-cool Grades Reset

T.P 562.09 79

6 Elev. Sta. of Brook Near R. Verview P. Plant
 BM 3.62 382.79 379.17
 — 946 373.33
 179+59.56 Top Pipe 932
 +6.75 = 366.72
 16.07 = 366.5
 Grade = 366.5
 Within 50% 0.22 High

Grade for Top of Blowoff Box East of Curve 22 at 46+
 Ground 9' uphill from Box 15
 " 26' N of Box 12.7
 Top Pipe 8.3 8.3
 Top Nat Slope Fig 4.5 2.5
 Top Box 2' above nat slope 2.5 5.58

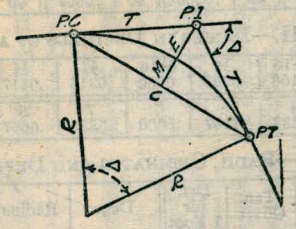
Grades for Drainage gutter at Lakewood

Sta	Grade	G. Rod	cut
0+00	377.0	5.9	5.0
0+18	376.9	6.0	5.4
0+48	376.75	6.19	5.26
0+62	376.66	6.28	5.23
1+03	376.5	6.44	4.84
1+14	376.2	6.74	5.58

9. 34 33' 306 1.5 45 Top Natural Ground I

DIETZGEN'S RAILROAD CURVE AND REDUCTION TABLES

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498.3
 479.3
 19.0
 448.3
 481.9
 83 162
 408 21.70
 476.3 76.9
 22.3 32
 9.0 79.1
 83 12.9
 2.5 15.6
 5.8

CURVE FORMULAS

- Radius— $R = \frac{50}{\sin \frac{D}{2}}$ (1) Degree of Curve— D and $\sin \frac{D}{2} = \frac{50}{R}$ (2)
- Tangent— $T = R \tan \frac{\Delta}{2}$ (3) Length of Curve— $L = 100 \frac{\Delta}{D}$ (4)
- Middle ordinate— $M = R(1 - \cos \frac{\Delta}{2})$ (5) $= R \text{vers} \frac{\Delta}{2}$ (6)
- External— $E = T \tan \frac{\Delta}{4}$ (7) $= R \div \cos \frac{\Delta}{2} - R$ (8) $= R \text{exsec} \frac{\Delta}{2}$ (9)
- Long Chord— $C = 2 R \sin \frac{\Delta}{2}$ (10) 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. $\Delta = 62^\circ 10'$ $D = 8^\circ 20'$. From Table IV for 1° curve $T = 3454.1$ and $\div 8\frac{1}{3} = 414.49$ ft. From Table V correction—.36 or $T = 414.85$ ft. P. C.—Sta. P. I.— $T = 157 + 45.50$. Also from (4) $L = 746.00$ and P. T.—Sta. P. C.— $L = 164 + 91.50$.

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

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

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

TABLE I.—MINUTES IN DECIMALS OF A DEGREE.

Table with 11 columns representing minutes from 1' to 11' and 10 rows representing decimal values from .0167 to 1.0000.

TABLE II.—INCHES IN DECIMALS OF A FOOT.

Table with 11 columns representing inches from 1 to 11 and 2 rows representing decimal values from .0052 to .9167.

TABLE III.—RADI, ORDINATES AND DEFLECTIONS.

Large table with 10 columns: Deg., Radius, Mid. Ord., Tan. Offset, Def. for 1 Foot, and corresponding values for degrees 0 to 30.

Note. Chord Deflection=2 times tangent deflection.

Handwritten notes: 4/10.22, 12.6, 488.9.6

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

Table with 9 columns: Central Angle, Tangent, External, and corresponding values for angles from 1° to 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	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32°	1643.0	230.9	42°	2199.4	407.6	52°	2794.5	645.2
10'	1652.0	233.4	10'	2209.0	411.1	10'	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33°	1697.2	246.1	43°	2257.0	428.5	53°	2856.7	672.7
10'	1706.3	248.7	10'	2266.6	432.0	10'	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34°	1751.7	261.8	44°	2314.9	450.0	54°	2919.4	700.9
10'	1760.8	264.5	10'	2324.6	453.6	10'	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35°	1806.6	278.1	45°	2373.3	472.1	55°	2982.7	729.9
10'	1815.7	280.8	10'	2383.1	475.8	10'	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.3	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	789.1
10'	1926.4	315.2	10'	2501.2	522.2	10'	3121.7	793.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	797.7
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	801.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	805.6
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	809.6
38°	1972.9	330.2	48°	2551.0	542.2	58°	3176.0	814.4
10'	1982.2	333.2	10'	2561.0	546.3	10'	3186.9	818.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	823.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	827.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	831.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	836.1
39°	2029.0	348.6	49°	2611.2	566.9	59°	3241.7	840.5
10'	2038.4	351.8	10'	2621.2	571.1	10'	3252.7	844.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	849.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	853.7
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	858.1
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	862.5
40°	2085.4	367.7	50°	2671.8	592.3	60°	3308.0	866.8
10'	2094.9	371.0	10'	2681.9	596.6	10'	3319.1	871.2
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	875.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	879.8
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	884.1
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	888.4

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	1591.0	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	1						

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	.15	.15	.12	.07	.41	8	199.51	298.05	395.14	490.31
20	.05	.10	.14	.17	.19	.20	.18	.15	.09	.51	9	199.38	297.54	393.86	487.75
22	.06	.12	.17	.21	.23	.24	.22	.18	.10	.62	10	199.24	296.96	392.42	484.90
24	.07	.14	.20	.25	.28	.28	.26	.21	.12	.74	12	198.90	295.63	389.12	478.34
26	.09	.17	.24	.29	.32	.33	.31	.25	.15	.86	14	198.51	294.06	385.22	470.65
28	.10	.19	.27	.34	.37	.38	.36	.29	.17	1.00	16	198.05	292.25	380.76	461.86
30	.11	.22	.31	.39	.43	.44	.41	.33	.19	1.15	18	197.54	290.21	375.74	452.02
32	.13	.25	.36	.44	.49	.50	.47	.38	.22	1.31	20	196.90	287.94	370.17	441.15
34	.15	.28	.40	.50	.55	.57	.53	.43	.25	1.48	22	196.32	285.44	364.06	429.30
36	.17	.32	.45	.56	.62	.64	.59	.48	.28	1.66	24	195.63	282.71	357.43	416.53
38	.18	.36	.51	.62	.70	.71	.66	.53	.31	1.80	26	194.87	279.76	350.80	402.89
40	.21	.40	.56	.69	.77	.79	.73	.59	.35	2.00	28	194.00	276.59	342.69	388.43
42	.23	.44	.62	.76	.85	.87	.81	.65	.38	2.23	30	193.13	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	1.20	.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

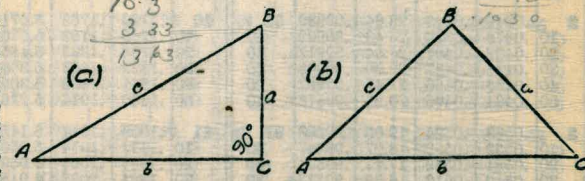
SLOPE REDUCTIONS.

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=15²÷2×250.3=.45 (by slide rule) or horizontal distance=250.3—.45=249.85. When vertical angle=V. A. is measured horizontal distance=slope distance—slope distance (1—Cos. V. A.). Thus for slope distance of 248.7 ft. and V. A. of 4° 20' from Table VIII Cos=.99714 and correction=1—.99714=.00286 per foot or total of .286×2½ (near enough)=.57 and horizontal distance=248.7—.57=248.13 ft.

See fig. (a).

TRIGONOMETRICAL FORMULAS.

sin. $A = \frac{a}{c}$
 cos. $A = \frac{b}{c}$
 tan. $A = \frac{a}{b}$
 cot. $A = \frac{b}{a}$
 sec. $A = \frac{c}{a}$
 cosec. $A = \frac{c}{b}$



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 $B = 90^\circ - A$, $b = a \cot. A$, $c = \frac{a}{\sin. A}$
 A, b B, a, c $B = 90^\circ - A$, $a = b \tan. A$, $c = \frac{b}{\cos. A}$
 A, c B, a, b $B = 90^\circ - A$, $a = c \sin. A$, $b = c \cos. A$
 Given Sought. Oblique triangles. See fig. (b).
 A, B, a b $b = \frac{a \sin. B}{\sin. A}$
 A, a, b B sin. $B = \frac{b \sin. A}{a}$
 a, b, C A — B tan. $\frac{1}{2}(A - B) = \frac{(a - b) \tan. \frac{1}{2}(A + B)}{a + b}$
 c, b, c A $\left\{ \begin{array}{l} \text{If } s = \frac{1}{2}(a + b + c), \sin. \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{bc}} \\ \cos. \frac{1}{2} A = \sqrt{\frac{s(s-a)}{bc}}, \tan. \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}} \\ \sin. A = \frac{2\sqrt{s(s-a)(s-b)(s-c)}}{bc} \end{array} \right.$
 A, B, C, a area area = $\frac{a^2 \sin. B \sin. C}{2 \sin. A}$
 A, b, c area area = $\frac{1}{2} bc \sin. A$
 a, b, c area $s = \frac{1}{2}(a + b + c)$, area = $\sqrt{s(s-a)(s-b)(s-c)}$

TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.	Angle	Sine.	Tan.	Cotg.	Cosin.
0	0	0	∞	1	90	1	∞	0	0
10	.0029	.0029	343.8	.99999	80	.9848	.1583	6.343	.1736
20	.0058	.0058	171.9	.99998	70	.9397	.3443	2.884	.3420
30	.0087	.0087	114.6	.99996	60	.8660	.5774	1.732	.5000
40	.0116	.0116	85.94	.99993	50	.7660	.9848	1.107	.6428
50	.0145	.0145	68.75	.99989	40	.6428	1.107	.9848	.7660
1	.0175	.0175	57.29	.99985	30	.5000	1.732	.5774	.8660
10	.0204	.0204	49.10	.99979	20	.3420	2.884	.3443	.9397
20	.0233	.0233	42.96	.99973	10	.1736	6.343	.1583	.9848
30	.0262	.0262	38.19	.99966	0	0	∞	0	1
40	.0291	.0291	34.37	.99958					
50	.0320	.0320	31.24	.99949					
2	.0349	.0349	28.64	.99939					
10	.0378	.0378	26.43	.99929					
20	.0407	.0407	24.54	.99917					
30	.0436	.0437	22.90	.99905					
40	.0465	.0466	21.47	.99892					
50	.0494	.0495	20.21	.99878					
3	.0523	.0524	19.08	.99863					
10	.0552	.0553	18.07	.99847					
20	.0581	.0582	17.17	.99831					
30	.0610	.0612	16.35	.99813					
40	.0640	.0641	15.60	.99795					
50	.0669	.0670	14.92	.99776					
4	.0698	.0699	14.30	.99756					
10	.0727	.0729	13.73	.99736					
20	.0756	.0758	13.20	.99714					
30	.0785	.0787	12.71	.99692					
40	.0814	.0816	12.25	.99668					
50	.0843	.0846	11.83	.99644					
5	.0872	.0875	11.43	.99619					
10	.0901	.0904	11.06	.99594					
20	.0929	.0934	10.71	.99567					
30	.0958	.0963	10.39	.99540					
40	.0987	.0992	10.08	.99511					
50	.1016	.1022	9.788	.99482					
6	.1045	.1051	9.514	.99452					
10	.1074	.1080	9.255	.99421					
20	.1103	.1110	9.010	.99390					
30	.1132	.1139	8.777	.99357					
40	.1161	.1169	8.556	.99324					
50	.1190	.1198	8.345	.99290					
7	.1219	.1228	8.144	.99255					
10	.1248	.1257	7.953	.99219					
20	.1276	.1287	7.770	.99182					
30	.1305	.1317	7.596	.99144					
40	.1334	.1346	7.429	.99106					
50	.1363	.1376	7.269	.99067					

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TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.	Angle	Sine.	Tan.	Cotg.	Cosin.
16	.2756	.2867	3.487	.96126	74	.9613	3.487	.2867	.2756
10	.2784	.2899	3.450	.96046	50	.7660	1.107	.9848	.6428
20	.2812	.2931	3.412	.95964	40	.6428	1.107	.9848	.7660
30	.2840	.2962	3.376	.95882	30	.5000	1.732	.5774	.8660
40	.2868	.2994	3.340	.95799	20	.3420	2.884	.3443	.9397
50	.2896	.3026	3.305	.95715	10	.1736	6.343	.1583	.9848
17	.2924	.3057	3.271	.95615	73	.9562	3.271	.3057	.2924
10	.2952	.3089	3.237	.95545	50	.7660	1.107	.9848	.6428
20	.2979	.3121	3.204	.95459	40	.6428	1.107	.9848	.7660
30	.3007	.3153	3.172	.95372	30	.5000	1.732	.5774	.8660
40	.3035	.3185	3.140	.95284	20	.3420	2.884	.3443	.9397
50	.3062	.3217	3.108	.95195	10	.1736	6.343	.1583	.9848
18	.3090	.3249	3.078	.95106	72	.9511	3.078	.3249	.3090
10	.3118	.3281	3.048	.95015	50	.7660	1.107	.9848	.6428
20	.3145	.3314	3.018	.94924	40	.6428	1.107	.9848	.7660
30	.3173	.3346	2.989	.94832	30	.5000	1.732	.5774	.8660
40	.3201	.3378	2.960	.94740	20	.3420	2.884	.3443	.9397
50	.3228	.3411	2.932	.94646	10	.1736	6.343	.1583	.9848
19	.3256	.3443	2.904	.94552	71	.9455	2.904	.3443	.3256
10	.3283	.3476	2.877	.94457	50	.7660	1.107	.9848	.6428
20	.3311	.3508	2.850	.94361	40	.6428	1.107	.9848	.7660
30	.3338	.3541	2.824	.94264	30	.5000	1.732	.5774	.8660
40	.3365	.3574	2.798	.94167	20	.3420	2.884	.3443	.9397
50	.3393	.3607	2.773	.94068	10	.1736	6.343	.1583	.9848
20	.3420	.3640	2.747	.93969	70	.9397	2.747	.3640	.3420
10	.3448	.3673	2.723	.93869	50	.7660	1.107	.9848	.6428
20	.3475	.3706	2.699	.93769	40	.6428	1.107	.9848	.7660
30	.3502	.3739	2.675	.93667	30	.5000	1.732	.5774	.8660
40	.3529	.3772	2.651	.93565	20	.3420	2.884	.3443	.9397
50	.3557	.3805	2.628	.93462	10	.1736	6.343	.1583	.9848
21	.3584	.3839	2.605	.93358	69	.9336	2.605	.3839	.3584
10	.3611	.3872	2.583	.93253	50	.7660	1.107	.9848	.6428
20	.3638	.3906	2.560	.93148	40	.6428	1.107	.9848	.7660
30	.3665	.3939	2.539	.93042	30	.5000	1.732	.5774	.8660
40	.3692	.3973	2.517	.92935	20	.3420	2.884	.3443	.9397
50	.3719	.4006	2.496	.92827	10	.1736	6.343	.1583	.9848
22	.3746	.4040	2.475	.92718	68	.9272	2.475	.4040	.3746
10	.3773	.4074	2.455	.92609	50	.7660	1.107	.9848	.6428
20	.3800	.4108	2.434	.92499	40	.6428	1.107	.9848	.7660
30	.3827	.4142	2.414	.92388	30	.5000	1.732	.5774	.8660
40	.3854	.4176	2.394	.92276	20	.3420	2.884	.3443	.9397
50	.3881	.4210	2.375	.92164	10	.1736	6.343	.1583	.9848
23	.3907	.4245	2.356	.92050	67	.9205	2.356	.4245	.3907
10	.3934	.4279	2.337	.91936	50	.7660	1.107	.9848	.6428
20	.3961	.4314	2.318	.91822	40	.6428	1.107	.9848	.7660
30	.3987	.4348	2.300	.91706	30	.5000	1.732	.5774	.8660
40	.4014	.4383	2.282	.91590	20	.3420	2.884	.3443	.9397
50	.4041	.4417	2.264	.91472	10	.1736	6.343	.1583	.9848

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TABLE VIII.—NATURAL TRIGONOMETRICAL FUNCTIONS.

Angle	Sine.	Tan.	Cotg.	Cosin.		Angle	Sine.	Tan.	Cotg.	Cosin.	
or						or					
32	.5209	.6249	1.600	.84805	58	30	.6225	.7954	1.257	.78261	
10	.5324	.6289	1.590	.84650	50	40	.6248	.8002	1.250	.78079	
20	.5348	.6330	1.580	.84495	40	50	.6271	.8050	1.242	.77897	
30	.5373	.6371	1.570	.84339	30	39	.6293	.8098	1.235	.77715	
40	.5398	.6412	1.560	.84182	20	10	.6316	.8146	1.228	.77531	
50	.5422	.6453	1.550	.84025	10	20	.6338	.8195	1.220	.77347	
33	.5446	.6494	1.540	.83867	57	30	.6361	.8243	1.213	.77162	
10	.5471	.6536	1.530	.83708	50	40	.6383	.8292	1.206	.76977	
20	.5495	.6577	1.520	.83549	40	50	.6406	.8342	1.199	.76791	
30	.5519	.6619	1.511	.83389	30	40	.6428	.8391	1.192	.76604	
40	.5544	.6661	1.501	.83228	20	10	.6450	.8441	1.185	.76417	
50	.5568	.6703	1.492	.83066	10	20	.6472	.8491	1.178	.76229	
34	.5592	.6745	1.483	.82904	56	30	.6494	.8541	1.171	.76041	
10	.5616	.6787	1.473	.82741	50	40	.6517	.8591	1.164	.75851	
20	.5640	.6830	1.464	.82577	40	50	.6539	.8642	1.157	.75661	
30	.5664	.6873	1.455	.82413	30	41	.6561	.8693	1.150	.75471	
40	.5688	.6916	1.446	.82248	20	10	.6583	.8744	1.144	.75280	
50	.5712	.6959	1.437	.82082	10	20	.6604	.8795	1.137	.75088	
35	.5736	.7002	1.428	.81915	55	30	.6626	.8847	1.130	.74896	
10	.5760	.7046	1.419	.81748	50	40	.6648	.8899	1.124	.74703	
20	.5783	.7089	1.411	.81580	40	50	.6670	.8952	1.117	.74509	
30	.5807	.7133	1.402	.81412	30	42	.6691	.9004	1.111	.74314	
40	.5831	.7177	1.393	.81242	20	10	.6713	.9057	1.104	.74120	
50	.5854	.7221	1.385	.81072	10	20	.6734	.9110	1.098	.73924	
36	.5878	.7265	1.376	.80902	54	30	.6756	.9163	1.091	.73728	
10	.5901	.7310	1.368	.80730	50	40	.6777	.9217	1.085	.73531	
20	.5925	.7355	1.360	.80558	40	50	.6799	.9271	1.079	.73333	
30	.5948	.7400	1.351	.80386	30	43	.6820	.9325	1.072	.73135	
40	.5972	.7445	1.343	.80212	20	10	.6841	.9380	1.066	.72937	
50	.5995	.7490	1.335	.80038	10	20	.6862	.9435	1.060	.72737	
37	.6018	.7536	1.327	.79864	53	30	.6884	.9490	1.054	.72537	
10	.6041	.7581	1.319	.79688	50	40	.6905	.9545	1.048	.72337	
20	.6065	.7627	1.311	.79512	40	50	.6926	.9601	1.042	.72136	
30	.6088	.7673	1.303	.79335	30	44	.6947	.9657	1.036	.71934	
40	.6111	.7720	1.295	.79158	20	10	.6967	.9713	1.030	.71732	
50	.6134	.7766	1.288	.78980	10	20	.6988	.9770	1.024	.71529	
38	.6157	.7813	1.280	.78801	52	30	.7009	.9827	1.018	.71325	
10	.6180	.7860	1.272	.78622	50	40	.7030	.9884	1.012	.71121	
20	.6202	.7907	1.265	.78442	40	50	.7050	.9942	1.006	.70916	
							.7071	1.	1.	.70711	
										45	
										or	
	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	.90	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 + .039 = 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 1/2 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.

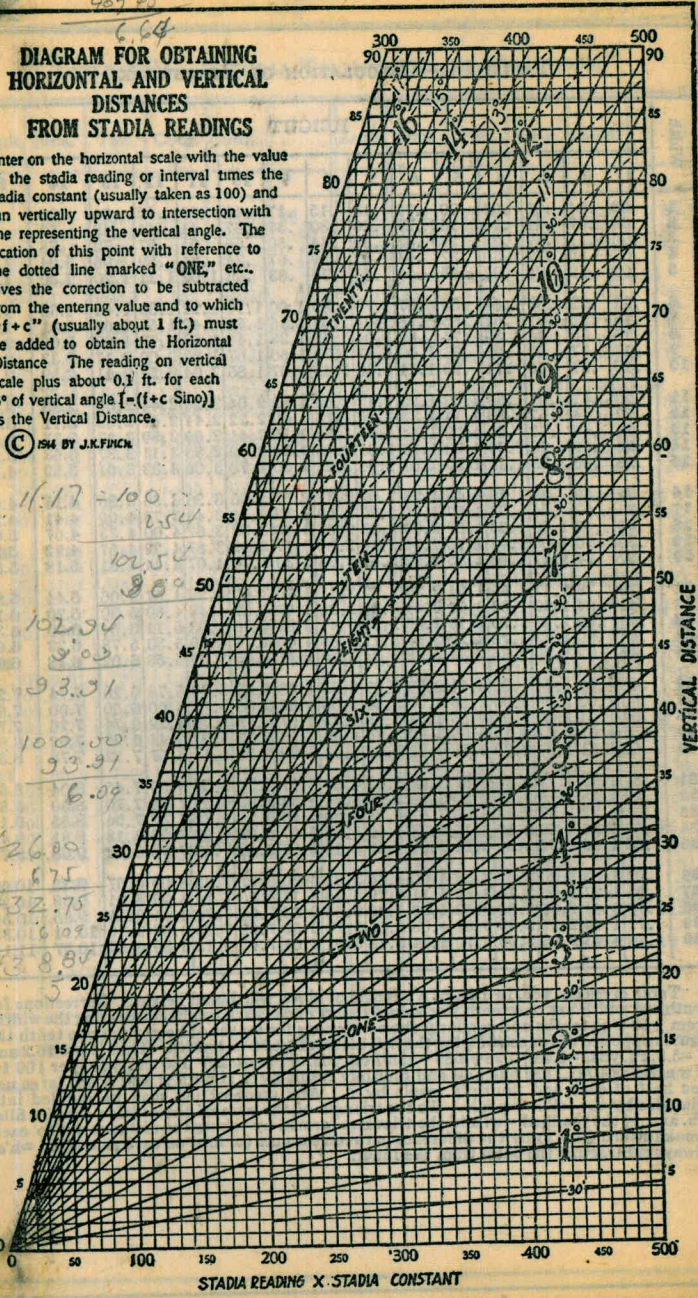
41419
407.45
4.1419

**DIAGRAM FOR OBTAINING
HORIZONTAL AND VERTICAL
DISTANCES
FROM STADIA READINGS**

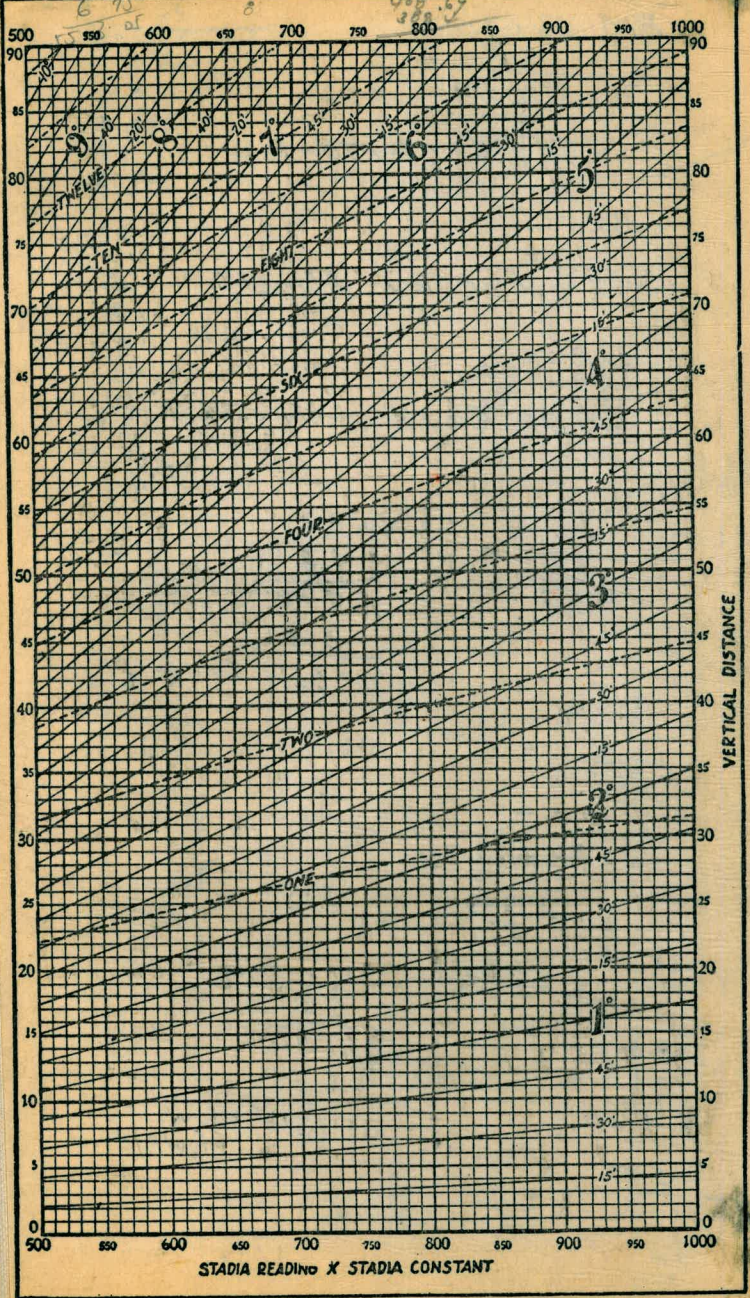
Enter on the horizontal scale with the value of the stadia reading or interval times the stadia constant (usually taken as 100) and run vertically upward to intersection with line representing the vertical angle. The location of this point with reference to the dotted line marked "ONE," etc., gives the 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 [$=(f+c \sin \alpha)$] is the Vertical Distance.

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11.17 = 100
254
102.54
30° 50
102.94
3.03
93.91
100.00
93.91
6.09
426.00
675
432.75
609
438.84
5
20



539.8 20.3 # 72.59 406.46 223 10.3 408.7



BM. 361.70
6.80 +
368.50

10.1
358.4 Elev TOP PIPE

368.50
11.1 -
357.4 Elev. Flow. Blowoff

368.50
8.8 -
359.70 Elev. Flow. line cut at 2nd case

539.8
671
533.11

9.5 +
5.8
+ 3.7

363.9
1.8 +
365.7
9.5
356.2 Top pipe

363.9
4.0 +
367.9
9.9 -
358.0 Flow cut

365.7
5.0
359.9 Ground
5.55
0.857
11.43

390.7
386
47
5.87

88.42
0.857
79.85

356.2
5.6
361.80
6.85
354.95 Flow
Blowoff

80 | 490
400
700
200

8 5.9
415
15
373.5
207.5
204.95

L1875593

32
216123.93
386
24
388.2
2.1
391.8

388.4
2.3
390.7
5.4
384
5.4
345.0
19.20

2.3
2.3

365+70 49.190 45.19
363+50. 97.55
2.20 78 47.45
2 | 156 366+19.32 7.64
498.3
8.35
490.0

220 370 398.2 498.3
6.1 388.2 481.8
363.9 10.0 165
382.4 498.3 570
481.1 565.50
17 4.50
1.26

0° 48.52 + 100 + 5.7
1° 25 9.5
2° 18 530.15 15.1
1.25
3° 38 530
1.25
5° 03 529+50 42
1.25
6° 28 529 384.15
1.25 4.20
7.53 526+5280.00
1.25
9° 28 528 371.5
1.25 8.2
10° 48 527+50 379.9
1.25 45.80
12° 06 527 361.5
57 10
13° 03 526+66 9.65
11. 113.5
1.35 9.65
1.70

365+70
364+50
1.20
366+19.32
43
377.4
375.60
2.00

49 | 365+70.22
120 1590
480
1150
1090
200

